

# Did monetary policy cause a housing bubble in the US? --Evidence from 2000-2005 in US

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**Abstract.** This article uses quantitative analysis, setting three variables: the federal funds rate, mortgage servicing as a percentage of disposable personal income, and house prices. I made a simple model using the logical relationship of the independent variable, mediator variable, and dependent variable. Then regression analysis is conducted to explore the relationship between monetary policy and real estate bubbles. The conclusion is that loose monetary policy contributed to the housing bubble, but raising the federal funds rate did not contain the rise in housing prices, which means the existing monetary policy tools are insufficient to solve the problem. A better regulatory system is needed to avoid the emergence of bubble economies.

**Keywords:** Monetary policy; Housing bubble; Federal funds rate; Federal Reserve System.

## 1. Introduction

In recent years, rising housing prices in the United States have had enormous implications for the monetary policy system and financial stability. The development of the real estate market and the practice of monetary policy in the United States have also constantly confirmed the close relationship between real estate prices and monetary policy.

To begin with, we need to clarify the three main definitions in this paper. The first is monetary policy. Monetary policy, also known as financial policy, refers to the general term of various guidelines, policies, and measures adopted by the central bank to control and regulate the money supply and credit quantity to achieve its specific economic goals. The second is the Federal Reserve System. As the central bank of the United States, the Federal Reserve obtains authority from the United States Congress to set monetary policy and supervise financial institutions in the United States. The Federal Reserve System has long undertaken the formulation and implementation of monetary policy in the United States. The Federal Reserve creates a relatively stable financial environment by adjusting the federal funds rate and other monetary policies. The third is the housing bubble. A housing bubble can be understood as a continuous rise in real estate prices in a constant process. Such price increases create expectations of further price increases and attract new investors. With the continual rise of the price and the continuous increase of speculative capital, the real estate price is much higher than the corresponding real estate price, which leads to the real estate bubble.

Then we should understand why the Fed cut the federal funds rate in the early 2000s. From 1999, the Internet bubble kept expanding. To prevent the economy from overheating, from June 1999 to May 2000, the Federal Reserve raised the Federal funds rate from 4.75% to 6.5%. The dot-com bubble burst in 2000, the NASDAQ index collapsed, and the September 11 attacks added to the economic and stock market woes. In response to the resulting recession and a wave of job losses, the Federal Reserve immediately reversed course, cutting interest rates sharply from the beginning of the following year, driving the U.S. economy from the Internet economy to the housing economy.

However, many scholars have significant doubts about the monetary policy adjustment decided by the Federal Reserve every year. Some people think that the real estate bubble is caused by the excessively loose monetary policy of the Federal Reserve. In contrast, others believe that the real estate bubble is not directly related to the monetary policy adjustment. I read the literature by John B. Taylor and Ben S. Bernanke on the relationship between monetary policy and housing bubbles:

Taylor (2008) argues that the Fed's departure caused the housing bubble in the early 2000s from the rate-setting principles it had followed for the previous two decades. To stimulate consumption, the Federal Reserve blindly supported some financial institutions and creditors and adopted

excessively loose monetary policy, ultimately leading to this crisis. He suggested that the key to solving the housing bubble crisis was to establish principles on which the government or the Federal Reserve should base its monetary policy interventions rather than blindly adjusting them. It is also time to return to the rate-setting principles that worked during the Great Moderation. Not only that, but there are also concerns about inflation in international markets, and the Fed's monetary policy is likely to affect global financial markets.

Bernanke (2009) argued that there was no significant relationship between monetary policy and changes in housing prices. He argues that it was not the fall in short-term interest rates that drove the housing boom but the use of alternative mortgages and the decline in underwriting standards that allowed more people to enter the housing market. Therefore, he proposed to strengthen supervision, carry out financial regulatory reform, establish a systemic risk committee from the perspective of the entire country's financial system, macro assessment of leverage ratio, liquidity and other indicators as early as possible to find and solve the existing risks.

By analyzing their views, this paper will further discuss whether the monetary policy decisions made by the Federal Reserve during the first five years of the 2000s directly or indirectly caused the housing bubble.

## **2. Theoretical Hypothesis**

Loose monetary policy will increase people's propensity to invest and increase the cash flow in the entire financial market. At the same time, the low loan rate also stimulates people to buy houses through mortgage loans and other ways to obtain more income. Eventually, rising house prices lead to a housing bubble. To sum up, the theoretical hypothesis of this paper is that monetary policy causes real estate bubbles.

## **3. Methodology**

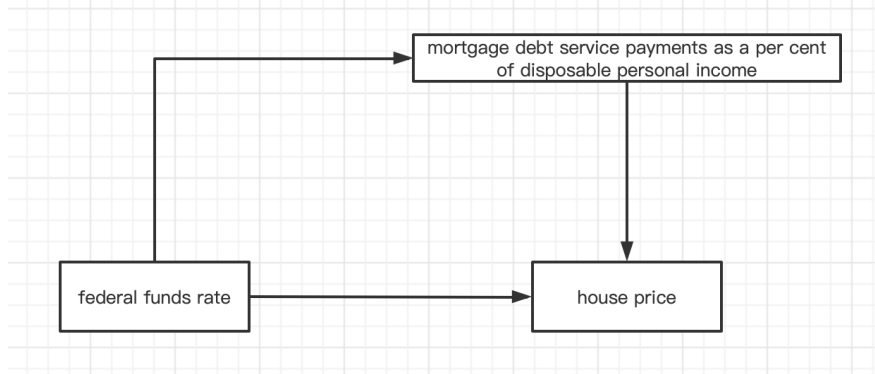
This paper aims to study whether monetary policies lead to real housing bubbles. Therefore, I choose the quantitative analysis method to represent monetary policies or real estate bubbles with a series of quantifiable data, and the relationship between the two is quantitatively analyzed. And finally, conclude and prove the hypothesis.

### **3.1 Variables**

To explore whether monetary policy causes housing bubbles, I will introduce three variables in this paper: the federal funds rate, mortgage servicing as a percentage of disposable personal income, and house prices.

### **3.2 Model**

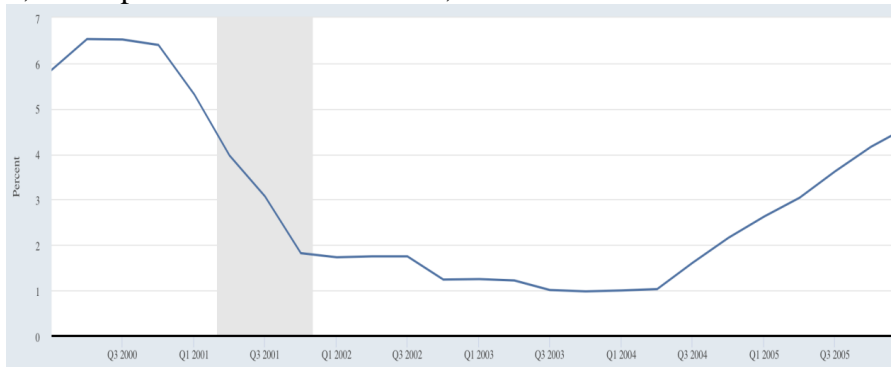
The Federal funds rate will directly affect banks' deposit and lending rates. The lower deposit and lending rates will lead to lower interest rates on savings and loans, and people will be more willing to invest in the real estate market and have a more vital willingness to take out mortgage loans, thus leading to the rise of housing prices. So I set the federal funds rate as the independent variable, mortgage debt service payments as a per cent of disposable personal income as the intermediary variable, and house prices as the dependent variable. Finally, the model is established according to the logical relationship between the above three variables.



**Fig. 1** Drawn by Xmind.

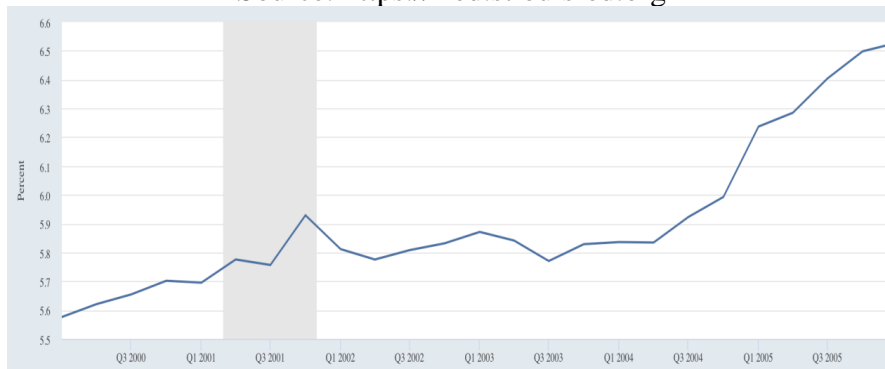
**3.3 Data**

I looked for quarterly data on the federal funds rate, mortgage service as a percentage of disposable personal income, house prices from 2000 to 2005, and line charts.



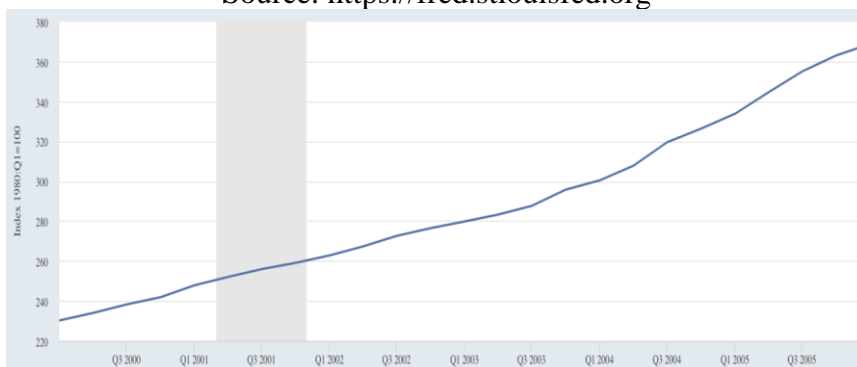
**Fig. 2** federal funds rate

Source: <https://fred.stlouisfed.org>



**Fig. 3** mortgage debt service payments as a per cent of disposable personal income

Source: <https://fred.stlouisfed.org>



**Fig. 4** house price

Source: <https://fred.stlouisfed.org>

According to the line chart of the independent variable federal funds rate, from the first quarter of 2000 to the first quarter of 2004, the Federal Reserve rate has been reducing federal funds rate. It raised the federal funds rate from the second quarter of 2004 to the fourth quarter of 2005. So I will discuss the relationship between the three variables in terms of the two phases of the change in the federal funds rate.

#### 4. Regression analysis

This paper aims to explore whether changes in the federal funds rate will directly cause house price fluctuations and indirectly through changes in mortgage willingness to cause house price fluctuations. So I will conduct regression analysis on three variables.

##### 4.1 Regression analysis of federal funds rate (independent variable) and housing price (dependent variable) in the first phase

**Table 1.** Regression analysis of federal funds rate (independent variable) and housing price (dependent variable) in the first phase

Model	R	R-square	coefficient	constant
1	0.963	0.928	-2.941	109.565

Source: Analyzed by SPSS.

According to the regression analysis results, housing price and interest rate are negatively correlated, and the function expression is

$$Y = -2.941X + 109.565, R\text{-squared} = 0.92, \text{ indicating a good degree of fit.}$$

So we can conclude that expansionary monetary policy in the early 21st century, the fed cut the federal funds rate, bank loan interest rate, and deposit income lower than the investment revenue of the real estate market. Hence, people are more inclined to buy houses for long-term returns, and with increased demand, prices rise, causing a real estate bubble.

##### 4.2 Regression analysis of the federal funds rate (independent variable) and mortgage debt service as a percentage of disposable personal income (dependent variable) in the first phase:

**Table 2.** Regression analysis of the federal funds rate (independent variable) and mortgage debt service as a percentage of disposable personal income (dependent variable) in the first phase:

Model	R	R-square	coefficient	constant
1	0.880	0.774	-0.041	5.899

Source: Analyzed by SPSS.

The regression analysis results show that the percentage of mortgage debt service to disposable personal income is negatively correlated with the interest rate, and the function expression is  $Y = -0.041x + 5.899$ ,  $R\text{-squared} = 0.774$ , indicating a good degree of fit.

The fed cut the federal funds rate, resulting in decreased bank loan interest rates. So compared to the money in the bank to get lower interest rates, people are more inclined to invest in the real estate market. However, due to the higher purchase cost, people need to choose the mortgage method to buy a house, so the mortgage servicing the percentage of disposable personal income increases.

##### 4.3 Regression analysis of mortgage debt service as a percentage of disposable personal income (independent variable) and housing price (dependent variable) in the first stage:

**Table 3.** Regression analysis of mortgage debt service as a percentage of disposable personal income (independent variable) and housing price (dependent variable) in the first stage:

Model	R	R-square	coefficient	constant
1	0.736	0.542	60.436	-247.030

Source: Analyzed by SPSS.

The regression analysis results show that house price positively correlates with the percentage of mortgage debt service to disposable personal income, and the function expression is  $Y = 60.436X - 247.030$ ,  $R\text{-squared} = 0.542$ , indicating a general degree of fit.

The general goodness of fit may be that the period is too small, and the terrorist attacks in the United States in 2001 have caused significant turbulence in the domestic economic market. But we can see from the line chart that they are related. The decrease in interest rate leads to an increase in people's willingness to invest in real estate, the amount of mortgage loans increases, and people put the mortgage into the real estate market, so the price of housing rises.

#### 4.4 Regression analysis of the federal funds rate (independent variable) and housing price (dependent variable) in the second phase:

**Table 4.** Regression analysis of the federal funds rate (independent variable) and housing price (dependent variable) in the second phase:

Model	R	R-square	coefficient	constant
1	0.997	0.995	8.203	102.072

Source: Analyzed by SPSS.

We can find a positive correlation between interest rate and housing price, opposite the result in the first phase. Monetary policy has lost its effect because raising the federal funds rate can no longer contain housing price rises.

#### 4.5 Regression analysis of the federal funds rate (independent variable) and mortgage debt service as a percentage of disposable personal income (dependent variable) in the second phase:

**Table 5.** Regression analysis of the federal funds rate (independent variable) and mortgage debt service as a percentage of disposable personal income (dependent variable) in the second phase:

Model	R	R-square	coefficient	constant
1	0.994	0.988	0.277	5.343

Source: Analyzed by SPSS.

In this case, interest rates and MDSP are also positively correlated. In the same way as in 3.4, raising the federal funds rate has not deterred people from investing in the housing market.

#### 4.6 Regression analysis of mortgage debt service as a percentage of disposable personal income (independent variable) and house price (dependent variable) in the second phase:

**Table 6.** Regression analysis of mortgage debt service as a percentage of disposable personal income (independent variable) and house price (dependent variable) in the second phase:

Model	R	R-square	coefficient	constant
1	0.984	0.968	29.068	-52.756

Source: Analyzed by SPSS.

The regression analysis results show that house price positively correlates with the percentage of mortgage debt service to disposable personal income, and the function expression is  $Y = 29.068X - 52.756$ ,  $R\text{-squared} = 0.968$ , indicating a good degree of fit.

Although the Fed wants to head off a housing bubble by raising the federal funds rate, people are still willing to invest in real estate, so house prices are still rising.

#### 4.7 Findings

After analysis, we can see that the Fed was right to adjust monetary policy and lower the federal funds rate to promote economic development in the first place. The reduction in interest rates greatly stimulated people's willingness to take out mortgages and invest in the real estate market. A large amount of money flowing helped the United States escape the economic recession and high

unemployment. Still, it also led to the rapid rise of housing prices and the overheating of the real estate market, eventually leading to the real estate bubble.

From the second quarter of 2004, the Federal Reserve began tightening monetary policy to curb the rise in housing prices, raising the federal funds rate to control the real estate bubble through higher deposit and lending rates. However, through the comparison of the three line charts, we can see that the house price continued to rise despite the rapid increase of mortgage interest due to the growth of loan interest rate, indicating that the tightening monetary policy has lost its effect at this time. In my opinion, the main reason for this phenomenon is the continuous improvement of the capital property of houses. Although the interest rate has increased, it is undeniable that houses, as real estate, are the best investment for maintaining and increasing value. Especially in the case of global inflation, the best way to resist it is to buy real estate. So changes in short-term interest rates are unlikely to change people's willingness to invest in real estate.

## 5. Conclusion

In my opinion, the expansionary monetary policy of the United States led to the real estate bubble in the early 21st century. Although the excessively loose monetary policy brought a short-term boom to the real estate market, a recession was inevitable after the boom. The Fed was aware of the problem in 2004, but by then, adjusting the federal funds rate had been unable to control the rise in house prices. Through the analysis of this paper, the country must conduct a comprehensive and objective analysis and evaluation of the financial market before adjusting the monetary policy. The monetary policy tools must be used properly within a reasonable range to maintain the steady development of the economy. At the same time, the government should establish a complete mortgage supervision system. When monetary policy is adjusted, the system should detect leverage ratio and liquidity in real-time, and use these data to predict possible overlending in advance. Timely measures should be taken when necessary.

## Limitation

Although this paper verifies the hypothesis that monetary policy causes the real estate bubble, it does not give a specific method to solve the real estate bubble. And the sample is just the United States. I will collect more data in the future to further study.

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