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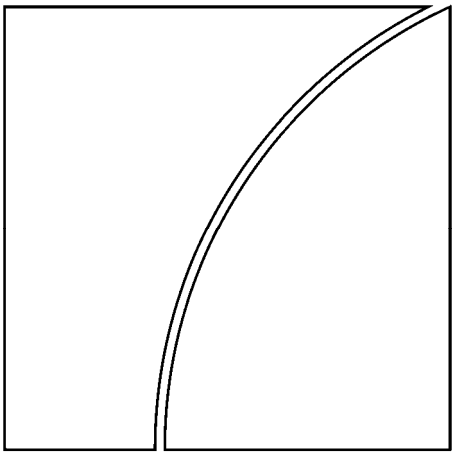

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China's financial conundrum and global imbalances

by Ronald McKinnon and Gunther Schnabl

Monetary and Economic Department

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Foreword

On 26–27 June 2008, the BIS held its Seventh Annual Conference on "Whither monetary policy? Monetary policy challenges in the decade ahead" in Luzern, Switzerland. The event brought together senior representatives of central banks and academic institutions to exchange views on this topic. BIS Paper 45 contains the opening address of William R White (BIS), the contributions of the policy panel on "Beyond price stability – the challenges ahead" and speeches by Edmund Phelps (Columbia University) and Martin Wolf (Financial Times). The participants in the policy panel discussion chaired by Malcolm D Knight (BIS) were Martin Feldstein (Harvard University), Stanley Fischer (Bank of Israel), Mark Carney (Bank of Canada) and Jean-Pierre Landau (Banque de France). The papers presented at the conference and the discussants' comments are released as BIS Working Papers 273 to 277.

Conference programme

Thursday 26 June

10:00	Registration and refreshments	
11:00	Opening remarks:	William White (Bank for International Settlements)
	Chair:	Guillermo Ortiz, Bank of Mexico
11:15	**Session 1:**	**In search of monetary stability: the evolution of policy regimes**
	Paper title:	*In search of monetary stability: the evolution of monetary policy Some reflections. Experience – Lessons – Open issues*
	Author:	Otmar Issing (Centre for Financial Studies)
	Discussants:	José de Gregorio (Central Bank of Chile) Allan Meltzer (Carnegie Mellon University)
12:45	Lunch	
	Chair:	Durmus Yilmaz (Central Bank of the Republic of Turkey)
14:15	**Session 2:**	**Monetary policy communication**
	Paper title:	*Talking about monetary policy: The virtues (and vices?) of central bank communication*
	Author:	Alan Blinder (Princeton University)
	Discussants:	Benjamin Friedman (Harvard University) Y V Reddy (Reserve Bank of India)
15:45	Coffee break	
	Chair:	Tito Mboweni, South African Reserve Bank
16:15	**Session 3:**	**Expectations formation: beyond rational expectations**
	Paper title:	*Inflation expectations, uncertainty and monetary policy*
	Author:	Christopher Sims (Princeton University)
	Discussants:	Athanasios Orphanides (Central Bank of Cyprus) Lars Svensson (Sveriges Riksbank)
18:00	End of day one	
19:00	Reception followed by formal dinner	
	Keynote address by Edmund Phelps (Columbia University)	

Friday 27 June

	Chair:	Donald Kohn (Board of Governors of the Federal Reserve System)
09:00	**Session 4:**	**Changes in monetary policy transmission**
	Paper title:	*Has the monetary transmission process in the euro area changed? Evidence based on VAR estimates*
	Author:	Axel Weber (Deutsche Bundesbank)
	Discussants:	Marvin Goodfriend (Carnegie Mellon University) Arminio Fraga Neto (Gávea Investimentos)
10:30	Coffee break	
	Chair:	Hamad Saud Al-Sayari (Saudi Arabian Monetary Agency)
11:00	**Session 5:**	**Price stability and the external dimension**
	Paper title:	*China's financial conundrum and global imbalances*
	Authors:	Ronald McKinnon (Stanford University) and Gunther Schnabl (Leipzig University)
	Discussants:	Ricardo Caballero (Massachusetts Institute of Technology) Michael Mussa (The Peterson Institute for International Economics)
12:30	Lunch	
	Luncheon remarks by Martin Wolf (Financial Times)	
	Chair:	Lucas Papademos (European Central Bank)
14:00	**Session 6:**	**Credit frictions and monetary policy analysis**
	Paper title:	*Credit frictions and optimal monetary policy*
	Author:	Michael Woodford (Columbia University)
	Discussants:	Olivier Blanchard (Massachusetts Institute of Technology) Charles Goodhart (London School of Economics)
15:30	Coffee break	
16:00	**Panel discussion: Beyond price stability: the challenges ahead**	
	Chair:	Malcolm Knight (Bank for International Settlements)
	Panellists:	Martin Feldstein (Harvard University) Stanley Fischer (Bank of Israel) Mark Carney (Bank of Canada) Jean-Pierre Landau (Banque de France)
17:30	Close of conference	

Abstract and executive summary

China's financial conundrum arises from two sources: (1) its large trade (saving) surplus results in a currency mismatch because it is an immature creditor that cannot lend in its own currency. Instead foreign currency claims (largely dollars) build up within domestic financial institutions. And (2), economists – both American and Chinese – mistakenly attribute the surpluses to an undervalued renminbi. To placate the United States, the result is a gradual appreciation of the renminbi against the dollar of 6 percent or more per year. This predictable appreciation since 2004, and the fall in US interest rates since mid 2007, not only attracts hot money inflows but inhibits private capital outflows from financing (compensating?) China's huge trade surplus. This one-way bet in the foreign exchange markets can no longer be offset by relatively low interest rates in China compared to the United States, as had been the case in 2005-06. Thus, the People's Bank of China (PBC) now must intervene heavily to prevent the renminbi from ratcheting upwards – and so becomes the country's sole international financial intermediary.

Despite massive efforts by the PBC to sterilise the monetary consequences of the reserve buildup, inflation in China is increasing, with excess liquidity that spills over into the world economy. China has been transformed from a deflationary force on American and European price levels into an inflationary one. Because of the currency mismatch, floating the RMB is neither feasible nor desirable – and a higher RMB would not reduce China's trade surplus. Instead, monetary control and normal private-sector finance for the trade surplus require a return to a credibly fixed nominal yuan/dollar rate similar to that which existed between 1995 and 2004. But for any newly reset yuan/dollar rate to be credible as a monetary anchor, foreign "China bashing" to get the RMB up must end.

Currency stabilisation would allow the PBC to regain monetary control and quash inflation. Only then can the Chinese government take decisive steps to reduce the trade (saving) surplus by tax cuts, increased social expenditures, and higher dividend payouts. But as long as the economy remains overheated, the government hesitates to take these trade-surplus-reducing measures because of their near-term inflationary consequences.

JEL classification: F21, F32

Keywords: Global Imbalances, Chinese Exchange Rate Regime

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China's financial conundrum and global imbalances[1]

Ronald McKinnon[2] and Gunther Schnabl[3]

1. Introduction

Because China's trade surplus (net saving surplus) has spiralled up rapidly since 2000, its overall current-account surplus reached $359 billion in 2007 which is equivalent to about 10% of GDP. This covers almost half of the much larger US current-account deficit of $750 billion (6.1% of GDP in 2007) – and if recent trends continue it will soon cover more than half. Of course, this trade imbalance can only be corrected in the longer term if China's *net* saving – ie saving minus investment as shown in Figure 1 – falls, and the inverse occurs in the United States (the silver lining in the housing crisis?).

But, in the near term, China faces a financial conundrum. Because of political pressure from the United States, since July 21, 2005 the renminbi's peg to the dollar has crawled steadily upward at about 6 percent per year, and this rate of appreciation is expected to continue or even accelerate. Because of this one-way bet in the foreign exchange markets, since 2004 more than 100 percent of China's huge current account surplus has been financed by building up official exchange reserves.

Clearly, China with its ever-rising official exchange reserves contrasts sharply with other large surplus-saving countries such as Germany and Japan, whose surpluses on current account are matched by private short-term and long-term capital outflows. Could foreign exchange restrictions be the problem? By 2007, China had virtually eliminated foreign exchange controls on capital *outflows* by industrial corporations and financial institutions, while individuals have generous foreign exchange allowances for travelling abroad. Although now free to diversify by investing outside of the country, private (non-state) financial institutions and individuals refuse to do so. On the contrary, China's State Administration of Foreign Exchange (SAFE) is still struggling, somewhat vainly, to restrict the deluge of "hot" money inflows.

What is behind this abnormality? Because all participants in the foreign exchange markets now expect that the renminbi will continue appreciating against the dollar, they are reluctant to hold dollar assets. This reluctance is accentuated even more when American interest rates are abnormally low, as they now are with the US federal funds rate at just 2 percent.

So at this juncture in international finance we distinguish between two meanings of the concept of "global imbalance". First, the great saving imbalances across countries that are reflected in the large trade (saving) deficit of the United States and large trade (saving) surpluses of China, Japan, Germany, oil exporters, and a host of smaller countries. Second, the further massive imbalance in financial intermediation for China's huge current account

[1] We thank Ricardo Caballero, Michael Mussa and the participants of the BIS 7th Annual Conference, as well as Nick Hope of the Stanford Center for International Development, for very useful comments. Anke Hertwig, Stephan Freitag, Axel Löffler and Holger Zemanek of Leipzig University and Brian Lee of Stanford University provided excellent research assistance.

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surplus with the United States. Instead of a normal outflow of private capital to finance China's trade surplus, China's central bank accumulates vast amounts of foreign exchange – some of which is invested in US treasury bonds.

Of the two types of global imbalance, saving-investment imbalances across countries are at once the best known and most intractable in the short run. And re-balancing by jointly reducing excess saving in large creditor countries while increasing net saving the United States, without disturbing exchange rates, is certainly possible in the longer run (McKinnon 2007a). However, the global re-balancing of net saving propensities is best preceded by currency stabilisation.

Consequently, we initially focus on the sub-problem of unbalanced international financial intermediation and loss of monetary control in China. Because of the one-way bet on renminbi appreciation as aggravated by the extraordinary cuts in U. S. interest rates since August 2007, the People's Bank of China (PBC) has had to intervene massively to buy dollars and inject base money into the economy. However to better understand China's current monetary impasse, we first consider a brief history of China's foreign exchange policies since its market-oriented liberalisation began in 1979.

2. Three phases of the Yuan-Dollar exchange rate

At the risk of over simplifying, Figure 2 partitions the evolution of China's exchange rate regime into three phases: *currency inconvertibility* and exchange depreciation before 1994, the *fixed dollar exchange rate* from 1995 to 21 July 2005, and the subsequent appreciation by a *predictable upward crawl* through mid 2008.

Phase 1

Before 1994, China's currency was inconvertible in the strong sense of the word. There were multiple exchange rates (an official rate and floating swap rates for new exports of manufactures in different parts of the country), exchange controls on both current and capital account transactions, and exports and imports had to be funnelled through state trading companies. Going back into the 1980s, this so-called "airlock system" insulated domestic relative prices still influenced by central planning from those prevailing on world markets – except for a few fledgling Special Economic Zones (SEZs) on the East Coast.

So without free arbitrage between domestic and foreign prices in Phase 1, how the official exchange rate was set was arbitrary. Figure 2 shows only the path of the official exchange rate from 1.5 yuan per dollar back in 1979 and devalued in steps to 5.8 yuan per dollar by the end of 1993. However, incentives for exporting or importing were not much affected – nor was the domestic price level. And tight exchange controls prevented "hot" money flows. The official exchange rate was not economically very meaningful.

Phase 2

1994 was China's banner year for sweeping financial reforms both in domestic taxation and in the organisation of foreign trade. The Chinese authorities abolished exchange controls on current-account transactions (exporting, importing, interest and dividends) and unified the exchange rate. Separate and more favourable exchange rates for manufactured exports were abolished. By 1996, China had formally satisfied the International Monetary Fund's Article VIII on current account convertibility.

The new consolidated official rate was set at 8.7 yuan per dollar in 1994, which was closer to the average of the previous swaps rates. True, this represented a substantial devaluation of the official rate from 5.8 yuan per dollar, but the period 1993-95 was a period of high inflation in China. Figure 3 shows that the nominal depreciation of the official rate was about the same order of magnitude of the excess of China's inflation over that prevailing in the United States (as much as 20 percent in 1994). With the currency unification, real depreciation – if any – was minimal.

By 1995, the nominal exchange rate had settled down to about 8.28 yuan per dollar and was held there for 10 years – our Phase 2. The main motivation for so fixing the exchange rate was to anchor the domestic price level and stabilise the rate of growth. Figure 3 shows inflation in China's CPI converging to that in the United States by 2004.

In the previous phase of currency inconvertibility going back to 1979 when liberalisation began, China had suffered from a "roller coaster" ride in the rate of real output growth and in inflation rates – peaking out with the high inflation of 1993-95 (Figure 4). With only an embryonic domestic capital market and with the progressive relaxation of central planning and direct price controls, the PBC had great trouble anchoring the overall price level by domestic means alone. Thus the unification of the exchange rate regime in 1994, and move to full current account convertibility by 1996, presented an opportunity to adopt a more stable external nominal anchor. And Figure 4 shows that, as the exchange rate remained fixed at 8.28 yuan/dollar until 21 July 2005, cycles of inflation and real output growth in China were smoothed – while inflation came down to the American level.

Indeed, in the great Asian crisis of 1997-98, sharp devaluations by neighbouring countries – not only the well known crisis five,[4] but also by Japan, Taiwan, and Singapore – imposed strong deflationary pressure on China. But Premier Zhu Rongji wisely ignored advice to let the renminbi become more "flexible" and depreciate in tandem. Instead, he held on to the fixed exchange rate anchor and engaged in a great "one trillion" dollar fiscal expansion, largely infrastructure investments, over the next four years. In the crisis, China's exchange rate and fiscal policies saved the East Asian economy from further imploding – and allowed the neighbouring countries to recover more quickly. China's policy of fixing the nominal yuan exchange rate at 8.28 per dollar, within a narrow band of ± .3 percent, gained credibility.

In Phase 2, the fixed exchange rate's success as an anchor for China's price level was as much a guideline for domestic monetary policy as an instrument. True, continual PBC purchases of foreign exchange, modest by today's standards, were the main instrument for increasing the monetary base. However, before 2004 when the renminbi was not expected to appreciate, these purchases generally amounted to less than 100 percent of the growth in base money (Table 1). Thus substantial sterilisation operations were not necessary. In this fixed rate period, the rapid increase in the demand for base money from China's very high GDP growth, coupled with an income elasticity of money demand greater than one, more or less balanced the rapid increase in money supply.

Moreover, the monetary control mechanism was not only the exchange rate itself. To prevent overheating, there remained a panoply of supporting direct controls over bank credit – including reserve requirements, credit quotas, lending restrictions by sector, and so on. But for controlling inflation, the renminbi's exchange rate against the dollar was the effective intermediate target.

[4] Indonesia, Korea, Malaysia, Philippines and Thailand.

Why didn't China rely more heavily on domestic financial indicators? With rapid financial transformation and very high saving, the velocity of money – whether based on M0, M1, or M2 – was (is) too unpredictable for any monetary aggregate to be useful as an intermediate target. And the velocity of money, defined as GDP/M, becomes even more difficult to predict when nominal GDP itself is subject to large revisions. Indeed nominal GDP was revised sharply upward in 2006. Since 1990, Figure 5 shows that these monetary aggregates grew faster than nominal GDP – with M2 growing twice as fast so as to approach 200 percent of nominal GDP in 2008. The high growth in M2 was largely a natural result of China's very high saving rate when bank deposits are the principal financial asset open to Chinese savers. Thus, the authorities had, and still have, no firm idea of what the noninflationary rate of growth in M2 should be.

Still, couldn't the Chinese monetary authorities target inflation more directly? The absence of a well developed domestic bond market, and presence of rigid interest rate pegs for bank deposits and loans, militated against using conventional open-market operations to fix some key internal interest rate – as per the Taylor Rule – to control inflation, as in the United States or the euro zone. The internal structure of interest rates was (is) too fragmented – see figure 6 – and is accompanied by differentiated direct credit controls in various lending categories.

The "New Keynesian" Taylor Rule itself presumes that the authorities have fairly accurate information on the ebb and flow of excess capacity over the business cycle, which could not be the case in China's era of extremely high – but somewhat unpredictable – real economic growth. Thus, the fixed dollar exchange rate was the preferred intermediate monetary target for stabilising the price level. In Japan's similar era of extremely high real economic growth and financial change from 1949 to 1971, the domestic price level was safely anchored by pegging the yen at 360 to the dollar (McKinnon and Ohno, 1997).

To summarise Phase 2, the 10-year fix at 8.28 yuan per dollar was seen as a way of implementing monetary policy, made possible by the currency unification in 1994 and the move to current account convertibility in 1994-96. It was very successful in anchoring the domestic price level through 2004 (Figure 3) and smoothing fluctuations in real economic growth (Figure 4). Contrary to what is often alleged,[5] the fixed exchange rate was not a device to cunningly "undervalue" the renminbi so as to create a mercantile advantage by artificially stimulating exports.

Phase 3

What then pushed China off its fixed rate anchor on July 21, 2005?

First, after 2003, unexpected net saving surpluses, coupled with large inflows of foreign direct investment, led to large balance of payments surpluses. Figure 1 shows the sudden spurt in China's current account surplus from 2 percent of GDP in 2003 to more than 10 percent in 2007. And the US was the recipient of much of the surge in China's manufactured exports. China's bilateral trade surplus with the United States reached 1.1 % of America's GDP in 2004 – twice as large as Japan's (Figure 7). The loss of jobs in US manufacturing disturbed American politicians.

Second, China's balance of payments surpluses were misinterpreted by economists and politicians as an exchange rate problem: that the renminbi was artificially "undervalued". And

[5] See, for example, Dooley, Folkerts-Landau and Garber (2004) misinterpreting China's fixed exchange rate, and those of smaller Asian countries, as a deliberate attempt to undervalue their currencies.

the more rapid build-up of official exchange reserves in 2003-5 (Table 1 and Figure 8) was taken as per se evidence of unfair currency manipulation. Whence the American political pressure on China to begin appreciating the renminbi: our Phase 3. Led by Senators Charles Schumer of New York and Leslie Graham of North Carolina, the US government threatened to sanction China by imposing import tariffs unless it appreciated the renminbi. This "China bashing" was, and is, effective. On July 21, 2005, China appreciated discretely by 2.1 percent, and subsequently has been appreciating by about 6 percent per year with the disruptive effects on international capital flows discussed above.[6]

(In Japan's high growth era of the 1950s and 60s under a fixed exchange rate, significant inflows of FDI had been prohibited and domestic saving and investment were in better balance. However, from the late 1970s, through the 1980s, into the mid 1990s, Japan developed large current account (saving) surpluses – much of which showed up as a large bilateral trade surplus with the United States (Figure 7). The result was political "Japan bashing" to get the yen up from 1978 through 1995 that was ultimately economically disastrous for Japan – as we shall see. But Figure 7 also shows that China's rapidly rising bilateral trade surplus with the US had surpassed Japan's by 2000 – with China bashing succeeding Japan bashing.)

In 2007–08, the expectation of further appreciation of the renminbi coupled with the sharp fall in US interest rates to below Chinese level (the US Federal Funds rate fell from 5.25 percent in August 2007 to just 2 percent in mid 2008) have become the crucial determinants of the huge accumulation of official exchange reserves in China – Table 1 and Figure 8. For 2007, Figure 9 shows that virtually the whole of China's huge balance of payments surplus – including its current account surplus, inflows of foreign direct investment, and other financial inflows (hot money?), was financed by the PBC intervening to build up official exchange reserves. In the absence of private capital outflows, China's central bank has become its sole international financial intermediary.

The increasing magnitude of the PBC's purchases of foreign exchange explain its loss of monetary control in 2007–08. The scope for sterilising the monetary effects of massive official exchange intervention is limited. As a result China has turned from being a deflationary force in the world economy into an inflationary one – as we shall see.

3. Currency mismatches in immature creditor economies

An *immature* creditor country is one that cannot lend to foreigners in its own currency to finance its cumulating current account surpluses. Either its domestic financial markets are underdeveloped or the international capital markets have been have pre-empted by major currencies from areas that do have highly developed financial markets. Today, the US dollar remains internationally dominant for short term interbank transacting, but the euro has risen to be almost as important as the currency of denomination for new international bond issues – particularly on the European periphery, although the dollar still has the edge in Asia and Latin America. Aside from relatively illiquid foreign direct investment outflows, an immature creditor economy continually accumulates liquid claims on foreigners denominated in some internationally acceptable currency such as the US dollar. However, the resulting currency

[6] Another less obvious sanction has been to impose US anti dumping restrictions more frequently on Chinese goods much beyond what China's large share in US imports would warrant. This arises out of the US Department of Commerce classifying China as a "non-market" economy that makes it much easier for private anti dumping suits to succeed legally (Roberts 2008).

mismatch makes securing portfolio equilibrium in domestic financial markets, and monetary management, more difficult.

In the world economy today, China is the prime example of an immature creditor because it cannot lend in renminbi. But this inability to lend in your own currency is also shared by the smaller East Asian creditor economies – such as Taiwan, Korea , Malaysia, and Singapore – and by oil-producing countries with large trade surpluses such as the Gulf Coast states and Russia. In the Chinese case, continuing interest rate restrictions on domestic bank deposits and loans, as well as high reserve requirements on domestic banks, ensure that the renminbi won't be used much for international lending into the indefinite future.

Historically, large creditor countries have been able to lend in their own currencies because they had open capital markets and also provided the principal vehicle currency for the international monetary system: they were "mature "creditors. Britain in the 19th century lent in sterling (backed by gold) on a massive scale throughout the world. For 25 years after World War II, the United States had large current account surpluses that were financed by making dollar loans to foreigners.

In the new millennium, Germany, at the centre of the euro system, is a mature creditor because it finances its large current account surplus by lending heavily abroad in euros. German financial institutions face no currency risk for intermediating Germany's saving surplus internationally because its banks, insurance companies, pension funds, and so on – which are all funded in euros – build up euro claims on foreigners on the asset sides of their balance sheets. The upper panel of Figure 10 shows that since 2002, the private financial outflow from Germany has been greater than its large current account surplus: the surplus is "over funded". But even if banks in a mature creditor face no currency risk, default risk in foreign lending remains – much as it does in domestic lending.

In contrast, in an immature creditor country like China, and like Japan before it, its private financial intermediaries face enormous currency risk, ie risk from (potential) exchange rate fluctuations, from buying dollar assets. If China's banks, insurance companies, and so forth, invest in (dollar) claims on foreigners on a scale commensurate with the country's huge saving surpluses, then, on their balance sheets, these dollar assets would loom ever larger relative to their domestic liabilities – bank deposits, annuity claims, and so on, denominated in renminbi. Then, even putting aside the one-way bet on renminbi appreciation (dollar depreciation), just random exchange rate fluctuations could wipe out the net worth of a well capitalised bank.

This currency mismatch is an additional reason why China is so anxious to keep its currency pegged to the dollar in order to lessen the currency risk facing (potential) domestic private holders of dollar assets. During Phase 2 of the credibly fixed yuan/dollar rate from 1994 to 2004, private holdings of dollar assets became substantial relative to the (smaller) size of the economy – before falling sharply in Phase 3.

In Phase 3 with the predictable renminbi upward crawl, the private sector shuns accumulating dollar assets. Thus the PBC has been accumulating official (dollar) reserves much more rapidly (than in Phase 2) in order to prevent large upward ratchets in the exchange rate. However, to clear international payments, Chinese banks making the foreign exchange market cannot avoid holding some working balances in dollars – as must importers and exporters – even though they face losses on exchange rate movements. Therefore, besides intervening to smooth high frequency (short-term) exchange fluctuations, the PBC further reduces the risks seen by banks by swapping dollars for renminbi today while agreeing to buy them back some months hence at a known forward rate.

Conflicted virtue

The currency mismatch itself poses problems of risk management within an immature creditor country. But this "natural" problem of managing the risk from the currency mismatch is greatly compounded if foreigners agitate to have the creditor country's currency appreciate – as with China bashing today. Incorrectly, they accuse the Chinese government of manipulating the yuan/dollar rate in order to undervalue the RMB and secure an unfair mercantile advantage. These complaints then lead to what we call the syndrome of *conflicted virtue* (McKinnon and Schnabl 2004, McKinnon 2005).

Countries that are "virtuous" by having a high saving rate (like China and Japan but unlike the US) tend to run surpluses in the current account of their international balance of payments, ie lend to foreigners. But because their domestic currencies are generally not used for international lending, these foreign claims are denominated largely in dollars. With the passage of time two things happen. First, as the *stock* of liquid dollar claims cumulates, domestic holders of dollar assets worry more about an appreciation of the domestic currency. Second, foreigners start complaining that the country's ongoing *flow* of trade surpluses is unfair – and threaten trade sanctions unless the currency is appreciated. Because of the destabilising properties of open-ended currency appreciation, the virtuous country becomes conflicted. Whence *conflicted virtue*.

Somewhat strangely for a major industrial country, Japan is also an immature international creditor. Japan still runs large current account surpluses but does not lend much abroad in yen – although its overseas direct investment finances about one quarter of its saving surplus (lower panel of Figure 10). Thus, domestic Japanese banks, but more its insurance companies, accumulate higher yield dollar assets – which they see to be riskier because the liabilities of Japanese financial institutions are mainly in yen. (The yield on yen assets is abnormally low because of Japan's liquidity trap.) With this internal currency mismatch, portfolio equilibrium in Japanese financial markets is precarious even though there is no longer any one-way bet that the yen will appreciate.

Nevertheless, any unexpected shock can still create a run from dollars into yen *within* Japan. This self-reinforcing process of runs into the domestic currency was experienced by Japan most prominently following the Plaza-Agreement in 1985, and again in 2003 into 2004 when the US federal funds rate had been cut to just one percent. In the latter case, the Bank of Japan purchased over 330 billion dollars – mainly from private Japanese financial institutions – to prevent the yen from again ratcheting upwards in the foreign exchanges (McKinnon 2007b). In the lower panel of Figure 10, this episode of an internal run into yen shows up clearly as the sharp build up in Japanese official reserve assets in 2003–04.

Why should conflicted governments in immature creditor countries intervene to resist currency appreciation although that may cause them to lose monetary control in the near term? First, as stressed by Dooley, Folkerts-Landau and Garber (2004), a strong appreciation of the domestic currency in the short run, crowds out exports which are an important source of growth dynamics. Despite more than one decade of high growth as shown in Figure 4, China's GDP per capita remains low. Faltering growth is likely to cause political discontent and social unrest among migrant workers and the rural population.

Second, from the principle of purchasing power parity, the long-run effect of sustained nominal appreciation is to cause an eventual fall in the domestic price level relative to that prevailing in international markets. When the yen rose from 360 to the dollar in 1971 to peak out at 80 to the dollar in 1995, eventually the Japanese price level (WPI) fell relative the American and threw the Japanese economy into a deflationary slump in the 1990s replete with a near-zero interest liquidity trap (McKinnon and Ohno 1997) from which it has yet to fully recover (McKinnon 2007b) .

Anticipatory sterilisation and sovereign wealth funds

Green (2008) calculates that the total foreign exchange inflows into China in 2007 were $550 billion, and analyses why they are even higher than the published build up of official exchange reserves of $459 billion. His reasons are many: withdrawals from official reserves to support China's new sovereign wealth fund (China Investment Corporation), lodging some of the dollar reserves with domestic commercial banks, and so on. Thus, Green claims that the increase in official reserves understates the volume of actual foreign exchange interventions by the People's Banks of China (PBC) in 2007, perhaps going back to 2005. Whether one accepts Green's higher estimate or not, the flow of funds through the PBC is extraordinary. The currency denomination of the official foreign assets can be assumed to be mainly in dollars.

Because massive official intervention in the foreign exchanges leads to a parallel expansion in the domestic monetary base and potentially in bank lending, near-term monetary control over inflation in China has become difficult. To counteract this threat of inflation and overheating, starting in 2002 the PBC engaged in extensive sterilisation operations.

To analyse the scope and types of sterilisation, Figure 11 plots the most important items of the PBC balance sheet. In the upper panel, the asset side of the balance sheet is plotted with positive signs. It shows that liquidity has been created mainly by accumulating foreign exchange reserves. Also on the asset side, the substantial increase in claims on government in the year 2007 is due to the creation of a sovereign wealth fund: the China Investment Corporation (CIC). For financing the CIC, 10 year renminbi bonds were issued by the Chinese government and swapped for 200 billion US dollars from the PBC's foreign exchange reserves.[7] Through this operation, foreign assets were removed from the PBC's balance sheet into an external overseas fund which invests these funds mainly in less liquid assets such as stakes in Morgan Stanley, Blackstone and Visa. In line with Green (2008), this makes the stocks of official reserves, as reported in the central bank's balance sheet, look smaller.

However, this asset swap between the two agencies of China's government does not itself reduce the monetary base. Rather it enables the CIC to invest in riskier foreign assets that potentially (but not so far in practice!) bear a higher yield than the State Administration of Foreign Exchange (SAFE's) of more traditional holdings of liquid assets such as US Treasury bonds. The formation of the CIC is a response to the absence (because of the one-way bet) of normal private capital outflows intermediated by Chinese banks, insurance companies and so forth. But the CIC's purchase of foreign-currency assets does not offset the impact of the PBC's own purchases of dollars on increasing domestic base money – and is not "sterilisation" in any immediate sense.

That said, using a sovereign wealth fund today could still forestall future foreign exchange crises. When there is continuing exchange rate uncertainty and an internal currency mismatch, having the CIC, as a government corporation, accumulate foreign-currency assets could be safer than if they were lodged in private financial intermediaries. In future foreign exchange crises, private financial institutions might again be tempted to liquidate their dollar assets in favour of renminbi – a "hot" money flow that would again undermine the PBC's monetary control. In effect, having SWFs undertake international financial intermediation instead of private financial institutions amounts to "anticipatory" sterilisation, ie possible future hot money flows arising out of the currency mismatch are avoided.

This type of anticipatory sterilisation of foreign exchange intervention is reminiscent of Singapore. For more than 20 years, Singapore has had the world's most persistent, and very

[7] For more details see Chan (2007).

large, current account surpluses – now running about 20 percent of its GDP. However, the Singapore dollar is not used for international lending, and indeed the government discourages local banks from lending in Sing dollars. Thus Singapore is also an immature creditor, and the Monetary Authority of Singapore (MAS) manages the exchange rate against the US dollar with slow net appreciation – although much slower than China's today. How then does Singapore cope with its internal currency mismatch to prevent runs into the Sing dollar as foreign currency claims bulk ever larger?

By mandating large compulsory contributions to a defined-contribution domestic pension fund, the Provident Fund (PF), the Singapore government nationalises the large flow of domestic household saving. The PF then invests (among other things) large sums in Singapore dollars in two huge sovereign wealth funds, ie the Government of Singapore Investment Corporation (330 billion dollars) and the Temasek Holdings (159 billion dollars). Because both funds invest mainly in US dollar denominated assets (such as stakes in Merrill Lynch, Bank of China and Union Bank of Switzerland), Singapore's government, as represented by its two SWFs, bears the exchange risk from the currency mismatch should the Sing dollar appreciate. By investing in overseas assets under government control, Singapore was (is) not vulnerable to a run into its domestic currency despite having had a huge current account surplus for more than 20 years.

Is this "Singapore solution"[8] to the currency mismatch feasible for China? Not really. Private savings are much more de-centralised in China, and largely outside of pension funds. Households and firms make their own decisions as to where to hold their liquid assets in a wide variety of banks and, occasionally, in insurance companies. These financial intermediaries then decide whether or not to invest in foreign-currency assets. Fledgling Chinese pension arrangements are more decentralised at the municipal and enterprise level and investment is not so much under the tight control of the central government as in Singapore. Thus it would be impractical, and certainly undesirable, to nationalise China's huge flow of private saving in order make government controlled investments overseas. Foreigners might well fear that huge Chinese SWFs would not be market oriented and might take over substantial portions of their economies. In contrast, the city state of Singapore is so small in absolute size that foreigners ignore this threat.

So currency mismatches are intrinsic in immature creditor economies, such as China or Japan. Putting the Singapore solution of nationalising most of the domestic flow of private saving aside, the best an immature creditor government can do is to construct a monetary cum exchange rate regime that minimises exchange risk. Only then would "normal" private sector intermediation for financing the current account surplus be feasible – as we shall discuss below.

Sterilisation and its limits: the Chinese case

In the interim, however, with the one way bet on renminbi appreciation and unduly low interest rates in the United States, China has had virtually no choice but to finance its large huge current account surplus by building up official exchange reserves – while trying to sterilise the immediate impact on the domestic monetary base. How well has it coped?

The liability side of the PBC's balance sheet in the lower panel of Figure 11 shows – with negative signs – sterilisation instruments. To mop up the surge of liquidity from the accumulation of official exchange reserves, in 2004 the PBC began issuing central bank bonds. As long as these sales occur at market rates, the monetary tightening will tend to

[8] For further discussion of this Singapore solution, see McKinnon 2005, Ch 8

drive interest rates upward. But higher interest rates attract more (hot) money inflows that force further official foreign exchange interventions. The degree of reserve accumulation becomes a positive function of the domestic interest rate.

The PBC was not able to fully sterilise the monetary effects of reserve accumulation via bond sales. The small size and limited liquidity of the Chinese capital market did not allow issuing an unlimited amount of central bank bills (without substantial hikes in interest rates). And the central bank tended to hold the interest rate on central bank bills below the market rates (Figure 6) to minimise the sterilisation costs.[9] The sterilisation costs originating in central bank bill sales further grew when interest rates started to rise after 2005.

Since 2005, therefore, an increasing proportion of the rapidly accumulating official foreign exchange reserves was sterilised by requiring commercial banks to hold ever-larger deposits with the PBC (Figure 11). These required reserves were remunerated at a substantially lower rate than the central bank bills.[10] For instance, in April 2008 the interest rate on 1–year central bank bills was roughly 4% while required reserves were remunerated at 1.9%. The required reserve ratio increased from 6% in August 2003 to 17.5% in June 2008. In addition, by requiring the commercial banks to hold some of their additional reserves in dollars, the PBC could mop up dollars from Chinese capital markets before they were exchanged into domestic currency.

Requiring commercial bank reserves to be held in dollars reduces the need for outright official foreign exchange intervention, but also shifts the sterilisation costs to the banking sector because the remuneration rate on required reserves is low. The central bank becomes "immune" from revaluation losses because a declining yuan value of the dollar bonds on the asset side of the balance sheet is matched by a declining yuan value of commercial bank reserves on the liability side. More of the revaluation losses are born by the commercial banks, thus resulting in a wider spread between their deposit and loan rates of interest.

If sterilisation costs and revaluation losses are shifted to the commercial banks, the lending activities of the commercial banks are restricted in two ways. First, claims on the nonbank private sector are replaced by claims on the central bank. Lending to the private nonbank sector shrinks as reflected by rising lending rates of interest. Second, insofar as revaluation losses reduce the equity of the commercial banks, lending to the nonbank private sector declines further. Because these sterilisation operations reduce investment activities in Chinese enterprises, they incidentally further increase China's net saving surplus. Perversely, the restrictive monetary policy measures taken by the PBC in response to both the need for sterilisation and the rising inflationary pressure have, since 2006, contributed to a larger current account surplus.

The fast growth of assets and liabilities on the PBC's balance sheet, as shown in Figure 11, shows both the tremendous speed of foreign exchange accumulation and the determined sterilisation attempts. Nevertheless, the PBC was only able to sterilise partially the monetary effects of reserve accumulation, in 2007 to about 70%. Given international capital mobility, the ever tightening of the domestic money supply induces an upward shift in domestic interest rates that triggers additional hot money inflows. This effect is even stronger, when – as during 2007 and 2008 – interest rates in the US decline sharply.

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[9] In a repressed financial system the central bank can "force" commercial banks to hold low interest rate central bank bonds. By doing this the central bank shifts sterilisation costs to the banking sector.

[10] In Figure 11, "deposits" include both required and excess commercial bank reserves. But the former greatly exceed the latter.

Because of fast reserve accumulation and limited sterilisation, currency in circulation – which is one measure of monetary expansion in the Chinese economy – expanded fast as indicated by the bold black line in Figure 11. The annual growth rate of currency in circulation rose from roughly 5% in 2000 up to 46% in 2007. On average, currency in circulation rose by 30% per year since the turn of the millennium. Going back to Figure 5, broad money (M2) also expanded significantly faster than output – although nobody knows what the "true" noninflationary growth in the demand for any monetary aggregate might be.

Open interest parity and monetary control

Can interest rate movements in China compensate for an ever-higher renminbi in securing domestic portfolio balance? For China, from 1994 through 2005 with the tight dollar peg, interest rate convergence with the United States was incomplete for several reasons. First, because the capital account was liberalised only gradually, international capital market arbitrage remained incomplete.[11] Second, domestic interest rates were subject to political restraints, for instance in form of government controlled bank deposit and lending rates. Third, although the tight dollar peg kept expectations stable in Phase 2, after 2004, uncertainty increased when the yuan started to crawl upward against the dollar at a gradually rising speed.

Figure 12 shows the shifting relationship between movements in the yuan/dollar exchange rate and the interest differential between dollar and renminbi assets from 2002 to 2008. We use annualised overnight money market rates that, by and large, are determined by market forces in both the US and China. These are plotted against year-over-year yuan/dollar exchange rate changes. Before mid 2005, the yuan/dollar rate was stable as per our "Phase 2". Before 2004, there was no sustained movement in the interest differential although Chinese interest rates remained a bit higher and more volatile.

But, by mid 2004, China bashing induced Chinese interest rates to begin falling relative to American as if the market was anticipating the modest revaluations that did actually begin on July 21, 2005. The interest differential became negative in early 2005 and, by the end of 2006, Chinese interest rates were as much as 4 percentage less than American (Chinese rates fell a bit as American rose.) Figure 12 shows that, in 2005–06, the interest differential just matched the percentage changes in the yuan dollar rate – as if the principle of *open interest parity* (OIP) held.

$$\text{OIP (2005–06):} \quad i_{Ch} = i_{US} + E(\Delta e), \quad \text{where } E(\Delta e) < 0,\ e = \text{yuan/dollar} \tag{1}$$

Up to January 2007, the gradual appreciation of the Chinese RMB against the dollar reflected roughly the interest rate differential between the two countries – as per the principle of open or uncovered interest parity. As long as private holdings of dollar assets within China were significant and the rate of predictable appreciation of the RMB was modest, a rough portfolio equilibrium between renminbi and dollar assets was maintained. Dollar holders within China were not penalised by the moderate appreciation because they received a higher interest rate.

[11] China followed a gradual capital market liberalisation strategy. The renminbi became convertible on current account transactions on November, 1st 1996. Since then the regulations on the capital account were gradually eased. First, in- and outflows of FDIs were deregulated. Second, short-term capital inflows were eased. Third, in December 2006 China opened up the market for foreign banks by relaxing restrictions for the ownership of banks by foreigners. Forth, in 2007 the channels for capital outflows were expanded by increasing quotas for qualified domestic and foreign institutional investors.

Our hypothesis, that the well signalled appreciation of the renminbi initially kept Chinese interest rates below American in 2005–06 when US interest rates were increasing, can never be proved of course. However, the relatively low Chinese interest rates in this period eased the monetary control problem of the PBC: the incentives to bring hot money into the country were dampened, and there may even have been some very modest private capital outflows (Figure 9). So the sterilisation problem confronted by the PBC was manageable.

Even if well established, however, open interest parity can still be undermined by macroeconomic shocks. In China's case, the rate of exchange appreciation increased above 3 to 4 percent, and, by early 2007 people began to expect 6 to 8 percent annual appreciation. In addition, the US short-term federal funds rate fell precipitately from 5.25 percent in August 2007 to just 2 percent by August 2008. So interest rates on RMB assets could no longer be pushed below those on dollar assets to reflect expected exchange appreciation. To further aggravate the situation, the PBC began to increase some interest rates on renminbi assets to "fight inflation" (Figure 6).

Thus, asset market equilibrium, as measured by uncovered interest parity, spun out of control. Chinese interest rates rose above American *despite* the expectation that the renminbi would continue to appreciate. By August 2008, Figure 13 shows (at one year maturities) Chinese deposit rates rising almost 2 percentage above dollar LIBOR rates in London. Unsurprisingly, within China, private individuals and institutions have unloaded all their discretionary dollar assets in favour of renminbi. The result is a "corner" solution: no internal private holdings of dollar assets unless subsidised by the government. Consequently, in 2007–08, the covered interest arbitrage condition (1) fails.

OIP Fails(2007–08): $iCh >> iUS + E(\Delta e)$, where $E(\Delta e) < 0$ (2)

Hot money inflows from abroad into China accelerated. As shown in Figure 9, in 2007 short-term capital flows as well as errors and omissions (which can be interpreted as unrecorded hot money flows) turned from net outflows into inflows adding to the appreciation pressure. In 2008, this trend can be assumed to have been even stronger.

The (opportunity) costs of reserve accumulation and sterilisation can be seen as a proxy for the future appreciation of the yuan/dollar rate. In this context appreciation expectation can be self-fulfilling as appreciation expectations become sustained thereby triggering new hot money inflows.

Alternatively the opportunity costs of holding dollar assets can be expressed in terms of the real value to the dollar assets by deflating Chinese foreign reserves by world inflation and alternatively by oil prices. As shown in Figure 14, the nominal worth has skyrocketed while the real worth has lagged behind. In particular, if oil prices (UK Brent) are used as a deflator, since 2004, the real worth of China's official exchange reserves has stagnated.

During most of the 2000s, the Peoples Bank of China was able to restrict the inflationary pressure of fast reserve accumulation by extensive sterilisation operations. In addition, the influx of a vast amount of migrant workers from rural areas to the industrial centres helped to keep the upward pressure on wages and inflation low. For a high growth economy, inflation rates remained surprisingly low, sometimes turning even into deflation. Growing exports of cheap Chinese manufacturing goods also softened inflationary pressure in both industrial countries and other emerging market economies. Wage competition from China contributed to wage austerity in the industrialised countries. Up to 2007, central banks around the world were praised for having achieved an unprecedented degree of price stability – sometimes called "the great moderation".

Figure 15 shows that consumer price inflation in China increased in 2004 with low US interest rates, but then fell in 2005–06 when US interest rates rose and so reduced capital inflows into China. However, after August 2007 when US interest rates started to decline

again, the inflationary outlook for China and the world changed dramatically. Official reserve accumulation further accelerated, raw material and food prices soared, and monetary growth in China got out of control. By May 2008, Chinese consumer price inflation had climbed above 8% (Figure 15). With consumer prices rising, Chinese wage increases will put additional upward pressure on international prices for Chinese manufacturing products.

In 2007–08, China has changed from being a deflationary force for the world economy into an inflationary one. The combination of internal inflation and an appreciating renminbi is now raising the dollar prices of Chinese manufactured goods shipped to the United States – as shown in Figure 16. Before 2007 (slightly) falling dollar prices for goods imported from China helped to keep US inflation low. Since then, however, the dollar prices of Chinese goods shipped to the US have spiked upward. The impact of China on world inflation is further amplified by its overheated economy's demand for industrial raw materials and primary food products. True, even without internal inflation, China's rapid growth could well have bid up primary products prices. But in the economy's current overheated state, it seems plausible that its demand for primary products is greater and so accentuates the bubble in world commodity prices.

4. Overcoming three misconceptions about currency stabilisation

Because China's current monetary and exchange rate impasse – with its one-way bet in the foreign exchange markets – is overheating its economy with unwanted inflation, its government is inhibited from taking appropriate actions to reduce its ballooning net trade (saving) surplus. Obvious steps for reducing "excess" net saving – such as cutting taxes and increasing government social expenditures would have a near-term inflationary impact. Less obvious is the impact on net saving of forcing (or encouraging) much higher dividend payouts from China's corporate sector; but, under certain conditions, that too could be expansionary.

Meanwhile, China's current account surplus, uncovered by outflows of private capital, continually worsens the monetary impasse. Figure 17 shows the recent "frensied" build up of exchange reserves so far in 2008 reaching US$100 billion per month, which is much higher than the monthly current account surplus. Because foreigners misinterpret the trade surplus and accumulating official exchange reserves to be evidence of an undervalued currency, they call for further appreciation of the renminbi. This foreign pressure strengthens the expectation that the renmimbi will be higher in the future, thus causing more inflows of hot money.

What is the best way to escape from this conundrum? China can't end its exchange rate impasse, and the worldwide monetary turmoil that goes with it, on its own. With proper foreign cooperation, however, the monetary impasse from the one-way bet in the foreign exchange markets could be resolved rather quickly. Thus, currency stabilisation should *precede* measures to correct the saving-investment imbalance – which may take months or years to be effective both in China and abroad.

Nevertheless, to be successful, the political economy of any international agreement likely requires both as a package deal. China bashing to get the renminbi up can only be stopped if China proposes definite fiscal measures to reduce its future saving surpluses – possibly in conjunction with US efforts to reduce America's saving deficiency, and overly loose domestic monetary policy leading to a weak dollar.

Populist politics aside, what inhibits China and the United States (representing the interests of the industrial economies more generally) from agreeing on such a package deal that would be of such great mutual benefit? Three common misconceptions in economic theory on the role of the exchange rate inhibit any political agreement to stabilise China's currency. Let us consider each in turn

Misconception #1: *the exchange rate can affect the trade balance.*

Many, if not most, economists believe that a country's net trade balance can be controlled by manipulating the level of its exchange rate. However, a current account surplus (dominated by a trade surplus) just reflects a surplus of saving over investment at home – and the converse abroad. Thus, how a discrete appreciation of a creditor country's currency will eliminate its saving surplus is neither obvious nor unambiguous. True, its goods would become more expensive to foreigners – the relative price effect. But, in an economy open to international capital flows, domestic investment would fall because appreciation makes the country a more expensive place in which to produce. Also, because China owns huge stocks of foreign currency claims (largely dollars), a negative wealth effect from having the dollar fall against the renminbi would further reduce domestic expenditures – including for imports. This decline in imports offsets the dampening effect of higher foreign currency prices for exports so as to leave any change in the net trade balance small and ambiguous (Qiao 2007).

To illustrate this exchange rate – trade balance misconception, it is instructive to revisit the consequences of Japan bashing to get the yen up more than three decades earlier starting with the Nixon shock of August 1971. The yen rose episodically from 360 to the dollar in early 1971 to touch 80 to the dollar in April 1995. "Despite" this enormous cumulative appreciation, Japan's net trade surplus rose from being negligible in the 1960s to average about 2 percent of GDP in the 1970s, peaked out at about 5 percent in the late 1980s, and remains close to four percent of GDP in 2008 with the yen at 100–110 to the dollar. Massive currency fluctuations had no systematic impact on Japan's net trade (saving) balance.

However, the great nominal appreciations of the yen against the dollar, which Japan more or less welcomed during the worldwide inflation of the 1970s, eventually unhinged Japan's macro economy (McKinnon and Ohno 1997). In the late 1980s, the syndrome of the ever-higher yen provoked bubbles in Japan's stock and land markets along with a falling WPI. When the bubbles broke in 1990–91 followed by a further sharp rise in the yen in 1994–95, Japan was thrown into deflationary slump: its infamous "lost decade" of 1992 to 2002. Foreign exchange risk created (and still sustains) a near zero interest liquidity trap that renders monetary policy virtually impotent for stimulating domestic spending. (Goyal and McKinnon , 2003). Although Japan has had modest export-led GDP annual growth of 2 to 3 percent since 2002, a deflationary hangover continues: wages and consumption are stagnant (McKinnon, 2007b).

Misconception #2: *Ongoing exchange rate appreciation reduces inflation*

The second, but more subtle, misconception is that ongoing exchange appreciation can reduce domestic price inflation – or, at the very least, insulate the economy from international inflation. China gets much gratuitous advice to appreciate faster in order to "fight inflation". This admonition is certainly true in the long run, as Japan's unfortunate experience with eventual deflation from yen appreciation attests. However, for a country emerging from a fixed nominal exchange rate where domestic and foreign rates of price inflation had been more or less aligned, the near-term effect of a well-telegraphed transition to an appreciating currency can be highly inflationary – as with China's current monetary impasse. In the near-term transition, the inflationary impact from the loss of monetary control can overwhelm the deflationary impact of a higher level of the exchange rate.

Again, let us refer to Japan's earlier experience with this transition problem. Under the Bretton Woods system of fixed exchange rate parities, the yen had been successfully fixed at 360 to the dollar from 1949 to August 1971, so that price inflation in tradable goods (WPI) between the US and Japan were similar. As early as 1970, however, market participants began to project that the dollar might be depreciated. Hot money began to flow out of the United States into European countries as well as Japan (despite its capital controls). In order

to prevent more precipitate appreciation, in 1971–72 the Bank of Japan intervened heavily in the foreign exchange markets with a rapid buildup of foreign exchange reserves and surge in domestic money growth. By 1974, annualised WPI inflation in Japan became higher than in the United States: 31.3 percent versus "just" 18.9 percent in the US. Only in the late 1970s did Japanese inflation fall below American – the "long run" relative deflationary effect of a higher yen that most economists expect. But the length and strength of the near term inflationary transition was surprising. China is still in the inflationary "near-term" which, with no change in present circumstances of arm twisting to get the renminbi up, could continue for an uncomfortably long time.

Are there circumstances where China should acquiesce to continual reminbi appreciation? Clearly if the centre country under the world dollar standard continues to inflate too much, the People's Bank of China would have little choice but to acquiesce to a managed ongoing appreciation of the renminbi against the dollar. However, the current rate of appreciation is too rapid for securing either near-term monetary control in China or long-term price-level alignment with the United States.

Misconception # 3: *Floating the rate would equilibrate the foreign exchange market.*

"Flexibility" is a nicer word than floating. Couldn't the PBC simply withdraw from the foreign exchange market and let the exchange rate be determined by private market makers – much in the way that the euro's value against the dollar is determined? No, because this proposed solution presumes that a determinate market exchange rate – which could balance the demand and supply of dollars in terms of renminbi – actually exists if the PBC were to exit the market. Unlike the Europe-United States situation, however, China faces an ongoing *currency mismatch* leading to the syndrome of "conflicted virtue" (McKinnon and Schnabl 2004, and McKinnon 2005) that prevents private market makers from clearing the excess supply of dollars.

What causes the mismatch that undermines the case for floating? The renminbi, like the currencies of other developing economies, is not used significantly for international borrowing or lending; but China couples this gap in its capital markets with an enormous saving (trade) surplus. Thus dollar, rather than renminbi, claims on foreigners continually pile up within the economy. (The dollar is the "default" international money.) Natural private market makers such as Chinese banks – or even insurance companies and pension funds – all have their liabilities to depositors, policy holders, and so forth, denominated in renminbi. Thus, even if the yuan/dollar rate fluctuated only randomly, Chinese financial institutions would be exposed to too much exchange risk (relative to their limited capital) to allow dollar assets continually to pile up on their balance sheets. At some point, they would stop buying new dollar claims associated with the ongoing trade surplus. Consequently, a free float would result in an indefinite upward spiral of the renminbi against the dollar – with no well-defined balance point where Chinese financial institutions become sufficiently willing buyers of dollar assets to stop their further depreciation.

This third misconception is linked to the first. A floating but appreciating renminbi would not predictably reduce China's trade surplus, and dollars would continue to pour into the economy. On the other hand, if China was not an immature creditor country because foreign trade (net saving) was close to being balanced, then no substantial internal currency mismatch would exist and an uneasy float could be possible.[12]

[12] The non feasibility of a pure float applies symmetrically to a chronic debtor economy whose debts are denominated in foreign currencies, say dollars, that continue to pile up from ongoing trade deficits. Again there is an internal currency mismatch where domestic foreign currency debtors are threatened with bankruptcy

However, the issue is somewhat broader. Suppose China did not have a chronic saving surplus, but its bond markets were still not well developed at different terms to maturity, and there were residual capital controls (as in most developing economies). Then forward markets for private hedging against currency risk becomes difficult to organise and expensive. So, willy nilly, if the government attempted to float the rate, it would soon be drawn back to smooth exchange fluctuations – if only at higher frequencies – in order to reduce the risks seen by exporters and importers. This "fear of floating" is well documented by Carmen Reinhart and Guillermo Calvo (2000 and 2002).

5. Toward a credibly fixed exchange rate

Overcoming these three misconceptions about the exchange rate is crucial for stabilising China's monetary system. For a developing country like China on the periphery of the dollar standard, the exchange rate is best considered just an extension of domestic monetary policy – and not an instrument of trade policy. This monetary approach to the exchange rate suggests that China should reset the yuan/dollar exchange rate and adjust domestic monetary policy through time to keep it stable, as was the case between 1995 and 2004, ie phase 2 in Figure 2.

What should this new rate be? The precise level of the new rate is much less important than having it credibly stable into the indefinite future. However, with the unfortunate recent history of bashing China to get the rate up, an international understanding or more formal agreement to end China bashing is now necessary for any new fix to be sufficiently credible to eliminate the one-way bet on future renminbi appreciation. If such an agreement were forthcoming "today" (mid–2008), the PBC should simply pick today's rate of 6.8 yuan per dollar as the central rate – within the conventional narrow band of ±0.3 percent – to be continued forward.

Ending China bashing through a political agreement is not as far fetched as it might first seem. After almost 25 years of Japan bashing to get the yen up, in April 1995 US Treasury Secretary Robert Rubin announced a new "strong dollar policy", and Japan bashing ceased. The US Federal Reserve Bank and Bank of Japan intervened jointly several times in the summer of 1995 to quash any further yen appreciation. Although this strong dollar policy saved Japan from further deflationary ruin, it was just a ceiling on the yen and not a stable fix. Subsequent fluctuations in the yen/dollar rate, when domestic holdings of dollar assets are large, have destabilised the Japanese financial system and tightened its low interest rate liquidity trap. But this interest rate story is a digression for another time (McKinnon 2007b).

In the Chinese case, it would be sufficient to stabilise the renminbi if foreign pressure to appreciate ceased. Then the PBC itself could reset the yuan/dollar rate so as to eliminate the one way bet on ongoing appreciation. A massive outflow of *private* capital largely intermediated by Chinese banks, insurance companies, pension funds, and so forth, would surely follow as these institutions would be more than happy to diversify into foreign assets once the one-way bet was eliminated.

With normal private sector finance for China's huge current account surplus, the PBC could stop purchasing dollar assets on a large scale. Indeed, if the new capital outflow exceeded the current account surplus , the PBC might have to sell some of China's absurdly high dollar

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should the domestic currency depreciate – and the threat thereof could easily precipitate a run out of the domestic currency. This was the case in the great Asian crisis of 1997–98 as the five countries involved had run trade deficits for several years and built up large (private) dollar debts.

reserves to keep the renminbi fixed against the dollar at the newly reset rate. In any event, the PBC could regain control over the domestic money supply while reducing reserve requirements on domestic banks. Inflation would come down and the efficiency of both domestic and international financial intermediation would improve. The credit crunch in US financial markets would be eased as private capital flowed back to the United States.

Finally, once its domestic monetary and exchange rate system was stabilised, China could then proceed deliberately to reduce excess domestic saving relative to its huge domestic investment without worrying about exacerbating near-term inflation. But to analyse desirable long-term changes in China's tax, spending, and dividend policies would be a major exercise in public finance beyond the scope of this paper.

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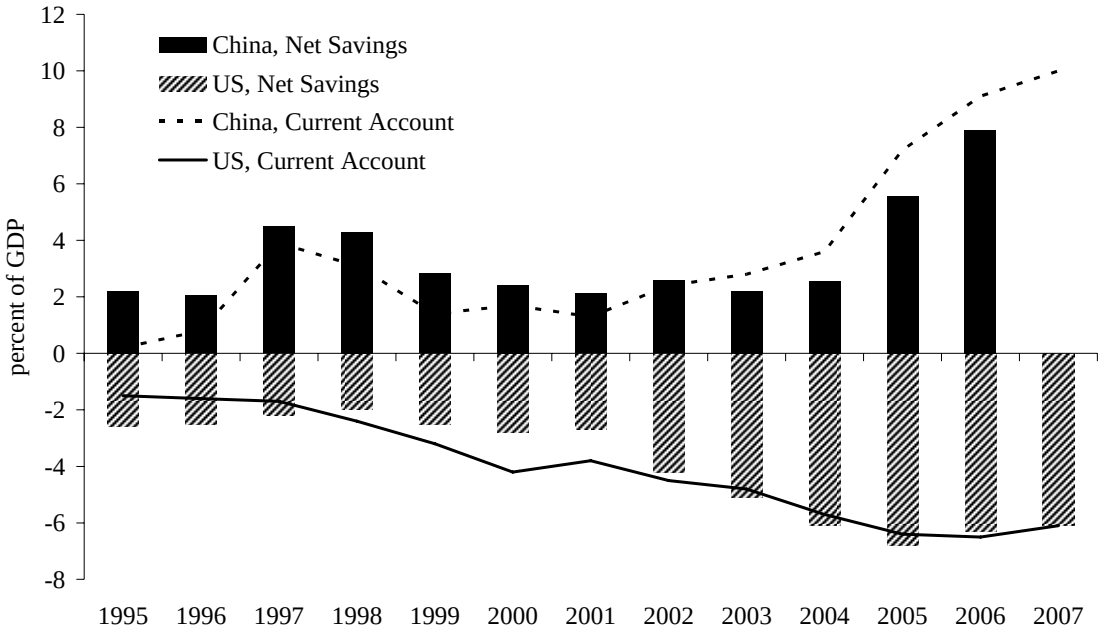
Figure 1

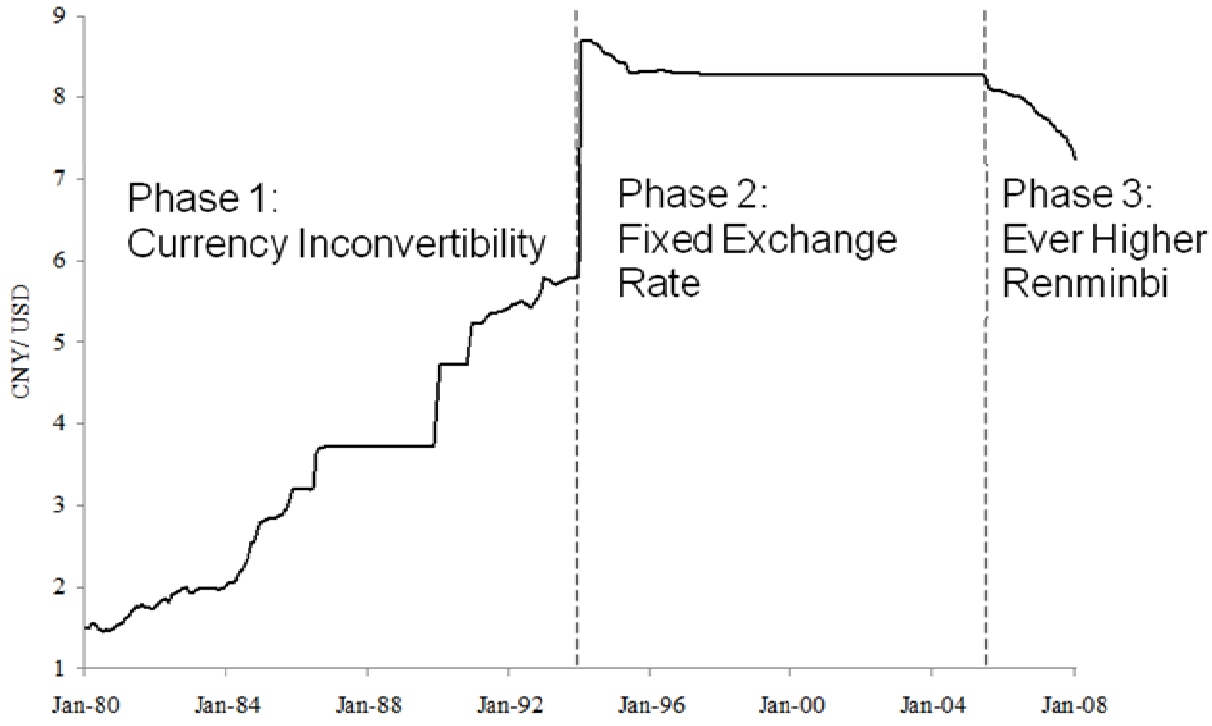
Saving-investment balance and current account, China and US



Source: IMF: WEO, IFS.

Figure 2

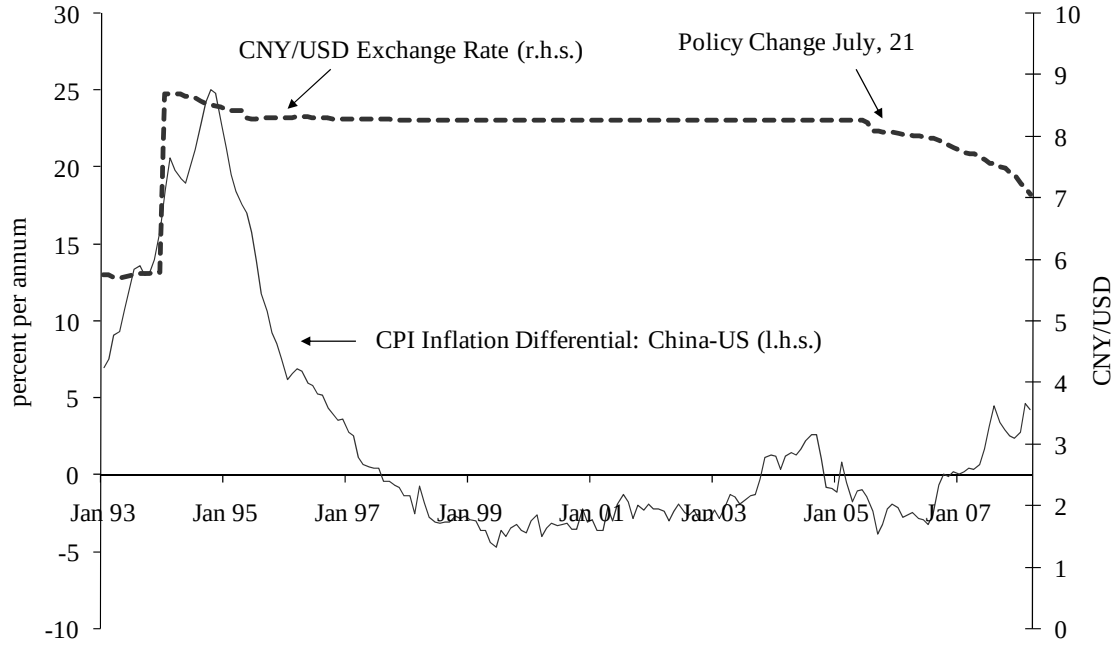
Exchange rate CNY/USD, 1980–2008



Source: IMF.

Figure 3

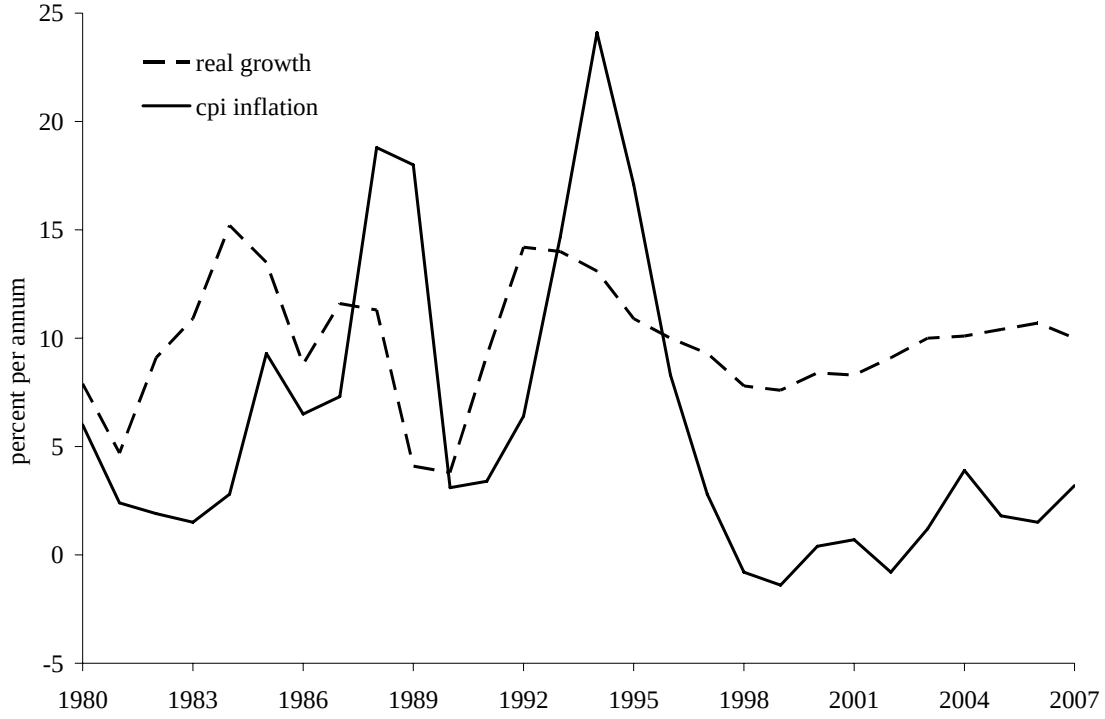
Yuan/Dollar exchange and China-US inflation differential



Source: IFS.

Figure 4

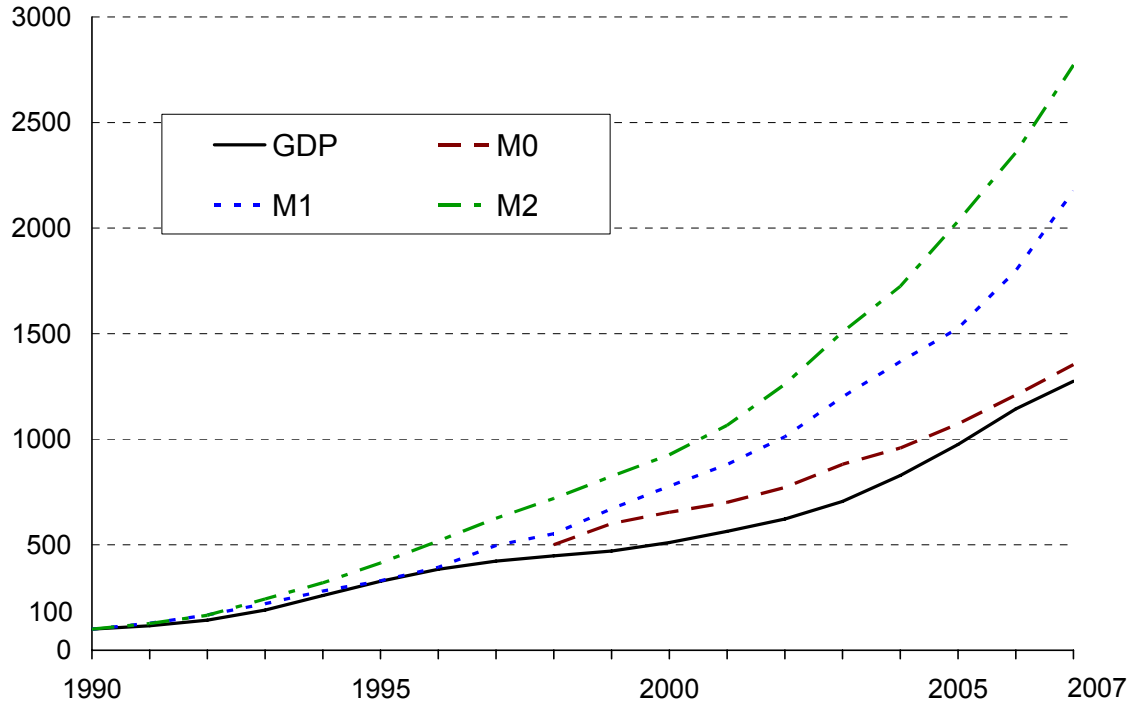
Real GDP growth and consumer price inflation, China, 1980–2007



Source: IMF.

Figure 5

Money supply and nominal GDP, China, 1990–2007

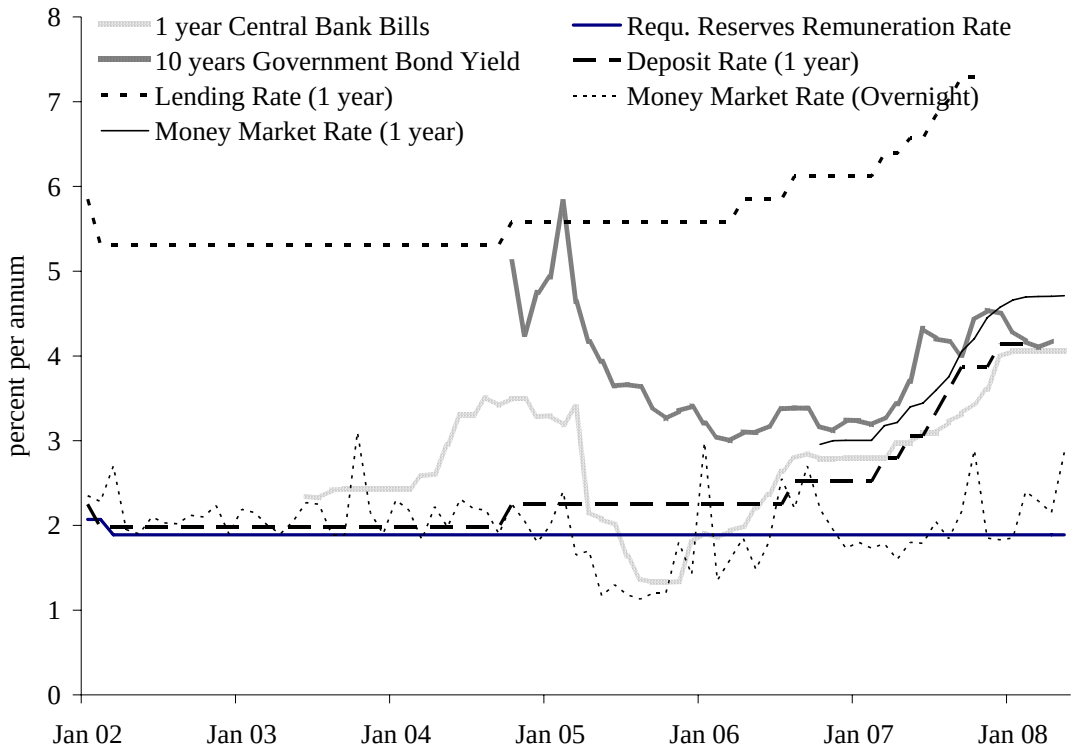


Source: IMF.

Note: Data in 1990 are based to 100 except M0. For M0, data in 1998 is based to 500.

Figure 6

The fragmented structure of Chinese interest rates, 2002–2008

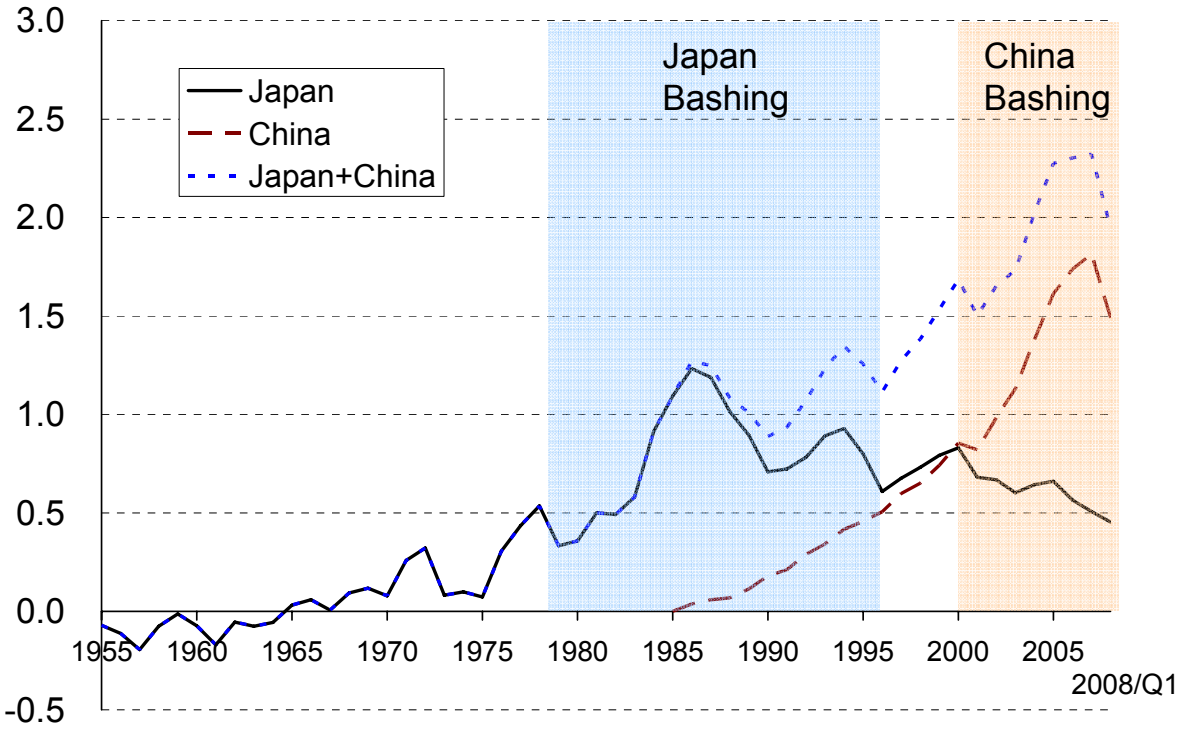


Source: Datastream.

Figure 7

Bilateral trade balances of Japan and China versus the United States

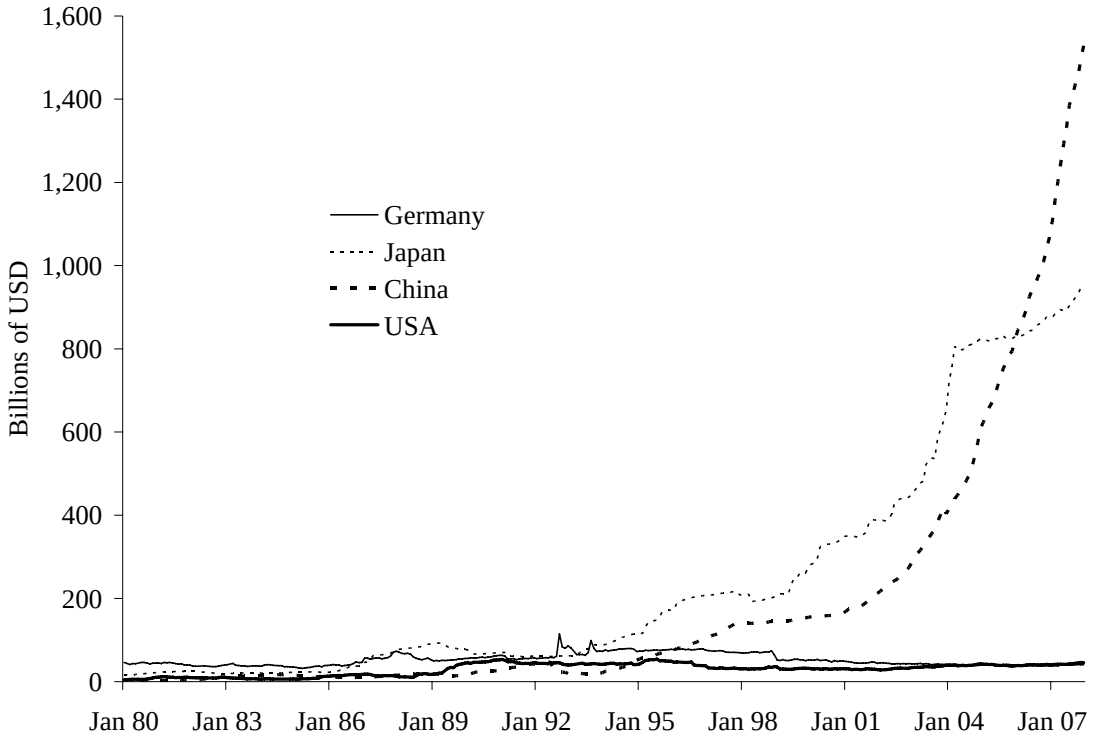
(percent of US GDP)



Source: IMF.

Figure 8

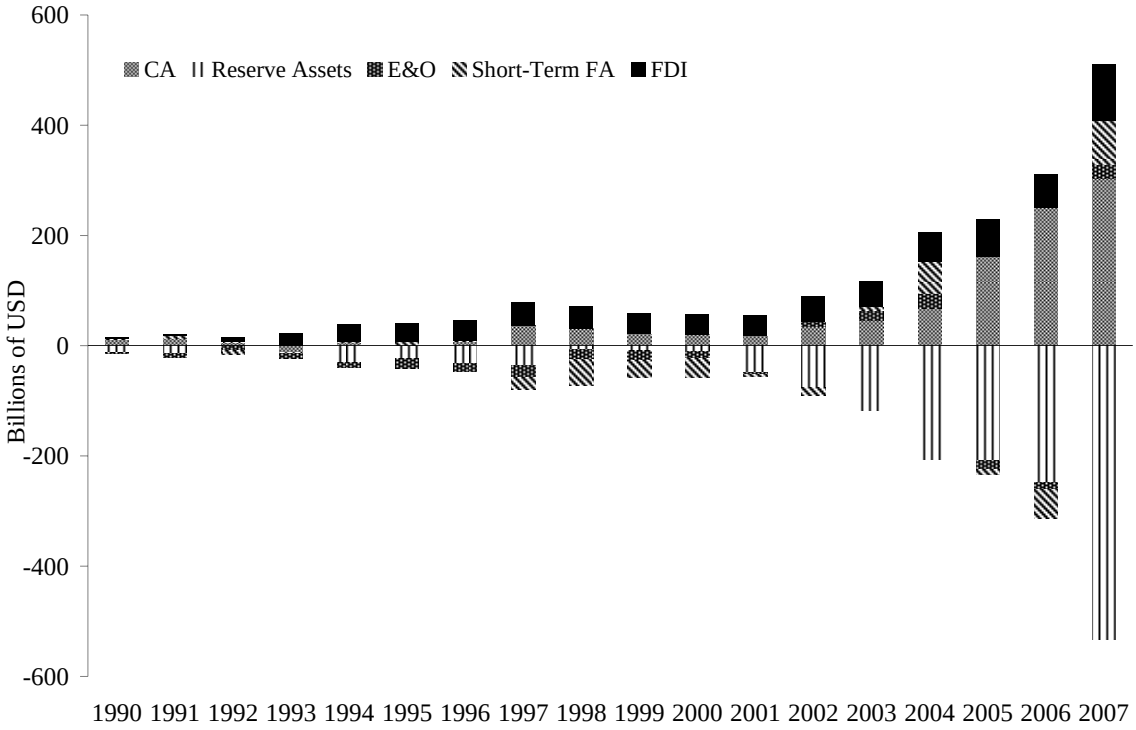
Foreign reserves of China, Japan, Germany and US, 1990–2007



Source: IMF, Peoples Bank of China.

Figure 9

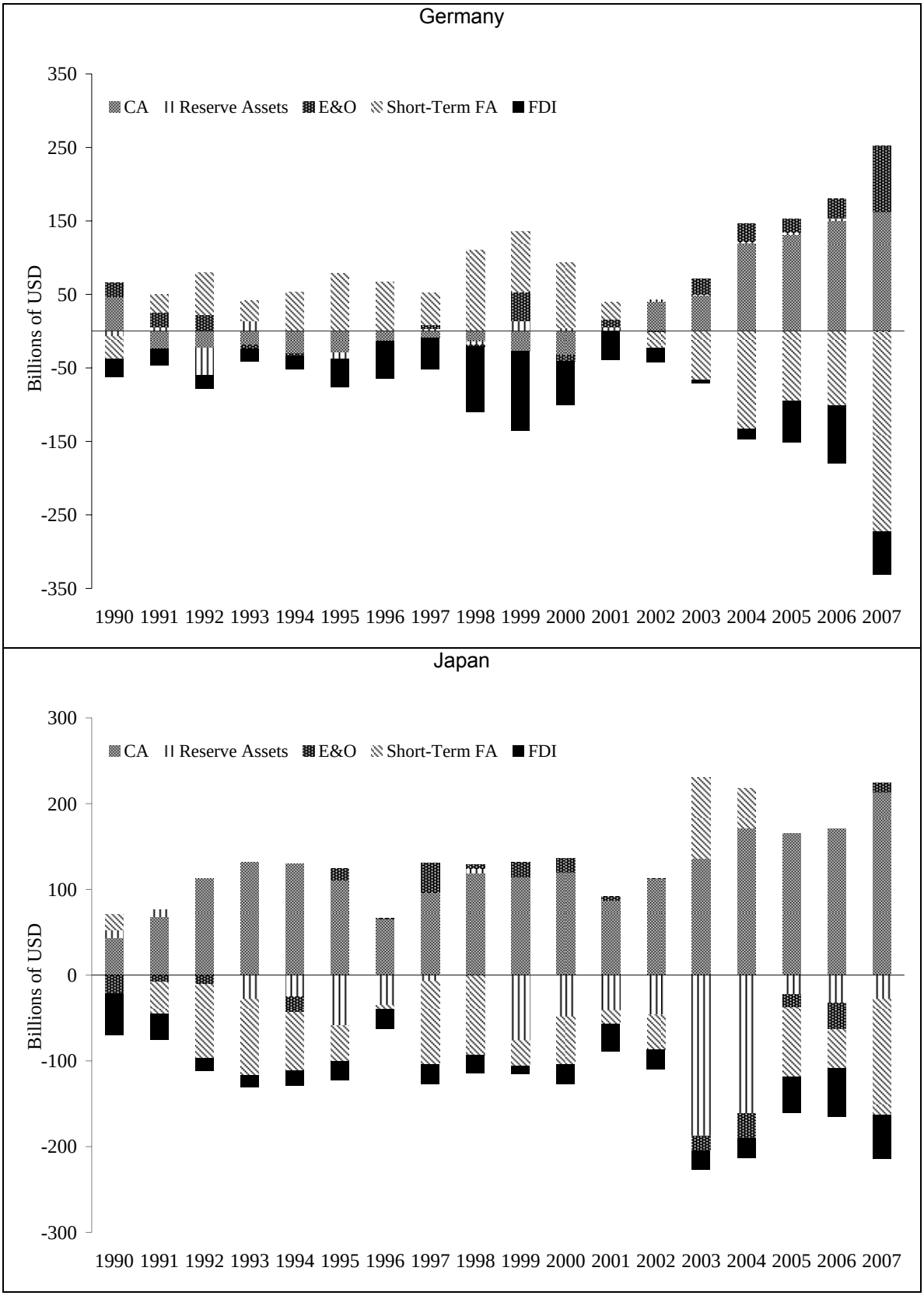
Balance of payments, China, 1990–2007



Source: IFS, WEO, SAFE. 2007 approximated.

Figure10

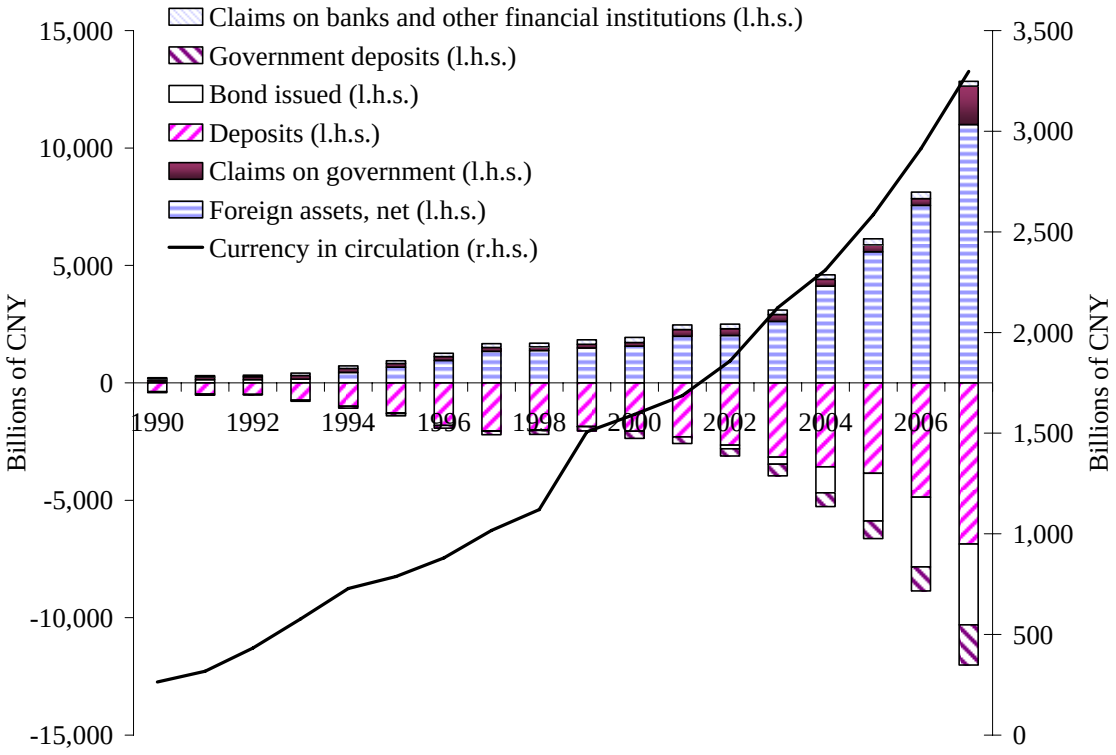
Balance of payments, Germany and Japan, 1980–2007



Source: WEO, OECD, Deutsche Bundesbank, Japan: MoF. 2007 approximated.

Figure 11

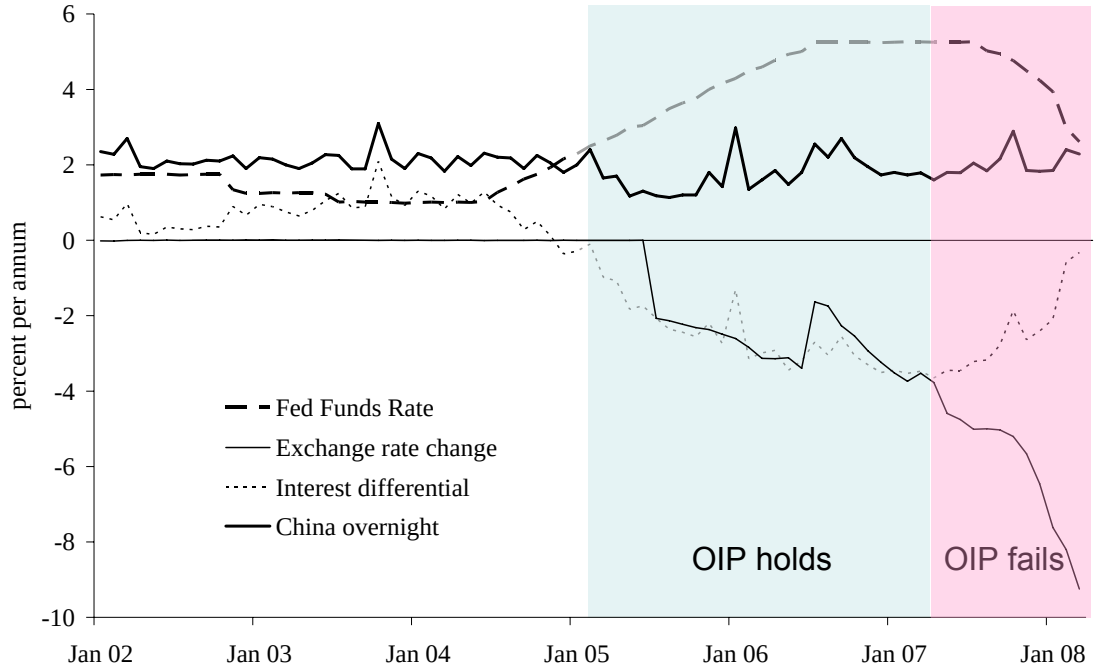
Peoples' Bank of China sterilisation operations



Source: IMF, Peoples Bank of China.

Figure 12

Short-term interest differentials versus percentage changes in the Yuan/Dollar exchange rate: China, 2002–2008



Source: Ecowin Database.

Note: OIP is Open Interest Parity

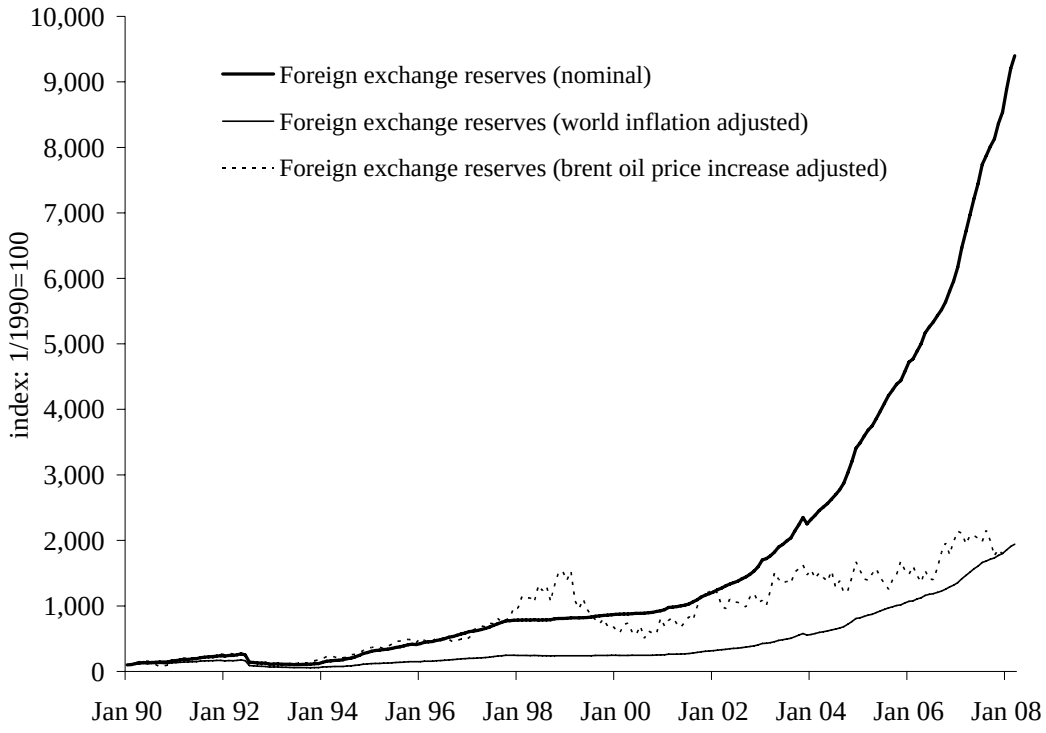
Figure 13

Interest rates of the US and China

Source: UBS

Figure 14

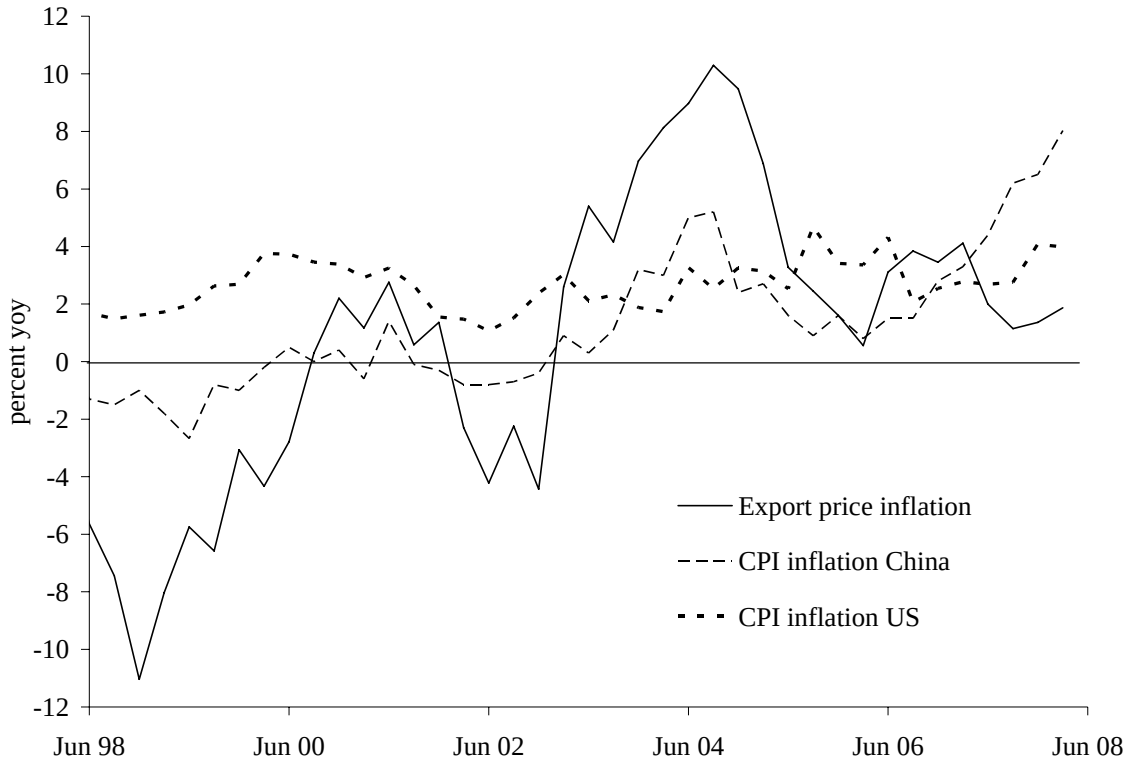
Nominal and real value of Chinese foreign reserves, 1998–2008



Source: Ecowin Database.

Figure 15

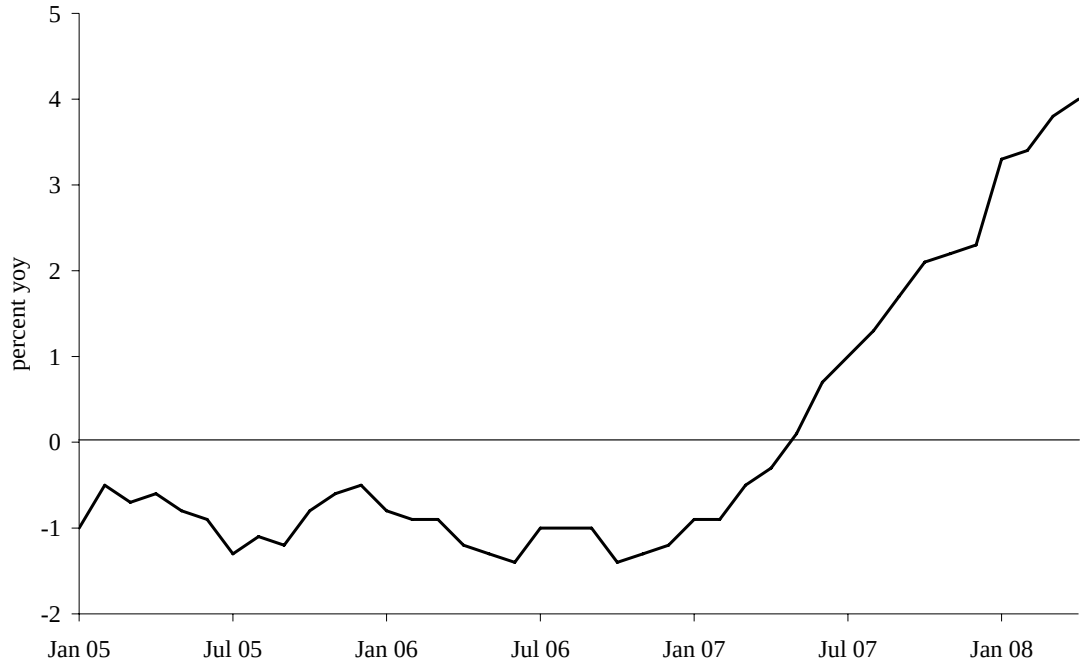
Inflation, China and US, 1998–2008



Source: Ecowin Database.

Figure 16

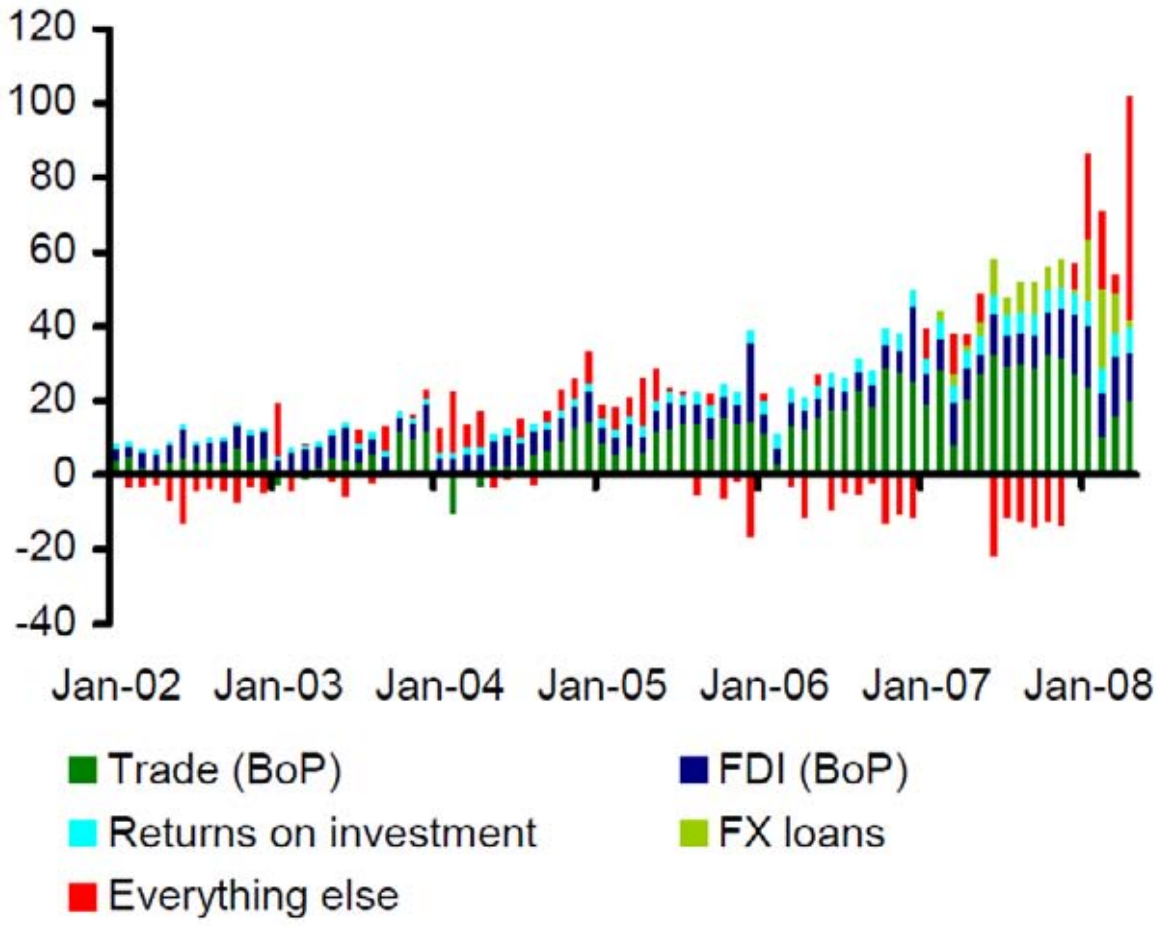
US price inflation over imports from China, 2005–2008



Source: Ecowin Database.

Figure 17

Monthly foreign reserve build-up, China, 2002–2008



Source: Standard Chartered.

Table 1

Foreign reserve holdings and base money of the PBC, 1990–2007

	Reserves	Base Money	Reserves / Base Money	Δ Reserves	Δ Base Money	Δ Reserves / Δ Base Money
1990	82.0	638.7	12.8%	41.5	147.6	28.1%
1991	140.0	793.1	17.6%	57.9	154.4	37.5%
1992	133.0	922.8	14.4%	–6.9	129.7	–5.3%
1993	155.0	1314.7	11.8%	21.9	391.9	5.6%
1994	445.1	1721.8	25.9%	290.2	407.1	71.3%
1995	667.0	2076.0	32.1%	221.8	354.2	62.6%
1996	956.2	2688.9	35.6%	289.3	612.9	47.2%
1997	1345.2	3063.3	43.9%	389.0	374.4	103.9%
1998	1376.2	3133.5	43.9%	31.0	70.3	44.1%
1999	1485.8	3362.0	44.2%	109.6	228.5	48.0%
2000	1558.3	3649.2	42.7%	72.5	287.2	25.3%
2001	1986.0	3985.2	49.8%	427.8	336.0	127.3%
2002	2324.3	4513.8	51.5%	338.3	528.7	64.0%
2003	3114.2	5284.1	58.9%	789.9	770.3	102.5%
2004	4696.0	5885.6	79.8%	1581.8	601.5	263.0%
2005	6344.0	6434.3	98.6%	1648.0	548.7	300.3%
2006	8577.3	7775.8	110.3%	2233.3	1341.5	166.5%
2007	12217.1	9243.3	132.2%	3639.8	1467.5	248.0%

Source: IFS, WEO; OECD. Billion CNY.

Massive and persistent resistance to substantial and necessary appreciation of the renminbi by the Chinese authorities: a comment on McKinnon and Schnabl

By Michael Mussa[1]

Thank you very much Governor Al-Sayari. It is a great pleasure to participate in this Conference honouring Bill White on the occasion of his retirement as the Chief Economist of the BIS. I have known Bill for seventeen years, first when he was Deputy Governor of the Bank of Canada and more recently in his role at the BIS. Like most of you here, I have not always agreed with Bill on every point, although I have agreed with him far more often than not. Even when we have disagreed, I have always admired that Bill's papers and comments made important points clearly and succinctly, leaving no doubt about the facts and analysis backing Bill's position.

Following in that tradition, I note that while there are a number of points where I agree with the analysis of McKinnon and Schnabl, especially their focus on monetary developments analysing in China's exchange rate, I disagree fundamentally with their basic conclusion and would characterise it as economic nonsense.[2] Since 2002, the Chinese renminbi has become increasingly undervalued on a real effective basis, as is reflected in a massive expansion of China's current account surplus to over 11 percent of GDP in 2007 and to a world record of 372 billion US dollars. The Chinese government's policy of massive, mainly sterilised intervention (exceeding $450 billion in 2007) to resist appreciation of the renminbi is both a key cause of this massive and growing balance of payments disequilibrium and a violation of China's obligation under the IMF Articles of Agreement to "avoid manipulating exchange rates or the international monetary system in order to prevent effective balance of payments adjustment or gain unfair competitive advantage over other members."

This criticism of China's exchange rate policy does not, as McKinnon and Schnabl assert, extend back to "…the mid 1990s." As a senior official of the IMF with direct responsibility for exchange rate surveillance, I know as a fact that while the Fund was already becoming concerned about the overvaluation of the US dollar (relative to longer-term fundamentals) in 1999-2001, the Fund expressed no general view that the renminbi was undervalued at least through June of 2001 (when I stepped down as Economic Counsellor).[3] Prominent critics of China's recent exchange rate policy, most notably my Peterson Institute colleagues Morris Goldstein and Nicholas Lardy, did not launch their analyses until 2003; see Goldstein (2004 and 2006) and Goldstein and Lardy (2003, 2006 and 2008)

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[1] Senior Fellow, The Peterson Institute of International Economics

[2] For this comment, I draw extensively on Mussa (2008).

[3] In 1997/98, IMF officials complemented the Chinese government for not contributing to a further deepening of the Asian crisis by holding the exchange rate of the renminbi against the dollar and not allowing it to depreciate.

The behaviour of China's exchange rate and balance of payments

The facts about China's exchange rate and related policies since 2002, in comparison with the preceding decade, are relevant to examining this controversy. Figure 1 shows two widely used measures of China's real effective exchange rate, as well as an estimated longer-run equilibrium path for this real exchange rate. The suggested equilibrium path embodies the assumption that the Balassa(1964)/Samuelson(1964) effect for China induces a 2 percent annual rate of appreciation of the real effective exchange rate. (Recent evidence on very rapid productivity growth in China's manufacturing industries suggests that the rate of appreciation of the equilibrium real effective exchange rate has probably picked up in the past few years; see Lardy 2007.)

Figure 1 indicates (by construction) that China's real effective exchange rate was somewhat undervalued relative to its longer run equilibrium path in the years immediately following the reform of the exchange rate regime at the beginning of 1994. As reported in Table 1, rapid domestic inflation in China, above the rates prevailing in its trading partners, soon eliminated this undervaluation. By 1997-98, much lower Chinese inflation, the general appreciation of the US dollar (to which the renminbi was pegged) and the collapse in the foreign exchange values of many Asian currencies against the dollar and the renminbi induced moderate overvaluation of the renminbi relative to its longer-term equilibrium path. In 2000-2001, the upward trend in the longer-run equilibrium rate and the recovery in the values of key Asian currencies from their crisis lows broadly offset the effects of continued general appreciation of the dollar against non-Asian currencies, leaving the real effective exchange rate of the renminbi approximately on its longer-run equilibrium path.

As reported in Table 1, during the nine years from 1994 through 2002, China's current account surplus as a share of GDP fluctuated from a low of 0.2 percent in 1995 to a high of 3.8 percent in 1997 and averaged 1.8 percent of GDP. The bulge up in this share in 1997-98 plausibly reflected the usual lagged response to the relative weakness of the renminbi exchange rate (relative to its longer-term equilibrium path) in 1994-96, and the decline in this share in 1999-2001 plausibly reflected the lagged response to the relative strength of the renminbi's real effective exchange rate in 1997-99.

In 2003, China's current account surplus (relative to GDP) begins its ultimately spectacular rise above the levels experienced in 1994-2002 (and in earlier years), reaching in 2007 a share of over 11 percent of GDP. Contrary to the intimations of McKinnon and Schnabl, this rapid and massive rise in China's current account surplus is not similar to the current account performances of Japan and Germany on another non-commodity exporting country of substantial size.

Looking for an explanation of this extraordinary recent surge in China's current account surplus, one naturally turns to the established tenants of international economics and the usual empirical regularises linking current account balances and movements in real effective exchange rates. As illustrated in Figure 1, since 2002 the real effective exchange rate of the renminbi has depreciated very substantially relative to its longer-run equilibrium path. One would normally expect that, with a lag, this real effective depreciation of the renminbi would be reflected in a substantial widening of China's current account surplus. There is no big surprise here. The standard analysis and empirical regularities of international economics work very well.

The role of Chinese exchange rate and related policies

The behaviour of the real effective exchange rate of the renminbi can be attributed to four proximate factors, but in the end it is fundamentally the consequence of China's exchange rate and related policies. The four proximate factors are (1) the continued and probably

accelerating real appreciation of the longer-run equilibrium real exchange rate of the renminbi reflecting very rapid productivity growth in China's traded goods industries; (2) substantial nominal and real depreciation of the US dollar against most of the world's currencies (including recently other important Asian currencies) except the renminbi; (3) a low inflation rate in China through 2006 that was on average below that in the United States and China's other major trading partners (excluding Japan); and (4) a nominal exchange rate for the renminbi that remained pegged at 8.28 to the US dollar until July 2005 and subsequently appreciated at about a 5 percent annual rate.

Of these four proximate factors, (1) and (2) were largely or entirely independent of China's exchange rate and related policies, but (3) and (4) were critically dependent on these policies. The nominal exchange rate of the renminbi did not remain constant and then appreciate only slowly against the US dollar because of the unimpeded operation of market forces. Since 2002, the Chinese authorities have had to intervene in the foreign exchange market on an increasing massive basis to prevent the renminbi from appreciating rapidly against the dollar. Cumulatively, the extent of this intervention is reflected in the enormous build up in China's official foreign exchange reserves (and probably some disguised reserve build up) since 2002 to become the world's largest, exceeding $1.5 trillion in 2007 and probably headed around $2 trillion in 2008.

Meanwhile, to prevent the massive accumulation of foreign exchange reserves from exploding the size of the domestic monetary base and generating rapid domestic inflation (potentially on the order of 25 to 30 percent per year), the Chinese authorities have sterilised the monetary effect of the reserve inflows. Between 2002 and 2007, these sterilisation operations amounted to 4.5 trillion renminbi, taking the net domestic assets of the People's Bank of China (PBOC) down from 2.2 trillion renminbi to minus 2.3 trillion renminbi. As indicated in Table 1, sharp annual declines in net domestic assets averaged about 4 ½ percent of China's GDP and offset about half of the annual gains in foreign exchange assets (which averaged about 10 percent of GDP). The net result was annual increases in the monetary base that averaged about 5 ½ percent, which was consistent with meeting the growing demand for base money implied by a rapidly expanding real economy with relatively low inflation (with the ratio of base money to GDP remaining near its normal ratio of about 37 percent).

What plausibly would have happened if the Chinese authorities had not sterilised most of the monetary effect of the foreign exchange reserve inflows resulting from their policy of determined restraint of appreciation of the renminbi? Indeed, what plausibly would have happened if the Chinese authorities had maintained the same ratios of net domestic assets and foreign exchange assets in the monetary base (both about 50 percent) that prevailed in 2002? We have a clear indication of the likely result from China's experience in 1994-96 when both, the net domestic assets and the foreign exchange assets of the PBOC were growing quite rapidly, leading to quite rapid growth of the monetary base, as reported in Table 1. In this period inflation in China was quite high and (as illustrated in Figure 1) the real effective exchange rate of the renminbi appreciated considerably, both absolutely and relative to its longer-run equilibrium path. With the usual lag of about two years or so, this strong real appreciation was reflected in a narrowing of China's current account surplus.

Looking more hypothetically at the period since 2002, suppose that we accept (temporarily) McKinnon and Schnabl's assertion that the current account balance is not sensitive to the real exchange rate. We may also accept their argument that some of the foreign exchange gains of the PBOC since 2002 (or at least since July 2005) reflected intervention needed to offset capital inflows motivated by expectations of appreciation of the renminbi – intervention that might not have occurred if the Chinese authorities had maintained a rigid exchange rate peg to the dollar. Thus, suppose that the rise in the foreign exchange assets of the People's

Bank of China from 2.3 trillion renminbi in 2002 was "only" to 10 trillion renminbi in 2007 rather than to the actual figure of 12.4 trillion renminbi.[4] Rather than the aggressive sterilisation policy pursued by the PBOC, assume instead that the PBOC expanded net domestic assets pari passu with gains in foreign exchange assets – a policy similar to that pursued (on average) from 1994 through 2002. The monetary base would have expanded from 4.5 trillion in 2002 to 19.6 trillion renminbi in 2007, rather than the actual figure of 10.2 trillion renminbi. Clearly, massive sterilisation rather than pari passu expansion of net domestic assets makes an enormous difference for the behaviour of the monetary base (especially under the McKinnon and Schnabl assertion that the behaviour of the current account would have been unaffected by the real appreciation of the renmimbi induced by much more rapid domestic inflation).

It does not require a rabid monetarist to recognise that a doubling of China's monetary base (relative to the actual outcome) would necessarily imply a very much higher domestic price level in 2007 than that which actually prevailed. With the nominal exchange rate of the renmimbi assumed to have followed the path it actually traversed (or even assuming that it remained pegged at 8.28 renminbi to the dollar as McKinnon and Schnabl would have preferred), there is no doubt that much higher Chinese inflation between 2002 and 2007 would have produced a very substantial real effective appreciation of the renminbi, in accord with the price-specie-flow mechanism that David Hume (1752, reprinted in Cooper 1969) so insightfully described 256 years ago. Thus, the real effective exchange rate would have followed a path much closer to the upward rising path of the renminbi's longer-run equilibrium exchange rate depicted in Figure 1.

Dispensing with McKinnon and Schnabl's bizarre notion that China's current account balance would have been unaffected by this alternative path for the real effective exchange rate, it is apparent that this alternative policy on sterilisation (especially with pari passu expansion of net domestic assets of the PBOC) would have forestalled much if not all of the spectacular rise in China's current account surplus. Of course, smaller current account surpluses would have meant less accumulation of foreign exchange reserves and less pari passu expansion of net domestic assets of the PBOC. The monetary base would still have grown more than it actually did under the actual policy of aggressive sterilisation but significantly less than under the assumption of an unchanged path for the current account surplus. Accordingly, domestic inflation would have been higher than under the actual policy of aggressive sterilisation but lower than under the (absurd) assumption that the current account would have been unaffected by the alternative path of the real effective exchange rate. The implied, moderate but still substantial, real effective appreciation of the renminbi relative to its actual path would presumably have delivered current account surpluses much closer to those experienced between 1994 and 2002.

This entirely standard analysis establishes how the exchange rate and related policies adopted by the Chinese authorities have prevented effective balance of payments adjustment – in contravention of China's clear obligation under Article IV of the IMF Articles of Agreement. Chinese policies effectively precluded the operation of both of the available mechanisms for adjusting the real effect exchange rate in response to an increasingly wide divergence of the actual rate from its longer-run equilibrium path. First, persistent and

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[4] Cumulative net capital inflows into China from 2002 through 2006: $268 billion or about RMB 2.2 trillion. Additional inflows in 2007 probably brought the total to about RMB 2.7 trillion. However, not all of these net capital inflows are plausibly the consequence of speculation about appreciation of the renminbi since July 2005 when the exchange rate was allowed to crawl upward. In particular, from 1994 through 2002 when speculation about appreciation of the renminbi was presumably not a factor, net capital flow into China were (on average) quite sizable. Thus, reducing the assumed gain in reserves between end 2002 and end 2007 by RMB 2 trillion below the actual gain is a generous allowance for McKinnon and Schnabl's contention that reserve gains have been motivated by speculation about renminbi appreciation.

increasingly massive official intervention in the foreign exchange market countervailed clear market pressures for substantial appreciation of the nominal exchange rate of the renminbi against the dollar and thus the appreciation of the real effective exchange rate in line with the upward path of its longer-run equilibrium value. Second, the policy of massive sterilisation of the monetary effect of huge foreign exchange reserve inflows frustrated the other normal mechanism for adjustment of the real effective exchange rate – Hume's price-specie-flow mechanism – through which foreign exchange inflows pump up the domestic price level and achieve adjustment of the real effective exchange rate without altering the nominal exchange rate. With both mechanisms of adjustment effectively closed down by Chinese policy, proximate factors (1) and (2) listed above led to an increasing undervaluation of the real effective exchange rate of the renminbi relative to its longer-run equilibrium path, thereby inducing a massive upsurge in China's current account surplus.

McKinnon and Schnabl argue that China should have rigidly maintained the nominal peg of the renminbi to the US dollar for reasons of monetary and financial stability. However, they are clearly unwilling to allow the domestic inflationary consequences that would result from non-sterilisation of China's rapidly rising current account surplus (and of that part of net private capital inflows into China that is not motivated by expectations of appreciation of the renminbi's nominal exchange rate against the dollar). This is neither economically sensible nor legal under international law. Changing conditions in the world economy require that the balance of payments positions and the real effective exchange rates of different countries adjust over time. Market pressures may not always be an infallible guide to the direction and extent of exchange rate adjustments needed to achieve desirable balance of payments adjustment. But, persistent and massive official resistance of real exchange rate adjustments that market pressures indicate are warranted – especially on the enormous scale pursued by the Chinese authorities since 2002 – is unambiguous evidence that necessary and desirable adjustments in real effective exchange rates and balance of payments positions are being frustrated by official actions. The IMF Articles of Agreement proclaim such actions to be illegal.

Japan, Germany and Switzerland

McKinnon and Schnabl point to the experiences of Japan and Germany as somehow supportive of their arguments about China. I find that this entirely off the mark. To make my point more emphatically, since this conference is in Lucerne, I add the case of Switzerland to my discussion of Japan and Germany.

Forty years ago, under the Bretton Woods system, all three countries maintained nominal exchange rates that were effectively pegged to the US dollar. In 1968, before the Bretton Woods system began to collapse, the Japanese yen was pegged at 360 yen to the dollar, the German deutsche mark at about 25 cents US, and the Swiss franc at about 20 cents US Since the collapse of the Bretton Woods system in 1973, all three of the countries have allowed their exchange rates against the US dollar to fluctuate in response to market forces. Movements of these exchange rates have been approximated random walks (with drift); monthly percentage changes have averaged more than 3 percent and annual changes have averaged about 10 percent. Over the past forty years, all three currencies have appreciated substantially against the US dollar in nominal terms and somewhat less so in real terms: The yen has appreciated more than 200 percent nominally and by more than 100 percent in real terms. The German currency (the deutsche mark until 1999 and the euro subsequently) has appreciated a little less than 200 percent nominally and has about doubled in real terms. The Swiss franc is the appreciation champion, rising nominally by almost 400 percent and more than doubling in real value against the dollar.

Since the collapse of Bretton Woods, the German and Swiss authorities have intervened occasionally to influence exchange rates against the US dollar, but the scale and persistence of such intervention has been trivial in comparison with the actions of the Chinese authorities since 2002.

The Japanese authorities have intervened more actively (most notably in 2003 through the first quarter of 2004), but not on the scale and with the persistence of recent Chinese actions. Clearly, none of these countries saw it as wise to try to maintain a nominal peg of their currency to the US dollar – at the rates prevailing forty years ago or at any other fixed rates – and rightly so.

Take the case of Switzerland. If the Swiss franc had been kept pegged at 20 cents US, there clearly would have been enormous difficulties for the Swiss economy from wide fluctuations of the exchange rate of the Swiss franc against the currencies of Switzerland's most important trading partners if the deutsche mark and other European currencies floated freely against the dollar. Leaving this aside, there clearly would have been a longer-run inflation problem for Switzerland resulting from a policy of pegging the franc at 20 cents US Under this pegging policy, the real exchange rate of the Swiss franc might be somewhat different from what it actually is today; but it would not plausibly be more than 20 percent or so above or below its present real value against the dollar. To achieve this real exchange rate with the nominal dollar rate pegged at 20 cents, Switzerland would have had to endure at least an additional 300 percent domestic price inflation cumulatively over the past forty years, which is equivalent to an increase by 3.5 percent in the annual inflation rate. The Swiss authorities and the Swiss people were clearly not willing to tolerate such a higher rate of inflation.

The story for Germany and for Japan is essentially the same. These countries and many others did not want to accept the domestic economic consequence implied by maintaining nominal exchange rates pegged to the US dollar. For its part, the United States was not prepared to sacrifice key domestic objectives for its policies – especially monetary policy – in order to meet the objectives of other countries whose currency values were rigidly pegged to the dollar. Indeed, the Bretton Woods system collapsed precisely because there was no way to resolve this fundamental difficulty. Eventually, after the collapse of Bretton Woods, all of these countries came to understand that substantial adjustments of nominal and real exchange rates against the US dollar are necessary and desirable over time in order to accommodate both different national priorities for domestic inflation and the need for real exchange rate changes as effective mechanism of balance of payments adjustment.

The basic problem with the policy that the Chinese authorities are pursuing and with the even more rigid exchange rate policy recommended by McKinnon and Schnabl is that it denies this fundamental truth. The actual and recommended policy objective is both to set a rigid path for the nominal exchange rate of the renminbi against the dollar and to isolate the domestic Chinese price level from the international influences implied by massive accumulation of foreign exchange reserves. Despite the intimations of McKinnon and Schnabl, the experience and the policies of countries like Germany, Japan and Switzerland since the collapse of the Bretton Woods system provides no rationale or support either for what the Chinese authorities are doing or for what McKinnon and Schnabl recommend.

It is true, of course, that the large real appreciations of the Japanese, German and Swiss currencies over the past forty years have not been associated with large deteriorations in the current account balances of these countries – quite the contrary. Correspondingly, the very large real effective depreciation of the US dollar over the past forty years has been associated not with an improving current account balance but rather with a deteriorating one. Houthakker and Magee (1969) pointed out a key reason for this forty years ago, and subsequent analysis (see Baily and Lawrence 2006) has confirmed their research. The income elasticity of US demand for imports is about 1.5 or somewhat higher while the foreign income elasticity of demand for imports from the US is around l or a little lower. Also, the sum of the relative price elasticities of demand for imports in the United States and abroad is

somewhat but not enormously greater than unity, implying that fairly large changes in the real effective exchange rate of the dollar are needed to have a substantial effect on the trade balance. It follows that, with US potential GDP growth not that much lower than its trading partners (on average), the real effective exchange rate of the dollar must depreciate at a moderately rapid pace in order to maintain any given level of the US current account balance (relative to GDP). For other reasons, the US has moved from a net exporter to a net importer of financial capital and other countries have been comfortable with this situation. The result has been that the US current account position has moved from moderate surplus forty years ago to persistent deficit in more recent years, and the real effective exchange rate of the dollar has depreciated less over the last forty years than would have been necessary if US and foreign residents had been unwilling to shift substantially the long-run pattern of international capital flows and move the United States from the world's largest net external creditor to its largest net external debtor.

These longer-term developments do not, however, belie the principle that *ceteris paribus* an improvement in the US current account balance and corresponding worsening of the current account balances of other countries must be associated with a real depreciation of the dollar (relative to its longer-run equilibrium trend). Empirical research has documented this relationship for nearly three decades, and the relationship holds up for other relatively large economies (see Baily and Lawrence (2006) for a recent exposition and re-affirmation of this point). Indeed, earlier discussion in this commentary provides clear evidence that the relationship holds for China where the recent upsurge in the current account surplus is clearly associated with the real effective depreciation of the renminbi relative to its longer-run equilibrium trend.

Of course, it is true that adjustments in real effective exchange rates relative to their longer-run equilibrium paths are not the only thing that needs to happen in connection with adjustments in a country's balance of payments. In particular, for the United States to reduce its current account deficit, it is necessary for spending by US residents to fall relative to US GDP and for spending in the rest of the world to rise relative to GDP in the rest of the world. In previous discussions of the US balance of payments (Mussa 2004, 2005, and 2006), I have repeatedly emphasised this point. From the early 1990s through 2005, a complex of forces simultaneously brought about a rise of US spending relative to GDP and, until its peak in early 2002) a substantial strengthening of the dollar, with the lagged effects of dollar appreciation (and rising world oil prices) continuing to contribute to deterioration of the US current account until 2006. Similarly, I have tried to make clear how the slowdown of spending growth now under way in the United States (with growth better maintained abroad) and the cumulative effects of substantial dollar depreciation since early 2002 are already bringing and will continue to bring significant improvement to the US current account balance.

The relevance of other factors in explaining movements in the current account, however, does not refute an essential role for exchange rate adjustments. McKinnon and Schnabl deny that there is an essential role for the exchange rate, referring for support to earlier work by Prof. McKinnon. Specifically, Prof. McKinnon argues that no adjustment of the exchange rate (or even a perverse direction of adjustment) is necessary in connection with improving a country's current account balance. As a matter of theory, international economists have long known that Prof. McKinnon is correct; the analysis goes back to the controversy between Keynes (1929) and Ohlin (1929) over the effects of the transfer payments (reparations) that Germany was required to make (primarily) to Belgium and France under the Versailles Treaty; see Johnson (1956) for the classic exposition of this analysis to the issue of exchange rate adjustments and the balance of payments. Keynes argued that in making the transfer, Germany would suffer a real income loss greater than the amount of the transfer because the reduction in spending in Germany necessary to secure the resources for the transfer would depress demand for German goods and services while the increased spending in the countries receiving the transfer would raise the relative prices of their goods

and services. The result would be that Germany would suffer a terms of trade loss (a depreciation of the real exchange rate) that would be in addition to the direct loss from making the transfer. Ohlin argued, correctly in theory, that **if** the reductions in spending on goods by German residents was matched by increased spending in the same amounts on those same goods in the countries receiving the transfer, no change in relative prices (or of the real exchange rate) would be necessary as a consequence of the transfer. Indeed, if the marginal propensity to spend on German goods in the countries receiving the transfer was greater than the marginal propensity to spend on these goods in Germany, the transfer could end up raising the relative price of German goods (appreciating Germany's real exchange rate).

Leaving the purely theoretical view aside, as an empirical matter, there is no real doubt that German residents in the 1930s spent far more, on average and at the margin, on German goods and services (including many non-traded goods and services) than Belgian and French residents spent on German goods and services. Therefore, as an empirical matter, there is no real doubt that Keynes was right and Ohlin was wrong: even for countries with relatively similar economies and patterns of consumption, a transfer will worsen the terms of trade (depreciate the real exchange rate) of the country making the transfer.

Applying this analysis to the United States today, we may note that the marginal propensity of US residents to spend on imported goods and services is no greater than 25 percent and, correspondingly their marginal propensity to spend on US goods and services is at least 75 percent. The marginal propensity to spend of foreign residents on US goods and services is no more than about 5 percent. Suppose that holding GDP constant both in the United States and in the rest of the world, we somehow depress US spending by $100 billion and increase foreign spending by $100 billion. This would deliver precisely the reduction in US spending relative to US income and the increase foreign spending relative to foreign income necessary for a $100 improvement in the US current account. However, at an unchanged relative price of US goods and services relative to foreign goods and services (i.e., at an unchanged real exchange rate), individual markets for the two categories of goods and services would be imbalanced. For US goods and services, there would be excess global supply of at least $70 billion because US demand would fall by at least $75 billion and foreign demand would rise by no more than $5 billion. In the market for foreign goods and services there would be excess demand of at least $70 because foreign demand would rise by at least $95 billion and US demand would fall by no more than $25 billion. To clear the markets simultaneously for both US and foreign goods and services, the relative price of the US goods and services needs to decline; that is, the dollar needs to depreciate in real terms.

Thus, real exchange rate adjustments are an essential part of the balance of payments adjustment process. This does not mean or require that all exchange rate adjustments are well-justified or desirable. Along with McKinnon and Schnabl, most (if not quite all) international economists agree, that there are occasions when fluctuations in exchange rates among major currencies have been excessive. For example, the dollar was too strong in 1984-85, the yen appropriated too rapidly in 1986-87, the dollar weakened too much in early 1995. Such episodes of apparent exchange rate overshooting in response to market forces raise both legitimate concerns that macroeconomic stability is being impaired and some frustration that more effective means are not available to limit these problems. However, attempting to move back to the Bretton Woods system is clearly not a sensible or viable cure for this problem. For one country, such as China, to attempt this alone is even less sensible. As we have seen since 2002, fluctuations of exchange rates between the US dollar and other important currencies (the euro, the yen, sterling, and so forth) can substantially alter the equilibrium value of the renminbi relative to the dollar. A world in which real exchange rates among most major currencies are continually adjusting, sometimes by quite large amounts, is not compatible with the Chinese policy of pegging the nominal exchange rate of the renminbi to the dollar while suppressing the domestic price level consequences of massive foreign exchange market intervention.

The United States pursuing Chinese policies

Another useful way to illustrate problems with China's exchange rate and related policies and with the recommendations of McKinnon and Schnabl is to consider what would happen if the United States pursued similar policies. Suppose that the US authorities decided that it was urgently important to eliminate the US current account deficit and move to at least a modest current account surplus. To achieve this result, the US authorities announce a policy of massive intervention in the foreign exchange market to drive down the value of the dollar by at least one-third against the Euro (and presumably other currencies). This policy will be implemented for at least three years and beyond that for as long thereafter as necessary.

Normally, I argue that intervention has very little ability to affect the exchange rate of the dollar against the Euro or other major currencies. Accordingly, intervention is primarily useful as a signalling device to be used infrequently, in concert with other national authorities, and in circumstances when market forces appear to be driving exchange rates far away from levels implied by economic fundamentals. Such interventions have been carried out by the US authorities during the Clinton Administration and following the attacks of September 11, 2001. The amounts involved in these interventions have not exceeded a few billion dollars. The results achieved were quite modest but, in my view, were beneficial.

A flood of spam messages persistently reminds me (albeit in a different context) that – "size matters." Rather than the piddling scale of past interventions, suppose that the US authorities announce that for at least the next three years, they will purchase euros for dollars at the rate of 100 billion euros – per month. I assume that this will drive the dollar value of the Euro from a little over $1.50 at present to somewhat over $2.00 per Euro. Hence, somewhat more than $200 billion would be issued each month in the intervention operations. This scale of intervention (1.2 trillion euros and over 2.5 trillion dollars per year) is enormous, but relative to the size of the US economy (which is about 5 times as large as the Chinese economy measured in US dollars), these amounts of intervention are no larger than what the Chinese authorities have recently been undertaking.

Of course, the Federal Reserve could not simply expand the monetary base by more than an additional $200 billion per month. The base at present is about $830 billion. Adding more than $200 billion per month would rapidly induce unacceptably dire inflation, as well as undermining the real depreciation of the dollar which is the objective of the exercise. Instead, the Federal Reserve (like the PBOC) would sterilise the dollars issued in the intervention. In about four months, these sterilisation operations would reduce the net domestic assets of the Federal Reserve to zero. Subsequently, the Federal Reserve (like the PBOC) would have to issue sterilisation bonds, at a pace of more than $200 billion per month.

What plausibly would be the effects of this adoption by the US authorities of a Chinese-like exchange rate policy. Leaving aside the likelihood that the whole world, including the US, would react with horrified panic, it is reasonable to suppose that the dollar would depreciate substantially in real effective terms and, in accord with previously observed empirical regularities. This would (with a lag) bring substantial improvement to the US current account. In addition, it is clear that the massive sterilisation operations would exert a powerful negative effect on spending by US residents – thereby contributing directly to improvement in the current account. More than $2.5 trillion of annual borrowing by the Federal Reserve (on top of $200 to $400 billion of borrowing by the Treasury) would more than absorb the total supply of domestic savings and the present level of net capital inflows into the United States. Nothing would be left for US businesses to finance investment or for US households to finance mortgages or consumer credit; and any conceivable increase in net capital flows to the United States would not substantially ameliorate this situation.

Indeed, with due regard to the fact that the normal saving rate in China is far higher than in the United States, this depressive effect on domestic spending arising from the exchange rate and related policies pursued by the Chinese authorities is something that we observe in

China. As I explain in more detail in Mussa (2008), this effect provides at least an important part of the explanation of why the national saving rate in China, which was already very high in the 1990s, has jumped up further to unprecedented levels since 2002. This upsurge in national saving is **not** symptomatic of a voluntary decision by Chinese households that they want to increase their savings rates and desire that the government should acquire huge holdings of foreign assets on their behalf. It is forced saving that is imposed by repressing the growth of household disposable income relative to national income and requiring households to acquire the additional base money embodied in their rising currency holdings and in the rising reserves that banks must hold against household deposits by reducing household expenditure (rather than as a result of net domestic credit expansion by the PBOC). This forced saving, in turn, is reflected in the extraordinary recent performance of China's current account surplus. The result has also been a gross distortion of the path of development of the Chinese economy towards expansion of tradable goods industries and away from activities that would better meet the needs of China's people and achieve the stated objectives of the Chinese government.

I do not, of course, present this analysis as a suggestion of what the US authorities ought to do. Along with many others, I have argued that the US current account deficit, which reached 6 ½ percent of GDP in 2006, has grown too large to be sustainable in the longer-term (see Mussa (2004, 2005 and 2007), and a downward correction of this deficit to no more than about 3 percent of GDP is needed over the medium term. That correction is already underway, with the current account deficit falling to about 5 ½ percent of GDP last year. With the significant further depreciation of the dollar on a real effective basis over the past two years, and with the prospect that the slowing of US domestic demand growth visible in recent quarters will persist for some time, it is reasonable to expect that the US current account deficit will continue to correct downward. A more sensible Chinese exchange rate policy would assist modestly but meaningfully in achieving this desirable result, as well as contribute importantly to a better balanced and more desirable path for the development of China's own economy.

Table 1

Current Account and Monetary Data for China, 1994-2006

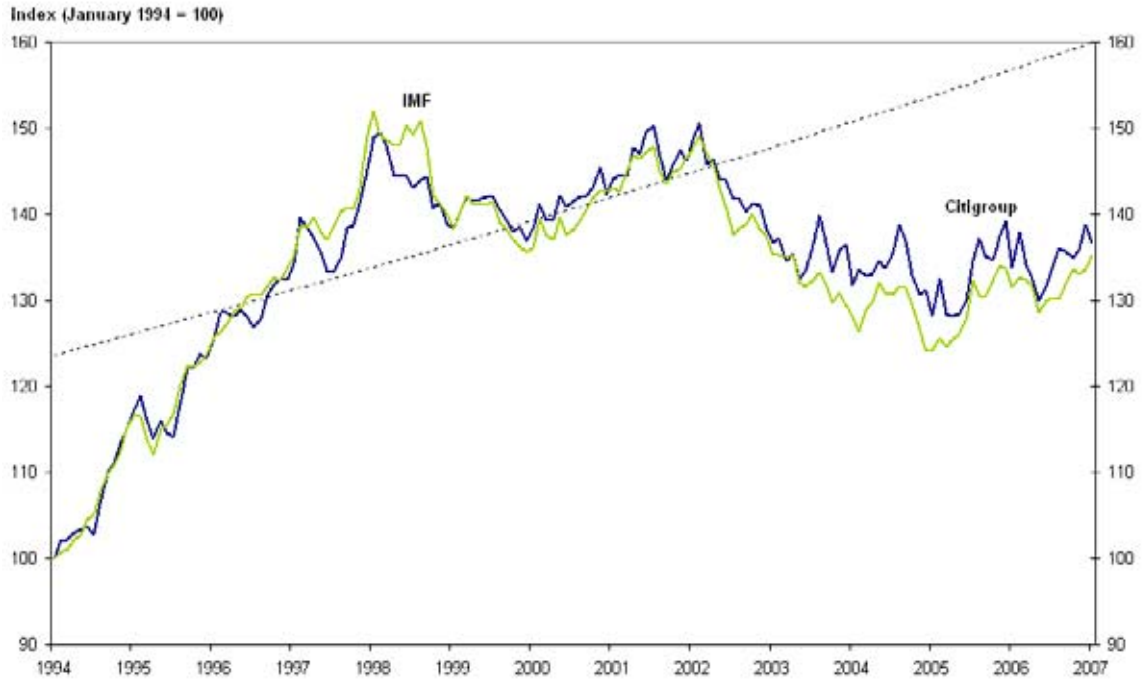
All figures are percent

Year	DY/Y	DP/P	DB/B	CA/Y	B/Y	DB/Y	DN/Y	DF/Y
1994	36.4	24.2	30.1	1.2	35.7	8.44	2.43	5.81
1995	26.1	16.9	20.6	0.2	34.2	5.82	2.17	3.55
1996	17.1	8.3	29.5	0.8	37.8	8.61	4.55	4.06
1997	10.9	2.8	13.9	3.8	38.8	4.74	–0.19	4.86
1998	6.9	–0.8	2.3	3.1	37.1	0.84	0.47	0.37
1999	6.3	–1.4	7.3	1.4	37.5	2.54	1.32	1.22
2000	10.5	0.3	8.5	1.7	36.8	2.89	2.17	0.72
2001	10.5	0.5	9.2	1.3	36.3	3.06	–0.84	3.90
2002	9.7	–0.8	13.3	2.4	37.1	4.40	1.59	2.81
2003	12.9	1.2	17.3	2.8	38.9	5.67	–0.14	5.81
2004	17.7	3.9	11.4	3.5	36.8	3.77	–6.14	9.91
2005	15.0	1.8	9.3	7.0	35.0	2.98	–5.98	8.96
2006	14.7	1.5	20.1	9.4	36.1	6.36	–4.23	10.59
2007	11.5	4.8	30.6	11.3	41.2	9.65	–6.19	15.84

Y = nominal GDP, P = the consumer price index; B = the monetary base (reserve money on line 14 of the IFS); CA = current account surplus, monetary base; N = net domestic assets of the PBOC (measured as line 14 minus line 11 in the IFS; F = foreign assets of the PBOC (line 11 in the IFS); and D means “change in;” from the preceding year.

Underlying data are from the IMF *International Financial Statistics Yearbooks 2007and 2007* and *International Financial Statistics*, June 2008.

Figure 1: Real effective exchange rate of the renminbi, January 1994–September 2007



Source: Citigroup and IMF.

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