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Credit Booms—Is China Different?

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Abstract

Strong Chinese output growth after the Global Financial Crisis was supported by booming credit. This credit boom carries risks. International experience suggests that China's credit growth is on a dangerous trajectory, with increasing risks of a disruptive adjustment and/or a marked growth slowdown. Several China-specific factors—high savings, current account surplus, small external debt, and various policy buffers—can help mitigate near-term risks of a disruptive adjustment and buy time to address risks. But, if the risks are left unaddressed, these mitigating factors will likely not eliminate the eventual adjustment, but make the boom larger and last longer. Hence, decisive policy action is needed to deflate the credit boom safely.

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I. INTRODUCTION

China's strong growth after the Global Financial Crisis (GFC) was supported by rapid credit growth. If additional credit had created a similar amount of value added as in the past, the credit-to-GDP ratio would have remained stable. However, the nonfinancial sector domestic credit-to-GDP ratio, which was stable at around 135 percent before the GFC, increased sharply over the last decade to about 235 percent in 2016. As a result, the credit gap—the deviation of credit-to-GDP ratio from its historical trend—is about 25 percent of GDP, well above the 10 percent threshold for the maximum countercyclical buffer as suggested by the BIS. Moreover, over the last five years, the efficiency of this credit expansion has deteriorated, pointing to growing resource misallocation.

Total domestic nonfinancial sector debt has risen
(In percent of GDP)

Sources: CEIC and IMF staff estimates.
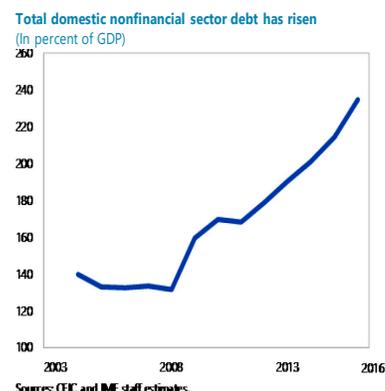
Rapidly rising debt and deteriorating credit efficiency raise concerns about financial stability and a disruptive adjustment. International experience suggests that such rapid credit growth is not sustainable and is typically associated with a financial crisis and/or a sharp growth slowdown. However, many believe China-specific factors set China apart from historical precedents. These factors include a lack of reliance on foreign financing, low government debt, and state control. Our analysis in this paper suggests that China's buffers are helpful in mitigating near-term risks. But, if the risks are left unaddressed, these mitigating factors will likely not eliminate the eventual adjustment, but make the boom larger and last longer. Hence, decisive policy action is needed to deflate the credit boom safely.

Our analysis relies on the rich literature on credit booms and busts. One strand of work notes the existence of a "credit" cycle, characterized by changes in credit aggregates and asset values; these cycles are often distinct from business cycles. In the post-WWII era, the upswings of these credit cycles have been characterized by complex forms of leverage (Schularick and Taylor, 2010). Leverage accelerates asset appreciations in an upturn and exacerbates depreciations in a downturn—with spillovers to the real economy (Geanakoplos, 2010). The interaction between credit and business cycles is summarized by Borio (2012), who defined financial cycles as the "self-reinforcing interactions between perceptions of value and risk, attitudes towards risk and financing constraints, which translate into booms followed by busts. These interactions can amplify economic fluctuations and possibly lead to serious financial distress and economic dislocations."

A related strand of work uncovered empirical evidence that movements in debt and asset ratios affect financial stability. Sharp increases in credit provision are seen as a key predictor of financial or banking crises (Friedman, 1986; Gourinchas and Obstfeld, 2012; Jorda et al., 2010; Chen and Svirydzenka, forthcoming). The aftermath of such sharp credit accumulation – credit busts – tends to be associated with depressed economic growth, sometimes for a prolonged period. Indeed, the accumulation of debt and subsequent retrenchment have played a role in lowering demand in the U.S., Europe, and elsewhere (Eggertson and Krugman, 2010; Philippon and Midrigan, 2011; Mian et al., 2011).

Still, there is no consensus regarding the debt threshold beyond which credit busts and compromised growth prospects become more likely. Estimates vary significantly across studies (Cecchetti et al., 2011; Kumar and Woo, 2010; Baum et al., 2013; Reinhart and Rogoff, 2010). Yet a number of studies raise concerns about China's credit boom. Cecchetti et at (2011) estimate the threshold for corporate debt at about 90 percent of GDP for OECD countries (China's corporate debt—excluding local government financing vehicles—was 135 percent of GDP in 2016). Dell'Ariccia et al. (2016) found that the longer and sharper the credit expansion, the greater the likelihood of a disruptive adjustment, such as a financial crisis, a severe growth contraction, or both. These studies suggest that China's credit boom—one of the largest and longest lasting globally—could have a substantial negative impact on growth and financial stability.

The paper is organized as follows. Following the discussion of recent China's credit developments in Section II, we analyze the drivers of this credit growth focusing on monetary policy and industrial structure in Section III. Section IV discusses several reasons why the current credit boom in China is worrisome. We discuss whether various China-specific factors can potentially prevent the current trajectory from leading to a disorderly adjustment in Section V. Policy recommendations to deflate the credit boom without precipitating a crisis are presented in Section VI. Section VII concludes.

II. CHINA'S CREDIT DEVELOPMENTS

Credit surged since the GFC. China's nonfinancial sector domestic credit-to-GDP ratio was stable at around 135 percent before the GFC. Large fiscal stimulus in response to the GFC pushed this ratio higher before it stabilized at about 170 percent in 2011. However, over the last five years, domestic nominal credit to the nonfinancial sector has more than doubled, and the domestic nonfinancial sector credit-to-GDP ratio rose to about 235 percent of GDP as of end-2016.[2] During this period, the efficiency of credit expansion has increasingly deteriorated, pointing to growing resource misallocation. In 2007-08, about RMB 6½ trillion of new credit was needed to raise nominal GDP by about RMB 5 trillion per year. In 2015-16, it took more than RMB 20 trillion in new credit for the same nominal GDP growth.

Credit Intensity: more credit is needed to create value added (in percent)

Change in credit (RMB tr.) (A)
Change in output (RMB tr.) (B)
Credit intensity (RHS) (=A/B)

Sources: CEIC and IMF staff estimates.
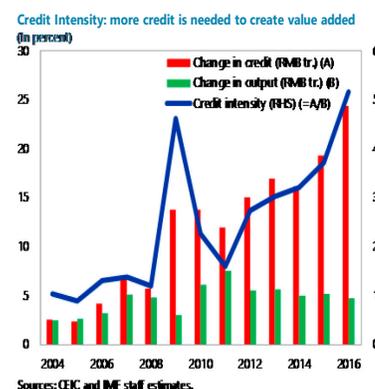
Some sectors, firms, and regions take more than their "fair" share and use credit relatively inefficiently. More credit has been allocated to service sectors in recent years and credit is now broadly evenly distributed between industrial and service sectors. But due to continued deterioration in credit efficiency in the industrial sector, this credit contributed only about one-fifth of GDP, while the more-efficient service sector contributed more than two thirds of GDP in 2016. State enterprises account for less than a half of total stock of credit in industrial sectors as of end-2016, down from about 60 percent before the GFC. However, these enterprises still account for about half

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[2] See Box 1 for more details on how to measure total domestic nonfinancial sector credit in China.

of new credit while their profitability is much lower and cumulative value added growth has been only about a half of that of private enterprises.

Credit Intensity for 2012-16: Credit is less efficiently used in industrial and construction sectors
(Ratio)
1/ Change in credit / Change in GDP.
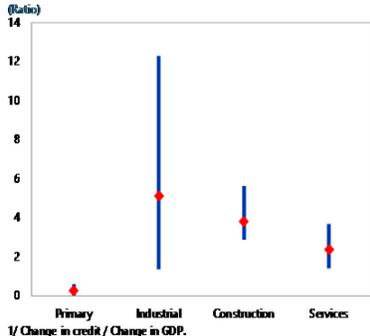
More new credit allocation to state owned enterprises in industrial sectors...
(RMB billions)
1/ Proxied by change in total liabilities.
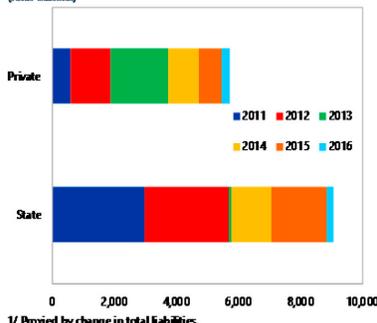
... but more value added by private sector.
(In percent of real term, year-on-year)
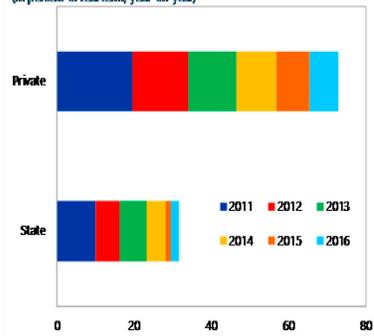
**Another indicator of deteriorating credit efficiency can be seen in provincial GDPs.** The contribution to national industrial output of five provinces located in the Northeast with heavy exposure to mining sectors has declined in recent years, but their relative shares of credit in industrial sectors remain broadly constant, implying that a significant amount of new credit is still flowing into these provinces, despite falling productivity. Hence, credit efficiency in these provinces deteriorated significantly, compared to the national average, and especially relative to those provinces with more focus on service sectors.

Credit Intensity: Less efficient use of credit in some provinces
(TSF flow / change in GDP)
1/ Heilungjin, Jilin, Liaoning, Inner Mongolia, and Shanxi.
2/ Top 10 provinces with the highest tertiary sector share in nominal GDP in 2011.
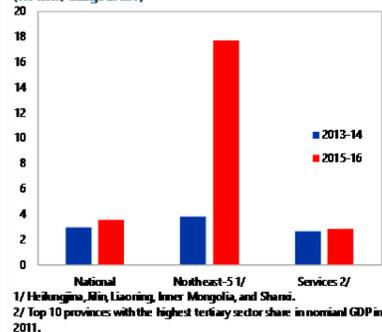
III. DRIVERS OF CHINA'S CREDIT GROWTH

To better assess the sustainability and potential risks from the credit boom, we analyzed determinants of private sector credit growth in China. We adopt a standard time-series model of private credit determinants with the following specifications; data are quarterly observations from 2008Q4 to 2016Q4:

$$Credit\ growth_t \\ = \beta_0 + \beta_1{\times}Deposit\ growth_t + \beta_2{\times}GDP\ growth_{t-1} \\ + \beta_3{\times}Growth\ forecast\ a\ year\ ahead_t \\ + \beta_4{\times}Change\ in\ benchmart\ deposit\ rate_{t-1} + \beta_5{\times}NPL\ ratio_{t-1} + \varepsilon_t$$

Growth rate of deposits captures the supply of loanable funds, lagged GDP growth measures the overall strength of the economy (lagged variable is used to avoid the problem of reverse causality), and the growth forecast a year ahead (proxied by consensus forecast) captures the demand outlook. The change in benchmark deposit rate is used as a proxy for the overall monetary policy stance (lagged variable is used to allow for the lag in monetary policy) and the NPL ratio is used to capture the health of the banking system.

Empirical results confirm that loose monetary policy is a key driver of rapid credit growth in recent years. As shown in Table 1, all variables except NPL ratio have the expected signs and are statistically significant when considered all together. In 2015-16, overall economic activity and growth outlook as well as deposit growth slowed compared to previous years, implying that credit growth should have slowed by about 3½ percentage points compared to 2013-14 period. However, actual credit growth slowed only by ¾ percentage points during this period as the monetary policy stance contributed to robust credit growth,

confirming that policy support was needed to provide more credit and support the economy to achieve the high growth target.
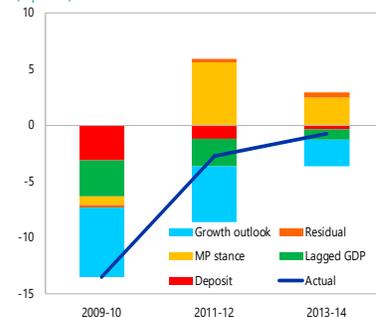
That said, benchmark interest rates are not the only monetary policy instrument in China. The People's Bank of China's (PBC's) policy tools fall broadly into three categories: (1) quantity-based instruments such as reserve requirements and M2 targets, (2) price-based instruments including lending rates, deposit rates and open-market operations, and (3) administrative window guidance. Therefore, the impact of rates on credit supplied is but one of the effects of monetary policy on credit provision. For example, empirical analysis found changes in reserve requirement ratios played an important role in bank lending, though its impact since 2010 has waned (Fungáčová et al., 2016; Chen, forthcoming). Meanwhile, many corporate borrowers, including state owned enterprises (SOEs) are relatively insensitive to changes in interest rates due to perceptions of implicit state guarantees and their relatively-large role in the manufacturing-based, overcapacity sectors with reduced credit efficiency. The use of quantitative credit targets and window guidance therefore remain important monetary policy instruments. This latter point raises a broader and crucial issue of the role of the economy's industrial structure in credit outstanding; we undertook a separate analysis accordingly below.

We find notable differences in credit growth and its efficiency across provinces which have different economic structures. To understand the potential impact of industrial structure on credit growth, we adopt a cross-provincial panel regression with the following specification for a period of 2008-2016, assuming that nation-wide macro, financial, and policy variables would have had the same effects across provinces.

$$Loan\ growth_{it}$$
$$= \beta_0 + \beta_1 \times Deposit\ growth_{it} + \beta_2 \times GDP\ growth_{it-1}$$
$$+ \beta_3 \times GDP\ per\ capita_{it-1} + \beta_4 \times \frac{FAI}{GDP} ratio_{it-1}$$
$$+ \beta_5 \times Infrastructure\ share\ in\ FAI_{it-1} + \varepsilon_{it}$$

The dependent variable is a deviation of provincial bank loan growth from the national growth rate. Explanatory variables are deposit growth, GDP growth, NPL ratio (capturing banking sector healthiness), GDP per capita (capturing convergence), fixed asset investment (FAI) scaled by overall GDP (capturing degree of reliance on traditional investment-led growth model), infrastructure FAI share in total FAI (capturing degree of reliance on infrastructure spending). All

variables are in the form of deviations from national values, and lagged variables are used (except deposit growth) to avoid the problem of reverse causality. We exclude Hainan and Tibet provinces as they are outliers with contribution to overall GDP growth of less than 0.3 percent.

Empirical results confirm that industrial structure matters for excessive credit growth. As shown in Table 2, higher deposit growth and GDP growth led to higher credit growth as expected. When these standard determinants of credit are controlled, we find that more credit has flown to those provinces relying more on FAI investment, especially infrastructure investment. For example, average bank loan growth of those five provinces with heavy exposure to mining sectors (Heilungjiang, Jilin, Liaoning, Shanxi, Inner Mongolia) was higher than national growth rate by about 3 percentage point in 2015 despite slower deposit growth and lower GDP growth. Instead their FAI/GDP ratio was higher by about 5 percentage points and infrastructure FAI/total FAI ratio was higher by about 2½ percentage points than the other provinces. That is, more credit was provided than implied by overall demand and deposit growth, suggesting that industrial structure, in particular the extent of reliance on FAI (esp. infrastructure) investment, led to higher credit growth.

More credit to provinces with more (infra) investm
(In percent, year-on-year)
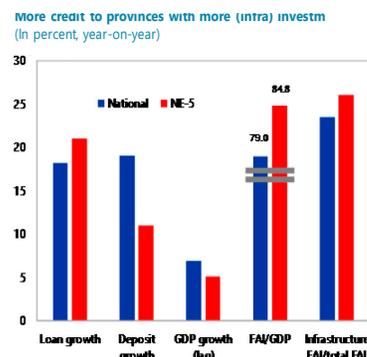
IV. WHY WORRY ABOUT CHINA'S CREDIT BOOM?

International experience suggests that China's current credit trajectory is dangerous with increasing risks of a disruptive adjustment and/or a marked growth slowdown. To find analogues for China, we identified 43 cases of credit booms in which the credit-to-GDP ratio increased by more than 30 percentage points over a 5-year period. Among these, only five ended without a major growth slowdown or a financial crisis in the immediate aftermath. However, once considering country-specific factors, these five countries provide little comfort.[3] In addition, all credit booms that began when the ratios were above 100 percent—as in China's case—ended badly.

Credit Booms Tend to End Badly
(In percentage points)

Sources: IMF International Financial Statistics and World Economic Outlook; IMF staff estimates.
1/ Average growth differential between 5-year post-boom and 5-year pre-boom periods.
2/ No growth change as China's boom has not ended.
3/ Banking crisis is identified following Laeven and Valencia (2012).
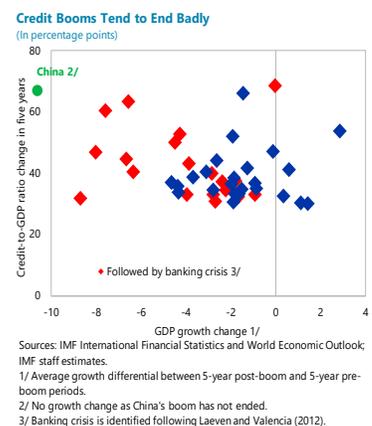
In addition to the large stock of existing debt, the length of China's current credit boom is the longest in our observation and ongoing. A disorderly correction from such an expansion could have far-reaching implications on financial stability and growth. To better understand the behavior of credit in China, we use a turning point algorithm as per Harding and Pagan (2002) on log-level of

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[3] Credit boom in New Zealand (1992) was due to a one-off credit expansion in 1988 from a low base. A boom in Hong Kong SAR (1983) should be seen in the context of its role as a global financial center. A boom in Finland (2003) was the result of economic recovery after large deleveraging in late 1990s. Credit booms in Indonesia (1990) and Switzerland (1985) eventually led to crises after futher credit expansion.

(continued…)

credit series, deflated by the GDP deflator, from BIS.[4] We interpolated quarterly data into monthly observations to ensure sufficient observations. The algorithm typically imposes conditions for cycle identification, including the minimum duration of a phase (at least 2 quarters for upturns or downturns), as well as the length of a cycle (at least 5 quarters for an up and down cycle). We relaxed these conditions to capture all the downturns in China. This cycle-dating exercise highlights two remarkable features: the extended duration of the current boom is without historical precedent and the corrections seen in previous downturns have been much more limited compared to international experience.[5]

- *Since the end of the most recent cycle in 2003, we have yet to see a downturn* (Table 3).[6] This means that the current expansion is 15 years and continuing. When a downturn does materialize, the duration of the current expansion would have far surpassed the median duration of credit booms observed elsewhere. The median duration of upswings was 7 to 12 quarters in a study of OECD countries by Claessens et. al. (2011) and about 3 years for a broader sample including emerging economies by Dell'Ariccia and others (2016).

- *Another notable feature of the China's credit booms is the limited corrections seen during downturns.* Historically, downturns tend to feature sharp declines in short periods. The amplitude of these downturns usually surpasses the size of credit buildup during the boom years. These corrections tend to be associated with growth contraction and financial crises—i.e. "credit gone bad." Claessens et. al. (2011) found that the median downturn lasts 4 to 18 quarters for OECD countries from 1960 to 2007, with associated declines in asset values of 3 to 28 percent. The average duration of credit downturns in China was 2 *months*, far shorter by comparison. The amplitude of downturns was equally limited—ranging from about 1 percent to 9 percent. This suggests that far from shedding excess credit, total credit in China has expanded nearly uninterrupted since the 1990s. Such expansion likely helped China avert painful growth contractions seen elsewhere in the aftermath of credit busts, but it has also allowed for underlying vulnerabilities to build further.

Sustainable growth, in the absence of excess credit, is estimated to be well below actual growth over the last five years, underscoring potential pressure on debt service capacity. If credit growth has been excessive over the last five years, what would have growth have been without excessive credit expansion? For illustrative purposes, we estimate growth under a scenario in which the nonfinancial *private* sector credit-to-GDP ratio had only increased by 10 percentage points over this period, compared to actual increase of more than 45 percentage points, leading to no private sector credit gap in 2016. We use two different approaches, both of which indicate growth would have been significantly lower were credit growth not excessive and other policies did not compensate[7].

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[4] BIS data is used given its longer history going back to 1996. Total social financing, a shorter data series, offers qualitatively similar results.
[5] Note that we analyzed the behavior of credit, independent of movements in GDP.
[6] Cycles are identified as trough-to-trough in the log level of credit series.
[7] For example, the growth subtracting effect of credit restraint could have been partly offset by pro-rebalancing, on-budget fiscal stimulus as well as by the productivity gains from more decisive structure reforms.

- The first approach calculates credit and GDP growth paths assuming that credit efficiency evolved in line with slower credit growth and thus deteriorated less relative to reality. The results indicate that average real GDP growth for 2012–16 would have been 5.3 percent rather than the actual average of 7.3 percent.

- The second approach uses estimated fiscal and credit multipliers based on provincial panel data during 2003–15 period (Chen et al. 2017). It finds that 2012-16 average real GDP growth would have been 5.9 percent.

Sustainable GDP growth is lower than actual growt
(In percent)

1/ Chen and Kang (2017).
2/ Chen, Ratnovksi and Tsai (2017).
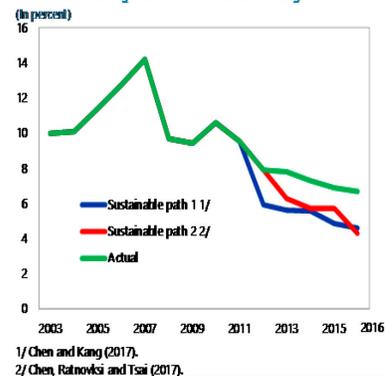
Thus, both approaches find that sustainable growth was likely much lower than actual growth over the last five years. These results highlight the crucial need to arrest the negative feedback loop between slower underlying growth, excessive credit provision, and worsening debt service capacity. We discuss policy options in Section VI.

The rapid increase and growing complexity in Chinese banks' balance sheets are another vulnerability. Chinese banks' balance sheets have expanded by more than 50 percentage points of GDP over the last three years. At 310 percent of GDP, which is above the advanced economy average and nearly three times the emerging market average, China now has one of the largest banking sectors in the world. The sharp growth in recent years reflects increases in credit to the real economy and financial firms. This asset expansion was funded by complex structures, extending beyond deposit funding to interbank markets and wealth management products (WMPs), and via interlinked networks of entities. The increase in size, complexity and interconnectedness of these exposures have resulted in sharply rising risks.

Banks' balance sheets have grown rapidly

Source: Haver Analytics.
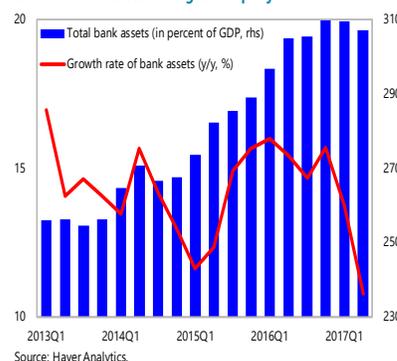
- *One particular risk is the sizable maturity mismatch between asset and liabilities.* Most banks remain net borrowers in the interbank market, with maturities still hovering near the short end. The maturities of their assets tend to be much longer, by comparison. Meanwhile, growing interlinkages suggest that a liquidity crunch could quickly spillover to the broader financial system. For instance, the WMP business invests more than half of its assets in the fixed income markets. Bond market losses suffered by WMPs could lead to bank balance sheet stress given the widespread perception of implicit guarantees of banks' sponsorship of WMPs. Moreover, if a disruption to financing flows were to occur, not only could the borrower face liquidation pressure, the loss could cascade down the intermediation ladder, reaching other financial products and institutions including the broader banking sector.

China: Gross total of reverse repo turnover by tenor
(RMB billions)

Source: PBoC; CEIC.
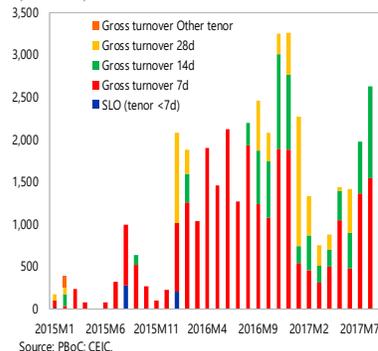
- *The Chinese authorities' efforts at deleveraging the financial system have produced notable progress in recent months.* For example, the net issuance of WMPs turned negative in the second quarter of 2017 while total usage of the interbank repo market has declined somewhat. Still, banks remain vulnerable to funding shocks. Their role as the primary nexus of credit intermediation in China suggests that any banking sector balance sheet stress can affect the broader economy and its growth outlook.

Net flows of repo and interbank borrowings by institution type
(RMB tn)

Sources: CEIC and IMF staff estimates.
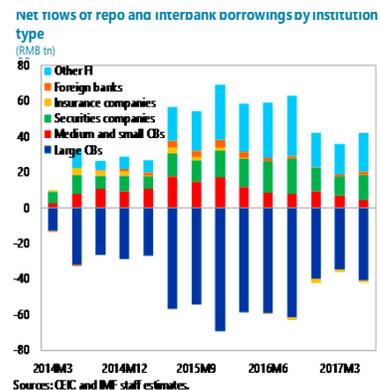
V. CAN CHINA-SPECIFIC FACTORS SAVE CHINA FROM A CREDIT BUST?

There are several China-specific factors that could mitigate risks in the near term. A current account surplus and small external debt reduce the possibility for a typical external funding crisis as in many other emerging economies. A low bank loan-to-deposit ratio could help prevent a domestic funding crisis as well. Despite the rapid increase in gross debt, corporate balance sheets have also benefitted from asset values that have increased more than liabilities. Policy buffers can also mitigate the impact of potential shocks: the government can use its fiscal resources to backstop the system, the PBC can provide liquidity, and capital controls can contain capital flight. In this section, we analyze each factor to better understand whether they can prevent a credit bust. We find that while these China-specific factors can help delay and mitigate the risk of a disruptive adjustment, they do not eliminate the need for eventual change. Indeed, these factors could just make the boom larger and longer, with higher probability of a more disruptive adjustment.

Strong external position. Persistent current account surpluses and low external debt could help avoid a typical external funding crisis triggered by a sudden stop of external capital flows as in many other EMs. However, countries have experienced credit booms that ended badly despite running current account surpluses and/or with little external debt, as funding crisis could still occur without foreign funding exposure. If financial institutions are expanding their balance sheets by relying on short-term funding amid ample liquidity, a funding squeeze could still materialize. The U.S. savings and loan crisis in the 1980s, Japan's banking crisis in 1997, and the U.S. and U.K. financial crises in 2008 are such examples that did not involve any large reversal of foreign funding.

Current account to GDP vs. External debt to GDP: booms can end badly even with low external fund

Sources: CEIC, IMF WEO database and IMF staff estimates.
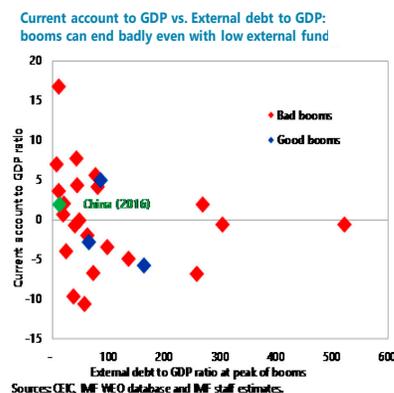
***High domestic savings and stable domestic deposit base.*** A low bank loan-to-deposit ratio (narrowly-defined, 72 percent in 2016) could help prevent a domestic funding crisis. As shown in Table 4, even the total nonfinancial domestic credit-to-total deposit ratio of 118 percent is well below other countries that experienced funding crises. However, loan-to-deposit ratios do not capture total assets and liabilities and many countries experienced crises despite stable deposit funding. These cases are usually associated with balance sheet expansion through non-loans and non-deposit funding. Many of these assets may be weakly regulated (and collateralized), while funding sources tend to include interbank exposure, which potentially increases systemic risk. In China, the ratio of non-loan assets to total assets is about 50 percent in 2016, higher than the median in the cross-country sample.

LTDR vs. Non-loan asset ratio: credit booms can e even with stable domestic deposit base

Sources: CBC, IMF WEO database and IMF staff estimates.
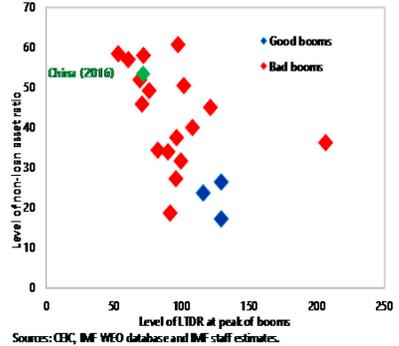
Strong asset side of balance sheets. Corporate balance sheets have benefitted from rising asset values, which have increased more than liabilities. As a result, leverage as measured by the debt-to-asset ratio, has been falling. However, asset valuations are highly procyclical could fall sharply were the boom to end (Adrian and Shin, 2012). There is also a mismatch in the structure of liabilities and assets. Corporates' liabilities are mostly financial liabilities, while a significant portion of assets are nonfinancial fixed assets (e.g. land), which may not be easily liquidated and are subject to sharp valuation changes. In addition, more vulnerable firms—for example, those with lower debt servicing capacity— tend to hold fewer liquid assets, suggesting such firms have lower buffers during times of stress. Firm-level data (WIND database; 5,428 firms) suggests that the asset side of leveraged firms would not provide much comfort because:

Short-term wholesale funding has risen (non-deposit funding with maturity < 1 year in percen asset)

Sources: CBC and IMF staff estimates.
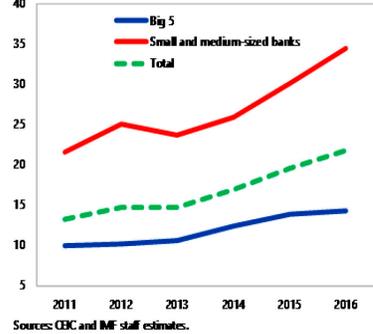
- more leveraged firms tend to have lower current ratios (liquidity);

- lower debt servicing capacity (i.e. interest coverage ratio) is associated with lower cash buffers (cash-to-current liabilities); and,

More leveraged firms tend to have lower liquidity (Current ratio vs. Debt-to-equity ratio (2015))

$y = -0.6972x + 3.6891$

Source: WIND; staff calculations.

- non-financial firms' exposure to financial assets is rising though still at very low level (about 3-4 percent of total assets on average), implying increased vulnerability to market shocks.
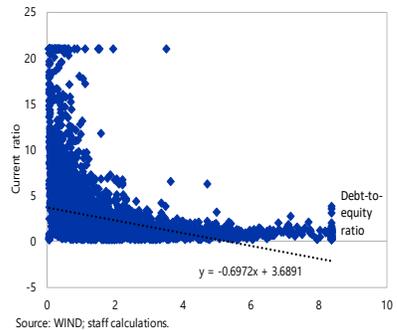
As a result, debt-to-GDP ratio better reflects the debt servicing capacity for the economy—if debt is rising but GDP is not, then the payment capacity is deteriorating. In this regard, asset valuations offer little comfort to the current level of leverage.

Ample fiscal space in a state-controlled economy. With official general government debt of less than 40 percent of GDP as of 2016, the government would seem to have fiscal space to backstop the banking system and the broader economy in the event of a credit contraction. However, fiscal space is likely more limited and is eroding with "augmented" debt projected to rise to more than 90 percent of GDP over the medium term, with debt on an unsustainable path.[8] Selling real assets or shares in SOEs is possible, but would require a major change in government policy.

Rising Public Debt In Baseline Due to Large Primary Deficit
(In percent of GDP)

— Augmented debt (current estimates) 1/
— Primary augmented deficit (rhs) 1/
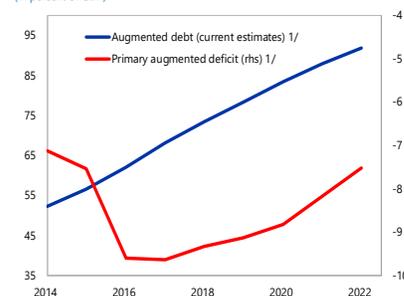
1/ Data through 2015, 2016 estimated, 2017 projection. Includes explicit, guaranteed and contingent liabilities.
Note: Calculations take into account non-debt creating financing from land sales.
Sources: CEIC Data Company Ltd.; and IMF staff estimates.

- History suggests that the cost of bailouts is likely to be larger than just the direct costs for the financial system. Indirect costs associated with slower GDP growth, lower tax revenue, higher government spending, higher interest payments, and contingent liabilities can add to the total costs bailouts. In cross-country studies, the average direct fiscal cost is estimated to be 5-10 percent of GDP (Laeven and Valencia, 2010) and indirect fiscal cost arising from the contingent liabilities realization is about 6 percent of GDP during 1990-2014 (Bova, et al., 2016). In line with these findings, Dell'Ariccia et al. (2012) found the average gross fiscal cost of systemic banking crises to be about 15 percent of GDP.

- The process of bailouts is not always smooth. The fiscalization option implicitly assumes a smooth and immediate move of bad assets onto the government's balance sheet. But in practice, debt distress could emerge in a disruptive and unpredictable manner, and coordination across different stakeholders would likely be challenging. Further, many of the impaired assets may be in a grey area—e.g. shadow credit products widely distributed among a range of private creditors—making state intervention difficult. Even if the government successfully used fiscal resources, it could deepen moral hazard and increase the potential cost of future bail outs.

Liquidity provision. The PBC can provide liquidity against funding stress. However, even quick action by central banks may not be sufficient (e.g. the U.S. in the GFC) given the size, complexity and interconnectedness of the system. China's financial system has become increasingly large, interlinked, and opaque. Many institutions and assets are outside the PBC's liquidity framework. So if funding stress were to occur (such as in small banks or non-banks), it is uncertain if such stress could be contained by the authorities. The bond market stress in December 2016 and money market squeeze in March 2017 served as a reminder that leverage is often built using informal markets with limited transparency, and credit risks of small institutions can lead to widespread counterparty risks and liquidity squeeze. Under such conditions, counterparty risks and broadening risk aversion can overwhelm all other considerations, with few banks, including the Big 4, willing to provide liquidity backstop. Even if the PBC can stabilize the financial markets in the near term, this would impart even more moral hazard, leading to an even larger problem in the future.

Relatively closed capital account and effective capital controls. Recent tightening of existing capital controls and the corresponding decline in capital outflows in 2017 prove that capital controls

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[8] IMF's augmented fiscal data expand the perimeter of government to include local government financing vehicles and other off-budget activity (IMF, 2017).

are still very effective. However, liquidity provision against funding stress could also lead to capital outflows and foreign exchange pressure. If the PBC were to flood the financial system with liquidity, this may well result in capital outflows given underlying concerns about asset quality. Stopping this would require either a large increase in interest rates or new and draconian capital controls, which would also likely spur a growth slowdown and possibly provoke further capital outflows. Moreover, international experience, including from China, suggests capital controls tend to lose effectiveness over time.

Strong growth and financial deepening. Rapid credit growth is a natural consequence of strong underlying growth and reflects financial deepening. However, the leverage ratio in China is significantly higher than in countries with similar levels of development. Indeed, over the five years during which credit grew rapidly, debt ratios have exceeded the level typical for developed economies. This indicates that credit growth has been far faster than a normal path of financial deepening. Sahay et al. (2015) find that China's rapid financial deepening has exceeded the turning point that maximizes the positive effect on growth. Moreover, the efficiency of investment and credit has been falling sharply in China as discussed above, and financial performance of corporates (profitability, leverage, debt servicing capacity), in particular of SOEs, has deteriorated. Despite recent improvements in corporate profits, the estimated potential debt-at-risk remains high.[9]

Corporate Credit: High vs. Peers
(Selected economies, 2014)
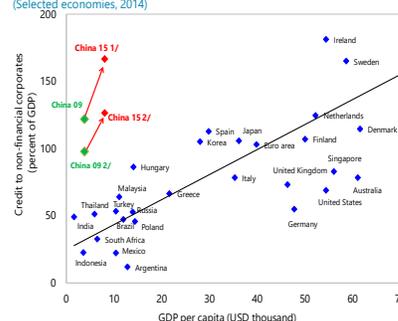
Sources: Bank for International Settlments (BIS); and IMF staff estimates.
1/ Calculated as total social financing minus equity and household loans.
2/ Calculated as total social financing minus equity, LGFV borrowing and household loans.

VI.   HOW TO DEFLATE CREDIT BOOM WITHOUT PRECIPITATING A CRISIS?

What should policymakers do to avoid a disruptive adjustment? We consider an illustrative proactive scenario under which faster progress on structural reform (especially SOE reform) and improving overall efficiency in resource allocation would allow credit growth to slow gradually, while supporting medium-term growth prospects. Near-term growth could dip reflecting the faster credit adjustment, but medium-term growth would rise driven by higher TFP growth (Lam et al., 2017). Improved credit efficiency would help raise GDP growth even with slower credit growth over the medium term, which would stabilize the ratio of total domestic nonfinancial sector credit-to-GDP at about 270 percent in 2022, about 20 percentage points lower than in the baseline presented in the latest IMF staff report on China (2017).

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[9] An estimate for Chinese banks' debt at risk—defined as borrowing by companies unable to generate sufficient earnings to cover debt interest payments—declined from about 15 percent of total loans at its peak in 2015 (IMF, 2016) to about 7 percent in 2017Q3, but it remains substantially higher than official estimates of NPLs and Special Mention Loans.

Private credit growth (In percent)	Real GDP growth (In percent)	Total domestic nonfinancial sector debt (In percent of GDP)

Sources: CEIC and IMF staff estimates.

Sources: CEIC and IMF staff estimates.

Sources: CEIC and IMF staff estimates.
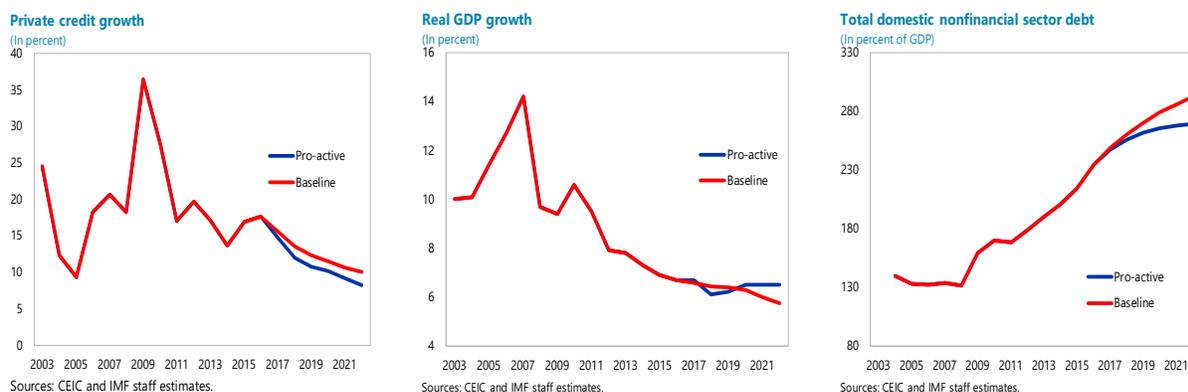
Decisive policy action is thus needed to deflate the credit boom safely. A precondition is to deemphasize high and hard GDP targets and the attendant excessive credit necessary to achieve these targets. To support growth while credit expansion slows, a comprehensive strategy is needed to increase credit efficiency by reducing demand for the least productive uses (as discussed in Section III). Financial reforms are also necessary to bolster the regulatory and supervisory framework, including closing loopholes for regulatory arbitrage, reining in leverage and increasing transparency of nonbank financial institutions and wealth management products.

- *Measures on the demand for credit side* include (i) let zombies exit, continue to reduce overcapacity, and reform SOEs by hardening budget constraints, (ii) open up SOE-dominated sectors, especially services sectors (likely to be more productive sectors and firms to which credit can be more effectively channeled), and (iii) implement macro-prudential measures more effectively.

- *Measures on the supply of credit side* include (i) eliminate implicit government guarantees carefully; (ii) tighten macro prudential measures, and (iii) conduct focused asset quality reviews with corresponding loss recognition and capital backstop.

- *Measures on the financial side* include (i) a strong supervisory focus on the adequacy of liquidity risk management and collateral standards in wholesale funding markets, (ii) a holistic approach to shadow banking supervision to contain the proliferation of shadow credit products, (iii) an upgrade in supervisory cooperation and coordination, (iv) develop resolution and crisis management frameworks to address defaults/mini-crises of nonbank financial institutions without large liquidity showers.

- *Bankruptcy framework*: International experience suggests that a robust bankruptcy system in which both creditors and borrowers can reach loss-sharing agreements efficiently can mitigate the negative macro impact from deleveraging. The ability to proceed with bankruptcy proceedings judiciously and efficiently has also proven crucial in allowing private entities to start anew—a vital component to help economies rebound from post debt overhang slumps.[10]

- *Macroprudential policies* should be the main instrument in preventing financial instability, rather than monetary policy. Macroprudential policies, when well designed and enforced, can

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[10] For more details, please also see Maliszewski et al. (2016).

target imbalances and market imperfections much closer to their source than monetary policy, and with less output loss. Also, they would allow monetary policy to focus on its price stability mandate.[11]

VII. Conclusions

China's credit boom is one of the largest and longest in history. Historical precedents of "safe" credit booms of such magnitude and speed are few and far from comforting. Moreover, history suggests that China's debt overhang, if left unaddressed, could post risks to its financial stability and growth. Credit deterioration in recent years suggest its leverage expansion is increasingly unsustainable. China-specific factors—high savings, current account surplus, small external debt, and various policy buffers—can help mitigate near-term risks of a disruptive adjustment and buy time to address risks. But, if left unaddressed, these factors will likely not eliminate the eventual adjustment, but make the boom larger and last longer.

Decisive policy action is needed to arrest the negative feedback loop between slowing growth, excessive credit provision, and worsening debt service capacity. A precondition is to deemphasize high and hard GDP targets and the attendant excessive credit necessary to achieve these targets. A comprehensive strategy is needed to increase credit efficiency by reducing demand for the least productive uses. Financial reforms are also necessary to bolster the regulatory and supervisory framework, including closing loopholes for regulatory arbitrage, reining in leverage and increasing transparency of the financial sector. With China's rising economic footprint and its growing influence on global financial markets, its ability to deflate the credit boom safely matters not only for China, but for the global economy. The current period of stable financial markets and robust growth offers a unique opportunity for tackling these issues.

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[11] For more details, see IMF Policy Paper at http://www.imf.org/~/media/Websites/IMF/imported-full-text-pdf/external/np/pp/eng/2015/_082815a.ashx.

Box 1. Measuring credit: How large is China's nonfinancial sector credit?

- The narrowest measure is banks' claims on the private nonfinancial sector, which stood at about 155 percent of GDP as of 2016.

- Total social financing (TSF) statistics capture not only conventional bank loan channels but financing through off-balance items of financial institutions—trust loans, entrusted loans, and undiscounted bankers' acceptances—and corporate bond issuance. As of end-2016, TSF stock was about 209 percent of GDP, of which households accounted for about 44 percent. Separately, official general government debt is about 37 percent of GDP.

- Total domestic nonfinancial sector credit is estimated to be about 235 percent of GDP, smaller than the sum of above TSF and general government debt. It is because former credit to local government financing vehicles (LGFVs) which was explicitly recognized as local government debt (about 17 percent of GDP) is captured both in TSF and general government debt statistics, while social capital portion of government guided funds and special construction funds (about 4 percent of GDP) is not captured in either.

- The treatment of LGFV debt that has not been explicitly recognized as government debt straddles the border line between public and private debt. From a legal perspective, the authorities' definition of general government debt (37 percent of GDP), which includes only former LGFV borrowings that were explicitly recognized as LG debt, is public debt and the remaining is private debt (198 percent). But assuming that the non-recognized LGFV debt resulting from public policy and social capital portion of government guided funds and special construction funds are contingent government liabilities, "augmented" debt is then total public debt (62 percent of GDP as of 2016) and the remaining nonfinancial sector debt is private debt (173 percent).

- Table 5 summarizes the IMF's estimate of China's nonfinancial sector credit.

Table 1. Determinants of Private Sector Credit Growth

Period: 2008Q4 - 2016Q4

Dependent variable: Private sector credit growth

	(1)	(2)	(3)	(4)
Deposit growth	0.56 ***	0.25 ***	0.14	0.06
GDP growth (lag)	1.95 ***	1.18 ***	0.97 **	
GDP growth forecast		2.49 ***	3.24 ***	1.71 ***
Change in deposit rate (lag)	-3.59 ***	-4.33 **	-4.54 ***	-4.49 ***
NPL ratio (lag)			0.54	
Constant	-0.06 ***	-0.14 ***	-0.18 ***	-1.88 ***
Adjusted R-squared	0.92	0.94	0.94	0.91

*, **, *** indicate statistically significant coefficients with 10%, 5%, and 1% confidence levels, respectively.

Table 2. Determinants of Bank Loan Growth

Period: 2008 - 2016

Dependent variables: Loan growth

	(1)	(2)	(3)	(4)	(5)
Deposit growth	0.39 ***	0.37 ***	0.39 ***	0.41	0.40 ***
GDP growth (lag)	0.41 ***	0.39 ***	0.31 **	0.28 **	0.27 **
GDP per capita (lag)		-0.01 **	-0.01		
FAI / GDP (lag)			0.04 *	0.05 ***	0.04 ***
Infrastructure FAI / Total FAI					0.09 **
Constant	0.17	0.36	0.35	0.29	0.08
Observation	260	260	260	260	260
Adjusted R-squared	0.52	0.56	0.60	0.61	0.72

*, **, *** indicate statistically significant coefficients with 10%, 5%, and 1% confidence levels, respectively.

Table 3. Cycle Dates for Total Nonfinancial Sector Credit

Trough date 1	Trough date 2	Peak date btwn troughs	Cycle Duration (months)	Upturn Duration (months)	Downturn Duration (months)	Trough-to-peak amplitude (%)	Peak-to-trough amplitude (%)
9/1996	2/1998	12/1997	17	15	2	30.0	-1.4
2/1998	2/2000	12/1999	24	22	2	35.3	-1.4
2/2000	3/2001	12/2000	13	10	3	12.4	-6.6
3/2001	11/2003	9/2003	32	30	2	64.4	-9.4
Average			*22*	*19*	*2*	*35.5*	*-4.7*

Source: BIS, Staff estimates

Notes: 1/ Upturns are defined as trough to peak; downturns are peak to trough; 2/ Amplitude measures the change in log-level from a trough to peak (upturn) or peak to trough (downturn).

Table 4. Breakdown of Non-financial Sector Debt in China

In percent of GDP	2008	2009	2010	2011	2012	2013	2014	2015	2016
Total deposit	139	163	166	165	170	176	182	191	200
Total credit to nonfinancial sectors	131	160	170	168	179	190	201	214	234
Augmented public sector (GG + LGFVs + Gov funds)	38	43	42	43	44	48	52	57	62
of which General Government a la IMF def.	27	34	34	34	34	37	40	43	44
Private sector	93	117	127	125	135	142	148	158	172
SOEs	40	46	54	53	57	60	61	66	74
Non-SOE corporates	35	46	46	44	48	49	52	53	54
Households	18	24	27	28	30	33	35	38	44
In percent of total deposit									
Total deposit	100	100	100	100	100	100	100	100	100
Total credit to nonfinancial sectors	95	98	102	102	105	108	111	112	118
Augmented public sector (GG + LGFVs + Gov funds)	28	26	25	26	26	27	29	30	31
of which General Government a la IMF def.	19	21	20	20	20	21	22	22	22
Private sector	67	72	77	76	79	81	82	82	86
SOEs	29	29	32	32	33	34	34	35	37
Non-SOE corporates	25	29	28	27	28	28	29	28	27
Households	13	15	16	17	17	19	20	20	22

Table 5. Non-financial Sector Debt

	(In RMB trillion)			(In percent of GDP)			Coverage		
	2014	2015	2016	2014	2015	2016			
Total	134	155	180	207	222	242			
Central government	9.6	10.7	12.0	15	15	16	MOF GG Debt		
Local government								Staff GG Debt	Augmented Debt
Regular financing	1.2	1.6	2.6	2	2	3			
Former LGFV debt 1/	14.2	13.2	12.8	22	19	17			
Local government financing vehicles (LGFV)									
"Likely" to be recognized									
As per the 2014 audit	1	1	1	1	1	1			
New borrowing in 2015-16 (staff estimate) 2/ 3/	0	2	4.9	0	3	7			
"Unlikely" to be recognized									
As per the 2014 audit	8	8	8	12	11	10			
New borrowing in 2015-16 (staff estimate) 2/ 3/	0	1	2.5	0	2	3			
Government funds 4/	0	2	3	0	3	4			
Households	23	27	33	35	38	44			
Corporates (excluding LGFV)									Private Sector Debt
Domestic	73	85	97	113	121	129			
External	4	4	4	6	6	6			
Memo items:									
Corporates (including LGFVs)	86	101	117	133	145	157			
of which LGFVs	9	12	16	13	17	22			
Households	23	27	33	35	38	44			
General government (MOF definition)	25	25	27	39	36	37			
Government funds 4/	0	2	3	0	3	4			
Nominal GDP	65	70	75						

Sources: CEIC Data Co., Ltd.; Ministry of Finance; and IMF staff estimates.

1/ LGFV debt recognized as LG debt as of 2014 (by the 2014 audit).

2/ New LGFV borrowing estimate for 2015-16 is based on infrastructure fixed asset investment data.

3/ Relative share of "likely to be recognized" new LGFV borrowing is based on the historical recognition ratio.

4/ Government guided funds (GGF) and special construction funds (SCF). Social capital portion only.

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