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The Impact of Short-term and Long-term International Capital Flows on Economic Growth

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Abstract: With the rapid growth of foreign direct investment (FDI) in the world, FDI plays an increasingly important role than the trade in the process of economic globalization and integration. However, the effect of international capital on economic growth is ambiguous. Moderate foreign capital inflow can solve the problem of insufficient funds in the real economy and promote the development of the virtual economy as well. Empirical analyses have shown that the impact of long-term international capital flows on economic growth is more favorable and long-lasting, but the rapid pace of short-term international capital flows has an unstable impact on a country's economy. This study explores the impact of China's long-term and short-term international capital flows on GDP since 1971, and the results show that both long-term and short-term international capital flows could benefit economic growth before 2011. Although short-term international capital flew out rapidly after 2012, it did not reduce the steady growth trend of China's economy.

Keywords: International Capital Flows, Foreign Direct Investment, Short-term and Long-term International Capital Flows

1. Introduction

Foreign investment can fill a gap between domestic investment and savings as well as the foreign reserve gap between imports and exports, which has an impact on economic development. Neoclassical theories believe that the main factors that determine long-term economic growth are technological progress, while foreign investment can promote economic growth by promoting production technology. The Endogenous Growth Model emphasizes the role of technology diffusion in the economic growth of small countries and developing countries. The model holds that foreign direct investment (FDI) as a combination of factors of production, a capital factor drives a direct effect on the gross domestic product (GDP), and as a technical factor permits an indirect effect on GDP, while at the same time as a collection factor affects net exports and promotes GDP growth. Under the influence of the theory of Endogenous Growth based on technological progress, researchers have begun to focus on the spillover effects of FDI neglected by the traditional "double gap" model to a greater extent.

The impact of FDI on economic growth has been widely debated, with many economists even holding a negative attitude. As far as China's economic situation is concerned, most economists still give a positive and confident answer to this question (Gu *et al.*, 2008; Whalley & Xin, 2010; Nourbakhshian, 2012). Hu (2003) confirmed the inflow of FDI on Beijing's economic growth, import and export trade, and fixed asset investment has a positive impact. However, Beijing's stock of FDI limited the role of FDI to the overall Beijing economy. Fan *et al.* (2010) tested the economic growth of FDI in Sichuan Province, and the result showed that the capital remediation effect of FDI was not obvious with only 0.2098% of the contribution to economic growth. This is because Sichuan Province, as an inland province, attracts a limited amount of FDI that restrains the capital remediation effect on economic growth.

By building an extended Solow-Swan model, Liu and Zhang (2018) conducted an empirical study of the contribution of FDI to Chongqing's economic growth from 1990 to 2016. It was found that the output elasticity of FDI was only 0.024, which was much lower than that of labor input (0.968) and domestic capital input (0.621). At the same time, FDI's real average contribution to GDP was only 1%, which is also well below the level of domestic capital contribution (11%), indicating that the fundamental driving force of Chongqing's economic growth was domestic capital accumulation, while FDI's contribution was generally small.

Li and Hu (2010) applied panel data of six central provinces to establish a model of FDI, human capital, and economic growth. The study found that the six central provinces have not yet embarked on the path of endogenous growth and the effect of human capital stock to promote economic growth has not yet appeared. The introduction of FDI in six provinces has not played a role in

promoting the growth of human capital in the provinces, and the exertion of the spillover effect of FDI technology has been restricted by the poor human capital situation in the six provinces.

International capital flows are one-way, two-way, or multi-directional transfers of capital between countries. In addition to the different geographical impacts, the duration of FDI is one of the factors affecting the contribution of FDI to economic growth. International capital is usually bounded by one year and divided into long-term international capital and short-term international capital. Because of the different forms and duration of international capital flows, the impact on capital inflow countries is different, sometimes even the opposite. Usually developing countries are characterised by capital scarcity and hence resort to stringent trade and capital control policies. As a result, scarce capital might move across the borders illegally and traders might under-report export and over-report import to send the capital abroad. Households in the less financially developed country will use the financial system in the more developed country to transform their savings into productive investment (von Hagen and Zhang, 2014). Biswas et al. (2021) analyze the differences between bilateral FDI and trade data reported by the US and by China for the period from 1983 to 2017 to prove the existence of hidden capital flows that hidden capital flows occur in both directions: from China to the US through the trade channel and from the US to China through the FDI channel.

As China's economy becomes increasingly integrated into the global economy and the Chinese government gradually liberalizes its capital account, the issue of international capital flows in China has attracted increasing attention. Yu & Chen (2010) have developed a two-sector model, including both foreign-funded sector and domestic-funded sector to estimate the externalities between the two sectors. Their results suggested that foreign capital contributed positively to China's economic growth during 1993 and 2007 and guided the flow direction of domestic capital as well as the formation of social capital. Short-term international capital flows (SCF) are of particular interest, in addition to medium- and long-term international capital flows such as FDI and medium- and long-term external debt. The reason is that SCF is generally considered to be highly volatile, have large changes in the size of flows, and are prone to reversal of the direction of flows, which has significant negative impacts on a country's real economy and financial markets.

Speculative funds in short-term international capital are often referred to as "Hot money". Hot money also refers to large-scale short-term international capital flows by capital holders out of speculative psychology of expected devaluation (or appreciation) of currencies or stimulation by the fact that international spread yields are significantly higher than exchange rate risks and held in the money market by speculators with a high degree of liquidity and volatility. Whether it is net capital flows, net long-term capital flows, or short-term net capital flows, the macroeconomic impact has commonality. The increase in net capital inflows/outflows leads to nominal exchange rate appreciation/depreciation, increases inflation, and thus affects the development of the domestic economy. It is worth noting that the impact of SCF on the macro-economy is stronger than that of long-term net capital flows, which means that high attention should be paid to the risks that short-term international capital poses to China's macroeconomic stability (Zhou & Zhu, 2017).

Based on nearly half a century of data from 1971 to 2019, this paper studies the impact of short-term and long-term international capital inflows on China's economic output over different periods. The remainder of this paper is organized as follows. In section 2, we explain our data and methodology. Sections 3 and 4 present the characteristics of short and long run capital flows and discuss the results and observations by employing the VAR models. Finally, section 5 concludes.

2. Materials and Methods

An important reason for the international transfer of capital is that the profit from capital exports outweighs that at home. In the context of global economic integration, prospective economic development and increasing win-win strategy of opening-up policies in China have attracted a large number of international capital inflows. There are, in general, three more mature methods to calculate SCF, namely, direct, indirect, and hybrid.

Direct method refers to the method of obtaining the scale of SCF by directly adding up several items in a country's balance of payments (Cuddington, 1986), which is calculated as "SCF = errors and omissions (inflows) + short-term capital inflows from the private non-banking sector"¹. The indirect method, also known as the "Residual Method", refers to the method of obtaining the scale of SCF by subtracting several items from a country's balance of payment increment of foreign exchange reserves (World Bank, 1985) and is calculated as "SCF = foreign exchange reserve increments - current account surpluses - FDI net inflows - external

¹ Kant (1996) extended the direct method and proposed three formula. Formula 1 is "SCF I = errors and omissions (inflows) + other asset inflows in other short-term capital projects in other sectors"; Formula 2 is "SCF II = errors and omissions (inflows) + other short-term capital inflows in other sectors", and Formula 2 is essentially equivalent to the Cuddington formula; Formula 3 is "SCF III = SCF II + bond investment inflow + equity investment inflow".

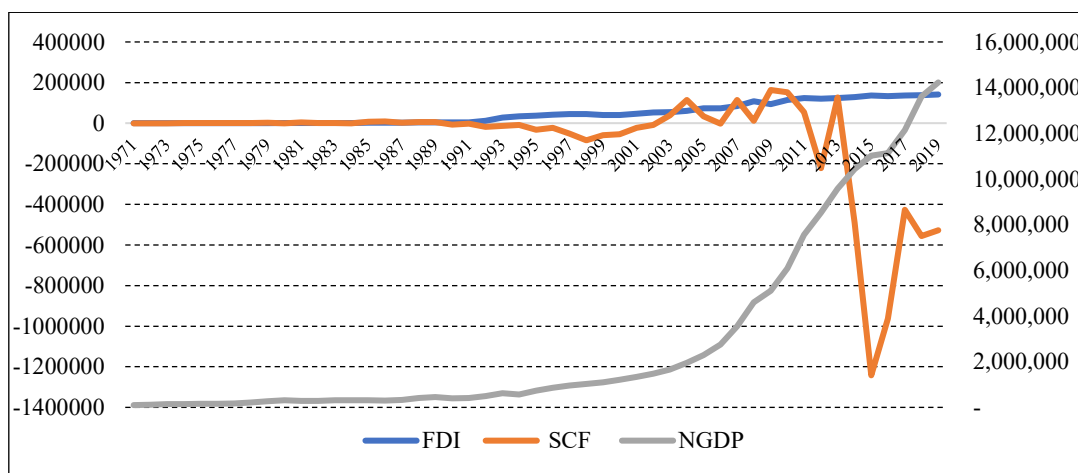
debt increments”². The hybrid method is essentially a combination of the direct and indirect methods (Dooley, 1986), and calculated as “SCF = errors and omissions (inflows) - the increase in external claims of domestic residents other than FDI - the difference between the increase in debt obtained by World Debt Table and the increase in external debt in the country’s balance of payments table + the number of external claims generating average international returns”.

The above three methods are different in statistical methods and have advantages and disadvantages. Generally speaking, the SCF calculated by the direct method is the smallest in scale, while that by the indirect method is the largest. The result of the hybrid method is between that of the two methods. Therefore, the direct method estimate can be used as the lower limit of SCF and the indirect method estimate as the upper limit of SCF (Yang and Chen, 2000). In this study, FDI represents long-term international capital flows, and the residual method is used to estimate the situation of short-term international capital flows (SCF) as follows.

$$SCF = \text{changes in foreign reserves} - \text{current account surplus} - FDI \tag{1}$$

The flow of long-term international capital in China is generally reflected in net inflows with strong inflows of FDI as the main form showing a trend of sustained growth (Fig. 1). China’s FDI inflows of only US\$57 million in 1980 have since developed rapidly, reaching US\$27.515 billion in 1993. In 2002, under the influence of China’s accession to the WTO, the inflow of international capital investment surged to US\$52.743 billion. International capital inflows, which have declined significantly since 2008 as a result of the global financial crisis, began to rebound rapidly in 2010, to US\$124 billion in 2011. The growth has slowed since 2012 but reached around US\$140 billion in recent years.

The SCF defined in this study mainly refers to the short-term non-FDI international capital, which contains international capital with speculative nature. Unlike a stable situation of FDI, SCF varies widely. Before 1991, China’s SCFs were very small, and since then they have expanded to show a net outflow overall. The SCFs had rapid and large-scale net inflows in 2003 and 2004 and a rapid increase in net outflows after 2005. After the economic crisis in 2008, SCF entered in large quantities in its profit-seeking characteristics. In terms of total volume, China’s SCF is smaller than FDI before 2011, indicating a more stringent capital inflow control in China and the size of SCF is limited to a small range.



Data sources: United Nations Conference on Trade and Development; International Monetary Foundation.

Fig. 1. The short-term and long-term international capital flow in China (1971~2019).

3. Short and Long-run Capital Flows

According to the different characteristics of FDI and SCF, this study distinguishes the impact of the two on China’s economic growth. In order to improve the accuracy of the conclusions, exchange and inflation rates are introduced to analyze the interrelation

² Morgan Guaranty Trust Company (1986) has improved this approach to include “SCF = foreign exchange reserve increments - current account surplus - FDI net inflows - increases in external debt - increases in commercial banks’ overseas net assets”. Cline (1987) revised Morgan Guaranty Trust Company’s method and the specific formula is “SCF = foreign exchange reserve increments - current account surplus - FDI net inflows - foreign debt inflows - commercial banks overseas net assets increase - stay abroad overseas asset re-investment income - other investment income - tourism income.”

between economic growth (GDP), long-term international capital flows (FDI), short-term international capital flows (SCF), exchange rates (ROE), and inflation rates (CPI).

Due to the relationship between the variables applied in this study, the linear regression method usually cannot make an effective estimate of the causal relationship between variables. The unlimited vector autoregression model (VAR) is used to test and analyze, and the VAR model is established as

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 Y_{t-2} + \dots + \alpha_p Y_{t-p} + \varepsilon_t \quad t = 1, \dots, T \quad (2)$$

where $Y_t = (GDP, FDI, SCF, ROE, CPI)$. Since the VAR model requires the system to be stable, the ADF stability of each variable is tested first followed by the Johansen cointegration test method for the long-term cointegrated relationship between the variables. Finally, the impulse response effect is analyzed.

3.1. Stability Tests

The EViews 10.0 software is used to carry out a stability test on the dependent and independent variables for unit root tests. By observing the line chart, all variables have intercept items that are included in Augmented Dickey-Fuller (ADF) test forms. The lag length is automatically determined according to the AIC/SC information guidelines (Table 1). Tests for unit root are in the 1st difference for all variables as the I(1) process, i.e. the corresponding first-order differential values for most variables are obtained from a smooth process.

Table 1. Stability test results for variables. Tests for unit root are in the 1st difference for all variables as the I(1) process, i.e. the corresponding first-order differential values for most variables are obtained from a smooth process.

Variables	Difference	Test form (C, T, K)	ADF	5% level	1% level	Result
GDP	0	(C, 0, 2)	1.9313	-2.9266	-3.5812	Not stable
FDI	0	(C, 0, 0)	1.1980	-2.9238	-3.5744	Not stable
SCF	0	(C, 0, 1)	-2.4575	-2.9252	-3.5777	Not stable
ROE	0	(C, 0, 1)	-1.3765	-2.9252	-3.5777	Not stable
CPI	0	(C, 0, 2)	-0.2533	-2.9266	-3.5812	Not stable
Δ GDP	1	(C, 1, 0)	-3.7761	-3.5085	-4.1658	Stable
Δ FDI	1	(C, 0, 0)	-7.4615	-2.9252	-3.5777	Stable
Δ SCF	1	(C, 0, 0)	-6.6677	-2.9252	-3.5777	Stable
Δ ROE	1	(C, 0, 0)	-3.7246	-2.9252	-3.5777	Stable
Δ CPI	1	(C, 0, 0)	-4.5157	-2.9252	-3.5777	Stable

3.2. Co-integration Tests

Co-integration exists when two variables follow the time-series process of the dependent variable. Unit root tests show that all variables follow I(1) process, and the Johansen co-integration tests of trace statistic and maximum Eigen statistic are applied in this study. The results are illustrated in Table 2 and demonstrate that there are at least two co-integrated relationships between the five variables. The unit root test of non-equilibrium error is carried out at the same time that the obedience to I(0) process is stable, which further confirms the existence of a co-integration relationship in the sequence.

Table 2. Johansen co-integration results for variables demonstrate that there are at least two co-integrated relationships between the five variables. The unit root test of non-equilibrium error is carried out at the same time that the obedience to I(0) process is stable, which further confirms the existence of a co-integration relationship in the sequence.

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None*	0.5732	97.8088	69.8189	0.0001
At most 1*	0.5036	57.7884	47.8561	0.0045
At most 2	0.2891	24.8674	29.7971	0.1662
At most 3	0.1380	8.8298	15.4947	0.3814
At most 4	0.0386	1.8479	3.8415	0.1740

Trace test indicates 2 cointegrating equations at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level; ** MacKinnon-Haug-Michelis (1999) p-values

3.3. Granger's Causality Tests

The co-integration tests demonstrate a long-term equilibrium relationship between GDP, FDI, SCF, ROE, and CPI. Granger's causality tests are necessary to further verify the relationship between the causes and effects. Table 3 validates that the causality exists for FDI and SCF in one to three lagged periods. However, Granger causality tests do not include ROE and CPI for all lagged periods. The results suggest that FDI and SCF affect GDP, while the impact of exchange rates (ROE) and inflation rates (CPI) on GDP is uncertain.

Unit root tests and co-integration tests prove the existence of co-integration relationship among non-stable variables in this study followed by the Granger causality tests for the demonstration of causes and effects. The causality equation can be expressed as:

$$GDP = 56.8205FDI - 4.4960SCF - 275,770.8ROE + 3,158.474CPI \quad (3)$$

The equation demonstrates that there is a positive correlation between long-term international capital and economic growth, while there is a negative correlation between short-term international capital and economic growth, but the impact is relatively small.

Table 3. Granger causality tests. The equation demonstrates that there is a positive correlation between long-term international capital and economic growth, while there is a negative correlation between short-term international capital and economic growth, but the impact is relatively small.

Null Hypothesis	Lags to include	F-Statistic	Prob.	Result
FDI does not Granger Cause GDP	1	17.7915	0.0001	Reject
SCF does not Granger Cause GDP		38.9708	0.0000	Reject
ROE does not Granger Cause GDP		3.0908	0.0855	Not Reject
CPI does not Granger Cause GDP		0.0477	0.8281	Not Reject
FDI does not Granger Cause GDP	2	5.6363	0.0068	Reject
SCF does not Granger Cause GDP		13.2876	0.0000	Reject
ROE does not Granger Cause GDP		0.9174	0.4074	Not Reject
CPI does not Granger Cause GDP		0.0998	0.9052	Not Reject
FDI does not Granger Cause GDP	3	5.6300	0.0026	Reject
SCF does not Granger Cause GDP		10.6685	0.0000	Reject
ROE does not Granger Cause GDP		0.7165	0.5482	Not Reject
CPI does not Granger Cause GDP		0.1384	0.9365	Not Reject

3.4. Analysis of Impulse Response Effect

The impulse response function is used to measure the system's response to a variable. Only the effects of FDI and SCF on NGDP are observed (Fig. 2). The results of the impulse show that short-term international capital has a positive impact on economic growth during the initial periods with sustained stability over time. Its effect has weakened by the 10th phase but still has a positive impact on the economy. The role of long-term international capital in promoting economic growth appears weak in the initial stage and began to expand after phase 3 with a long-term and sustained effect. In terms of the magnitude of change, economic growth is more sensitive to long-term changes in international capital and reflected more strongly after impact. The result is consistent with

the finding of Zhao and Ban (2011) that export trade and FDI has the effect for improving the economic growth of Henan with their impulse and positive response to economic growth, although the export played an important improving role to economic growth than FDI in Henan.

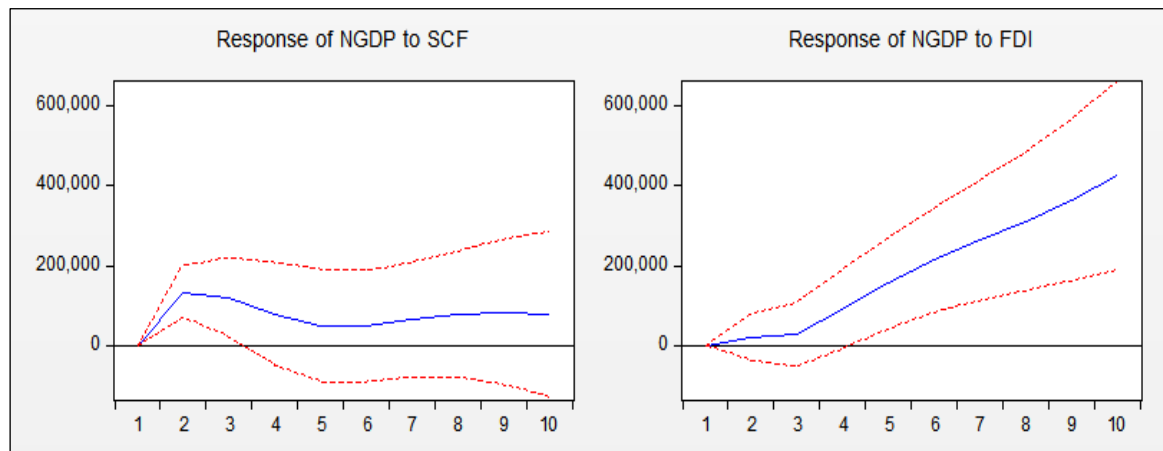


Fig. 2. Impulse response of NGDP to SCF and FDI. The results of the impulse show that short-term international capital has a positive impact on economic growth during the initial periods with sustained stability over time. Its effect has weakened by the 10th phase but still has a positive impact on the economy. The role of long-term international capital in promoting economic growth appears weak in the initial stage and began to expand after phase 3 with a long-term and sustained effect. In terms of the magnitude of change, economic growth is more sensitive to long-term changes in international capital and reflected more strongly after impact.

4. Empirical Results

The model results are presented in Table 4 where Model 1 reveals the initial regression results including all independent variables. The Chow breakpoint test is further applied regarding the possible impact of FDI in 1992 and SCF in 2002 on China's GDP. Two dummy variables (DUM_1 and DUM_2) are introduced, and the Stepwise Least Squares method is applied for plausible model results.

The regression results of Model 2 show that one-period lag is positively related to current GDP. In fact, the lagged GDP is an important indicator of capital stock and is positively related to the productivity level of the economy. The one-period lagged GDP contributes to nearly 99% of current production. FDI in this model indicates a positive impact on GDP, representing a one-unit increase in FDI results in three-unit increases in GDP. Coupled with 0.5942 unit increases in GDP caused by one-unit increase in SCF, the model demonstrates a plausible effect of international capital inflows on GDP.

Model 3 presents estimation results allowing two dummy variables for structural change. The Chow breaking tests and t-statistics of intercepts for DUM_1 and DUM_2 in this model demonstrate the feasibility of variables setting. The one-period lagged GDP contributes to nearly 93.48% of current production, slightly lower than that in Model 2. FDI in this model also indicates a one-unit increase in FDI results in 2.48 unit increases in GDP before 1992, while 16 unit increases in GDP after 1993. This is nearly 6.5 times higher by the impact of FDI on GDP before 1992. Contradictory to previous studies in China, this result reveals an increasing impact of long-term international capital flows on the economic growth of China. The negative impact of SCF on GDP before 2012 indicates a decrease of GDP by 0.8675 units when SCF increases by 1 unit. The positive impact of SCF on GDP after 2013, however, indicates an increase of GDP by 0.55 (1.4214–0.8675) units when SCF increases by 1 unit. The variation of the impact of short-term international capital flows to GDP confirms previous studies (Zhang, 2017; Zhang, 2020; Jiang, 2020) that SCF fluctuates wildly and shows a large outflow after 2012, and the symmetrical outflow significantly affects gross domestic output in China.

Table 4. Empirical results of international capital flows to economic growth. The Chow breakpoint test is further applied regarding the possible impact of FDI in 1992 and SCF in 2002 on China's GDP. Two dummy variables (DUM₁ and DUM₂) are introduced, and the Stepwise Least Squares method is applied for plausible model results.

Variables	Model 1	Model 2	Model 3
C	-4,086,747	-511,556.1	-112,623.3
(t-statistic)	(-7.4811)	(-3.4606)**	(-0.6508)
DUM ₁			-670,021.1
			(-4.0764)**
DUM ₂			-6,498,762
			(-3.2577)**
GDP _{t-1}		0.9894	0.9348
		(34.6490)**	(27.5156)**
FDI	2.7182	3.0487	2.4820
	(0.1734)	(1.0417)	(0.3651)
DUM ₁ ×FDI			13.6594
			(2.0051)*
SCF	-2.8463	0.5942	-0.8675
	(-4.5506)**	(3.9330)**	(-1.4259)
DUM ₂ ×SCF			1.4214
			(2.2460)*
ROE	-6,950,090	-577,533.3	-361,319.5
	(-2.6200)*	(-1.0747)	(-0.7374)
CPI	143,713.4	14,975.49	5,958.73
	(4.9124)	(2.2165)*	(0.9339)
DUM ₂ ×CPI			65,092.61
			(3.1541)**
R ²	0.9562	0.9986	0.9992
\bar{R}^2	0.9522	0.9984	0.9989
D-W	0.5590	2.0730	1.9142
Chow test ^a	0.0072**/0.0000**	0.3012/0.0000**	

^a The Chow breakpoint test is implemented at the breakpoint of year 1992 (DUM₁) and 2012 (DUM₂), respectively

* denotes rejection of the hypothesis at the 0.05 level; ** denotes rejection of the hypothesis at the 0.01 level.

5. The Impact of International Capital Flows on Economy

Moderate international capital inflow can solve the problem of insufficient funds in the real economy and promote economic development. Empirical analysis shows that the impact of long-term international capital flows on economic growth is more favorable and lasting, but the short-term international capital flows are fast and have different impacts on a country's economy. The influx of international capital leads to the extraordinary growth of the base currency, a sharp expansion of the money supply, and, ultimately, overheating of the economy. In recent years, the scale of money and credit in China has grown rapidly, so inflationary pressures have increased. The change of the base currency causes the change of money supply through the effect of the money multiplier and ultimately affects the structure of the money supply. China's foreign exchange deposits have become the main part of the Central Bank's base money. The passive supply of base money weakens the initiative and effectiveness of the monetary policy.

No matter what form of inflow of international capital, the current foreign exchange settlement system requires the involvement of the exchange of money, which in turn affects the supply and demand of the foreign exchange market. Large inflows of international capital result in increased supply and foreign exchange reserves in the foreign exchange market, which inevitably creates potential appreciation pressure on RMB. Despite China's reforms to its exchange rate regime, the appreciation pressure on RMB has not been fundamentally eased. Appreciated RMB would devalue foreign assets and cause losses for the current situation of large foreign reserves possessed.

Excessive capital inflows make it difficult to follow up on the relevant supporting facilities in the importing country. Then, the real industry sector is not be able to absorb excess foreign investment. When the capital is saturated in the real economy, a large amount of capital enters the asset sectors such as real estate and the stock market. Excessive capital investment in the virtual economic sector, however, does not improve a country's real output capacity. When the economic bubble collapses, it destroys the

equilibrium of the financial system, lowers domestic consumption level, decreases asset market yields, and eventually leads to financial market chaos, sharp devaluation of the currency, economic growth rate decline, and other serious consequences.

6. Conclusions and Discussions

If international capital is only a unilateral inflow rather than a corresponding outflow, it may only create local pressure on the economy rather than a disruptive impact. However, after the oversized inflow of international capital into a country, the speculative nature is bound to leave the country on a large scale at some point in the following period. Enormous wealth is taken away along with irreparable damage to the country. Speculative capital inflows are now mainly arbitrage against the expected appreciation of the RMB. The foreign exchange bureau needs to take measures to limit the large-scale inflow of short-term international capital, improve the ability to identify and monitor all kinds of hot money, and step up efforts to crack down on irregular capital flows. At the same time, the government must improve foreign exchange management policies, improve the supervision system of the foreign exchange market, rectify and standardize the order of the foreign exchange market in order to prevent large fluctuations in the real economy, exchange rate, and domestic asset prices which are caused by hot money inflow.

The concrete way to guide the flow of capital rationally is to expand its floating range on the basis of maintaining the stability and increasing the flexibility of the RMB exchange rate and avoid the formation of unilateral expectations of the RMB exchange rate appreciation. Rational use of the medium- and long-term international capital to develop China's real economy encourages investment in international capital linked to industries and provides financial support for enterprises that contribute to industrial restructuring, which is in line with the direction of sustainable development. In the construction of the foreign exchange market and the improvement of the exchange rate formation mechanism, we need to continuously improve the degree of marketization of RMB exchange rate formation, steadily promote the exchange of capital items and other related reforms, strengthen the monitoring and management of cross-border RMB business, adjust the foreign exchange management model, and gradually form a stable and open foreign exchange market. These are the approaches to fundamentally ensure that the RMB exchange rate reaches a reasonable balance and the international capital flows benefit economic growth.

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