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**China's Financial Conundrum and Global
Imbalances**

by

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Abstract

China's financial conundrum arises from two sources: (1) its large saving (trade) 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 U.S. interest rates since mid 2007, not only attracts hot money inflows but inhibits private capital outflows from financing 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 sterilize 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 stabilization 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.

Keywords: Chinese monetary policy; currency mismatch; currency stabilization

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1. Introduction

Because China's trade surplus (net saving surplus) has spiraled 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 U.S 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—i.e., 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 U.S. 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 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 U.S. 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 stabilization.

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 liberalization 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 funneled 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 organization 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 favorable 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 stabilize 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 liberalization 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 neighboring countries—not only the well known crisis five¹, 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 neighboring 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 $\pm .3$ 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

¹ Indonesia, Korea, Malaysia, Philippines, and Thailand.

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 sterilization 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.

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 stabilizing 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 summarize 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 alleged², 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 U.S. 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 U.S. 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 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 U.S. 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 above³.

(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

² 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.

³ Another less obvious sanction has been to impose U.S. anti dumping restrictions more frequently on Chinese goods much beyond what China’s large share in U.S. imports would warrant. This arises out of the U.S. 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).

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 U.S. 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 U.S. interest rates to below Chinese level (the U.S. 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 sterilizing 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 pre-empted by major currencies from areas that do have highly developed financial markets. Today, the U.S. 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 U.S. dollar. However, the resulting currency 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 center 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, i.e., 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 capitalized 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 U.S.) tend to run surpluses in the current account of their international balance of payments, i.e., 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 destabilizing 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 even 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 U.S. 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 Sterilization and Sovereign Wealth Funds

Green (2008) calculates that the total foreign exchange inflows into China in 2007 were \$550 billion, and analyzes 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 sterilization operations.

To analyze the scope and types of sterilization, 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 U.S. dollars from the PBC's foreign exchange reserves.⁴ 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,

⁴ For more details see Chan (2007).

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 U.S. 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 “sterilization” 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 favor 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” sterilization, i.e., possible future hot money flows arising out of the currency mismatch are avoided.

This type of anticipatory sterilization of foreign exchange intervention is reminiscent of Singapore. For more than 20 years, Singapore has had the world's most persistent, and very 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 U.S. 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 nationalizes 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, i.e. the Government of Singapore Investment Corporation (330 billion dollars) and the Temasek Holdings (159 billion dollars). Because both funds invest mainly in U.S. 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”⁵ to the currency mismatch feasible for China? Not really. Private savings are much more de-centralized 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 decentralized 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 nationalize China’s huge flow of private saving in order to 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 nationalizing 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 minimizes exchange risk. Only then would “normal” private sector intermediation for financing the current account surplus be feasible—as we shall discuss below.

Sterilization 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 sterilize 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—sterilization 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 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 sterilize the monetary effects of reserve accumulation via bond sales. The small size and limited liquidity of the Chinese capital market did not allow

⁵ For further discussion of this Singapore solution, see McKinnon 2005, Ch. 8

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 minimize the sterilization costs.⁶ The sterilization 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 sterilized 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.⁷ 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 sterilization 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 sterilization 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 sterilization 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 sterilization 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 sterilization attempts. Nevertheless, the PBC was only able to sterilize partially the monetary effects of reserve accumulation, in 2007 to about 70%. Given international capital mobility, the

⁶ 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 sterilization costs to the banking sector.

⁷ In Figure 11, “deposits” include both required and excess commercial bank reserves. But the former greatly exceed the latter.

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 U.S. decline sharply. .

Because of fast reserve accumulation and limited sterilization, 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 liberalized only gradually, international capital market arbitrage remained incomplete.⁸ 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 annualized overnight money market rates that, by and large, are determined by market forces in both the U.S. 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

⁸ China followed a gradual capital market liberalization 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.

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.

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

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 penalized by the moderate appreciation because they received a higher interest rate.

Our hypothesis, that the well signaled appreciation of the renminbi initially kept Chinese interest rates below American in 2005-06 when U.S. 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 sterilization 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 U.S. 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 favor of renminbi. The result is a “corner” solution: no internal private holdings of dollar assets unless subsidized by the government. Consequently, in 2007-08, the covered interest arbitrage condition (1) fails.

$$\text{OIP Fails(2007-08): } i_{\text{Ch}} \gg i_{\text{US}} + E(\Delta e), \quad \text{where } E(\Delta e) < 0, \quad (2)$$

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 sterilization 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 (U.K. 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 sterilization operations. In addition, the influx of a vast amount of migrant workers from rural areas to the industrial centers 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 industrialized 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 U.S. interest rates, but then fell in 2005-06 when U.S. interest rates rose and so reduced capital inflows into China. However, after August 2007 when U.S. 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 U.S. inflation low. Since then, however, the dollar prices of Chinese goods shipped to the U.S. 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 Stabilization

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 “frenzied” 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 renminbi 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 stabilization 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 U.S. 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 stabilize 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 U.S. 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, annualized WPI inflation in Japan became higher than in the United States: 31.3 percent versus “just” 18.9 percent in the U.S. 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 renminbi appreciation? Clearly if the center 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 possible⁹.

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 organize 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).

⁹ 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 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.

5. Toward a Credibly Fixed Exchange Rate

Overcoming these three misconceptions about the exchange rate is crucial for stabilizing 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, i.e., 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 U.S. Treasury Secretary Robert Rubin announced a new “strong dollar policy”, and Japan bashing ceased. The U.S. 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 destabilized 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 stabilize 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 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

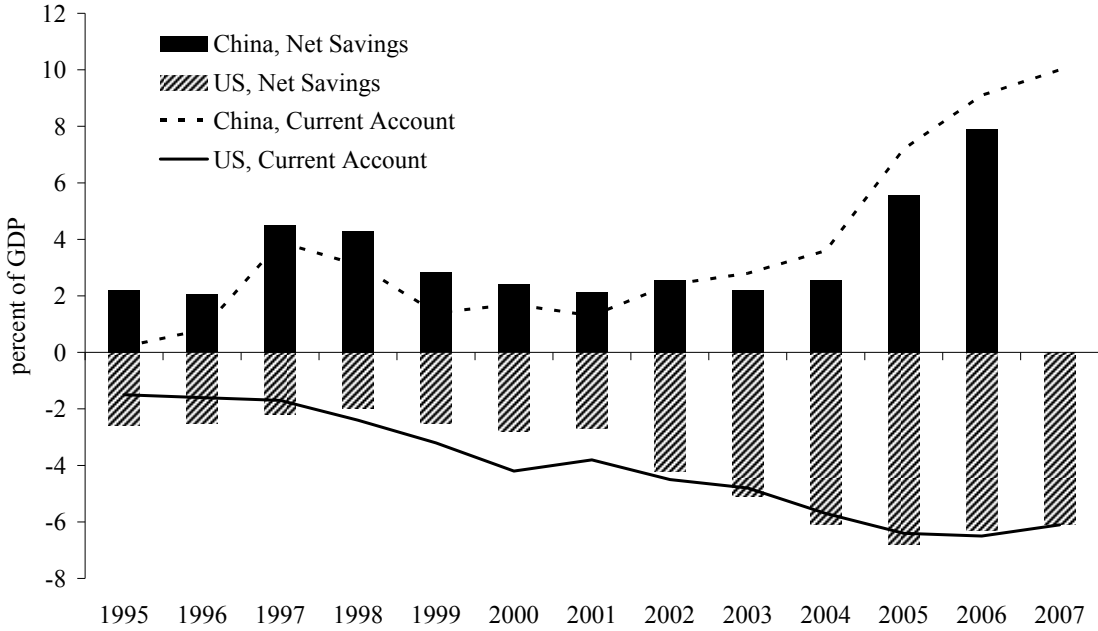
international financial intermediation would improve. The credit crunch in U.S. financial markets would be eased as private capital flowed back to the United States.

Finally, once its domestic monetary and exchange rate system was stabilized, 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 analyze 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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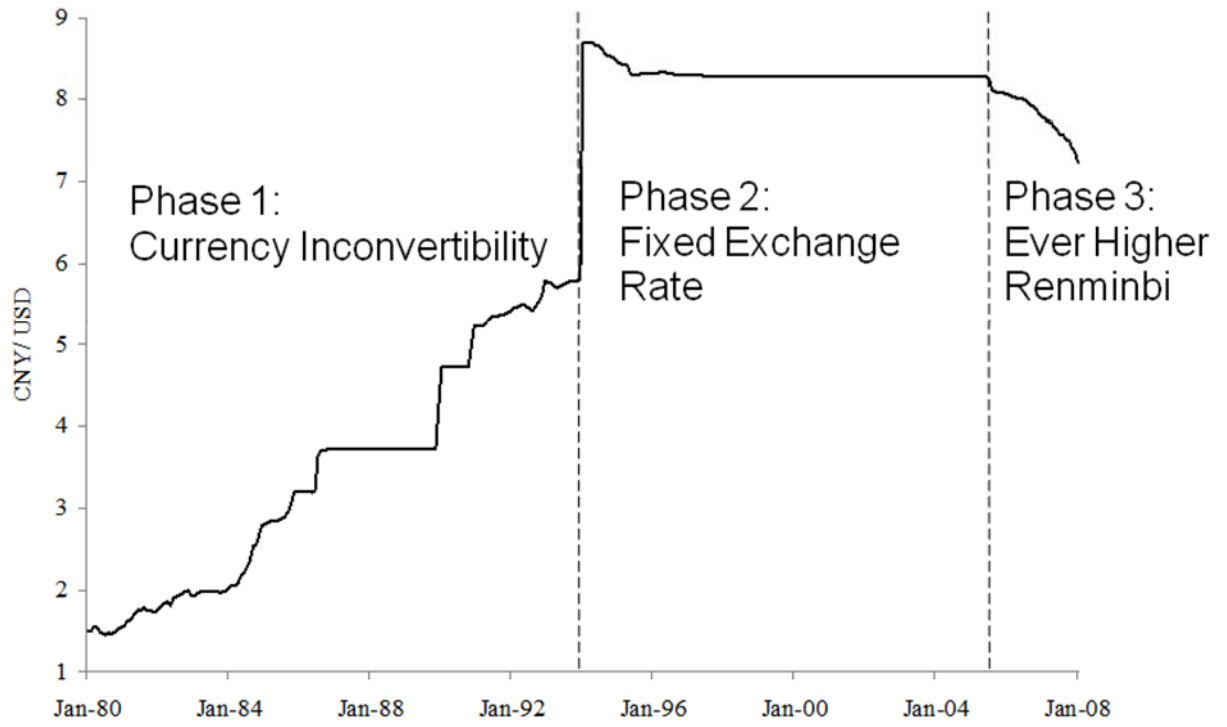
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Figure 1: Saving-Investment Balance and Current Account, China and U.S.



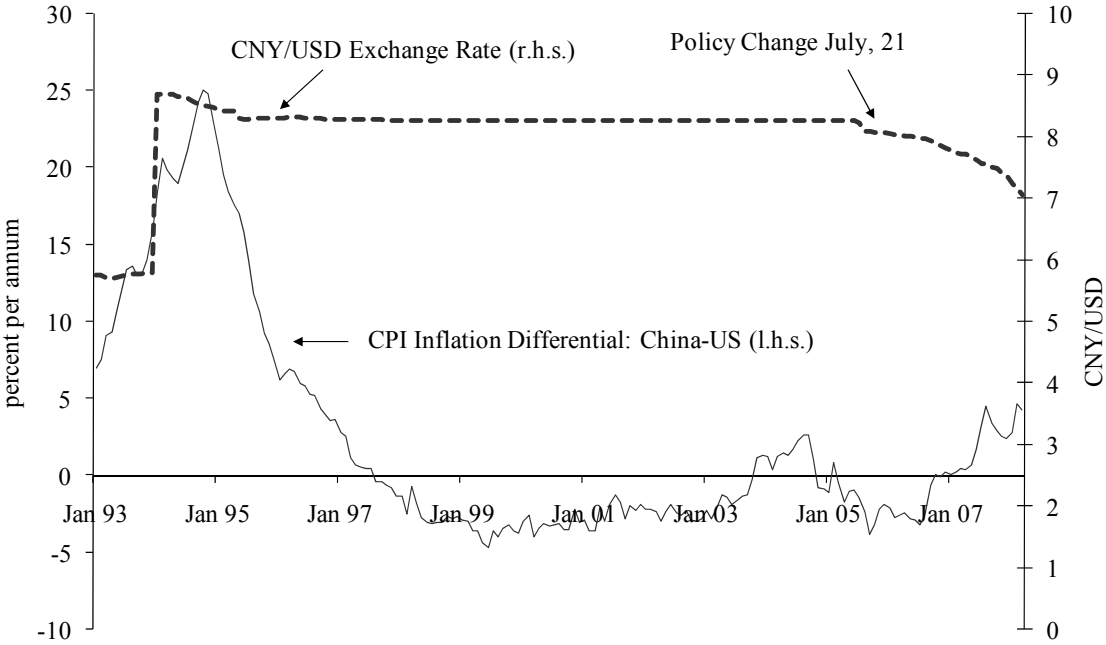
Source: IMF: WEO, IFS.

Figure 2: Exchange Rate CNY/USD, 1980-2008



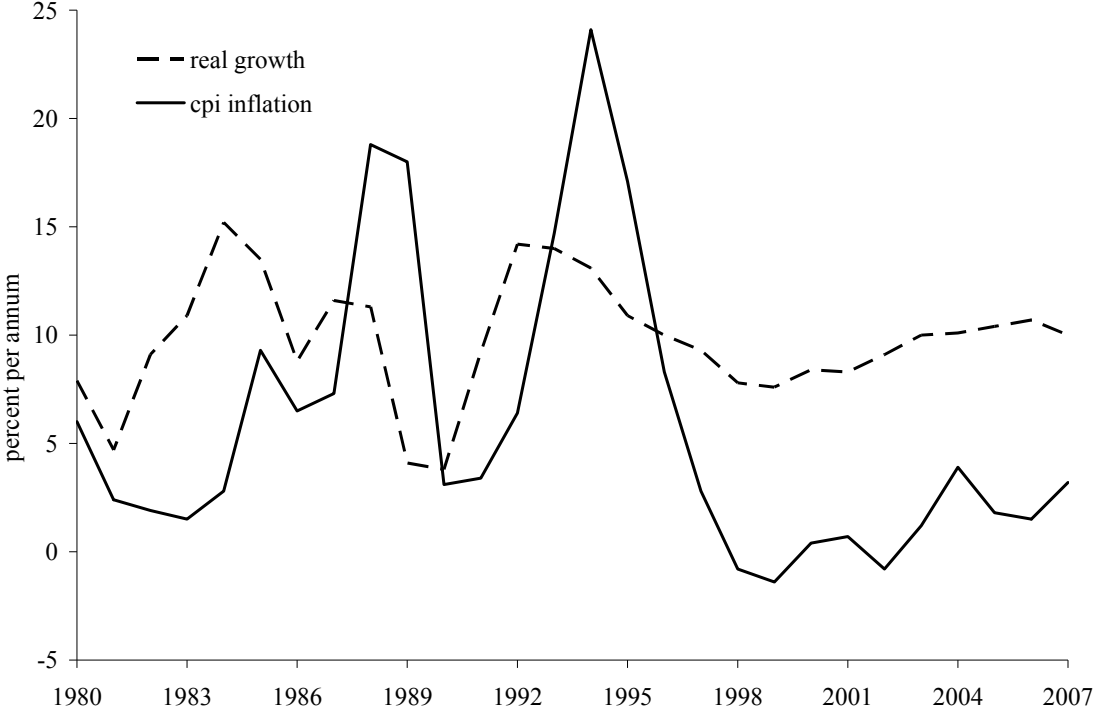
Source: IMF.

Figure 3: Yuan/Dollar Exchange and China-U.S. Inflation Differential



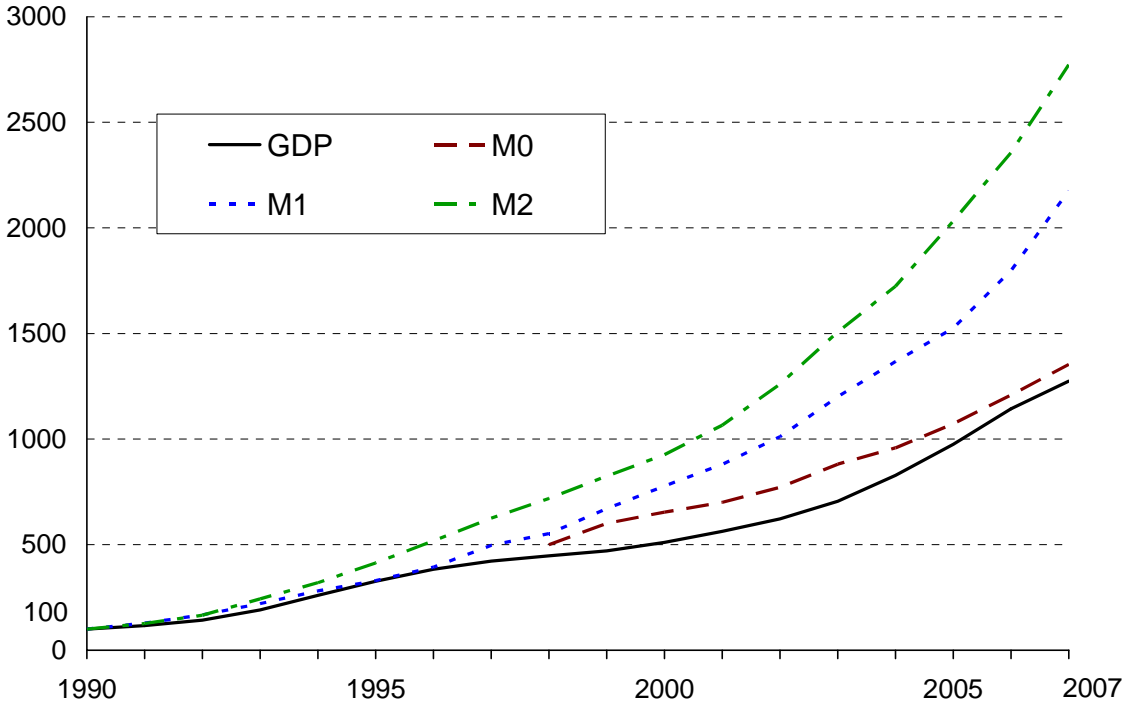
Source: IFS.

Figure 4: Real GDP Growth and Consumer Price Inflation, China, 1980-2007



Source: IMF.

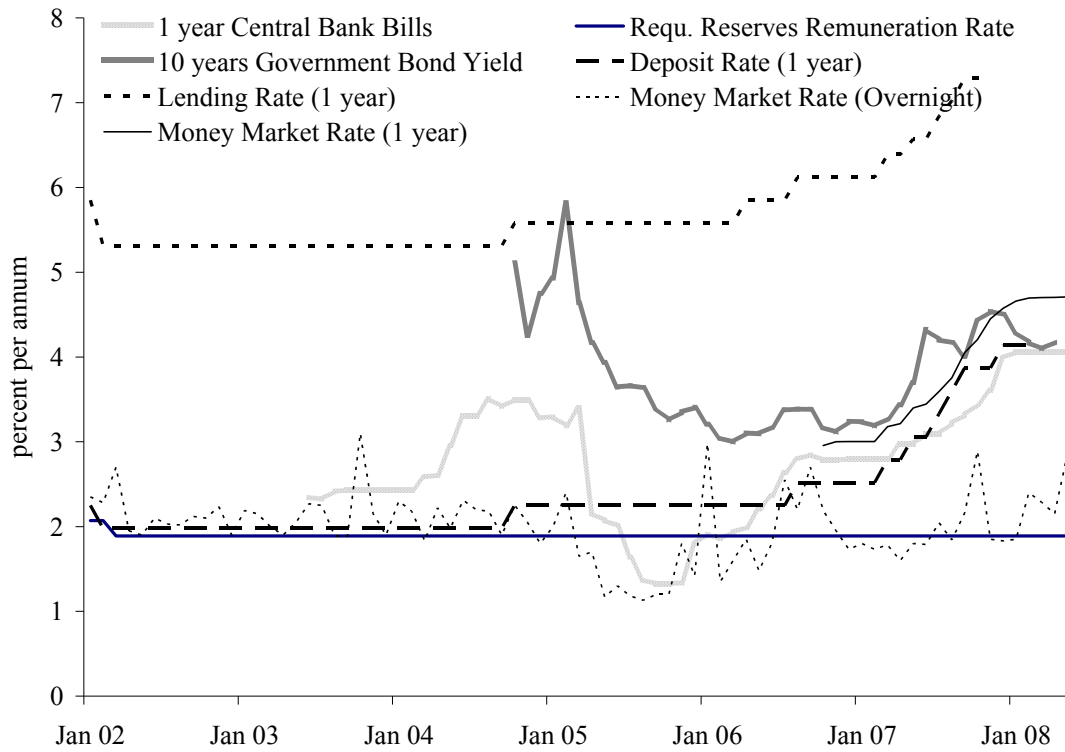
Figure 5: Money Supply and Nominal GDP, China, 1990-2007



Source: IMF.

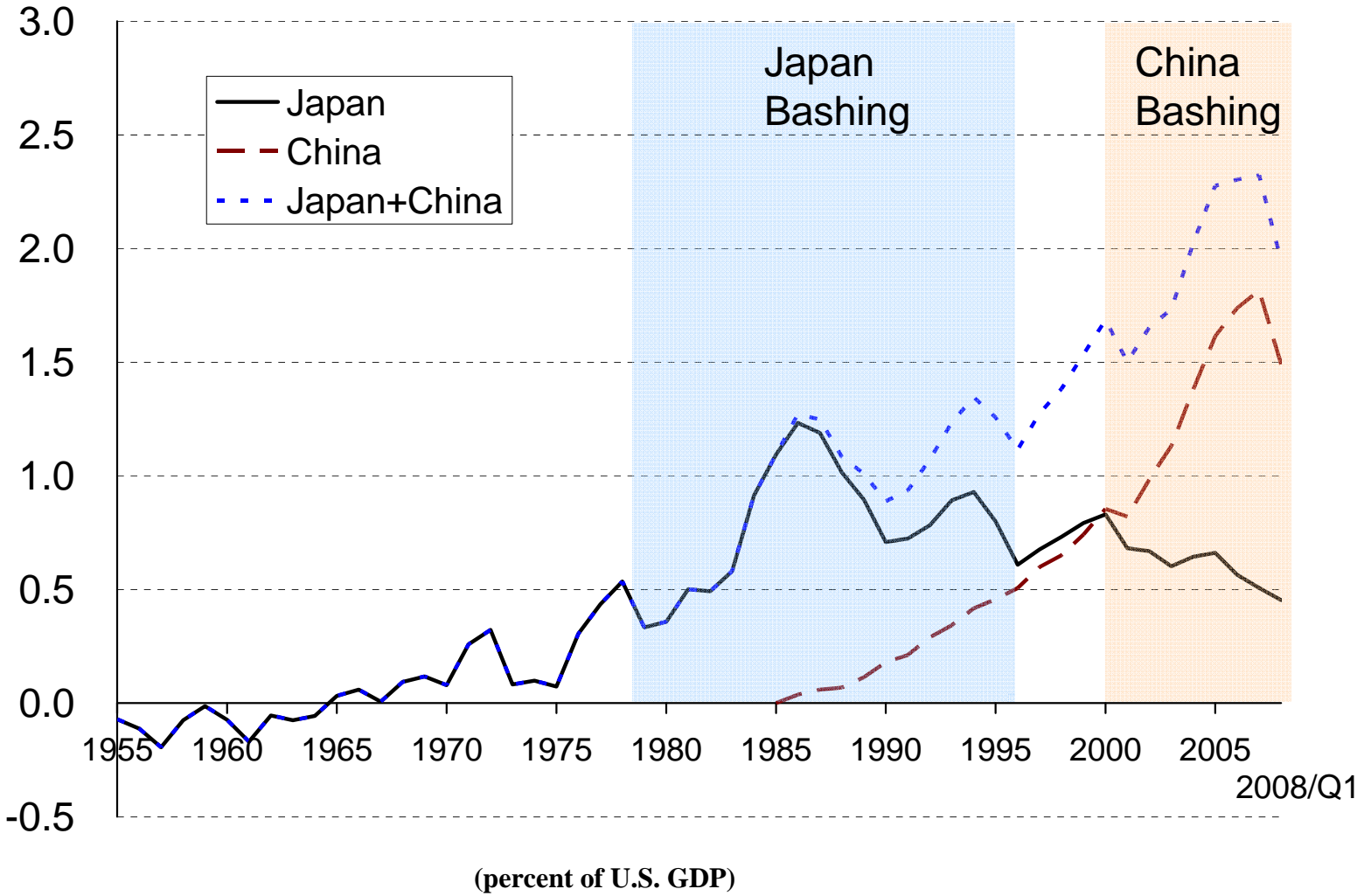
Note: Data in 1990 are based to 100 except M0. For M0, data in 1998 is based to 500.

Figure 6: The Fragmented Structure of Chinese Interest Rates, 2002-2008



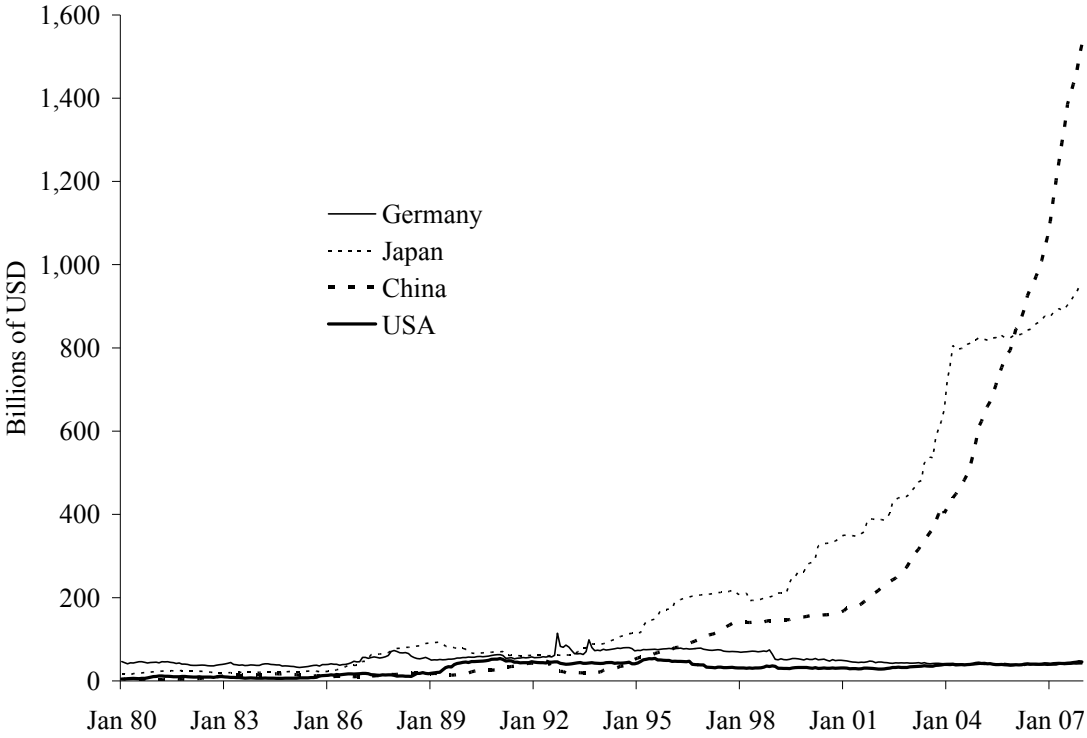
Source: Datastream.

Figure 7: Bilateral Trade Balances of Japan and China versus the United States



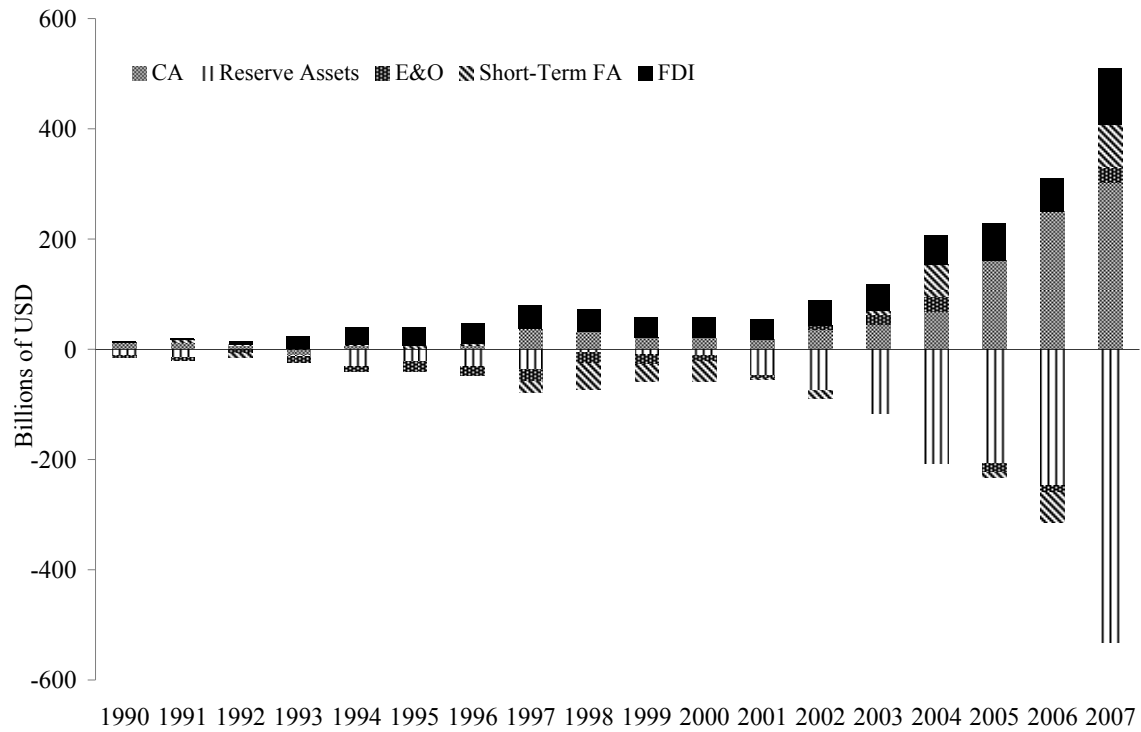
Source: IMF.

Figure 8: Foreign Reserves of China, Japan, Germany, and U.S., 1990-2007



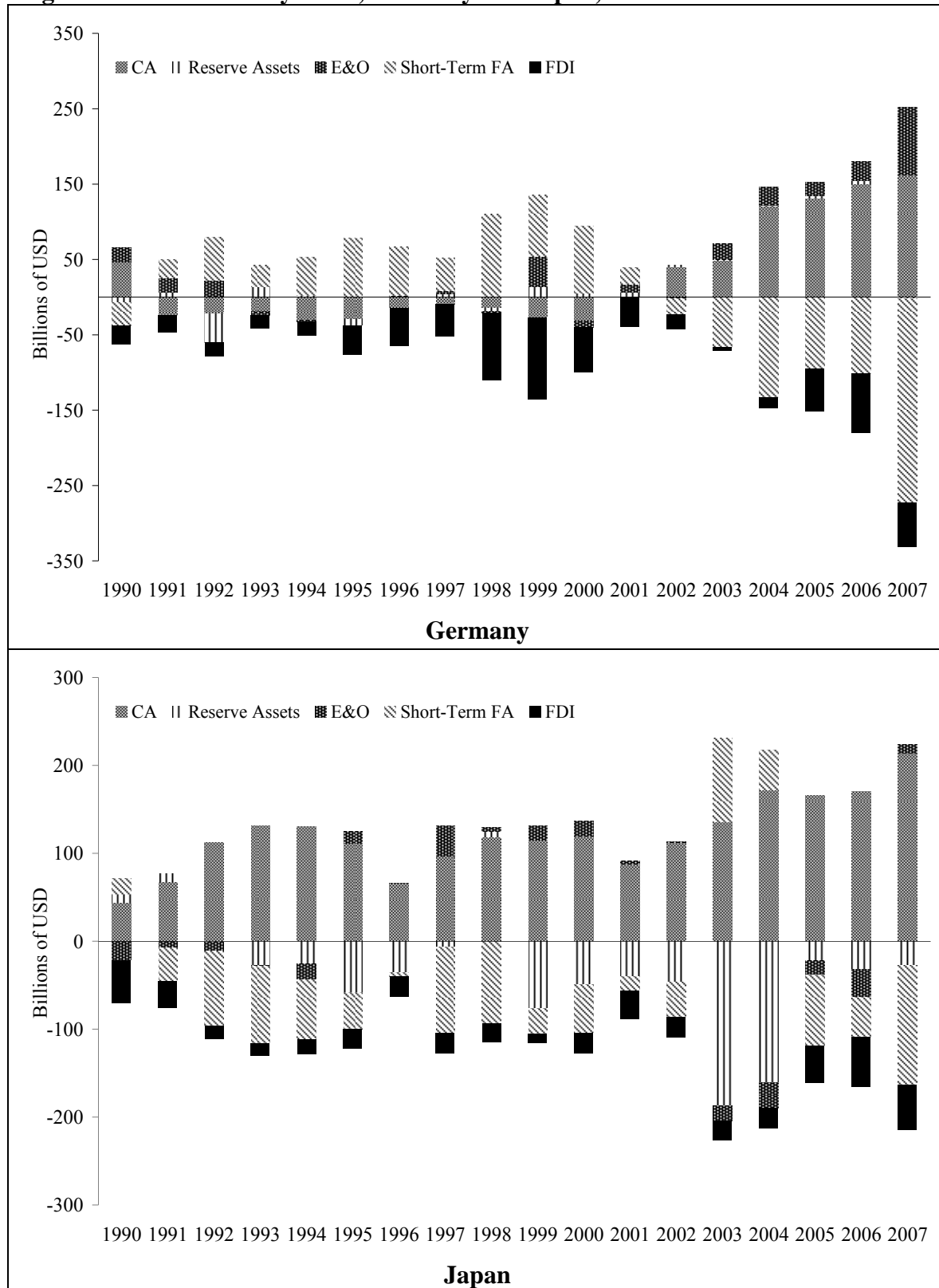
Source: IMF, Peoples Bank of China.

Figure 9: Balance of Payments, China, 1990-2007



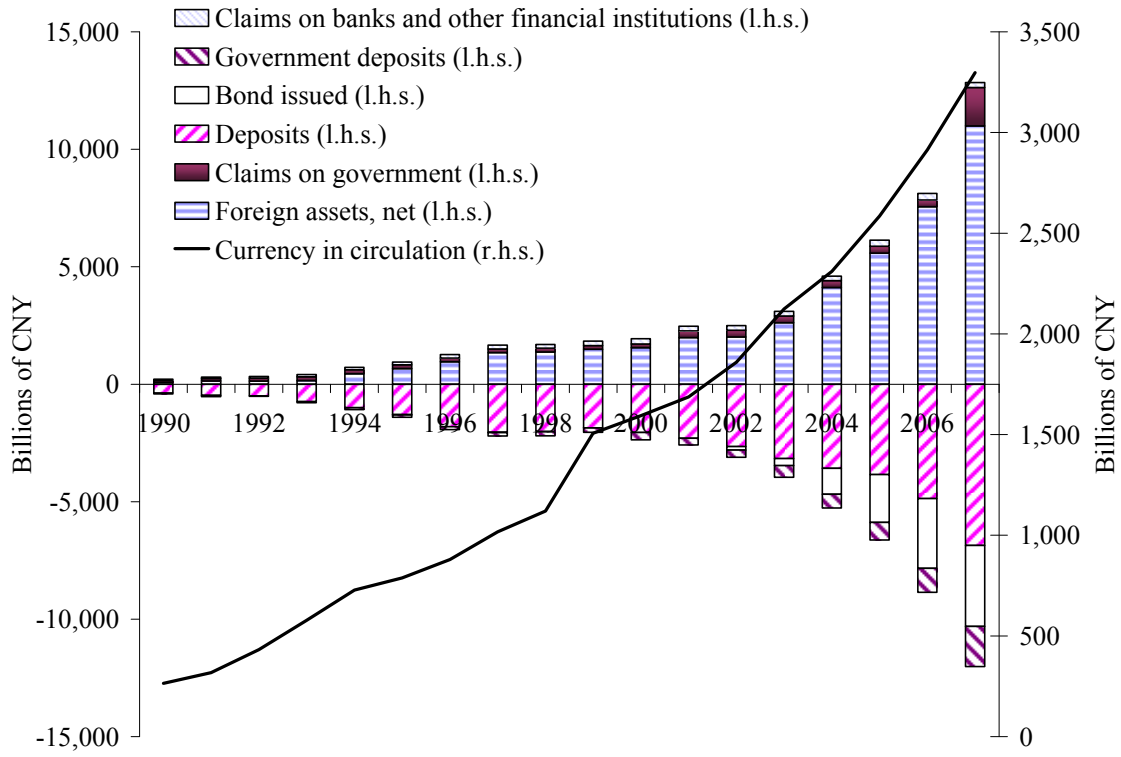
Source: IFS, WEO, SAFE. 2007 approximated.

Figure10: Balance of Payments, Germany and Japan, 1980-2007



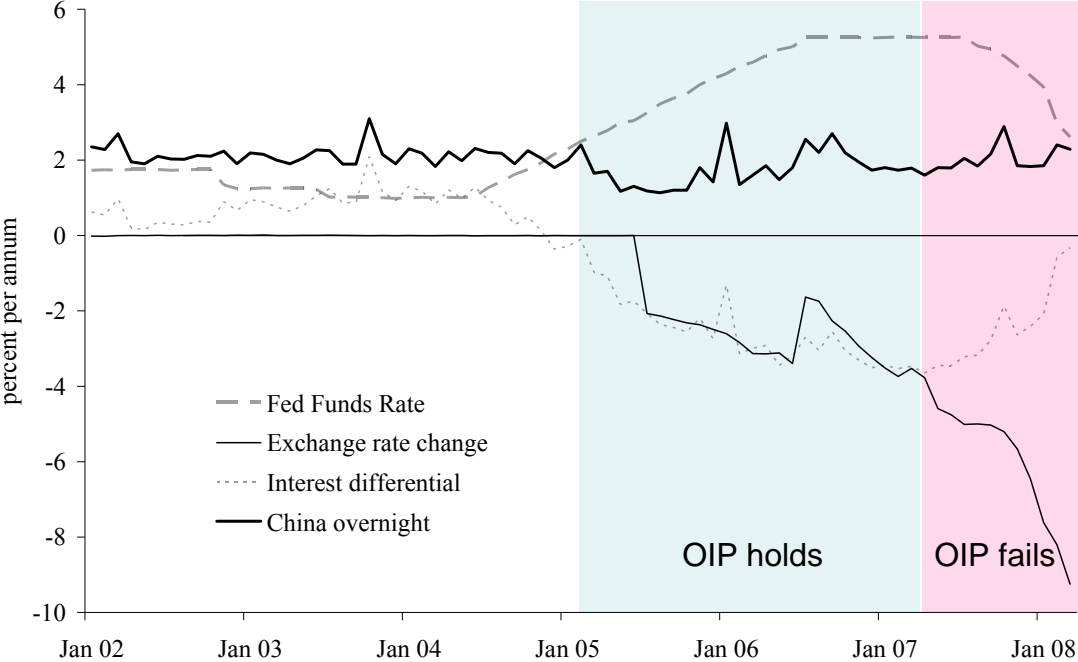
Source: WEO, OECD, Deutsche Bundesbank, Japan: MoF. 2007 approximated.

Figure 11: Peoples Bank of China Sterilization Operations



Source: IMF, Peoples Bank of China.

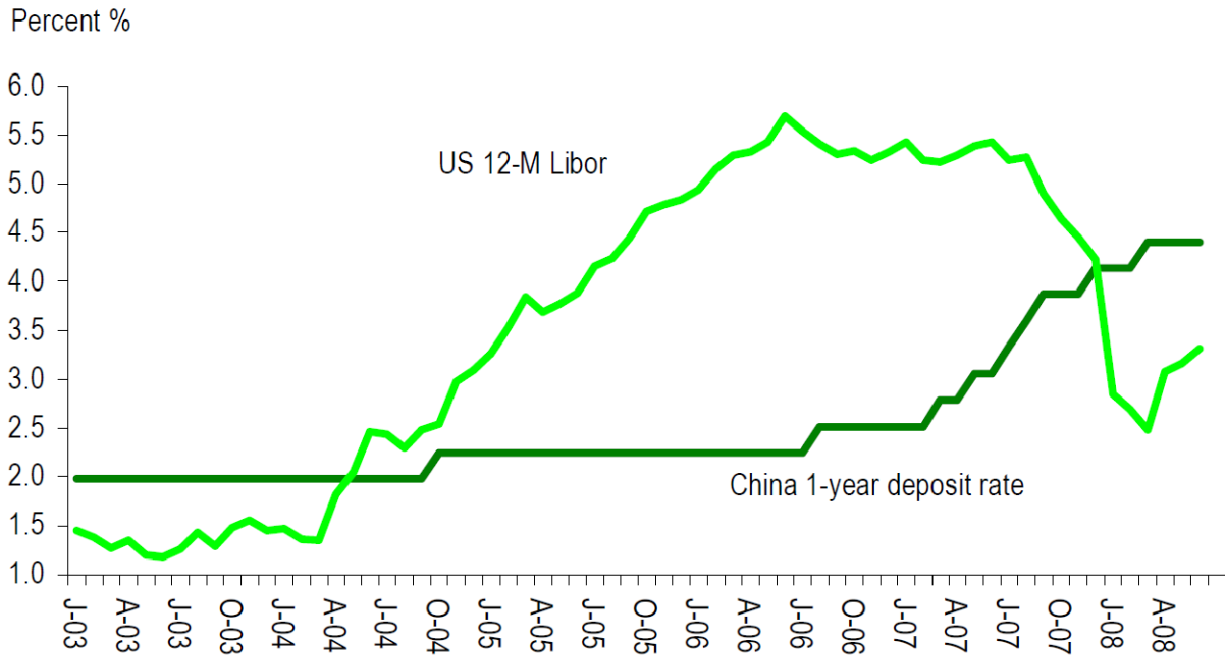
Figure 12: Short-Term Interest Differentials versus Percentage Changes in the Yuan/Dollar Exchange Rate: China, 2002-2008



Source: Ecwin Database.

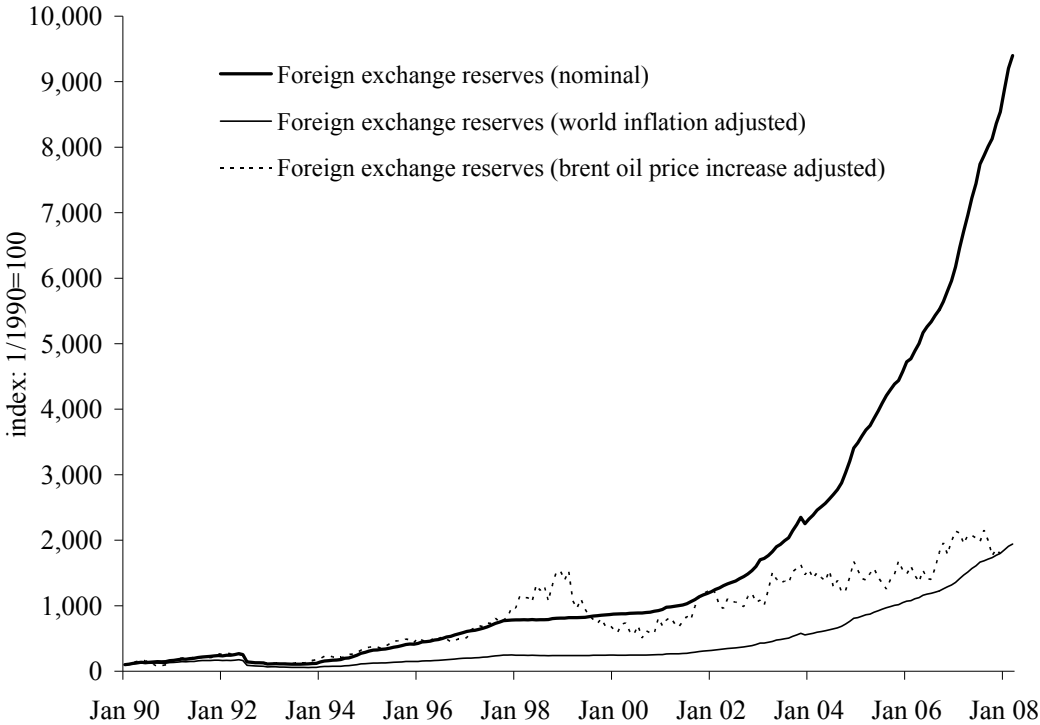
Note: OIP is Open Interest Parity

Figure 13: Interest rates of the U.S. and China



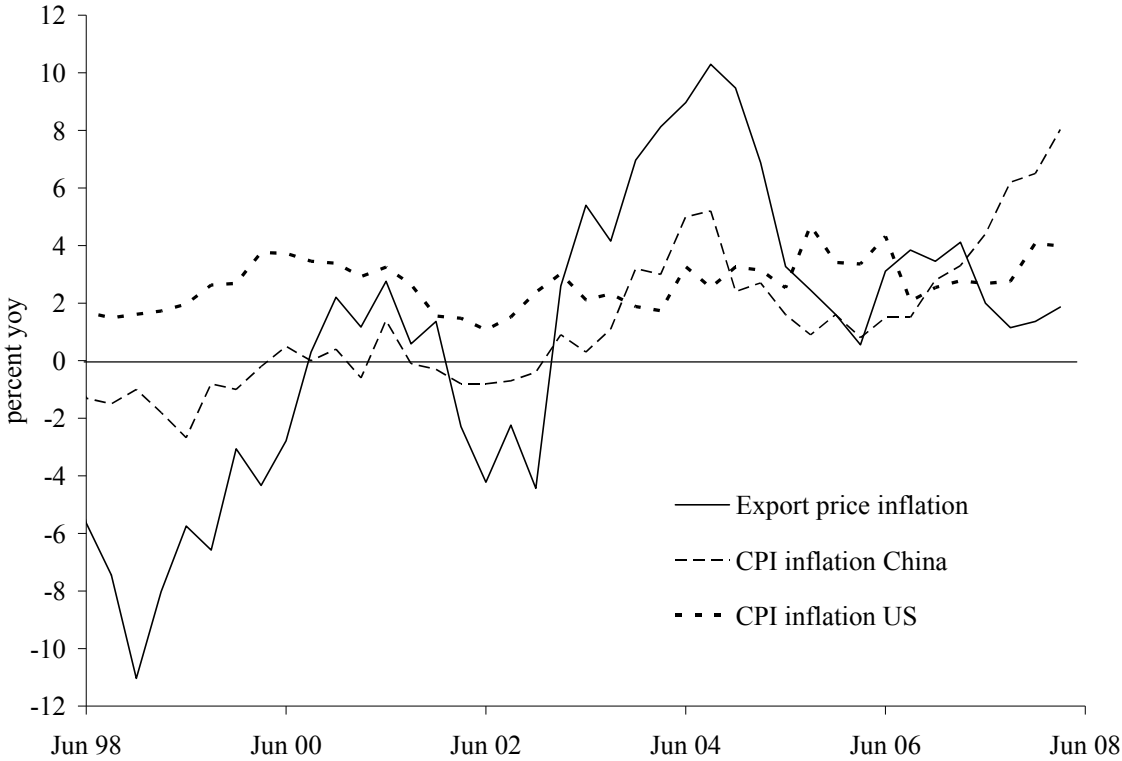
Source: UBS

Figure 14: Nominal and Real Value of Chinese Foreign Reserves, 1998-2008



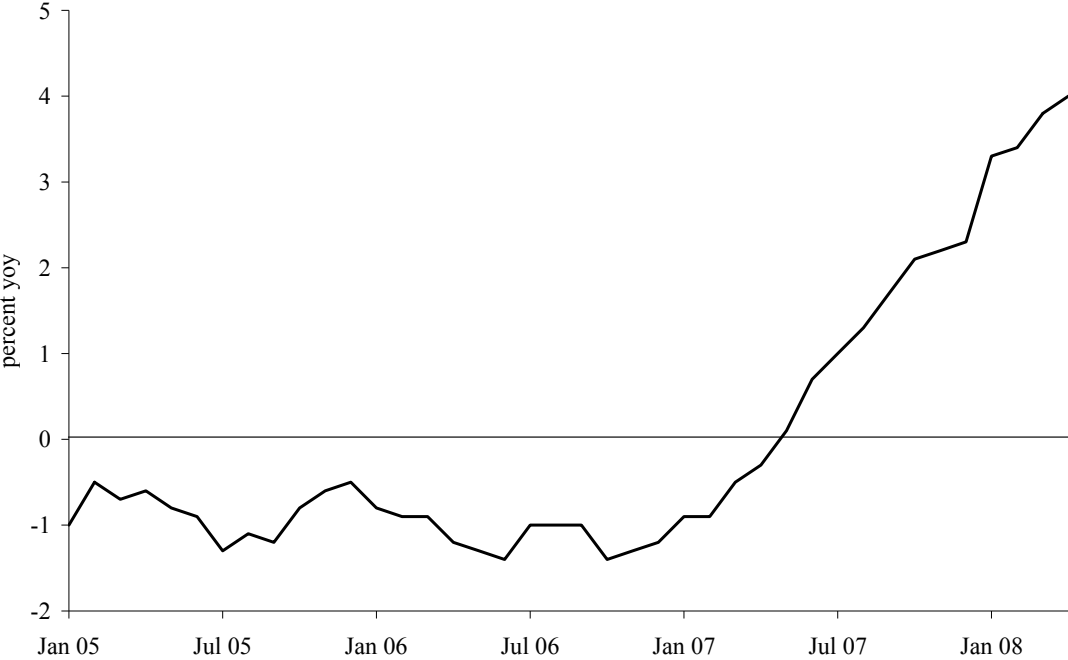
Source: Ecwin Database.

Figure 15: Inflation, China and U.S., 1998-2008



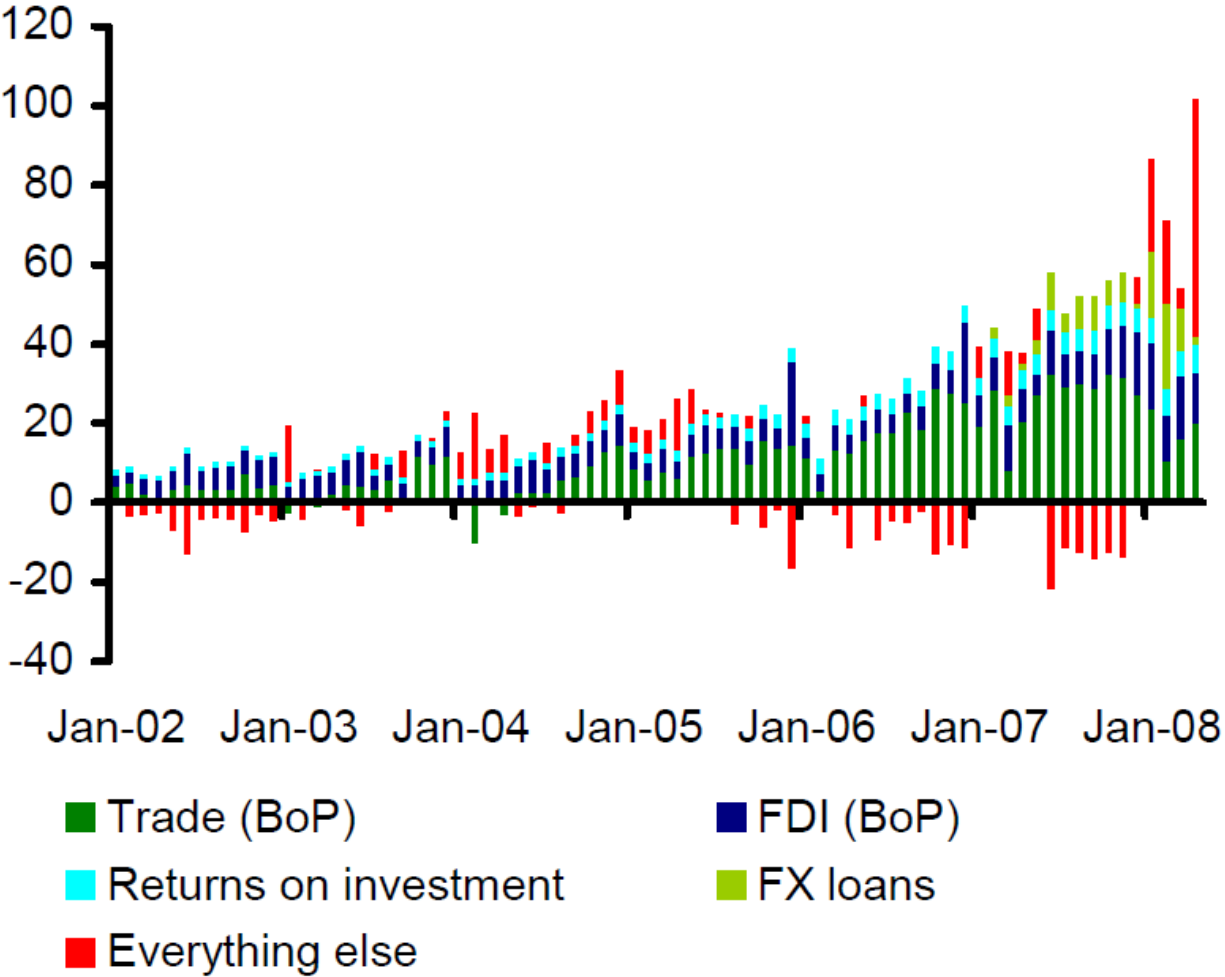
Source: Ecwin Database.

Figure 16: U.S. Price Inflation over Imports from China, 2005-2008



Source: Ecwin 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.