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The relationship among the liquidity in real economy, financial economy and inflation

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The Relationship Among the Liquidity in Real Economy, Financial Economy and Inflation

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Abstract

This paper introduces the principles supporting the fisher transaction equation. Then, it transforms the traditional quantity equation, and adds the financial economic department into the equation to estimate currency liquidity respectively.

We show that when liquidity enters into the real economy and the financial economy, the capital price will change earlier than the product price does. We could also interpret that the excess liquidity in the financial economy firstly affects the capital price. Then, the capital price will take positive effects on the product price. This is opposed to the influence mechanism taken by liquidity on the real economy. We conclude by analyzing the relationship between liquidity in real economy, financial economy, and inflation.

1. Introduction

With the development of the financial market, the use of financial derivative has increased, and this has lead to the degree of economic virtualization to steadily increase so that it occupies a larger portion of the economy. This tendency has made the economic structure vary to a large extent. The economic structure can be divided into a real economy and a financial economy. The innovation of the financial derivatives has encouraged investors to focus more on this field rather than traditional methods.

However, the *real* and *financial* economy has two different pricing methods: price system and asset price system. The effect of the economy on currency liquidity should be considered respectively. When the increased liquidity enters into the real economy, it creates inflation. The liquidity also impacts the financial economy; it causes fluctuations in the asset price.

Bark & Kramer (1999) divides liquidity into currency liquidity and the market liquidity, and indicates that that currency liquidity happens prior to market liquidity. Also, Adrian & Shin (2007) research the liquidity in financial system. This paper divides liquidity into financial liquidity and real market liquidity.
Thorsten Polleit and Dieter Gerdesmeier (2005) also provide the theory of excess liquidity in different markets. Hicks J.R.Liquidity [J] expresses a similar opinion on currency liquidity. In recent years, Chinese economists have focused on this area. For example, Professor Song Qingguo has researched the relationship between liquidity and the stock market. Also, the Economic department of Beijing University has done research on the relationship between capital price and the classifying liquidity.

In previous papers, the researchers were concerned about the relationship between the overall liquidity and the inflation, or the impact of the assets by currency liquidity. Actually, currency liquidity respectively enters into the real economy and financial economy. So this paper focuses on liquidity and this relationship.

This paper introduces the principles supporting the fisher transaction equation. Then, it transforms the traditional quantity equation, and adds the financial economic department into the equation to estimate currency liquidity respectively. We conclude by analyzing the relationship between liquidity in real economy, financial economy, and inflation.

2. Chinese Financial Economic Development

After the reform and opening, the financial market and the capital market has undergone a flourish of developments. Investors have recognized more and more derivative instruments. For example, securities like options and futures. The financial economy has come to occupy an increasing portion of the overall economy.
(Figure 1 the ratio between the value of the stock market and the GDP in China)

Year	Stock market value（a hundred million）	GDP (a hundred million)	Stock market value /GDP
1997	17529	78060.8	22.46%

Year	Stock market value（a hundred million）	GDP (a hundred million)	Stock market value /GDP
1998	19506	83024.3	23.49%
1999	25471	88479.2	28.79%
2000	48091	98000.5	49.07%
2001	43522	108068.2	40.27%
2002	38329	119095.7	32.18%
2003	42458	135174	31.41%
2004	37056	159586.7	23.22%
2005	32430	185808.6	17.45%
2006	89404	217522.7	41.10%
2007	327141	267763.7	122.18%
2008	121366	316228.8	38.38%
2009	243939	343464.7	71.02%
2010	273897	376780.8	72.69%

Figure 2 stock market development relevant indexes in china

Year	Stocks listing	Trading volume（billion shares）	Stock turnover（billion RMB）	Total Market value（billion RMB）	Stock total issued capital（billion shares）	Circulation capital stock（billion shares）
1997	821	256.02	3072	1759	194.67	67.44
1998	931	215.11	2354	1956	235.35	74.94
1999	1029	293.39	31319	2547	298.85	95.34
2000	1174	475.38	6082	4809	363.39	123.32
2001	1240	315.29	3830	4352	488.35	148.88
2002	1310	301.19	2799	3839	542.99	169.94
2003	1372	416.08	3211	4248	599.93	189.32
2004	1463	582.73	4233	3706	671.74	219.15
2005	1467	662.73	3166	3243	716.54	249.89
2006	1520	1614.23	9046	8940	1268.99	344.5
2007	1636	3640.75	46055	32714	1700.45	493.64
2008	1711	2413.39	26711	12136	2458	1257
2009	1804	5110.99	53598	24399	2616	1976
2010	1903	7310.87	61085	26342	2887	2513

We can conclude that the financial economy develops as fast as the real economy develops from these figures. After the year 2005, the capital market developed rapidly, and relevant derivative innovations occurred simultaneously. Investors have an increasingly deep knowledge of financial products; consequently the investment channels have become more diverse. Individual investors are no longer relying solely on their bank accounts to augment their savings. More investors are allocating money into bond/debt/futures instruments. So we can conclude that the financial economy is occupying an increasingly important status in national economy.

3. Estimate of Currency Liquidity in Real and Financial Economy

Firstly we should introduce fisher transaction equation: $MV = PQ$ (Equation1)

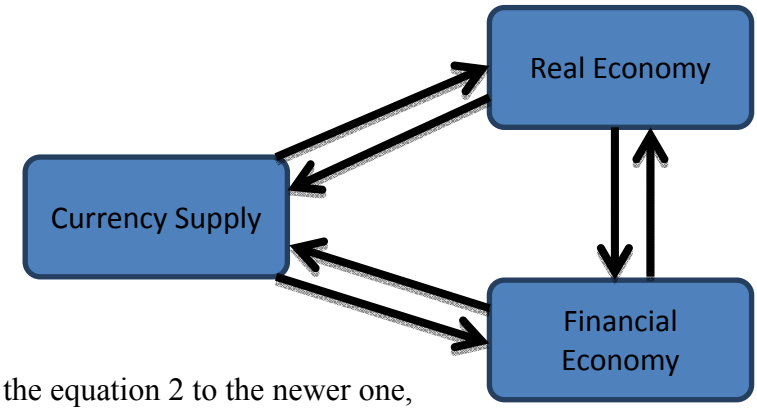
M: quantity of money
V: liquidity of money
P: average weighted product price
Q: aggregate output

From the equation we can see that the research field must be restrained to the currency and real economy. However, with the development of the capital market, this two-department model cannot explain well the economic phenomenon taking place in the actual world.

This paper will add the financial economy into this equation, formatting the three department economic model. $MV = rP \cdot rQ + sP \cdot sQ$ (Equation2)

SP: the average weighted security price
SQ: the security transaction quantity
PR: the average weighted product price
RQ: the transaction quantity in product market

From the Equation 2, we can see that currency will enter into two different departments, real economy and financial economy (M=rM+sM). This is a three department model equation. Currency, the real economy, and the financial economy affect each other.



We could also transform the equation 2 to the newer one,
MV=rM*rV+sM*sV Equation 3

RM: quantity of money in real economy
RV: liquidity of money in real economy
SM: quantity of money in financial economy
SV: liquidity of money in financial economy

We could dominate equation 1-2 and 1-3, we could get this equation:

$$rM \cdot rV + sM \cdot sV = rP \cdot rQ + sP \cdot sQ$$ Equation 4

$$V = \frac{MV}{M} = \frac{rM \cdot rV + sM \cdot sV}{rM + sM} = \frac{\frac{rM}{sM} rV + sV}{\frac{rM}{sM} + 1}$$ Equation 5

We also let C=rM/sM , so we could get the equation become

$$V = \frac{sV + C \cdot rV}{1 + C}$$ Equation 6

$$C = \frac{rM}{sM} = \frac{sV - V}{V - rV}$$ Equation 7

From these equations, we can draw the conclusion that we can calculate the quantity of money in the real and financial economies. This way we can proportionally divide the liquidity of money in the complicated economy.

4. The estimation of the liquidity in financial and real economy

Some variables will now be used to calculate the monthly data. We will also use stock relevant figures. In the financial economy, the liquidity equals the turnover divided by the flow of market value.

SV=12*turnover/flow of market value Equation 8

In the real economy, we use the liquidity to rate the turnover of current assets in the industrial enterprises presents. So the RV has been represented by the data

RV=Sales(Industry enterprise)/turnover of current asset Equation 9

The overall velocity equals the sum of sales in industrial enterprises plus the turnover of the stock market divided by M2.

So V= (sales in industrial enterprises + turnover of stock market)/m2 Equation 10

So we use the V, SV, RV to calculate the following formula:.

Following this calculation we will find the relationship between the C and the liquidity in real and financial economy. These variables are respectively represented by these equations.

$$rL = M_2 \cdot \frac{C}{1 + C}$$ Equation 11

$$sL = M_2 \cdot \frac{1}{1 + C}$$ Equation 12

4.1 Analysis of the Relationship between the Inflation and Liquidity in Two Markets.

When there is a surplus liquidity of currency, it will enter different markets, leading to different effects. If it flows into real markets, it will lead to price increases, causing inflation. If it flows into financial market, it will increase the price of the capital, causing asset bubbles. We will now examine the relationship among the liquidity of currency in the real economy and the financial economy. We will conduct this examination of capital pricing and inflation using the Vector Autoregressive method, Johansen Cointegration Test, Impulse Responses method etc.

We use VAR model to analyze which was provided by C.A. Simi. The basic VAR model is

$$Y_t = \theta_0 + \theta_1 Y_{t-1} + \theta_2 X_{t-1} + e_t$$

$$X_t = \partial_0 + \partial_1 X_{t-1} + \partial_2 Y_{t-1} + u_t$$

4.2 Data Interpretation

The interpretation of the data shown is as follows. Inflation is represented by the CPI. The capital price is represented by the Shanghai exchange stock index, record as SZ. The liquidity of money in the real economy and financial economy are represented by the rL and sL respectively.

We will use the difference method to deal with the data, since all data sets are time series.

$$DLNCPI = LNCPI - LNCPI(-1) \quad \text{Equation 13}$$

$$DLNSZ = LNSZ - LNSZ(-1) \quad \text{Equation 14}$$

$$DLNrL = LNrL - LNrL(-1) \quad \text{Equation 15}$$

$$DLNsL = LNsL - LNsL(-1) \quad \text{Equation 16}$$

The variable that should be considered are the rate of price change, rate of SH stock index change, the rate of currency liquidity change in real economy, and the rate of currency liquidity change in financial economy respectively.

4.3 Unit Root Test

All variables used in our model are time series data. Before we decide how to apply our model, we have to know whether those series are stationary or not. We do this through the unit root tests, we also use the Augmented Dicky-Fuller method (ADF) and results provided by E-views are shown as follows.

variables	ADF	Critical value (1%)	Consequence
DLNCPI	-3.629776	-4.284580	Stationary
DLNsL	-7.09124	-4.226815	Stationary
DLNrL	-6.323084	-4.226815	Stationary
DLNSZ	-5.660351	-4.030729	Stationary

From the consequence above, we can conclude that the DLNCPI, DLNsL, DLNrL and DLNSZ do not contain unit roots, they are all stationary.

4.4 Cointegration Test and the Lag Value

Here we use the Johansen Cointegration test because the ADF test is not suitable to this field. Secondly, we need to test among 4 variables, so we should use Johansen Cointegration test. The consequence of test is following:

Johansen Cointegration test consequence

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.445353	186.4361	40.17493	0.0001
At most 1 *	0.341741	110.9899	24.27596	0.0000
At most 2 *	0.271938	57.46577	12.32090	0.0000

Form the table, we can conclude that, at 5% critical value, we can reject the null hypothesis, and there are at least 3 cointegrated variables. This also means that the DLNCPI, DLNsL, DLNrL and DLNSZ have stationary equilibrium relationships in the long-term.

There is also a relatively important procedure to conduct, to ascertain the optimal lagged value. In the choice of lagged value, the lagged value should be considerably larger, so the model's dynamic characteristics can be adequately disclosed. There are other factors that should not be forgotten. For example, when the lag value is larger, there is a smaller degree of freedom that they should have. Consideration of the lagged value is comprehensive. Luckily, using EViews we can make sure we use the optimal lagged value.

The estimate of the lagged value

Lag	LogL	LR	FPE	AIC	SC	HQ
0	718.5472	NA	8.73e-11	-11.81070	-11.71828*	-11.77316
1	749.2795	58.92470	6.84e-11	-12.05421	-11.59209	-11.86652*
2	773.2143	44.30907	6.01e-11	-12.18536	-11.35356	-11.84753
3	780.7757	13.49792	6.92e-11	-12.04588	-10.84438	-11.55791
4	811.6812	53.12692	5.43e-11*	-12.29225*	-10.72106	-11.65413
5	816.7595	8.393903	6.55e-11	-12.11173	-10.17085	-11.32346
6	834.8480	28.70234	6.39e-11	-12.14625	-9.835677	-11.20784
7	849.2850	21.95382	6.65e-11	-12.12041	-9.440151	-11.03186
8	868.8835	28.50695*	6.38e-11	-12.17989	-9.129940	-10.94119
9	876.6035	10.71857	7.50e-11	-12.04303	-8.623388	-10.65418
10	887.8273	14.84149	8.37e-11	-11.96409	-8.174752	-10.42509

From the table, we can make see that the optimal lagged value is 4 through the AIC principle.

4.5 VAR Model

We use EViews to estimate the data by the VAR model, the result is as follows:

estimate of the VAR

	DLNCPI	DLNrL	DLNsL	DLNSZ
SER01(-1)	0.401460	0.671241	-1.467620	-1.257634
	DLNCPI	DLNrL	DLNsL	DLNSZ
	(0.08987)	(3.24031)	(1.92436)	(1.12284)

estimate of the VAR

	DLNCPI	DLNrL	DLNsL	DLNSZ
	[4.46701]	[0.20715]	[-0.76265]	[-1.12005]
SER01(-2)	-0.235969	-4.010882	4.076333	1.320667
	(0.09845)	(3.54952)	(2.10800)	(1.22998)
	[-2.39688]	[-1.12998]	[1.93375]	[1.07373]
SER01(-3)	-0.008353	-0.050906	0.050719	-0.251477
	(0.10072)	(3.63154)	(2.15671)	(1.25841)
	[-0.08293]	[-0.01402]	[0.02352]	[-0.19984]
SER01(-4)	-0.078340	-6.686141	3.332850	0.211709
	(0.09068)	(3.26957)	(1.94174)	(1.13297)
	[-0.86388]	[-2.04496]	[1.71642]	[0.18686]
SER02(-1)	0.002828	-0.039118	-0.199549	-0.015267
	(0.00661)	(0.23849)	(0.14163)	(0.08264)
	[0.42753]	[-0.16402]	[-1.40890]	[-0.18473]
SER02(-2)	0.004535	0.218946	-0.254781	0.077366
	(0.00657)	(0.23684)	(0.14065)	(0.08207)
	[0.69036]	[0.92445]	[-1.81139]	[0.94269]
SER02(-3)	-0.003078	-0.135196	-0.136979	0.070526
	(0.00630)	(0.22728)	(0.13498)	(0.07876)
	[-0.48825]	[-0.59484]	[-1.01483]	[0.89549]
SER02(-4)	0.010068	0.060763	-0.130919	-0.152249
	(0.00598)	(0.21565)	(0.12807)	(0.07473)
	[1.68331]	[0.28177]	[-1.02224]	[-2.03740]
SER03(-1)	0.013798	0.734303	-0.853590	0.095081
	(0.01107)	(0.39900)	(0.23696)	(0.13826)
	[1.24682]	[1.84037]	[-3.60230]	[0.68769]
SER03(-2)	-0.001284	0.658365	-0.667767	0.190680
	(0.01153)	(0.41557)	(0.24680)	(0.14400)
	[-0.11142]	[1.58424]	[-2.70569]	[1.32413]
SER03(-3)	-0.015687	-0.081190	-0.379524	0.141306
	(0.01100)	(0.39671)	(0.23560)	(0.13747)
	[-1.42569]	[-0.20466]	[-1.61089]	[1.02792]
SER03(-4)	0.001172	0.353077	-0.339983	-0.249334
	(0.00988)	(0.35618)	(0.21153)	(0.12342)
	[0.11866]	[0.99130]	[-1.60728]	[-2.02016]
SER04(-1)	-0.006681	-0.867052	0.483806	0.022722
	(0.00810)	(0.29208)	(0.17346)	(0.10121)
	[-0.82469]	[-2.96854]	[2.78913]	[0.22450]
SER04(-2)	0.010268	0.517082	-0.133930	0.167232
	(0.00802)	(0.28925)	(0.17178)	(0.10023)
	[1.27991]	[1.78769]	[-0.77967]	[1.66848]
SER04(-3)	0.008326	0.333393	-0.195480	0.068852
	(0.00809)	(0.29167)	(0.17322)	(0.10107)
	[1.02917]	[1.14304]	[-1.12851]	[0.68123]
SER04(-4)	0.005715	0.461516	-0.317403	0.160449

estimate of the VAR

	DLNCPI	DLNrL	DLNsL	DLNSZ
	(0.00811)	(0.29231)	(0.17360)	(0.10129)
	[0.70494]	[1.57888]	[-1.82841]	[1.58406]
C	0.001102	0.003209	0.046184	0.002040
	(0.00089)	(0.03216)	(0.01910)	(0.01114)
	[1.23520]	[0.09979]	[2.41847]	[0.18305]
	[1.68331]	[0.28177]	[-1.02224]	[-2.03740]

4.6 The Granger Cause

Next step, we should take the Granger Causality test of the rate of inflation as a result of currency liquidity in the real economy and financial economy, in order to test whether they have causal relationship and effect. Next, follows three tables which

Null hypothesis	F-value	P-value
DLNCPI does not Granger Cause DLNrL	1.31942	0.28286
DLNrL does not Granger Cause DLNCPI	4.98473	0.01378

test whether two factors have causal relationship.

The Granger Test between inflation and Currency liquidity in real economy.

From this table, we can conclude that, at 5% significant level, the null hypothesis of DLNrL does not Granger Cause DLNCPI should be rejected, that is to say that the DLNrL cause DLNCPI. Also, the null hypothesis that DLNCPI does not cause DLNrL should be accepted, that means DLNCPI does not cause DLNrL. Next, we will verify the relationship between inflation to currency liquidity in the financial

Null hypothesis	F-value	P-value
DLNCPI does not Granger Cause DLNsL	1.32739	0. 2446
DLNsL does not Granger Cause DLNCPI	4.79720	0.02790

economy. The result is as follows:

The Granger Test between inflation and currency liquidity in the financial economy

From the test result, we can draw a conclusion that the null hypothesis that DLNCPI does not cause DLNsL should be accepted, and the null hypothesis of the DLNsL does not cause DLNCPI should be rejected at a 5% significant level. That is to say that, currency liquidity in financial economy causes DLNCPI. Finally, we also test the relationship between the capital price and the currency liquidity in financial economy.

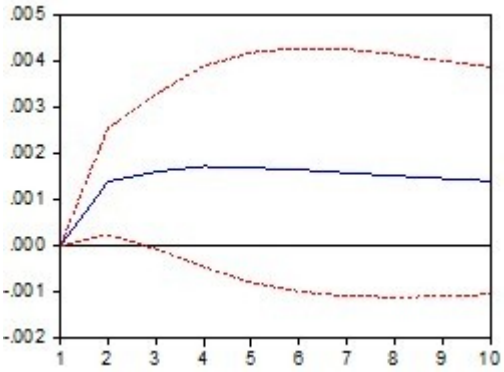
The Granger Test between capital price and currency liquidity in financial economy.

From the test results above, we can conclude that at 5% significant level, DLNsL Granger Cause DLNSZ, while DLNSZ does not cause DLNsL.

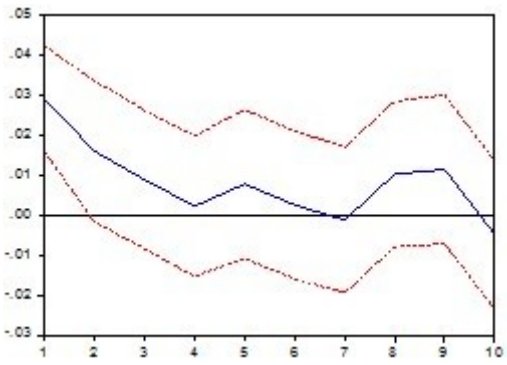
Null hypothesis	F-value	P-value
DLNsL does not Granger Cause DLNSZ	4.78450	0.01562
DLNSZ does not Granger Cause DLNsL	1.06567	0.35040

4.7 Impulse Response function

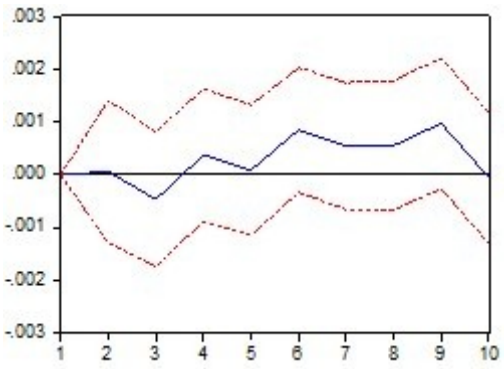
To better demonstrate the dynamic movements on Granger Causality Test, I will identify the structure shocks and the impulse response.



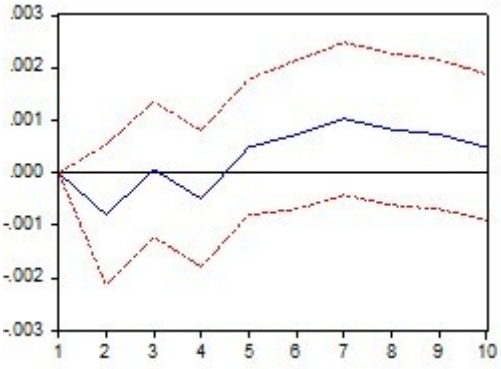
The response of DLNrL to DLNCPI



The response of DLNsL to DLNSZ



The response of DLNsL to DLNCPI



The response of DLNsL to DLNSZ

From the first graph showed above, the response of the liquidity in the real economy to CPI is positive, and after that period, it reaches a peak at the 6th period, and then becomes relatively stable.

We can see from the second graph that a one-time shock on liquidity in the financial economy leads to a positive response in the Shanghai exchange stock index. While

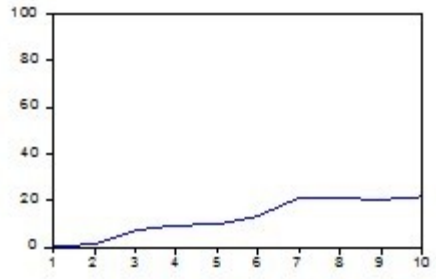
this trend is going to be weakened as time goes on, also between the period 4th and 6th periods, it experiences a slight fluctuation.

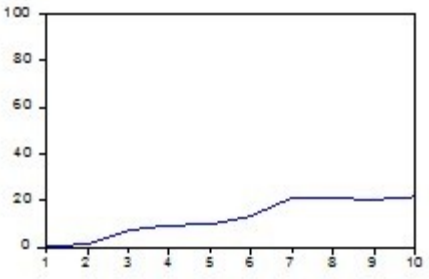
Graph 3 displays that a one-time shock on liquidity in the financial economy first leads to an almost negative response at the beginning. After the 3rd period, it turns to be positive and with an upward fluctuating trend. After the 3rd period, the response effect increases until the 9th period.

Graph 4 indicates the impact from the Shanghai stock market index to CPI. It shows that the impulse response has almost the same trend as the 3rd graph. We can conclude that the liquidity in the financial economy and real economy has a different influence on CPI. The impulse effect of CPI from liquidity in the real economy is positive and continuous. However, the liquidity in the financial economy indirectly affects CPI. Firstly, the excess liquidity in the financial economy affects the capital price and then the capital will transfer the impulse to the CPI.

4.8 Variance Decomposition

To better understand and determine how much of the forecasted error variance of each of the variable can be explained by exogenous shocks to the other variables, we will conduct a variance decomposition:





Percent DLNCPI variance due to DLNrL Percent DLNCPI variance due to DLNsL

From the these two graphs, we can see that the forecast of the inflation error variance can be explained by currency liquidity in the real economy and the financial economy gradually increases as time goes on, finally explains 20%, 18% respectively of the inflation fluctuation at 10th period.

5. Conclusion

From above analysis, we know that when liquidity enters into the real economy and the financial economy, the capital price will change earlier than the product price does. We could also interpret that the excess liquidity in the financial economy firstly affects the capital price. Then, the capital price will take positive affects on the product price. This is opposed to the influence mechanism taken by liquidity on the real economy.

To conclude, I also have some suggestions to make. Firstly, our financial institutions should increase the floating exchange rate interval. Secondly, they should more effectively monitor currency liquidity inflow and outflow. We should also monitor the effect of the price of currency liquidity in the real economy and financial economy. Finally, relevant authorities should pay close attention to the fluctuation of the capital price.

References

Tobias, A., & Hyun, S.S. (2007). Liquidity and Leverage. *Journal of Financial Intermediation, Forthcoming*. Retrieved from http://www.imf.org/external/np/seminars/eng/2008/fincycl/pdf/adsh.pdf.

Bark., & Kramer, C. (1999). Global Liquidity and Asset Prices: Measurement, implications and spillovers. *IMF Working Paper*, Research Department, WP/99/l68.

Hicks, J.R. (1962). Liquidity. *The Economic Journal*, Vol.72.pp 787-802.

Polleit, T., & Gerdesmeier, D. (2005). Measures of excess liquidity. *ECB 2005 Working Paper.* No.65.宋国青，2007:<<流动性与股票价格>>，北京大学中国经济研究中心一 2007 年宏观经济专题课程讲义.

北京大学中国经济研究中心宏观组.流动性的度量及其与资产价格的关系[J].金融研究，2008 年第 9 期.