Stanford
Center for International
Development

Working Paper No. 322

Why China Should Keep its Dollar Peg: A Historical Perspective from Japan

by

Ronald McKinnon*

May 2007

Stanford University
579 Serra Mall @ Galvez, Landau Economics Building, Room 153
Stanford, CA 94305-6015

* Stanford University

Why China Should Keep its Dollar Peg: A Historical Perspective from Japan

Ronald McKinnon[1]
Stanford University

January 2007 (Rev)

JEL Codes: E52, O53
Keywords: China, Japan, dollar peg

Introduction

China's fixed its exchange rate at 8.28 yuan to the dollar from 1994 to July 21, 2005, and has only allowed a small, tightly controlled, appreciation since then. China's productivity and wage growth has been very high relative to most other countries, its trade surplus has been rising, and it continues to accumulate large dollar exchange reserves. The result has been "China bashing" with strong American pressure on China to appreciate further. Although appreciation need not reduce China's trade surplus, the threat thereof will reduce nominal interest rates—as happened in the earlier era from 1978 to 1995 of "Japan bashing" and yen appreciation. The resulting deflation from the overvalued yen, coupled with a zero-interest liquidity trap, led to Japan's "lost decade" of the 1990s with no reduction in its trade surplus measured as a share of its own GNP. It could happen to China in the new millennium.

This paper shows the monetary rationale for China using its dollar peg to anchor its domestic price level and to prevent a zero interest liquidity trap. As a prelude, my own monetary approach to the nominal exchange rate and price level is contrasted with Roubini's (2007) fixation, and that of much of the economics profession as in Bergsten et al. (2005), on changing real exchange rates to "correct" trade imbalances. The main body of the paper then compares China to Japan.

Exchange Rate Clubs and the Monetary Approach

Specialists in exchange rate economics fall into two distinct clubs: A and B. Members of Club A, by far the larger group, have been brought up since they were undergraduates on the elasticities model of the balance of trade. Besides being algebraically tractable, the microeconomics of this model seem intuitively plausible. With nominal export prices "sticky" in each country's currency in the short run, the relative price effects of a depreciation in the nominal exchange rate seem to go in the right direction for reducing a trade deficit. The depreciating country's exports become cheaper in world markets and it sells more, and its imports become more expensive in the domestic currency so it buys less, so the trade balance allegedly improves. Members of Club A often focus unconditionally on the link between the real, i.e., inflation-adjusted, exchange rate and the real trade balance.

[1] Email: mckinnon@stanford.edu. Thanks to Qiao Hong, Nick Hope, Nan Li, Kenichi Ohno, and Gunther Schnabl, for their invaluable help.

What about absorption adjustment? True, Club A's more sophisticated members also worry about saving-investment imbalances across countries; but these don't easily fit into the elasticities model, which dominates their thinking. They still see an appreciation of the real exchange rate to be useful for easing the adjustment process if, say, a country such as China began to consume more to reduce its trade surplus. Indeed, they may see real exchange appreciation to be a useful "expenditure switching" device for moving resources out of the tradables sector. Nouriel Roubini is a member of Club A in very high standing.

Club B is much smaller, and is mainly made up of monetary economists (excluding monetary cranks, of course!). Characteristically, members of Club B emphasize the linkages between national monetary policies, *nominal* exchange rates, and price levels, in financially open economies. Causality goes in both directions. Following the earlier work of Michael Mussa (1979), a floating nominal exchange rate today is determined by what forward-looking investors think the national monetary policy (and possibly other "fundamentals") will be relative to that in other countries into the future. Conversely, official action taken today to peg an exchange rate into the indefinite future—or negotiate some major change such as a devaluation or appreciation—requires that relative national monetary policies must (eventually) be changed to support it. Otherwise, the officially assigned path for the nominal exchange rate cannot be sustained. Countries that agree (perhaps by some Plaza-type negotiation) to having their currencies appreciate are also agreeing to follow a deflationary future monetary policy relative to the depreciating country.

I am sorry to report that membership in Club B is quite exclusionary (although not so much as to exclude Ronald McKinnon!). It won't admit economists who believe that governments can manipulate real exchange rates on a sustainable basis—let alone those who believe that exchange rate changes can compensate for saving-investment imbalances across countries. As narrow-minded monetary economists, members of Club B believe that central banks should aim only to stabilize the national price level. They are most fearful of having to alter the national monetary policy to support either an exchange rate appreciation or depreciation that the Ministry of Finance negotiates (mistakenly in their view) to "correct" a trade imbalance with some foreign country.

Being monetary economists, Club B's members can easily understand international currency asymmetry: why it is convenient, and even necessary, for one currency such as the dollar to dominate international finance as a vehicle and invoice currency. They understand the logic of an intervention system where other countries use the dollar as their key intervention currency, and the United States (as center country) does not intervene in order to minimize potential conflicts.

On occasion, a central banker in good standing in Club B may opt to peg (stabilize) his country's nominal exchange rate to the dollar in order to better anchor his country's price level as when Japan kept the yen at 360 to the dollar from 1949 to 1971, and China kept the renminbi at 8.28 yuan per dollar from 1994 to July 2005—and as

many smaller countries in Asia now do "softly". Unfortunately, members of Club A may see this as a mercantilist plot for stimulating exports by keeping its real exchange rate undervalued. But, with a fixed nominal exchange rate against the world's dominant money in which most of world trade is invoiced, Club B members know any such "undervaluation" would eventually be washed away by inflation.

Members of Club B readily agree that international saving imbalances are the basis for trade imbalances—but believe that moving the exchange rate is generally the wrong instrument for reducing, or helping to reduce, these imbalances. They worry that members of Club A so dominate political economic thought in the United States that many otherwise responsible American politicians are caught up in vendettas of Japan bashing or China bashing. They want foreigners to appreciate their currencies under the false presumption that this way of devaluing the dollar will reduce the U.S. trade deficit.

From Japan Bashing to China Bashing

Since the early 1980s, structural fiscal deficits in the United States and very low personal saving have contributed to rising "global imbalances", i.e., a rising U.S. current account deficit financed by heavy borrowing by the United States *in dollars* from the rest of the world.[2] With only a brief respite in the last quarter of 1991when the U.S current account briefly touched zero, Figure 1 shows a U.S. current account deficit of more than 6.5 percent of GDP in 2006. Much of the real counterpart of this financial transfer comes from the high-saving East Asian countries, principally Japan and now China, collectively running large trade surpluses, mainly in manufactures, with the United States. (Figure 1 shows their surpluses as a proportion of their smaller GDPs). However, since 2003, the surpluses of the petroleum producing countries have also become important.

<Figure 1 about here>

The manufacturing trade surpluses of the East Asian countries, in combination with exchange rate stabilization against the dollar, resulted in large accumulations of official exchange reserves (mainly dollars). These have led to increasing mercantilist pressure from Europe and the United States for Asian countries to appreciate their currencies. In particular, China, a country with remarkably high saving relative to its huge domestic investment, has come under heavy foreign pressure to appreciate the renminbi in 2005-2006—on the widely held belief that it would reduce its correspondingly large trade (saving) surpluses.

The current U.S.-China trade frictions are reminiscent of U.S.-Japan frictions from the 1970s through to 1995. The rising penetration of Japanese manufactured goods into the American market led to a political phenomenon popularly known as "Japan

[2] Whether it is mainly "undersaving" in the United States or "oversaving" in the rest of the world, particularly Asia, can be debated. For the latter view, see the ingenious argument by Bernanke (2005). For understanding the monetary and exchange rate consequences of current account imbalances, however, it need not matter which way causality goes.

bashing". Episodically, the Japanese government responded to American threats of trade sanctions and demands that the yen be appreciated by imposing "voluntary" constraints on particular exports to the United States and by allowing the yen to appreciate. The yen rose all the way from 360 to the dollar in August 1971 to a peak of 80 to the dollar in April 1995. McKinnon and Ohno (1997) showed that the ever-higher yen caused a deflationary slump in the Japanese economy with a zero-interest-rate liquidity trap, but *without* reducing Japan's current account surpluses measured as a proportion of its GNP. Worried about the slumping Japanese economy, the U.S. Treasury Secretary, Robert Rubin in April 1995 announced a new "strong dollar" policy, after which Japan bashing more or less ceased. Although a welcome change in American policy, it came too late to prevent Japan's "lost decade" of the 1990s and today's still fragile macro economy.

Japan bashing from 1978 to 1995 occurred when Japan had the world's largest *bilateral* trade surplus with the United States (Figure 2). Japan was then America's foremost industrial competitor—not only in heavy industries such as steel, autos and machine tools but also in high technology such as color televisions and semi-conductors. America's protectionist threats were usually specific to a particular industry within some short time frame. The Japanese would often respond serially by temporarily restraining exports in steel, autos, semi conductors, and so on. But also general yen appreciation, which was not temporary, often accompanied these specific industrial disputes—resulting in "the syndrome of the ever-higher yen" (McKinnon and Ohno, Ch.1).

<Figure 2 about here>

In the new millennium, history is repeating itself. China bashing is now superseding Japan bashing. Figure 2 shows China's bilateral trade surplus with the United States rising from being trivially small in the 1980s to equal Japan's by 2000, and then becoming more than twice as large as Japan's in 2006—now reaching more than 1.5 percent of America's GDP.

Unlike Japan's earlier more concentrated export surges into specific American markets for advanced manufactures, China's export surge is more in light and medium-tech industry and is "across the board". China has become mainly an exporter of finished consumer goods. Value added in most individual Chinese products is not high because inputs of capital goods, sub-assemblies, and a variety industrial inputs including basic minerals and petroleum products are largely imported. China is merely the face of a worldwide export surge into the saving-deficient American economy. Both Japan and Germany as well as several smaller East Asian countries now have bilateral trade surpluses with China. Nevertheless, at Christmas time, when American families open their presents, they see mainly made-in-China labels! While good for consumers, producers blame contracting employment in American manufacturing on competition from Chinese manufactures. The consequent rise in China bashing is more focused on demanding that the renminbi be appreciated to reduce the international competitiveness

of Chinese industry generally, rather than on more industry-specific protectionism as in the earlier Japanese experience[3].

Other than continual jaw-boning, American official pressure on China to appreciate has taken two specific forms. First is a bill introduced into the U.S. Congress in March 2005 to impose a 27.5 percent tariff on all U.S. imports from China unless the renminbi was substantially appreciated. This would have been an egregious violation of America's WTO commitments. If passed, it would be similar to the "Nixon shock" of August 1971 when he imposed a tariff on imported manufactures that was not rescinded until all the industrial countries—including Japan but not China—agreed to appreciate in December 1971. However, after China speeded up its rate of appreciation in August and September of 2006, Senators Schumer of New York and Graham of South Carolina agreed to withdraw the bill. But next year, they threaten to craft a more WTO-compliant measure to force China to further reform its currency practices.

Second, twice a year in May and November under Section 3004 of U.S. Public Law 100-418, the Secretary of the Treasury is required to assess whether countries such as China that have global current account surpluses, or large bilateral trade surpluses with the United States, are manipulating exchange rates to prevent effective balance of payments adjustment or to gain an unfair advantage in international trade, with unspecified sanctions to follow if he does. In May 2006, after being heavily lobbied by industry and labor groups to sanction China, the Secretary narrowly decided not to officially classify China to be a currency manipulator. However, he warned that this decision could change in the future if the renminbi did not appreciate, a warning based on the mistaken presumption that an appreciation would reduce China's trade surplus. Similarly, in December 2006, the new Secretary of the Treasury Henry Paulson refused to sanction China but hoped that the renminbi would appreciate in the future

Consequently, we now live in world where, although the renminbi has not yet appreciated very much, a strong expectation exists that it will be higher against the dollar in the future.

The Political Economy of the Trade Imbalance

China bashing now and Japan bashing earlier is both "political" and "economic". On the political side, the loss of jobs in American manufacturing arouses the ire of trade unions and the National Association of Manufacturers. Unsurprisingly, Congressmen from states with large manufacturing sectors have been the most vociferous in demanding that something be done about it. Blaming foreigners for misaligned exchange rates is

[3] The major exception seems to be in textiles where both Europe and the United States have reimposed quotas on imports from China and elsewhere. But this special case arises out of the expiration of the International Cotton Textile agreement on January 1, 2005. The rest of the world knew about this for the previous 10 years but failed to prepare for an unfettered Chinese export drive.

easier than facing up to the problem of inadequate private saving and large structural fiscal deficits in the United States.

But political populism is only part of the problem. Bad economic theorizing is at least as culpable. Most mainstream economists believe that a governments can control its real (inflation adjusted) exchange rate, and thereby control the real trade balance. Unfortunately, this presumption has been canonized in a model called the elasticities approach to (or model of) the balance of trade. Because this elasticities model focuses narrowly on the relative price effects of changes in real exchange rates, it is seriously incomplete. The reality is that governments can at most control nominal exchange rates, for which any change can only be sustained by altering the stance of the national monetary policy. So the macroeconomic repercussions of sustained exchange rate changes are large, and not adequately treated within the elasticities model.

For an international creditor, as are most East Asian economies, the income and spending repercussions of a sharp discrete appreciation against the world's dominant money are so strong that the effect of currency appreciation on its trade surplus is ambiguous. To see this, let us focus on how a creditor economy with a trade surplus would react to a discrete currency appreciation in the short and medium terms when domestic prices remain somewhat "sticky". Because an appreciating country's exports become obviously more expensive in world markets and decline, whereas imports look cheaper in the domestic currency and possibly increase, it seems intuitively plausible that its trade surplus should diminish—as the elasticities approach would have it. But there are at least three offsetting effects of an appreciation on national income and spending that tend to nullify this relative price effect.

First, the fall in exports itself, and fall in output of industries producing import substitutes, would tend to reduce national income—and dampen spending based on it, including spending for imports.

Second, firms must assess the investment costs of producing for a worldwide market. If country A is suddenly forced to appreciate, it becomes a relatively more expensive location in which to invest. Any new investment project looks more expensive to foreign firms, which must commit their limited capital to buy A's now more expensive currency. And once any physical investment is made, because domestic wages and other variable costs are higher for selling in foreign markets through the lens of an appreciated exchange rate, both domestic and foreign firms will see the project's ongoing profitability to be reduced. The upshot is that both inward foreign direct investment (FDI) and national investment could slump in response to a discrete appreciation—with a further fall in domestic expenditures including imports (McKinnon and Ohno, 1997, Ch. 6).

Third, in creditor countries that have built up large dollar claims on foreigners, this deflationary impact of an exchange appreciation is further accentuated because these dollar assets lose value in terms of the domestic currency: a negative wealth effect that reduces domestic consumption as well as investment (Qiao 2005). This negative wealth effect is stronger insofar as the dollar assets are held in the private sector rather than as

official exchange reserves. Thus, one would expect it to be stronger in Japan, where insurance companies and banks are major holders of dollar assets, than in China where a higher proportion of liquid claims on foreigners are held as official exchange reserves[4].

In summary, in the short and medium terms, depressed domestic spending offsets the relative price effect of an appreciation so as to leave the effect on the net trade balance indeterminate.[5] The proponents of the elasticities approach focus on the relative price effects of an exchange rate change and either ignore the income (absorption) effects or believe them to be small and controllable.

The above analysis focused on the impact effect of a surprise discrete appreciation of the *nominal* exchange rate in the short run before the domestic price level begins to change. Thus any nominal appreciation was also a real appreciation. But a more fundamental question is whether any such real appreciation could be sustained in the long run. Among financially open economies, nominal exchange rates and national monetary policies are mutually determined. For a discrete nominal exchange rate change to be sustained, it must reflect relative monetary policies expected in the future: relatively tight money and deflation in the appreciated country and relatively easy money with inflation in the country whose currency depreciates. Japan's experience with the syndrome of an ever-higher yen from the late 1970s through to 1995 was coupled with a falling domestic price level (measured in tradable goods prices) that lasted well into the new millennium. Its deflationary "lost decade" of the 1990s attests to the strength of this monetary approach.

Ironically, because Japan's price level fell relative to that of the United States, Japan's real exchange rate by the year 2000 had depreciated back to about where it had been in 1980. By the criterion of purchasing power parity, there was no sustained appreciation in Japan's real exchange rate—despite quite massive appreciations in its nominal rate (McKinnon and Ohno, 1997; McKinnon 2005, Ch 3). Nor has there been any sustained reduction in Japan's current account surplus—as seen in Figure 1.

Conflicted Virtue

Because of the currency asymmetry associated with the world dollar standard, the problem of a large dollar overhang and threatened currency appreciation is more general than the current problems facing China and Japan. Any international creditor country that cannot lend in its own currency cumulates a currency mismatch that we call the syndrome of *conflicted virtue* (McKinnon and Schnabl 2004, McKinnon 2005). Countries that are "virtuous" by having a high saving rate (like Japan, China or South Korea, but unlike the

[4] Whether governments, particularly central banks, worry about taking capital losses on their foreign exchange assets from appreciation is controversial—but not necessary for the argument been made here.

[5] In dollar debtor countries facing the threat of having their currencies depreciate against the dollar, the negative wealth effect tends to reinforce the relative price effect of an actual devaluation. Their trade balances could improve sharply from devaluation as domestic consumption (and imports) slumps even as their now cheaper exports expand into world markets. This was the case for Indonesia, Korea, Malaysia, Philippines, and Thailand after the Asian crisis of 1997-98. Their current accounts went from being sharply negative before the crisis to positive immediately afterwards.

United States) tend to run surpluses in the current account of their international balance of payments, i.e., lend to foreigners—but in dollars and not in their domestic currencies. With the passage of time, however, two things happen. First, as its *stock* of dollar claims cumulates, domestic holders of dollar assets worry more about a self-sustaining run into the domestic currency forcing an appreciation. Second, foreigners start complaining that the country's ongoing *flow* of trade surpluses is unfair, and results from an undervalued currency.

Of course both interact. The greater are foreign mercantilist pressures for appreciation of the domestic currency, the greater is the concern of the domestic holders of dollar assets. As runs out of dollars into the domestic currency begin, the government is "conflicted" because appreciation could set in train serious recession and deflation—particularly if the domestic price level was already stable or falling slightly. Nevertheless, foreigners may threaten trade sanctions if the creditor country in question does not allow its currency to appreciate.[6] Thus "virtuous" creditor countries become "conflicted"—as is now the case in China.

In what sense are China's private sector holdings of liquid dollar assets an overhang? Clearly if people expect the renminbi to remain credibly pegged to the dollar, then existing dollar claims—and further accumulation—can be held in rough portfolio equilibrium. Because GDP growth in China has been enormous, Chinese savers in the non-state sector could accommodate high parallel growth in their dollar assets as domestic financial institutions such as banks, insurance companies, and pension funds, become more adept at international financial intermediation—and the remaining restrictions on their holding foreign currency claims are eliminated.

But foreign pressure to appreciate the renminbi, and the expectation that it will continue, has upset what had been a rough portfolio equilibrium. The return flow of previously "flight capital" into China since 2001 could well indicate that private agents were less willing to hold dollar claims. More generally, the increasing share of official exchange reserves in total liquid claims on foreigners also indicates increasing reluctance by China's non-state sector to accumulate liquid dollar assets.[7]

In order to prevent the renminbi from appreciating further as the private sector dishoards dollars, the People's Bank of China (PBC) must intervene in the foreign exchange market to buy the excess dollars. Leaving these interventions partially

---

[6] Notice that conflicted virtue would not arise in international creditor countries whose money is internationally accepted, as the currency risk is shifted to the periphery. Britain was the world's dominant creditor country in the 19th century, but sterling was used to denominate most British claims on foreigners—sometimes with gold clauses. Similarly, for two and half decades after World War II, the US had large trade surpluses and was the world's biggest creditor country—but its claims on foreigners were largely in dollars and US investors did not have to fear changes in the dollar exchange rate.

[7] In 2006, higher US interest rates provided some offsetting incentive for the non-state sector to hold dollar assets rather than converting them all into renminbi.

unsterilized[8] relieves the pressure: the monetary base expands so that domestic interest rates fall relative to those on dollar assets. As long as interest rates on renminbi assets remain well above zero, increases in the monetary base coming from the buildup of official exchange reserves is tolerable.

Yet, the appreciation threat for China is a repetitive one. As in the Japanese case, China's surplus saving, i.e., its current account surplus, is unlikely to diminish as its currency appreciates. Instead, China's economic growth would slow and its China's price level would start declining. Because speculators would understand that China's trade surplus would not diminish, they would continue to short the dollar and go long in renminbi in anticipation of future pressure from foreigners for appreciation.

Because China's "traditional", i.e., 10-year old, dollar peg of 8.28 yuan per dollar was abandoned on July 21, 2005, markets now expect further appreciations. With no equilibrium upper bound, a floating renminbi could result in an upward spiral (as with the Japanese yen two decades earlier) that would force the PBC back into the market to cap renminbi's dollar value at a higher level. The upshot is that a country with conflicted virtue is trapped into accumulating foreign reserves well above any "desired" level of international liquidity. Since 2001 the stock of Chinese foreign reserves has expanded fast and now exceeds Japan's. As long as the center country's price level remains stable, the best that a peripheral creditor country can do is to limit hot money inflows with capital controls and to keep its nominal (dollar) exchange rate fixed.

China's Exchange Rate as an Instrument of Monetary Policy

If we jettison the still well-entrenched theory that the real exchange rate is a useful device for balancing international payments on current account and with it jettison the idea that a "free" float is possible or desirable in the presence of a huge overhang of dollar assets, how can one best theorize about "optimal" exchange rate policy? The alternative view is that a controlled *nominal* exchange rate is part and parcel of national monetary policy for targeting the national price level. This monetary approach is nicely illustrated by China's experience for the past decade.[9]

The monetary problem China faced, and still faces, as its increasingly open economy grew by leaps and bounds was how to anchor its domestic price level, i.e., keep inflation low and stable. Because its capital markets are still immature, the People's Bank

[8] Since August 2002 when the Peoples Bank of China started sterilization operations by issuing central bank bills, it absorbed about 50% of the liquidity resulting from foreign exchange interventions. Note that under a fixed exchange rate regime (and partial international capital mobility) full sterilization is impossible, as it would drive up interest rates and therefore attract new capital inflows.

[9] However, the basic asymmetry of the world dollar standard is such that only countries on the dollar's periphery, such as China, can successfully use their (dollar) exchange rate as a monetary instrument. The center country itself must fashion domestic monetary policy independently of the foreign exchanges. Indeed, the U.S Federal Reserve Bank seldom intervenes in foreign exchange markets.

of China (PBC) cannot rely on a Friedman rule that fixes the rate of growth in MI—or on a Taylor Rule that relies on manipulating the short-term interbank interest rate—to control overall macroeconomic activity in order to achieve an inflation target. So the simplest solution was to look for an external monetary anchor.

The PBC anchored the national price level from 1994 to September 21, 2005, by keeping its currency, the renminbi, virtually fixed at 8.28 yuan to the U.S. dollar—the world's dominant international money in which most of Asian trade is invoiced. The policy was a great success: over the period, China's consumer price inflation dropped to around 1 to 2%, from over 25%, and inflation-adjusted GDP grew at a healthy 9 to 10% clip per year. Figure 3 shows the very high rate of price inflation in China in 1993-96—probably aggravated by the over depreciation of the renminbi when the official exchange rate was combined with the free market swap rates. But this inflation came down subsequently as the nominal exchange rate remained stable. Figure 4 shows that the former "roller coaster rides" in both inflation and real growth rates were smoothed out after 1996.

<Figures 3 and 4 about here>

However, the U.S. monetary anchor isn't always sufficiently stable. From mid 2005 past mid 2006, U.S. inflation jumped up with consumer prices rising to 4.1% and producer prices to 4.2% on a year-on-year basis through last July (Figure 5). Then as the world price of oil fell sharply in late 2006, U.S. inflation fell sharply back to 2 percent on an annual basis—about the same as China's current inflation.

<Figure 5 about here>

So what should China do? Since July 21 2005, when the People's Bank of China unhooked the renminbi and allowed a discrete appreciation of 2.1%, the mainland's policymakers have allowed the currency to crawl upwards slowly. The total appreciation totaled 3.3% through July 21, 2006—and seems to be continuing at about this rate.

The initial motive for unhooking China's peg to the U.S. dollar was probably to defuse--or confuse--misguided American political pressure to appreciate the renminbi's value versus the dollar. The premise of such arguments, that renminbi appreciation would reduce China's large and growing trade surplus, is widely held but wrong—as we have seen. The trade imbalance between China and the United States results from high saving in China combined with low saving in the U.S., neither of which is predictably affected by changing the yuan/dollar exchange rate.

China's inflation *is*, however, predictably affected—albeit with lags—by sustained exchange rate changes. Although unhooking the yuan/dollar exchange rate to reduce China's trade surplus was wrongly motivated, the subsequent small, but well-signaled, appreciation had a positive effect: it helped to insulate China from the surprisingly high U.S. price inflation from mid 2005 to mid 2006. So should small

controlled exchange appreciation now become China's monetary guideline for maintaining internal price stability? Only if the U.S. inflation rate bubbles up once more.

A New Monetary Rule

Beyond just U.S.- China trade, the U.S. dollar is an international currency widely used for pricing foreign trade in goods and services in Asia and the world, more generally. When a highly open economy such as China's gears its domestic monetary policy to a slow, but well signaled and sustained appreciation against the U.S. dollar, its price inflation will eventually fall below the correspondingly American rate.

This reasoning leads to a new monetary rule for China: Pick some target rate for annual inflation in China's CPI, say 1% (it could be as high as 2%), then see how much higher American inflation, say 4.1%, is above China's internal target rate. The difference, in this case 3.1%, then becomes the planned annual upward rate of crawl of the central renminbi rate against the dollar. As is already the case, the crawl would be tightly controlled by China's central bank, with only tiny movements in the central exchange rate on a daily basis—around which the narrow band of ± 0.3% would continue. (Some people now believe that the official band has become widened to ± 1% .) And the exact timing of these movements would be randomized so that speculators don't get any free lunches. Finally, if U.S. Federal Reserve chairman Ben Bernanke does succeed in reducing American inflation as seemed to be the case toward the end of 2006, China's upward crawl should slow accordingly—and stop altogether when American inflation stabilizes at China's internal target rate.

A Balassa-Samuelson Caveat[10]

In the long run, this exchange-rate-based monetary rule targeting China's rate of CPI inflation to be the same as America's would be warranted only if there were no significant Balassa-Samuelson (BS) effect in the structure of domestic prices within China. In high-growth economies, the BS model presumes that productivity growth is faster in tradable goods production than in nontradables, which are largely services. So when economy-wide wages grow to match the high productivity growth in the tradables sector, the price of services increases relative to goods. Then inflation in the CPI, which contains both goods and services, should run faster than in the wholesale price index (WPI), which contains only goods. Thus, for any given exchange rate, high-growth China should accept a greater CPI inflation than in slow-growth United States. A rough balance in international competitiveness is then maintained because the WPIs of the two counties would rise at the same rate—hopefully near zero.

However, the Balassa-Samuelson effect in China has been quite muted compared to the early experiences of high growth Scandinavia in the 1950s and 1960s leading to the "Scandinavian model of (CPI) inflation" (Lindbeck 1979). The BS effect was even more pronounced in high-growth Japan in the 1950s and 1960s when the yen was safely fixed

[10] I would like to thank Torkeir Hoien of SKAGEN Funds, Norway for reminding me of the Balassa-Samuelson effect.

at 360 to the dollar. Then the Japanese CPI index grew more than two percentage points faster than the American CPI, and almost 4 percentage points faster than the Japanese WPI (McKinnon and Ohno, 1997).

Precisely why the BS effect in high-growth China today is so muted remains a puzzle. But preliminary data suggest that China's CPI only increases about one percentage point faster than its fledgling WPI. One purely statistical reason is that China's CPI is still mainly a goods price index—a with food products getting a relatively high weight, and in which many important service components have yet to be fully incorporated. But a more interesting economic reason is that productivity growth in China's service sectors has been relatively high, in part because of unrestricted foreign direct investment in retailing. In contrast, in Japan's high growth era of the 1950s through the 1970s, foreign direct investments in services were virtually prohibited—and competition in retailing within Japan was heavily restricted to protect small retailers from large discounters. Thus, in the face of rising wages, Japan's service sectors remained backward with very low productivity growth. This exaggerated the inflation in its CPI rose relative to its WPI.

The upshot is that our monetary rule may have to be modified in the future. When China's CPI is broadened to include more services, and its WPI also is broadened beyond being an ex-factory index, the CPI may show more growth relative to the WPI. If (and only if) so, the People's Bank of China might well raise its target rate for domestic inflation in its revised CPI. Ironically, this would be another argument for slowing the rate of appreciation of the renminbi against the dollar—despite the foreign clamor for faster appreciation.

Downward Pressure on Interest Rates

In the absence of effective capital controls, interest rates on renminbi assets are more immediately sensitive to expected exchange rate movements than are domestic inflation rates. Those interest rates that are not officially pegged are already endogenously determined by the expected path of renminbi against the dollar. Figure 6 shows the paths of one-year interest rates for China and the U.S. and the yield spread between them. In December 2006, the yield on dollar bonds quoted in London was 5.2%, while that on bonds issued by China's central bank was just 2.8%—a spread of just 2.4 %. Figure 6 then superimposes the path of the renminbi's appreciation since July 21, 2005. Remarkably, by July 2006, the two curves conjoin: the 3% appreciation over the year roughly equals the interest differential! Investors in renminbi assets were willing to accept a lower return because they expected the renminbi to appreciate. This interest differential of 3% or so will continue as long as investors project that the renminbi will continue to appreciate by that amount.

<Figure 6 about here>

It is important to keep the rate of renmimbi appreciation moderate and in line with the inflation differential between the two countries. Suppose the rate of appreciation was

accelerated to 6%, with U.S. inflation was 4% and the U.S. dollar interest rate at 5.7%. Financial markets, which are very fast to adjust, would bid interest rates on renminbi assets toward zero—from which they would be bounded from below: the infamous liquidity trap. In goods markets, where prices are slower to adjust, inflation would begin to fall below the 1% target—and then could even fall below zero, so as to create outright deflation.

Alternatively, suppose that U.S. inflation remained at 2%, and dollar interest rates came down toward 3%. Then, if China's central bank stayed with its current policy of a slightly more than 3% annual upward crawl of the renminbi, Chinese interest rates would again be forced toward zero, with the (lagged) threat of outright deflation in the general price level. Instead, the correct strategy of China's central bank then becomes to slow the rate of appreciation—or halt it altogether (which it has not done so far in 2007).

The bottom line is that China's central bank must carefully watch inflation and interest rates in the United States when formulating its own exchange-rate based monetary strategy. Any exchange rate changes against the dollar should be tightly controlled and gradual.

Floating and the Plight of Agriculture

Floating the renminbi, which would lead to a large initial appreciation, would be a major policy mistake. China's trade (saving) surplus would continue unabated with a continued putative accumulation of dollar claims by the non-state sector that would refuse to hold them. The renminbi would continue appreciating until the central bank was again forced to intervene and stabilize the rate at a much appreciated level—the problem of conflicted virtue. As long as China's financial system remains undeveloped so that lending to foreigners in renminbi is infeasible, floating with an ever-increasing dollar overhang would result in an upward spiral with no well-defined "equilibrium" for the exchange rate. And exchange rate fluctuations themselves would generate a negative risk premium in China's interest rates (see the analysis below). By then expectations of ongoing appreciation and deflation in China would be firmly in place much like the ever higher yen in the 1980s through the mid 1990s led to asset bubbles, then to a deflationary slump with a zero interest liquidity trap, and to Japan's "lost" decade.

The initial impact of a discrete appreciation of the renminbi on prices in different sectors of China's economy would be highly asymmetric. Domestically produced and consumable (nontradable) services would be the most insulated. The renminbi prices of manufactures would be more strongly affected, but insofar as they were brand name goods (Hicksian "fixprice" goods) with some independent pricing power, immediate price declines could be somewhat mitigated. Because many Chinese consumer manufactures have a very high import content (as much as 70 percent), the fall in input prices would further soften the immediate effect on profits of a fall in the output prices.

However, the sector least protected from exchange rate fluctuations is agriculture. It is well known that homogenous primary products the world over are priced in dollars

in international trade—with the world price set at some central basing point such as Chicago with major commodity exchanges. They are Hicksian "flex price" goods and potentially move up and down daily according to (world) market conditions modified by the distance from Chicago.

In order to be accepted into the WTO by 2000, China agreed to phase out tariffs and quantitative restrictions on both industrial and agricultural imports. It is now in full compliance with its WTO obligations such that its agriculture in most dimensions is more liberalized than that of Europe or the United States—and certainly more liberal than Korea's or Japan's. Thus Chinese farmers, who are still more than 50 percent of the population and now much poorer than their urban brethren, would be particularly vulnerable to an appreciation that reduced the renminbi prices of standardized grains—rice, wheat, soybeans, and so on—by the same percentage amount that the renminbi rose against the dollar. Apart from a discrete appreciation itself, just large random fluctuations in the exchange rate would introduce a lot of noise into domestic agricultural prices.

In the event, of course, such large catastrophic movements in Chinese agricultural prices would not be allowed to happen. The government would be forced back in to re-impose quantitative restraints on international trade flows of agricultural produce—and re-institute domestic price support programs much in the mode of the "advanced" industrial economies. Indeed, this is what happened in Japan in the face of the ever higher yen after 1970. Japan introduced strict quotas on imports and state trading to seal off domestic prices from international ones. Now the domestic price of rice in yen can be anywhere between 6 and 8 times the yen equivalent of the world dollar price depending on whether the yen is low or high in the foreign exchanges. Clearly, major fluctuations in the renminbi against the dollar would lead to a serious regression in China's commitment to liberalize its economy—not only in agriculture but probably elsewhere.

The Negative Risk Premium and Zero-Interest Liquidity Trap

Even though Japan sealed off much of its agriculture from the domestic price effects of exchange rate fluctuations, this did not prevent it from eventually falling into a zero-interest liquidity trap because of foreign exchange risk. How likely is this to happen in China?

In China several key interest rates are pegged by the government: the basic deposit rate is about 2.4% and the standard loan rate is over 6%. And they stay fixed for long periods of time to protect the profit position of the banks. However, Figure 6 compared one-year dollar interest rates in London (LIBOR) with those on one-year PBC bonds—whose rates seem to move fairly freely. Also, China's overnight bank rate seems to be market determined. Figure 7 compares China's rate with the similar overnight interbank rates for the U.S. and Japan. In December 2006, China's interbank rate was also about 3.4 percentage points less than that on U.S. federal funds.

<Figure 7 about here>

Figure 7 also shows that Japan's overnight Gensaki rate is about 5 percentage points less than the U.S. federal funds rate and is virtually zero: the dreaded liquidity trap. For more than a decade, foreign exchange risk has compressed the structure of yen interest rates toward zero so that the Bank of Japan (BOJ) essentially lost control over domestic monetary policy. In the 1990s into the new millennium, the BOJ could not expand domestic aggregate demand in order to not stop the deflation arising from the overvalued yen. Can we come up with a simple portfolio balance condition reflecting how foreign exchange risk keeps market determined interest rates in either China or Japan below those in the United States? Consider China first.

The expectation of an ever higher renminbi tends to bid down market-determined nominal interest rates on renminbi assets, and this effect is stronger the more China's financial system is liberalized. To illustrate this point, counterfactually let us assume that China's financial system is completely liberalized. Domestic interest rate restrictions on bank deposits and loans are abolished, and domestic bond markets thrive with interest rates free to seek their own market-determined level at every term to maturity. Furthermore, we assume that exchange controls on international financial flows are removed: arbitrage between foreign (dollar based) financial markets and domestic renminbi based markets becomes uninhibited. Then we posit that the interest differential at every term to maturity is determined by

$$i = i^* + E(\hat{e}) + \varphi \qquad (1)$$

where i is the (endogenously determined) Chinese nominal interest rate, and i^* is the (exogenously given) U.S. nominal interest rate, and E the expectations operator. $\hat{e}$ corresponds to the nominal percentage change of the yuan/dollar exchange rate. Thus, if the renminbi is expected to appreciate, $E(\hat{e}) < 0$, as with the familiar principle of open interest parity.

But more than the mean expectation of renminbi appreciation is involved. The risk premium in Chinese interest rates is denoted by φ. Insofar as China's private sector holds dollar assets net, and the yuan/dollar rate fluctuates around its mean expected value, then $\varphi < 0$, the risk premium is *negative* (Goyal and McKinnon 2003)[11]. That is, Chinese wealth holders, whose natural currency habitat is renminbi, see dollar assets to be riskier than renminbi assets even if there is no unidirectional expectation that the renminbi will appreciate. φ becomes more negative the more volatile the exchange rate and the greater are private holdings of renminbi assets.

Be that as it may, Figure 6 shows that virtually the whole of the interest differential between dollar bonds and renminbi bonds can be explained by the open interest parity condition embedded in $E(\hat{e})$, if one presumes that the actual appreciation of 3.0 percent reflects what was expected. How then can one explain the absence of our

[11] Note that the sign of the risk premium is linked to the current account position and the sign of the net international investment position. For countries with sustained current account deficits and a negative net international investment position, the risk premium would be positive.

negative risk premium, denoted by φ in equation (2)? The negative risk premium depends positively on the stock of dollar bonds held privately within our creditor economy and the volatility of the exchange rate around its trend, i.e., its expected rate of appreciation. The stock of privately held dollar bonds in China is quite low (Table 1) and the volatility of the yuan/dollar exchange rate has also been low. Since the initial discrete 2.1 percent appreciation on July 21, 2005, the PBC has managed the upward crawl in the exchange rate very tightly with negligible variance around the trend (Figure 6). Whence the absence of a significant negative risk premium in China's financial markets—unlike what currently exists in Japan.

<Table 1 about here >

The experience of Japan with currency risk from anticipated yen appreciation and random fluctuations in the yen/dollar rate is instructive. Since the late 1970s, Japan's financial markets were more developed and more open to international arbitrage than China's are now. On 10-year Japanese Treasury Bonds (JGBs), Figure 8 shows that the yield has been 2 to 5 percentage points below that on 10-year U.S. Treasuries since 1978. In December 2006, the yield on JGBs was about 1.7 percent when that on U.S. Treasuries is about 4.7 percent.

<Figure 8 about here>

In addition, Japanese short term (interbank) interest rates fell toward zero in the mid 1990s and then remained at zero into the new millennium (Figure 7). In December 2006, Japan's Gensaki rate was still a full five percentage points less than that on U.S. federal funds. Why doesn't overwhelming international financial arbitrage close the gap?

First consider this interest differential between yen and dollar assets from a somewhat longer historical perspective. In log form, Figure 8 also shows the long, if erratic, appreciation of the yen from 360 to dollar in August 1971 (the Nixon shock) to April 1995, when the yen peaked out at 80 to the dollar and Japan bashing ceased. After 1971, the expectation that the yen would go ever higher lagged the actual course of events. When all the major industrial countries were forced to appreciate sharply against the dollar (17 percent in the Japanese case), the markets viewed this Nixon shock to be a one-time, if cataclysmic, event—and interest rates did not "forecast" that the dollar would depreciate further. But once Japan emerged as America's foremost industrial competitor and Japan bashing began in earnest with a trade dispute and another sharp appreciation of the yen in 1978, markets began to anticipate more Japan bashing as its bilateral trade surplus with the U.S. continued to grow (Figure 2). By 1978, the expectation of an ever-higher yen had become so dominant that Japanese long-term interest rates dropped below American and have stayed there ever since (Figure 8).

While all of this is well and good, a major puzzle remains. Since 1995, the yen has shown no further secular appreciation against the dollar. The upper panel in Figure 8 shows the upward trend in the yen lasting to 1995, when the yen finally stopped appreciating and Japan bashing ceased. Since then, however, the yen/dollar rate has

fluctuated rather widely but with no apparent trend. So why do Japanese interest rates remain so much lower than American?

Interpreting equation (1) in Japanese terms, the interest differential $i = i^*$ between yen and dollar bonds is partitioned into two components: $E(\hat{e})$ and φ. In the Japan bashing period before April 1995, one could reasonably expect that the yen would continue to appreciate so that the $E(\hat{e})$ term was dominant (as in China today). And because entrenched expectations often change with a lag, after 1995 the expectation of a secular appreciation of the yen may have decayed only gradually so that $E(\hat{e})$ remained important while slowly losing its dominance. However, for the interest rate differential to remain so large in the new millennium, one must appeal to the negative risk premium φ, and to the behavior of American interest rates .

Because of Japan's long history of running current account surpluses, the cumulative total of liquid dollar claims to be held by the economy are much greater relative to GNP then they were back in 1980s—and they are continually growing (Table 2). Private sector finance for acquiring counterpart dollar claims is always chancy because of ongoing high volatility in the yen/dollar exchange rate (Figure 8)—the risk that offsets the higher yield on dollar relative to yen assets. For the private sector to keep acquiring additional dollar claims, the interest rate differential may have to increase—reflecting an increasingly negative risk premium.

<Table 2 about here>

But after the collapse of the high tech bubble in 2001, U.S. short-term interest rates came down sharply—and became very low in 2003 and 2004 (Figure 7). Because Japanese short-term interest rates were bounded from below by zero, the differential of American over Japanese rates narrowed rather than widening. Consequently, there was net dishoarding of dollar assets by Japan's private sector and a sharp jump in official exchange reserves. From the end of 2002 though 2004, official reserves almost doubled. Because of extremely heavy foreign exchange intervention by the Bank of Japan (BOJ) to keep the yen from ratcheting upward, official reserves increased by U.S.$ 372.8 billion.

Conversely, because U.S. interest rates have risen sharply in 2005-2006 thus widening the interest differential at shorter maturities with yen assets, the BOJ has hardly intervened at all. The private sector has returned to acquiring most of the dollar assets generated by Japan's current account surpluses. But this is only a lull. When U.S. interest rates stop increasing and dollar assets continue to accumulate in private Japanese portfolios, a point will be reached where the risk premium again won't be sufficiently negative (Japanese interest rates being bounded from below by zero). Then any mere rumor of currency appreciation will prompt another run out of private portfolios into official exchange reserves. These episodic runs into official reserves, followed by quiescent periods, are also part of Japan's earlier experience (McKinnon, 2005).

But our concern here with the mechanics of runs and negative risk premia in interest rates should not detract from how expensive foreign exchange instability has

been for Japan's economy. The extraordinary appreciations of the yen through the mid 1990s threw the economy into a deflationary slump. Then the subsequent low interest rate liquidity trap, caused by ongoing exchange rate volatility, prevented the Bank of Japan from re-inflating the economy to escape from slump. True, by 2006, Japan's price level had stopped falling, and the economy grew modestly—but mainly on the back of increased exports, particularly to China. Increases in domestic aggregate demand remain weak, and the economy remains fragile.

A Concluding Note:

In the long run, the preferred solution for both China and Japan is exchange rate stabilization against the dollar to prevent unduly low interest rates and deflationary traps. For China, stabilization is needed to escape from the expectation of an ever-higher renminbi that exceeds the desired inflation differential. As inflation in the United States moderates, appreciation in the renminbi should slow down and perhaps end altogether.

For Japan, stabilization means just smoothing out fluctuations in the yen/dollar exchange rate so as to eliminate the need for a negative risk premium in yen interest rates. As Japan's large trade surplus continues, that part of it not offset by (illiquid) outward foreign direct investment will continue to be mainly financed by the private accumulation of liquid dollar claims. In 2006, most are still being acquired by private Japanese financial institutions such as insurance companies and banks. But as private stocks build up and dollar assets continue to look riskier because of exchange rate fluctuations, another run out of dollars into yen, i.e., into official exchange reserves, is inevitable. And Japanese short-term interest rates will remain trapped close to zero.

If both China and Japan succeed in stabilizing their dollar exchange rates, all the smaller Asian countries will likely follow suit. Because the trade of East Asian countries with each other is growing so fast, East Asia is now close to being an "optimum currency area" (McKinnon 2005, ch. 7). Thus, the mutual stabilization of intra-East Asian exchange rates by each pegging to the dollar will be of great mutual benefit. Indeed, this would facilitate the further integration of East Asian financial markets.

Of course, all of this will not eliminate the saving (trade) imbalance between East Asia and the United States. That would require other measures beyond the reach of exchange rate policy.

References

Bergsten, C. Fred et al. 2005: *The United States and the World Economy*. Institute for International Economics, Washington D.C.

Bernanke, Ben 2005: *The Global Saving Glut and the U.S Current Account Deficit.* Sandridge Lecture, Virginia Association of Economics, Richmond Virginia.

Goyal, Rishi , and Ronald McKinnon, 2003: Japan's Negative Risk Premium in Interest Rates: The Liquidity Trap and Fall in Bank Lending. *The World Economy* 26, 3, 339-363.

Lindbeck, Assar, 1979: *Inflation and Unemployment in Open Economies* , North Holland, Amsterdam.

McKinnon, Ronald 2005: *Exchange Rates under the East Asian Dollar Standard: Living with Conflicted Virtue* . MIT Press, Cambridge Mass.

McKinnon, Ronald and Kenichi Ohno, 1997: *Dollar and Yen. Resolving Economic Conflict between the United States and Japan*, MIT Press, Cambridge Mass.

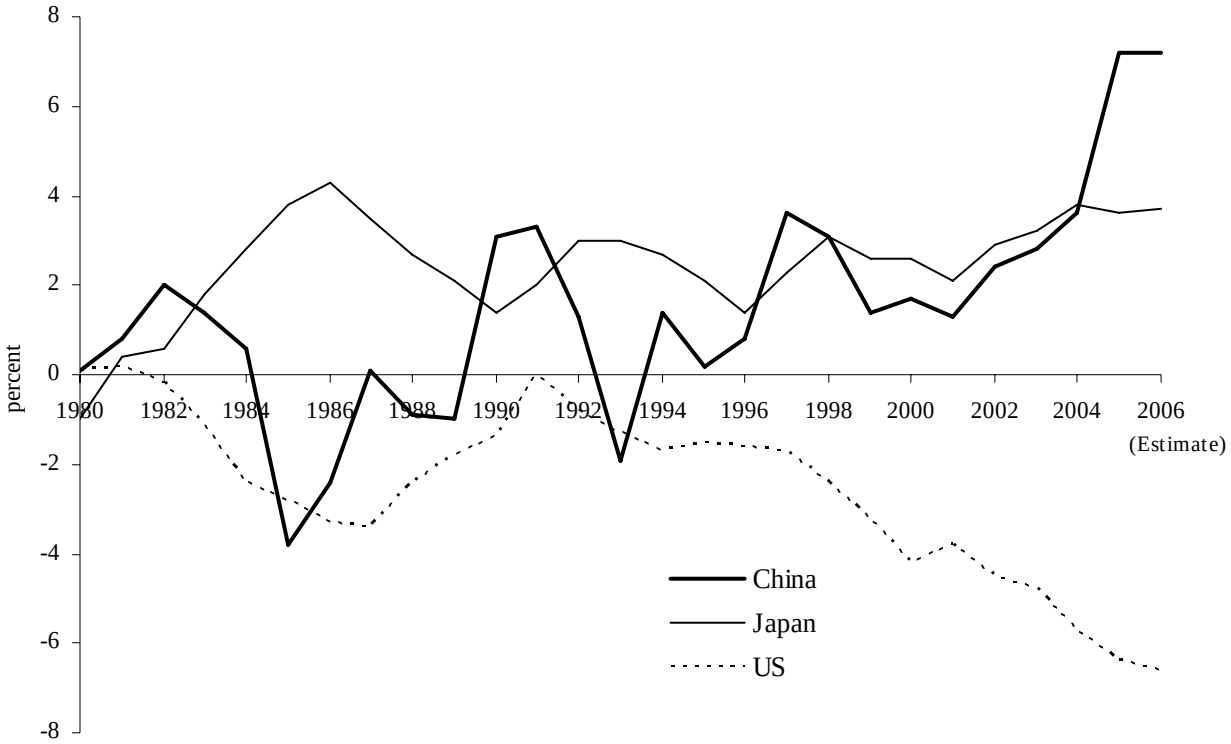
McKinnon, Ronald, and Gunther Schnabl 2004: A Return to Exchange Rate Stability in East Asia? Mitigating Conflicted Virtue. *International Finance* 7 (2004), 2, 169-201.

Mussa, Michael, 1979: "Empirical Regularities in the Behavior of Exchange Rates and Theories of the Foreign Exchange Market" in Bruner and Meltzer eds *Carnegie-Rochester Conference Series on Pubic Policy*.

Qiao, Hong 2005: *Exchange Rates and Trade Balance under the Dollar Standard*. Stanford University, Center for International Development, China Working Paper Series #259

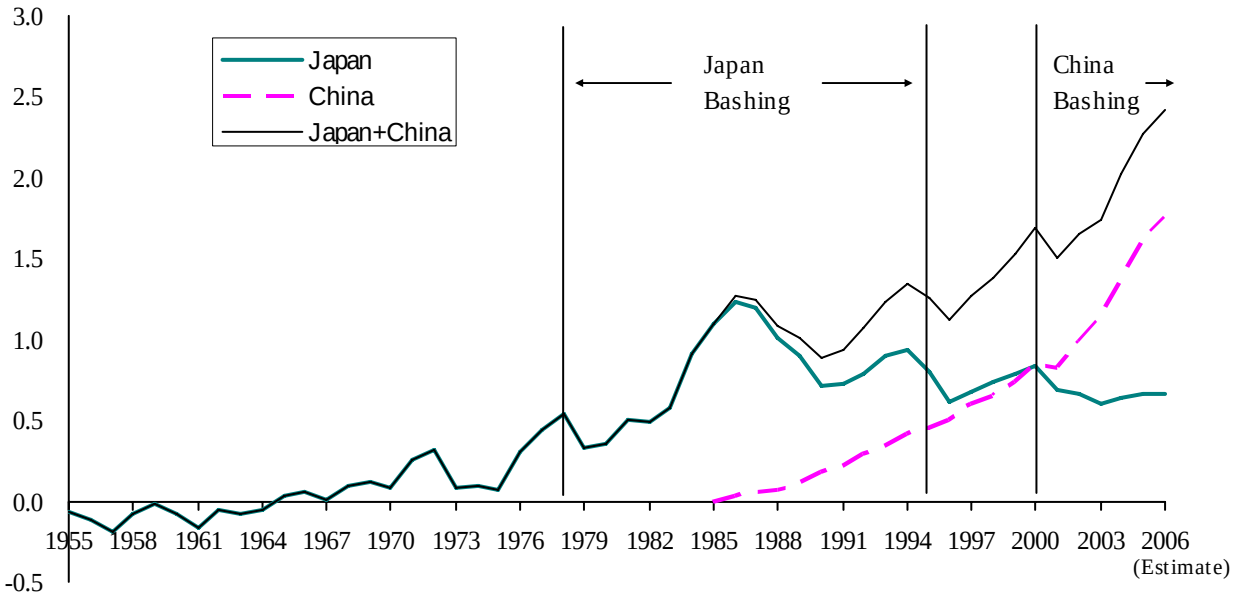
Roubini, Nouriel, 2007: "Why China Should Abandon its Dollar Peg", *International Finance*, Spring (forthcoming).

Figure 1: Current Accounts of China, Japan, and U.S., 1980 – 2006 (percent of GDP)



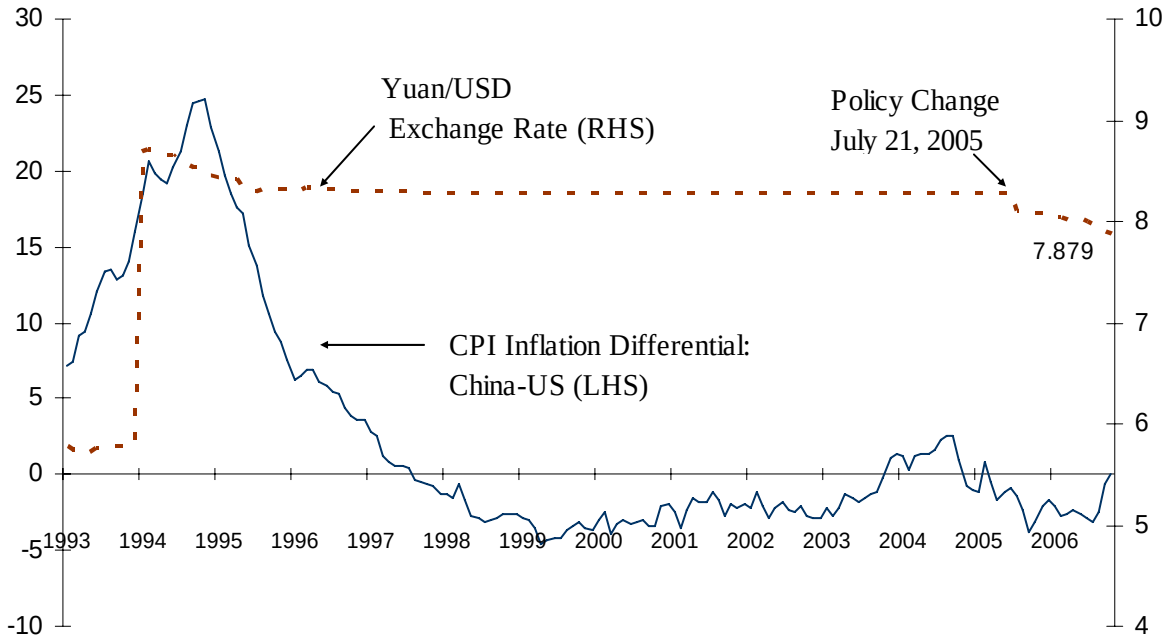
Source: IMF

Figure 2: Bilateral Trade Surpluses of Japan and China with the U.S., 1955-2006 (percent of U.S. GDP)



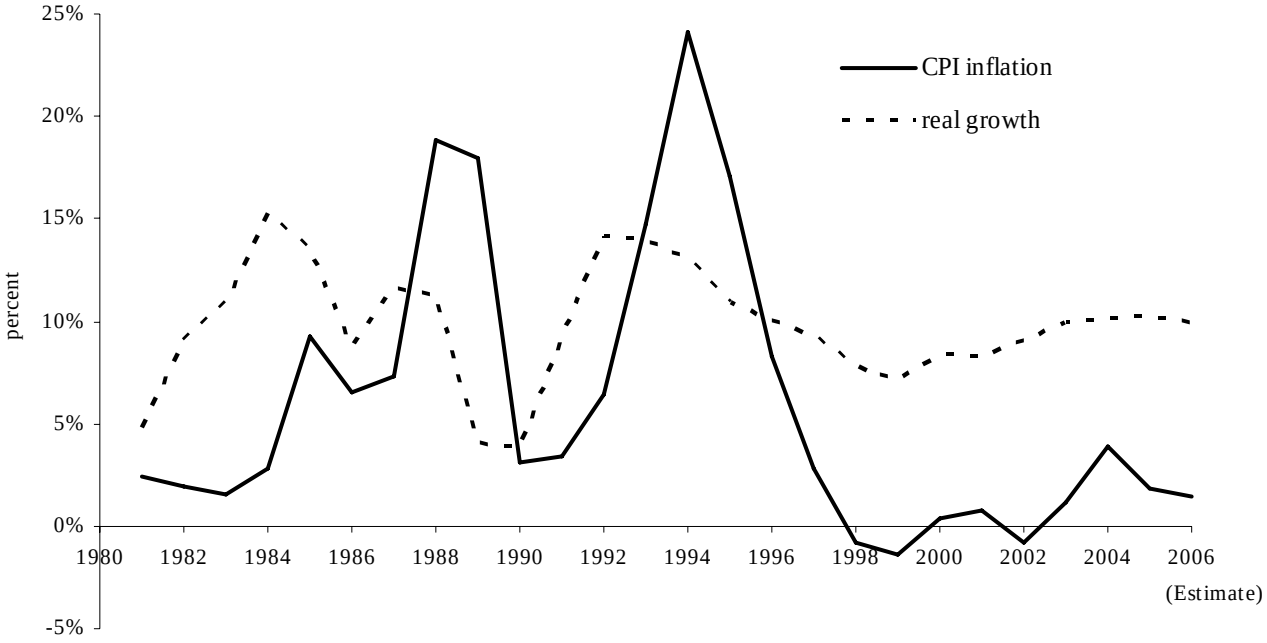
Source: Kenichi Ohno, BEA

Figure 3: Yuan/Dollar Exchange Rate and CPI inflation Differential, 1993-2006



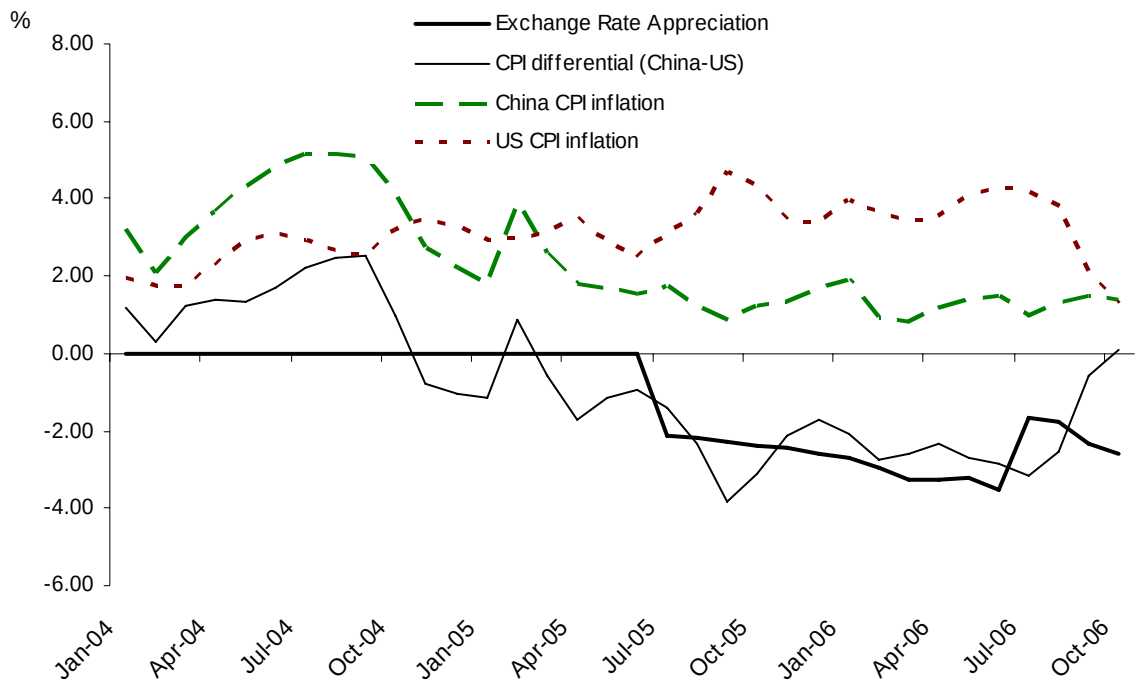
Source: EIU

Figure 4: Real Growth and Inflation in China, 1980-2006



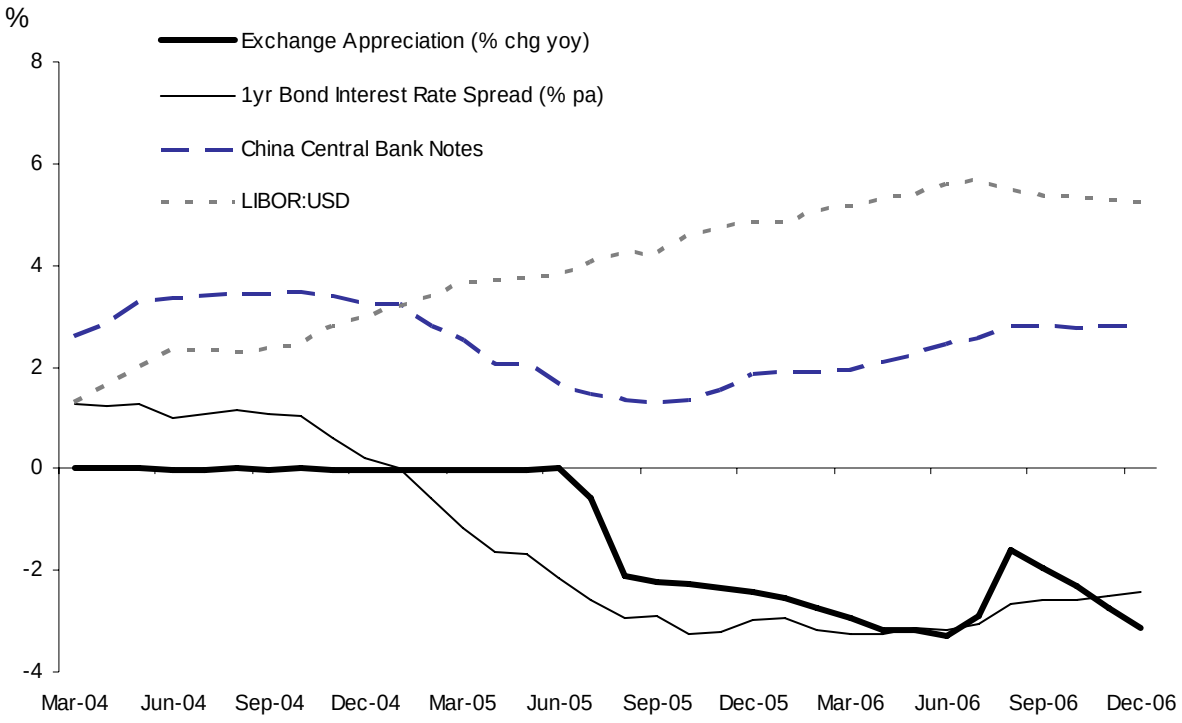
Source: IMF

Figure 5: Inflation of China and the United States, and Yuan/Dollar Exchange Appreciation, 2004-2006



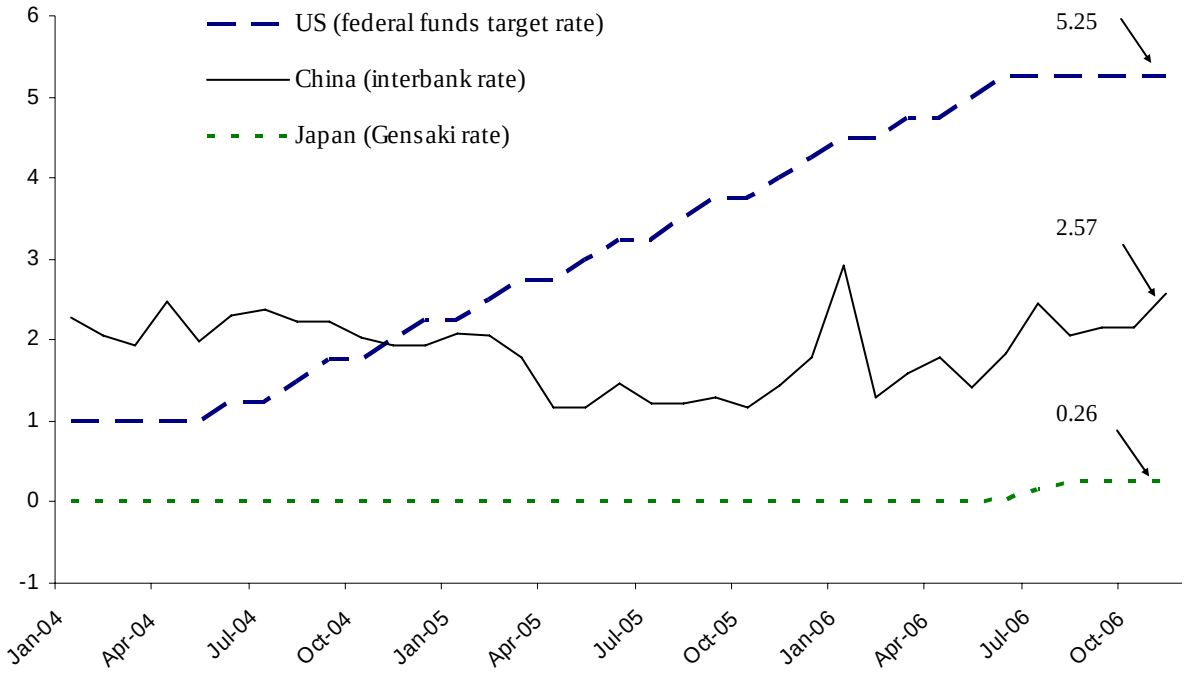
Source: EIU

Figure 6: Interest Rates of China and the United States, and Yuan/Dollar Exchange Appreciation, 2004-2006



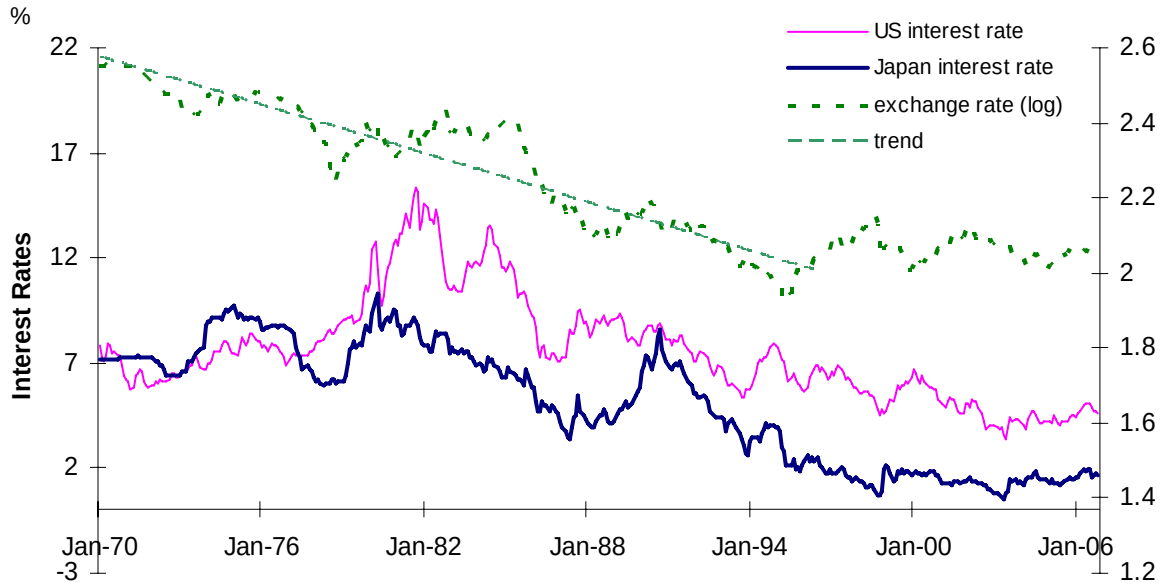
Source: CEIC

Figure 7: Overnight Interest Rates in the U.S., China and Japan, 1990-2006



Source: Bloomberg

Figure 8: The Yen/Dollar Exchange Rate and Long-Term Interest Rates in the United States and Japan, 1990-2006. (10-year bonds)



Source: IMF

Table 1: Estimates of Chinese Net Liquid International Assets, 1990-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Official Foreign Exchange Reserves	Net Foreign Assets of Banking Institutions	Cumulative Unrecorded Capital Outflows	Total Liquid Foreign Assets	Non-state Sector NFA as % of Total	Cumulative Current Account Surplus	Cumulative Net Inward FDI to China	Indirect Estimate of Liquid Foreign Assets
				(1)+(2)+(3)	[(2)+(3)]/(4)			(6)+(7)
1990	28.6	5.1	3.1	36.8	22.3%	12.0	2.7	14.7
1991	42.7	1.1	9.9	53.6	20.5%	25.3	6.1	31.4
1992	19.4	6.4	18.1	44.0	55.7%	31.7	13.3	44.9
1993	21.2	11.7	27.9	60.8	65.1%	19.8	36.4	56.2
1994	51.6	7.1	37.7	96.5	46.4%	27.4	68.2	95.6
1995	73.6	-3.4	55.6	125.7	41.5%	29.0	102.0	131.1
1996	105.0	-4.3	71.1	171.8	38.9%	36.3	140.1	176.4
1997	139.9	5.2	102.4	247.5	43.5%	70.7	181.8	252.5
1998	145.0	17.9	121.3	284.1	49.0%	102.7	222.9	325.2
1999	154.7	31.0	136.3	322.0	52.0%	118.3	259.9	378.1
2000	165.6	59.6	148.2	373.4	55.7%	138.8	297.3	436.1
2001	212.2	85.5	153.0	450.6	52.9%	156.2	334.7	490.9
2002	286.4	107.8	145.2	539.5	46.9%	191.6	381.5	573.1
2003	403.3	85.4	126.8	615.5	34.5%	237.5	428.7	666.2
2004	609.9	108.1	102.1	820.2	25.6%	307.5	484.3	792.0
2005	818.9	157.5	100.9	1077.2	24.0%	421.5	536.8	958.4

Source: International Financial Statistics
All values in billions of USD

Memo: Official Foreign Exchange Reserves reported to be 1009.6 billion USD as of October, 2006

Table 2: Estimates of Japanese Net Liquid International Assets, 1980-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Cumulative Current Account Surplus	Cumulative Net Outward FDI	Estimate of Liquid Foreign Assets	Official Foreign Exchange Reserves	Net Foreign Assets of Banking Institutions	Estimate of Non-Bank Private Foreign Assets	Private Sector NFA as % of Total
			(1)+(2)			(3)-(4)-(5)	[(3)-(4)]/(3)
1980	-10.8	-2.1	-12.9	21.6	-35.0	0.6	NM
1981	-6.0	-6.8	-12.8	24.7	-37.7	0.1	NM
1982	0.9	-10.9	-10.1	19.2	-36.5	7.2	NM
1983	21.7	-14.1	7.6	20.4	-35.1	22.3	NM
1984	56.7	-20.1	36.6	22.3	-51.1	65.4	39%
1985	107.8	-25.9	81.9	22.3	-65.2	124.8	73%
1986	193.7	-40.4	153.3	37.7	-139.9	255.5	75%
1987	278.0	-59.5	218.5	75.7	-219.1	362.0	65%
1988	357.3	-95.5	261.8	90.5	-260.5	431.8	65%
1989	420.5	-142.5	278.0	78.0	-251.4	451.4	72%
1990	464.6	-191.3	273.3	69.5	-263.5	467.3	75%
1991	532.8	-221.6	311.2	61.8	-163.0	412.5	80%
1992	645.3	-236.2	409.1	61.9	-87.0	434.3	85%
1993	777.0	-249.9	527.0	88.7	225.2	213.1	83%
1994	907.2	-267.1	640.1	115.1	267.2	257.8	82%
1995	1018.3	-289.6	728.7	172.4	366.5	189.7	76%
1996	1084.1	-312.8	771.3	207.3	224.7	339.2	73%
1997	1180.9	-335.7	845.2	207.9	301.5	335.9	75%
1998	1299.6	-357.0	942.6	203.2	220.7	518.7	78%
1999	1414.2	-367.0	1047.2	277.7	203.7	565.8	73%
2000	1533.9	-390.3	1143.6	347.2	219.1	577.3	70%
2001	1621.7	-422.6	1199.1	387.7	202.9	608.5	68%
2002	1734.1	-445.5	1288.6	451.5	187.5	649.7	65%
2003	1890.4	-468.1	1422.4	652.8	184.3	585.3	54%
2004	2062.5	-491.2	1571.3	824.3	219.0	528.0	48%
2005	2226.2	-516.2	1710.0	828.8	372.7	508.5	52%

Source: International Financial Statistics, Amar Nair (2006)
All values in billions of USD

Memo: Official Foreign Exchange Reserves reported to be 876.3 billion USD as of November, 2006