

Impact of One-child Policy on Housing Bubbles

Introduction

My research aims to study how housing bubbles in China could be potentially influenced by the 36-year-long One-child policy (OCP) and the male-biased sex ratio that stemmed from it.

OCP was enacted in 1979 but was not strictly enforced until ten years later, in 1990, OCP was linked to the promotion of local officials and provided local officials the incentives to increase the penalty fines.

In the early 1990s, the marketization of houses in China happened after the unprecedented housing reform. The housing prices skyrocketed in the following decades due to the rapid urbanization and policies made to stimulate investment in the housing market, as a thriving real estate industry can bring in more job opportunities and contribute to GDP growth.

Regarding the recent unprecedented housing crisis in China, most speculations employ the “post-COVID-19” narrative, claiming COVID-19 as the ultimate culprit for the significant decrease in housing prices. Admittedly, COVID-19 may have catalyzed the process, but it is also possible that this bubble-bursting process began before COVID-19 made it discerned by people.

I would like to explore the potential underlying factors, specifically OCP and the consequent male-biased sex ratio, that caused the bubbles to burst in China, my research will investigate these factors in a difference-in-differences framework by answering the following questions:

1. Before COVID-19, were housing prices in different regions influenced by previous enforcement of OCP in that region?
2. Does the local imbalanced sex ratio at birth (men: women) during the OCP era aggravate or alleviate the burst of bubbles before COVID-19?

Motivation

This topic is interesting as it centers around OCP, a policy that created the biggest only-child generation in history, this artificial social experiment is likely to lead to unexpected and unique outcomes. The importance of this topic can be summarized in the following reasons: firstly, it focuses on the housing market and population composition of China, the second largest economy with approximately a fifth of the world's population. Secondly, population composition determines demand in the housing market, and the housing sector accounts for more than 25% of Chinese GDP; these two features of the Chinese macroeconomy are closely intertwined and play a crucial role in the economic prospects of China. In an era of globalization, studying topics related to China can give us useful insights into how the global economy will be consequently influenced in the future.

Regarding the legacy of OCP, some scholars suggest it lingers longer than expected, for example, the severity of China's aging and decreasing growth rate will not be effectively alleviated given the universal two-child policy started in 2016 (Jia and Li, 2019). This can be linked to another study that investigated the lifecycle outcomes of individuals who grew up under the influence of OCP: Huang, Lei, and Sun (2020) found that individuals with exposure to stricter OCP restrictions when young are more likely to receive more education, work a white-collar job, delay their marriage, and have a lower fertility rate.

Another issue that arose from OCP is the sex ratio imbalance in China. After the implementation of OCP, the deep-rooted son preference in China caused the "missing girl" phenomenon (Ebenstein, 2010), and the imbalanced sex ratio was also found to be correlated with an increase in the probability of depression among Chinese men (Zhang, He and Ma, 2021).

According to Bian and Gete (2015), housing preferences (e.g. marriage house) and population shocks play an important role in explaining the changes in housing investment and prices in China. One article by Ding (2019) indicates the population control policy in big cities of China decreases housing prices. Therefore, the legacy of OCP and the imbalanced sex ratio could potentially affect the housing dynamics in China. In terms of the relationship between housing prices and individual decisions, most studies in the field focus on the impact of housing price instead of the other way around: high housing price

delays the age of the first marriage (Zhao, Chen, and Li, 2023) and decreases the fertility rate (Clark, Huang and Yi, 2019).

Among the plentitude of articles that study such a relationship between housing prices and individual decisions, one paper specifically demonstrates how high housing prices could potentially alleviate the sex-ratio imbalance in China: Guo, Wang, Yi, and Zhang (2022) employed a difference-in-differences estimator to identify the impact of housing prices on the sex of second-born child after the implementation of housing reform and OCP in the early 1990s. They found the probability of having a second-born con decreases as housing price increases.

Albeit the authors considered OCP in their research, one might wonder how the newborn babies in their study would behave after entering adulthood. My research will build on their paper and use the difference-in-differences framework to study a reverse causality in a more recent context: the impact of OCP and son preference on the housing bubbles in China prior to COVID-19, with a specific focus on cohorts born after the tightening of OCP.

Underlying Economic Theories

Life-Cycle Theory

In the 1950s, Modigliani and Brumberg proposed the Life-cycle Hypothesis that suggests individuals make decisions about consumption, savings, and fertility over the course of their lives. One of these decisions is investment in

human capital (Becker, 1964), meaning individuals allocate their time and resources to education and training in the hope of enhancing their productivity and earning potential in the future. This is particularly true for the generation, especially females, that grew up under the influence of OCP, as mentioned in the motivation section, they are found to be more likely to delay marriage and pursue higher education, so it is conceivable that they prefer more affordable and flexible housing options (e.g. renting instead of owning property) in a period of uncertainty and individual development. Applying this to my study, the prediction is OCP negatively affects the housing price through its impact on individual human capital investment decisions of the only-child generation.

Status Good

The concept of status good was proposed by economists to demonstrate that owners can derive utility from comparing their good's value with the values of similar goods owned by members in the comparison group (Frank, 1985). In the context of China, houses can also fall under this category since it is a very visible form of wealth and can improve men's perceived attractiveness in the marriage market competition caused by sex-ratio imbalance (Wei, 2017).

An imbalanced sex ratio at birth can be seen as a signal of son preference, and in places where this ratio is higher, competition in the marriage market can potentially lead to a higher demand for houses. But in the meantime, the

increasingly high pressure from work and out-of-reach housing prices could convert a good number of men into “herbivore men”, who prioritize personal interests over pursuing career goals and marriage. As a result, the impact of a distorted sex ratio on housing prices prior to COVID-19 remains ambiguous and will be worthwhile to explore in my research.

Data Sources

In my research, the unit of observation is 70 major medium and large-sized cities in China. The three most important variables of interest are the Property Price Index (PPI), birth rate, and local sex ratio at birth. PPI demonstrates the current property price level compared to the same period last year, in other words, it reflects the change in property prices, and it is used as the dependent variable in my study. Because of the nature of the difference-in-differences framework, I will use PPI from year 2011 to 2019, the reasons will be discussed in the empirical strategy section.

EPS will provide data for the PPI of 70 medium and large-sized cities in China. Both PPIs in the newly-built and second-hand residence markets will be used to further investigate if differences in impact of interest exist for different types of houses.

Birth rate and local sex ratio at birth constitute the primary independent variables of interest, with the former being a proxy for the strictness level of OCP and the latter being consequently caused by son preference under OCP.

Birth rate data will come from years 1985 to 1994 because individuals born during this period constitute the 25-year-old age groups during 2011-2019, please refer to the next section for the reason behind choosing 25 years old. Local sex ratio data at birth will also come from people born between 1985 and 1994. Both birth rate and sex ratio at birth will be obtained from the Gotohui website.

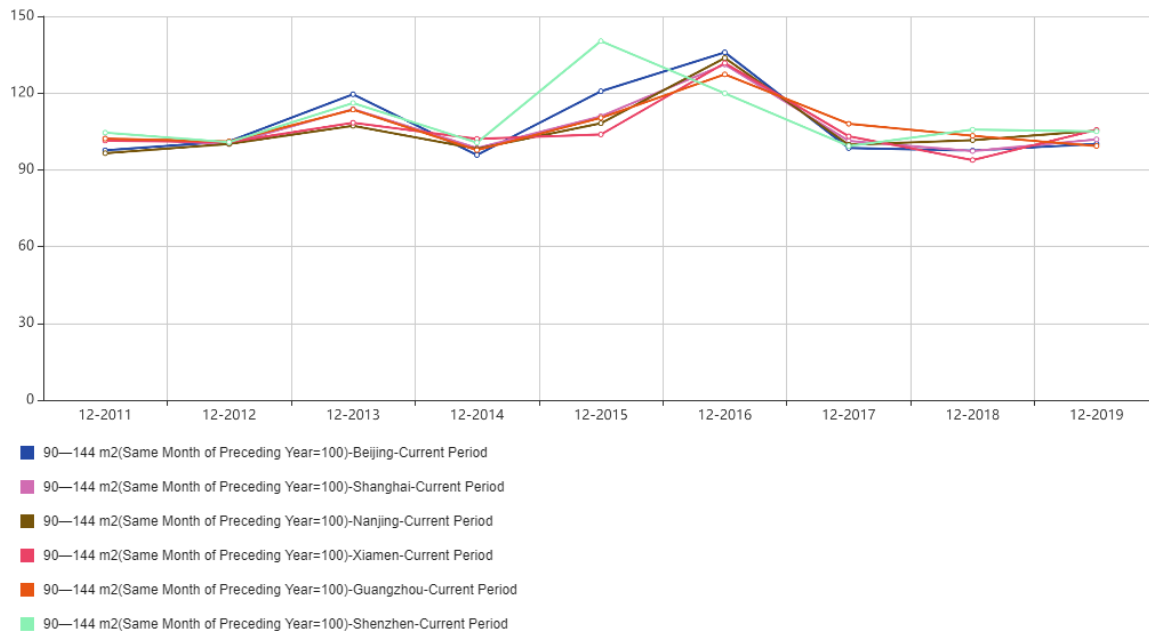
Besides, for the potential controls in my model, I will also use the EPS website to control for GDP, employment rate, income, labor force population, education by sex, and so on, at both the year and regional level. When needed, the CFPS website will also supplement data that EPS lacks.

Empirical Strategy

In my study, the cohorts of interest are the people who were born in or after 1990, the year when the tightening of OCP happened nationwide, and the time window being considered for the dependent variable PPI will be from 2011 to 2019, to firstly, cover both the years when cohorts born before OCP tightening turned 25 (2011 to 2014) and several years after 2015 to include subsequent cohorts of interest; it ends at 2019 to exclude the impact of COVID-19. The year 2015 is obtained by calculating the year that the 1990-born cohort (the first cohort born after the tightening of OCP) turned 25 ($1990+25=2015$). The choice of the 25-year-old cohort is made on purpose, because it is the average age of first marriage in China, as mentioned in the motivation and

theories section, marriage is a big reason for purchasing houses in China, thus the effect of OCP on individual marriage decisions can influence housing price.

Inspired by the article “Housing prices and son preference: Evidence from China’s housing reform” (Guo, Wang, Yi, & Zhang, 2022), I will use a similar difference-in-differences framework to study the impact of OCP and the consequential sex-ratio imbalance on the housing market in China. However, because of the panel data used in my study, it will appear more like a two-way fixed effects difference-in-differences model. The source of variations in OCP strictness level and sex ratio comes from the location and time, from which I infer the variations exist in my dependent variable (PPI).



PPI trend of selected cities from December 2011 to December 2019

The difference-in-differences estimation method requires the dependent variable (PPI) to follow a common trend in the 70 major cities before my first

cohort of interest turned 25 in 2015, to validate the common trend

assumption, I will plot the trend of PPI using years prior to 2015.

To estimate the potential impact of OCP strictness level and local sex ratio on housing prices, I propose the following specifications:

$$PPI_{rt} = \beta_0 + \beta_1 BR_{rt-25} + \beta_2 Post_t + \beta_3 BR_{rt-25} Post_t + \gamma_r + \lambda_t + \beta_4 X_{rt} + \epsilon_{rt} \quad (1)$$

$$PPI_{rt} = \beta_0 + \beta_1 SR_{rt-25} + \beta_2 Post_t + \beta_3 SR_{rt-25} Post_t + \gamma_r + \lambda_t + \beta_4 X_{rt} + \epsilon_{rt} \quad (2)$$

In these specification equations, PPI_{rt} represents the PPI in region r , at time t ; in equation (1), BR_{rt-25} is the birth rate in region r , at time $t-25$ (the birth rate for the 25-year-old cohort at t); in equation (2), SR_{rt-25} represents the sex ratio at birth in region r , at time $t-25$ (similarly, the sex ratio at birth for the 25-year-old cohort at t); time dummy $Post_t$ takes the value of one if t is or is after 2015, and takes the value zero if t is before 2015.

β_3 , the coefficient in front of the interaction terms, captures the difference-in-differences treatment effect of birth rate, the proxy for OCP strictness level, in equation (1), and the treatment effect of sex ratio at birth, the proxy for son preference, in equation (2). γ_r is regional fixed effect and λ_t represents the time fixed effect. ϵ_{rt} is the error term in region r , at time t .

To account for the endogeneity issue that arises from unobservable factors that affect both PPI and birth rate, I proposed ER_r to be my instrumental variable.

ER_r is a ratio calculated by the university-educated population of females over that of males in region r , using the 1990 census. The justification is education and fertility are negatively related, especially for women, and ER_r

affects PPI only through its impact on the birth rate. A higher ER_r means a bigger proportion of educated women relative to men in region r , thus a lower birth rate. The validity of this instrument will be further tested in my analysis.

Word Count: 2068

References

- Becker, G. S. (1964). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*. University of Chicago Press.
- Bian, T. Y., & Gete, P. (2015). What drives housing dynamics in China? A sign restrictions VAR approach. *Journal of Macroeconomics*, 46, 96-112.
- Clark, W. A. V., Huang, Y., & Yi, D. (2019). Can millennials access homeownership in urban China? *Journal of Housing and the Built Environment*, 1-19. 9.
- Ding, Y. (2019). Housing prices and population dynamics in urban China. *Pacific Economic Review*, 24(1), 27-45.
- Ebenstein, A. (2010). The "Missing Girls" of China and the Unintended Consequences of the One Child Policy. *The Journal of Human Resources*, 87.
- Frank, R. H. (1985). The demand for unobservable and other non-positional goods. *The American Economic Review*, 75(1), 101-116.
- Guo, R., Wang, Q., Yi, J., & Zhang, J. (2022). Housing prices and son preference: Evidence from China's housing reform. *Economics of Transition and Institutional Change*, 30(3), 421-446.
- Huang, W., Lei, X., & Sun, A. (2021). Fertility restrictions and life cycle outcomes: Evidence from the One-Child Policy in China. *Review of Economics and Statistics*, 103(4), 694-710.
- Li, H., Zhou, T., & Jia, C. (2019). The influence of the universal two-child policy

on China's future population and ageing. *Journal of Population Research*, 36(3), 183-203.

Wei, S., Zhang, X., & Liu, Y. (2017). Home ownership as status competition: Some theory and evidence. *Journal of Development Economics*, 127, 169-186.

Zhang, K., He, F., & Ma, Y. (2021). Sex ratios and mental health: Evidence from China. *Economics & Human Biology*, 42, 101014.

Zhao, C., Chen, B., & Li, X. (2023). Rising housing prices and marriage delays in China: Evidence from the urban land transaction policy. *Cities*, 135, 104214.