# Evidence of a Housing Bubble in Beijing

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*Abstract*

*The price of residential housing in Beijing has increased at an annual nominal rate of 20 percent for the past decade. This rapid growth has happened in a period of rapid urbanization where rural people have moved to cities and towns and there is a rapid and sustained growth in per capita income. This paper reports on the findings from a purpose-designed survey administered to a total of 420 households in 16 districts in Beijing on the determinants of house prices. Our analysis reveals that housing prices in Beijing have deviated above the norms in terms of expectation and affordability. Economic fundamentals in the form of income growth and low interest rates on home-loans are able to explain just 12 percent of the inflation in house prices. The remainder is due to speculation which is another reason for the bubble in house prices. Policies, in the form of interest rate hikes, reduced loans to purchase second and third homes, and limits on the purchase of additional homes have been introduced to slow the growth of the bubble. Respondents to the survey doubt the effectiveness of these policies in slowing the growth of price bubble, both in the short and the long term.*

*Keywords: housing bubble; housing policy; Beijing housing market; marriage;*

## 1. Introduction

The recent boom in the housing market in Beijing, capital of China, provides a good opportunity to assess the evidence for a bubble and find reasons for its formation. Over the last decade, residential prices in Beijing have increased at an annual nominal rate of 20 percent. Figure1 shows the monthly percent change of housing prices from 2005 to 2012 in Beijing. The growth rate of housing prices kept increasing during most of the time after 2007, but fell sharply into negative territory in 2008 as a result of the global financial crisis. It revived and reached a new and record high in 2009 as China started to recover from the crisis, but decreased in the first half of 2012. Supply of housing has increased with demand but the rising prices suggest that the growth in demand has outstripped the increase in supply. This is demonstrated by what happened in Tongzhou, one urban district in Beijing: it had 1.87 billion square meters of living space under construction in the first quarter of 2010, 36% more than in the first quarter of 2009; however, prices in Tongzhou in the same period still increased by 20.8%.

**Figure1:** The housing price index monthly growth rate in Beijing from 2005 to 2012
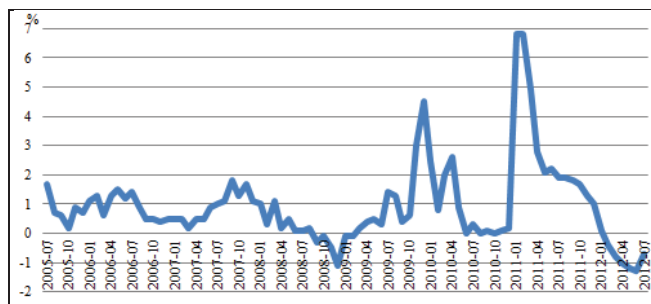


**Source:** China Statistic Report 2006-2012, published by China Statistics Bureau.

The favorable economic growth promotes the prosperous development of housing market in Beijing, given the income growth and rapid increase of GDP. From 2001 to 2012, the annual disposable income per household increased by 61.4% to RMB 30,000. In 2012, Beijing's nominal GDP reached RMB 1.78 trillion and RMB 87,091 per capita GDP. At the same time, continuous migration to urban cities and natural population growth drives up the demand for housing. According to the Beijing Statistical Information Net [1], between 2001 and 2012, the population in Beijing has grown by 33.3% to 21 million, and the number of immigration who gets the Beijing Hukou[2] increased from 174,865 in 2003 to 211,447 in 2011. Given the limited amount of available land in urban areas in Beijing, housing prices were pushed up by the excess demand for housing. However, prices have raised more than it should be according to these reasons. For example, Hou (2010) found the bubble started to appear in Beijing from 2005 and peaked in 2007 based on the large deviation of prices from fundamentals.

To control the price inflation, a succession of measures was introduced by the local government to subdue speculative buying and force developers to increase the supply of housing. There are two major recent policies. Firstly, from 2010, the local government restricted purchases of multiple homes[3]. It aims to restrain the speculative investment in Beijing housing market. According to new rules, the local government forbade the Beijing registered family who own more than two houses to purchase additional houses. The non-registered family who have more than (or equal to) one houses is also forbade to purchase additional houses if they have no documents certifying that members of family have been paying social security or income tax for five straight years.

Secondly, from 2005, the local government enlarged the supply of the public housing[4]: the affordable housing, low-rent housing and housing with limited prices. Each of them has the different target, application criteria, housing size and transaction conditions[5]. The low-rent housing is targeted at Beijing registered and low-income families with the yearly household income less than RMB6,960. The affordable housing is targeted at those becoming Beijing registered families for at least 3 years and single applicants should be over 30 years old. The yearly household income should be less than RMB22,700. The housing with limited prices is targeted at urban families with middle-income level who cannot afford the house and peasants whose land has been requested by the government. The yearly household income should be less than RMB88,000.

The survey in this paper attempts to identify the following questions: whether there is housing bubble in Beijing housing market? What are the determinants of housing prices? And this paper also discusses the impact of local housing policies on housing prices.

## 2. Survey methodology and data collection

Each respondent was given a copy of a questionnaire that was ten pages long and divided into three sections covering: 1) general information on households and renters; 2) respondents' opinions on the impact of marriage on housing price; and 3) respondents' opinions on the impact of housing policies on housing prices. In the questionnaire, we encouraged respondents to write comments in the last question which were indeed helpful to us in interpreting the meaning of answers. In total, 422 copies of questionnaires were administered comprising 200 from house owners, 195 from tenants and 27 from households who live in their parents' or friends' houses. The number of questionnaires collected in each district is summarized in Table2. Huairou is the lone district missing from the analysis – this was due to a nil response to the survey. Besides, 9 responses have been collected from tenants in Shunyi district, but none from house owners.

The sample characteristics were cross checked with the available percentage of number of households in the 2010 National Census for Beijing and interviewed. It can be seen from Table1 that the survey covers most pictures of urban districts. But low response rates are found in parts of the inner suburbs, all of old city and outer suburbs. The low response rate might cause the bias problem for the subsequent analysis. Thus, in order to enlarge the sample size, the data in neighboring districts Dongcheng (1) and Xicheng (2) are combined together as the new district (1). The same is in district Tongzhou (8), Fangshan (7), Daxing (11) named as distrct (6), Shunyi (9), Mentougou (12) and Changping (10) named as district (7). The District Pinggu (14), Huairou (13), Miyun (15) and Yanqing (16) are combined as district (8).

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[1] http://www.bjstats.gov.cn/xwgb/tjgb/ndgb/201302/t20130207_243837.htm
[2] The registration system (Hukou, in Chinese) was first set up in urban China in 1951 and lately extended to rural areas in 1955 (Chan and Zhang, 1999).It was originally intended to stop rural migrants flowing into the cities.
[3] http://www.gov.cn/gzdt/2010-05/02/content_1597790.htm
[4] http://sqjt.beijing.cn/bzxzfsqzn/
[5] : http://sqjt.beijing.cn/bzxzfsqzn/ , 1AUD=6.5 RMB

The new distribution of the percent of number of respondents is shown in Table2.

**Table1:** Summary data on number of house owners and tenants interviewed

| | District | Chinese name | households interviewed | tenants interviewed | other respondents interviewed* | Percentage of respondents interviewed % | Percentage of residents in the Census % |
|---|---|---|---|---|---|---|---|
| 1 | Dongcheng | 东城区 | 9 | 5 | 2 | 3.8 | 6.9 |
| 2 | Xicheng | 西城区 | 25 | 4 | 2 | 7.3 | 9.5 |
| 3 | Chaoyang | 朝阳区 | 53 | 38 | 3 | 22.3 | 14.8 |
| 4 | Fengtai | 丰台区 | 22 | 13 | 1 | 8.5 | 8.9 |
| 5 | Shijingshan | 石景山区 | 7 | 3 | 3 | 3.1 | 2.8 |
| 6 | Haidian | 海淀区 | 43 | 74 | 8 | 29.6 | 13.6 |
| 7 | Fangshan | 房山区 | 5 | 3 | 1 | 2.1 | 2.4 |
| 8 | Tongzhou | 通州区 | 6 | 6 | 2 | 3.3 | 6.5 |
| 9 | Shunyi | 顺义区 | 0 | 9 | 0 | 2.1 | 5.3 |
| 10 | Changping | 昌平区 | 19 | 29 | 2 | 11.8 | 4.7 |
| 11 | Daxing | 大兴区 | 3 | 4 | 3 | 2.4 | 4.9 |
| 12 | Mentougou | 门头沟区 | 3 | 1 | 0 | 0.9 | 7.1 |
| 13 | Huairou | 怀柔区 | 0 | 0 | 0 | 0.0 | 2.6 |
| 14 | Pinggu | 平谷区 | 1 | 0 | 0 | 0.2 | 3.4 |
| 15 | Miyun | 密云县 | 3 | 2 | 0 | 1.2 | 4.0 |
| 16 | Yanqing | 延庆县 | 1 | 4 | 0 | 1.2 | 2.6 |
| Total | | | 200 | 195 | 27 | 100% | 100% |

Color key
- Old city formerly enclosed by city walls, now inside the 2th Ring Road.
- Urban districts between the 2nd and 5th Ring Road.
- Inner suburbs linked by the 6th Ring Road
- Outer suburbs and rural areas.

**Data source:** Author calculation from the field work in 2012 in Beijing and Beijing Statistic Yearbook (2011) published in Beijing Statistical Information Net. * Those stay in houses of parents or friends.

**Table2:** Summary data on number of respondents interviewed with neighboring districts combination

| | District | Chinese name | Percent of number of households in the Census % | Percent of number of respondents interviewed % |
|---|---|---|---|---|
| 1 | Dongcheng Xicheng | 东城区 西城区 | 16.4 | 11.1 |
| 2 | Chaoyang | 朝阳区 | 14.8 | 22.3 |
| 3 | Fengtai | 丰台区 | 8.9 | 8.5 |
| 4 | Shijingshan | 石景山区 | 2.8 | 3.1 |
| 5 | Haidian | 海淀区 | 13.6 | 29.6 |
| 6 | Fangshan, Tongzhou and Daxing | 房山区 通州区 大兴区 | 13.8 | 7.8 |
| 7 | Shunyi ,Changing and Mentougou | 顺义区 昌平区 门头沟区 | 17.1 | 14.8 |
| 8 | Huairou, Pinggu, Miyun and Yanqing | 怀柔区 平谷区 密云县 延庆县 | 19.7 | 2.6 |
| Total | | | 100% | 100% |

**Data source:** Author calculation from the field work in 2012 in Beijing.

## 3. Survey results

### 3.1 Is there housing bubble in Beijing?

Respondents turned out to be clear about the main features of housing bubbles-Stiglitz (1990): "large deviation from fundamentals driven by positive expectations". In the survey, almost 56% respondents thought a bubble happens when there is a rapid growth of housing price. The rest thought a bubble happens when expectations dominate price developments causing significant speculative investments in the market.

A large number of respondents (89%) think housing prices in Beijing are at a high level compared with the national average price levels. The evidence was found when housing prices were compared with expected prices levels and income levels. Table3 shows the number of respondents and their choices on the expected reasonable price level in each district. By using the number of respondents as the weight, the expected housing price level in each district has been calculated and reported in Figure2. Actual prices are the average of housing prices in the sample in each district. Among eight districts, actual prices in five of them are above RMB 20,000 per square meter. In the old city and urban areas, actual housing prices are 1.2 to 2.5 times than that in inner and outer suburbs. Comparing the actual and expected average housing prices level, it can be seen that respondents from any district are expected to have a lower housing prices than actual ones.

**Table3:** The number of respondents in response to the expected reasonable price level in each district

| | District | Chinese name | 5000 RMB/sq.m | 10000 RMB/sq.m | 15000 RMB/sq.m | 25000 RMB/sq.m | 30000 RMB/sq.m |
|---|---|---|---|---|---|---|---|
| 1 | Dongcheng Xicheng | 东城区 西城区 | 1 | 16 | 8 | 6 | 3 |
| 2 | Chaoyang | 朝阳区 | 2 | 21 | 15 | 7 | 8 |
| 3 | Fengtai | 丰台区 | 2 | 13 | 6 | 1 | 0 |
| 4 | Shijingshan | 石景山区 | 0 | 3 | 3 | 1 | 0 |
| 5 | Haidian | 海淀区 | 2 | 21 | 17 | 1 | 2 |
| 6 | Fangshan, Tongzhou and Daxing | 房山区 通州区 大兴区 | 3 | 4 | 7 | 0 | 0 |
| 7 | Shunyi ,Changing and Mentougou | 顺义区 昌平区 门头沟区 | 1 | 14 | 6 | 0 | 1 |
| 8 | Huairou, Pinggu, Miyun and Yanqing | 怀柔区 平谷区 密云县 延庆县 | 2 | 3 | 0 | 0 | 0 |

**Data source:** Author calculation from the field work in 2012 in Beijing. 1AUD=6.5RMB

**Figure2:** The expected reasonable and actual housing prices (RMB/sq.m)
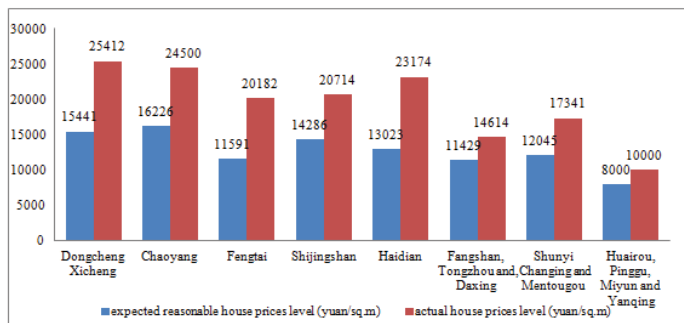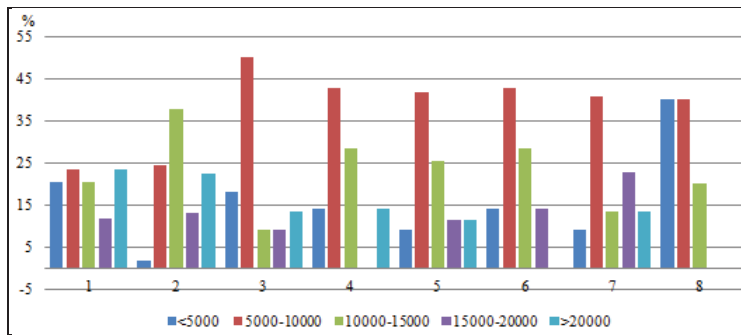


**Data source:** Author calculation from the field work in 2012. 1AUD=6.5RMB

Figure3 reports the percentage of average household income per month in eight districts covering five levels: less than RMB5,000, RMB5,000 to RMB10,000, RMB10,000 to RMB15,000, RMB15,000 to RMB20,000 and more than RMB20,000. The households with income between RMB5,000 and RMB10,000 formed the majority, apart from district 2 where most local residents have an income between RMB10,000 and RMB15,000. Table4 shows that the average living space per person in eight districts ranges from 26 to 36 square meters. Besides, one family on average has three members. By using the data in Table4, the ratio of housing prices to income was calculated. The last column of Table4 shows that the housing prices on average was approximately 17 times the average annual income per household. This

figure is higher than that reported by E-House China R&D Institute which is 12.94 in Beijing in 2012[6]. In Australia, Sydney had the highest ratio in 2012 which was between 8 and 9 according to the report from Reserve Bank of Australia (Fox & Finlay, 2012).

**Figure3:** The percent of five income levels in eight districts



**Data source:** Author calculation from the field work in 2012. 1AUD=6.5RMB

**Table4:** The average living space per person, number of person in one family and household income in each district

| | District | Average living space per person (square meters) | Average housing prices (RMB per square meters) | Average number of person in one family | Average annual household income (RMB per year) | Ratio of housing price to income |
|---|---|---|---|---|---|---|
| 1 | Dongcheng Xicheng | 32 | 25412 | 3 | 10853 | 19:1 |
| 2 | Chaoyang | 36 | 24500 | 3 | 11726 | 19:1 |
| 3 | Fengtai | 30 | 20182 | 3 | 8659 | 17:1 |
| 4 | Shijingshan | 33 | 20714 | 3 | 8786 | 19:1 |
| 5 | Haidian | 32 | 23174 | 3 | 9395 | 20:1 |
| 6 | Fangshan, Tongzhou and Daxing | 30 | 14614 | 3 | 8071 | 14:1 |
| 7 | Shunyi ,Changing and Mentougou | 35 | 17341 | 3 | 10205 | 15:1 |
| 8 | Huairou, Pinggu, Miyun and Yanqing | 26 | 10000 | 4 | 6200 | 14:1 |

**Data source:** Author calculation from the field work in 2012.

*3.2 What drives the high level of housing prices in Beijing?*

What drives the high level of housing prices in Beijing? Can changes in market fundamentals explain the increase? The fixed effect model was used to test the impact of fundamental factors including income and loan interest rates on housing prices. Table5 summarized the sample data. Variables of housing prices and household income have been divided by the number of years after the house was purchased. Table6 shows model results, that both household income and loan interest rates have a statistically significant impact on housing prices: one percent increase of income will lead to 0.11% increase in housing prices, and a one percentage point increase in interest rates led to a fall of 0.06 percent in housing prices. The model can explain nearly 12% of those changes of housing prices in Beijing. Coefficients of fixed effects indicate that housing prices differ in each district: old city areas including Dongcheng and Xicheng districts have the highest housing prices, followed by those in urban areas and inner suburbs. Outer suburbs such as Huairou, Pinggu, Miyun and Yanqing have the lowest prices levels. It seems that after controlling for factors on income and loan interest

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[6] http://www.chinascopefinancial.com/news/post/8113.html

rate that price falls with the distance from the city center. According to Siqi and Kahn (2008), the closer to city center, the better services including fast public transport, high quality schools, major universities could be enjoyed, all of which may explain for the fact that housing prices fall with measured distance from the city center.

**Table 5:** The descriptive characteristic of sample data

| Variable | D(Y)/D(Year) | D(HP)/D(Year) | r |
|---|---|---|---|
| Min. | 0.0 | -1000.0 | 3.0 |
| Median | 375.0 | 1655.0 | 5.0 |
| Mean | 658.6 | 2042.9 | 5.5 |
| Max. | 5000.0 | 12000.0 | 9.5 |

**Data source:** Author calculation from the field work in 2012 in Beijing

**Table 6:** Model result of housing prices and fundamentals

| Variable | District name | Estimate | Pr(>|t|) |
|---|---|---|---|
| log(y) | | 0.11 | 0.09. |
| r | | -0.06 | 0.01 ** |
| 1 | Dongcheng Xicheng | 3.36 | < 2.2e-16 *** |
| 2 | Chaoyang | 3.35 | < 2.2e-16 *** |
| 3 | Fengtai | 3.30 | < 2.2e-16 *** |
| 4 | Shijingshan | 3.03 | < 2.2e-16 *** |
| 5 | Haidian | 3.23 | < 2.2e-16 *** |
| 6 | Fangshan, Tongzhou and Daxing | 3.06 | < 2.2e-16 *** |
| 7 | Shunyi ,Changing and Mentougou | 3.27 | < 2.2e-16 *** |
| 8 | Huairou, Pinggu, Miyun and Yanqing | 2.97 | < 2.2e-16 *** |
| | Adj. R-Squared: 0.13 | p-value: 0.008 | F-statistic: 5.13 |

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

### 3.3 Why does the marriage play a great role on housing demand?

Questions were designed to find out the motives of people purchasing housing in Beijing. Results in the questionnaire reveal that nearly 39.5% respondents purchased a house for their own marriage, and 30% for the marriage of their children. For tenants, around 71% of them want to purchase their own house in the future. Over half of the tenants (51.85%) wanted to purchase their own houses for the marriage in the future, and 14.80% for their children's marriage. In the questionnaire, 91% respondents in total think in China it is common to buy the house in preparation for marriage.

The explanation for most people purchasing housing for the marriage requires the cultural background. Answers to open ended questions are helpful to understand why the marriage plays a great role in housing demand. Three reasons have been mentioned frequently, namely: (i) 38% of respondents considered that buying the house in preparation for marriage is a "tradition" in China 41% respondents thought that owning a house can provide them safety and feeling of stability - "A marriage without a house cannot be called a "family" The other 10% considered it as a request from the mother-in-law, implying that the ability to possess a house reflects the groom's economic status. 4% of respondents mentioned that they want to have more living space instead of sharing the house with their parents. The remaining 7% bought the house as a means to saving or security because of the immature renting market and rapid growth of housing prices. According to the survey, more than 60% of respondents bought a house a year before the marriage and 40% bought the house two years after the marriage.

Impending marriages have been well recognized as a determinant of housing demand. A report in China Economic Daily (March 8, 2010) emphasized the important effect of marriage on housing prices: "Demands from mothers in law are pushing up house prices; less than 20% accept sons in law who can only rent." The high percentage of purchasing houses for marriage suggests that housing demand may be strong for a period in the future.

*3.4  What is the impact of government controlling policies on housing prices?*

In the survey, we designed questions to rate the different policies' impact on people's purchasing decisions shown in Table7. With the different income levels, the housing purchase decision has been affected by different policies: 1) for residents with income less than RMB5,000 per month, the key factors were the level of mortgage rate (35.7%) and supply of housing provided by government (34.9%); 2) for residents with income between RMB5,000 and RMB10,000 per month, the key factors were also the level of  mortgage rate (32.4%) and supply of housing provided by government (33.5%); 3) for residents with income between RMB10,000 and RMB20,000 per month, the key factors were the level of mortgage rate and a limited number of houses available to purchase; 4) for residents with income more than RMB 20,000 per month, the key factor was a limited number of houses available to purchase (42.5%).

These conclusions suggest that people with income less than RMB20,000 per month require the bank loan to pay for the house. Among them, people with lower income (less than RMB10,000) not only borrow money from the bank, but also seek help from the government. More than one third of them (35% and 36% respectively) care about the supply of low cost housing provided by the government. People with higher income (RMB10,000 to RMB20,000) tend to use houses as a vehicle for saving and investment. One third of them (33%-32.4%) are concerned about the policy of limited number of houses to purchase. More people (42.5%) with high level of income (more than RMB20,000) are likely to purchase more houses as the investment. They express less concern about the bank loan interest rate, but more on the tax and other costs. Thus, polices on the enlargement of housing supply provided by the government would be helpful for the low-income families, especially for those with income less than 10,000RMB per month. Policies on the adjustment of bank loan interest rate could affect the residents with income less than RMB20,000 per month. Polices to limit the number of housing available purchases are effective in curbing the speculative investment.

**Table 7:** Significant policies affecting the housing purchase decision (percent %)

|  | <5000 | 5000-10000 | 10000-15000 | 15000-20000 | >20000 |
|---|---|---|---|---|---|
| Bank lending rate | **35.7** | **32.4** | **39.4** | **27.0** | 15.0 |
| Limited number of house to purchase | 16.7 | 19.0 | **33.0** | **32.4** | **42.5** |
| Tax and other cost | 4.80 | 6.70 | 5.30 | 8.10 | 20.0 |
| Supply of housing provided by government | **34.9** | **33.5** | 12.8 | 18.9 | 15.0 |
| Others | 7.90 | 8.40 | 9.50 | 13.6 | 7.50 |
| Total | 100% | 100% | 100% | 100% | 100% |

**Data source:** Author calculation from the field work in 2012 in Beijing

## 4.  Conclusion

This paper uses the household level data from Beijing, the capital of China. A total of 420 questionnaires were administered in 16 districts and the collected data analyzed to understand the drivers for house-price inflation in the city. The empirical result shows that housing bubble exists in Beijing market given the large deviation of housing prices from income and expected price level asked in the questionnaire. The cross sectional model indicates the strong correlation between income growth and housing prices, 1% increase of income leading to 0.11% increase of housing prices after accounting for district level effects. Plenty of residents purchased housings on the purpose of marriage what was considered as the "tradition" in China. Different policies issued by the government to control price inflation were found to be effective for people with different income levels. Among them, the adjustment on banking loan interest rate could affect people with income less than RMB20,000 per month; the supply of housing provided by the government could affect people with income less than RMB10,000 per month; the limitation on the number of housing to purchase is effective to people with income more than RMB 10,000 per month.

Two main policy implications can be drawn from these findings. Firstly, although the marriage plays a great role in the housing market, the impact of marriage on housing demand may fall with the aging of the population in the future. Secondly, when government intervenes into the housing market, a clear target should be made according to different adjustment aim. For example, in order to curb the speculative investment on housing market, policies on limitation on number of housing to purchase and adding taxes and other costs might be reasonable choices instead of adjusting the mortgage interest rate.

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