The impact of continuous tightening policies on China’s real estate industry

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Abstract

The purpose of this study is to answer the question of whether China's real estate industry is limited when facing tightening policies and to comment on the impact of government regulation on the real estate industry. This study is mainly based on the comprehensive real estate-related indicators test from 2000 to 2019. The experimental results show that the land purchase area of real estate developers has a negative correlation with real estate prices. There is a two-way relationship between monetary policy and the real estate industry. Further research shows that the tightened land policy has a significant effect on alleviating the rapid development of the real estate industry. This paper suggests that the land policy be implemented as a central policy.

JEL Classification: E20, G28, G51

Keywords: China, House price, Real estate, Tightening Policies

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1. Introduction

With the development of a socialist market economy, the urbanization level is constantly enhancing. There is no doubt that acceleration of the urbanization progress and frequent population mobility, quantity demand for houses is rapidly growing. The real estate industry is developing at high speed, symbolizing that the real estate industry has already become a pillar industry of the national economy. The rapid development of the real estate industry brings both positive and negative impacts on the national economy. On the one hand, it supplies national economic development with robust support. Also, the real estate industry shows a substantial degree of an industrial association. It drives the development of many industries, such as building materials, steel, and blocks of cement and furniture and household appliances. In other words, it makes excellent contributions to pulling the growth of the national economy.

On the other hand, with the constant expansion of the real estate market, the housing price keeps climbing, resulting in a series of economic and social issues, market structure unbalance, severe speculation phenomenon, complex housing, or even some foaming features. In recent years, under the role of multiple factors, the rising trend of the real estate price is swift, strongly exceeding the affordable ability of residents. Hence, the real estate issue becomes the emphasis and focus concerned by citizens. The government, media, scholars, and common people join in the discussion on the real estate prices. Common people constantly complain too fast rise of real estate prices. Some scholars argue that the real estate market bubble is excessively swelling so that the government should issue strict measures to drop the housing price. Some people state that due to the progress of urbanization, mobility of population, release of rigid demands, and the rise of construction costs, the real estate prices will rise at a faster speed. Affected by multiple factors,
the government blows hot and cold to the real estate market policies but cannot formulate a scientific, reasonable, and stable measure.

To promote the sustained, healthy, and stable development of the real estate market, the government has issued and implemented a series of regulatory policies. There is no doubt that these regulatory policies have also achieved certain results. However, the problems existing in China's real estate market have not been fundamentally improved. Some cities still have problems such as high house prices and imbalance between supply and demand. If these problems are not solved for a long time, it will not only affect the healthy development of the real estate market, but also be detrimental to the healthy development of China's national economy and the smooth transformation of economic structure. Therefore, starting from the tight national policy, this paper selects the land policy, monetary policy and tax policy in the national real estate tightening policy to study the impact of China's tightening policy on real estate prices, comprehensively analyzes the impact mechanism and effect of China's tightening regulation policy on real estate prices, and the research confirms the internal law of China's real estate market regulation, The empirical results of this paper show that only by scientifically regulating the real estate market, grasping the regulation principles and enhancing the pertinence, rationality and foresight of policy regulation, can we improve the effect of policy regulation, ensure that the real estate price does not fluctuate greatly and realize the stable operation of the real estate market.

In this paper, the correlation test does not exceed 0.5, it indicates that there is no correlation between variables, and regression test can be carried out. ADF unit root test is used. The time series of the original variable is not stable, and the variable is stable after the second-order difference, which is shown in Table 3. The empirical results show that in the continuous tightening policy, the impact coefficient of land tightening policy on the real estate industry is -1.8388 in the
first phase and -0.5533 in the second phase. Although the land tightening policy will always inhibit the real estate industry, with the retirement of the policy, its impact is constantly increasing. In the error correction test results, the impact of the tightening land policy on the real estate industry is -3.3094 in the short term, indicating that the tightening land policy will inhibit the real estate industry. The impact coefficient of tight monetary policy and tax policy on the real estate industry in the short term is 0.2998 and 0.0028, indicating these will promote the real estate industry. And there are 36.31% of the real estate industry will be adjusted in the short term. The Impulse Response foundation shows that there is a significant negative between the growth of house price and the growth of social financing scale. The variance decomposition results show that the real estate industry's explanation for itself is 63.0856%, the biggest explanation is tightening land policy, followed by tightening monetary policy, and the smallest explanation is tightening tax policy.

The research significance of this paper lies in analyzing the dilemmas encountered by the real estate market under the current situation according to the real estate operation status under the macroscopic tightening regulating policies to propose countermeasures and provide a specific reference value for formulating suitable developmental strategies.

This paper selects the relevant data from 2000 to 2019 as the research sample, and what impact will it have on China's real estate market under the influence of China's tightening policy. There are many tightening policies adopted in China. This paper mainly selects the common tightening policies, land policy, monetary policy, and tax policy as independent variables to explore the impact of these three main tightening policies on the price of China's real estate market. This paper provides a positive influence on some people who think it is beneficial in the long term, but it is harmful quickly and gives high quality comment on different local governments in
evaluating the developmental prospect of China’s real estate industry. Furthermore, the researcher focuses on contributing to judge the prospect of China’s economic growth, it is necessary to estimate the impacts of the tightening policies on real estate investment and economic growth.

The remainder of the paper proceeds as follows. Section 2 reviews propose literature and develops hypotheses. Section 3 describes the data and the sample and variable construction. Section 4 points out the result and provides a particular reference value for formulating suitable developmental strategies. Section 5 summarizes the impact of a series of macro-control policies issued by the state and point out the variables with the greatest impact.

2. Literature review

As an essential national economic industry, the real estate industry plays a crucial role in economic growth, employment, well-being support, and urban development. The experience at home and abroad indicates that the development of the real estate industry is always concerned by multi-subject researchers, such as economics, finance, investment, sociology, politics, and social policies to form lots of research achievements, providing a necessary theoretical foundation for us to comprehend the real estate industry, especially for the development of Chinese real estate industry.

2.1 Studies on the regulation of the real estate market

In terms of governmental intervention on the real estate market, foreign scholars have conducted research analysis from multiple aspects. In terms of the land resource supply and land resource management, Blanchard (2003) studies and analyzes Montgomery shire data and finds a positive correlation between the strict degree of land resource limit and land development price.
In other words, strict land supply limitations will accelerate land development and housing price. At the same time, regarding the regulation effect of currency, land, and finance in macro policies on the real estate market, relevant foreign scholars express their opinions on it from different aspects. In detail, based on the housing inventory model and flow model, Lawless and Whelan (2007) analyze the impacts of the currency policy on the housing market and show that expansionary currency policy will result in simultaneous variation of the housing inventory and flow. However, the sensitivity of the housing inventory market on currency policy is greater than that of the housing flow market. Finally, Ludwig (2002) states a positive correlation between the real estate price and the governmental financial expenditure, but Kuijs (2005) holds an opposite opinion. In his opinion, there is a negative correlation between the real estate market and the government's financial expenditure.

Domestic scholars pay much attention to studying the real estate market and regulation of the real estate market. From the perspective of studies on China’s currency policies, Zhao (2017) studied the real estate market and analyzed the impacts of the currency policies on real estate prices from supply and demand. Li (2018) indicates that the publication of new policies of Chinese taxation and enhancement on deposit reserve ratio has a direct relationship with the capital chain breakage of real estate development enterprises. Regarding the studies of land policy participation in the real estate market regulation, Guo (2014) starts from the legal perspective to analyze the land use control system, land planning system, and land macro-control decision-making system, and considers the land policy as the foundation of the real estate macro-control. On the grounds of studying panel data of land prices and real estate prices of 23 Chinese provinces from April 2003 to May 2012, Wang, and Zhang (2010) conclude that the supply modes including bidding, auction,
and listing of land resources cause a significant impact on the investment costs of real estate enterprises.

In terms of real estate regulation policy evolvement, Lou, and Zhang (2018) sorts out and analyze real estate macro-control policies in 1994–2008 and 2004–2012, and respectively comprehend the policy effective from the perspectives of regulation purposes and regulation means. Through the evolvement analysis of real estate macro-control policies in 2002–2012, Sun et al. (2011) propose that stabilizing real estate development, preventing the relationship of real estate bubble, and guaranteeing the state balance should be the critical points of macro-control. Speaking of the relationship between the real estate price fluctuation and the real estate bubble, Zhang, and Zhu (2013) state that consumers' rational expectation demands will significantly impact the real estate price. On the grounds of sorting out relevant references, they analyze panel data and discuss a series of factors that affect the rational expectation demands of consumers. Based on the rational expectation demand model of the real estate market, Zhang, and Zhou (2018) combines it with empirical analysis of relevant data and conclude that rational expectation demands of the real estate market exert a significant impact on the real estate price fluctuation.

2.2 Studies on the real estate price fluctuation

Foreign scholars gradually derive the studies on real estate from relevant studies of land economics and urban economics.

Speaking of the relationship between the real estate supply and balance price, Min, and John (2006) regard the new classical economic theory as the framework and assume two sub-markets of the total residential market and inventory market in the residential market. The total market
determines the level of newly increased residential construction. In contrast, the interaction between supply and demand in the inventory market determines the residential price level, called the “inventory-flow” price model of real estate. As a unique asset, another research method determined by the real estate price is to start from the perspective of the asset pricing to compare the return between the investment real estate and investment of other categories or make a comparison on the cost and earning of renting and buying a house to determine the house pricing. John and Campbell (2006) utilize the dynamic Goldstein growth model to divide the determinant factors of the rent housing price into three parts: expected future rent growth, expected actual future rate, and expected future risk premium. In their opinion, the expected future rent growth does not cause a significant impact on the rent housing price ratio, implying that the expected future price variation results in the change of the housing price rent ratio instead of rent change.

In recent years, the sustainable raising of China’s housing prices has aroused great attention from the whole society. Domestic scholars have conducted analytical research on the rising causes for the housing price. For instance, Song and Gao (2017) utilize the Granger causality test method to do empirical testing on the relationship between China’s housing price and land price, indicating that within a short time, the land price is the Granger cause of the housing price. The housing price does not affect the land price. In the long run, there is a dual causality between the housing price and the land price. Through the multivariate regression analysis, Xu et al. (2015) state that at the national level, the land price, per capita disposable income of urban residents, and credit loan of financial institutions are important factors that affect the housing price fluctuation. Meanwhile, the land price, income, and credit loan will rapidly rise in housing prices. In the end, Qiu, and Li (2016) argue that there are inadequate features of rigid demand, land supply limit, and
heterogeneity in the real estate market. It is expected that the housing price deviates from the fundamental value.

To sum up, the foreign real estate market has an early start, so their studies on the real estate market are very early. Their achievements show China's positive significance incorrectly recognizing the influence factors of the real estate market while helping the government confirm reasonable regulation means and regulation goals. However, due to differences in primary national conditions, the real estate market is also different. Hence, foreign research achievements show reference significance, but it is still not enough to break the confusion of the Chinese real estate market. In terms of China, due to the late start and awful market experience, numerous problems affect the real estate market. At the same time, previous studies analyze real estate from multiple aspects while this paper combines with the latest tightening policy on the real estate market, showing novelty to a large extent. Hence, it is suitable for enriching and updating academic opinions.

Hypothesis:

(1) The government's macro-control has a positive impact on the real estate market.

(2) The land policy has the most significant impact on the real estate market.

3. Data and Methodology

3.1 Data

Considering that China implemented the housing reform policy after 1998, China began to enter the real estate market, and the house price began to be determined by the market. Considering
the availability of data, the data range we selected is from 2000 to 2019. The main sources of data are China Statistical Yearbook and China economic network statistical database.

After the real estate industry has entered the market, China has been introducing a series of relevant policies to regulate housing prices (Thomes, 2013). To prevent excessive bubbles in housing prices, China has adopted a tightening policy to influence the real estate industry. It mainly includes tight land policy, monetary policy, and tax policy (Hamilton, 1994).

In the data selection of dependent variables, the average sales price of commercial housing in China from 2000 to 2019 is selected as the dependent variable (Brock, 2016).

Therefore, in the selection of variable data, the independent variable we selected is the average sales price of houses. The land purchase area of real estate enterprises represents the land area of land use rights obtained in a certain year by various means (except allocation) and represents the government's land supply in a certain year. The data is derived from the statistical database of China economic network (Hamilton, 2019).

Select the scale of social financing as the variable of tightening monetary policy. Social financing scale refers to the total amount of funds obtained by the real economy from the financial system in a certain period, indicating the support of the financial system to the real economy. In the theoretical circle, for a long time, the intermediate goal of China's monetary policy has been m2 and new RMB loans. However, due to the changes in China's financing structure in recent years, more direct financing and the strengthened role of non-bank financial institutions, the financing channels of the real estate industry have shifted to non-bank financial institutions and direct financing under the influence of national regulation and control policies. At present, the capital sources of China's real estate development enterprises are mainly their own funds and other
funds. Therefore, the new RMB loan index is not as comprehensive as the social financing scale index to reflect the financing scale of the real estate industry (Kim, 2018).

Select local real estate tax revenue as the variable of tightening fiscal and tax policy. Local real estate tax revenue includes real estate tax, urban land use tax, land value-added tax, cultivated land occupation tax and deed tax, etc. By testing the availability of data, this study takes the real estate tax, urban land use tax, land value-added tax and deed tax as the representative variables of the tightening fiscal and tax policy and defines them as the local real estate tax revenue (Chen, 2017).

Table 1 shows the descriptive statistical analysis of the selected variables, Since the house price reform, the average sales price of houses in China has risen to 22.17 million yuan, the highest house price is 13.26 million yuan, and the lowest house sales price is only 0.09 million yuan. There is a large gap in house sales prices in China. The average land acquisition area of real estate enterprises is 12.74, the highest value is 13.80 and the lowest value is 11.50. The average social financing scale is 38985 million yuan, the highest value is 5.74 trillion yuan, and the lowest value is 2.32 trillion yuan. The social financing scale has not changed much in recent years. The average value of real estate tax revenue is 53.76 billion yuan, the maximum value is 66.98 billion yuan, and the minimum value is 43.35 billion yuan.

3.2 Methodology

The most basic analysis method of time series is autoregressive model, which was founded by box and Jenkins. It describes the change trend of economic variables with the help of the balance
and randomness of time series and predicts the change of time series. The general form of the
model is as follows:

$$x_t = \alpha_0 + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + \alpha_3 x_{t-3} + \cdots + \alpha_m x_{t-m} + \mu_t$$

(1)

Where $\alpha_0$ is a constant term, $\alpha_1$ to $\alpha_m$ is the coefficient of the model, $\mu_t$ is Random error term.

The $m$-order autoregressive model of the above equation is recorded as VAR $(m)$. The premise of
establishing autoregressive model of time series directly is that the series is stable, otherwise
pseudo regression will appear. The stationarity of time series means that the mean, variance, and
auto covariance of time series do not depend on the time. If the time series $x$ is stationary, so

$$E(x_t) = \alpha, \text{var}(x_t) = d_t, \text{cov}(x_t, x_{t-s}) = d_s,$$

among them, the autocovariance of time series
does not depend on time $t$, but only on the interval between them. The common method to test the
stationarity is the unit root test. Unit root test mainly includes DF test and ADF test.

Assuming that there is $m$-order autocorrelation in the time series, the $m$-order autoregressive
equation is used to judge the unit root in the form of.

That is, the original assumption is that there is at least one unit root in the sequence, and the
alternative assumption is that there is no unit root in the sequence. When using ADF test, we should
pay attention to the following problems: first, we should determine the reasonable lag order;
Secondly, because the critical value of test statistics depends on the form of equation, it is very
important to choose the form of equation; Finally, if the result of the test is to reject the original
hypothesis, then the original sequence has no unit root, that is, the original sequence is stationary;
If the original hypothesis is given and accepted, the sequence is unstable, and several differences
are needed until the original hypothesis is rejected, so as to determine the order of single integer
of the sequence.
Johansen cointegration test is a test method for testing regression coefficients based on VAR model proposed by Johansen (1988, 1990). The basic idea is to transform a problem of finding the maximum false function into a problem of finding the eigenvalue and the corresponding eigenvector based on VAR model.

Johansen test estimates the rank of matrix and test matrix based on the idea of canonical correlation analysis. Canonical correlation is to find two pairs of linear combinations with the largest correlation coefficient. Obviously, the correlation between unbalanced variables and balanced variables cannot be maximized. Therefore, only when the two variables are balanced can the correlation coefficient reach the maximum. Therefore, if there is a cointegration relationship between unbalanced variables, there should be a specific linear combination to maximize the correlation with the post difference equilibrium variables. For the estimation of cointegration vector, that is, mainly by finding a specific set of linear combinations, the linear combination has the maximum correlation coefficient with any combination, and the eigenvalue is the square of the correlation coefficient. According to the relevant theory of linear algebra, the number of matrix rank is equal to the number of non-zero eigenvalues, so the test of matrix rank becomes the test of the number of non-zero eigenvalues (Thoneme, 2018).

Let the n eigenvalues of the matrix be in the order of magnitude $\gamma_1, \gamma_2, \ldots, \gamma_n$. The following are common inspection methods.

A. Trace test

The statistics of trace test method are:

$$q_r = -T \sum_{i=r+1}^{n} \ln(1 - q_r), r = 0, 1, 2 \ldots N - 1$$

The original hypothesis and alternative hypothesis are:
\[ h_0: q_r > 0, q_{r+1} = 0 \]
\[ h_1: q_{r+1} > 0 \]

The original assumption is equivalent to assuming that there are at most R cointegration relationships. Trace inspection is a right-side inspection process of step-by-step inspection:

1. When \( q_0 \) < the critical value (the critical value is the critical value of Johansen distribution at a certain significance level), accept the original hypothesis, that is, there is no cointegration relationship; Otherwise, reject the original hypothesis, think that there is at least one cointegration relationship, and then test it.

2. When \( q_1 \) < the critical value, accept the original hypothesis, that is, there is at most one cointegration relationship, and the test process stops; Otherwise, reject the original hypothesis, think that there are at least two cointegration relationships, and then proceed.

And so on until there are at most R cointegration relationships.

A. Maximum eigenvalue method

The statistics of the maximum eigenvalue method are:

\[ q_r = -T \sum_{i=r+1}^{n} \ln(1 - q_r), r = 0, 1, 2 \ldots N - 1 \]  

(3)

The original hypothesis and alternative hypothesis are:

\[ h_0: q_r > 0, q_{r+1} = 0 \]
\[ h_1: q_{r+1} > 0 \]

It is like the trace inspection process:

When \( q_0 \) < the critical value, no Cointegration.

When \( q_0 \) > the critical value, there is at least one cointegration relationship.

When \( q_1 \) < the critical value, at most, there is only one cointegration relationship.
When \( q_1 > \) the critical value, there are at least two cointegration relationships.

And so on until there are at most \( R \) cointegration relationships.

Cointegration analysis can reveal the long-term equilibrium relationship between dependent variables and independent variables. To explore the adjustment degree of dependent variables to long-term mean, we need to use error correction model. Vector error correction model (VECM) is a model that combines the ideas of Cointegration and error correction. Its basic form was proposed by Davison, Hendry, SRBA and Yeo in 1978, so it is also called DHSY model. The model believes that there may be a long-term stable equilibrium relationship between economic variables, but this equilibrium relationship may be unbalanced in the short term. Then combining short-term changes with long-term equilibrium can analyze the short-term to long-term adjustment process.

The general form of VECM mold is:

\[
\Delta y_t = \prod y_t - 1 + \sum_{i=1}^{k-1} (A_i \Delta y_{t-i}) + \mu_i
\]  

\((\prod y_t - 1)\) represents the cointegration relationship, if the previous period value deviates from the cointegration relationship, the next period value is adjusted according to this equation form. Therefore, the above formula is not only the basis equation of cointegration test, but also represents the general form of VECM model. The basic framework of VECM model is the same as that of VAR model. The difference lies in the constraint of cointegration relationship. Therefore, VECM model is often called constrained VAR model.

Impulse response function is used to analyze the change path of each sequence in the system when the system is subjected to external impact. Specifically, it describes the impact of a standard deviation impact on the current and future values of endogenous variables.
Variance decomposition is to analyze the interaction between variables from another angle. Specifically, variance decomposition is to analyze the contribution of shocks from itself and other endogenous variables in the change of endogenous variables. Through the variance decomposition process, we can see that the variance decomposition of VAR model can give the relative importance information of random information items. The calculation idea is to decompose the fluctuation of each endogenous variable into a single component associated with the information items of each equation according to the causes, to understand the relative importance of each information to the endogenous variables of the model. When the error term is correlated, the result of variance decomposition is affected by the order of variables.

4. Results and Discussions

We define the average sales price of real estate as \( Y \), set the purchase area of real estate enterprises as \( X_1 \), set the social financing scale as \( X_2 \), and set the real estate tax revenue as \( X_3 \). Our regression model is constructed as follows:

\[
\text{Price}_t = \beta_0 + \beta_1 \text{Area}_t + \beta_2 \text{Fin}_t + \beta_3 \text{Tax}_t + \mu_t
\]  

(5)

The selected variable data is processed by logarithm, the reconstructed model is as follows:

\[
\ln Y_t = \beta_0 + \beta_1 \ln X_{1t} + \beta_2 \ln X_{2t} + \beta_3 \ln X_{3t} + \mu_t
\]  

(6)

To test the stationarity of time thickness variables and avoid that the model is pseudo regression. In this paper, ADF unit root test is used. The time series of the original variable is not stable, and the variable is stable after the second-order difference. Which is shown in Table 3.

The ADF values of all variables after the second-order difference are less than three critical values, indicating that all variables are stable after the second-order difference.
The Table 2 shows the correlation test results between all variables. It can be seen from the correlation coefficient between all variables that the coefficient value does not exceed 0.5. If the coefficient does not exceed 0.5, it indicates that there is no correlation between variables, and regression test can be carried out.

Cointegration test after second-order difference for variables. The cointegration regression test results are as Table 4.

The empirical results show that in the continuous tightening policy, the impact coefficient of land tightening policy on the real estate industry is -1.8388 in the first phase and -0.5533 in the second phase. Although the land tightening policy will always inhibit the real estate industry, with the retirement of the policy, its impact is constantly increasing.

The empirical results show that in the continuous tightening policy, the impact coefficient of monetary tightening policy on the real estate industry is 0.0284 in the first period and -0.0373 in the second period. The tightening monetary policy will not inhibit the development of the real estate industry in the early stage but will have an inhibitory impact on the real estate industry in the later stage.

The empirical results show that in the continuous tightening policy, the impact coefficient of tax tightening policy on the real estate industry is 0.0014 in the first phase and -0.0040 in the second phase. The tightening tax policy will not inhibit the development of the real estate industry in the early stage but will have an inhibitory impact on the real estate industry in the later stage.

We find that the real estate industry is greatly affected by the tightening policy. Changes in policies such as mainland, finance and taxation, money and finance will have a direct or indirect impact on the demand and supply of the real estate market, and then have an impact on the real
In view of the important position of the real estate industry in the national economy, it is necessary to constantly improve the real estate market regulation policy. This requires clarifying the objectives of scientific regulation of the real estate market, grasping the regulation principles, and strengthening the pertinence, rationality, and foresight of policy regulation, to improve the effect of policy regulation, ensure that real estate prices do not fluctuate greatly, and realize the stable operation of the real estate market.

5. Conclusion

This paper selects the relevant data from 2000 to 2019 as the research sample to study the impact on the real estate market under the influence of China's tightening policy. China has adopted many austerity policies. This paper mainly selects the commonly used tightening policy, land policy, monetary policy, and tax policy as independent variables to explore the impact of these three main tightening policies on the price of China's real estate market.

The survey results show that the ultimate purpose of real estate market regulation is to promote the healthy, stable, and sustainable development of the real estate market. According to Marx's social reproduction theory, the real estate industry, as an important part of the national economy, ensures the stable development of the real estate industry on the one hand and the reasonable proportion of the real estate industry in the national economy on the other hand. In addition, the change law of real estate price is different from other commodities, such as the complete difference of real estate commodities and the restriction of land on real estate price. The stability of real estate prices is not only affected by month by month and year-on-year changes. However, no matter how the real estate price changes, it cannot be separated from the level of social and economic development and the regulatory policies issued by the state.
The land purchase area of real estate enterprises with representative variables of land policy has a significant negative impact on real estate prices, and its coefficient is -0.5533, indicating that the land purchase area increases by 1% and the real estate price decreases by 0.5533%. When the state introduces the land tightening policy, it will reduce the purchase of land by real estate enterprises and tightening the land will limit the number of real estate development. This will curb China's real estate market. Tight monetary policy will also restrain China's real estate market, with an impact coefficient of -0.0373. The empirical study of this paper shows that the increase of house prices will reduce the scale of social financing. When the State implements a tight monetary policy, the funds that real estate can borrow from the state are very limited, which inhibits the development of the real estate market. The tightening tax policy also has a significant inhibitory effect on the real estate market, and the influence coefficient is -0.0040. The impact of the tightening tax policy on the real estate market has been restrained.

The variance decomposition results show that the real estate industry's explanation for itself is 63.0856%, and the land policy tightening's explanation for the real estate industry is 26.7735%. The explanation of tightening monetary policy for the real estate industry is 5.9005%. The explanation for tightening tax policy in the real estate industry is 4.2401%. The biggest explanation is tightening land policy, followed by tightening monetary policy, and the smallest explanation is tightening tax policy.

Among all the tightening policies, the land policy has the greatest impact on the real estate market. The tightening land policy limits the effective use of land area by real estate developers, and then affects the real estate market. The real estate market is based on land. If land is lost, it will have a greater impact on the market. Therefore, the tightening land policy is the main policy affecting China's real estate market.
Based on the theory of real estate economics, this paper analyzes and studies the impact mechanism and effect of China's real estate market tightening policy on real estate prices and studies the internal law of China's real estate market regulation. By selecting three main tightening policies to analyze the changes of the real estate market, under the new normal of economic growth, it has an important contribution to improve the tightening control policies of China's real estate market, promote the healthy development of the real estate market, and promote the healthy development and smooth transformation of the national economy.
References


Table 1 Descriptive Statistics

The table shows descriptive statistics of three policies of real estate price and tightening. Since the house price reform, the average sales price of houses in China has risen to 22.17 million yuan, the highest house price is 13.2638 million yuan, and the lowest house sales price is only 0.0088 million yuan. There is a large gap in house sales prices in China. The average land acquisition area of real estate enterprises is 12.7493, the highest value is 13.8093 and the lowest value is 11.5035. The average social financing scale is 38985 million yuan, the highest value is 5.74 trillion yuan, and the lowest value is 2.32 trillion yuan. The social financing scale has not changed much in recent years. The average value of real estate tax revenue is 53.7625 billion yuan, the maximum value is 66.98 billion yuan, and the minimum value is 43.35 billion yuan. The kurtosis and skewness values of the four variables are within the normal distribution range, indicating that the variable data obey the positive distribution.

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<th>Std.Dev</th>
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<td>669.8000</td>
<td>0.1002</td>
<td>1.5709</td>
</tr>
</tbody>
</table>
Table 2 Correlations

The following table shows the correlation test results between all variables. It can be seen from the correlation coefficient between all variables that the coefficient value does not exceed 0.5. If the coefficient does not exceed 0.5, it indicates that there is no correlation between variables, and regression test can be carried out. ***, ** and * are significant at 1%, 5% and 10%, respectively.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$L2.Price_t$</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L2.Area_t$</td>
<td>-0.1897***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L2.Fin_t$</td>
<td>0.0361***</td>
<td>0.1987**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.0001)</td>
<td>(0.0011)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$L2.Tax_t$</td>
<td>-0.0191***</td>
<td>0.0131***</td>
<td>0.0987***</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(0.0000)</td>
<td>(0.0005)</td>
<td>(0.0031)</td>
<td></td>
</tr>
</tbody>
</table>
Table 3 Unit root test

Table 3 shows the stationarity test of variables. The original series of variable house average sales price $Y$, land purchase area $X_1$, social financing scale $X_2$ and real estate tax revenue $X_3$ are unstable, which is also unstable after the first-order difference, and the variable is stable after the second-order difference. The ADF values of all variables after the second-order difference are less than three critical values, indicating that all variables are stable after the second-order difference.

<table>
<thead>
<tr>
<th>variable</th>
<th>ADF value</th>
<th>1% critical value</th>
<th>5% critical value</th>
<th>10% critical value</th>
<th>conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnPrice$_t$</td>
<td>-1.9976</td>
<td>-3.8315</td>
<td>-3.0299</td>
<td>-2.6551</td>
<td>Unstable</td>
</tr>
<tr>
<td>lnArea$_t$</td>
<td>-2.0515</td>
<td>-3.8315</td>
<td>-3.0299</td>
<td>-2.6551</td>
<td>Unstable</td>
</tr>
<tr>
<td>lnFin$_t$</td>
<td>-2.0579</td>
<td>-3.8315</td>
<td>-3.0299</td>
<td>-2.6551</td>
<td>Unstable</td>
</tr>
<tr>
<td>lnTax$_t$</td>
<td>0.9440</td>
<td>-3.8315</td>
<td>-3.0299</td>
<td>-2.6551</td>
<td>Unstable</td>
</tr>
<tr>
<td>L.lnPrice$_t$</td>
<td>-1.5421</td>
<td>-3.9591</td>
<td>-3.0810</td>
<td>-2.6813</td>
<td>Unstable</td>
</tr>
<tr>
<td>L.lnArea$_t$</td>
<td>-1.1640</td>
<td>-3.9591</td>
<td>-3.0810</td>
<td>-2.6813</td>
<td>Unstable</td>
</tr>
<tr>
<td>L.lnFin$_t$</td>
<td>-1.2206</td>
<td>-4.0579</td>
<td>-3.1199</td>
<td>-2.7011</td>
<td>Unstable</td>
</tr>
<tr>
<td>L.lnTax$_t$</td>
<td>-1.8390</td>
<td>-4.0579</td>
<td>-3.1199</td>
<td>-2.7011</td>
<td>Unstable</td>
</tr>
<tr>
<td>L2. lnPrice$_t$</td>
<td>-5.2761</td>
<td>-3.8867</td>
<td>-3.0521</td>
<td>-2.6665</td>
<td>stable</td>
</tr>
<tr>
<td>L2.lnArea$_t$</td>
<td>-5.5250</td>
<td>-3.9203</td>
<td>-3.0655</td>
<td>-2.6734</td>
<td>stable</td>
</tr>
<tr>
<td>L2.lnFin$_t$</td>
<td>-7.1564</td>
<td>-3.9203</td>
<td>-3.0655</td>
<td>-2.6734</td>
<td>stable</td>
</tr>
<tr>
<td>L2.lnTax$_t$</td>
<td>-7.0992</td>
<td>-3.9203</td>
<td>-3.0655</td>
<td>-2.6734</td>
<td>stable</td>
</tr>
</tbody>
</table>
Table 4 Main Regression Results

The table shows results for the in-sample regression:

\[ \ln Price_t = \beta_0 + \beta_1 \ln Area_t + \beta_2 \ln Fin_t + \beta_3 \ln Tax_t + \mu_t, \]

where \( \beta_0 \) is a constant term, \( \beta_1 \) to \( \beta_3 \) are estimation coefficients, and \( \mu_t \) is a random error term. The results of principal regression analysis show that in the early stage of tightening the land policy, the impact coefficient of land purchase area \( X_1 \) on the real estate industry is -0.5533. The impact of tightening land policy on the real estate industry will gradually increase in the later stage, which has restricted the development of the real estate industry. The impact of tight monetary policy on the real estate industry was -0.0373 in the early stage. With the implementation of tight monetary policy, it has a restraining effect on the real estate industry. The impact of tightening tax policy on the real estate industry was -0.0040 in the early stage. Tighter tax policies will also curb the real estate industry. ***, ** and * are significant at 1%, 5% and 10%, respectively.

<table>
<thead>
<tr>
<th></th>
<th>L2. Price_t</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2. Area_t</td>
<td>-0.5533***</td>
</tr>
<tr>
<td></td>
<td>(-2.83)</td>
</tr>
<tr>
<td>L2. Fin_t</td>
<td>-0.0373***</td>
</tr>
<tr>
<td></td>
<td>(-7.64)</td>
</tr>
<tr>
<td>L2. Tax_t</td>
<td>-0.0040***</td>
</tr>
<tr>
<td></td>
<td>(-6.39)</td>
</tr>
<tr>
<td>constant</td>
<td>-1.2491</td>
</tr>
<tr>
<td></td>
<td>(-1.58)</td>
</tr>
<tr>
<td>Obs</td>
<td>20</td>
</tr>
</tbody>
</table>
Table 5 Error Correction Model

The error correction model is to test whether there is a short-term relationship between variables. In the error correction test results, the impact of the tightening land policy on the real estate industry is -3.3094 in the short term, and the impact result is negative, indicating that the tightening land policy will inhibit the real estate industry in the short term. The impact coefficient of tight monetary policy on the real estate industry in the short term is 0.2998, indicating that tight monetary policy will promote the real estate industry in the short term. The impact of the tightening tax policy on the real estate industry is 0.0028 in the short term, which also shows that the tightening tax policy will promote the real estate industry in the short term. The random error coefficient is -0.3631, indicating that 36.31% of the real estate industry will be adjusted in the short term. ***, ** and * are significant at 1%, 5% and 10%, respectively.

<table>
<thead>
<tr>
<th></th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln Area_t )</td>
<td>-3.3094***</td>
</tr>
<tr>
<td></td>
<td>(-7.93)</td>
</tr>
<tr>
<td>( \ln Fin_t )</td>
<td>0.2998***</td>
</tr>
<tr>
<td></td>
<td>(14.33)</td>
</tr>
<tr>
<td>( \ln Tax_t )</td>
<td>0.0028***</td>
</tr>
<tr>
<td></td>
<td>(3.68)</td>
</tr>
<tr>
<td>constant</td>
<td>-0.0018</td>
</tr>
<tr>
<td></td>
<td>(-2.19)</td>
</tr>
<tr>
<td>Obs</td>
<td>20</td>
</tr>
<tr>
<td>Adj-( R^2 )</td>
<td>0.7188</td>
</tr>
<tr>
<td>Error correction coefficient</td>
<td>-0.3631</td>
</tr>
</tbody>
</table>
Table 6 Impulse Response Function

The impulse response function results show that the impact of the tightening land policy on the real estate industry has been negative, which is consistent with the above regression results. The impact of tight monetary policy on the real estate industry decreased in the early stage, began to rise after phase 3, reached the maximum in phase 5, and then began to decline. The impact of the tightening tax policy on the real estate industry was an upward trend in the early stage, then began to decline, and has been showing an upward trend after a decline.

Response of $lnY_{1t}$:

<table>
<thead>
<tr>
<th>Period</th>
<th>$lnArea_t$</th>
<th>$lnFin_t$</th>
<th>$lnTax_t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0000</td>
<td>0.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>2</td>
<td>-0.0377</td>
<td>0.0090</td>
<td>0.0005</td>
</tr>
<tr>
<td>3</td>
<td>0.0121</td>
<td>-0.0158</td>
<td>0.0162</td>
</tr>
<tr>
<td>4</td>
<td>0.0122</td>
<td>0.0012</td>
<td>0.0005</td>
</tr>
<tr>
<td>5</td>
<td>-0.0089</td>
<td>0.0151</td>
<td>-0.0292</td>
</tr>
<tr>
<td>6</td>
<td>0.0068</td>
<td>-0.0145</td>
<td>0.0179</td>
</tr>
<tr>
<td>7</td>
<td>-0.0065</td>
<td>0.0100</td>
<td>0.0126</td>
</tr>
<tr>
<td>8</td>
<td>-0.0012</td>
<td>-0.0114</td>
<td>-0.0134</td>
</tr>
<tr>
<td>9</td>
<td>0.0285</td>
<td>0.0083</td>
<td>-0.0088</td>
</tr>
<tr>
<td>10</td>
<td>-0.0175</td>
<td>0.0042</td>
<td>0.0150</td>
</tr>
</tbody>
</table>
Table 7 Variance Decomposition

The variance decomposition results show that the explanation of the real estate industry to itself is 63.0856%, and the explanation of the tightened land policy to the real estate industry is 26.7735%. The explanation of the tight monetary policy to the real estate industry is 5.9005%. The explanation of the tightening tax policy to the real estate industry is 4.2401%. The biggest explanation is the tightening land policy, the second is the tightening monetary policy, and the smallest is the tightening tax policy.

<table>
<thead>
<tr>
<th>Period</th>
<th>S.E.</th>
<th>$\ln Price_t$</th>
<th>$\ln Area_t$</th>
<th>$\ln Fin_t$</th>
<th>$\ln Tax_t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0906</td>
<td>100.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>2</td>
<td>0.1082</td>
<td>70.9004</td>
<td>27.9495</td>
<td>0.0389</td>
<td>1.1110</td>
</tr>
<tr>
<td>3</td>
<td>0.1170</td>
<td>67.2946</td>
<td>26.3252</td>
<td>2.9359</td>
<td>3.4441</td>
</tr>
<tr>
<td>4</td>
<td>0.1286</td>
<td>71.8595</td>
<td>22.4239</td>
<td>2.8444</td>
<td>2.8720</td>
</tr>
<tr>
<td>5</td>
<td>0.1393</td>
<td>66.6671</td>
<td>27.7964</td>
<td>2.9126</td>
<td>2.6237</td>
</tr>
<tr>
<td>6</td>
<td>0.1485</td>
<td>61.8561</td>
<td>27.2153</td>
<td>6.5213</td>
<td>4.4072</td>
</tr>
<tr>
<td>7</td>
<td>0.1564</td>
<td>64.8326</td>
<td>25.2888</td>
<td>5.9014</td>
<td>3.9770</td>
</tr>
<tr>
<td>8</td>
<td>0.1648</td>
<td>62.9019</td>
<td>27.7443</td>
<td>5.3367</td>
<td>4.0170</td>
</tr>
<tr>
<td>9</td>
<td>0.1708</td>
<td>61.2974</td>
<td>27.7750</td>
<td>6.3751</td>
<td>4.5523</td>
</tr>
<tr>
<td>10</td>
<td>0.1776</td>
<td>63.0856</td>
<td>26.7735</td>
<td>5.9005</td>
<td>4.2401</td>
</tr>
</tbody>
</table>