Excess Liquidity, Inflation and the Yuan Appreciation: What Can China Learn from Recent History?

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1. INTRODUCTION

RAPID economic growth in China since the early part of the last decade has been accompanied by a surge in foreign capital inflows through the so-called ‘twin surpluses’ in both current and capital accounts, although flows of foreign direct investment (FDI) continue to predominate. In addition, low interest rates in mature markets have driven the capital flows to China, as have improved macroeconomic fundamentals in the Chinese economy, as well as financial innovation and gradual liberalisation on international capital markets, which have promoted increased mobility of global capital flows.

The large capital influx has ignited massive accumulation of international reserves in China, which in turn has caused a rapid surge in the position for foreign exchange purchase (PFFP), given the ‘exchange surrender system’ currently implemented in China.¹ The PFFP measures the total amount of renminbi (RMB) involved in foreign exchange purchases in the entire banking system (including the Central Bank in China), which effectively corresponds to the published build-up of foreign exchange reserves. Several years’ accumulation then builds up abundant liquidity for the Chinese domestic market. Consequently, the monetary authorities in China have repeatedly expressed serious concern about the rise of...

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¹ Under the exchange surrender system, domestic enterprises and private agents must sell/buy foreign exchange to/from the designated foreign exchange banks at a unified rate. These banks are not allowed to hold foreign exchange positions in excess of official limits, and any excess holdings have to be sold in the inter-bank foreign exchange market.
excess liquidity. In particular, the government is concerned about the potential transmission of excess liquidity to consumer prices.

Surprisingly, in recent research, despite its heightened importance, excess liquidity has not been found to be a significant element in explaining the resurgence of consumer price inflation in China (see Li and He, 2007; Makin, 2007; Siebert, 2007). For instance, Makin (2007) proposes that expanding money supply does not generate inflationary pressure in China because the strong economic growth raises real domestic money demand. Likewise, Siebert (2007) also argues that inflationary pressure stemming from excess liquidity has been tempered in China over the past few years. In addition, Li and He (2007) claim that the excess liquidity in China, rather than heading towards the consumer goods market, could have moved towards the asset markets and would therefore have contributed to the rise of stock prices or to the dynamism of the real estate market.

The present study, nevertheless, develops a simple dynamic model and shows that excess liquidity imposes statistically significant and quantitatively sizeable impacts on consumer price inflation in China over the period 1998–2007. Moreover, the paper also documents the new paradigm of inflation differential and interest rate differential between China and the United States and shows that from 2006 to 2007 there has been a major 'regime shift' where both relative purchasing power parity and open interest rate parity posited in McKinnon (2007) broke down. The underlying evidence suggests that the call for rapid appreciation of RMB against the dollar to solve external imbalances between the two countries should be exercised with caution. Instead of appreciating the yuan at a faster pace, we propose that the monetary authorities in China should consider adding a random element to the daily movements in the RMB/USD exchange rate so as to reduce the predictability in the movements in the exchange rate and thereby moderate market speculation. This implementation, combined with effective capital control and more exchange derivatives, can be a sensible strategy to discourage the speculative capital inflows, depress excess liquidity, and in turn mitigate the upward pressure on domestic inflation.

The paper proceeds as follows: Section 2 depicts the stylised facts of excess liquidity in China promoted by the huge foreign capital inflows of the recent decade. A notable contribution of the paper in this section is that we provide a quarterly measure of excess liquidity, which has been almost entirely ignored by the literature. Section 3 constructs a dynamic model to capture the feedback of excess liquidity on consumer price inflation. In Section 4, we investigate the dynamic changes to inflation and interest rate differentials between China and the United States and provide evidence to oppose the accelerating appreciation of

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2 It should be noted that randomising the rate of RMB appreciation might not be very helpful in staunching the inflow of speculative money if the expectation of secular appreciation is firmly in place. Section 5 discusses this in more detail.
the Chinese currency. Section 5 discusses the policy implications of our findings. Section 6 concludes the paper.

2. STYLISED FACTS: CAPITAL INFLOWS AND EXCESS LIQUIDITY

a. Huge Capital Inflows

Over the past 10 years, China has witnessed marked international capital inflows. International capital favours China because of its remarkable economic growth which, during the recent decade, has created far greater opportunities for business and investment. In addition, the ever-increasing returns in the Chinese capital and real estate markets particularly promote large capital inflows. Moreover, strong expectations of RMB appreciation also boost sizeable amounts of international capital inflows, which are considered mostly short term and speculative in nature.

The evidence of large capital inflows can be examined in a number of ways (e.g. Liang, 2007). Here we focus on two conventional channels, namely inward net capital inflows and the twin surpluses of balance of payments. First, Figure 1 shows the net inward capital inflows from foreign direct investment (net FDI), portfolio investment (net PI) and other investment (net OI) in China during the period 1998–2007 based on the semi-annual data published by the State Administration

![FIGURE 1]

Notes:
Net FDI, net OI and net PI refer to net foreign direct investment inflows, net portfolio inflows, and net other investment inflows, respectively. Total capital inflows are the sum of the three inflows.

Source: SAFE (1998–2007) and the author’s calculations.
of Foreign Exchange (SAFE) of China. Among these three categories of net capital inflows, the net FDI appears to be predominant in most periods, except for 2004 and 2005 during which the net OI slightly surpassed it. The net PI, on the other hand, seems to rise steadily, in particular after the early 2000s.

Overall, Figure 1 suggests that the total inward net capital inflows were relatively stable during 1998–2002, while exhibiting continuous increases since 2002, with a notable jump in 2004. In particular, by the first half of 2007, the total capital inflows registered US$188 billion, which is five times larger than that in 1998.

Second, China’s ballooning twin surpluses reflect more comprehensively the fact of large capital inflows. Figure 2 presents the balances of both the current account (CA) and the capital account (KA) in China over the period 1998–2007 (semi-annual data). The figure shows that the CA remains positive for the entire sample period, with a marked increase since the early 2000s. For instance, the CA surplus registered US$20 billion in 2000, while it grew to US$160 billion in 2005, and reached as high as US$325 billion in the first half of 2007.

The persistent increase in the CA surplus reflects partly the huge trade surpluses since China became a member of the World Trade Organization (WTO) in 2001. The KA, on the other hand, became positive in 1999 and has been in surplus ever since. In addition, there is a sizeable surge in capital account surplus in 2007, from

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3 Note that Net OI involves trade credits, loans, and currency and deposits. Other investment became a separate category only after 1997 in the Chinese balance of payments statement.
its low level in the second half of 2006. The total surplus (CA + KA), as shown in Figure 2, has been growing rapidly since 2000. In particular, the twin surpluses in total in the first half of 2007 registered US$500 billion, which is equivalent to one-third of the nominal GDP in China over the same period.

The huge twin surpluses in China remain an immediate cause of excess liquidity. This is because the rapid expansion in the balance of payments helps build up massive foreign exchange reserves, which in turn contributes to the money supply, since the People’s Bank of China (PBC) has to intervene in the market by issuing money aimed at RMB exchange rate stability. According to data published by the International Financial Statistics (IFS, 2007), the foreign exchange reserves in China amounted to US$1,528 billion in the last quarter of 2007 (see Figure 3), far outpacing that in Japan (US$973 billion) in the same period.

Given the exchange surrender system in China, the rapid increase of foreign capital inflows inevitably causes the RMB position for foreign exchange purchase (PFFP) to soar, which in turn induces an involuntary increase in money supply. As an illustration, Figure 4 compares the level of the PFFP with M1 and illustrates dramatic year-to-year increases in PFFP relative to that in M1 over the past decade.

The figure suggests that the bank’s RMB equivalent for foreign exchange purchase went up to RMB12,800 billion in 2007Q4, after an increase of RMB9,800 billion in the first three quarters of the year. The rapid increase in the PFFP leads to high ratios of PFFP over M1. Figure 5 shows that the ratio of PFFP to M1 was around 30 per cent in 2000, 45 per cent in 2004, while it grew to above 80 per cent in 2007. Such an exceptionally high ratio of PFFP to M1 leaves policy makers in China in an unenviable position from which to maintain an effective and independent monetary policy.

**FIGURE 3**

Foreign Exchange Reserves in China: 1998Q1–2007Q4

Therefore, the position for foreign exchange purchase, ignited by the dramatic influx of foreign exchange and compelled by the ‘exchange surrender system’, has contributed greatly to the large and growing monetary supply in China. Figure 6 illustrates the monetary aggregates in China during 1998Q1–2007Q4. It shows that M0, M1 and M2 all manifest considerable increases over the past 10 years, with the growth in M2 particularly striking. For example, M2 registered RMB15,000 billion in the year 2000, while it grew to more than RMB35,000 billion in the last quarter of 2007. The amounts of M0 and M1 register above RMB2,800 billion and RMB12,000 billion in 2007, respectively, both of which also double their respective amounts in 2000.

Source: PBC and the author’s calculations.
b. Some Salient Features of Excess Liquidity

The preceding discussion indicates that the drastic international capital inflows remain a fundamental cause of excess liquidity in China over the past decade. In recent years the monetary authorities in China have repeatedly expressed concerns about the excessive accumulation of liquidity in the Chinese economy, in relation to its possible implications for price and financial stability at a national level. Nonetheless, there is little research that provides systematic analyses of the stylised facts of excess liquidity in China, in particular the facts of excess liquidity over the recent decade using quarterly data. Therefore, this sub-section investigates the features of excess liquidity in China.
As a starting point, we present the evidence of high growth in money supply in China over the period 1998–2007. In Figure 7, the data from the PBC suggest that both narrow money (M1) and broad money (M2) in China have been growing at a fast rate for nearly one decade since 1998, with the average growth rates of M1 and M2 at 15.9 per cent and 16.2 per cent, respectively, over the period. The average growth rate of M0 is also as high as 11.6 per cent. Further investigation of Figure 7 reveals that the growth of monetary aggregates since 2006 appears to be trending upwards.

The marked growth in monetary aggregates, however, only reflects part of the story of expansion of liquidity in China. Whether the liquidity is excessive, however, requires further investigation using quantitative measures of excess liquidity. To date, there are a variety of alternative measures of excess liquidity. For instance, the European Central Bank (ECB, 2004) has advocated the so-called ‘real money gap’, defined as the deviation of the actual stock of money from an estimated equilibrium level, to measure excess liquidity (see Gerdesmeier and Polleit, 2005, for a comprehensive survey of recent development in the measures of excess liquidity).

Among alternative measures of excess liquidity, Ruffer and Stracca (2006), in a study of global excess liquidity across G5 countries, suggests that it is often useful to compare broad money supply with nominal spending to gauge the size of excess liquidity in a country. Therefore, the ratio of the broad monetary aggregate (e.g. M2) to nominal GDP (NGDP), also known as the ‘Marshallian K’, remains an intuitive and useful indicator of excess liquidity in the country.

In this paper, we follow the conventional definition and use the ratio of broad money over nominal GDP as the measure of excess liquidity. The statistical data
that support our analysis is from the IFS and the sample spans 1998Q1 to 2007Q4.

A note of caution is in order here, with respect to the calculation of M2/NGDP using quarterly data for China, as published by the IFS. Specifically, the NGDP is a flow variable while money aggregate is a stock variable, and in addition, the published data by the IFS for the NGDP of China has not been annualised. Consequently, if the ratio of M2 to NGDP is calculated directly using the raw data, the quarterly ratio of M2 to NGDP will be misleadingly high and manifest an undesirable, choppy (seasonal) pattern (see Figure 8).

To correctly construct the ratio of M2 to NGDP using the quarterly data (not seasonally adjusted) published by the IFS, the NGDP in the denominator of the M2/NGDP ratio here is calculated as four quarters moving sum of its quarterly observations and M2 is measured by the corresponding quarterly observations of the monetary aggregate:

$$
(M2/NGDP)_t = \frac{M2_t}{NGDP_t + NGDP_{t-1} + NGDP_{t-2} + NGDP_{t-3}},
$$

(1)

where \( t \) denotes quarter.

This calculation provides a measure of excess liquidity which is comparable to and in line with that computed using annual data. The method proposed here also alleviates the potential influence of seasonality in the published quarterly data since each observation of the NGDP constructed in this way spans four different quarters.

As such, Figure 9 illustrates the ratio of M2 to NGDP in China during 1998–2007. As a comparison, the figure also plots M2/NGDP using annual data. It shows that the measure of M2/NGDP calculated using quarterly data mimics that computed using annual data reasonably well. Indeed, the general pattern of the
measure of excess liquidity using different frequency data is quite similar over the entire sample period of 1998–2007. The figure shows that M2/NGDP kept increasing during 1998–2003, slightly declined during 2003–05, and has crept higher since the middle of 2005. Overall, the level of M2/NGDP in China has been growing from around 1.2 in the late 1990s to above 1.8 in 2007, with a remarkable rise of 50 per cent over 10 years.

Clearly, Figure 9 suggests that more money has been used to pursue less economic output in China during the recent decade as the level of M2/NGDP has been persistently above unity over the underlying period. Although M2/NGDP exhibited a slightly downwards movement in 2005, it started to go upwards again thereafter.

3. EXCESS LIQUIDITY AND INFLATION IN CHINA: A DYNAMIC MODEL

An important consequence of excess liquidity surrounds the question of inflation in China. In retrospect, China experienced high inflation (over 20 per cent) in the early 1980s triggered by regime shifts of pricing system in its early period of transition, and in the middle 1990s caused mainly by structural imbalances in investments and coupled with domestic credit expansion. After the Asian financial crisis, however, inflation in China has spiked and it has since been remarkably low for nearly one decade.

After a few years of positive surprises, inflation is now creeping higher, perhaps finally reflecting accumulative effects of abundant liquidity over the years. According to the data published by the National Bureau of Statistics (NBS) of China, by September 2007, the year-to-year consumer price index (CPI) inflation...
has been consistently above 3 per cent for seven months, reaching 6.5 per cent in the last quarter of 2007. With the increasing surge of liquidity, it is widely believed (PBC survey report, 2007) that consumer price inflation in China will not be tame in the short term.

As we have discussed at the beginning of the paper, it is surprising that such little research has been conducted into the potential correlation between excess liquidity and inflation in China. To examine this issue, we start by providing an intuitive illustration, followed by a formal model verifying the conjecture.

First, we plot in Figure 10 quarterly data of CPI inflation and M2/NGDP in China over the period 1998–2007. It presents an evident co-movement between inflation and the measure of excess liquidity over the underlying period. Further, the figure indicates that M2/NGDP tends to lead inflation for several periods, indicating that an increase in the level of excess liquidity at the current period will be followed by a rise in inflation in the ensuing period in the economy. ⁴

Figure 10 provides the intriguing scenario that excess liquidity may systematically and significantly drive consumer price inflation in China over the recent decade. A formal test of the relationship, however, is not yet established in the literature and it is to this gap that we now turn.

To test whether excess liquidity is a significant pressure on inflation, a preliminary idea might be a model defining inflation as a linear function of excess liquidity. Though relatively straightforward, such a model cannot reflect the

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⁴ The same results are obtained if Figure 10 is replotted using M1.
dynamic impact of the liquidity in excess on inflation, as indicated by Figure 10. Moreover, a model without inflation dynamics (i.e. lagged inflation) cannot capture inflation persistence (see Zhang, 2007). Therefore, we set up the following model with lagged inflation characterising inflation dynamics:

\[ \pi_t = c + \alpha \pi_{t-1} + \beta \text{excess}_t + u_t, \]  

(2)

where \( \pi_t \) denotes inflation, \( \text{excess}_t \) denotes the measure of excess liquidity (M2/NGDP), and \( u_t \) is a serially uncorrelated error term.

By construction, although model (2) specifies current inflation as a function of excess liquidity at the current period, the model effectively captures the dynamic interactions between inflation and excess liquidity. To see this, rewrite model (2) as:

\[ \pi_t = (1 - \alpha L)^{-1}(c + \beta \text{excess}_t + u_t), \]  

(3)

where \( L \) denotes lag operator. Noting that \( (1 - \alpha L)^{-1} = 1 + \alpha L + \alpha^2 L^2 + \cdots \), it is not difficult to see that the baseline model (2) indicates that inflation at time \( t \) is driven by excess liquidity not only at the current period, but also at lagged periods. Thus model (2) captures the dynamic relationship between inflation and excess liquidity, \textit{per se}.

To estimate model (2), we note that the current-period variable of excess liquidity (\( \text{excess}_t \)) might be correlated with contemporaneous noise, \( u_t \). Therefore, in addition to the traditional ordinary least squares (OLS) estimator, we also employ the two-stage least squares (2SLS) estimator with four lags of the right-hand-side variables in model (2) as instrumental variables.

Based on the foregoing set-up, we report the empirical results of model (2) in Table 1, using the quarterly data for the CPI inflation and the measure of excess liquidity (M2/NGDP). One can see from Table 1 that the OLS and 2SLS produce

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<tr>
<td>OLS</td>
<td>-6.37***</td>
<td>0.73***</td>
<td>4.51***</td>
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<td>2SLS</td>
<td>-6.78***</td>
<td>0.72***</td>
<td>4.80***</td>
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Notes:
Sample spans 1998Q1–2007Q4 (prior to lag adjustment). S.E. refers to the standard error of the regression; \( p \)-auto denotes Breusch–Godfrey \( LM \) test for serial correlation up to four lags; heteroscedasticity-robust standard errors are reported in parentheses; *** denotes significance at the 1 per cent level. The instrumental variables in 2SLS include four lags of inflation and M2/NGDP.
very similar results: M2/NGDP is a significant driver of consumer price inflation, with a 1 per cent change in excess liquidity leading to a 4.5 per cent rise in inflation, *ceteris paribus*. In addition, the parameter estimate on lagged inflation is above 0.70, which indicates that the CPI inflation in China exhibits considerable persistence, a finding in broad agreement with Zhang (2007). Furthermore, the diagnostic statistics reported in the last three columns in Table 1 also suggest that the model has reasonable goodness of fit (adjusted $R^2 = 0.82$) and the estimated residuals of the model are free of serial correlation ($p$-value of the serial correlation test is insignificant at the 1 per cent level).

Although reasonably specified, model (2) may suffer from the problem of omitting the real driving variable for inflation, as indicated by the conventional Phillips curve theory (e.g. Stock and Watson, 1999). In practice, therefore, we also estimated alternative models by adding the growth rate of real GDP or the output gap to the baseline model. In addition, we have also tried to replace excess by excess$_{t-1}$ in the model, alter the order of the lagged inflation, and vary estimation samples so as to examine the robustness of our baseline finding. These augmentations, however, did not give rise to improved fitness for the model or substantial changes in the baseline finding. An interesting result in these exercises, however, is that neither real economic growth nor the real GDP gap exerts statistically significant pressure on consumer price inflation in China during the most recent decade, albeit the real variables maintain an intuitive (positive) sign in the relevant estimations.

Overall, the empirical results in this section show that excess liquidity in China does play a significant role in driving consumer price inflation during the period 1998–2007, a finding frequently overlooked in the existing literature. Since inflation contains important information for evaluating the plausible RMB exchange rate, it is desirable to compare the dynamic paths of inflation between China and the United States, so as to assess the policies in regard to changes in the yuan exchange rate. The next section is designed to address this important question.

4. EXCHANGE RATE OF THE RMB/USD UNDER THE NEW PARADIGM

In recent years, China has been under heavy pressure from the United States and other major trading parties to allow the RMB to appreciate at a faster pace. Consequently, in July 2005 the change took place from the fixed peg to the US dollar, which had been in place since 1994, to the beginning of the managed floating exchange rate regime.

Although unhooking China’s peg to the dollar may have been wrongly motivated (McKinnon and Schnabl, 2004; McKinnon, 2007), over the first year of the new exchange rate regime in China, namely July 2005–July 2006, the yuan
appreciation against the US dollar has appeared to be fairly in line with the inflation differential between the two countries over the same period, which seems to justify the relative purchasing power parity (PPP). Based on this observation and recent studies in Goyal and McKinnon (2003) and McKinnon (2007), a new monetary policy rule of two-country inflation targeting has emerged for China. In particular, McKinnon (2007) proposes that China should follow the annual difference in inflation between China and the US as the blueprint for gradual appreciation of the yuan against the dollar.

This reasoning, however, leads to policy advice which is against further appreciation of the yuan, given the new paradigm of inflation differential between China and the US that was established from September 2006 to the present. To help show this, Figure 11 plots CPI inflation in China and the United States in conjunction with the RMB/USD exchange rate appreciation (per cent change, year-to-year) from January 2004 to November 2007. As shown in Figure 11, the appreciation of the Chinese currency against the dollar over the period July 2005–July 2006 was indeed consistent with the China–US inflation differential. More specifically, CPI inflation in China registered about 1 per cent over the year to July 2005, while the corresponding inflation in the US was 4 per cent. This differential of 3 percentage points was generally consistent with the yuan’s appreciation of 3.3 per cent over the year.

However, the scenario has changed dramatically since October 2006. Figure 11 shows clearly that inflation in China has surpassed that in the United States since October 2006 and the gap between the inflation series of China and the US
amounts to 1.4 per cent over the year from October 2006 (i.e. October 2006–November 2007). In effect, Figure 11 suggests that McKinnon’s model of relative PPP broke down after mid-year 2006, which reflects a significant regime change at that time. In particular, before mid-2006, China still had sufficient monetary control because the expected appreciation then was more modest and controls on capital inflows were more effective. Thus the PBC could sterilise ‘excess’ foreign exchange accumulation to prevent excess money growth so as to keep inflation 2 or 3 percentage points lower than that in the United States, in a way that was consistent with modest RMB appreciation of about the same amount. However, with the expectation of fast appreciation of RMB increasingly in place after mid-2006, the PBC could not effectively staunch excess money growth due to the upsurge in capital inflows. Consequently, inflation in China has started to increase since then.

The fact that inflation in China may continue surging while inflation in the United States may remain tamed is reinforced by the excess liquidity prevailing in China and the sub-prime mortgage loan crisis recently penetrating through the US economy. On the one hand, since the second half of 2006, there has been heightened concern about the slump in the economy in the United States (ignited by the sub-prime turmoil), which in turn is likely to lead to plunging prices across the US economy. On the other hand, as discussed in the foregoing section, price inflation is driven significantly by the excess liquidity in China. Meanwhile, the excess liquidity in China may be difficult to curb in the short term given the market expectations on the crawl of the yuan value. Therefore, it would be unsurprising to see the new paradigm of relatively high inflation in China compared to that in the United States persisting for a protracted period.

The dynamic evolution of the inflation differential between China and the United States has important implications for assessing sensible movements in the RMB/USD exchange rate because a key exchange rate determinant is inflation behaviour in the two countries involved. As shown by McKinnon (2007), it is important to have the yuan rise at a moderate pace and consistent with inflation differential between the two nations. Since the inflation differential over the past 12 months has deviated substantively from the exchange appreciation, with inflation in China surmounting that in the United States, it is advisable for the monetary authorities in China to slow down the rate of yuan appreciation against the dollar.

In addition to the inflation differential, another important RMB/USD exchange rate determinant is the interest rate differential between the two countries, i.e. the open interest rate parity (OIP), which also advises against faster appreciation of the yuan against the dollar. Figure 12 compares one-year RMB interest rates of China Central Bank notes with one-year dollar interest rates quoted in London (LIBOR) from January 2004 to November 2007. The figure also depicts the paths of the yield spread and the RMB/USD exchange rate appreciation over the same period.
Figure 12 suggests that, prior to October 2006, the path of the yuan appreciation mimicked remarkably the behaviour of the interest rate differential. However, the differential has witnessed marked decline since late 2006 with the RMB interest rate crawling upwards while the dollar interest rate was trending downwards. For example, the differential (in absolute value) was 2.5 per cent in December 2006, while it drops to 1.3 and 0.8 per cent in October and November 2007, respectively.

In theory, if China’s financial system were liberalised with interest rates determined freely by the market, one would expect that the upwards crawl in the yuan tends to bid down nominal interest rates on RMB assets. Figure 12 shows clearly that this hypothesis is not the case.

Adding to this, the overnight bank rates between China and the US provide a strikingly similar scenario to that witnessed in Figure 12. To see this, Figure 13 compares China interbank offer rate (CHIBOR) with the corresponding overnight rate for the United States, i.e. the federal funds rate (FFR). The figure also suggests that the interest rate differential between the two countries coincides with the RMB appreciation before early 2007, while the differential has deviated substantively from the path of the yuan appreciation since then.

The key reason why the interest rate differential between China and the US has deviated from the path of the yuan appreciation lies in the predominant weight that the Chinese government has put on its domestic inflation. In particular, inflation in China has been increasing since early 2007, reflecting the cumulative effect of abundant liquidity, as documented in Section 2.
In order to control domestic inflation, the monetary authorities in China have an explicit mandate for the maintenance of ‘stable prices’, which is one of its overriding objectives. In light of this mandate, the PBC has raised the RMB interest rate six times during 2007. On the other hand, the sub-prime turmoil has promoted the Federal Reserve to ease its monetary policy by reducing interest rates in response to the credit crunch. Consequently, the interest rate differential between China and the United States has been progressively reduced, as shown in Figures 12 and 13.

The breakdown of McKinnon’s posited OIP relationship between China and the United States is responsible for the outflow of speculative capital from the United States to China becoming an avalanche despite SAFE’s attempt to reinstitute stronger controls on capital flows. One possible explanation for the breakdown of the OIP is that there are no more unprotected private holders of dollar assets within China. All their holdings of dollar assets have been converted into RMB by the end of 2006. In 2007–08, Chinese interest rates no longer reflect the expected rate of exchange appreciation. When domestic private dollar holdings were substantial, movements from dollar into RMB assets were sufficient to bid down interest rates on RMB assets below that on dollars. However, when domestic dollar holdings go to zero, this arbitrage breaks down. Interest rates on RMB assets are then free to rise, in particular if promoted by the government as an anti-inflationary measure.

To summarise, from the end of 2006 to the beginning of 2007, we witness a major ‘regime change’ where both relative PPP and OIP break down. The rise in

![Figure 13](image_url)

Notes: CHIBOR and FFR denote China inter-bank offer rate (overnight) and federal funds rate, respectively.
Source: The author’s calculations based on data from CEIC.
interest rates in China accentuates the inflow of hot money leading to faster monetary expansion that makes inflation more difficult to control. The authorities cannot use faster appreciation as a disinflationary policy in the near term because the inflow of hot money would be even more damaging. With China’s huge trade surplus continuing to pour more dollars into the economy that nobody wants to hold, a ‘free’ float would lead to an upward spiral.

5. POLICY IMPLICATIONS

Recently, it is increasingly said that the yuan should appreciate at a faster pace (e.g. Roubini, 2007). The argument claims that larger appreciation of the RMB can not only mitigate the pressure of huge trade imbalances between China and the United States, but also help to tame inflation currently prevailing in China. The empirical findings in the present study, however, indicate that this argument does not hold.

In particular, our study shows that the ongoing exchange rate appreciation has had little effect on the trade imbalance as reflected in the current account (recall Figure 2). Indeed, the current account balances of China have been positive for more than two years since the initial yuan appreciation. This finding is in broad agreement with McKinnon (2007) who elegantly shows that the trade imbalance between China and the United States results from the low savings rate in the United States combined with the opposite tendency in China. This is unlikely to be predictably affected by unhooking China’s peg to the dollar. The issue amounts to the necessary conditions for the effectiveness of exchange rate changes on trade imbalance, per se. That is, the import–export demand and supply elasticity in China and the United States may hardly satisfy the well-known Marshall–Lerner–Robinson (MLR) condition.

Neither has the yuan appreciation been effective in curbing inflation in China. On the contrary, quick appreciation of the Chinese currency can exacerbate the ongoing inflation in China. In Section 4, we have shown that China’s inflation has not been predictably affected by sustained exchange rate changes. This finding, however, is different from the corresponding argument in McKinnon (2007). Although McKinnon (2007) agrees that the yuan appreciation cannot be used to improve the trade balance, he believes that the yuan appreciation can help to insulate China from foreign inflation.

This belief rests on the analysis using data prior to July 2006. Once the time horizon is extended to the most recent, namely the end of 2007, the proposal is no longer true. In particular, Section 3 shows that the CPI in China has been systematically driven by excess liquidity over the past decade. With the wrongly motivated yuan appreciation, short-term international capital inflows to China have contributed considerably to the excess liquidity in China. To see this, Figure 14...
shows that the net transitory capital inflows to China have turned positive since 2003 and it appears to have kept increasing considerably since the yuan appreciation.

In essence, the expectation of an ever high RMB tends to attract large capital inflows, in particular those that are speculative in nature, which can lead markets to form strong expectations for future inflation and this in turn promotes inflation escalation in China. Thus the unhooking of China’s peg to the dollar manifests an increasingly dominant effect of inducing inflation in China, rather than helping to curb ongoing inflation.

Moreover, nor is accelerating the yuan appreciation in accord with fundamental parity theories. As shown in the foregoing section, the RMB/USD exchange rate has demonstrated considerable deviations from both inflation differential and interest rate differential for more than 12 months. This is evidently inconsistent with the familiar principles of (relative) purchasing power parity and open interest rate parity, albeit that the parity theories require fairly restricted conditions. With the increasingly liberalised financial system in China, changes in the inflation and interest rate differentials between China and the United States suggest that the yuan appreciation should slow down.

Instead of appreciating the yuan at a faster pace, the monetary authorities in China should promote more flexibility in the yuan exchange rate. For instance, the PBC can choose to add a random element to the daily movements in the RMB/USD exchange rate around the general trend of appreciation. By allowing more volatile yuan trading, the authorities may make the RMB’s long-term trends unpredictable in order to effectively curb speculation that has undercut economic policies. Furthermore, the authorities can allow the yuan to rise and fall at an
uneven rate, with the pace of gains being irregular, to completely break the predictability in the movements in the exchange rate so as to thwart market speculation.

In a nutshell, under the ongoing liberalisation of China’s financial system, the monetary authorities in China must prudently watch inflation and interest rates in the US when formulating the yuan/dollar exchange rate. In addition, it is critical for both China and the United States to be aware that an unreasonable appreciation of the yuan is likely to unleash adverse consequences that boost capital influx into China, cause excess liquidity, promote inflation in China, harm Chinese consumers, and may eventually lead to unfavourable terms-of-trade effects for both countries.

6. CONCLUSIONS

International capital inflows, excess liquidity and inflation in China are interactively related to the RMB exchange rate appreciation. This paper summarises the stylised facts of capital inflow and excess liquidity in China and shows that excess liquidity plays a significant role in driving Chinese consumer price inflation. This finding indicates that the external disequilibrium has initiated internal imbalances in China, which entail more sensible policies for China to maintain its gradual foreign exchange reform.

Quick appreciation of the RMB, however, is not a sound policy. The appreciation cannot help reduce liquidity accumulation and tame the prevailing inflation in China, neither is it in line with international parity theories. Rather, our study suggests that the monetary authorities in China should make greater efforts at enhancing the flexibility of the yuan/dollar exchange rate to thwart market expectation and speculation, and in turn tame ongoing inflation.

However, it should be noted that randomising the rate of RMB appreciation may also have limits in staunching the inflow of speculative capital if the expectation of secular appreciation is now firmly in place. To effectively get short-term inflation under control, China may consider returning to a credibly fixed exchange rate – as existed between 1995 and 2004. Then hot money inflows into China would cease and domestic private financial institutions would want to quickly rebuild their depleted dollar assets so that the PBC could stop intervening in the foreign exchange market and thus reassert monetary control. But to make the fixed exchange rate credible would require more cooperation from the United States to stop hectoring China to get the RMB revalued ever higher.

While inflationary pressure has been rising in China during 2007, we expect the inflationary impulse in China to peak by late 2008 in response to a gradual tightening in financial conditions combined with a more sensible strategy in exchange rate management. As Chinese policy makers steer the economy back
to a more sustainable, though still robust, growth path, consumer price inflation may be stabilised in the foreseeable future. If this transpires, that could allow the underlying positive dynamics of policy and economic development in China over the past decade to reassert itself on global markets.

REFERENCES