

An Empirical Study on the Relationship between Real Estate Prices and Bank Credit in Fujian Province

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Abstract: Since the reform of the real estate market in 1998, the real estate market has driven economic development, followed by explosive price growth, but triggered the real estate bubble. Since most of the capital lending in the real estate industry comes from banks, the relationship between the real estate industry and the banking industry is particularly important. This paper studies the relationship between real estate price and bank credit in Fujian province and concludes that there is a long-term equilibrium between them through the VAR model.

1. Introduction

From 1997 to 2007, the consumption sum of commercial housing in Fujian province rose from 8.35 billion yuan / 10,000 square meters to 570.519 billion yuan / 10,000 square meters. In the whole process of real estate production, a large amount of financial support is needed. The medium- and long-term loans of financial institutions in Fujian province show an increasing trend year by year and have reached 2,531.711 billion yuan by the end of 2017. These data trigger our thinking on the relationship between real estate prices and bank credit. Many scholars at home and abroad have studied this relationship. For example, Qin Ling and Yao Yimin (2012) used the data from 2005 to 2010 to establish VAR model and conducted many studies on the interaction between housing price and bank credit, and the conclusion showed that there was a two-way effect between the rise of real estate price and the expansion of bank credit [1]. Throughout the whole real estate market in Fujian Province, it is inseparable from the support of bank credit funds from the beginning to the end. Therefore, this paper studies the relationship between real estate prices and bank credit by using the unit root (ADF) test, Co-integration (Johansen) test, Granger causality test, impulse response function, and variance decomposition.

2. Literature and Research Hypothesis

In recent years, some scholars believe that there is a short-term positive correlation between real estate prices and bank credit. For example, Gerlach S. and W. Peng (2005) believe that in the short term, real estate price and bank credit have a positive impact, but vice versa [2]. Some scholars believe that bank credit plays an important role in real estate prices. For example, Lamont and Stein (1999) conducted an empirical analysis on the data of American cities and found that the higher the level of household borrowing of urban residents, the greater the fluctuation of housing price due to the influence of the economy [3]. Some scholars believe that the two influences are two-way. For example, Davis E. P. and H. Zhu (2011), based on the data analysis of 17 countries, concluded that the relationship between real estate price and bank credit is particularly strong in countries that have experienced banking crises [4].

From the domestic research, also some scholars from the perspective of the short-term to the east of the real estate prices in the Midwest and bank credit relations has carried on the empirical research, as tnk-bp and Yunfeng Gao (2011), according to the results of empirical research in the short term, the eastern region real estate price has the largest effects on bank credit, central times, western effect minimum [5]; Some scholars believe that there is a two-way interaction between real

estate price and bank credit. For example, the empirical analysis of Huang Zi Wei and Pan Haiying (2014) confirms the two-way causality between the two [6].

Through the research of the above scholars, this paper proposes a hypothesis: real estate prices and bank credit present a long-term equilibrium relationship. From the perspective of real estate investors, rising house prices enable them to make a profit in the real estate market. The large profits allowed them to exploit new resources, which increased the demand for bank credit. From the perspective of property buyers, the higher the house price is, the more people will be attracted to wait and see. Once the house has the potential characteristics of appreciation, more people will be attracted to buy it, and the property buyers will also borrow money to buy a house for investment in real estate, expecting to gain income. Investors then continue to expand housing and open new buildings, and so on and so on, with the demand side of bank credit only increasing.

3. Empirical Research Methods

3.1 Model Construction

In this paper, the vector autoregression (VAR) model was used for empirical analysis, and the literature of many scholars was referred to. For example, Cao Xue and Li Jingping (2018) took the real estate price, bank credit, and GDP of Shanxi Province as the main variables in their empirical study of Shanxi Province [7]. Chen Yun and Yang Jianzheng (2018) also set housing prices, bank credit, interest rate, and GDP as variables [8]. Therefore, this paper believes that real estate prices in Fujian province may also be affected by economic growth variables, and bank credit may be affected by market interest rates. This paper finally selects Fujian real estate market price (AP), bank LOAN, medium and long-term LOAN of more than five years (R), and Fujian regional GDP as the main variables, and establishes the VAR model, the formula is as follows:

$$Y_t = AY_{t-1} + \varepsilon_t$$

Where, $Y_t = [AP_t, Loan_t, R_t, GDP_t]$ is the variable matrix, A is the parameter matrix to be estimated, and ε_t is the random interference term.

To maintain data stability and eliminate heteroscedasticity and collinearity, all data except interest rate were logarithmic processed, and the logarithmic real estate price of Fujian province was recorded as LnAP, bank credit as LnLoan, and gross regional product as LnGDP. This paper selects data from 1997 to 2017 as research samples to test the relationship between real estate prices and bank credit in Fujian Province. The data were collected from the National Bureau of Statistics of the People's Republic of China, The Statistical Yearbook of Fujian Province over the years, and the official website of the People's Bank of China.

3.2 Selection of Variables

3.2.1 Explained Variable: Average Selling Price of Commercial Housing in Fujian Province (Ap)

Based on the research of Lian Sulan and Ji Zhirong (2016) et al., this paper selects the average selling price of commercial housing in Fujian Province (HP/ yuan/square meter) as the sample data of real estate price [9].

The calculation formula is as follows : $AP = S_{amount} / S_{area}$, where S_{amount} represents the sales amount of commercial housing, S_{area} represents the sales area of commercial housing, and the unit is 100 million yuan / 10,000 square meters.

3.2.2 Core Explanatory Variable: Balance of Medium - and Long-Term Loans of Financial Institutions in Fujian Province

Because personal loans and corporate loans are related to real estate loans, real estate loans are simply selected as sample data is too one-sided. Therefore, it is more appropriate to use the medium-and long-term loan balances of financial institutions as a criterion directly.

3.2.3 Control Variables

① Interest rate of medium- and long-term Loans of the People's Bank of China over five years (R)

Since the real estate price is inversely related to the market interest rate, and the variable of interest rate is also related to bank credit, which may become a major factor affecting the conclusion of this study, it is considered, and the real estate loans are relatively long-term, so the interest rate of medium- and long-term loans of more than five years is chosen as the representative.

② GDP of Fujian Province

From 2005 to 2016, the economic growth rate of Fujian province was more than 10%, which may become an important factor affecting the real estate market price. Therefore, the variable of Fujian provincial regional GDP was introduced.

4. Empirical Research on the Relationship between Real Estate Price and Bank Credit in Fujian Province

4.1 Unit Root (Adf) Test

Table 1 Adf Test Results of Each Variable

| difference | variable | ADF value | P value |
|---------------------|----------|-----------|---------|
| 1st difference form | LnAP | -1.92167 | 0.0541 |
| | LnLoan | -0.65065 | 0.4212 |
| | LnR | -4.37928 | 0.0002 |
| | LnGDP | -0.34199 | 0.5483 |
| 2nd difference form | LnAP | -6.02238 | 0 |
| | LnLoan | -7.22726 | 0 |
| | LnR | -5.37353 | 0 |
| | LnGDP | -1.85446 | 0.0622 |

As shown in Table 1, the first-order difference shows that the three variables are not stationary; Second-order difference, only LnGDP is not stationary, so this variable is not considered anymore. The other three stationary variables conform to second-order integration, namely $I(2)$.

4.2 Co-Integration (Johansen) Test

Table 2 Co-Integration Test Results

| The null hypothesis | The eigenvalue | The Trace statistic | 5% critical value | P value |
|---------------------|----------------|---------------------|-------------------|---------|
| None | 0.849638 | 49.13056 | 29.79707 | 0.0001 |
| At most 1 | 0.559122 | 15.02577 | 15.49471 | 0.0587 |
| At most 2 | 0.015655 | 0.284021 | 3.841466 | 0.5947 |

Table 2 Shows That At the Confidence Level of 5%, There is a Long-Term Stable Co-Integration Relationship between the Three Variables.

4.3 Granger Causality Test

From table 3 shows that real estate prices and there are no significant causality between bank credit, and real estate prices and more than 5-year long-term loan interest rates appear two-way causality, this paper argues that this is due to the medium and long term loan interest rate data of reaction is the market interest rate, compared with the bank credit data in many ways it can more accurately and timely reflect market conditions, Hence the conclusion. Fundamentally, the correlation between real estate price and bank credit still exists, and the Granger causality test only discusses numerical results, and there may be deviations in the test of practical problems, so other tests are carried out next.

Table 3 Granger Causality Test Results

| The dependent variable | Null Hypothesis | Degrees of freedom | P values |
|------------------------|------------------------------------|--------------------|----------|
| AP | LnLoan does not Granger Cause LnAP | 2 | 0.3893 |

| | | | |
|------|---------------------------------------|---|--------|
| | LnR does not Granger Cause LnAP | 2 | 0.0309 |
| | LnLoan, LnR do not Granger Cause LnAP | 4 | 0.0968 |
| Loan | LnAP does not Granger Cause LnLoan | 2 | 0.3782 |
| | LnR does not Granger Cause LnLoan | 2 | 0.3292 |
| | LnAP, LnR do not Granger Cause LnLoan | 4 | 0.5713 |
| R | LnAP does not Granger Cause LnR | 2 | 0.0074 |
| | LnLoan does not Granger Cause LnR | 2 | 0.2128 |
| | LnAP, LnLoan do not Granger Cause LnR | 4 | 0.0047 |

4.4 Impulse Response Function and Variance Decomposition

4.4.1 Impulse Response of Real Estate Prices

Fig.1 (a) the Real Estate Price Responds to Its Own Shock in a Stable State. in Phase 2, Bank Credit Reaches the Maximum Value for the Real Estate Price, and Then Gradually Decreases.

Figure 1 (b) The impact of real estate price on bank credit increased after the second period but began to approach 0 in the seventh period. In the early stage, the increase of bank credit drives the increase of real estate prices. In the later stage, banks may carry out a strict examination of loans to ensure the effective recovery of loans, which reduces the amount of bank credit issuance, and real estate developers sell houses at a lower price in the short term.

Figure 1 (c) The impact response of real estate price to loan interest rate is always negative, falling from phase 1 to phase 3, then rising slightly and gradually leveling off, which is in line with the theory that real estate price is inversely proportional to loan interest rate. The increase of the loan interest rate can effectively restrain the real estate price in the early stage, but as time goes by, the real estate price rises again.

4.4.2 Impulse Response of Bank Credit

Figure 1 (d) the impact of the bank credit on real estate prices, presents the fast growth tendency, continuously in 1-3 period, at the slowly rising stage, starting stage 4, bank credit began to rapid growth, this could be due to at the early stage of the real estate market is in a stage of xu li, real estate developers are to understand the market stage, the first in the middle, Real estate agents have identified the needed loans and begin to borrow from banks to ensure the implementation of the project, which makes the amount of bank credit rise in the middle and later period.

FIG. 1 (e) The response of bank credit to its own shock is stable, with an upward trend in the later period. Whether it is personal housing loans, or real estate development loans, the amount of bank credit will not be in decline. The number of bank loans has increased because buyers may find it difficult to pay the full cost of a home. For real estate developers, although they can obtain a source of funds through investment, in real estate construction, most developers choose to obtain bank loans to maintain the cost of land contracts, construction costs, and workers' wages. So, the reaction of bank credit to itself cannot be ignored.

Figure 1 (f) The response of bank credit to lending rates is always negative, and from the first phase onwards, the decline becomes more and more severe. Real estate developers on the premise that to ensure their profits if the loan interest rate increases will reduce the size of bank loans. This article uses long-term lending rates of more than 5 years. For a long time, to other kinds of funds. Real estate developers will reduce bank credit to some extent.

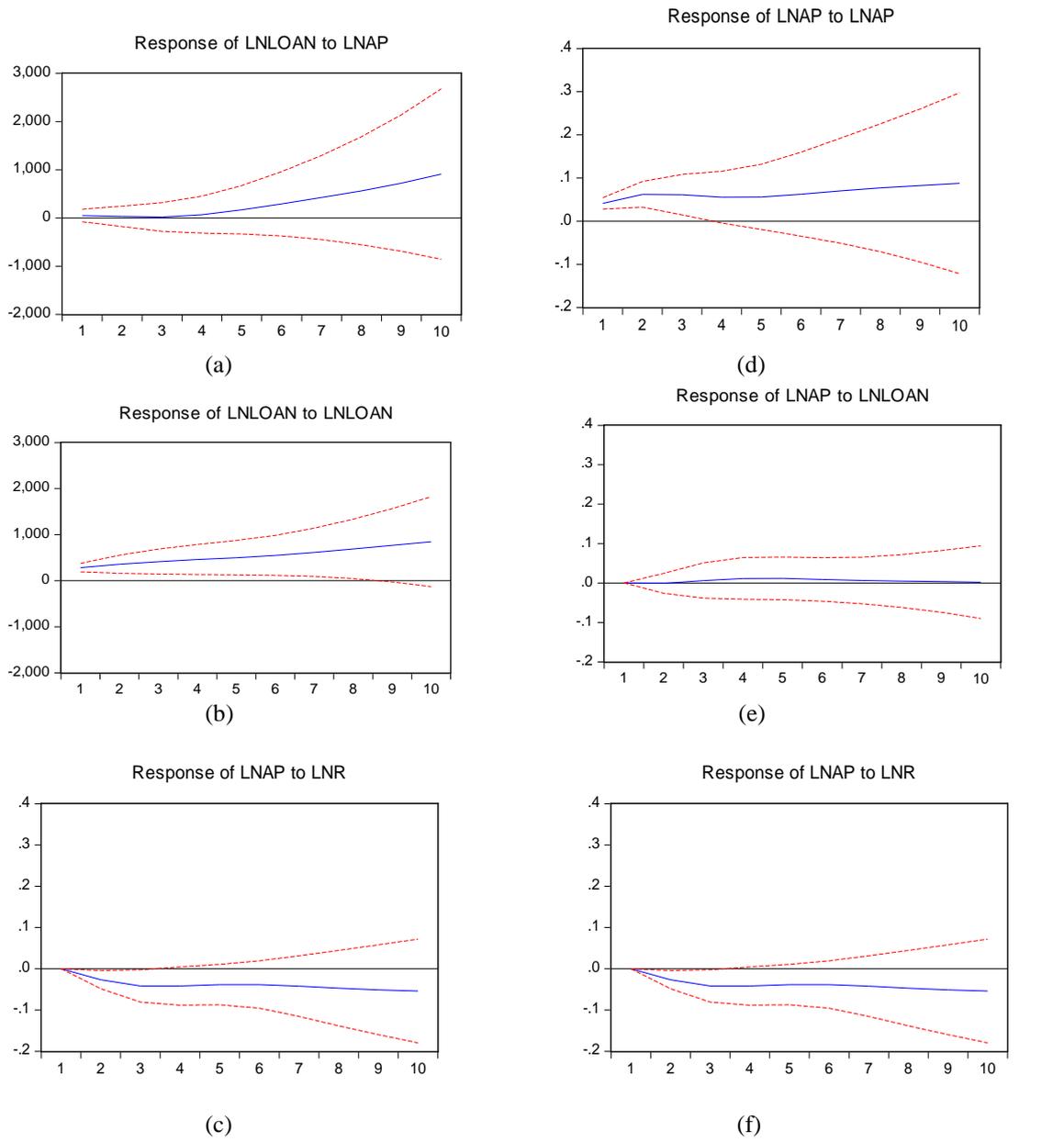
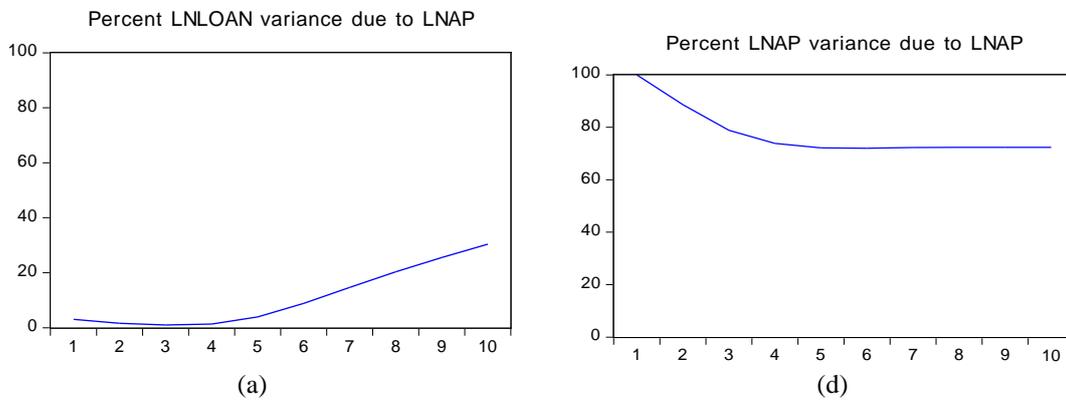


FIG. 1 Impulse response of real estate price and bank credit



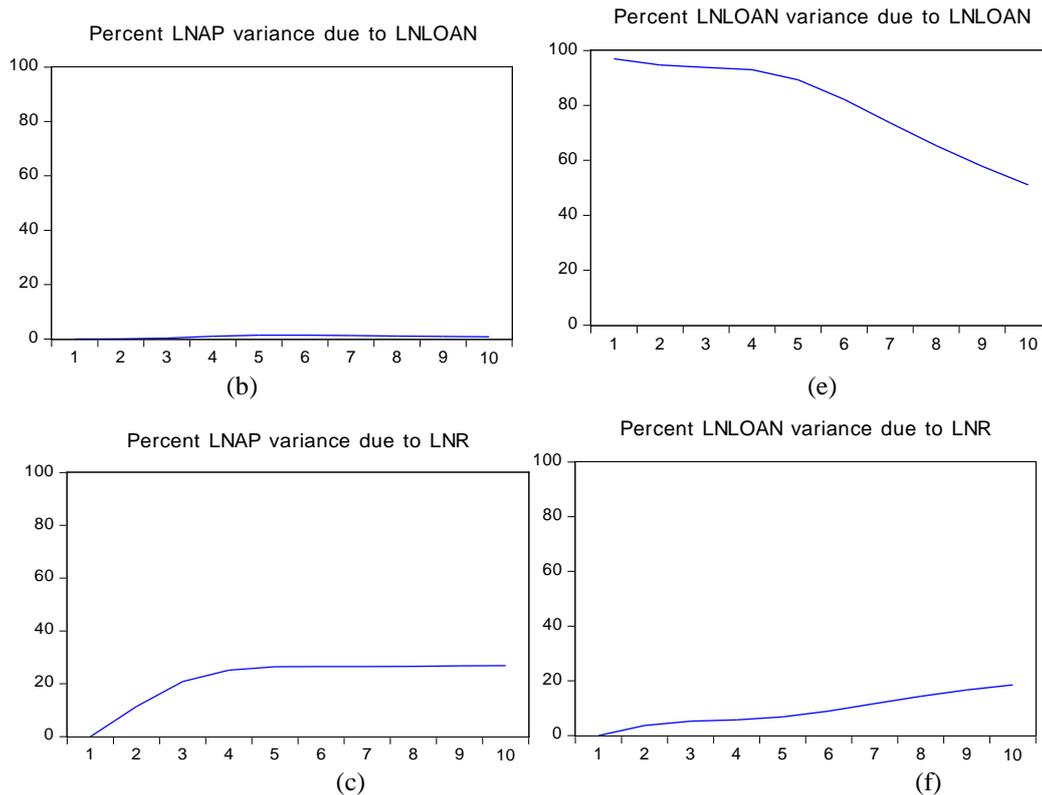


Fig.2 Variance Decomposition of Real Estate Price and Bank Credit

4.4.3 Variance Decomposition of Real Estate Prices

Figure 2 (a) The contribution of real estate price to itself gradually decreases and remains at about 70% for a long time. The price of real estate is determined by the amount of human and material resources used by the property, so the contribution of real estate price to its own is certainly not low and will account for the majority.

Figure 2 (b) The contribution of bank credit to the real estate price increased by about 3% from the third to the seventh period. The response of bank credit to the real estate price lagged, and after the seventh period, the contribution of the real estate price decreased slightly.

Figure 2 (c) The contribution of medium - and long-term loan interest rates over five years to real estate prices gradually increased and finally remained at the level of 25%. Compared with Figure 2 (b), loan interest rates contribute more quickly to real estate prices. This may be because the loan interest rate is the market interest rate, which is active in the real estate market transactions, so its contribution to the real estate price will be higher than the scale of bank credit, but fundamentally, bank credit is still a major factor affecting the real estate price.

4.4.4 Variance Decomposition of Bank Credit

Figure 2 (d) The contribution of real estate price to bank credit. Due to the lag of bank credit response, the contribution of real estate price to bank credit grows almost zero from phase 1 to phase 4, and then shows a rapid upward trend in the later period. The price of real estate is directly proportional to the credit scale of real estate companies. The larger the number of loans, the price of real estate will be raised to make up for the loan amount, whereas the lower.

Figure 2. (e) The contribution of bank credit to itself, which maintained at about 80% in the first five periods, then began to decline. If a bank is in a long-term loan situation, if it cannot recover the loan funds, it will have an impact on its own operation scale. Therefore, the contribution of bank credit to itself is not as strong as before, but it is the external multiple reasons that have a greater impact on bank credit.

Figure 2 (f) The contribution of interest rate of medium- and long-term loans over five years to bank credit continues to rise, with slow growth in the first four periods and a gradual increase in the

later period. Over time, as interest rates change, homebuyers or property developers choose to borrow from banks or find another way, so the contribution of interest rates to bank credit continues to rise.

To sum up, excluding the impact of real estate price and bank credit itself, the relationship between real estate price and bank credit exists, but the interaction between them is relatively slow.

5. Conclusion

Through analysis, this paper draws a conclusion: the increase of the loan amount of real estate developers makes the real estate in the seller's market, in the control of real estate developers, at this time the scale of bank credit will expand accordingly, so the real estate price will continue to rise; Real estate developers increase the loan amount and build many commercial housings so that the supply exceeds the demand. In the case of oversupply, the buyer's market appears, leading to the decline of real estate prices. Based on the above specific empirical analysis, Fujian province is still in the first situation, that is, the seller's market is under the monopoly of real estate developers, and the real estate price keeps rising. Even though the government has adopted corresponding real estate price regulation policies in recent years, the effect is still very small.

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