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# Mortgage Rate and the Choice of Mortgage Length: Quasi-experimental Evidence from Chinese Transaction-level Data

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# Mortgage Rate and the Choice of Mortgage Length: Quasi-experimental Evidence from Chinese Transaction-level Data

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## Abstract

Utilizing a large transaction-level dataset on housing mortgages in China, this study estimates the effect of the mortgage rate spread between long- and short-term loans on property purchasers' choice of loan length. Our identification of the causal effect of this spread on loan length hinges on a unique institutional feature of China, that is, its "dual-track" mortgage scheme. We observe two types of mortgagors in this setting: "normal" mortgagors who face floating mortgage rates spread and "special mortgagors" who are entitled to a fixed mortgage rate spread. Using the latter as a comparison group to address the confounding effects of omitted factors, we find that the change in interest rates significantly affects the mortgage decisions of normal mortgagors. When the prime mortgage rate spread increases by 10 basis points, the likelihood of such a mortgagor choosing a short-term loan increases by 8.4 percent.

Keywords: Mortgage rates; Loan decision; Quasi-experiment; China housing market

JEL: E58, R21, R28

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## Introduction

The way in which mortgage interest rates affect the housing market remains a major concern for policymakers. Many studies have investigated the effect of mortgage rate on consumer's behavior (e.g. Quigley, 1987; Deng and Liu, 2009). Previous studies usually use macro level data to investigate effects of monetary policy (e.g. interest rate) on house price (Liang and Cao, 2007; Giuliadori, 2005). Some scholars concentrate on the transmission mechanism among monetary policy, house price and individual consumption (Aoki et al, 2002; Rigobon and Sack, 2004; Iacoviello, 2005). Empirical works based on macro data to test the effectiveness of monetary policy is proved difficult (Bernanke and Blinder 1992). It is hard to distinguish multiple channels of transmission mechanisms from each other, i.e. credit demand and credit supply (Mishkin, 2001; Peek, Rosengren and Tootell, 2003). Yao et al (2011) uses monthly macro data from June, 2006 to September, 2010 to test the effect of interest rate on house price. They use VAR model and Granger causality test, and draw the conclusion that interest rate change has no effect on house price, and further point out that investors in China's real estate market are irrational speculators. This result seems suspicious and will be addressed later. In addition, estimation for effects of the interest rate is highly challenging because it is typically endogenous (Aspachs-Bracons and Rabanal, 2009).<sup>2</sup> Factors impacting house price and trading volume are too complicated, and statistical relationship between interest rate and housing price or trading volume barely indicate any causality relationship due to other confounding simultaneous factors. It is perhaps for this reason that the existing empirical studies assessing the effect of mortgage rate policies have generated contradicting results (see, for example, Ding and Tu [2007] and Liang and Cao [2007]). So far, results on the studies of interest rates remain ambiguous.

In this study, we adopt a micro-econometric approach that takes advantage of the institutional setting of China to estimate the causal effect of mortgage rates on the demand side of the housing market. As noted, China's central government maintains direct control over mortgage rates, and it has explicitly used this control as an instrument to intervene in the economy, including the housing market. Importantly for this research, we note that China operates a unique "dual-track" mortgage rate scheme comprising floating commercial mortgage rates (for "normal" mortgagors) and Housing Provident Fund mortgage rates (for "special" mortgagors). The latter is a special mortgage rate that applies only to a clearly defined subgroup of borrowers (see Yeunga and Howes, 2006). This unique feature provides a quasi-experiment that allows us to identify the pure effect of a change in commercial mortgage rates on the economy by treating the Provident Fund mortgagors as a control group.<sup>3</sup>

This study focuses specifically on mortgagors' choice of mortgage length and examines how that choice is affected by the mortgage rate spread (the difference between long- and short-term interest rates). In theory, when the interest spread increases, mortgagors should choose longer loans. Although the link between spread and maturity has no direct implications for market transactions, it reflects whether and how interest rate policies affect the demand side of the housing market.

It is possible in this research that the macro-economic policies that accompany mortgage interest rates affect the choice of mortgage length. If such confounding factors are not fully observed, then they could bias our estimates. To address this issue, we compare the estimates of normal mortgagors with those of special mortgagors, as previously noted. Special mortgagors are those offered the opportunity by their employers to contribute to the Provident Fund. They thus qualify for Provident Fund loans, whose rates spread between long- and short- term loans were fixed throughout the sample period.

In the sample of mortgagors borrowing at normal interest rates, we find that the mortgage rate spread between long- and short-term mortgages had a significant effect on these mortgagors' choice of loan length: when the spread increased by 0.1 of a percentage point, the probability that a mortgagor would choose a short-term mortgage loan increased by 8.4 percent. Among the Provident Fund borrowers, in contrast, we find no such effect on the choice of loan length arising from normal mortgage rates. This finding strengthens our claim that the choice of loan length

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<sup>2</sup> Existing studies on the effect of mortgage rates rely primarily on macro-econometric regressions that relate aggregate economic indicators to changes in mortgage rates. Zhang, Gong, and Bu (2006) show that the mortgage rate can be a useful instrument to regulate the housing market.

<sup>3</sup> Unlike the central banks in developed economies, the policymaking of the Central Bank of China remains heavily influenced by the central government.

among normal mortgagors is indeed influenced by changes in the mortgage rate spread, not by other confounding factors.

The paper proceeds as follows. The next section briefly discusses the development of China's housing market and recent changes in its relevant monetary policies. The third section describes the data and identifies preliminary patterns. The fourth section summarizes our empirical findings, and the fifth and final section provides concluding remarks.

## China's Housing Market and Mortgage Policy

China's housing market is monopolistic and highly regulated. As we have noted earlier, Chinese government operates a unique "dual-track" mortgage rate scheme comprising floating commercial mortgage rates (for "normal" mortgagors) and Housing Provident Fund mortgage rates (for "special" mortgagors). In consequence, there are only two major mortgage institutions offering two types of loans respectively in China: commercial banks and Housing Provident Fund Management Center. The former engages in commercial individual housing credit business while the latter engages in issuing subsidiary individual housing mortgages. However, commercial banks dominate the loan market in term of volume. By the end of 2007, commercial mortgage loan balance is 3012.13 trillion yuan nationwide, but the Housing Provident Fund mortgage balance is only 507.43 trillion yuan. In the commercial mortgage loan market, though the competition is accelerated as foreign and domestic private banks enter into the market in recent years, four largest state-owned banks account for the majority of market shares. In addition, the housing developers usually cooperate with these banks directly. After signing "house sales contract" with developer, a house purchaser is usually required to apply for the mortgage loan from one of developers' partner banks. Further, China's central bank, People's Bank of China (PBC), regulates housing credit market directly. The central government determines down payment ratio, mortgage rate and so on.

Meanwhile, Housing Provident Fund mortgage is issued to employees who have contributed part of the salary to the fund and most regions have upper limit on such mortgage loan. Compared with commercial loans, Housing Provident Fund Mortgage rate is much lower. For an example, the average mortgage rate for 3-5 year commercial loan is 5.2% during the period 2002 to 2006, but the Provident Fund Loans rates for 3-5 years is 3.92% during the same period of time. In addition, the repayment scheme of the Provident Fund Loan is more flexible than a commercial loan. Individuals have to pay off the loan by a monthly equally fixed payment scheme for a commercial loan. For Provident Fund Loan, however, there is no specified repayment scheme and individuals can pay back a loan in relatively free ways. Thirdly, the requirement for minimum down payment ratio of provident fund loan is relatively lower. Buyers with provident fund loan can pay as low as 20% of the total purchasing price as down payment, while buyers with commercial loans must pay a minimum of 30% of total price. In general, Provident fund loan is a government subsidiary loan, and thus only individuals achieving certain requirements can apply for the loan. Such requirements include: saving in the provident fund for some years, and the account balance reaches certain level, etc.

Compared with developed markets, China's real estate market is less developed, although it has been dynamic and fast-growing since the 1990s. The size of mortgage market is relatively small compared with western countries. The entire bank mortgage loan balance is only 12.2% of total GDP in 2007, which is less than 1/3 of OECD countries. There are only two types of institutions allowed to issue mortgage in China, while in US, mortgage issuers are well diversified, such as commercial banks, insurance companies etc. Lacking of supporting systems like individual credit system, the poor social security system also barely supported the development of China's mortgage market as in developed countries. All these features offer a less noisy quasi-experimental set-up of "dual-track" mortgage system for this study.

The recent wave of price surges began as early as 2003. According to statistics from the National Bureau of Statistics of China, the average price of new residential housing rose from 3,521 yuan per square meter in 2004 to 4,350 yuan per square meter in 2006, an increase of 23.5 percent. We focus here on the housing market of Chengdu City, a core city in Southwestern China whose market is quite representative of the national market, and we take the 2004-2006 period as our

sample period. Consistent with the national trend, Chengdu's housing market also flourished during these years. In 2004, for example, its total housing supply was 12 million square meters, which increased to 20 million square meters by 2006. Although the average house price in Chengdu was slightly lower than the national average in 2004, it has increased at a slightly higher rate than the national average. The official average price of a new apartment rose from 3,241 yuan per square meter in 2004 to 4,256 yuan per square meter in 2006, which is very close to the national average of 4,350 yuan per square meter.<sup>4</sup>

During the sample period, there were frequent government interventions in the real estate market in an attempt to avoid "over-heating." More than 30 regulative mortgage policy changes were made between 2004 and 2006. In addition, the People's Bank of China made four major increases in the mortgage rate during the sample period: in January and March of 2005 and in April and August of 2006. Although the PBC increased both long- and short-term mortgage rates during the period, the spread between the two fluctuated (see Table 2).

## Methodology and Model Specification

In this section, we discuss our empirical estimation of the effect of mortgage rate policy on mortgagors' choice of mortgage length. As noted, we expect a mortgagor to shift towards a shorter loan when the mortgage rate spread increases because long-term loans become more expensive. In other words, we expect this spread to have a negative impact on mortgage length. To test this hypothesis, we consider the following regression.

$$T_{it} = \alpha_0 + \alpha_1 \Delta MR_t + \alpha_2 Wage_i + \alpha_3 DPR_i + \alpha_4 t + \beta X_i + \varepsilon_{it}.$$

The dependent variable is the length of mortgage  $i$  at time  $t$ . We consider two alternative measures of mortgage length. The first is the actual mortgage length, which ranges from one to thirty years, and the second is a zero-one indicator that takes the value of one if the mortgagor chooses a loan between six (inclusive) and ten years and the value of zero if the mortgage length is between three and five years. The reason we focus on loans of between three and ten years in length is that the cut-off between short- and long-term loans in China is five years. Although the second measure reduces the sample size, the remaining sample may be more sensitive to the jump in the mortgage rate spread that occurs when the mortgage length increases from four to five years.

Of particular interest to us is the coefficient of  $\Delta MR_t$ , the mortgage rate spread between long- and short-term loans. If mortgage rates play an important role in a mortgagor's decision, then we expect coefficient  $\alpha_1$  to be negative: that is, a greater spread induces mortgagors to choose shorter loans.

To address potential omitted-variable bias in our estimates, we include rich control variables in our regressions. First, we include a linear time trend to account for common time patterns in mortgage lengths and mortgage rate spreads. Second, we include four potentially relevant indicators of mortgagor attributes: the logarithm of the monthly wage, the down payment rate (the down payment divided by the price of the property), and the gender and occupation of the mortgagor. Note that the effect of the mortgagor's income on mortgage length is ambiguous. On the one hand, a higher income may mean that the mortgagor is less financially constrained, and thus is more likely to choose a shorter mortgage length. Deng et al. (2005) find both higher income borrowers and white-collar workers to be more likely to prepay their mortgages. On the other hand, a higher income may also mean that the mortgagor has better outside investment opportunities, and thus requires more financing for the property, thereby increasing the length of the loan. We expect the down payment rate to be negatively associated with mortgage length because a larger down payment generally suggests that the mortgagor is ready to spend more on housing at the time of purchase. As a result, he or she should also be better able to take out a short-term loan. We assume that both variables (monthly wage and down payment rate) are exogenously determined.

<sup>4</sup> Data source: Chengdu Real Estate Development Annual Report 2006.

In addition, we also include housing type- and estate-specific indicators (an indicator for each block) to control for cross-estate differences in attributes. Last but not least, we also control for the potential effect of banks. In our sample, the Construction Bank of China was responsible for most of the transactions. Nevertheless, it is possible that different branches of this bank engaged in different practices. Accordingly, we also include bank (branch)-specific indicators.

In order to address the potential endogeneity problem in our estimation, we treat it as a quasi-natural experiment. In particular, we identify the distinct patterns of mortgage rates policy on commercial mortgage and on Provident Fund loan and use the later as a control group. The spread of commercial mortgage loans varies over time due to the change of interest rate policy, but the spread for Provident Fund Loans remains constant. This unique pattern allows us to incorporate quasi-experiment idea to estimate the effect of interest rate change on individual loan decisions. We aim to estimate the effect of loan spread on individual housing buyers' loan decisions. Intuitively, if central government's interest rate policy is effective, we expect to observe changes in individuals' loan decisions according to changes in spreads. However, such decision changes may come from other simultaneous confounding factors such as common macroeconomic shocks. In other words, there may exist endogeneity problem. Fortunately, spreads for Provident Fund mortgage rates keeps the constant during the entire sample period. Then we test the second hypothesis that loan decisions by Provident Fund mortgagors remains unchanged unless common macroeconomic shocks cause decision changes. Therefore, if decision changes in commercial mortgage loans mainly come from mortgage rate policies but not common macroeconomic shocks, we would expect to observe that loan decisions by Provident Fund mortgagors should remain unchanged. Indeed, our empirical results in next section support this hypothesis.

## Data and Stylized Patterns

In this section, we first discuss the data used in this study and next identify preliminary patterns to illustrate the features of the Chengdu housing market.

### 4.1 Data

The data used in this study come from a 10-percent random draw of actual transactions in the Chengdu housing market from 2004 to 2006. Our sample includes only new housing transactions. Of the 20,146 transactions in our sample, 15,230 contain non-missing values for the variables of interest, that is, transaction information (such as purchase price, down payment rate, mortgage rate, and the bank involved in the transaction), housing characteristics (such as location, floor area, and housing type), and individual attributes (such as age, gender, occupation, and monthly wage), and thus constitute the final sample.

Table 1 summarizes the statistics of the major variables in this study. The purchasers were 33.40 years old on average, and about 46 percent were female. Their median monthly wage was 3,000 yuan. The average floor area of the apartments they purchased was 95 square meters. The average housing unit price was 358,328 yuan (the most expensive property in our sample cost 14.5 million yuan), and the average price per square meter was 3850 yuan, which is typical for the Chengdu housing market as a whole. About 50 percent of the sample properties had a floor area greater than 90 square meters. Only about two percent of purchasers purchased more than one property during the sample period.

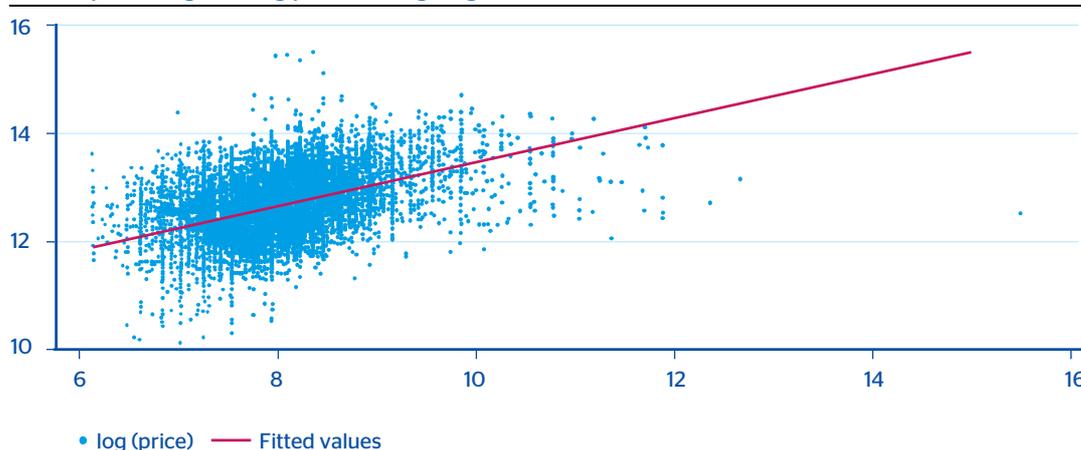
Figure 1 plots the log housing price on the log wage. Excluding those individuals reporting extremely low or high wages, there is a clear and positive relationship between the two.

Table 1  
Variable Description

Variable	Pool		3- to 5-year loans		5- to 10-year loans	
	Mean	St. D	Mean	St. D	Mean	St. D
Area	95.68	37.27	96.15	41.21	92.63	39.06
Age	33.40	7.60	37.43	8.77	35.72	8.20
Price/m2	3850	1748	3559	1511	4148	2791
Down Payment (%)	39.81	12.81	51.63	16.23	45.43	13.59
Wage/Month	3901	3335	5089	5602	4182	3734
Loan Period	15.45	5.37	4.85	0.50	9.82	0.69
Observation No.	15,230		1036		4137	

10-percent random draw of actual transactions in the Chengdu housing market from 2004 to 2006  
Source: Housing transaction records by Chengdu Housing Bureau

Figure 1  
Scatter plot of log housing price and log wage



Source: Housing transaction records by Chengdu Housing Bureau

## 4.2 Stylized Patterns

In this section, we summarize the general patterns of transaction volumes, housing prices, down payment ratios, and mortgage rates.

**Transaction Volume** Figure 2 plots the time series of weekly transaction volumes for the 2004-2006, when it appears that the market was in an upward trend. The transaction volume displayed small fluctuations from mid-2004 to mid-2005, but then rose rapidly, reaching more than 200 transactions per week in the second half of 2005 and more than 300 per week by the end of 2006.

**Housing Prices** We were particularly curious about the trend in housing prices. During the sample period (especially in late 2005 and 2006), these prices surged across China. Figure 3 plots the time series of a simple measure, price per square meter (the price of an apartment divided by its floor area), from which it can be seen that there was an unambiguous upward trend before mid-2005: rising from 2,500 yuan per square meter in early 2004 (note that this is much lower than the official figure) to just below 4,000 yuan by mid-2005. Since then, interestingly, housing prices in Chengdu appear to have leveled off, possibly for the following reasons. First, we did not control for housing quality. Second, the housing supply could have increased significantly after mid-2005. Third, government regulatory measures may have played a role, which is further investigated in the empirical section of this paper.

**Down-payment Ratio** We calculated the down payment ratios for each transaction by dividing the down payment by the house price (using the actual transaction figures). Figure 5 plots the histogram of the down payment rates for all transactions. Note that these rates for a large share of the transactions (more than 80 percent) were above 30 percent. Moreover, only 2.3 percent of transactions enjoyed 20-percent down payment treatment. Obviously, the change in the down payment policy that occurred during the sample period had no significant direct effects, as the policy applied only to purchasers enjoying the 20-percent down payment rate.<sup>5</sup> This result is consistent with that reported by Wonder, Wilhelm, and Fewings (2008) in their study of automotive market loans.

**Mortgage rates** Purchasers may face higher mortgage rates when they take out longer-term loans. Table 2 summarizes the mortgage rates over time for different mortgage lengths. It is clear that these rates rose during the sample period, increasing by about 1 percentage point during the two-year span from 2005 to 2006. Recall that during the same period, the growth rate of average property prices in the Chengdu market slowed significantly, which is consistent with rising mortgage rates.

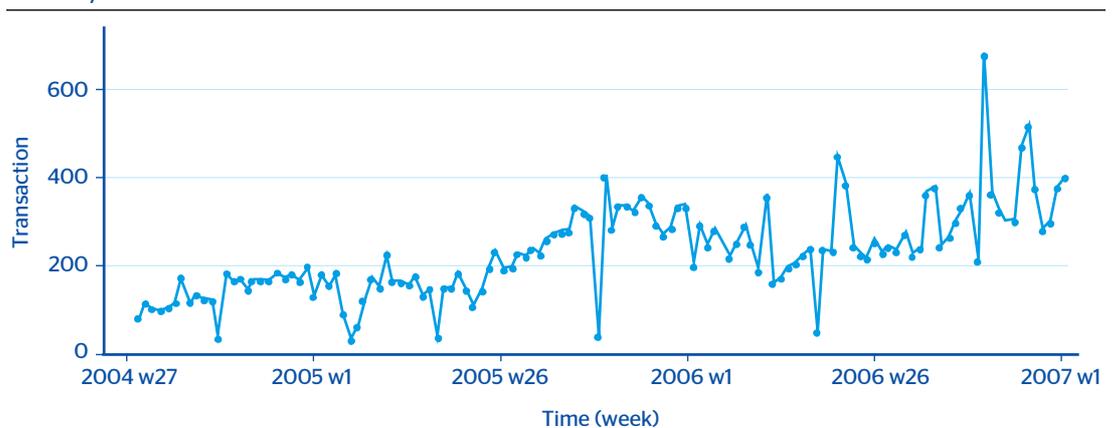
In addition, it seems that the changes in mortgage rates regulated by the PBC were effectively implemented. For example, the benchmark mortgage rate rose by 0.27 of a percentage point on April 28, 2006, and, on the same day, the commercial mortgage rate increased by 0.24 of a percentage point in Chengdu.

Table 2  
**Housing mortgage rates and the long- and short-term spread**

	21/2/02	1/1/05	3/17/05	4/28/06	8/19/06
<b>Commercial loans</b>					
3-5 years	4.77	4.95	5.27	5.51	5.51
> 5 years	5.04	5.31	5.51	5.75	5.81
Spread	0.27	0.36	0.24	0.24	0.3
<b>Provident Fund loans</b>					
3-5 years	3.6	3.78	3.96	4.14	4.14
> 5 years	4.05	4.23	4.41	4.59	4.59
Fixed Spread	0.45	0.45	0.45	0.45	0.45

10-percent random draw of actual transactions in the Chengdu housing market from 2004 to 2006.  
Source: Financial Yearbooks of China

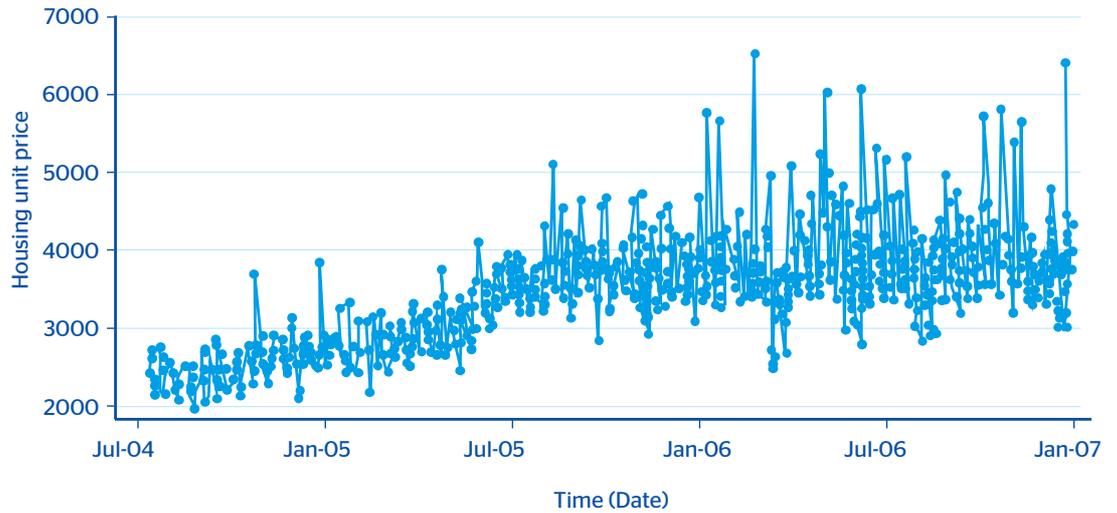
Figure 2  
**Weekly transaction volumes over time**



Source: Housing transaction records by Chengdu Housing Bureau

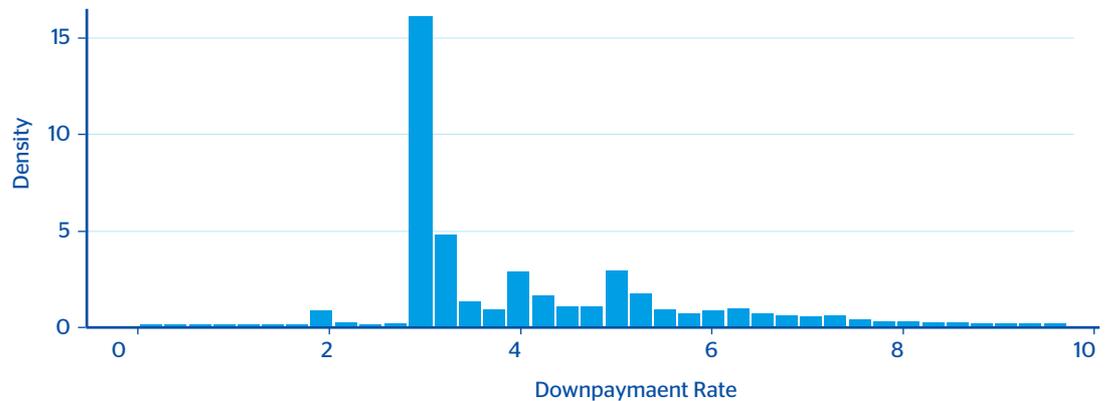
5 March 17, 2005: For regions with rapidly rising housing prices, the minimum down payment rate can be increased from 20 percent to 30 percent. June 1, 2006: The minimum down payment rate increased to 30 percent for houses with an area greater than 90 square meters and was maintained at 20 percent for other types of housing.

Figure 3  
Unit housing price (yuan per square meter)



Source: Housing transaction records by Chengdu Housing Bureau

Figure 4  
Distribution of down payment rates



Source: Housing transaction records by Chengdu Housing Bureau

## Empirical Evidence

In this section, we provide empirical evidence of the effect of changes in the mortgage rate on mortgagors' choice of loan length. The regression results are summarized in Table 3. In general, we find that the long- and short-term mortgage rate differentials significantly affect mortgagors' decisions about mortgage length. In all of the regressions considered (some of which are not reported here to save space), the coefficients of the rate spread are significant, and their signs are all negative, which is consistent with our hypothesis.

In the first regression of Table 3, the dependent variable is the indicator of a long-term (six to ten years) or short-term (three to five years) loan taken out by the mortgagor. The coefficient of the mortgage rate spread is -0.837 and significant. The time trend is positive and significant, which indicates that purchasers have systematically shifted towards longer loans. The income effect is negative and significant, which is consistent with the theory that higher-income purchasers have

less demand for bank financing. Consistent with our expectation, the coefficient of the down payment ratio is significantly and negatively associated with borrowing length. In this regression, we controlled for mortgagor's occupation, housing type, and lending branch (the estimates are not reported here due to space limitations).

Table 3  
Mortgage interest spread and loan length choice

Variable	<i>T5</i> (Commercial loans)	<i>T<sub>it</sub></i> (Commercial loans)	<i>T5</i> (Provident Fund loans)	<i>T<sub>it</sub></i> (Provident Fund loans)
$\Delta MR_t$	-0.837** (0.342)	-6.875*** (2.545)	-0.186 (1.074)	-0.142 (6.746)
$\Delta MR_t$	-0.837** (0.342)	-6.875*** (2.545)	-0.186 (1.074)	-0.142 (6.746)
<i>DPR</i>	-0.564*** (0.044)	-16.77*** (0.326)	-1.007*** (0.181)	-13.73*** (1.293)
<i>t</i>	0.0208* (0.011)	0.212*** (0.078)	0.0382 (0.031)	0.685*** (0.230)
<i>Age</i>	0.864* (0.525)	33.91*** (3.979)	1.983 (3.053)	-5.502 (20.140)
<i>Age</i> <sup>2</sup>	-0.0152** (0.007)	-0.726*** (0.056)	-0.0428 (0.039)	-0.34 (0.262)
<i>Female</i>	-0.0544*** (0.012)	-0.824*** (0.076)	0.0275 (0.051)	-0.571* (0.337)
<i>Constant</i>	-1.419 (1.256)	3.714 (8.603)	-5.37 (5.229)	-81.77** (38.260)
Observations	4699	14248	367	722
R-squared	0.176	0.328	0.223	0.442

Robust standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.  
Source: Authors' estimates

In the second regression, we replaced the dependent variable by the actual length of the mortgage, which more than tripled the sample size. Again, we find the mortgage rate spread to be a significant actor in the mortgage length decision. The coefficients of the other variables show the same signs as those in the first regression.

In the third and fourth columns of Table 3, we employ mortgagors who are eligible for Provident Fund loans as the control group to test for the presence of confounding factors. As previously noted, the mortgage rates for this group of mortgagors are different from those for normal mortgagors, and its rates spread between long- and short- term loans were fixed throughout our sample period. Hence, the change in the benchmark interest spread should not affect the loan length decisions of these mortgages. If it does, then bias due to omitted variables may be present, and we would need to exercise caution in interpreting the regression results for our normal mortgagor sample. According to these regression results, however, the coefficients of  $\Delta MR_t$  are insignificant for both dependent variables, thus supplying evidence in support of the absence of omitted-variable bias in our estimates.

In all of the aforementioned regressions, we implicitly assumed that the long- and short-term mortgage rates have equal (but contrasting) effects on mortgagors. In the regression results reported in Table 4, we relaxed this assumption and included the two rates separately. The coefficient estimates of both *LMR* (the mortgage rates for six- to ten-year mortgages) and *SMR* (the mortgage rates for three- to five-year mortgages) are significant, which suggests that if the short-term rate is fixed, but the long-term rate increases by 0.1 of a percentage point, then the likelihood of mortgagors choosing six- to ten-year loans decreases by 8.1 percent. In contrast, if the long-term rate is fixed, and the short-term rate increases by 0.1 of a percentage point, then the likelihood of mortgagors choosing short-term loans increases by 8.6 percent. Thus, the magnitude of the effects of short- and long-term rate changes appears to be comparable.

Table 4  
Regression results (long- and short-term rates)

	<i>T5</i> (Commercial loans)	<i>T<sub>it</sub></i> (Commercial loans)	<i>T5</i> (Provident Fund loans)	<i>T<sub>it</sub></i> (Provident Fund loans)
<i>LMR</i>	-0.814** (0.376)	-7.298*** (2.755)	0.242 (1.424)	2.832 (7.918)
<i>SMR</i>	0.859*** (0.319)	6.452*** (2.411)	0.00469 (1.148)	-0.790 (6.642)
<i>Wage</i>	-0.103*** (0.0108)	-1.611*** (0.0807)	-0.00698 (0.0594)	-0.940** (0.397)
<i>DPR</i>	-0.564*** (0.0444)	-16.77*** (0.326)	-1.009*** (0.176)	-13.75*** (1.221)
<i>t</i>	0.0208* (0.0113)	0.212*** (0.0782)	0.0199 (0.0520)	0.540* (0.308)
<i>Age</i>	0.864* (0.525)	33.91*** (3.979)	1.826 (3.066)	-6.216 (19.59)
<i>Age</i> <sup>2</sup>	-0.0152** (0.00707)	-0.726*** (0.0555)	-0.0410 (0.0390)	-0.331 (0.260)
<i>Female</i>	-0.0544*** (0.0116)	-0.824*** (0.0760)	0.0247 (0.0518)	-0.593* (0.343)
<i>Constant</i>	-1.419 (1.256)	3.714 (8.602)	-3.671 (6.717)	-68.83* (40.75)
<b>Observations</b>	4699	14248	367	722
<b>R-squared</b>	0.176	0.328	0.224	0.443

Robust standard errors in parentheses; \*\*\*p < 0.01, \*\*p < 0.05, \*p < 0.1.  
Source: Authors' estimates

The long- and short-term benchmark rates have no significant effects on the control group, which comprises mortgagors who borrow through the Provident Fund Scheme. This is again consistent with our earlier findings using the mortgage rate spread.

## Conclusions

In this study, we provide empirical estimates of the effect of mortgage rate spreads on mortgagors' loan length decisions. We find that, in general, the mortgage rate policies of the PBC appear to have significant effects on these decisions. First, the actual mortgage rates offered by China's commercial banks closely follow the benchmark mortgage rates set by the Central Bank. Second, we find economic evidence to suggest that a change in the benchmark interest spread significantly affects mortgagors' choice of loan length: if the spread increases by 10 basis points (i.e., 0.1 of a percentage point), then the likelihood of mortgagors choosing short-term loans increases by 8.4 percent.

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