

# Housing, Household Debt, and the Business Cycle

## An Application to China and Korea <sup>†</sup>

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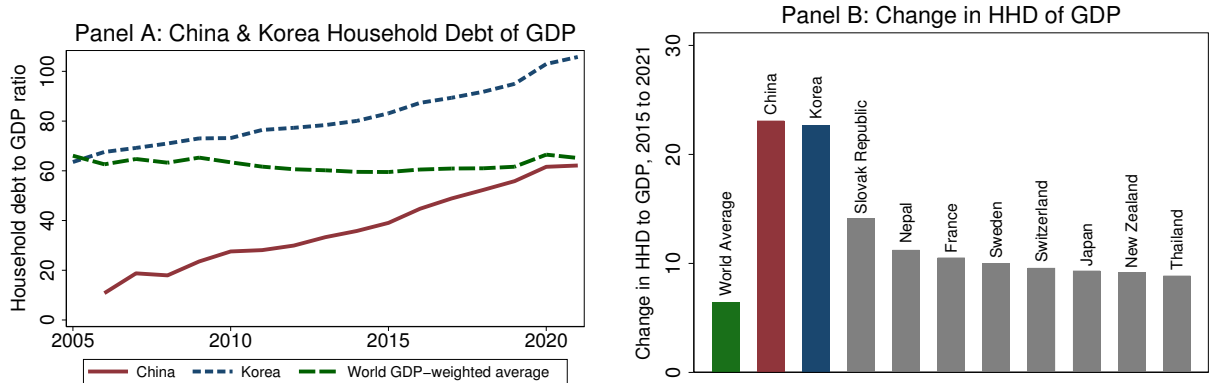
A rise in household debt in the medium run produces a boom-bust pattern in economic activity, and the subsequent downturn after a large rise in household debt can be especially painful (e.g., [Mian, Sufi and Verner \(2017\)](#), [Mian and Sufi \(2018\)](#), [Mian, Sufi and Verner \(2020\)](#)). The original research showing this pattern focused on advanced economies from 1967 to 2012; however, subsequent research has shown the robustness of this pattern when expanding the sample to include a larger set of economies including emerging markets ([Mian, Sufi and Verner \(2018\)](#)). Furthermore, the severe recession in Brazil from 2014 to 2016 was also preceded by a large rise in household debt, and it followed many of the patterns shown in the earlier research ([Garber, Mian, Ponticelli and Sufi \(2019\)](#); [Garber, Mian, Ponticelli and Sufi \(2022\)](#)). Collectively, the boom-bust pattern associated with a rise in household debt has been referred to by [Mian and Sufi \(2018\)](#) as the “credit driven household demand channel.”

Globally, the two countries with the largest rise in the household debt to GDP ratio over the last seven years are China and South Korea, which are the largest and fourth largest economies of Asia. Both are currently experiencing a housing market correction and slowdown in growth, which has spurred questions of the impact of the housing market troubles on broader economic activity. A significant economic slowdown in these two countries could have substantial impact on the Asian economy and on the world economy.

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Figure 1: Household Debt to GDP in China and Korea

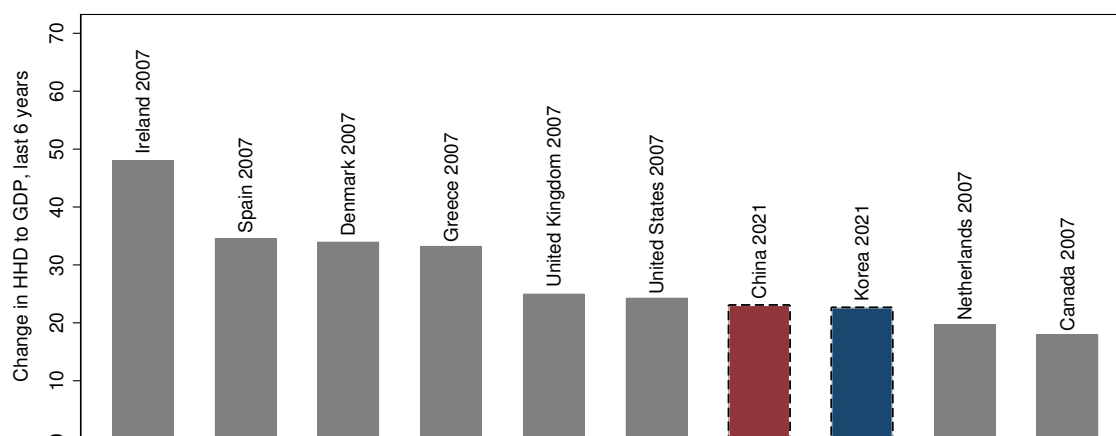


The left panel of this figure is the Household debt, loans and debt securities % of GDP for China, Korea, and the GDP weighted average of the World. Data is from the IMF Global Debt Database. The right panel is the change of household debt of GDP ratio from 2015 to 2021 for various countries.

The left panel of Figure 1 shows the evolution of the household debt to GDP ratio in China, Korea, and the world. While China started from a lower level than Korea, the rise from 2015 to 2021 has been similar. The right panel of Figure 1 shows the change in the household debt to GDP ratio from 2015 to 2021 for a number of countries. The first bar shows the average GDP-weighted rise in household debt to GDP ratio for all countries over this time-frame, which is modest. The next 10 bars show the countries with the largest increases; as is clear from the figure, China and Korea have seen household debt booms in recent years that are substantially larger than any other country for which data is available.

Figure 2 shows the Chinese and Korean household debt boom of 2015 to 2021 compared to some of the classic booms prior to the Great Recession. The 23 percentage point rise in the household debt to GDP is smaller than some of the largest booms prior to the Great Recession, but the Chinese and Korean booms are comparable with the booms that occurred in the United States and United Kingdom from 2001 to 2007.

Figure 2: Debt Booms in China and Korea: Comparison with 2001 to 2007



This figure shows the magnitude of the household debt boom for prominent episodes in history, and for China and Korea as of 2021.

An expansion in credit supply is a key culprit in explaining sudden increases in household debt in previous episodes (Mian et al. (2017)). Credit supply expansion also played an important role in explaining the rise in household debt in China and Korea from 2015 to 2021. In Korea, interest rates on household debt remained persistently low during the housing boom. This has helped fuel mortgage growth, and it has also led to an expansion in the use of a peculiar housing financial instrument called a “jeonse” (see, e.g., Jing, Park and Zhang (2022)). Capital requirements for banks on mortgages were kept substantially below the requirements for business loans. Furthermore, “in an effort to boost the real estate market, the ... government eased the housing market-related regulations drastically in 2014” (Shin, Yi et al. (2019)).

In China, the expansion in credit supply was linked to policies adopted in response to the Global Financial Crisis. As noted by Cong, Gao, Ponticelli and Yang (2019), “the Chinese government encouraged an increase in credit supply to the real economy by banks.” These efforts included an increase in loan quotas on banks and adjustments of bank regulation. As Deng, Morck, Wu and Yeung (2015) say when describing policies instituted in 2009, “Beijing ordered state-owned banks to lend and they lent.” An expansion in loans to local government financing vehicles was an important part of this wider credit supply expansion (e.g., Bai, Hsieh et al. (2016), Chen, He and Liu (2020b)), and the expansion is directly tied to the boom in construction and residential investment. There were also attempts to directly boost housing through mortgage lending, such as the relaxation of the minimum downpayment ratio for non-primary houses in 2014 (e.g., Chen, Wang, Xu and Zha (2020a)).

Is the credit-driven household demand channel operative in China and Korea? What will happen in China and Korea going forward? What are the main similarities with the previous booms in history? What are the main differences? Can a discussion of the similarities and differences help predict what lies in store for the Chinese and Korean economies over the next few years? These are

the central questions of this essay.

### “Naive” forecast

Let us begin the analysis of China and Korea by directly extrapolating the regression results from the previous research. As shown in Mian et al. (2017), a rise in the household debt to GDP ratio robustly predicts a decline in subsequent real GDP growth. Table 1 reports coefficients from a specification similar to the one reported in Table III of Mian et al. (2017). The sample is extended to include additional data from the International Monetary Fund’s Global Debt Database (Mbaye, Badia and Chae (2018)), and the sample period is 1967 to 2015. In total, there are 70 countries included in the regression sample. The exact regression specification is:

$$\Delta_{pre,post}y_{it} = \alpha + \beta_{HH}\Delta_6d_{it-1}^{HH} + \beta_F\Delta_6d_{it-1}^F + \epsilon_{it}, \quad (1)$$

where  $\Delta_{pre,post}y_{it}$  is the difference in average annualized real GDP growth from the pre period to the post period in country  $i$ . The pre period runs from year  $t - 7$  to  $t - 1$ , and the post period runs from year  $t + 1$  to  $t + 3$ . The difference in the growth rates is regressed on the change in the household debt to GDP ratio and the change in the non-financial firm debt to GDP ratio from  $t - 7$  to  $t - 1$ .<sup>1</sup>

The estimated coefficient  $\beta_{HH}$  in column 1 is -0.09. This implies that a 23 percentage point rise in the household debt to GDP ratio from 6 years ago to last year leads to a  $(-0.09 \times 23 =)$  2.1 percentage point decline in average annualized real GDP growth in the three years after the boom relative to the five years prior. The coefficient estimate is precisely estimated. To put the magnitude of the coefficient in perspective, the size of the largest household debt booms prior to the Great Recession were on the order of magnitude of 35 to 50 percentage points, which would imply a reduction in annualized GDP growth of 3 to 4.5 percentage points. Large increases in household debt to GDP predict substantial declines in GDP growth.

Figure 3 shows a bin-scatter of the relationship between the change in real GDP growth from before to after the boom and the change in the household debt to GDP ratio during the boom using the pre 2015 data. The strong negative relationship is visible in the figure. The figure also shows a quadratic fit through the bin scatter, which illustrates a non-linearity as in the original Mian et al. (2017) results: a particularly large increase in the household debt to GDP ratio leads to a decline in subsequent GDP growth that is larger than would be predicted by the linear specification alone.

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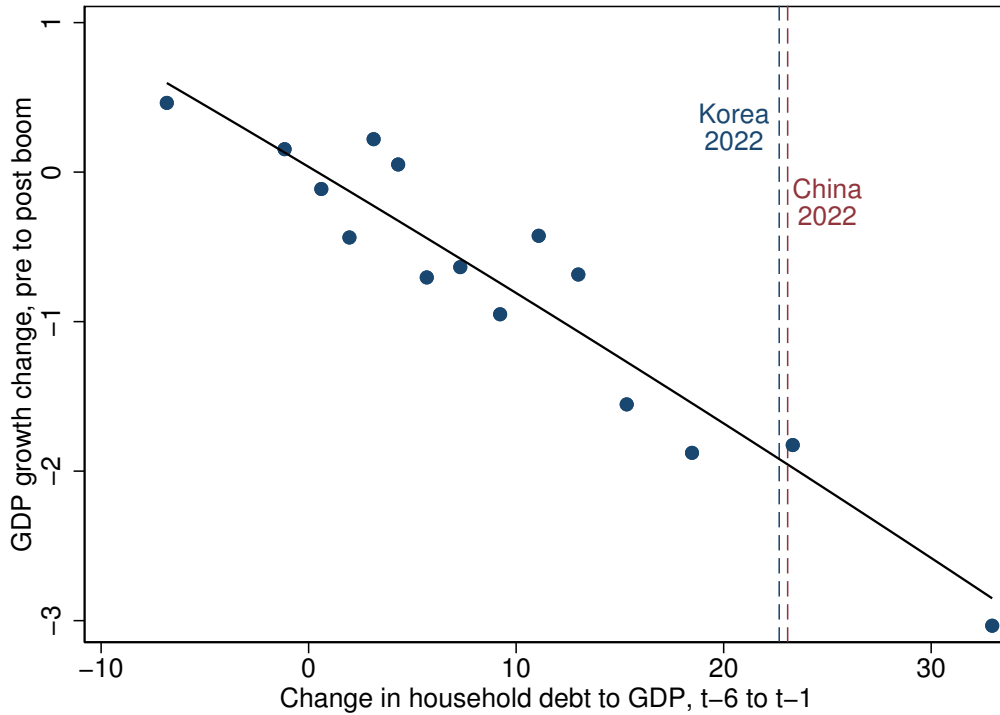
<sup>1</sup>This specification is a variation on the specification reported in Table III of Mian et al. (2017). In the original specification, country fixed effects are included and the left hand side variable is the change in log GDP from  $t$  to  $t + 3$ . In addition, in the original specification, the right hand side variables are changes from  $t - 4$  to  $t - 1$ . Using a longer time horizon for the change is motivated by the fact that the household debt booms lasted longer in China and Korea. The change in the left hand side variable is designed to make predictions easier to interpret. The results are qualitatively and quantitatively similar using the original specification from Mian et al. (2017).

Table 1: Household Debt Expansion predicts lower subsequent growth

	Dependent variable: $\Delta_{pre,post} y_i^{growth}$					
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta_6 d_{it-1}^{private}$	-0.01* (0.01)			-0.03** (0.01)		
$\Delta_6 d_{it-1}^{HH}$		-0.09** (0.02)			-0.07** (0.01)	
$\Delta_6 d_{it-1}^F$			-0.01+ (0.00)			-0.03** (0.01)
R-squared	0.03	0.09	0.01	0.08	0.11	0.03
Number of observations	966	966	966	966	966	966

This table reports regressions of real GDP growth on prior household debt expansion. The left hand side variable is the average annualized real GDP growth in the three years including  $t + 1$  to  $t + 3$  minus average annualized real GDP growth in the six years before  $t$  including  $t - 7$  to  $t - 1$ . The right hand side variables are the change in total private, household, and non-financial firm debt to GDP from  $t - 7$  to  $t - 1$ ; the results in columns (4)-(6) are from a specification that uses 2015 real GDP in U.S. dollars as weights +, \*, \*\* indicate the significance at 0.1, 0.05, 0.01 levels, respectively.

Figure 3: Household debt booms and GDP growth: The core relationship



This figure is a binscatter of the unweighted version of the regression specification in equation 1. The left hand side variable is the average annualized real GDP growth in the three years including  $t + 1$  to  $t + 3$  minus average annualized real GDP growth in the six years before  $t$  including  $t - 7$  to  $t - 1$ . The sample for the regression is all countries from 1962 to 2015. The two dotted lines show the rise in household debt to GDP for China and Korea from 2015 to 2021.

Figure 3 also evaluates the Chinese and Korean household debt rise in the context of the historical results. The vertical red and blue dotted lines in Figure 3 represent the rise in the household debt to GDP ratio in China and Korea, respectively. Taking the quadratic fit at face value, the rise in household debt in China and Korea implies a decline in real GDP growth of 2 percentage points from before to after the boom. This is an out-of-sample prediction based on the pre-2015 estimated relationship.

Table 2: China & Korea Prediction Results, unweighted GDP regression

Country	$\Delta_{15,21} \frac{HHD}{GDP}$	Coefficient	Prediction	Growth <sub>15,21</sub>	Predicted Growth <sub>23,25</sub>	IMF Forecast <sub>23,25</sub>
China	23.08	-0.09	-2.00	6.61	4.61	4.60
Korea	22.68	-0.09	-1.97	2.75	0.78	2.09

Table 2 presents the out-of-sample forecast more explicitly. The first column shows the rise in the household debt to GDP ratio in China and Korea from 2015 to 2021. The second column contains the coefficient from the linear regression reported in Table 1. The third column shows the predicted decline in GDP growth of 2 percentage points. The fourth column shows actual annualized real GDP growth in China and Korea from 2015 and 2021, and the fifth column shows the out-of-sample forecast for average annualized GDP growth from 2023 to 2025.

According to the out-of-sample forecast, real GDP growth in China from 2023 to 2025 will be 4.6 percentage points per year. It will be 0.8 percentage points for Korea. In the last column, we show the forecasted average annual GDP growth rates from the [International Monetary Fund's World Economic Outlook](#) for 2023 to 2025, which are forecasted as of April 2023. The WEO forecast and the forecast of the basic model in Table 2 are remarkably similar for China. For Korea, the WEO forecast is substantially more optimistic than the forecast implied by the regression model reported in Table 2.

It is important to emphasize that this is a “naive” forecast for China and Korea given the regression specification reported in the original study by [Mian et al. \(2017\)](#). There are important differences between historical episodes and the recent boom in China and Korea. The rest of this essay goes through the similarities and differences, with the aim of discussing whether the quantitative forecast is likely to be accurate for China and Korea going forward.

### Determinants of downturn severity

Research on the credit-driven household demand channel emphasizes five features that explain why a rise in household debt predicts a decline in subsequent economic activity:

- The close relationship between **consumption, debt burdens, and house prices** is a key element explaining why a rise in household debt burdens predicts a decline in economic activity. During the boom, consumption to GDP ratios rise, along with the importation of consumption goods from abroad. During the crash, a sharp decline in house prices leads to a pullback in consumption through both a standard wealth effect and through tightened borrowing constraints.
- Household debt booms can harm subsequent economic activity by **distorting the production sector** of the economy. Some of the largest household debt booms in history were associated with a substantial rise in construction and real estate activities, and household debt booms tend to lead to a shift in employment from the tradable to the non-tradable sector. When the boom ends, these changes on the production side of the economy are difficult to reverse, and they hold back growth well after the boom has ended.
- A rise in household debt is associated with a heightened risk of a **financial crisis** (see Jordà, Schularick and Taylor (2016) and further references in Sufi and Taylor (2022)), and financial crises are known to lead to substantial declines in economic activity (Jordà, Schularick and Taylor (2013)).
- A rise in household debt often occurs simultaneously in a large number of countries; a **rise in global debt burdens** reduces the ability of any given country of exporting its way out of a decline in domestic demand, as other countries are also contracting simultaneously.
- **Open economy frictions** also help explain the severity of downturns in the credit-driven household demand channel. In particular, countries that witness an increase in the current account deficit during a boom see more severe subsequent recessions, and countries that have less flexible exchange rates also see more severe subsequent recessions.

Are these features present for China and Korea? The answer to this critical question can help inform where the economies of China and Korea are headed over the next few years.

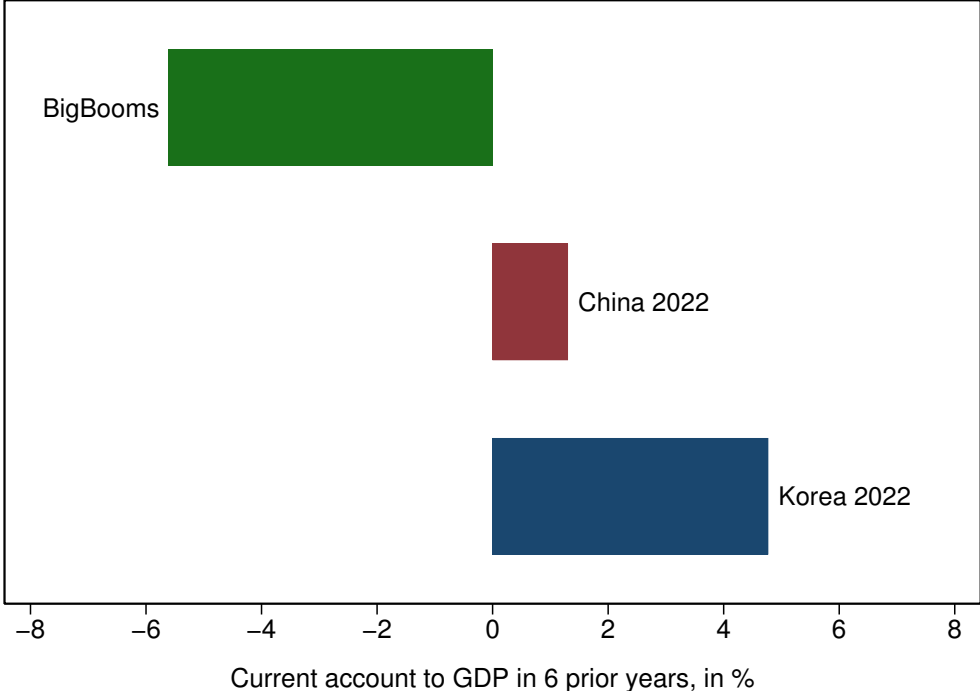
### **Global cycle and open economy considerations**

First, some good news. The international macroeconomic situation facing both China and Korea put them in a better position to avoid a severe downturn. Unlike the situation on the eve of the Great Recession, the global rise in household debt in recent years has been modest. As shown in Figure 1, the GDP-weighted global rise in household debt from 2015 to 2021 was 6.4 percentage points. This puts the rise in global household debt burdens between the 50th and 75th percentile of the distribution covering 1960 to 2021—above the median, but not extreme. In contrast, from 2001

to 2007, the rise in the GDP-weighted household debt to GDP ratio was 15.6 percentage points, the largest rise in the sample. A global credit-driven household demand channel is likely to be less operative today than it was in 2007.

However, forecasters at the IMF are pessimistic on global growth prospects from 2023 through 2025, as seen in the April 2023 edition of World Economic Outlook. The average of the forecasted growth rates for the world economy over the next three years is about 3 percentage points. This forecast is lower than the forecasts made in any year since 1993, with the exception of the forecasts made in the recession years of 2009 and 2020. If global growth is weak from 2023 to 2025, as is forecasted by the WEO, then a weak global economy may present challenges to both China and Korea, who both are likely to rely on exports to some degree to soften the blow coming from a slowdown in domestic consumption and residential investment.

Figure 4: Comparing with previous booms: the current account position



The green bar shows the average annual current account surplus to GDP ratio for big household debt booms from 1962 to 2015; a big boom is defined to be a rise in the household debt to GDP ratio from  $t - 7$  to  $t - 1$  in the top decile of the historical distribution. The bar graphs for China and Korea represent the same variable from 2015 to 2021.

A source of strength for both China and Korea relative to previous household debt booms is the current account position. Figure 4 shows the average annual current account deficit to GDP ratio during “big booms” in the sample from 1962 to 2015. “Big booms” are defined to be country-year observations where the rise in the household debt to GDP ratio from  $t - 7$  to  $t - 1$  was in the 90th



percentile of the distribution or above.<sup>2</sup> For big booms, the average current account deficit to GDP ratio was -5.5 percentage points, indicating that the rise in household debt in historical episodes was on average financed with capital inflows from abroad.

In contrast, both China and Korea ran current account surpluses during their household debt booms. From 2015 to 2021, China averaged a current account surplus of 1.3 percentage points, and Korea averaged a current account surplus of 4.8 percentage points. As shown in Mian et al. (2017), countries that experience large household debt booms while running current account surpluses still experience a decline in growth; however, the decline is less severe than countries that run current account deficits.

Countries with fixed exchange rates tend to see worse economic downturns after a boom in household debt, largely because the real exchange rate remains high, thereby restricting a shift toward exporting sectors of production when domestic demand falters. Mian et al. (2017) classifies countries into three categories based on the Ilzetzi, Reinhart and Rogoff (2019) classifications: Fixed exchange rate regime, intermediate, and freely floating. As of 2019, China is in the fixed exchange rate category, whereas Korea is in the intermediate category. The findings in Mian et al. (2017) imply that the exchange rate regime in China (and Korea, to a lesser degree) may hinder the re-adjustment needed if there is a large decline in domestic demand.

### **A financial crisis?**

Both China and Korea have experienced serious financial tremors over the past two years, and these tremors are closely tied to weakness in property markets. The vulnerabilities triggered by the property firm Evergrande in China in August 2021 and the Legoland bond default in Korea in September 2022 were ominous. Both events boosted measures of financial stress in the short-run. However, in both situations, a strong response by the government quelled the panic, helping to avert a full-blown financial crisis.

The willingness and ability of the government to manage financial stress due to a decline in property values is another major strength of China and Korea relative to the aftermath of previous household debt booms. In China, for example, all indications are that the government is willing to go to extreme lengths to prevent a major financial crisis from erupting. As Xiong (2023) notes: “The Chinese government’s commitment to financial stability and ability to mobilize local governments, state banks, and SOEs make a western-style debt crisis less likely.” Altman, Hu and Yu (2022) evaluate financial data for Chinese property and financial firms and come to the conclusion that “there is a low probability of a wide-ranging financial crisis ...” (although they do find that a “debt crisis in the real estate sector may be on the horizon”). Policy-makers in Korea also garnered a strong

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<sup>2</sup>For these “big booms”, the average rise in the household debt to GDP ratio from  $t - 7$  to  $t - 1$  was 28 percentage points. For China and Korea, the rise in the household debt to GDP ratio from 2015 to 2021 was 23 percentage points.

response to the threat of a financial crisis in the latter half of 2022, and all indications suggest that they will respond aggressively in the future as well. A financial crisis is not out of the question in Korea, but it is less likely than in historical credit cycles.

While a full-blown financial crisis does not seem likely in either country, the issues related to bad property and local government debt could take a toll on the Chinese economy in particular.<sup>3</sup> The Chinese banking sector has large exposure to the property market, both directly and through local governments. [Liu and Xiong \(2020\)](#) estimate that 25% of banking sector assets are collateralized by property, and over half of that exposure comes from exposure to firms and local governments as opposed to households.

The debt of local governments and local government financing vehicles (LGFVs), which generally invest in public infrastructure projects, are a key source of vulnerability.<sup>4</sup> [Chen, He and Liu \(2020b\)](#) describe the large increase in local government debt after the 2009 stimulus package in China. As the property market has cooled, there has been central-government led restructuring of the debt of LGFVs in particular. Early indications are that the central government will work to avoid any defaults on the debt of LGFVs, but it remains to be seen. Even in the absence of defaults, it is likely that the real economic activity driven by the investments of property firms, local governments, and LGFVs will decline substantially. This point is expanded on further below when discussing issues related to the production sector.

From the historical perspective, weakness in credit markets and the banking sector can have serious consequences for real economic activity, even in the absence of a full-blown financial crisis. [Baron, Verner and Xiong \(2021\)](#) discuss “quiet crises” in the historical data; these are episodes when bank equity values decline but there is no financial crisis. As they conclude, “the predictive content of bank equity declines is not simply driven by episodes with panics or bank failures and reinforces the result that episodes of non-panic bank distress are associated with substantial macroeconomic consequences.” Research from the 1990s on issues related to the banking sector comes to a similar conclusion (e.g., [Caprio and Klingebiel \(1996\)](#)). If losses on loans to property firms and local governments weigh down on Chinese banks, it will negatively affect economic activity even in the absence of a crisis.

## **Consumption and house prices**

The rise in house prices during a household debt boom tends to boost consumption; as [Mian et al. \(2017\)](#) show, a prominent characteristic of household debt booms has been a concurrent rise

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<sup>3</sup>Assessing the impact of financial market turmoil on economic activity in China requires a solid background in the Chinese financial system; the review chapter by [He and Wei \(2022\)](#) is an excellent starting point.

<sup>4</sup>For more on the debt of local government and LGFVs, which is perhaps the most pressing financial issue facing the Chinese government, see [this report in Caixin Global](#), [this report by Fitch](#), [this article by Bloomberg](#), and [this blog post by Marco Polo](#), a Paulson Institute think-tank.

in the consumption to GDP ratio. This, however, is not the case in China or Korea from 2015 to 2021. Over these six years, the average annual change in the consumption to GDP ratio in China was a modest 0.10 percentage points, and the average annual change in Korea was actually negative: -0.40. This is likely related to the fact that the ability to borrow against an increase in home equity is severely curtailed in China. As [Chen et al. \(2020a\)](#) note: “Chinese households cannot use home equity to obtain a line of credit for consumption and neither can they refinance their original mortgage debt to use a cash-out refinance for consumption.” In Korea, it is possible to borrow against the rise in home equity, but there are binding restrictions on total borrowing coming from government-imposed loan-to-value and debt-service ratio constraints. The lack of a consumption boom during the period of rising household debt is good news for China and Korea, as a large boom in consumption would likely have been unsustainable during the housing market correction.

However, there are worrisome signs for consumption in both countries. In China, consumer sentiment is closely tied to the housing market. [Shan, Wei, Li, Song, Hu and Tilton \(2019\)](#) document a strong correlation between house prices and consumer confidence as measured by the consumer confidence index of the National Bureau of Statistics on China. As [Shan et al. \(2019\)](#) point out, this is not surprising given that residential property represents the lion’s share of household assets in China. For example, [Han, Jurzyk, Guo, He and Rendak \(2019\)](#) show that housing assets made up almost 60% of total household assets in 2016 for Chinese households, and this is true even in the top quintile of the income distribution.

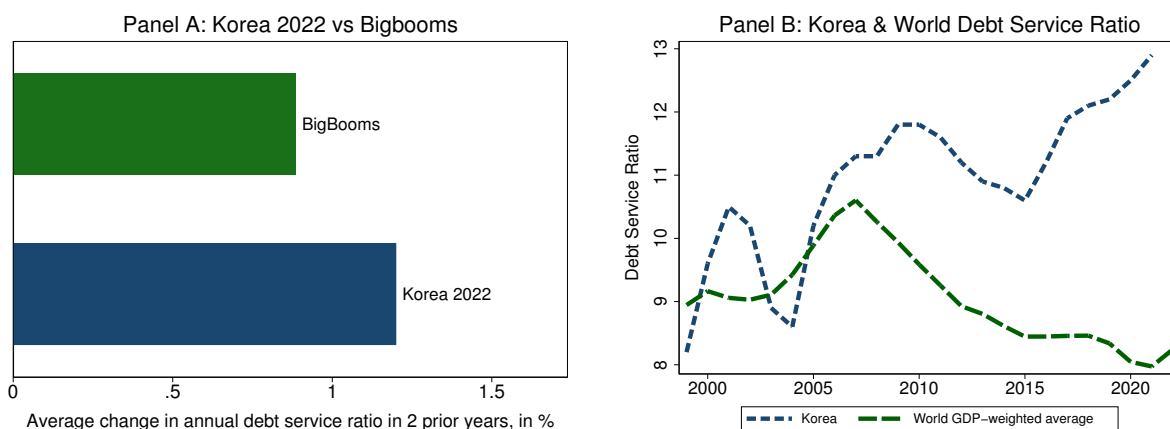
[Han et al. \(2019\)](#) also show a negative relationship between borrowing and subsequent household spending in household level data in China, and also using regional regressions in China. Households that borrow more in a given year typically see a reduction in consumption in the subsequent years, and this same relationship holds for regional areas that borrow more in a given year. This is a worrisome pattern given the large rise in the household debt to income ratio across households in China. Using micro data, [Han et al. \(2019\)](#) show a significant rise in the household debt to income ratio for Chinese households from 2010 to 2016, and this rise is present across the entire income distribution. The year 2016 is the last year in their sample, and it is likely that this ratio increased significantly from 2016 to 2019. For China, it will be imperative to track credible measures of household spending in the next year to see how property sector issues are affecting the household sector.

In Korea, the most worrisome issue for consumption is the sudden and large rise in interest rates. Since April 2022, the Bank of Korea has raised the base monetary policy rate from 1.25% to 3.50% to combat inflationary pressures and the weakening won. Over 80% of mortgages in Korea are floating rate, and so a rise in the monetary policy rate has an immediate impact on the household debt service ratio. From the end of 2020 to the third quarter of 2022, the household debt service

ratio has risen by 1.2 percentage points to almost 14%. Korea currently has the second highest household debt service ratio of any country in the world (behind Australia).<sup>5</sup>

The sudden and large rise in the household debt service ratio in Korea is even larger than in historical household debt booms, as shown in left panel of Figure 5. During previous household debt booms, the average rise in the household debt service ratio over a two year period is 0.8 percentage points. For Korea, as of the third quarter of 2022, it was 1.2 percentage points. The magnitude of the rise in the debt service ratio in Korea can be seen in the right panel of Figure 5. Since 2015, the global debt service ratio has declined slightly by 0.2 percentage points. There has been a slight uptick in 2022, but it is not large. In contrast, the debt service ratio in Korea has risen by more than 2 percentage points from 2015 to 2022.

Figure 5: Debt Service Ratio



In the left panel, the green bar shows the average annual debt service ratio for  $t - 1$  and  $t$  for big household debt booms from 1962 to 2015; a big boom is defined to be a rise in the household debt to GDP ratio from  $t - 7$  to  $t - 1$  in the top decile of the historical distribution. The blue bar shows the same variable for Korea for 2021 and 2022.

This is especially worrisome for Korea given the historical evidence on household debt cycles. Drehmann, Juselius and Korinek (2017) use a sample of 16 countries from 1980 to 2015 to show that household debt booms reach their most dangerous point when household debt service ratios start to rise significantly. At that point, the real economy begins to suffer. The study shows that the effect of a large rise in the household debt service ratio has a large negative impact on real GDP growth. The transmission of higher interest rates into lower household spending will be a key factor to monitor for Korea to assess future GDP growth.

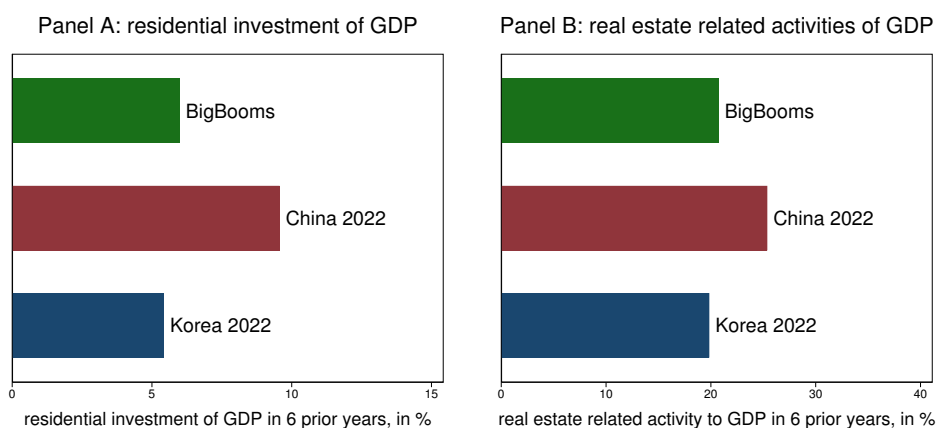
<sup>5</sup>The household debt service ratio is from the Bank of International Settlements. The variable is not available for China.

## Imbalances on the production side

The property booms associated with a credit boom have consequential effects on the production sector of the economy, boosting construction and real estate activity in particular. Müller and Verner (2023) use a sample of 117 countries from 1940 to 2014 to show that credit expansion to construction and real estate firms is a powerful predictor of subsequent economic downturns. A key reason for the subsequent downturn is that such booms “... coincide with an appreciation of the real exchange rate and a reallocation of labor and value added toward the non-tradable sector, suggesting rising sectoral imbalances.” Furthermore, such a reallocation is associated with a slowdown in productivity growth.

This is the most serious issue facing the Chinese economy, a point raised by several studies (e.g., Glaeser, Huang, Ma and Shleifer (2017); Rogoff and Yang (2021); Rogoff and Yang (2022); Shi (2018), Tilton, Sequeira, Shan, Kwon, Hu, Wei and Chen (2021)). The shift toward construction and real estate activities in China over the past decade is among the largest in the historical record. The left panel of Figure 6 shows the residential investment to GDP ratio for previous household debt booms, and for the booms in China and Korea from 2015 to 2021. The residential investment to GDP ratio was substantially higher in China during the boom compared to previous booms. In fact, the average annual residential investment to GDP ratio from 2015 to 2021 in China (9.6%) is the highest among any historical boom with one exception: Ireland from 2001 to 2007, which reached 10.2%.

Figure 6: Magnitude of the housing construction boom



In the left panel of this figure, the green bar shows the residential investment of GDP ratio from  $t - 7$  to  $t - 1$  for big debt booms from 1962 to 2015, defined to be a rise in the household debt to GDP ratio from  $t - 7$  to  $t - 1$  in the top decile. The bar graphs for China and Korea represent the same variable from 2015 to 2021. The right panel is same bar graph but for real estate related activities and the data is from Rogoff and Yang (2021). The data for the right panel end in 2018.

Rogoff and Yang (2021) create an alternative measure which incorporates the linkages between the construction and real estate sectors and the rest of the economy.<sup>6</sup> This methodology results in an estimate of how much of total production in an economy is impacted by the real estate sector. The right panel of Figure 6 uses data directly from Rogoff and Yang (2021) to compare previous booms with the booms in China and Korea from 2015 to 2018. Similar to the pattern shown with residential investment to GDP ratios, the dependence of the Chinese economy on real estate is substantially higher than the average of previous booms.

The average annual share of GDP that is dependent on the real estate for China from 2015 to 2018 is just over 25%. This is the highest among any observation in the data set from Rogoff and Yang (2021), which covers 9 countries from 2000 to 2018. The only other case that is comparable is Spain from 2001 to 2007, where the average annual share was 24%.

A common argument made to justify the enormous boom in construction and real estate activity in China over the past decade is that such an expansion was necessary given urbanization, population growth, and the need for better housing stock. This argument certainly carries some weight. However, research by Rogoff and Yang (2021) and Shan et al. (2021) evaluate the longer-term trends in urbanization, demographics, and investment demand in China to assess this argument in more detail. Both conclude that longer-term demand for housing is likely to fall. For example, Shan, Wang, Hu, Wei, Chen and Tilton (2021) show that annual demand for new urban housing peaked in 2018, and is likely to fall rapidly over the next 25 years. Furthermore, there is evidence that firms reallocated resources and managerial talent toward the real estate sector in a manner that reduces efficiency of the production sector (e.g., Shi (2018)).

A recent study by Rogoff and Yang (2022) evaluates housing supply and housing demand in the so-called “tier 3” cities in China. The findings are particularly ominous for future economic activity in these areas. As they show, the tier 3 cities account for 60% of China’s GDP, and they currently have a major imbalance between the supply and demand for housing units. A striking pattern illustrated in Rogoff and Yang (2022) is the evolution of house prices in Tier 3 cities from the beginning of 2021 through the middle of 2022: they find a 20% decline in house prices in Tier 3 cities, consistent with the observation that there are severe supply/demand imbalances in those cities. Rogoff and Yang (2022) conclude that their “estimates of the stock of housing show the sector is very likely going to demand constrained for a long time to come, and because of the outsized reliance of tier 3 cities on housing for wealth and employment, the adjustment could be a challenging one.”

How could this happen? How could it be that China has “overinvested” in property-related

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<sup>6</sup>See also the research analyses by Tilton et al. (2021) and Cook, Nie and Hall (2018) for estimates of the share of the economy linked to these sectors in China. Rogoff and Yang (2021) also have an appendix on their websites that provides an update and more details on their approach.

industries? The answer lies in incentives of both local governments and Chinese banks. Local governments rely on revenues from land sales to fund infrastructure and other government investment, which gives them a strong incentive to engage in policies that boost the housing market (see, e.g., Xiong (2023)). This is further amplified by the need for local governments to hit growth targets (e.g., Xiong (2018)). These incentives may have boosted both property developments and related infrastructure projects. In addition to these incentives coming from local government, a more standard behavioral explanation in which economic agents over-estimate the evolution of fundamentals could lead to over-investment.

The central worry is that many of these real-estate and infrastructure-related projects did not make economic sense. Pettis (2021) argues that in recent years, “...China began to overinvest systematically in projects that contributed less to the economy than they cost. The result was a sharp increase in the country’s debt burden: it is only when debt is used to fund non-productive investment that debt rises faster than a country’s debt-servicing capacity, for which GDP is a proxy.” This is a key point made in a series of papers by Bai, Hsieh, and Song (Bai, Hsieh et al. (2016), Bai, Hsieh and Song (2020)). Focusing specifically on investment projects driven by local governments in China, these authors argue that “The long-run effect of off balance-sheet spending by local governments may be a permanent decline in the growth rate of aggregate productivity and GDP.”

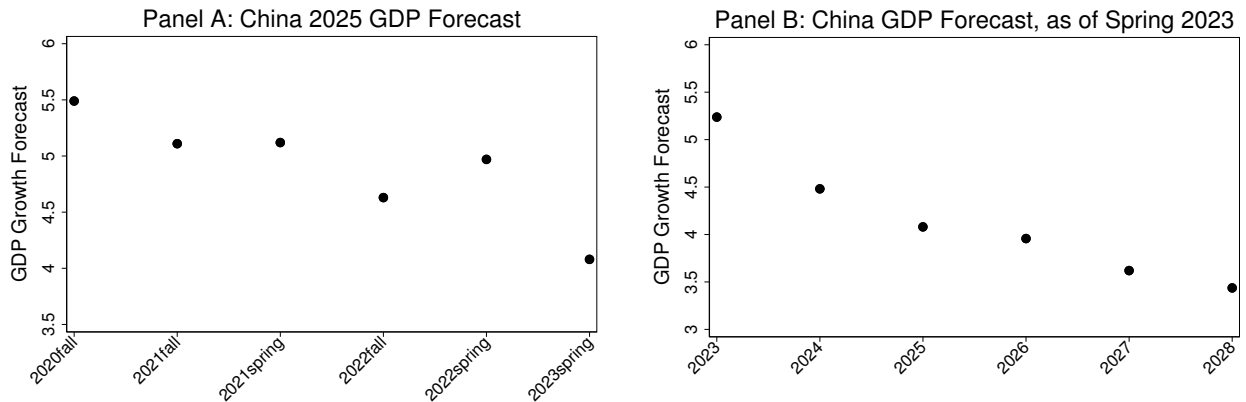
A key question for the Chinese economy going forward is the degree to which previous property-related development and infrastructure spending artificially boosted GDP in the short run, even though these projects were not economically viable in the long run.

## **Final thoughts**

There are key differences in China and Korea today relative to history that fortunately indicate that the economic correction following the household debt boom could be softer than in historical episodes. The global economy appears stronger, a full-blown financial crisis seems unlikely in either country, and both countries are in a relatively strong international position given the current account.

There are, however, two main threats. First, in both countries, consumer spending could be quite weak. This is an especially pronounced problem in Korea, where the debt service ratio has risen substantially and is now at an exceptionally high level. A rise in the debt service ratio during a household debt boom portends slower growth in the historical data, and Korea appears likely to follow that historical pattern.

Figure 7: IMF WEO forecasts of growth in China



For China, there are serious issues related to the production side of the economy. The allocation of production to real estate and construction activities over the past decade in China is historically unprecedented. It is difficult to imagine that the rate of activity in the real estate sector is sustainable, and it is difficult to see what sectors can take up the production slack if there is a continued decline in real estate activity. This perhaps explains the recent pessimism in economic forecasts made by the IMF’s WEO. The left panel of Figure 7 shows the revision in the forecast for real GDP growth in 2025 from the fall of 2020 through the spring of 2023. As the housing market has faltered, the forecast for growth in 2025 over time has fallen from 5.5% to 4%. The right panel of Figure 7 shows the forecast for growth from 2023 to 2028 from the Spring 2023 WEO. There is a substantial decline predicted for growth over time, with the forecasted growth for 2028 being almost 2 percentage points below the 2023 forecast. There are several reasons for this pessimism, but the weakness in the property sector is a major one.

The issues related to the high share of GDP in the real estate and construction industry are related to the bigger picture issue that the Chinese economy remains imbalanced toward low-productivity investment, largely due to government policy. Pettis (2021) places the current predicament facing China in the broader framework of the difficulties for emerging markets to shift from an economy driven by investment to an economy more evenly driven by consumption and investment. A broader discussion of this issue is in the book by Klein and Pettis (2020). This is consistent with the IMF country report on China published in February 2023, which says “On the demand side, without sustained rebalancing towards consumption, the saving rate will remain too high, enabling continued high investment in less productive sectors even as the real estate sector shrinks ... Lower potential growth risks worsening debt dynamics in the economy, as deleveraging through high growth becomes less likely, and creating challenging policy tradeoffs. The slower growth rates relative to the past decades will also weigh on growth in other countries, especially those with close trade links to



China”. The situation in China is worth watching carefully, as the future of the Chinese economy will have important implications for Asia and beyond.

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## A Data Appendix

*Household debt and non financial firm debt.* Household and non financial firm debt are from the International Monetary Fund Global Debt Database. See text details on the private debt variable definition.

*National Account.* National accounts data are from the World Bank’s World Development Indicators (WDI) database. We use annual data in current and constant prices from the WDI on GDP,  $Y$  and Gross fixed capital formation (% of GDP).

*Current Account.* Current account series,  $CA$ , is from the OECD.

*Debt Service Ratios.* Debt service ratios are from Bank for International Settlements “Debt service ratios for the private non-financial sector” series.

*Residential Investment.* Residential Investment data is from the OECD Economic Outlook “Gross fixed capital formation, housing” annual data, or from OECD “Investment by asset: Dwellings, % of GFCF” combined with WDI Gross fixed capital formation (% of GDP)<sup>7</sup>. China residential investment data is from China Statistical Yearbook published by National Bureau of Statistics<sup>8</sup>.

*Real Estate Related Activities.* Real Estate Related Activities are from the Rogoff & Yang CWE 2021.

*GDP Growth Forecast.* GDP growth forecast is from the IMF World Economic Outlook (WEO) data publication since 1990 (“S” for the Spring WEO forecast and “F” for the Fall WEO forecast), including 2-years of historical data and 6-years of forecast data.

*Housing Price Index.* Housing Price Index are from BIS, Federal Reserve Bank of Dallas and OECD, in both nominal and real terms. Source: Bank for International Settlements “Residential property prices: selected series (nominal and real)”. Federal Reserve Bank of Dallas “International House Price Database”. and OECD Housing prices.

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<sup>7</sup>We adopt 2 methods to obtain the residential investment to GDP ratio: (a) OECD Gross fixed capital formation, housing data, divided by the GDP. (b) the alternative approach - multiply the OECD data series “Investment by asset: Dwellings, % of GFCF” by the Gross fixed capital formation (GFCF % of GDP) from WDI, to calculate the resident investment to GDP ratio.

<sup>8</sup>The real estate section of the China Statistical Yearbook details the real estate investment into “residential buildings”, “office buildings”, “buildings for business use” and others.