# HOUSEHOLD HETEROGENEITY AND THE TRANSMISSION OF MORTGAGE POLICY IN CHINA: THE SPECULATIVE CHANNEL

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Booms and busts of a country's housing markets are inexorably connected with its macroeconomy. In this paper we study two important questions about housing booms that remain open:

(1) What's the role of credit policies in housing booms?
(2) Are housing booms driven mainly by fundamental or speculative demands?

There are disparate views on these questions in the literature. For example, Favilukis, Ludvigson, and Nieuwerburgh (2017) argue that the main cause of the U.S. housing boom prior to 2007 is an increase in housing consumption by credit-constrained households in response to a relaxation of collateral requirements. On the other hand, Kaplan, Mitman, and Violante (2017) attribute this housing boom mainly to the speculative investment of existing homeowners. The speculation was characterized by changes in belief about growth of future house prices.

In this paper, we exploit a unique loan-level dataset on China's mortgage to address the above two questions. During 2014Q4-2016Q2, China relaxed its mortgage policies by reducing the minimum down payment ratio of non-owner-occupied houses from 60-70% to 30%. Accordingly, it experienced a housing market boom: the average annualized growth rate of housing prices for the 35 major cities in China reached 7.30% during this period, as contrast to a 2.32% growth rate during 2011Q1-2014Q3; the average annual newly issued mortgage amount for the same group of cities during this period is 70 percent higher than its counterpart during 2011Q1-2014Q4. On the other hand, the aggregate consumption growth rate declined by 4% during this period, and more so for cities with faster housing price growth.

Hence, China's recent policy experiment offers a unique perspective to explore the role of mortgage policy on housing booms and the importance of speculative demand in this transmission. Specifically, we ask three questions: (1) How did a change in the mortgage credit policies fuel the rise in mortgage borrowing and housing prices during the recent Chinese housing boom? (2) How important is the speculative channel in this transmission? (3) What are the welfare consequences of such policy changes on households of different ages and income level? Our findings suggest that changes in mortgage policies play a crucial role in fueling the recent housing boom in China via the speculative channel on housing demand.

We address the above questions from both empirical and theoretical perspectives. Empirically, using a proprietary loan-level mortgage data set and a micro-data set on household

consumption covering 70 cities in China, we find that following the relaxation of down payment requirement, mortgage shares of middle-aged high-income households increased significantly (Figure 1 and Table 1). By contrast, the corresponding share of young high-income households declined, which is puzzling from the standard permanent income theory.

We then identify the speculative channel of mortgage policies by exploiting cross-city difference in ex-ante exposure to speculative housing demand, measured by the share of non-owner-occupied housing mortgage in total mortgage for individual cities before the mortgage policy change. We find that cities with stronger exposure to speculative demand experienced faster mortgage growth (Figure 2), larger increase in the mortgage share of middle-aged high-income household, faster housing prices growth (Figure 3), but lower consumption growth (Figure 4).

To shed light on the transmission of mortgage policies into housing markets via the speculative channel and to explore the welfare implications of such policies, we construct an overlapping-generations heterogeneous-household model with down payment constraints and housing tenure choices. Three key features consistent with China's institutional details are incorporated into this model: first, owner-occupied and non-owner-occupied housings are subject to different down payment ratios. As a result, a reduction in the down payment ratio for non-owner-occupied housing affects the households' purchasing decision on their primary house only through its indirect effects via housing prices. Second, households' utility on housing services contains two stochastic regimes, which capture belief about future housing demand as the likelihood of switching from one regime to the other. Under a strong belief about future housing demand, households are expected to enjoy high capital gain when the minimum down payment ratio for non-owned-occupied housing is reduced. Third, rental markets are frictional, which prevent the households with non-owner-occupied housing to rent them out to those without housing.

We find that a cut in the down payment ratio for non-owner-occupied houses involves a self-enforcing effect on housing demand under the speculative channel. With belief of strong future housing demand, a reduction in the down payment ratio for non-owned-occupied housing triggers an initial housing price increase by encouraging investment in non-owner-occupied housing. This, in turn, generates capital gains for households who are homeowners before the policy change and encourage them to switch to a large house for speculative purpose. Such a process is self-enforcing via the down payment constraint, as a stronger

housing demand, and thus, a higher housing price further fueled speculative demand in housing.

Our findings are crucial for evaluating the effectiveness of mortgage policies in China on home ownership and their welfare consequences. We show that, as an unintended consequence of the change in mortgage policies, higher housing prices makes housing less affordable to young households who were not homeowners before the policy changes. This policy change, moreover, crowded out consumption for those already or would-be homeowners. We explore the welfare consequences of alternative policies for different households in the economy.

TABLE 1. Share Change between 2013 and 2015: Mortgage Amount

| | Middle School and Below | High School | College and Above |
|---|---|---|---|
| Age $<$ 30 | -1.709 | -2.422 | -2.580 |
| 30 $\leq$ Age $<$ 50 | -4.540 | -2.122 | 13.451 |
| Age $\geq$ 50 | -0.507 | -0.394 | 0.823 |

TABLE 2. Share Change between 2013 and 2015: Mortgage Number

| | Middle School and Below | High School | College and Above |
|---|---|---|---|
| Age $<$ 30 | -1.527 | -1.132 | -0.089 |
| 30 $\leq$ Age $<$ 50 | -4.878 | -0.722 | 8.124 |
| Age $\geq$ 50 | -0.326 | -0.047 | 0.597 |

FIGURE 1. Mortgage Composition

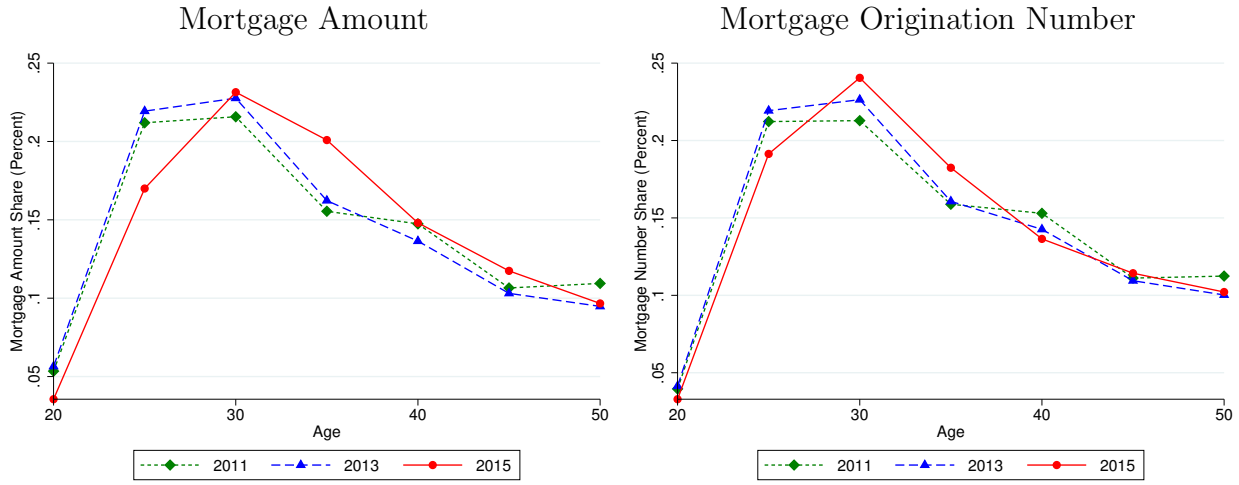


FIGURE 2. (Normalized) Total Mortgage Amount

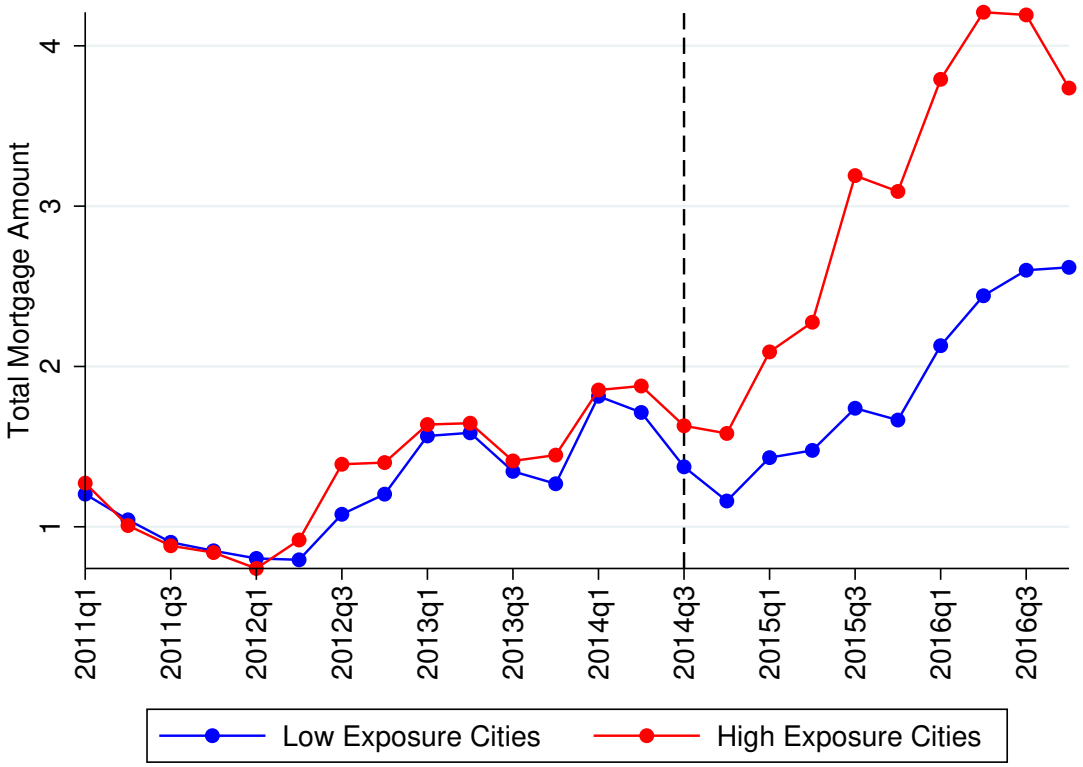
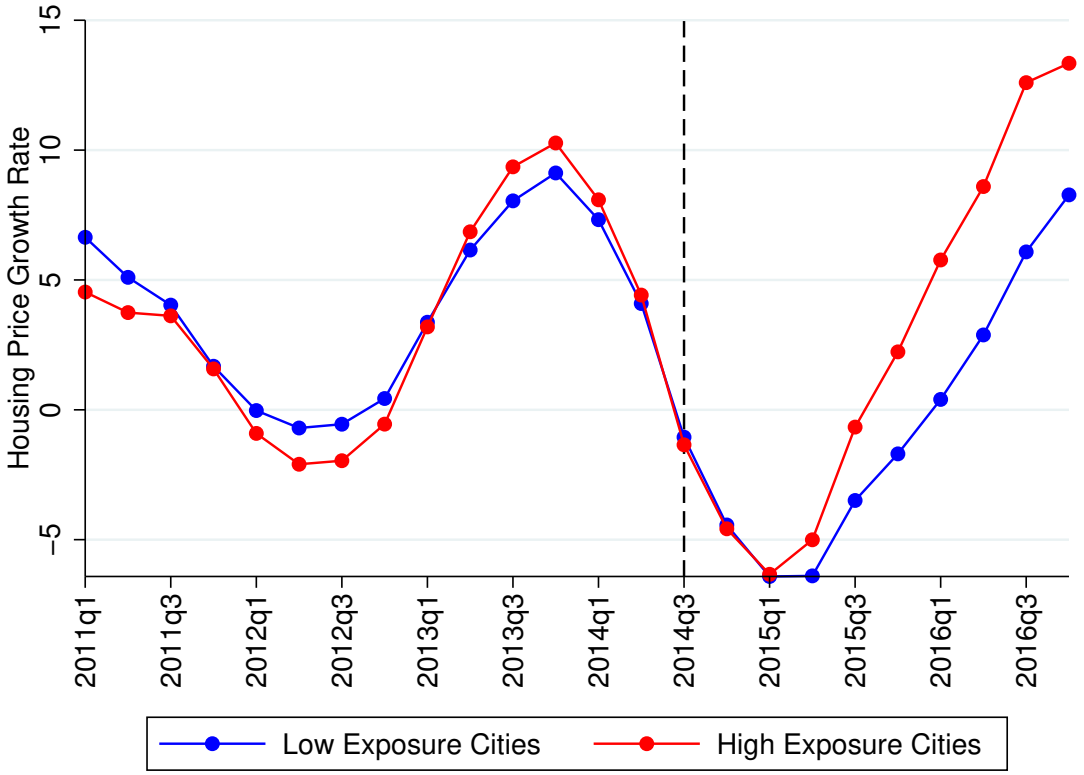
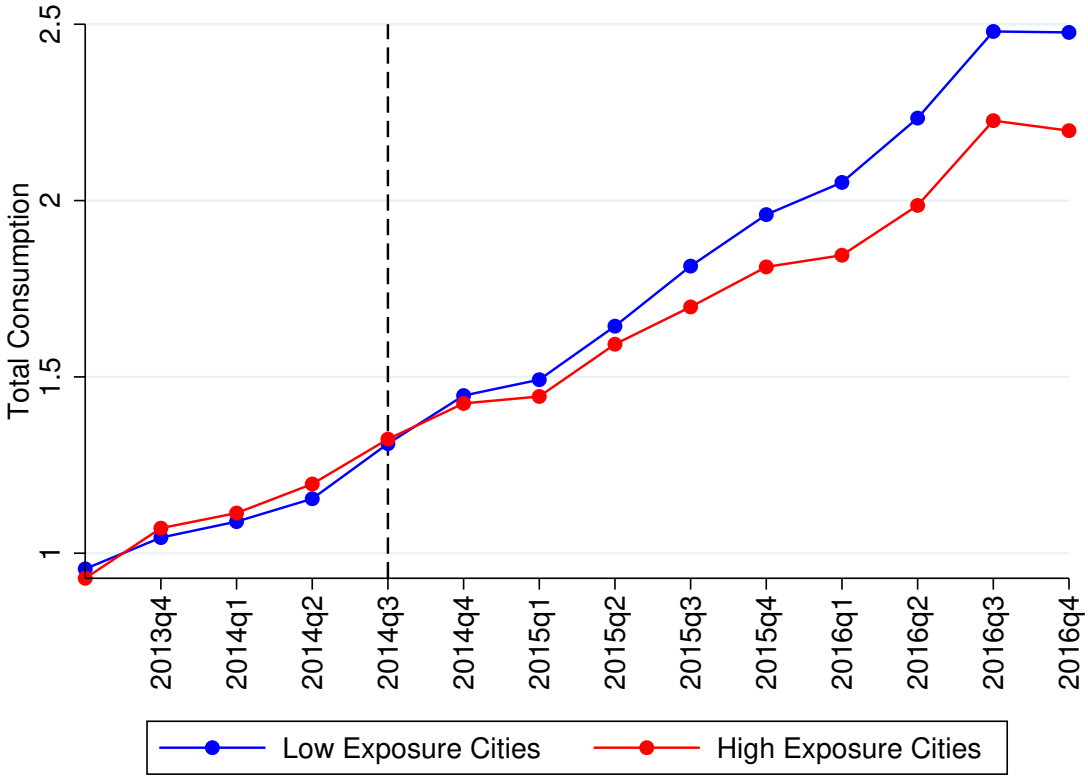


FIGURE 3. Housing Price Growth Rate Y2Y (NBS)




Notes: Fang, Gu, Xiong, and Zhou (2015) provide a more comprehensive approach to construct house price indices for various cities, but the those series discontinued after 2013. We apply the approach of Fang, Gu, Xiong, and Zhou (2015) to our transaction-based data and find that the post-2012 house price indices for 70 largest cities are remarkably similar to the NBS series.

FIGURE 4. (Normalized) Total Consumption



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