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An Empirical Study on the Impact of China's Virtual Economy on the Relationship between Money Supply and Inflation

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Abstract: This study examines the mechanisms through which China's virtual economy impacts the relationship between money supply and inflation. The study constructs a VAR model and conducts Granger causality tests using data collected from 2010 to 2025. The analysis comparatively investigates the differential effects of money supply changes on key virtual economy sectors, that specifically equity markets and real estate markets. This study reveals a bidirectional causal relationship between China's stock market and M1 money supply, exerting a significant influence on monetary structure. The real estate market demonstrates a pronounced diverting effect on M2, which indirectly impacts the CPI. Virtual economy attenuates the positive correlation between money supply and inflation established by the Fisher Effect, forming a complex mechanism characterized by asymmetric responses under specific conditions.

Keywords: Virtual economy; VAR; Monetary policy transmission

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1. Introduction

Virtual economy represents a major trend in the new era of economic development, having significantly outpaced the growth of physical economy in recent years. Despite China's sustained M2 growth rate exceeding GDP growth for an extended period, consumer price index (CPI) increases have remained consistently moderate, even transitioning through phases of low inflation. Traditional monetary theory primarily focuses on currency circulation and transaction behaviors within the real economy. The emergence of virtual economy has fundamentally altered the liquidity patterns and transactional mechanisms of money. Price fluctuations and trading volume changes in virtual assets influence both money supply and demand, ultimately impacting inflation levels.

The underlying mechanism likely involves monetary funds flowing into virtual economic sectors like stocks and real estate through financial innovation. While this elevates asset prices, the effect isn't fully transmitted to tangible goods prices. Consequently, it leads to monetary deceleration and a phenomenon of virtual-real

decoupling, manifesting as a distinctive "Virtue-Reality Divergence" in China's economic operations. This study integrates stock markets and real estate markets within a unified analytical framework. By constructing a Vector Autoregression (VAR) model and conducting Granger causality tests, it systematically reveals how virtual economy differentially influence inflation transmission mechanisms through monetary structure adjustments. The analysis specifically examines variations in how distinct virtual economy sectors mediate the relationship between money supply and inflation.

2. Current status and characteristics of China's virtual economy

The virtual economy typically refers to an economic domain distinct from the physical economy, primarily supported by financial systems. Stock markets and real estate markets are critical subsectors within this framework. The development status of these sectors significantly impacts the overall stability of the virtual economy.

2.1. China's stock market

China's stock market capitalization has demonstrated sustained growth since 2010, expanding from ¥26.54 trillion to ¥85.47 trillion by 2024 as shown in **Figure 1**. This trajectory reflects significant market scale expansion, notwithstanding a modest contraction in recent years that still maintains historically elevated levels. Concurrently, the number of listed companies has exhibited persistent growth, with accelerated expansion in earlier years moderating recently while remaining substantial. These trends collectively indicate historically heightened market transaction activity.

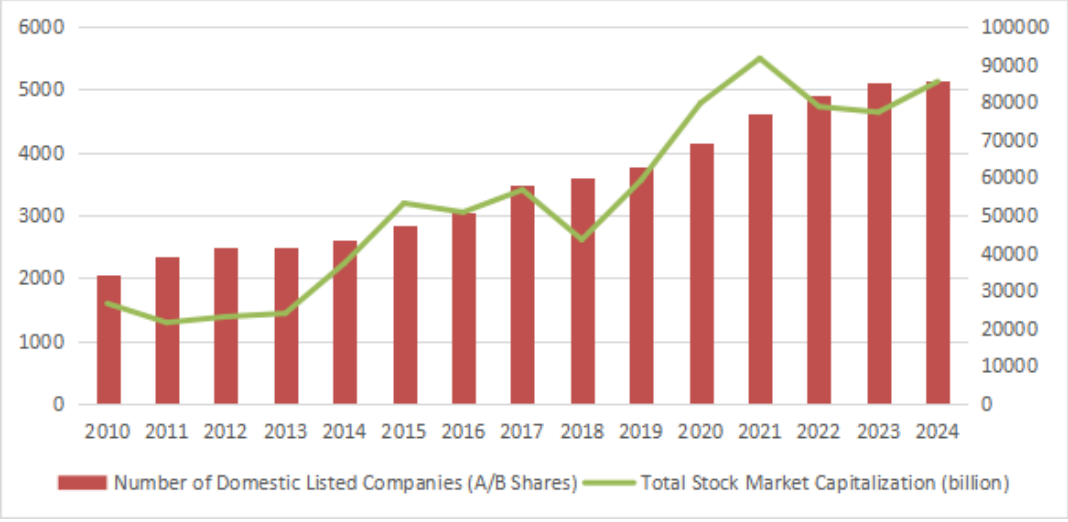

Figure 1. Stock market capitalization and number of listed companies (Source: The National Bureau of Statistics of China).

China's stock market exhibits high trading activity, with the average daily trading volume maintaining over ¥1.2 trillion in 2024. Significant volatility is observed, particularly on the ChiNext Board where the daily turnover ratio reaches 5.36%, that surpassing both the Main Boards (Shanghai/Shenzhen) and the STAR Market. Market fluctuations demonstrate pronounced sensitivity to policy shifts and economic cycles, where favorable policies or economic recovery signals can rapidly boost market and investor confidence.

2.2. China's real estate market

The real estate industry encompasses numerous sectors and has a relatively long industrial chain, exerting significant positive influence on China's overall economic development. As shown in **Figure 2**, after reaching historical peaks during 2016–2017, the sales area and revenue of Chinese residential properties entered an adjustment period; however, housing prices did not experience a noticeable decline during this time. This could be attributed to the continued presence of both improvement-driven demand and investment-driven demand, which supported housing prices. Additionally, regulatory policies in the real estate market helped stabilize housing prices to some extent.

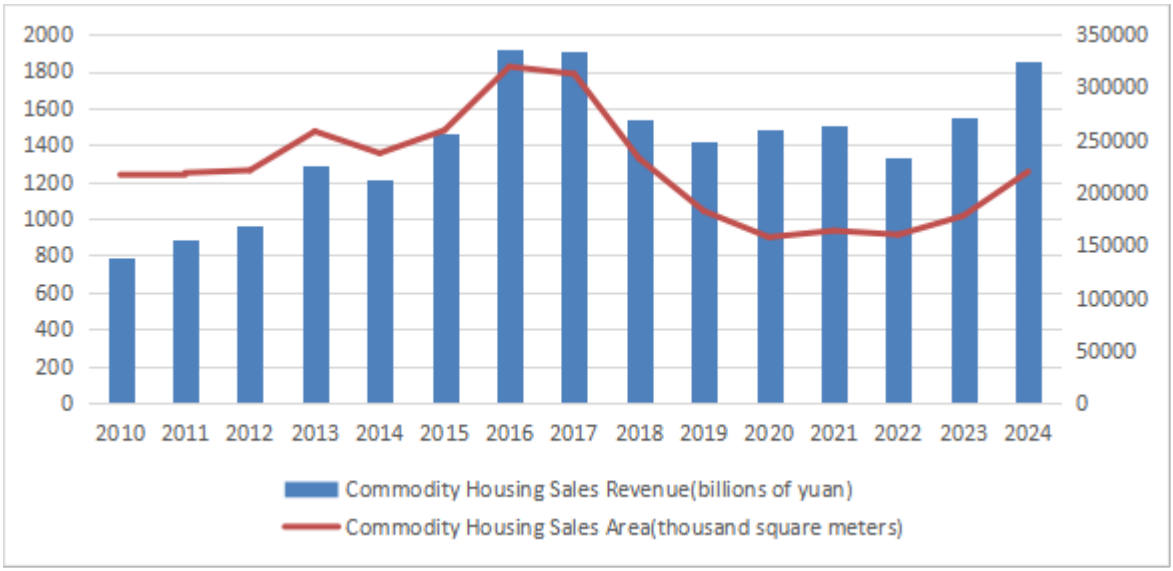

Figure 2. Sales Revenue and Sales Area of Real Estate Market in China (Source: The National Bureau of Statistics of China).

Currently, China's real estate market is undergoing in-depth adjustments, with distinct regional disparities. In first-tier cities and well-known second-tier cities, that characterized by high economic development levels, rational industrial structures, and strong population attraction, where housing demand remains relatively stable. Policy adjustments have swiftly influenced the recovery process of these cities' real estate markets. In contrast, most third and fourth tier cities face weaker industrial foundations, insufficient economic growth momentum, and population outflow issues, resulting in significant housing inventory pressure.

3. Characteristics of the relationship between money supply and inflation in China

During the early stages of monetization in China, there was no strong correlation between money growth and inflation. Subsequently, as the economy continued to expand, the country's money supply has persistently increased, yet the inflation rate has remained relatively stable, fluctuating within a narrow range. No significant inflation has emerged, leading to a prolonged scenario of low inflation coexisting with high asset prices in China.

As shown in **Figure 3**, quasi-money M2 surged from 62 trillion in early 2010 to 320 trillion in February 2025 (projected), marking a fivefold increase. During the same period, however, the CPI rose by only 35%. This phenomenon challenges the quantity theory of money, as the expansion in money supply did not fully translate into inflationary pressures, nor did it exhibit a strictly positive correlation. The reasons for this outcome can be

explained through multiple mechanisms in economic theories.

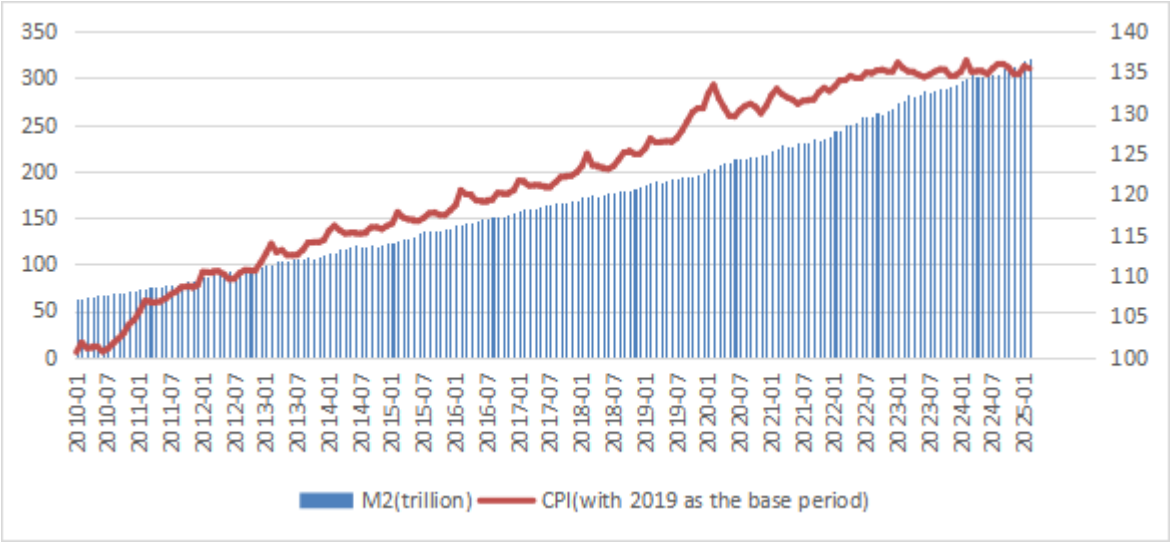

Figure 3. M2 and CPI (Source: The National Bureau of Statistics of China).

3.1. The effect of the stock market on money supply

During a bull market in the stock market, relatively higher investment returns draw substantial capital inflows from alternative avenues such as savings and bonds into equities. The impact of stock prices on money demand primarily operates through two channels: First, by affecting economic entities, stock price fluctuations influence the opportunity cost of holding money, thereby altering the willingness to hold monetary assets. This subsequently affects the speculative demand for money. Second, stock prices indirectly impact money demand through their effect on aggregate supply and demand, as well as financial asset prices. These changes influence domestic income levels and the volume of financial asset transactions, which in turn affect both the transactions demand and precautionary demand for money, ultimately shaping overall money demand.

3.2. Impact of the real estate market on money supply

Due to the high-leverage nature of the real estate sector, it is intrinsically linked with bank credit expansion. Real estate and infrastructure have become the primary engines of credit creation, which makes the credit expansion in the real estate market directly drive the rapid expansion of bank credit, thus increasing money supply. Home purchasing behavior also influences money supply: when housing prices rise, the nominal wealth held by the public increases, relaxing individual budget constraints and boosting the demand for money within the economy, ultimately leading to an expansion of money supply. As housing prices continue to climb, the scale of residential mortgage loans has also grown substantially. The issuance of large volumes of housing loans enables the banking system to create more money.

3.3. The impact of the stock market on inflation

During a stock market boom, rising share prices generate a wealth effect, which increases the value of investors' assets and boosts consumer confidence and spending. Investors may engage in substantial purchases of high-end consumer goods and real estate, driving up the prices of related goods and services and exerting upward pressure on inflation. The appreciation of stock prices also enhances the market value of enterprises, making it easier for

them to raise capital through equity financing and expand production capacity. However, if the growth rate of market demand fails to keep pace with the expansion of corporate capacity, it may lead to oversupply, thereby curbing price increases. Conversely, during a stock market downturn, the erosion of investor wealth reduces their willingness to consume and invest, which may lead to price declines and trigger deflationary pressures.

3.3.1. The effect of the real estate market on inflation

Rising housing prices drive up residential consumption costs, which carry significant weight in the Consumer Price Index (CPI) and consequently impact inflation levels. Housing price increases also elevate product prices across the real estate-related industrial chain, thereby triggering inflation. The wealth effect from property appreciation boosts homeowners' consumption expenditure, further driving up prices of other goods and services. However, an overheated real estate market may attract excessive capital inflows, crowding out investment in the real economy. This could lead to a decline in production efficiency, ultimately causing cost-push inflation.

4. Empirical analysis of the impact of virtual economy on money supply and inflation

4.1 Data sources and VAR model specification

The variables selected in this study include: the growth rates of M1 (narrow money supply) and M2 (broad money supply), the month-on-month growth rate of CPI (Consumer Price Index), the return rate of the Shanghai Stock Exchange Composite Index (STK_SH), housing price appreciation (FDC). The time span covers data from June 2010 to February 2025 (as shown in **Table 1**).

Table 1. Descriptive statistics of variables

	CPI	FDC	M1	M2	STK_SH
Mean	0.165706	0.350831	0.264856	0.386502	0.101273
Median	0.1	0.28	0.336592	0.362354	-0.061338
Maximum	1.56	2.83	2.117517	1.593245	10.70827
Minimum	-1.23	-0.92	-3.078937	-0.554221	-15.74994
Std. Dev.	0.498868	0.61559	1.01413	0.411535	3.593767
Skewness	0.17225	1.168624	-0.775488	0.344367	-0.321832
Observations	177	177	177	177	177

This study establishes both a baseline VAR model and an extended VAR model. The baseline model examines the impulse response of CPI to M2. In the extended model, factors from the virtual economy such as the stock market and housing prices are incorporated to analyze and compare changes in the dynamic transmission process relative to the baseline model.

The baseline VAR model is specified as follows:

$$CPI_t = a_{10} + A_{11}CPI_{t-1} + A_{12}CPI_{t-2} + B_{11}M2_{t-1} + B_{12}M2_{t-2} + e_{t1}$$

$$M2_t = a_{20} + A_{21}CPI_{t-1} + A_{22}CPI_{t-2} + B_{21}M2_{t-1} + B_{22}M2_{t-2} + e_{t2}$$

where e_{t1}, e_{t2} are n × 1 error vectors.

The extended VAR model examines the impulse responses of the stock market, housing prices, M1, and M2 to CPI:

$$CPI_t = a_{10} + \sum_{i=1}^{p} A_{11i}\, CPI_{t-i} + \sum_{i=1}^{p} A_{12i}\, \mathrm{STK\_SH}_{t-i} + \sum_{i=1}^{p} A_{13i}\, \mathrm{FDC}_{t-i} + \sum_{i=1}^{p} A_{14i}\, \mathrm{M1}_{t-i} \sum_{i=1}^{p} A_{15i}\, \mathrm{M2}_{t-i} + e_{t1}$$

$$\mathrm{STK\_SH}_t = a_{20} + \sum_{i=1}^{p} A_{21i}\, CPI_{t-i} + \sum_{i=1}^{p} A_{22i}\, \mathrm{STK\_SH}_{t-i} + \sum_{i=1}^{p} A_{23i}\, \mathrm{FDC}_{t-i} + \sum_{i=1}^{p} A_{24i}\, \mathrm{M1}_{t-i} \sum_{i=1}^{p} A_{25i}\, \mathrm{M2}_{t-i} + e_{t2}$$

$$FDC_t = a_{30} + \sum_{i=1}^{p} A_{31i}\, CPI_{t-i} + \sum_{i=1}^{p} A_{32i}\, STK\_SH_{t-i} + \sum_{i=1}^{p} A_{33i}\, FDC_{t-i} + \sum_{i=1}^{p} A_{34i}\, M1_{t-i} \sum_{i=1}^{p} A_{35i}\, M2_{t-i} + e_{t3}$$

$$M1_t = a_{40} + \sum_{i=1}^{p} A_{41i}\, CPI_{t-i} + \sum_{i=1}^{p} A_{42i}\, STK\_SH_{t-i} + \sum_{i=1}^{p} A_{43i}\, FDC_{t-i} + \sum_{i=1}^{p} A_{44i}\, M1_{t-i} \sum_{i=1}^{p} A_{45i}\, M2_{t-i} + e_{t4}$$

$$M2_t = a_{50} + \sum_{i=1}^{p} A_{51i}\, CPI_{t-i} + \sum_{i=1}^{p} A_{52i}\, STK\_SH_{t-i} + \sum_{i=1}^{p} A_{53i}\, FDC_{t-i} + \sum_{i=1}^{p} A_{54i}\, M1_{t-i} \sum_{i=1}^{p} A_{55i}\, M2_{t-i} + e_{t5}$$

where e_{t1}, e_{t2}, e_{t3}, e_{t4}, e_{t5} are n × 1error vectors.

4.2. Granger causality test

The following **Table 2** presented the Granger causality test results. The test outcomes reveal some significant granger causal relationships identified in this study. **Figure 4** illustrated these causal relationships among these variables based on these findings.

Table 2. Granger causality test

Null Hypothesis	Obs	F-Statistic	Prob (*p*-value)
M2 does not Granger Cause STK_SH	175	0.27833	0.7574
STK_SH does not Granger Cause M2	175	0.76122	0.4687
M1 does not Granger Cause STK_SH	175	3.36209	0.037
STK_SH does not Granger Cause M1	175	4.04359	0.0192
CPI does not Granger Cause STK_SH	175	2.77419	0.0652
STK_SH does not Granger Cause CPI	175	4.21185	0.0164
M1 does not Granger Cause M2	175	1.6616	0.1929
M2 does not Granger Cause M1	175	9.8389	9.E - 05
FDC does not Granger Cause M2	175	1.2144	0.2995
M2 does not Granger Cause FDC	175	0.89993	0.4085
CPI does not Granger Cause M2	175	3.33353	0.038
M2 does not Granger Cause CPI	175	9.18601	0.0002
FDC does not Granger Cause M1	175	4.04485	0.0192
M1 does not Granger Cause FDC	175	0.50664	0.6034
CPI does not Granger Cause M1	175	1.31024	0.2725
M1 does not Granger Cause CPI	175	21.8326	4.E - 09
CPI does not Granger Cause FDC	175	0.38638	0.6801
FDC does not Granger Cause CPI	175	2.07418	0.1288

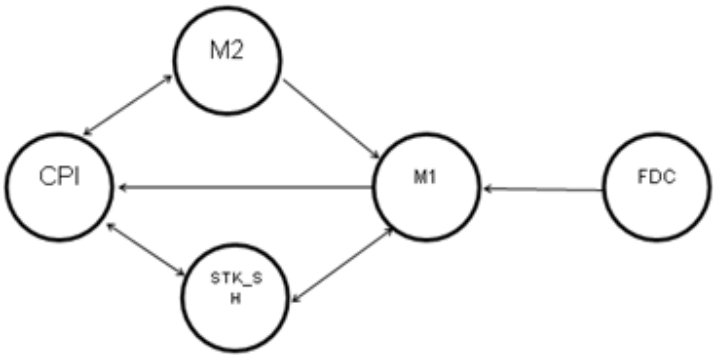

Figure 4. Causal relationships among these variables.

4.3. Impulse response analysis

Here is the impulse response data table for the baseline VAR model. It was observed that the data initially exhibits a positive pulse, which begins to decline into a negative pulse starting in period 2. It then gradually stabilizes and maintains a state close to zero (as shown in **Table 3**).

Table 3. Impulse response data for the baseline model of CPI and M2

Period	CPI	M2
1	0.466385	0.0000
2	0.11686	0.1311
3	-0.04622	-0.048855
4	-0.03507	-0.024013
5	-0.006727	0.004792
6	0.004775	0.002598

The following **Table 4** presents the impulse response results from an extended VAR model incorporating FDC and STK_SH.

Table 4. Impulse response data for the extended model

Period	CPI	M1	M2	FDC	STK_SH
1	0.431030	0.000000	0.00000	0.000000	0.00000
2	0.091449	0.190711	0.040709	0.039210	-0.05638
3	-0.039003	0.085503	-0.104269	-0.003619	0.032695
4	-0.028555	-0.048006	-0.042854	0.019247	0.020614
5	-0.025993	-0.011554	0.007074	0.015456	-0.015456
6	-0.007753	0.003995	0.008019	0.004469	

In the impulse response data of stock prices to CPI, we observe an initial decline forming a negative pulse, followed by an increase resulting in a positive pulse, and then gradual fluctuations before stabilizing. For M1's impulse response to CPI, there is initially a positive pulse that reaches its peak before rapidly declining into a

negative pulse. In the case of M2's impulse response to CPI, the data shows an initial small-range increase forming a positive pulse, followed by a decline resulting in a negative pulse. Compared to the baseline model's impulse response data, the positive pulse effect of M2 on CPI weakens while the negative pulse effect intensifies. For housing prices' impulse response to CPI, the data initially experiences a brief rise and consistently maintains a positive pulse.

5. Conclusion

This study analyzes and compares the different effects of changes in money supply on stock markets and real estate markets, which are considered virtual economic sectors. By establishing a baseline model and an extended model, it offers rational explanations for these differing impacts.

In the extended model, we find that the response of CPI to an M1 shock is more pronounced, indicating that the immediate liquidity effect of M1 on price levels is quite rapid. After incorporating stock market variables, it appears that some funds are channeled into the stock market and absorbed by capital markets, thereby weakening the impact of M2 on the real economy sectors. The stock market enhances the short-term driving role of M1 on CPI by altering the structure of money supply, while diminishing the direct transmission effect of M2 on CPI. This effect suggests that fluctuations in the stock market will influence the monetary liquidity structure during monetary policy adjustments, particularly highlighting the signaling role of changes in M1 for short-term price stability.

We also find that after incorporating real estate variables, the impact of M2 on CPI diminishes, while the influence of M1 on CPI continues to show a persistent upward trend. The development and sales of real estate have driven price increases in related industrial chains, which may exert some positive pressure on CPI. If housing prices continue to rise, consumers may curtail other expenditures to accommodate housing costs, thereby suppressing overall consumption demand. Stable housing prices help unlock residents' consumption potential. These dynamic shifts in consumer behavior significantly affect CPI trends. The real estate market alters the transmission mechanism of M2 by absorbing monetary funds, while also influencing M1 through transaction activities, which in turn affects CPI via M1.

Disclosure statement

The author declares no conflict of interest.

References

[1] Montes G, Tiberto B, 2012, Macroeconomic Environment, Country Risk and Stock Market Performance: Evidence for Brazil. Economic Modelling, 29(5): 1666–1678.

[2] Aastveit K, Furlanetto, F, Loria, F, 2017, Has the Fed Responded to House and Stock Prices? A Time-Varying Analysis. Review of Economics and Statistics, 105(5), 1314–1324.

[3] Zhang L, 2020, Financial Structure, Asset Prices and Inflation in China. Journal of Central University of Finance and Economics, 2020(8): 26–34.

[4] Duan Z, 2007, The Relationship Between Real Estate Prices, Inflation, and Output: Theoretical Analysis and Empirical Verification Based on Chinese Data. Quantitative Economics and Technical Economic Research, 2007(12): 127–139.

[5] Zhang W, Jing W, Xu N, 2021, Time-Varying Causes of the Divergence Between Money Supply and Inflation. Journal of Central University of Finance and Economics, (June): 77–89.

[6] He Q, Zou H, 2015, Credit Expansion, Virtual Economy, Resource Allocation, and Economic Growth. Economic Research, 50(4): 36–49.

[7] Feng F, 2009, Nominal Interest Rate and Inflation: A Re-examination of the 'Fisher Effect' in China—An Analysis Using Threshold Regression Models. Quantity Economics & Technical Economic Research, 2009(1): 89–98.

[8] He W, Wang C, 2008, Money Supply, Virtual Economy, and Inflation: A Reassessment of the Influence of Money Supply and Virtual Economy on Inflationary Factors. Journal of Finance and Economics, 10: 2–3.

[9] Wang J, Wu Y, 2014, The Impact of Stock Prices on Money Demand: An Empirical Study Based on China's M1 Data. Economic Issues, 2014(8): 65–70.

[10] Ma F, Tian Y, 2010, The Impact of Money Supply on Inflation in a Virtual Economy: An Empirical Analysis Based on the Chinese Economy. Journal of Capital University of Economics and Business, 2010(6): 32–33.