Research on the Impacts of Hidden Short-term International Capital Flows on China’s Economy

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Abstract. Hidden short-term international capital flows have complex and diverse impact channels which are difficult to supervise. This paper uses statistic software Eviews 8.0 to make Johansen cointegration test, VECM model test, Granger causality test and impulse responses analysis based on the collection of quarterly data from 2004 to 2014. The results show that hidden short-term international capital flows have huge and unstable impact upon China’s economy, therefore, we put forward policy suggestions based on the conclusion of empirical results.

Introduction

With the continuous development of economic globalization and the deepening of financial integration, the impact of short-term international capital on developing countries with rapid economic growth has become increasingly evident. Capital inflow plays a positive role in alleviating the shortage of funds, activating the financial markets, promoting the reform of the financial system and optimizing the allocation of resources. However, foreign capital flows into China through trade mis-invoicing and underground banks during the gradual liberalization of China’s capital account. China’s inelastic managed floating exchange rate regime leads to a strong expectation of Renminbi appreciation. Profit-driven capital with high liquidity cannot arbitrage in a short time in China, so it flows into banks, stock market and real estate market, which may disrupt steady economic operation and weaken the effectiveness of monetary policy. Therefore, hidden short-term capital flows have become a huge risk to China and its scale calculation and impact on economy worth researching.

Data and Empirical Analysis

Independent variable of this paper is the net flow of hidden short-term international capital (SCF). Dependent variables are China’s gross domestic product (GDP), Shanghai composite index (SZ), money supply (M2) and RMB exchange rate (ER), which respectively represent economic growth, stock market performance, monetary policy effectiveness and upward pressure on RMB.

Among the data across 44 quarters from 2004 to 2014, foreign exchange reserve, current account surplus, foreign direct investment, tourism revenue and other investment gains are collected from Balance of Payment (BPM5) published by SAFE; foreign debt, Shanghai composite index are obtained from Wind database; GDP and M2 are downloaded from China’s National Bureau of Statistics; RMB exchange rate sources from People’s Bank of China.

Scale Calculation of Hidden Short-term International Capital Net Flow

The foreign debts increase (FD) and foreign direct investment (FDI) are considered as the total capital inflows of a country, which is the source of capital; while foreign reserve assets increase (FRA) and current account deficits (CAD) are considered as the total capital outflows, which is the use of capital. Theoretically, the amount of capital source and capital use should be equal when transactions are legal, open and transparent, but the amounts usually do not equal, which indicates the existence of hidden capital flows. Therefore, the net flow of hidden capital can be calculated by the total capital outflows minus the total capital inflows. Among them, tourism revenue (TR) and other investment
gains (OIG) should not be included in the abnormal short-term capital inflow, which are deducted from the capital inflow. The formula is as follows:

Hidden short-term capital net flow = (FRA + CAD) – (FD + FDI – TR - OIG). (1)

Augmented Dickey-Fuller Test

Table 1. ADF Test Results.

| Variables | t-Statistics | Critical Value | p - Value | Stationarity |
|-----------|--------------|----------------|-----------|--------------|
|           |              | 1% Sig.        | 5% Sig.   | 10% Sig.     |               |
| SCF       | -0.180       | -3.606         | -2.937    | -2.607       | 0.9329 Unstable |
| D SCF     | -8.936       | -3.606         | -2.937    | -2.607       | 0.0000 Stable  |
| GDP       | 0.703        | -3.616         | -2.941    | -2.609       | 0.9907 Unstable |
| D GDP     | -2.956       | -3.616         | -2.941    | -2.609       | 0.0483 Stable  |
| SZ        | -2.895       | -3.597         | -2.933    | -2.605       | 0.0544 Unstable |
| D SZ      | -4.542       | -3.610         | -2.939    | -2.608       | 0.0008 Stable  |
| ER        | -1.373       | -3.600         | -2.933    | -2.605       | 0.5862 Unstable |
| D ER      | -3.341       | -3.600         | -2.933    | -2.605       | 0.0191 Stable  |
| M2        | -1.287       | -3.621         | -2.943    | -2.610       | 0.6254 Unstable |
| D M2      | -4.04        | -3.621         | -2.943    | -2.610       | 0.0033 Stable  |

As shown in Table 1, original values of variables are not stable, while the first difference of independent and dependent variables (D SCF, D GDP, D SZ, D ER, D M2) are tested stable, which meets the premise of Johansen Cointegration Test.

Johansen Cointegration Test

Table 2. Multicollinearity Test Results.

|             | D SCF | D GDP     | D ER       | D SZ       | D M2       |
|-------------|-------|-----------|------------|------------|------------|
| D SCF       | 1.000000 | -0.699809 | -0.033086  | -0.123626  | 0.336605   |
| D GDP       | -0.699809 | 1.000000  | -0.122168  | 0.077662   | -0.275473  |
| D ER        | -0.033086 | -0.122168 | 1.000000   | 0.247761   | 0.019955   |
| D SZ        | -0.123626 | 0.077662  | 0.247761   | 1.000000   | 0.089283   |
| D M2        | 0.336605  | -0.275473 | 0.019955   | 0.089283   | 1.000000   |

As shown in Table 2, there is no collinearity between D SCF and other first difference of dependent variables except that the correlation coefficient between D SCF and D GDP is a little bit higher. Before we test whether there is a stable long-term relationship between variables, we need to determine the optimal lags first.

Table 3. Lags Results.

| Lag | LogL   | LR      | FPE     | AIC     | SC      | HQ      |
|-----|--------|---------|---------|---------|---------|---------|
| 0   | -1373.193 | NA      | 2.19e+25 | 72.53648 | 72.75196 | 72.61315 |
| 1   | -1331.545 | 70.14455 | 9.23e+24 | 71.66026 | 72.95309 | 72.12024 |
| 2   | -1289.017 | 60.43442 | 3.94e+24 | 70.73773 | 73.10793 | 71.58103 |
| 3   | -1250.176 | 44.97399 | 2.31e+24 | 70.00925 | 73.45680 | 71.23586 |
| 4   | -1169.544 | 72.14385* | 1.87e+23* | 67.08129 | 71.60619* | 68.69121 |
| 5   | -1132.418 | 23.44821 | 2.28e+23 | 66.44306* | 72.04533 | 68.43630* |
Based on AIC and SC criterion, SC value reaches its minimum in fourth lags, and AIC value declines showly after fourth lags, so we set the optimal lags as 4 for both Johansen cointegration test and VECM analysis.

Table 4. Cointegration Rank Test Results.

| Hypothesized No. of CE(s) | Max-Eigen Eigenvalue | Statistic  | Critical Value | Prob.* * |
|---------------------------|----------------------|------------|----------------|----------|
| None                      | 0.793666             | 63.13041   | 33.87687       | 0.0000   |
| At most 1                 | 0.553410             | 32.24461   | 27.58434       | 0.0117   |
| At most 2                 | 0.354471             | 17.50742   | 21.13162       | 0.1494   |
| At most 3                 | 0.254176             | 11.73065   | 14.26460       | 0.1212   |
| At most 4                 | 0.050228             | 2.061322   | 3.841466       | 0.1511   |

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

Table 4 shows that the test results reject the hypothesis that there is at most 1 cointegrating equation, which means cointegration relationship exists between variables.

Table 5. Cointegrating Equations Results.

| Cointegrating Eq: | CointEq1 |
|-------------------|----------|
| SCF(-1)           | 1.000000 |
| GDP(-1)           | 0.065580 (0.01209) [ 5.42296] |
| ER(-1)            | 6093.247 (923.673) [ 6.59676] |
| SZ(-1)            | 0.965062 (0.23250) [ 4.15078] |
| M2(-1)            | 0.283456 (0.03474) [ 8.16024] |
| C                 | -57468.36 |

Summing from Table 5, we obtain a cointegrating equation (refered as CointEq1):

CointEq1: \( SCF = -0.066 \times GDP - 6093.247 \times ER - 0.965 \times SZ - 0.283 \times M2 + 57468.36 \) (2)
VECM Regression Analysis

Table 6. VECM Regression Results.

| Error Correction: | D(SCF)       | D(GDP)       | D(ER)         | D(SZ)         | D(M2)         |
|------------------|--------------|--------------|---------------|---------------|---------------|
|                  | (0.11016)    | (1.839245)   | (1.23E-06)    | (-2.16586)    | (1.56960)     |
| CointEq1         | [-0.60924]   | [0.78694]    | [1.1E-05]     | [-0.8596]     | [-6.09703]    |
|                  | [-2.0.1783]  | [2.33720]    | [0.77753]     | [-2.51951]    |               |
| D(SCF(-1))       | -0.483532    | -1.344021    | 9.74E-06      | 0.577346      | 6.202871      |
|                  | (0.23963)    | (1.71189)    | (2.3E-05)     | (0.18700)     | (3.41447)     |
|                  | [-2.0.1783]  | [-0.78511]   | [0.42287]     | [3.08736]     | [1.81664]     |
| D(SCF(-2))       | -0.395096    | 0.183949     | 4.70E-06      | 0.444857      | 4.005334      |
|                  | (0.24094)    | (1.72124)    | (2.3E-05)     | (0.18802)     | (3.43312)     |
|                  | [-1.63982]   | [0.10687]    | [0.20288]     | [2.36395]     | [1.16667]     |
| D(SCF(-3))       | 0.016772     | -0.956500    | 2.26E-06      | 0.052998      | 1.017249      |
|                  | (0.02583)    | (0.18450)    | (2.5E-06)     | (0.02015)     | (0.36800)     |
|                  | [0.64942]    | [-5.18429]   | [0.91047]     | [2.62960]     | [2.76430]     |
| D(GDP(-1))       | 0.0110847    | -0.745678    | 3.93E-06      | 0.019638      | 1.610852      |
|                  | (0.02514)    | (0.17961)    | (2.4E-06)     | (0.01962)     | (0.35824)     |
|                  | [0.43142]    | [-4.15170]   | [1.62697]     | [1.00091]     | [4.49654]     |
| D(GDP(-2))       | 0.021708     | -0.800235    | 1.78E-06      | -0.029716     | 0.613137      |
|                  | (0.01995)    | (0.14252)    | (1.9E-06)     | (0.01557)     | (0.28427)     |
|                  | [1.0889]     | [-5.61484]   | [0.92729]     | [1.90871]     | [2.15690]     |
| D(GDP(-3))       | -2.073.490   | -1913.68     | 0.328915      | 5186.227      | 4918.916      |
|                  | (2449.73)    | (17500.6)    | (0.23552)     | (1911.72)     | (34906.0)     |
|                  | [-0.84642]   | [-1.09349]   | [1.39656]     | [2.71285]     | [1.40915]     |
| D(ER(-1))        | 1240.713     | -6297.603    | 0.354391      | 2851.117      | 67005.86      |
|                  | (1994.64)    | (1424.95)    | (0.19177)     | (1556.58)     | (28421.5)     |
|                  | [0.62202]    | [-0.44195]   | [1.84805]     | [1.83165]     | [2.35758]     |
| D(ER(-2))        | 0.231287     | -2.247839    | -8.10E-06     | 0.598216      | 8.244013      |
|                  | (0.22514)    | (1.60835)    | (2.2E-05)     | (0.17569)     | (3.20794)     |
|                  | [1.02733]    | [-1.39761]   | [-0.37445]    | [3.40492]     | [2.56988]     |
| D(SZ(-1))        | 0.088040     | -2.391770    | -7.44E-05     | -0.147625     | 3.232600      |
|                  | (0.23648)    | (1.68940)    | (2.3E-05)     | (0.18455)     | (3.36962)     |
|                  | [-0.37229]   | [-1.41575]   | [-3.27039]    | [-0.79993]    | [0.95934]     |
| D(SZ(-2))        | -0.300850    | 0.244096     | -1.70E-05     | 0.799737      | 10.04078      |
|                  | (0.31345)    | (2.23926)    | (3.0E-05)     | (0.24461)     | (4.46633)     |
|                  | [-0.95980]   | [0.10901]    | [-0.56287]    | [3.26943]     | [2.24811]     |
| D(M2(-1))        | 0.013034     | -0.444413    | -1.92E-06     | 0.054844      | 1.301986      |
|                  | (0.02651)    | (0.18396)    | (2.5E-06)     | (0.02069)     | (0.37769)     |
|                  | [0.49174]    | [-2.34691]   | [-0.75218]    | [2.65133]     | [3.44722]     |
| D(M2(-2))        | -0.009278    | -0.251288    | 1.05E-07      | 0.050710      | 0.891677      |
|                  | (0.02233)    | (0.15950)    | (2.1E-06)     | (0.01742)     | (0.31814)     |
|                  | [-0.13338]   | [-1.57543]   | [0.04894]     | [2.91041]     | [2.80278]     |
| D(M2(-3))        | 0.003245     | -0.081289    | 7.82E-07      | 0.024829      | 0.481858      |
|                  | (0.01215)    | (0.08681)    | (1.2E-06)     | (0.00948)     | (0.17315)     |
|                  | [0.26705]    | [-0.93639]   | [0.66925]     | [2.61829]     | [2.78291]     |
| C                | -250.9671    | 9112.940     | -0.051077     | 190.1119      | -3567.704     |
|                  | (182.692)    | (1305.13)    | (0.01756)     | (142.570)     | (2603.17)     |
|                  | [-1.3737]    | [6.98237]    | [-2.90806]    | [1.33347]     | [-1.37052]    |

R-squared 0.702875 0.931919 0.661140 0.646091 0.910295
As degree of freedom is 43, the critical value is 1.681, we emphasized the significant coefficients in italic. Therefore, we obtain the regression equations as below:

\[
D\ GDP = 1.839 \times CointEq1 - 0.957 \times D\ GDP(-1) - 0.746 \times D\ GDP(-2) - 0.8 \times D\ GDP(-3) + 0.444 \times D\ M2(-1) + 9112.94. \tag{3}
\]

\[
D\ ER = 0.354 \times D\ ER(-2) - 7.43e-05 \times D\ SZ(-2) - 0.051. \tag{4}
\]

\[
D\ SZ = -0.217 \times CointEq1 + 0.577 \times D\ SCF(-1) + 0.445 \times D\ SCF(-2) + 0.053 \times D\ GDP(-1) - 0.03 \times D\ GDP(-3) + 5186.227 \times D\ ER(-1) + 2851.117 \times D\ ER(-2) + 0.598 \times D\ SZ(-1) + 0.8 \times D\ SZ(-3) + 0.055 \times D\ M2(-1) + 0.05 \times D\ M2(-2) + 0.025 \times D\ M2(-3). \tag{5}
\]

\[
D\ M2 = -9.57 \times CointEq1 + 6.2 \times D\ SCF(-1) + 1.017 \times D\ GDP(-1) + 1.61 \times D\ GDP(-2) + 0.613 \times D\ GDP(-3) + 67005.86 \times D\ ER(-2) + 8.244 \times D\ SZ(-1) + 10.04 \times D\ SZ(-3) + 1.302 \times D\ M2(-1) + 0.892 \times D\ M2(-2) + 0.482 \times D\ M2(-3). \tag{6}
\]

**Granger Causality Test**

| Null Hypothesis | Obs | F-Statistic | Prob. |
|-----------------|-----|-------------|-------|
| DGDP does not Granger Cause DSCF | 40 | 6.97202 | 0.0028 |
| DSCF does not Granger Cause DGDP | 5.18884 | 0.0105 |
| DER does not Granger Cause DSCF | 40 | 0.06919 | 0.9760 |
| DSCF does not Granger Cause DER | 0.51163 | 0.6771 |
| DSZ does not Granger Cause DSCF | 40 | 0.86509 | 0.4689 |
| DSCF does not Granger Cause DSZ | 0.37251 | 0.7734 |
| DM2 does not Granger Cause DSCF | 40 | 1.52369 | 0.2266 |
| DSCF does not Granger Cause DM2 | 2.53330 | 0.0738 |

As shown in Table 7, in the order of time, D SCF and D GDP are Granger causes of each other and D SCF is Granger cause of D M2.

**Impulse Response Analysis**

Figure 1 shows that the response of GDP to SCF is negative at first, and then fluctuates more and more intensively; exchange rate response is positive only in the third quarter and negative in
remaining quarters; stock market responses intensively at the beginning but tends to be stable; M2 response also fluctuates in a wide range.

Summary

Due to the speculative nature and complexity of hidden short-term international capital, net flow of hidden capital in different lags has different impact on the economic indicators. Long-term stable relationship exists between hidden capital and China’s economy measured by GDP, Shanghai Composite Index, exchange rate and money supply. As the coefficients of the cointegrating equation are all negative, it means, in the long run, hidden short-term international capital flows may inhibit the healthy development of China’s economy and stock market, increase upward pressure of RMB and weaken the effectiveness of monetary policies. In chronological order, the impact of hidden short-term capital on dependent variables does not show any obvious trend and will fluctuate in five years, which further illustrates the uncertainty and uncontrollability of hidden short-term capital.

As an emerging market with vast opportunities, China has been favored by short-term international capital for the purpose of speculative arbitrage since the late 20th century. While enjoying the benefits brought by capital inflows, China should also defend from its dangers. Under the current exchange rate regime in China, the massive inflows of foreign capital forces PBOC to increase money supply passively, contrary to China’s prudent monetary policy, which will greatly weaken the effectiveness and independence of China’s monetary policy. Profit-driven capital rushes into stock and real estate market, raising assets prices and expanding market bubbles. Once the speculative capital finished their arbitrage, its withdraw will prompt a burst of bubbles, causing serious market turmoil and threaten China’s financial security. Therefore, we put forward the following policy recommendations: Firstly, relevant administrations should focus on supervising short-term foreign capital flow through illegal channels; Secondly, financial institutions should establish an early warning mechanism which can be alerted by some indicators, such as asset price index and M2/GDP, then outliers will trigger risk management; Thirdly, government should guide capital to invest in high-technology industry and prevent market bubbles expanding through taxation policies, administrative or legal means; Finally, China can maintain the existing exchange rate regime and open its capital account in a steady and orderly manner to minimize the negative impact of foreign capital on the immature financial system.

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