

# Empirical Study on the Influencing Factors of China's Hot Money Scale

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**Abstract** –With the Position for Forex Purchase caused by hot money flowing fluctuating rapidly in China in recent years, the consequent monetary supply made an obvious impact on asset prices in China. Based on the review of prior scholars' studies about hot money, modifying existing model, this paper analyzes how the hot money inflows are affected and elaborates on the transmission mechanism of hot money to inflation during the period from 2008 Q1 to 2012 Q1. In the end, the article comes up with some corresponding control measures and political suggestions.

**Keywords** –Hot money; Inflation; Position for Forex Purchase; expectation

## 1. Introduction

After joined the WTO, China's capital projects have been in constant opening to the foreign capital. Although it has not yet reached the point of fully liberalized, a large number of short-term speculative international capital still focused on our excellent investment environment, and swarmed in through various channels. Whereby, overheated investment in China's financial markets arises.

However, the downgrading of Greek sovereign by S&P in July 2011, coupled with the outbreak of the debt crisis in Europe and U.S., makes the reviving global economic situation deteriorating. Western countries' paralysis results in capital's withdrawal.

Hot money is also known as speculative short-term capital, with the characteristic of speculative, short-term and economic destructive. Like other capital flow, its basic cause is also the pursuit for high return, which is a kind of market behavior. From the point of view of theoretical study, western scholars began the first deep discussion about hot money after the Southeast Asian financial crisis in 1997. According to the study on 13 developing countries' hot money scale, Fernandez (1996) found that the changes in interest rates affect the hot money scale more than the economic fundamentals does. Similar research can be seen from that of Calvo and Reinhart (1995). In China, more influential studies on capital flight and capital inflows were made by Wenbing Song (1999), Xiaofeng Li (2000), Guozhong Xie (2005) and Qing Wang (2008). Yang Wang (2004) and Qi Wang (2006) proved that capital flows in China are very sensitive to interest margin since 1994. Lida Liu (2007) and Jisheng Huang (2008) have drawn the similar conclusion. Empirical study made by Tingyu Chai (2011) proved that foreign hot money inflows pushed up in large part China's property prices, and resulted in abnormal fluctuations in stock prices. With the analysis on interest arbitrage, exchange arbitrage and asset prize speculation, Jian Su and Li Tong (2012) found that the expectations of RMB appreciation contribute most in hot money inflows.

In the context of hot money outflows since the second half of 2011, in Tan Ye's view (2011), the rising trend of RMB's central parity rate and unwavering market foundation may recall the hot money.

Besides, it is worthy to study to what extent various factors lead the inflows of hot money, and in return whether the inflow and outflow of hot money have some impact on inflation. While currently such researches are very limited, most of which are still focused on theoretical analysis. In this light, this paper makes some creative attempts. Based on the study of prior scholars on the factors affecting the scale of hot money, with author's own analysis combined, the paper readjust and further develop the existing model. And the following empirical study based on the latest data made compensation in this field.

## 2. The transmission mechanism and path of hot money inflows on domestic price

The domestic inflation rate is affected by hot money through multiple channels. But it is the funds outstanding for foreign exchange mechanism that works essentially. Both short-term physical investment, commodity markets, capital markets or other investment targets will produce large amounts of foreign exchange, imposing an important impact on future price. Generally speaking, foreign investment should make settlement of exchange when it comes into China, which means foreign money needs to be deposited in the bank in exchange for RMB. By producing monetary base more than expected banks are forced to release large amounts of liquidity which generates money supply many times greater than the original amount under the multiplier effect. Thus, inflation emerges.

Practically, it is since 2002 that China has been maintaining rapid economic growth, the GDP growth is even kept more than 8% under the global financial crisis in 2008. Alongside with the rapid growth is the increasingly higher commodity price, the trend of overheating has become significant. Nevertheless, the

current situation is different from inflations that we had experienced in the history. In the past, the excessive fixed asset investment resulted in a full range of inflation due to easy credit policy, while the current domestic inflation is partial and unbalanced, and one of the main performances is the rapid rise in asset prices such as real estate and stock. Meantime, the PBC has raised deposit reserve ratio many times to curb inflation, but have little effect. On the whole, the main reason for excess domestic liquidity is not domestic credit expansion, but the too much passive money supply acting on the field of real estate and other assets generated by funds outstanding for foreign exchange. This is also one of the fundamental causes of the coexistence of appreciating in RMB and overheating in domestic economy.

### 3. Measure the hot money scale

#### 3.1. Measure caliber

At present, two main methods are frequently used by domestic scholars to measure the scale of hot money: direct method and indirect method.

##### (1) Direct method

The modified errors and omissions in the international balance of payment are used to assess the hot money scale in this method. But some defects underlying in this looked simple method. On one hand, errors and omissions cannot be measured accurately. On the other hand, it is difficult to count on the short-term capital movement of non-bank private sectors.

##### (2) Indirect method

This method is mainly used to find the hot money in the abnormal trade surplus through adjusting the data and projects. Specifically, after excluding the actual utilization of foreign capital amount and the trade surplus which can be explained from the official foreign exchange reserves and incremental data, and the rest item which cannot be explained is hot money. Although there are still a lot of errors the indirect method, the required data is more available compared to the direct method.

#### 3.2. Hot money scale of China

In this paper, using the indirect method, the scale of international hot money flows is thought to be the foreign exchange reserves increase minus the trade surplus and foreign direct investment in order to measure China's hot money flows scale. Then the related data from the past 17 quarters was picked up and adjusted to obtain the rough estimate of hot money inflows.

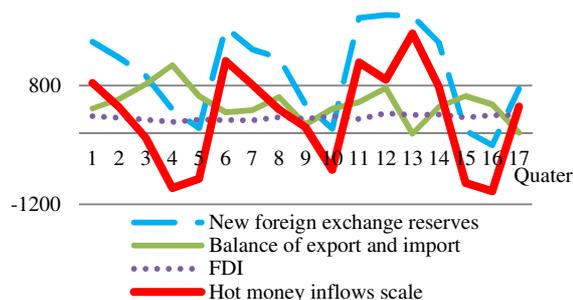


Figure 1. Hot money inflows scale from 2008. Q 1 to 2012. Q 1 (US\$bn)

Data source: Ministry of Commerce of the People's Republic of China and State Administration of Foreign Exchange websites

According to Figure 1, we can see clearly that massive hot money have been poured in China in recent years. Although short-term outflows existing in individual month, hot money is generally keeping flowing in till now, with huge fluctuate scale. What we should note here is that a large portion of hot money flowed in illegally for the half-finished marketization. So some deviations existed.

### 4. Empirical study

#### 4.1. The variables selection

As the thesis reviews in the beginning portion mentioned, interest margin, exchange rate, housing price and stock price were found impacting hot money scale in prior research. All these factors can be used to explain the hot money inflows scale. GDP can be used as argument either because that investment can be affect by the expectation of RMB appreciation.

##### (1) Interest margin ( $I$ )

Selected domestic interest rate is China's one-year certificate of deposit rate ( $Rd$ ). Data are gathered from the website of the People's Bank of China. Federal Funds Effective Rate ( $Rf$ ) data are taken from FED website. Then the interest margin can be calculated as  $I = Rd - Rf$ .

##### (2) Exchange rate ( $R$ )

This explanatory variable can be expressed by RMB-dollar reference rate. Data are collected from the State Administration of Foreign Exchange websites.

##### (3) Selling price index of house ( $H$ )

Related information is given by Chinese Academy of Sciences.

##### (4) Return on capital ( $Z$ )

The data of SSE Composite Index yields is gathered from the wind database.

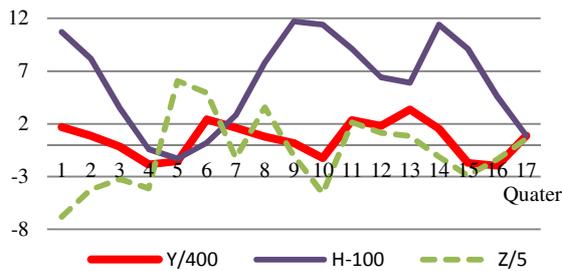
##### (5) Inflation rate ( $P$ )

##### (6) GDP ( $G$ )

The annual CPI rate and GDP rate at each quarter end are chosen.

##### (7) Dummy variable ( $A$ )

1 is assigned to  $A$  of those periods which experienced an improvement in the economy.



**Figure 2.** Correlations among hot money inflows, house price and stock yields 2008. Q1 ~ 2012. Q1

In Figure 2, distinctly negative relationship can be detected between the trend of house price and hot money inflows. And there is a positive relationship between hot money inflows and stock yields.

High correlation between *I* and *R* shown by the result of the covariance analysis (Table 1), can be explained by Interest Rate Parity Theory. Then the interest margin (*I*) can be eliminated from the econometric model.

**Table 1.** Covariance Analysis

	I	R	H	P	G	Z
I	1.000000	-0.977073	-0.036135	0.285789	-0.234002	0.049036
R	-0.977073	1.000000	0.018041	-0.250389	0.230448	-0.102298
H	-0.036135	0.018041	1.000000	0.639679	0.774131	-0.436113
P	0.285789	-0.250389	0.639679	1.000000	0.643312	-0.621417
G	-0.234002	0.230448	0.774131	0.643312	1.000000	-0.668279
Z	0.049036	-0.102298	-0.436113	-0.621417	-0.668279	1.000000

### 4.2. Establishment of model

The lagged variable is introduced in consideration of the existed lags in everyday economic life. The hot money inflows scale can be defined as:

$$Y_t = C + \alpha_1 Y_{t-1} + \alpha_2 R + \alpha_3 Z + \alpha_4 H + \alpha_5 G + \alpha_6 A \quad (1)$$

Eviews 6.0 is used to do the multiple regression analysis.

**Table 2.** Lag-one autoregressive model

	Coefficient	Std. Error	t-Statistic	Prob.
C	29401.09	15074.33	1.950408	0.0829
Y(-1)	0.386995	0.268692	1.440294	0.1836
R	-24.59284	13.30012	-1.849068	0.0975
Z	21.84745	19.44905	1.123317	0.2904
H	-176.0188	93.50993	-1.882354	0.0925
G	498.6241	269.4409	1.850588	0.0973
A	1481.787	748.1250	1.980668	0.0790

<b>R-squared</b>	0.623087	<b>Mean dependent var</b>	232.2369
<b>Adjusted R-squared</b>	0.371812	<b>S.D. dependent var</b>	855.2201
<b>S.E. of regression</b>	677.8330	<b>Akaike info criterion</b>	16.17531
<b>Sum squared resid</b>	4135118.	<b>Schwarz criterion</b>	16.51332
<b>Log likelihood</b>	-122.4025	<b>Hannan-Quinn criter.</b>	16.19262
<b>F-statistic</b>	2.479701	<b>Durbin-Watson stat</b>	2.588703
<b>Prob(F-statistic)</b>	0.106660		

Regression equation is acquired as

$$Y_t = 29401.09 + 0.386995Y_{t-1} - 24.59284R + 21.84745Z - 176.0188H + 498.6241G + 1481.787A \quad (2)$$

$R^2 = 0.623087$   
 $F = 2.479701$   
 $D.W. = 2.588703$

Regression coefficients are basically reasonable. The negative coefficient of *G* is because that more attention of speculators is paid on the price expectations rather than the present value of real estate.

The obtained result gives a goodness-of-fit test exceeding 62.3%, therefore the overall fitting effect is satisfactory, while the equation's significant test and each variable's t-test failed. Modification is necessary.

### 4.3. Heteroskedasticity eliminating

**Table 3.** Heteroskedasticity Test: White (exclude White cross terms)

<b>F-statistic</b>	2.632543	<b>Prob. F(6,9)</b>	0.0930
<b>Obs*R-squared</b>	10.19244	<b>Prob. Chi-Square(6)</b>	0.1168
<b>Scaled explained SS</b>	2.154811	<b>Prob. Chi-Square(6)</b>	0.9049

Statistics  $nR^2$  is relatively larger, and null hypothesis is accepted. Heteroskedasticity existed in the original regression. And it can be eliminated by using weighted least square. Take the reciprocal of variance's absolute value as weighting.

**Table 4.** Heteroskedasticity eliminate

	Coefficient	Std. Error	t-Statistic	Prob.
C	36658.04	6274.282	5.842587	0.0002
Y(-1)	0.511285	0.170116	3.005506	0.0148
R	-28.81360	5.708785	-5.047238	0.0007
Z	20.34474	7.327495	2.776493	0.0215
G	522.8380	162.4979	3.217507	0.0105
H	-221.9223	38.87778	-5.708203	0.0003
A	1744.796	236.9904	7.362304	0.0000

Weighted Statistics			
<b>R-squared</b>	0.967327	<b>Mean dependent var</b>	265.1534
<b>Adjusted R-squared</b>	0.945546	<b>S.D. dependent var</b>	995.8255
<b>S.E. of regression</b>	131.5229	<b>Akaike info criterion</b>	12.89587
<b>Sum squared resid</b>	155684.5	<b>Schwarz criterion</b>	13.23388
<b>Log likelihood</b>	-96.16700	<b>Hannan-Quinn criter.</b>	12.91318
<b>F-statistic</b>	44.40996	<b>Durbin-Watson stat</b>	2.524864
<b>Prob(F-statistic)</b>	0.000003		

Unweighted Statistics			
<b>R-squared</b>	0.595241	<b>Mean dependent var</b>	232.2369
<b>Adjusted R-squared</b>	0.325401	<b>S.D. dependent var</b>	855.2201
<b>S.E. of regression</b>	702.4262	<b>Sum squared resid</b>	4440623.

Durbin-Watson stat 2.700989

Regression equation is acquired as

$$Y_t = 36658.04 + 0.511285Y_{t-1} - 28.81360R + 20.34474Z - 221.9223H + 522.8380G + 1744.796A \quad (3)$$

$$R^2 = 0.967327$$

$$\text{Adjusted } R^2 = 0.967327$$

$$F = 44.40996$$

$$D.W. = 2.524864$$

Heteroskedasticity is eliminated, and the goodness-of-fit improved. Meanwhile, the equation's significant test and each variable's t-test are passed.

#### 4.4. Serial Correlation LM Test

Table 5. Breusch-Godfrey Serial Correlation LM Test (Lags to include: 2)

F-statistic	1.892590	Prob. F(2,7)	0.2203
Obs*R-squared	5.615379	Prob. Chi-Square(2)	0.0603

Statistics  $nR^2$  is relatively smaller, and the null hypothesis cannot be rejected. Second-order lag autocorrelation didn't exist in the regression above.

What's more, the multicollinearity has been gotten rid of according to the correlation analysis at the beginning of the 4<sup>th</sup> portion.

#### 4.5. Interaction between hot money inflows and inflation

Granger causality test is made to help to analyze whether if there is interaction between hot money inflows and inflation.

Table 6. Pairwise Granger Causality Tests (Lag: 1)

Null Hypothesis:	Obs	F-Statistic	Prob.
P does not Granger Cause Y	16	1.56230	0.2334
Y does not Granger Cause P		8.48548	0.0121

We can see clearly that the hot money will not flow in as the commodity price increasing. But the inflows of hot money may stimulate the price level.

### 5. Conclusion and policy suggestions

#### 5.1. Conclusion

The analyze of the model above can be concluded as that such factors – exchange rate, capital market yields, house price and GDP have largely guided the hot money inflows, which closely relates with the price level. At the meantime, the hot money inflows, no matter inflow or outflow, may bring a large shock on the keeping high inflation of China.

Also we can clearly recognize that some related political measures on those factors can be used to influence and manage inflation indirectly through the impact on hot money inflows.

Then affective measures, short-term and long-term policies, should be taken to guide hot money investment behavior.

#### 5.2. Short-term policy suggestions

##### (A) Monitoring and supervision of hot money

As mentioned above, our country has been convertible in the current-account and capital account partly at present international payments. So, a lot of hot money was poured into China through Underground canals under relatively strict capital controls. Those canals includes inflating price of import and export, false trading, immigrant remittance, transfer payment, and using the illegal private bank. Withal, relevant authorities should continuously improve the hot money inflows monitoring capacity. The authenticity of foreign trade need to be reviewed, and the supervision of the business account should also be strengthened. In addition, more attention must be paid on the funds for foreign investment projects. When necessary, compulsory means should be taken to crack it down.

##### (B) Reasonable guide on hot money investment

From a theoretical point of view, the inflow of hot money is a kind of market behavior, blindly anti-blocking may not be able to force control. On the other hand, since the hot money is a short-term capital in the pursuit of profit, at the same time, it is also a resource allocation process. Therefore, we should dare lead this capital through policy guidance to flow where it needs to be. Take China's capital market for example, it is still in the severe "bear market" status and in need of funding admission norms. Regulating and guiding hot money into the stock and bond markets well are conducive to the development of China's direct financing.

#### 5.3. Long-term policy suggestions

##### (A) To improve the relevant legal norms

In fact, there are a lot of hot money inflow through legal gaps and some loophole in the law. Chaotic and lax convergences also exist between relevant laws and departmental regulations. It is necessary that the existing laws and regulations are timely modified, so that illegal funds cannot easily and conveniently flow into China.

(B) China should tick to RMB exchange-rate reform and continue to increase the currency's flexibility.

At present, impacted by the adverse international economic situation and the US-led multinational political pressure, the RMB appreciation expectations continue to strengthen. But the marketization of the RMB exchange rate must be gradual, steady and long-term. Then the RMB appreciation expectations of the international investors and domestic public should be managed reasonably. The short-term hot money inflows willingness and arbitrage operations should be eliminated while the reform is steadily promoted.

(C) To persevere in the macroeconomic policies of structural adjustment

China is in an important period of economic structural transformation, and from a deep view, hot money problems are closely linked to the economic structure. The best way to control hot money is to reduce trade surplus and expand domestic demand. Therefore, it is the only way of our future to convert export-oriented economy into one developed through its own consumption and investment. It is crucial for RMB exchange rate fully marketization to transform the economic development pattern by the way of restructuring the economy and exploring new sources of economic growth through constant efforts. The establishment of a sound social security system and the increase of residents' incomes are also necessary

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