WP/19/258

IMF Working Paper

Assessing Macro-Financial Risks of Household Debt in China

by Fei Han, Emilia Jurzyk, Wei Guo, Yun He, and Nadia Rendak

INTERNATIONAL MONETARY FUND

 WP/19/258

IMF Working Paper

Asia and Pacific Department

Assessing Macro-Financial Risks of Household Debt in China

Prepared by Fei Han, Emilia Jurzyk, Wei Guo, Yun He, and Nadia Rendak[1]

Authorized for distribution by Helge Berger

November 2019

Abstract

High household indebtedness could constrain future consumption growth and increase financial stability risks. This paper uses household survey data to analyze both macroeconomic and finanical stability risks from the rapidly rising household debt in China. We find that rising household indebtedness could boost consumption in the short term, while reducing it in the medium-to-long term. By stress testing households' debt repayment capacity, we find that low-income households are most vulnerable to adverse income shocks which could lead to signficant defaults. Containing these risks would call for a strengthening of systemic risk assessment and macroprudential policies of the household sector. Other policies include improving the credit registry system and establishing a well-functioning personal insolvency framework.

JEL Classification Numbers: D10, D14, E21, G21

Keywords: Household indebtedness, macro-financial risks, houshold survey

Author's E-Mail Address: fhan@imf.org; ejurzyk@imf.org; wguo@imf.org; yhe2@imf.org; nrendak@imf.org

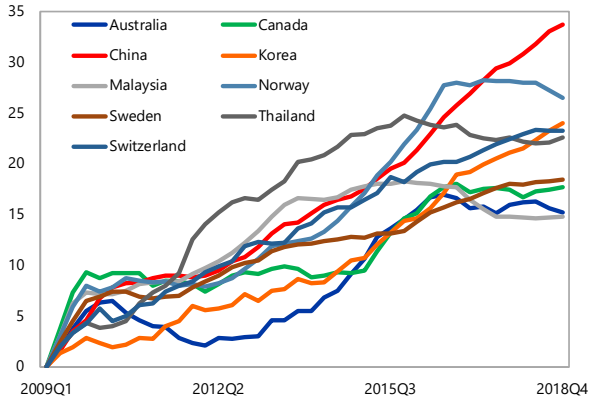
[1] The authors would like to thank Helge Berger, James A. Daniel, Alan X. Feng, Jose Garrido, Kenneth H. Kang, Joong Shik Kang, Yan Liu, Nico Valckx, Peichu Xie (all IMF), Mengmeng Miao, Liyang Tang, Xiandong Yan (all People's Bank of China), and other seminar participants at the People's Bank of China for their valuable suggestions and comments. All errors are our own.

Contents

I. INTRODUCTION

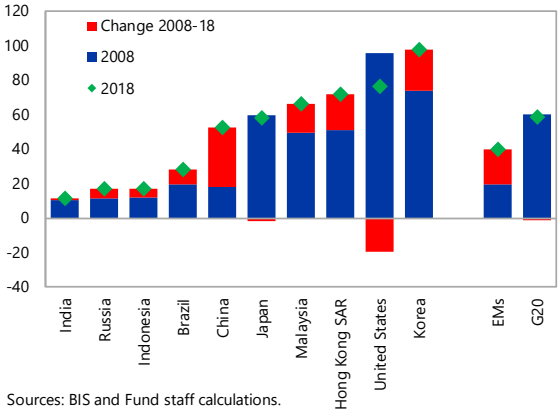
Household debt has been rising rapidly in China since the global financial crisis. As of end 2018, total debt of Chinese households stood at 52.6 percent of GDP, above the emerging market average, and 32 percentage points of GDP higher than in 2008. Part of that buildup can be attributed to rapid financial market development in China and improving financial inclusion, which, combined with rising incomes, increased availability of credit to households. However, the speed with which households accumulated leverage was the highest among all BIS-reporting countries since the Global Financial Crisis (GFC), raising concerns whether further debt increases could adversely affect growth and financial stability (IMF, 2017a).

China's household debt-to-GDP ratio increased rapidly since GFC
(Change since 2009 Q1, in percentage points)



Sources: BIS and Fund staff calculations.

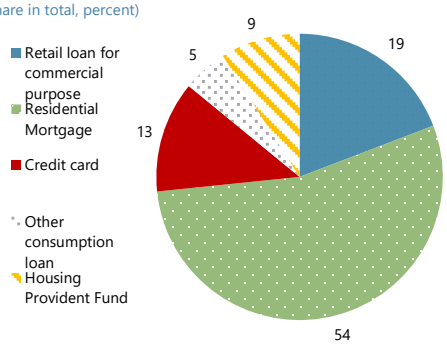
China's household debt-to-GDP ratio exceeded EM average
(In percent)



Sources: BIS and Fund staff calculations.

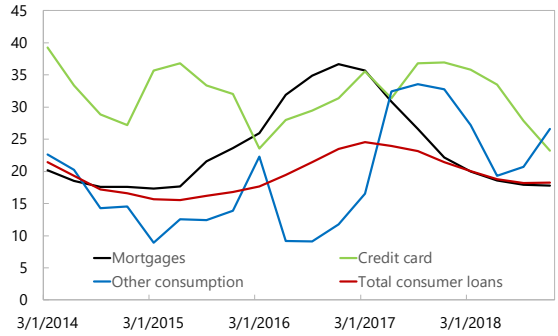
The rapid increase in household debt was mostly due to rising mortgage lending. At the end of 2018, housing-related debt (mortgage loans and Housing Provident Fund lending) accounted just below two-thirds of all household debt, a 7-percentage point (ppt) increase since 2013, while the remainder was almost evenly split between consumption loans (including credit card debt) and loans extended to households for business purposes (mostly SMEs). Most mortgages are extended on fixed-term rates, with maturity of about 10-20 years, and a minimum down payment of 20 (30) percent for the first (second) home that can be adjusted upwards by regional authorities. Mortgage rates are usually set at a discount/premium of 0-15 percent below/above the central banks' benchmark lending rate, with the adjustment depending on market conditions (Ding *et al*., 2017).

Composition of Household Debt, Q4 2018
(Share in total, percent)



Sources: CEIC; and HPF data for 2017.

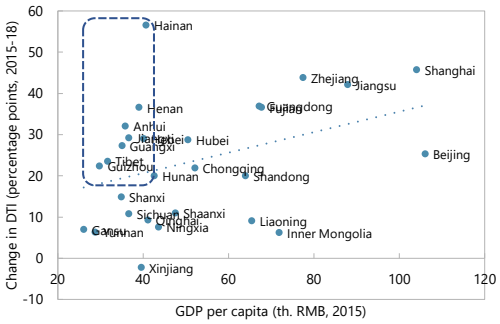
Growth Rates of Consumer Loans by Type
(Percent, y/y)



Sources: Haver Analytics; CEIC; and Fund staff calculations.

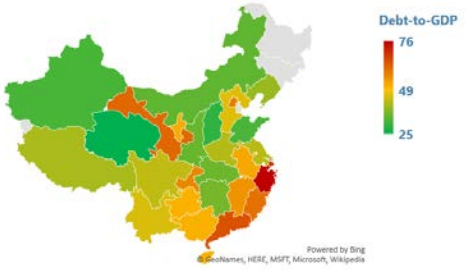
Household indebteness varies significantly across regions. Households in the richest, coastal provinces are the most indebted. In some provinces, debt has already risen above 60 percent of GDP—a threshold above which futher increases in debt can adversely impact consumption growth (Lombardi *et al*., 2017). In addition, debt-to-income (DTI) ratios increased significantly in some of the poorer provinces.

Change in Household Indebtedness v.s. GDP Per Capita



Sources: WIND; and Fund staff calculations.

Mainland China: Household Debt-to-GDP 1/
(In percent; end-2018)



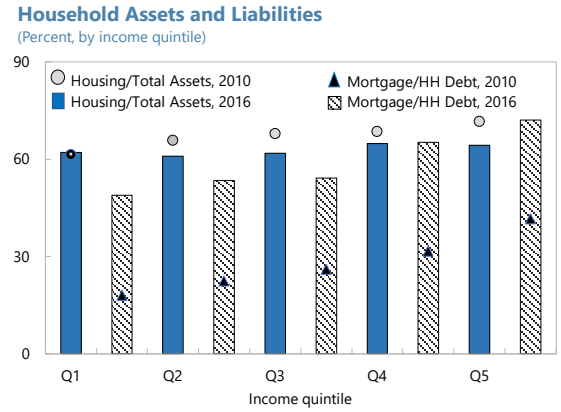
Sources: WIND; and Fund staff calculations.
1/ Data for Heilongjiang, Jilin, and Tianjin in Mainland China are not available. Hong Kong SAR, Macau SAR, and Taiwan Province of China are not included in the map.

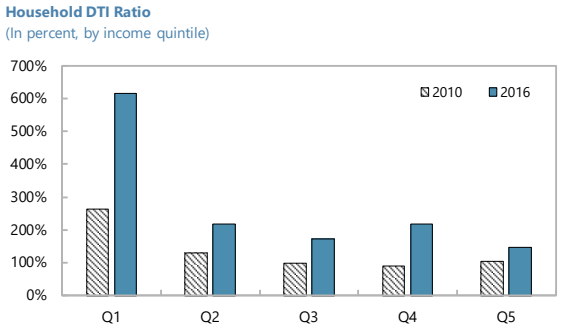
Household indebtedness also varies significantly across income groups as debt has become more "risky". Household survey data indicate that housing-related assets and debt are the main components of household balance sheets (Figure 1).[2] On average, housing assets constitute around 60 percent of all household assets, though this ratio declined over time for richer households as new investment opportunities became available. At the same time, as availability of credit for house purchases grew, mortgage debt became the main household liability. The riskiness of household debt increased as well: between 2010 and 2016, the share of debt held by highly indebted households—with debt-to-income (DTI) ratio above 4—increased from around a quarter to almost half. While most of that debt is held by richer households, the increase in DTI ratio among the lower income households was quite substantial as well, reaching almost 6. Nevertheless, the mortgage participation rate, which

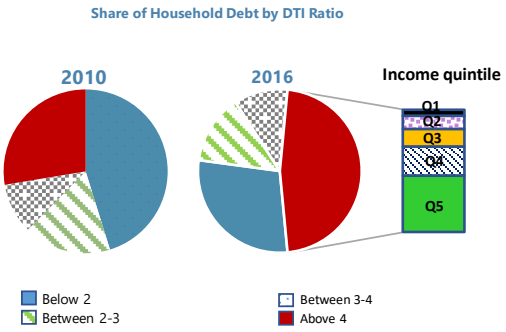
[2] The China Family Panel Studies (CFPS) (ISSS, 2015) provide a household survey database with detailed debt and asset information of surveyed households every two years during 2010-16.

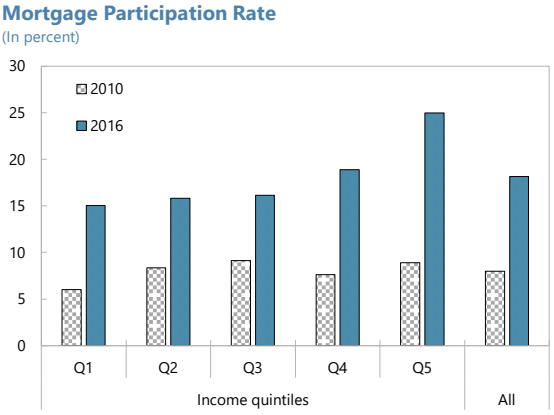
increased from 8 to 18 percent between in 2010 and 2016, is still relatively low and serves as a mitigating factor.

Figure 1. Household Assets, Liabilities, and Debt Burden









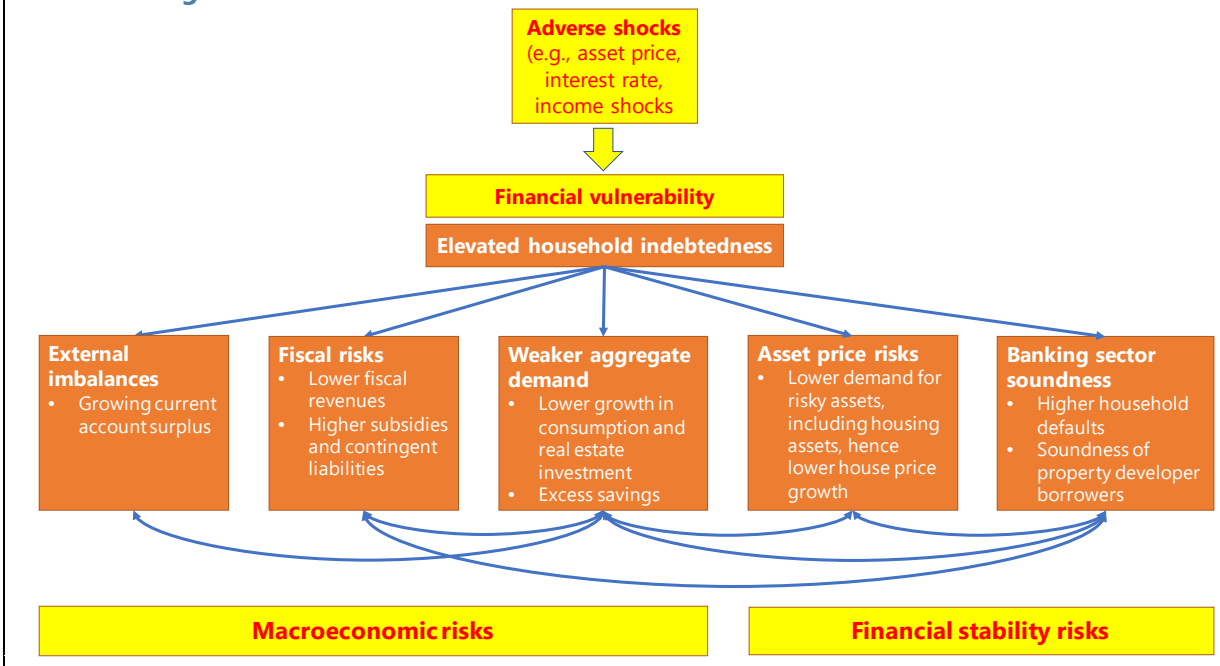
Sources: CFPS surveys 2010-16; and Fund staff calculations.

This paper analyzes both macroeconomic and financial stability risks from high and rapidly rising household debt in China. Given the importance of sustainable consumption growth in China's rebalancing process, the analysis focuses on the impact of higher household indebtedness on consumption growth in China. We find that an increase in household indebtedness could boost consumption in the short term (or the same period) but reduce it in the medium-to-long term. This finding is in line with cross-country studies (e.g., Mian *et al*., 2017; Jorda *et al*., 2016). The financial stability analysis includes a stress testing of households' debt repayment capacity—using a proxy measure of the debt-service-to-income (DSTI) ratio—and their loan-to-value (LTV) ratios under adverse income and house price shocks. We find that the debt-servicing capacity of the low-income group is most vulnerable to adverse income shocks, while declines in house prices could increase LTV ratios for all income groups but are less of a concern given the relatively low initial LTV ratios in China. The vulnerability of high household indebtedness can amplify the impact of adverse income shocks on debt repayment capacity and hence household defaults. This finding is in line with Funke *et al*. (2018) who also conducted a stress testing but with a different household survey dataset (China Household Finance Survey).

II. Macro-Financial Risks from High Household Debt

Higher household borrowing could increase macroeconomic risks (Figure 2). Cross-country studies indicate that higher household debt may lead to lower GDP growth (Mian *et al.*, 2017; Jorda *et al.*, 2016). Higher debt repayments could constrain future consumption growth. Real estate investment may also be affected as housing demand slows, property developers face funding pressures, and banks are more reluctant to lend due to higher household credit risk. Lower fiscal revenues and public support of home ownership also create risks for the fiscal sector. These in turn could contribute to excess savings and growing external imbalances.

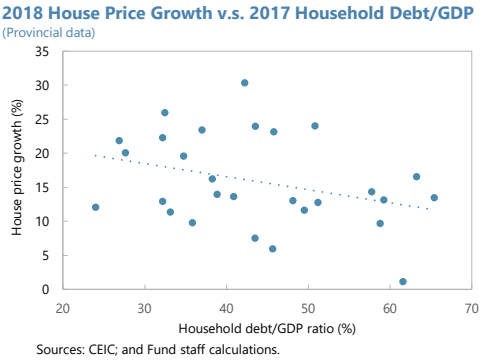
Figure 2. Macro-Financial Risks from Elevated Household Indebtedness



Source: Fund staff.

In particular, higher household debt could increase consumption and GDP growth in the short term but reduce them in the longer term. IMF (2017a) found that there is a trade-off between the short-term benefits of rising household debt and medium-term costs to growth. Using cross-country panel data, Lombardi *et al*. (2017) found that household debt increases consumption and GDP growth within one year but reduces them in the long run, with the negative long-run effects intensified when household debt/GDP ratio exceeds certain thresholds (60 percent for effects on consumption growth). Tian *et al*. (2018), using provincial data for China, found that high household debt in certain provinces has been associated with lower consumption growth. Higher household debt could also affect the income elasticity of consumption, particularly when facing a negative income shock (Nakajima, 2018; Baker, 2014).

Higher household debt could also increase financial stability risks. With high indebtedness, households are more vulnerable to adverse shocks, which could force households to deleverage abruptly and lead to significant macro-financial impact. Given that more than half of household debt in China is mortgages, deleveraging could constrain housing demand growth, putting pressure on house price growth and the financial soundness of property developers. Indeed, house price growth seems to be negatively correlated with lagged household indebtedness. Severe house price corrections could further reduce banks' financial soundness through lower collateral valuation (real estate collateral for loans), and may also increase funding pressure for property developers, further increasing risks for lending banks. Higher household debt may thus increase the probability of banking distress, and worsen any subsequent recessions—research has shown that recessions preceded by housing busts are longer and more severe (IMF, 2012).



III. Impact of High Household Indebtedness on Consumption

We use panel regressions with both micro-level household survey data and macro-level provincial data to estimate the impact of higher household indebtedness on consumption growth. The CFPS survey data allow us to compute two widely used measures of household indebtedness—debt/disposable income (DTI) ratio and debt/asset (DTA) ratio. The database also has detailed information about household expenditure, disposable income, and demographic characteristics. The quarterly provincial data span from 2015Q1 to 2018Q4 and cover 24 provinces. Debt/GDP ratio and DTI ratio are used as household indebtedness measures in the province-level regressions.[3]

Effects of Household Debt on Consumption Growth

Two panel regression models are estimated to explore the trade-off between positive short-term and negative longer-term effects. The first model focuses on lagged effects of household indebtedness on consumption growth:

$$\Delta c_{i,t} = \beta_0 + \alpha_i + \beta_1 \Delta y_{i,t} + \beta_2 HD_{i,t-1} + \beta_3 \left(\Delta y_{i,t} * HD_{i,t-1}\right) + \beta_4 X_{i,t} + \varepsilon_{i,t}, \qquad (1)$$

where $\Delta c_{i,t}$ and $\Delta y_{i,t}$ are household (real) expenditure growth and (real) disposable income growth, $HD_{i,t-1}$ is a measure of household indebtedness with a two-year lag (given that the

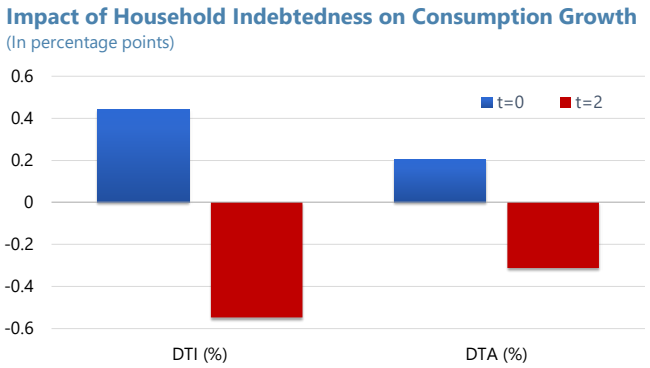
[3] Independent variables include (province-level) house price growth, change in lending rate, public consumption growth, fixed-asset investment growth, and (national) stock price growth. Some other macroeconomic variables (such as unemployment rate) are also considered in the regressions but do not alter the main results.

(continued…)

CFPS survey was conducted every two years), $\Delta y_{i,t} * HD_{i,t-1}$ is an interaction term between income growth and lagged household indebtedness, $X_{i,t}$ is a vector of household characteristics, and α_i is the household fixed effect.[4] For a household with income growth Δy, the impact of lagged household indebtedness on consumption growth is $\beta_2 + \beta_3 \Delta y$. For a household with a lagged household indebtedness measure of HD, the income elasticity is $\beta_1 + \beta_3 HD$. Hence, β_3 measures the impact of household indebtedness on income elasticity. To estimate the short-term effects, we estimate a similar panel regression model but with household indebtedness in the same year:

$$\Delta c_{i,t} = \beta_0 + \alpha_i + \beta_1 \Delta y_{i,t} + \beta_2 HD_{i,t} + \beta_3 \left(\Delta y_{i,t} * HD_{i,t}\right) + \beta_4 X_{i,t} + \varepsilon_{i,t}, \qquad (2)$$

Estimation results suggest that higher household indebtedness boosts consumption growth in the same year but reduces it after two years (Annex 1, Table A1.1). In particular, the results suggest that, a 100-percent increase in DTI ratio is associated with a 3.5-ppt increase in household consumption growth in the same period but a 4.4-ppt decline in household consumption growth two years later. These effects on household consumption growth translate to a 0.4-ppt increase in aggregate consumption growth in national accounts in the same period but a 0.5-ppt decline in aggregate consumption growth two years later.[5] Similarly, a 1-ppt increase in DTA ratio is associated with a 0.3-ppt increase in contemporaneous household consumption growth but a 0.5-ppt decline in household consumption growth two years later. Income elasticity is significantly positive across all specifications, and a 1-ppt increase in the real income growth boosts consumption growth by around 0.1 ppt.



Source: Fund staff estimates.
Note: The chart shows the impact of a one-standard-deviation increase in household indebtedness measures on real consumption growth, based on estimates from household survey regressions and normalized to impact on real consumption growth at the national level. All estimates are statistically significant at the 95-percent confidence level.

We also use provincial data to estimate the impact of household indebtedness on consumption growth. We estimate a province-level panel regression model similar to equation (1) but with different control variables, mainly province-level macroeconomic variables including change in lending rate, house price growth, public consumption growth, fixed-asset investment growth, and (national) stock price growth (GFSR, 2017).[6] We also use dynamic panel models to control for the effects of lagged dependent variable due to

[4] Household characteristics include changes in household size and the household head's marital and education level. Adding more household characteristics (e.g., household location) does not alter the main results.

[5] The text figure normalizes the impact on household consumption growth to the impact on national consumption growth using standard deviations of consumption growth and indebtedness measures in the CFPS surveys and national accounts.

[6] Some other macroeconomic variables (such as unemployment rate) are also considered in the regression but do not alter the main results.

consumption inertia. The models are estimated with a quarterly database spanning from 2015Q1 to 218Q4 and covering 24 provinces for which all the variables are available, and with one-year lagged household indebtedness measures (i.e., provincial household debt/GDP ratio and DTI ratio).

The provincial regressions also find that higher lagged household indebtedness is associated with lower consumption growth (Annex 2, Table A2.1). Specifically, a 1-ppt increase in the lagged household debt/GDP ratio is associated with a 0.1-ppt decline in consumption growth. When using DTI ratio as the indebtedness measure, we find that the impact of a 1-ppt increase in the lagged DTI ratio on consumption growth is slightly below 0.1 ppt. These results are comparable with other recent empirical studies using aggregate data. For example, using provincial data between 2015 and 2017, Tian *et al*. (2018) found that, for every 1-ppt increase in household leverage (measured as household debt/saving ratio), the consumption *per capita* growth for urban households decreases by 0.11 ppt. PBC (2019) found that a 1-ppt increase in household/GDP ratio is associated with a 0.3-ppt decline in retail sales growth.

Threshold Effects of Household Debt on Income Elasticity

When household debt exceeds a certain threshold, higher income growth may not lead to higher consumption growth as households suffer from a higher debt repayment burden. This is because households may choose to cut consumption growth to a minimum level and use the rest of their income to pay back the higher debt. This may be particularly true in countries without a well-established household bankruptcy regime such as China, as those households could not choose to default and have a "fresh start".

We estimate the following *threshold* panel regression model to examine the threshold effects of household debt on income elasticity:

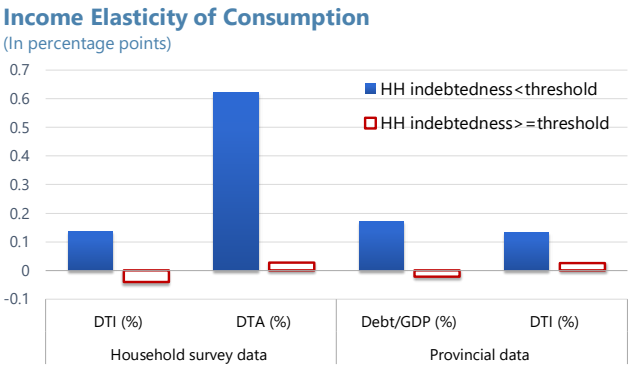
$$\Delta c_{i,t} = \beta_0 + \alpha_i + \beta_s \Delta y_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where:

$$\begin{cases} \beta_s = \beta_1, \text{ if } HD_{i,t-1} < HD^* \\ \beta_s = \beta_2, \text{ if } HD_{i,t-1} \geq HD^* \end{cases}$$

When household indebtedness is lower (or higher) than the threshold HD^*, we would expect a positive (or zero) income elasticity, i.e., $\beta_1 > 0$ (or $\beta_2 = 0$).

Estimation results confirm that, when lagged household indebtedness exceeds a certain threshold, higher income growth does not lead to higher consumption growth (Annex 1, Table A1.2). Specifically, threshold panel regressions suggest that, when lagged DTI ratio is below a threshold of 6.3, a 1-ppt increase in real income growth could boost consumption growth by 0.1 ppt. However, when DTI ratio is above that threshold, the estimated impact of income growth on consumption growth is not statistically significant from zero. About 10 percent of households in the sample have DTI ratios above the threshold. In other words, the income elasticity of consumption falls when lagged household indebtedness is higher than a threshold. We also use provincial data in the regressions and find similar threshold effects (Annex 2, Table A2.2).

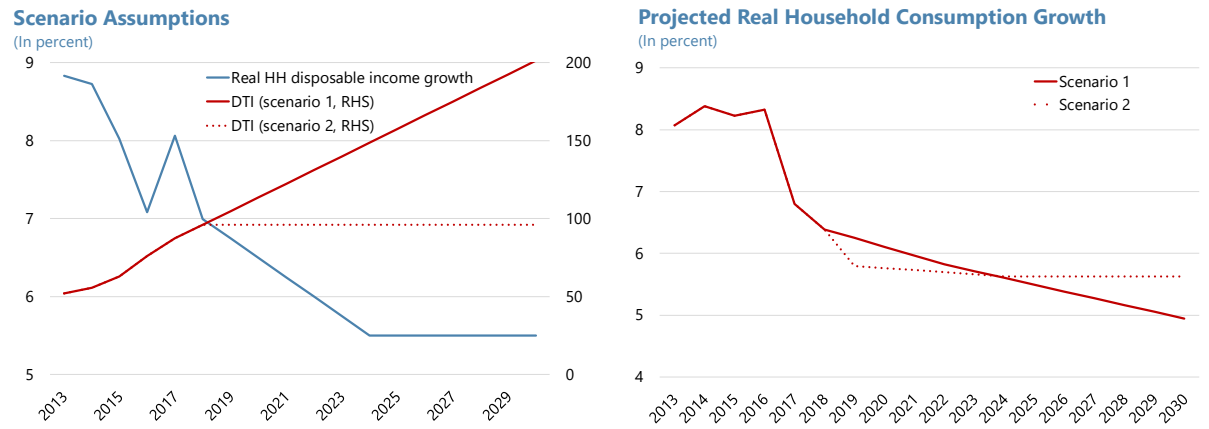


Source: Fund staff estimates.
Note: The chart shows the impact of a 1-ppt increase in real income growth on real consumption growth based on estimates from household survey regressions and provincial regressions. Solid bars mean that the impact is statistically significant at the 95-percent confidence level.

To better illustrate the impact of household indebtedness on consumption growth, we simulate the path of consumption growth under two scenarios with different dynamics of household indebtedness.[7] In line with staff's baseline projections for real GDP growth, we assume that real income growth slows gradually to 5.6 percent by 2023 in the two scenarios. In scenario 1, the DTI ratio is assumed to increase at the average pace of last five years while remaining at the end-2018 level in scenario 2 (Figure 3). Simulations suggest that rising household debt could reduce annual consumption growth from nearly 7 percent in 2017 to less than 5 percent by 2030. While consumption growth in scenario 1 is higher in the first few years due to the higher borrowing, it turns lower than scenario 2 over the medium-to-long term. Moreover, if household debt can be maintained at the current level, consumption growth could stabilize at a rate higher than the baseline income or GDP growth rate, facilitating further internal rebalancing towards consumption.

[7] Provincial regression estimates with DTI ratio are used in the simulations. For contemporaneous effects, we use the normalized impact estimates from survey regressions with DTI ratio. Simulation results using the estimates with debt/GDP ratio are very similar.

Figure 3. Illustrative Scenario Simulations



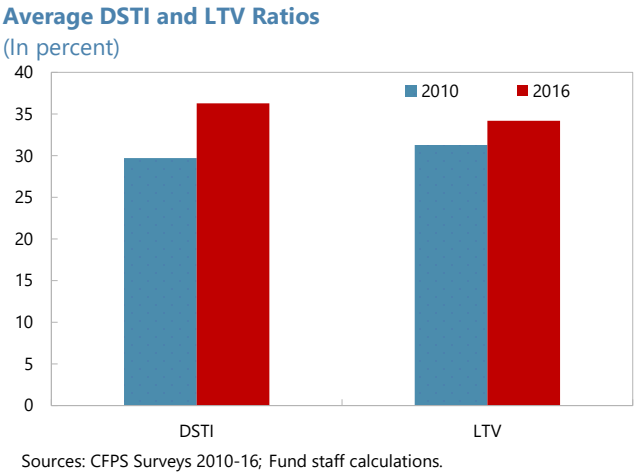
Sources: National Burea of Statistics; CEIC; IMF's World Economic Outlook database; and Fund staff estimates.

IV. Stress Testing Household Debt Repayment Capacity

To stress test households' debt repayment capacity, we construct two other indicators that are most relevant for measuring systemic risks from household sector and simulate the changes in these measures under adverse shocks. Following Funke *et al.* (2018), we construct two other measures of household indebtedness for each household using the CFPS survey data, i.e., DSTI ratio and LTV ratio—defined as the ratio of annual debt repayment to total annual disposable income of the household and the ratio of current mortgage balance to the self-reported market value of all houses owned by the household, respectively.

Two important caveats for these two measures are worth noticing. First, only annual mortgage repayment is available in the CFPS household survey data. Using mortgage repayment rather than total debt repayment, our DSTI ratio could underestimate the true debt servicing burden for borrowers. Therefore, one should view our DSTI ratio as a lower bound for debt servicing burden and focus on the change in the ratio under adverse shocks. Second, only the total mortgage balance outstanding is available in the CFPS database, and the mortgage balance at origination or breakdown by residence is not available. The LTV ratio is calculated by dividing the total mortgage balance outstanding by the self-reported market value of the household's all houses, and hence is different from the usual LTV ratio by residence when the mortgage was originated as calculated by banks. It could, however, be viewed as an average measure of the current LTV ratio across houses owned by the same household.

The DSTI and LTV ratios have generally increased during 2010–16. The average DSTI ratio for the entire household sample in the 2016 CFPS survey is about 36 percent, up from less than 30 percent in 2010. About 19 percent of households had DSTI ratios above 0.5 in 2016 (the share was only 14 percent in 2010)—the required cap on mortgage-service-to-income ratio imposed on banks. This could be due to the tendency of households to under-report their income levels. Meanwhile, the average LTV ratio increased from 31 percent in 2010 to 34 percent in 2016. As shown in Figure 4, both DSTI and LTV ratios have significant heterogeneity across income groups.



Following Funke *et al*. (2018), we use the so-called financial margin (FM) as an important indicator for household liquidity conditions. FM is defined as

$$FM = Y - C - DS$$

where Y denotes household disposable income, C is household consumption, and DS is debt service. These variables are measured in an annual frequency. For DS, we use the annual repayment for all outstanding mortgages given that it is the only debt service variable available in the CPFS surveys.

We define the condition for a household to default on its debt as when it lacks sufficient semi-liquid or liquid assets to sell to cover its debt repayments. Unlike real estate assets, liquid financial assets are typically easy to sell and subject to lower haircuts, and hence could serve as a short-term buffer against unanticipated adverse shocks to disposable income. Since the CFPS surveys do not provide a breakdown of assets between liquid and non-liquid assets, we use non-housing assets as a proxy measure for liquid assets. Therefore, it is likely that we are over-estimating households' liquid assets (for example, some non-housing assets such as cars are less liquid and subject to higher haircuts in liquidation), and hence households could actually start to default before they deplete all their non-housing assets.

Specifically, we follow Funke *et al*. (2018) and assume that a household would default on its debt if the following EFM condition is satisfied:

$$FM < 0 \text{ and } FM + LA < 0,$$

where LA denotes liquid assets. We assume that, for households not to default, their liquid assets should be able to cover the entire funding gap or negative FM within a year. One could make different assumptions for how long the accumulated buffers or liquid assets should be

able to cover the negative FM under unanticipated adverse shocks to income. For example, Funke *et al*. (2018) assumed 6 months or one year. For simplicity, we assume one year in this paper. Finally, since the CFPS survey data do not have a specific variable for liquid assets, we use non-housing assets as a proxy measure, which however also include non-housing non-liquid assets such as cars. Therefore, our results may over-estimate the accumulated buffers and hence under-estimate household defaults.

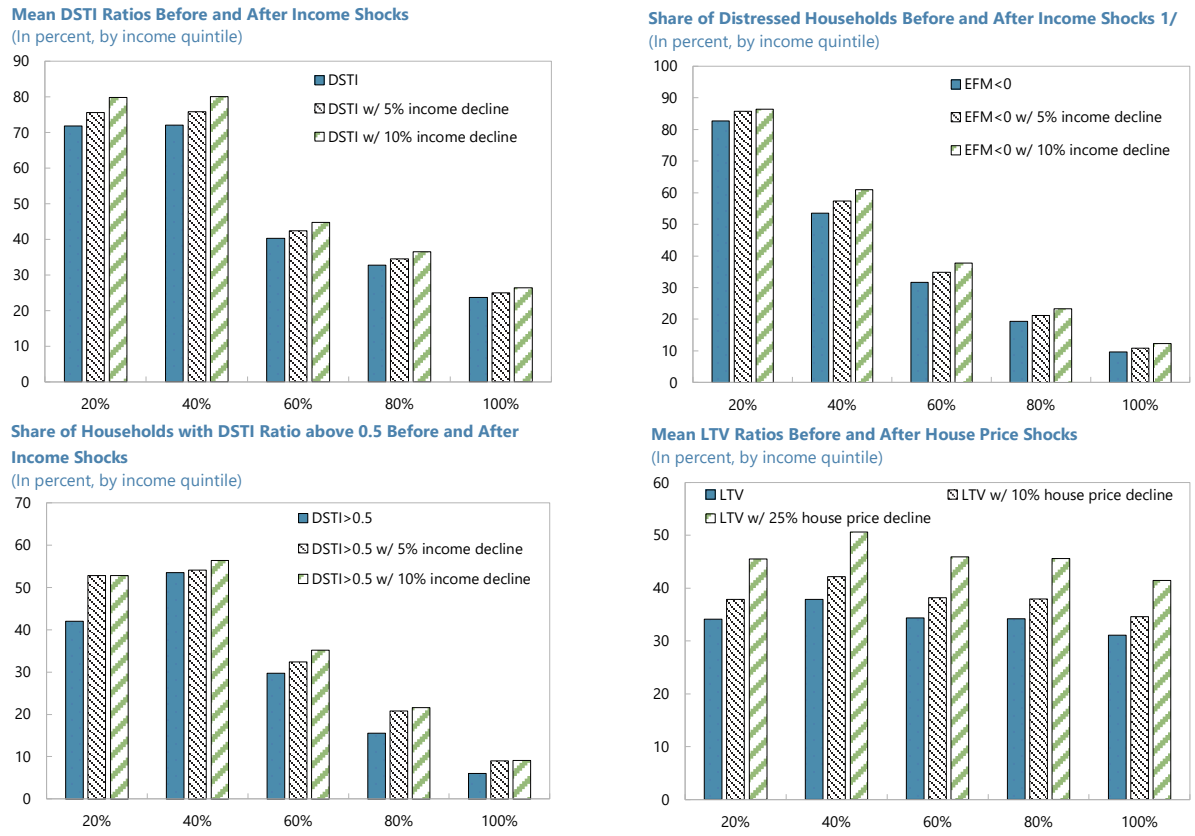
The stress tests consider adverse shocks to income and house prices using the 2016 CFPS survey data. Following Funke *et al*. (2018), we assume 5- and 10-percent declines in household income in the stress test for DSTI ratio and 10- and 25-percent declines in house prices or values in the stress test for LTV ratio. The 2016 CFPS survey data are used in the stress tests.

The stress test results suggest that low-income households are most vulnerable to adverse income shocks (Figure 4). As expected, the average DSTI ratio for each income quintile increases across the board after the income shocks, with greater increases for lower-income groups (Panel 1). The post-shock average DSTI ratios for the lowest two income groups (below 40^{th} income percentile) reached 80 percent, significantly above the 50-percent limit for mortgage-service-to-income ratio imposed on banks. High-income households are less affected by the adverse shocks to income.

We also calculate the share of "distressed" households who satisfy the EFM condition presented above before and after the income shocks. As shown in Panel 2, the share of distressed households increased for all income quintiles after the income shocks, with the highest increases occurring in the middle-income households. This is because most low-income households have already had negative EFMs before the shocks and high-income households have higher income and liquid asset buffers. Panel 3 presents the share of households with DSTI ratios above 0.5 (the limit on mortgage-service-to-income ratio), which increases across all income quintiles after the 10-percent income shock. Moreover, the increase in the lowest-income quintile clearly exceeds the increases in the other quintiles, implying that lowest-income quintiles are most vulnerable to adverse income shocks. These results highlight that focusing solely on the aggregate statistics may be insufficient to identify all the vulnerabilities emerging in the system.

The stress test results for the LTV ratio suggest that adverse shocks to house prices seem to be less concerning (Figure 4, panel 4). The initial LTV ratios are relatively low for all income groups in China (less than 40 percent). As a result, post-shock LTV ratios are mostly below 50 percent for all income groups—still relatively low compared to international peers. High-income households have lower LTV ratios since these households typically own more than one house which is subject to higher LTV requirements. This finding is also in line with recent empirical studies using other Chinese household survey data. For example, using the China Household Finance Survey data, Feng and Lu (2019) found that mortgage borrowers in major Chinese cities are more vulnerable to negative income shocks than to negative house price shocks.

Figure 4. Stress Testing Household Balance Sheet



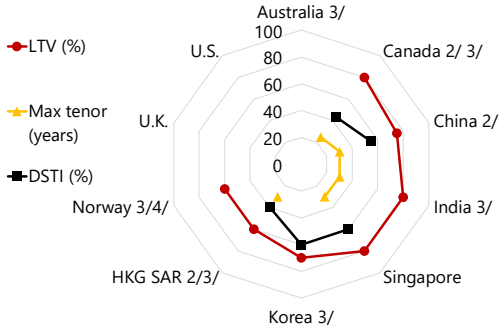
Sources: CFPS survey 2016; and Fund staff calculations.
1/ "Distressed Households" is defined as households who satisfy the EFM condition, denoted by EFM<0 in the chart.

V. International Experience: Measures to Contain Household Vulnerabilities

International experience suggests that improved data quality and strong policy and institutional frameworks can help counteract the negative effects of higher household debt. Accurate and comprehensive indebtedness measures could help better monitor household vulnerabilities. Cross-country studies have also shown that both demand-side macroprudential measures—such as limits on the DSTI and LTV ratios—and supply-side measures targeted at loans—such as limits on bank credit growth and loan loss provisions—can be effective in mitigating the negative effects of household debt on consumption and growth. Better financial sector regulations and institutions also play an important role: countries with stricter banking sector supervision and more capitalized banking systems are more able to withstand higher levels of household debt. The existence of credit registries can also reduce the risk of a crisis by enhancing overall financial sector transparency and allowing for early detection of problems (IMF, 2017a).

Macroprudential measures currently in place in China appear broadly comparable to other countries but could be strengthened further. While the maximum LTV ratio for first-home buyers in China stands at 75 percent, provinces can independently reduce that ratio—in some cases as low as 60 percent, which is comparable to other jurisdictions with high household debt (e.g., Norway). The current regulation in China requires a borrower's monthly DSTI ratio to be less than 55 percent (with a cap on mortgage-service-to-income ratio of 50 percent), which is relatively high compared to the international norm of 30-50 percent. However, the absence of comprehensive credit registry may hinder lenders' ability to properly evaluate household's total liabilities. China has not put in place supplemental capital requirements of different risk weights on household lending.

Macroprudential Measures: International Comparison 1/



Sources: IMF's Annual Macroprudential Policy Survey.
1/ There are no LTV limits for Australia, the U.S., the U.K., and Thailand. For China, the LTV limit on first-home buyers is shown. For Hong Kong SAR, the highest LTV ratio of 60 percent is shown.
2/ Fiscal measures to cintain systemic risk , including non-resident tax, deed tax, and others, are in place.
3/ Capital requirements on household sector loans in place.
4/ Norway has a total DTI ratio requirement in place: a maximum of 5.

VI. Conclusions and Policy Implications

This paper analyzes both macroeconomic and financial stability risks from high and rapidly rising household debt in China. Using both household survey and provincial data, we find that an increase in household indebtedness could boost consumption in the short term but reduce it in the medium-to-long term. By stress testing households' DSTI and LTV ratios under adverse income and house price shocks, we find that the debt-servicing capacity of low-income group is most vulnerable to adverse income shocks, while declines in house prices could increase LTV ratios for all income groups but are less of a concern given the relatively low initial LTV ratios in China.

Systemic risk assessment of the household sector should be strengthened and extended beyond mortgages. Given that non-housing loans account for nearly half of household debt (with a higher ratio for lower-income households), the authorities should step up efforts to collect and process data beyond the aggregate credit and housing market indicators. This could include having in place a wide range of household vulnerability indicators, such as leverage (e.g., consistent and comprehensive DSTI and DTI ratios), liquidity (average maturity of household loans or assets by type of loan or asset), composition of assets and liabilities, and interconnectedness with other sectors (such as banks and non-bank financial sector). The systemic risk monitoring framework should also take into account the distributional aspects of household debt by, for example, including the share of "debt at risk" and the share of "risky" borrowers (for example, the Bank of England monitors the share of households with high DSTI or loan-to-income ratios; see BoE, 2018). Interagency information and data sharing should also be strengthened, as recommended by the 2017 FSAP (IMF, 2017b).

The macroprudential policy toolkit should be strengthened. International experience suggests that demand-side macroprudential measures and supply-side measures targeted at loans are typically effective in mitigating the negative effects of household debt on consumption and growth. However, household debt in China still grew rapidly in the last three years (by around 20-30 percent per year) despite the existing LTV and DSTI limits.[8] The DSTI caps should be adjusted to the international norm of 30-50 percent and extended to other types of household loans including those from non-bank financial institutions. Stress testing of household DSTI ratio to interest rate and income shocks can also be used to gauge the potential risks in adverse scenarios. Sectoral capital requirements on banks' exposures to the real estate sector—a supply-side measure—may also help, but should be treated with caution, as they may result in leakages where loans are provided by non-banks and are often less effective in constraining credit growth than demand-side tools (Ding, *et al*. 2017).

Combining different tools and increasing the scope of macroprudential policy may enhance policy effectiveness and reduce the leakages from any single measure. More active use of DSTI limits backed by comprehensive analyses could enhance the effectiveness of LTV limits by restricting the use of short-term consumption loans for housing down payment. In this context, all leveraged providers of credit should be included in the purview of macroprudential policy. Otherwise, there is a risk that credit provision will migrate from banks to less-constrained nonbanks (Jacome and Nier, 2011). Given the importance of mortgages in household debt and the specific land ownership structure in China, land policies should also be used to increase effective housing supply and promote a transparent and efficient secondary market for land transactions (Box 1). The decision making for household sector policies, including both macroprudential and land policies, should be based on a strengthened systemic risk monitoring framework for the household sector (Figure 5).

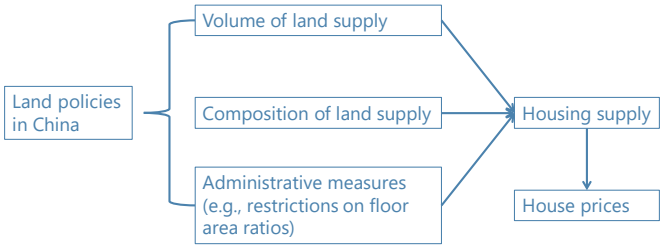
[8] For example, some home buyers use financial innovation (e.g., P2P lending) to borrow money for mortgage down payments, circumventing LTV and DTSI limits, although the authorities are trying to crack down on such practices (IMF, 2017a).

Box 1. Land Policies and House Prices in China

House prices in China are mainly affected by four types of policies—monetary (mainly interest rates and credit volume), macroprudential (mainly down payment requirements), tax, and land policies. Land policies are China-specific and are not seen as a major policy tool to contain rapidly rising house prices in international peers. This box aims to explain the main land policies in China and how they tend to affect house prices.

In China, land policies affect house prices mainly through the volume and composition of land supply.

Illustration of Land Policy Transmission in China



- In China, land is owed not privately but by the state (urban land) or by rural collectives (rural land). Land-use rights are privately owned, but those for residential use are only valid for 70 years. Higher land supply, without significant land hoarding by developers, should increase housing supply and alleviate the upward pressure on house prices. The composition of land supply, e.g., for residential, or commercial, or office use, could also affect residential housing supply and house prices.

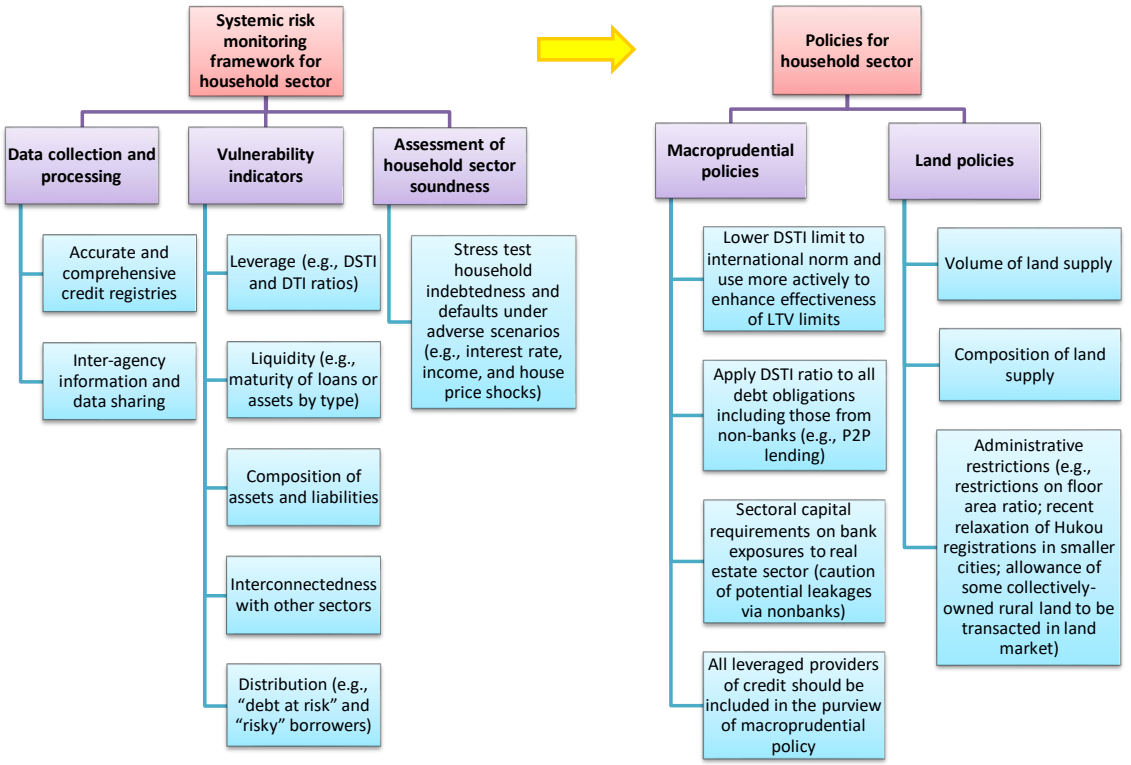
- Different types of land have different pricing schemes, leading to potential arbitrage opportunities. Residential land is further divided into four types of residential housing, i.e., small- and medium-sized apartments, villa and deluxe apartments, 'economic' houses (subsidized houses), and others. Current land policies aim to increase land supply for small- and medium-sized apartments while restricting the supply for villas and deluxe apartments, which should benefit general population. At the same time, increases in land supply for economic houses may also limit land supply for other houses, leading to higher market-determined house prices.

- Administrative measures such as restrictions on floor area ratios (defined as the ratio of a building's total floor area to the size of the land upon which it is built) could also be used to guide land supply towards small- and medium-sized apartments. For example, the floor area ratios in Shenzhen were recently raised in the future planning of the Great Bay Area to facilitate higher-floor buildings.

Land policies should aim to reduce land hoarding and enhance the market mechanism in the secondary land transaction market. Land hoarding by property developers and significant supply-side distortions—such as local governments' control over land supply and high reliance on land sales to finance spending—render China's property market susceptible to both price misalignment and overbuilding.[1] In this context, policies to contain land hoarding including penalties for developers could be enforced more strictly, while alternative sources for local government financing such as property taxes should be adopted. The recent relaxation of Hukou requirements in smaller cities and allowing some collectively-owned rural land to be transacted in the land market (without having to be purchased by the state first) are a step in the right direction. There may also still be room for raising floor area ratios in Tier 1 cities (less than 2 in 2010), compared to New York, Singapore, and Seoul which were mostly above 3 in the same period according to CICC estimates. These policies may help promote market mechanisms in land price formulation and increase housing supply.

[1/] Land hoarding refers to the practice of acquiring land and to deliberately hold it and wait for prices to increase in the future before selling it for a higher return.

Figure 5. Systemic Risk Monitoring Framework and Household Sector Policies



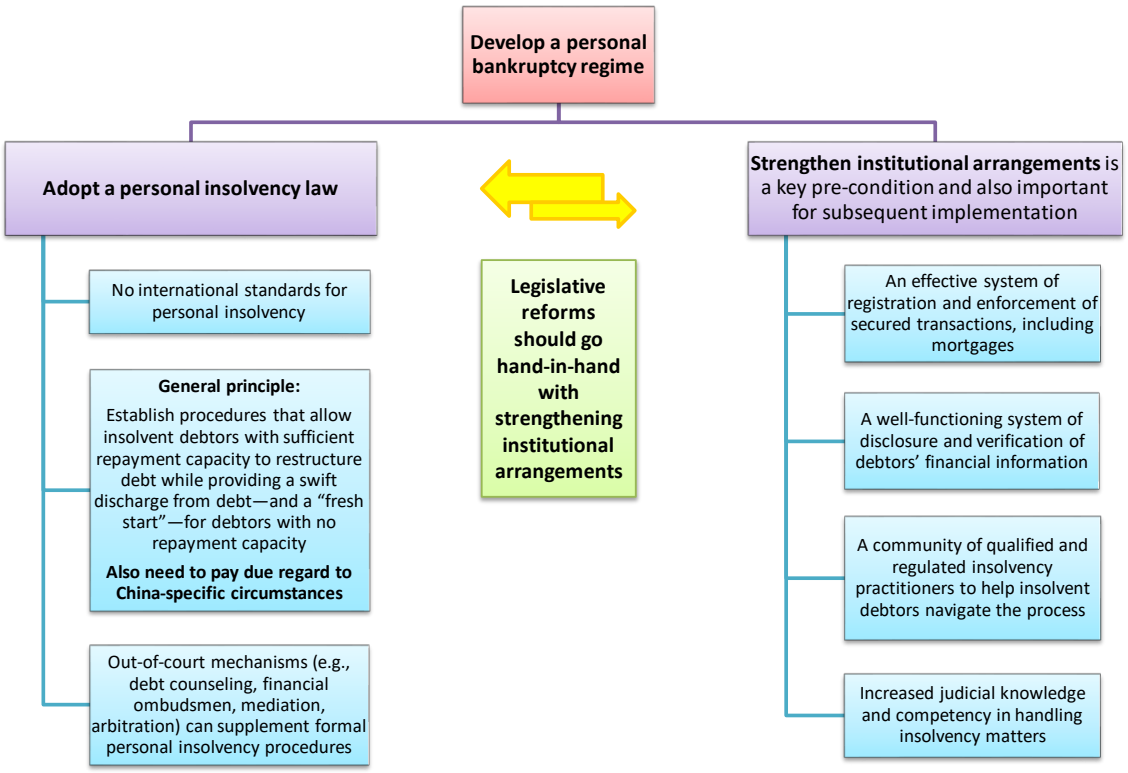
Source: Fund staff.

China should also consider developing a legal framework for personal insolvency, while also strengthening debt enforcement (Figure 6). The Enterprise Bankruptcy Law that came into effect in 2007 only applies to companies and not to individual debtors.[9] Chinese law includes provisions that allow certain protections for the debtor against enforcement by creditors.[10] However, these mechanisms are not well suited for situations where the debtor may have multiple creditors. Without a well-functioning personal insolvency regime, debtors cannot get a "fresh start" from over-indebtedness and may have to cut consumption more substantially to repay debt. As access to credit continues to increase in China, consideration should be given to developing a personal insolvency framework that would help address inevitable situations of over-indebtedness while mitigating moral hazard (Box 2). Effective enforcement of financial claims, including mortgages, would facilitate credit while allowing banks to recover assets in the event of default.

[9] The introduction of a personal insolvency law was considered in the past but no law has yet been enacted.

[10] For example, courts can allow debtors to pay their obligation in installments. There are some other protections for debtors built into the law, e.g., allowing debtors to keep certain minimum assets to take care of themselves and their families.

Figure 6. Developing a Personal Insolvency Framework for China



Source: Fund staff.

A comprehensive credit registry system should be developed as a prerequisite for enhancing the legal and prudential frameworks. The quality and scope of the credit registry should be strengthened in line with the 2017 FSAP recommendation—by capturing all individual debt obligations including those from nonbanks (such as P2P). A comprehensive credit registry could help lenders better assess the credit risk of borrowers and allow policy makers to better monitor and assess financial stability risks of the system, thereby helping bankruptcy prevention and the development of a personal insolvency regime (Box 2). Further enhancing the valuation system in China (e.g., valuation standards, qualification of valuators, selection of valuators) is also important to ensure that the information on which macroprudential policies are based is accurate and reliable, and to support the effective functioning of the personal insolvency regime.

Financial sector supervision and consumer protection should be improved. Micro-prudential supervision with stronger supervisory powers or more stringent capital regulation frameworks would allow China to better contain any negative effects of rapidly rising household debt on macroeconomic and financial stability. Measures to strengthen consumer financial protection—including, for example, expanding financial education, increasing the transparency of financial contracts, and regulating certain financial innovation products—would help unsophisticated consumers make wiser finance decisions and enhance overall financial stability (IMF, 2017a).

Box 2. Is It Time for China to Develop A Personal/Household Insolvency Framework?

An effective personal insolvency regime is an important part of the toolkit to address excessive personal debt. While ex-ante prevention of excessive debt accumulation by households should be the first line of defense, personal insolvency is a tool that helps address the consequences of over-indebtedness by establishing rules and procedures for fair burden sharing between debtors and creditors. Unlike individual enforcement/collection proceedings against a debtor, personal insolvency is a collective proceeding with participation of multiple creditors. In essence, it allows the debtor to get a "fresh start", thus allowing the debtor to return to economic activity. In some countries, personal insolvency regime covers also individual entrepreneurs and SMEs/micro-SMEs, thus seeking to reduce the stigma of business failure and promoting entrepreneurship (Aiyar, *et al*. 2015).

Over the past decade many countries have reformed their insolvency frameworks. For example, the Asian crisis in 1997 spurred corporate insolvency reforms in the region that in several countries, continues today, while the recent global financial crisis catalyzed insolvency frameworks by many European countries. Those reforms, aimed at strengthening legal and institutional frameworks for corporate debt restructuring and establishing new regimes for personal insolvency, were often part of broader strategies for dealing with high non-performing loans (NPLs) that were weakening countries' financial sectors (Bergthaler, *et al*. 2015). Several Asian countries have also introduced personal insolvency frameworks.[1]

The first step would be the adoption of a personal insolvency law. Unlike in the area of corporate insolvency, there are no international standards for personal insolvency, but cross-country experience and careful attention to the circumstances of China could guide the design of such a framework. As a general matter, the law—which could apply to individual debtors, including individual entrepreneurs and unincorporated enterprises—should establish procedures that allow insolvent debtors with sufficient repayment capacity the opportunity to restructure their debt (including secured debt) over a period of time by making partial payments to creditors, while providing for a swift discharge from debt—and a "fresh start"—for debtors with no repayment capacity. Given the novelty of personal insolvency in China, the law should be developed in broad consultation with all interested stakeholders. In addition to developing a personal insolvency law, consideration should be given to developing out-of-court mechanisms to facilitate resolution of personal debt distress. Cross-country experience demonstrates that such mechanisms, e.g., debt counseling, Financial Ombudsmen, mediation, arbitration, can be a useful supplement to formal personal insolvency procedures.

Beyond the adoption of a personal insolvency law, important pre-conditions will have to be in place to ensure effective implementation of the new framework. Thus, legislative reforms should go hand-in-hand with putting in place and/or strengthening institutional arrangements that would help ensure the effective functioning of the personal insolvency regime. Those include but are not limited to: (i) an effective system of registration and enforcement of secured transactions, including mortgages; (ii) a well-functioning system of disclosure and verification of information about the debtor's financial situation, (iii) establishment of a community of qualified and regulated insolvency practitioners who can help insolvent debtors to navigate the insolvency process, including the preparation of a repayment plan to restructure debt, and (iv) increasing judicial knowledge of and competency in handling insolvency matters, including by continuing with the development of specialized expertise in courts. Consideration can also be given to establishing an agency (or assigning this function to one of the existing agencies) to provide advice to debtors facing financial difficulties. More would have to be done to explain the concept of personal insolvency to the Chinese society to allow it to gain acceptance as one of the standard tools of a market economy.

[1/] Japan and Korea have developed personal insolvency laws, and these are widely used. There are also personal insolvency regimes in the Philippines, Thailand, Singapore, and Malaysia. The comprehensive reform of personal bankruptcy in India introduced in 2016 has not yet been implemented.

REFERENCES

Aiyar, S., Bergthaler, W., Garrido, J.M., Ilyina, A., Jobst, A., Kang, K., Kovtun, D., Liu, Y., Monaghan, D., and M. Moretti, 2015, "A Strategy for Resolving Europe's Problem Loans," IMF Staff Discussion Note 15/19 (Washington, DC: International Monetary Fund).

Baker, S., 2013, "Debt and the Consumption Response to Household Income Shocks," Stanford University.

Bergthaler, W., Kang, K., Liu, Y., and D. Monaghan, 2015b, "Tackling Small and Medium Sized Enterprise Problem Loans in Europe," IMF Staff Discussion Note 15/04 (Washington, DC: International Monetary Fund).

Bank of England (BoE), 2018, Financial Stability Report, Issue No. 43.

Ding, D., Huang, X., Jin, T., and W.R. Lam, 2017, "Assessing China's Residential Real Estate Market," IMF Working Paper 17/248 (Washington, DC: International Monetary Fund).

Feng, A.X., and X. Lu, 2019, "Household Debt in China: Micro-level Evidence on Financial Inclusion and Stability," IMF Working Paper (Washington, DC: International Monetary Fund) (*forthcoming*).

Funke, M., Sun, R., and L. Zhu, 2018, "The Credit Risk of Chinese Households – A Micro-Level Assessment," BOFIT Discussion Papers 12/2018, The Bank of Finland Institute for Economies in Transition.

International Monetary Fund (IMF), 2012, *World Economic Outlook April 2012: Growth Resuming, Dangers Remain*, International Monetary Fund, Washington, DC.

IMF, 2017a, *Global Financial Stability Report October 2017: Is Growth at Risk?* International Monetary Fund, Washington, DC.

IMF, 2017b, *People's Republic of China: Financial System Stability Assessment*, IMF Country Report No. 17/358 (Washington, DC: International Monetary Fund).

IMF, 2019a, *People's Republic of China: Staff Report for the 2019 Article IV Consultation*, IMF Country Report No. 19/266 (Washington, DC: International Monetary Fund).

IMF, 2019b, *People's Republic of China: Selected Issues*, IMF Country Report No. 19/274 (Washington, DC: International Monetary Fund).

Institute of Social Science Survey (ISSS), Peking University, 2015, "China Family Panel Studies (CFPS)", https://doi.org/10.18170/DVN/45LCSO, Peking University Open Research Data Platform, V31.

Jacome, L.I., and E.W. Nier, 2011, "Macroprudential Policy: Protecting the Whole," *Finance and* Development (Washington, DC: International Monetary Fund).

Jorda, O., Schularick, M., and A.M. Taylor, 2016, "The Great Mortgaging: Housing Finance, Crises and Business Cycles," *Economic Policy* 31 (85), pp. 107-152.

Lombardi, M., Mohanty, M., and I. Shim, 2017, "The Real Effects of Household Debt in the Short and Long Run," BIS Working Paper No. 607, Bank for International Settlements, Basel.

Mian, A., Sufi, A., and E. Verner, 2017, "Household Debt and Business Cycles Worldwide," *The Quarterly Journal of Economics*, Volume 132, Issue 4, pp. 1755-1817.

Nakajima, J., 2018, "The Role of Household Debt Heterogeneity on Consumption: Evidence from Japanese Household Data," BIS Working Paper No. 736, Bank for International Settlements, Basel.

People's Bank of China (PBC), 2019, "China Regional Financial Report (in Chinese)," Monetary policy analysis group of the People's Bank of China.

Tian, G., Huang, X., Ning, L., and Y. Wang, 2018, "Safeguarding Household Debt Crisis and Associated Systemic Financial Risks (in Chinese)," Policy Research Report No. 58, Shanghai University of Finance and Economics.

ANNEX 1. HOUSEHOLD-LEVEL REGRESSION RESULTS

Table A1.1. Household-Level Panel Regression Results

Dependent variable	**Real expenditure growth $\Delta c_{i,t}$**			
Lagged or contemporaneous HD	**Lagged HD**		**Contemporaneous HD**	
Household indebtedness measure (HD)	**DTI**	**DTA (%)**	**DTI**	**DTA (%)**
Real income growth $\Delta y_{i,t}$	**0.13*** **	**0.12*** **	**0.11*** **	**0.08*** **
	(0.02)	**(0.02)**	**(0.02)**	**(0.02)**
HD	**-4.39*** **	**-0.51*** **	**3.54*** **	**0.33*** **
	(1.09)	**(0.12)**	**(0.68)**	**(0.12)**
$\Delta y_{i,t} * HD$	**-0.0002**	**-0.002*** **	**0.01** **	**-0.001**
	(0.01)	**(0.001)**	**(0.003)**	**(0.001)**
Change in family Size	4.99***	4.91***	5.02***	6.69***
	(1.71)	(1.78)	(1.70)	(1.88)
Change in household head marital status	-9.90***	-9.11**	-6.61**	-5.19
	(3.74)	(4.31)	(3.22)	(3.60)
Change in household head education level	3.38**	4.06**	2.86**	4.36***
	(1.62)	(1.81)	(1.34)	(1.47)
Constant	26.64***	31.74***	35.90***	41.70***
	(2.76)	(3.25)	(2.88)	(3.46)
Household fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
# obs.	9,059	8,559	8,990	8,434
# households	6,365	6,112	6,199	5,905
Overall-R^2	0.04	0.03	0.03	0.02

Table A1.2. Household-Level Threshold Panel Regression Results

Dependent variable	**Real expenditure growth $\Delta c_{i,t}$**	
Household indebtedness measure (HD)	**DTI**	**DTA (%)**
Real income growth $\Delta y_{i,t}$ if $HD_{i,t-1} < HD^*$	**0.14*** **	**0.62*** **
	(0.03)	**(0.09)**
Real income growth $\Delta y_{i,t}$ if $HD_{i,t-1} \geq HD^*$	**-0.04**	**0.03**
	(0.07)	**(0.02)**
Change in family Size	1.98	3.15
	(2.38)	(2.76)
Change in household head marital status	-10.50*	-12.08
	(6.03)	(8.33)
Change in household head education level	1.10	0.89
	(2.47)	(2.76)
Constant	28.03***	33.77***
	(3.44)	(3.65)
Household fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
# obs.	1,689	1,455
# households	563	485
Overall-R^2	0.03	0.05
Estimated threshold HD^*	**6.3**	**2.4%**

ANNEX 2. PROVINCE-LEVEL REGRESSION RESULTS

Table A2.1. Province-Level Panel Regression Results

Dependent variable	**Real retail sales growth (qoq) $\Delta c_{i,t}$**			
Household indebtedness measure (HD)	**Debt/GDP (%)**		**DTI (%)**	
Estimation method	Fixed-effects with Driscoll-Kraay s.e.	Dynamic panel GMM	Fixed-effects with Driscoll-Kraay s.e.	Dynamics panel GMM
$\Delta c_{i,t-1}$	—	-0.25**	—	-0.26**
		(0.10)		(0.09)
Real income growth $\Delta y_{i,t}$	0.20***	0.23**	0.13*	0.20*
	(0.06)	(0.10)	(0.07)	(0.12)
$HD_{i,t-4}$	-0.10**	-0.12**	-0.05**	-0.08***
	(0.04)	(0.05)	(0.02)	(0.02)
$\Delta y_{i,t} * HD_{i,t-4}$	-0.002	-0.003	-0.0001	-0.001
	(0.001)	(0.002)	(0.001)	(0.001)
Real house price growth (lagged)	0.06**	-0.04	0.06**	-0.03
	(0.02)	(0.03)	(0.02)	(0.03)
Real stock price growth (lagged)	-0.02	0.004	-0.02	-0.01
	(0.02)	(0.04)	(0.02)	(0.05)
Lending rate (lagged)	-1.34	6.42	-1.41	5.90
	(1.02)	(3.99)	(1.11)	(3.92)
Real public consumption growth (lagged)	0.03	-0.22	0.05	-0.19
	(0.14)	(0.19)	(0.15)	(0.19)
Real fixed asset investment growth (lagged)	0.02***	0.02	0.02***	0.02
	(0.004)	(0.02)	(0.005)	(0.02)
# obs.	288	240	288	240
# provinces	24	24	24	24

Table A2.2. Province-Level Threshold Panel Regression Results

Dependent variable	**Real retail sales growth (qoq) $\Delta c_{i,t}$**	
Household indebtedness measure (HD)	**Debt/GDP (%)**	**DTI (%)**
Estimation method	Fixed-effects threshold	Fixed-effects threshold
Real income growth $\Delta y_{i,t}$ if $HD_{i,t-4} < HD^*$	0.17***	0.13**
	(0.05)	(0.06)
Real income growth $\Delta y_{i,t}$ if $HD_{i,t-4} \geq HD^*$	-0.02	0.03
	(0.07)	(0.09)
Lending rate (lagged)	-2.29	-1.60
	(2.04)	(2.27)
Real house price growth (lagged)	0.05	0.06
	(0.04)	(0.04)
Real stock price growth (lagged)	-0.02	-0.01
	(0.04)	(0.04)
Real public consumption growth (lagged)	-0.01	0.02
	(0.21)	(0.22)
Real fixed asset investment growth (lagged)	0.02	0.02
	(0.01)	(0.01)
Constant	12.73***	12.79***
	(1.23)	(1.30)
# obs.	288	288
# groups	24	24
Estimated threshold HD^*	**49%**	**131%**