

Empirical Analysis of Influences of Fictitious Economy on Real Economy in China

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Abstract: Influences of fictitious economy on real economy appeared gradually in China. An empirical analysis about the influences was given by using quarterly data from April 1998 to December 2008. The results show that there is cointegration relationship between China's fictitious economy and real economy in the long term; there is Granger cause of the representative variables of China's fictitious economy to the representative variable of real economy respectively; the influences of the turnover of stock trading, the turnover of foreign exchange transactions, and the turnover of commodity futures trading on the real economy are much remarkable based on the least squares analysis which is consistent to the conclusion of variance decomposition; and the effect from stock market to real economy is strongest in China. Therefore, the results indicate that the influences of stock market, foreign exchange market and commodity futures market on real economy development of China are much remarkable.

Key Words: Fictitious Economy, Foreign Exchange Market, Futures Market, Real Economy, Stock Market

I. INTRODUCTION

Fictitious economy of developed countries and some newly industrialized countries has been developing rapidly since 1980s, and its scale has been greater than the scale of real economy. The total of the world's fictitious economy reached \$160 trillion in 2000 which was equivalent to 5 times of the world's gross national product. Therefore, influences of fictitious economy on real economy become remarkable gradually. The stock market, bond market and futures market of China have been developing rapidly based on the establishment of Shanghai Stock Exchange and Shenzhen Stock Exchange since 1990s. The stock market, bond market, foreign exchange market and financial derivatives market etc. are important sub-markets of China's financial markets; and the scale of China's fictitious economy expands rapidly based on the development of financial market and real estate markets which can take more and more influences on China's real economy.

Shiller (1990) thought that the market had its own development trend to a certain extent based on an analysis of many datum^[1]. Sethi (1996) gave a conclusion that the wealth of the market decided the degree of endogenesis of the fictitious economy^[2]. Chang (2002) thought that the variables of the market conditions, the degree of financial development, the currency management system and the macroeconomic policy in different stage of economy development could influence the relationship between the fictitious economy and real economy^[3]. Liu and Wang (2004) thought that the fictitious economy's development was very important to

national economic security^[4]. Therefore, there is little quantitative analysis of the influences of fictitious economy on real economy.

The influences of fictitious economy on real economy in China will be analyzed by both qualitative and quantitative methods. The paper proceeds as follows. In Section 2, the model reflecting the influences of China's fictitious economy on real economy will be analyzed. In Section 3, an empirical analysis on the influences of China's fictitious economy on real economy will be taken. Finally, Section 4 concludes.

II. METHODOLOGY

Wang (2007) put forward a common equilibrium model of fictitious economy and real economy, as follows^[5]:

It is supposed that the entire economic system is divided into the real economy and fictitious economy when the condition of a country's macroeconomic is closed. Two important variables of the real economy system are the price level P and the profitability level r . Because real economy's price system is supported by cost, the price level can remain unchanged in the short term; and the profitability level is determined by exogenous variables. Two important variables of fictitious economy are the price level P^* and the interest rate i . Because fictitious economy is a price system supported by psychological, the price level is flexible; and the interest level is determined by supply and demand in the money market. It is supposed that risk-neutral investors construct portfolio between the real economy and fictitious economy and the capital can flow freely without any restrictions which has to meet the arbitrage qualification as in Eq.(1) that the fictitious economy's expected yield is equal to the real economy's.

$$1 + r = (1 + i) + \frac{P^{*e} - P^*}{P^*} \quad (1)$$

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Fictitious economy's price change degree is almost affected by investors' expectedness of the future, and the equation of expected mechanism can be expressed as Eq.(2).

$$\frac{P^{*e} - P^*}{P^*} = \left(\frac{\bar{P}^* - P^*}{P^*} \right) \theta \quad (2)$$

\bar{P}^* is fictitious economy's long-run equilibrium price. The synthesis of these two formulas can be expressed as Eq.(3).

$$r - i = \left(\frac{\bar{P}^* - P^*}{P^*} \right) \theta \approx \theta (\ln \bar{P}^* - \ln P^*) = \theta (\bar{p}^* - p^*) \quad (3)$$

$\ln \bar{P}^*$ is equal to \bar{p}^* and $\ln P^*$ is equal to p^* in Eq.(3), and these are same to the following equations.

If the macroeconomic system is in long-run equilibrium and fictitious economy is determined by real economy, the long-run relationship between fictitious economy and real economy can be expressed as Eq.(4).

$$\frac{d\bar{p}}{d\bar{p}^*} = 1 \quad (4)$$

Influences of Chin's fictitious economy on real economy will be analyzed based on the above theoretical analysis. Financial market is the most important part of fictitious economy, so China's financial market mainly contains the stock market, the bond market, the foreign exchange market and financial derivatives market etc. According to the analysis, we choose the gross domestic product (GDP) as the representative variable of real economy, and the turnover of stock trading (ST), the turnover of treasury bonds trading (TD), the turnover of foreign exchange transactions (FE), the turnover of investment of futures and securities trading (FS) and the turnover of commodity futures trading (CT) as the representative variables of China's fictitious economy.

III. RESULTS

A. Data

Because the statistic data of the turnover of trading of investment of futures and securities was from April 1998, the data of all economic variables are quarterly data from April 1998 to December 2008 which are taken from the electronic data delivery system of the National Bureau of Statistics of China and the People's Bank of China. Because the selected data is quarterly data, the original data must be adjusted by X12 seasonal adjustment method and the adjusted data can be taken to the empirical analysis. All the variables are broke to natural logarithm, which are recorded as LNGDP, LNST, LNTD, LNFE, LNFS, and LNCT.

B. Unit Root Test

The Engle and Granger (1987) and Gregory and Hansen (1996) cointegration tests require same degree of integration of nonstationary series^[6-7]. The augmented Dickey-Fuller (ADF) unit root test was used to ascertain the order of integration in this paper. The test results are reported in table I.

TABLE I ALL VARIABLES' UNIT ROOT TEST RESULTS

Variable	Inspection Type	ADF	0.10 Critical Value	0.05 Critical Value
LNGDP	(C,T,0)	-2.17	-3.19	-3.52
LNST	(C,T,0)	-2.32	-3.19	-3.52
LNTD	(C,T,0)	-1.47	-3.19	-3.52
LNFE	(C,T,0)	-2.46	-3.19	-3.52
LNFS	(C,T,0)	-1.86	-3.19	-3.52
LNCT	(C,T,0)	-2.99	-3.19	-3.52

It is evident in table I that all the variables LNGDP, LNST, LNTD, LNFE, LNFS and LNCT have unit root under 5% and 10% confidence level, so these series are not level stationary. First-order, second-order or third-order differential must be taken to the primary series in order to have unit root test again. The first-order differential variables' test results are reported in table II.

TABLE II THE FIRST-ORDER DIFFERENTIAL VARIABLE'S UNIT ROOT TEST RESULTS

Variable	Inspection Type	ADF	0.10 Critical Value	0.05 Critical Value
DLNGDP	(C,T,0)	-9.22	-3.19	-3.52
DLNST	(C,T,0)	-8.62	-3.19	-3.52
DLNTD	(C,T,0)	-5.98	-3.19	-3.52
DLNFE	(C,T,0)	-7.72	-3.19	-3.52
DLNFS	(C,T,0)	-7.83	-3.19	-3.52
DLNCT	(C,T,0)	-5.28	-3.19	-3.52

It is evident in table II that all the first-order differential variables DLNGDP, DLNST, DLNTD, DLNFE, DLNFS and DLNCT have no unit root under 5% and 10% confidence level, so all the series are I(1).

C. Cointegration Test

All variables are I(1), so they can be taken to cointegration analysis. Based on the cointegration test, the results reported in table III.

Table III shows that there is at most 6 cointegrating equation under 5% confidence level between the variable LNGDP, LNST, LNTD, LNFE, LNFS and LNCT. Furthermore, the resid U of that cointegration test must be taken to smooth test, and the result is shown in table IV. It is evident in table IV that the series of the resid U is level stationary, so it validates there is cointegration relationship between the variable of money supply and variables of China's fictitious economy.

D. Causality

On the basis of the Gregory and Hansen (1996) test for cointegration, the Granger Causality Test will be carried on. The Granger Causality Test results are reported in table V.

TABLE III JOHANSEN TEST RESULTS

Variable	Trace Statistic	0.05 Critical Value	Prob.	Hypothesized No. of CE(s)
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	182.61	125.62	0.000	None *
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	124.81	95.75	0.000	At most 1 *
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	84.72	69.82	0.002	At most 2 *
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	53.16	47.86	0.015	At most 3 *

Variable	Trace Statistic	0.05 Critical Value	Prob.	Hypothesized No. of CE(s)
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	30.99	29.80	0.036	At most 4 *
LNGDP&LNST, LNTD, LNFE, LNFS, LNCT	15.86	15.49	0.044	At most 5 *

TABLE IV SMOOTH TEST RESULT OF THE RESID U OF THE COINTEGRATION TEST

Variable	Inspection Type	ADF	0.5 Critical Value	DW Value
U	(C,T,0)	-5.7849	-3.5298	1.9300

TABLE V GRANGER CAUSALITY TEST RESULTS OF ALL VARIABLES

Original Hypothesis	F-Statistic	Probability
LNGDP does not Granger Cause LNST	3.5398	0.0395
LNST does not Granger Cause LNGDP	0.1863	0.8309
LNGDP does not Granger Cause LNTD	0.0425	0.1484
LNTD does not Granger Cause LNGDP	1.3794	0.2647
LNGDP does not Granger Cause LNFE	3.7642	0.0328
LNFE does not Granger Cause LNGDP	0.6525	0.0268
LNGDP does not Granger Cause LNFS	0.8595	0.0319
LNFS does not Granger Cause LNGDP	0.5706	0.5702
LNGDP does not Granger Cause LNCT	2.3086	0.0139
LNCT does not Granger Cause LNGDP	0.4818	0.6216

It is evident in table V that the Granger cause of the gross domestic product (GDP) to the turnover of stock trading (ST)

is remarkable and unilateral, and the former is the cause of the latter. The Granger cause of the gross domestic product (GDP) to the turnover of foreign exchange transactions (FE) is remarkable and bidirectional. The Granger cause of the gross domestic product (GDP) to the turnover of investment of futures and securities trading (FS) and the turnover of commodity futures trading (CT) respectively is remarkable and unilateral, and GDP is the Granger cause of FS and CT. However, there is no Granger cause between the gross domestic product (GDP) and the turnover of treasury bonds trading (TD) which indicates that there is no causality between GDP and TD in the short term.

E. Least Squares Analysis

The influences of the representative variables of China's fictitious economy on real economy respectively have been analyzed by the method of least squares, and the results are following as:

$$LNGDP = \underset{(17.7797)}{7.3} + \underset{(7.7927)}{0.3332}LNST \quad (5)$$

$$R^2 = 0.8970 \quad R_{adj}^2 = 0.8871 \quad F = 60.7264 \quad DW = 1.8936$$

It can be seen in Eq.(5) that the effect from the turnover of stock trading (ST) to the gross domestic product (GDP) is strong, the statistic of T is remarkable and the coefficient is about 0.3332 which indicates that there is positive correlative relationship between ST and GDP. The value of R-squared is big which is about 0.897, and the value of F-statistic is 60.7264 which indicates that the statistic of F is remarkable.

$$LNGDP = \underset{(10.3929)}{11.5004} - \underset{(-0.9200)}{0.1166}LNTD \quad (6)$$

$$R^2 = 0.0202 \quad R_{adj}^2 = -0.0036 \quad F = 0.8464 \quad DW = 0.0352$$

Eq.(6) shows that the statistic of T about the influence of the turnover of treasury bonds trading (TD) on GDP is unremarkable, the values of R-squared and adjusted R-squared are small, the statistic of F is unremarkable and the value of Durbin-Watson statistic is very small. The result is almost consistent with the conclusion that there is no Granger cause between TD and GDP in table V. Because the turnover of treasury bonds trading (TD) is composed by the turnover of spot trading of treasury bonds (GX) and the turnover of repo. trading of treasury bonds (GH), the least squares analysis between GX, GH and GDP has been done as Eq.(7).

$$LNGDP = \underset{(19.1795)}{12.4641} + \underset{(2.7150)}{0.2017}LNGH - \underset{(-8.6387)}{0.5488}LNGX \quad (7)$$

$$R^2 = 0.8511 \quad R_{adj}^2 = 0.8336 \quad F = 37.3192 \quad DW = 1.6926$$

It is evident in Eq.(7) that the statistic of T between GX, GH and GDP respectively is remarkable, the value of R-squared is big which is about 0.8511, and the statistic of F is remarkable. The coefficients of GH to GDP and GX to GDP are 0.2017 and -0.5488 respectively which indicate that the effect from GH to GDP is stronger than GX to GDP.

$$LNGDP = \underset{(17.7797)}{8.1288} + \underset{(18.4057)}{0.2895}LNFE \quad (8)$$

$$R^2 = 0.8920 \quad R_{adj}^2 = 0.8894 \quad F = 338.77 \quad DW = 1.6351$$

It can be seen in Eq.(8) that the statistic of T about the influence of the turnover of foreign exchange transactions (FE) on GDP is remarkable, the vale of R-squared is 0.892 and the statistic of F is remarkable. The coefficient is 0.2895 which indicates that there is positive correlative relationship between FE and GDP.

$$LNGDP = 9.2701 + 0.2043LNFS \quad (9) \quad R^2 = 0.8455$$

(27.5152) (3.6529)

$$R^2_{adj} = 0.8271 \quad F = 131.3435 \quad DW = 1.7264$$

Eq.(9) shows that the statistic of T about the influence of the turnover of investment of futures and securities trading (FS) on GDP is remarkable, the vale of R-squared is 0.8455 and the statistic of F is remarkable. The coefficient is 0.2043 which indicates that there is positive correlative relationship between FS and GDP.

$$LNGDP = 7.3962 + 0.3095LNCT \quad (10)$$

(37.0075) (15.5653)

$$R^2 = 0.8553 \quad R^2_{adj} = 0.8517 \quad F = 242.2782 \quad DW = 1.4095$$

It is evident in Eq.(10) that the turnover of commodity futures trading (CT) on GDP is remarkable, the vale of R-squared is 0.8553 and the statistic of F is remarkable. The coefficient is 0.3095 which indicates that there is positive correlative relationship between CT and GDP.

Therefore, the influences of the representative variables of China's fictitious economy ST, GH, FE, FS and CT on the representative variable of real economy GDP is remarkable, and the coefficients are positive. Furthermore, the influences of ST, FE and CT on GDP are more remarkable, and the effect from the turnover of stock trading (ST) to GDP is strongest.

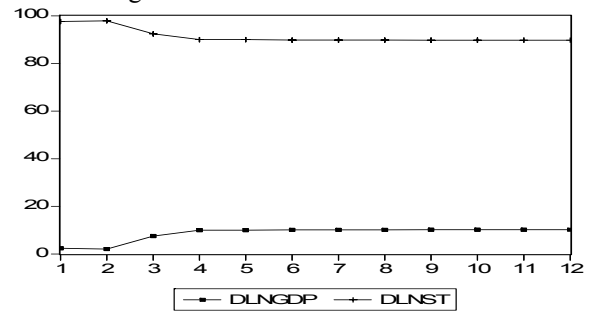
F. Variance Decomposition

The result of smooth test on the VAR(1) of the variables LNGDP, LNST, LNTD, LNFE, LNFS and LNCT shows that some roots of the characteristic equation are out of the unit circle, so the VAR(1) is not smooth and it need to take first-order differential of all variables in order to test again. The VAR(2) is established based on the optimal lag according to AIC and SC. The result of smooth test on the VAR(2) shows that all the reciprocal of the roots of VAR(2) are less than 1, and VAR(2) is smooth. Therefore, VAR(2) can be used to do variance decomposition test. The results are reported in table VI and Figure I.

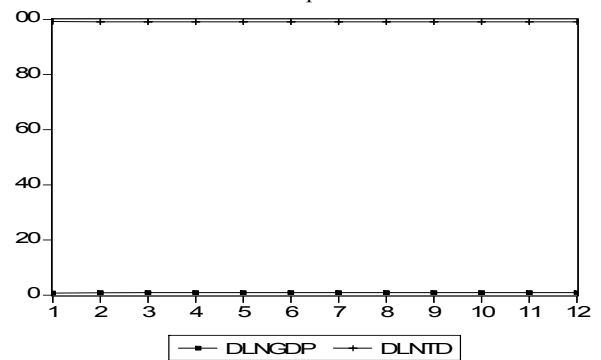
TABLE VI VARIANCE DECOMPOSITION OF DLNGDP

Per.	DLNGDP	DLNST	DLNTD	DLNFE	DLNFS	DLNCT
1	100.000	0.000	0.000	0.000	0.000	0.000
2	88.247	0.046	5.316	4.652	1.456	0.283
3	86.622	0.126	5.266	5.141	1.872	0.973
4	85.117	0.125	6.766	5.142	1.895	0.955
5	84.734	0.342	6.766	5.254	1.891	1.013
6	84.331	0.410	6.873	5.308	1.925	1.155
7	84.250	0.410	6.893	5.306	1.951	1.190
8	84.218	0.433	6.892	5.298	1.961	1.199
9	84.195	0.456	6.890	5.296	1.961	1.202
10	84.180	0.462	6.892	5.298	1.962	1.207
11	84.173	0.462	6.893	5.299	1.964	1.210
12	84.170	0.465	6.893	5.299	1.964	1.210

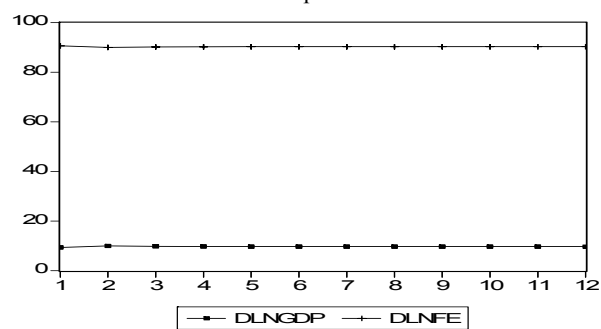
The results of variance decomposition show the contribution degree of prediction error from the turnover of stock trading, the turnover of treasury bonds trading, the turnover of foreign exchange transactions, the turnover of investment of futures and securities trading and the turnover of commodity futures trading to the gross domestic product. It is evident in table VI that the contribution degree of prediction error from all the variables of China's fictitious economy to the gross domestic product respectively is becoming bigger in the terms. Therefore, it indicates that there are great influences from all the variables of China's fictitious economy to the gross domestic product, and the conclusion is consistent to the results of cointegration test.



A. Variance Decomposition of DLNST

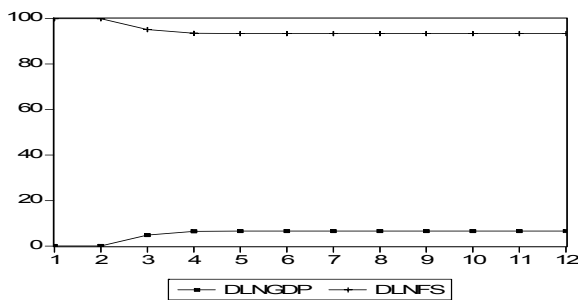


B. Variance Decomposition of DLNTD

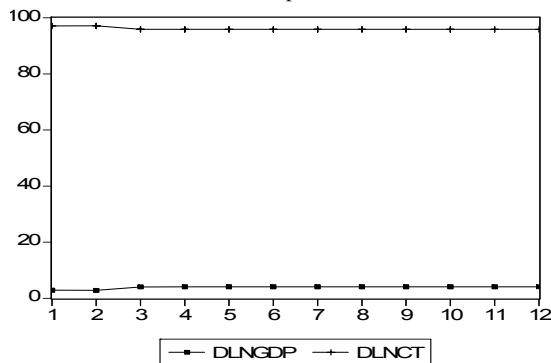


C. Variance Decomposition of DLNFE

Figure I shows the contribution degrees. It can be seen in figure I A that the fluctuation of the turnover of stock trading is almost caused by itself by about 97.59% degree in the first term, and the influence of the turnover of stock trading on the gross domestic product (GDP) is increasing gradually over time, then, the biggest degree is about 10.2% in the ninth term. The influence degree is up to about 10% finally which indicates that the effect from the turnover of stock trading to



D. Variance Decomposition of DLNFS



E. Variance Decomposition of DLNCT

FIGURE I RESULT OF VARIANCE DECOMPOSITION.

GDP is strong in the short term. It can be seen in figure I B that the fluctuation of the turnover of treasury bonds trading is almost caused by itself in the first term, and the influence degree of the turnover of treasury bonds on GDP is up to 0.95% from the fourth term which indicates that the effect is very weak in the short term. It is evident in figure I C that the fluctuation of the turnover of foreign exchange transactions is almost caused by itself by about 90.62% degree in the first term, then, the influence degree of the turnover of foreign exchange transactions on GDP is almost stable in every term, and the biggest degree is about 10% in the second term which indicates that the effect is strong in the short term. Figure I D shows that the fluctuation of the turnover of investment of futures and securities trading is also almost caused by itself in the first term, then, the influence degree of the turnover of investment of futures and securities trading on GDP is becoming bigger from the third term, and the degree is up to about 6.6% finally which indicates that the effect is weak in the short term. It can be seen in figure I E that the fluctuation of the turnover of commodity futures trading is almost caused by itself by about 97% degree in the first term, and the influence degree of the turnover of commodity futures trading on GDP is up to about 4% from the third term which the effect is very weak in the short term.

IV. CONCLUSION

An empirical analysis of influences of fictitious economy on real economy in China has been given by using quarterly data

from April 1998 to December 2008 and choosing the turnover of stock trading, the turnover of treasury bonds trading, the turnover of foreign exchange transactions, the turnover of investment of futures and securities trading and the turnover of commodity futures trading as the representative variables of China's fictitious economy, as well as the gross domestic product as the representative variable of real economy based on the cointegration test, Granger causality test, least squares analysis and variance decomposition. The results show that there is cointegration relationship between China's fictitious economy and real economy in the long term; there is unilateral Granger cause of GDP to the turnover of stock trading, the turnover of investment of futures and securities trading and the turnover of commodity futures trading respectively; there is bidirectional Granger cause of GDP to the turnover of foreign exchange transactions; and there is no Granger cause of GDP to the turnover of treasury bonds trading in the short term which is consistent to the conclusion of least squares analysis. The results of least squares analysis show that there is remarkable positive correlative relationship between the turnover of stock trading, the turnover of foreign exchange transactions, the turnover of investment of futures and securities trading and the turnover of commodity futures trading and GDP respectively, and the coefficient of the turnover of stock trading to GDP is biggest which is about 0.3332. The results of variance decomposition show that the contribution degrees of the turnover of stock trading and the turnover of foreign exchange transactions to GDP are up to 10.2% and 10% respectively finally which are bigger than the others fictitious economy variables to GDP. Therefore, there is positive correlative relationship between China's fictitious economy to real economy; the influences of stock market, foreign exchange market and commodity futures market on GDP are much remarkable; and the effect from stock market to GDP is strongest.

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