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The Impact of China's Appreciating Exchange Rate on Interest Rates and Wages: Japan Déjà Vu?

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Abstract

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 appreciation since then. China's productivity 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 and wage growth--as happened in the earlier era from 1978 to 1995 of "Japan bashing" and yen appreciation. The resulting deflation, coupled with a zero-interest liquidity trap, during Japan's "lost decade" of the 1990s could happen to China in the new millennium.

F15, F31, F33

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Introduction: From Japan to China Bashing

In the new millennium, expansionary fiscal policies 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] Much of the real counterpart of this financial transfer comes from the high-saving East Asian countries collectively running large trade surpluses, mainly in manufactures, with the United States—although, since 2003, the surpluses of the petroleum producing countries have also become important. The trade surpluses of the East Asian countries, in combination with exchange rate stabilization against the dollar, has led to increasing mercantilist pressure from Europe and the United States. In particular, China has come under heavy pressure to appreciate the renminbi (see for instance Goldstein 2003, Cline 2005, and Frankel 2006).

The current U.S.-Chinese 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 created trade frictions that led to a political phenomenon popularly known as "Japan bashing". Episodically, the Japanese government responded to American threats of trade sanctions and demands that the yen should appreciate by imposing "voluntary" constraints on particular exports to the United States and allowing the yen to appreciate (McKinnon and Ohno, 1997 and Schnabl 2000). 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 showed that the ever-higher yen caused a deflationary slump in the Japanese economy and a zero interest rate liquidity trap. Worried about the slumping Japanese economy, the US Treasury Secretary, Robert Rubin in 1995 announced a new "strong dollar" policy, after which Japan bashing more or less ceased.

The period of Japan bashing, which we date from 1978 to 1995, also corresponded to when Japan had the world's largest *bilateral* trade surplus with the United States—as shown in Figure 1. Japan was then judged to be America's foremost industrial competitor—not only in heavy industry such as steel, autos and machine tools but also in high technology such as color

[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

televisions and semi-conductors. At any one point in time America's protectionist threats were usually specific to a particular industry—and the Japanese would often respond serially (but temporarily) by restraining exports in steel, autos, semi conductors, and so on. But often general yen appreciation accompanied these specific industrial disputes—resulting in what McKinnon and Ohno called "the syndrome of the ever-higher yen".

In the new millennium, history is repeating itself. China bashing is now superseding Japan bashing. Figure 1 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 2005—now reaching more than 1.5 percent of America's GDP.

<Figure 1 about here>

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 for which value added in most individual 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 American consumer markets. Both Japan and Germany as well as several smaller East Asian countries 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 industry specific protectionism as in the earlier Japanese experience[3]. Other than jaw-boning,

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monetary and exchange rate consequences of current account imbalances, however, it need not matter which way causality goes.

[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.

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, but not yet passed, to impose a 27.5 percent tariff on all U.S. imports from China unless the renminbi is substantially appreciated. Second, every year in May 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 (see the discussion in Section 2.3 below).

So 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. To analyze the choice of an exchange rate regime in the economic catch-up process as China is now undergoing, we first focus on the response of interest rates in asset markets when the currency is expected to appreciate. Secondly, we go on to consider wage adjustment in labor markets both when the exchange rate has been credibly stabilized—as China's was from 1994 to 2004—and when it is expected to appreciate. We find that economic adjustment in the catch-up process is smoother under a credibly fixed exchange rate. The earlier disastrous Japanese precedent of an ever-higher yen provides useful insights into what could happen to China.

1. Adjustment in Asset Markets

In Japan's era of very high economic growth in the 1950s and 1960s, its current account was nearly balanced in part because the United States was relatively well behaved fiscally, and had moderate current account surpluses. With only a small stock of official exchange reserves, the Bank of Japan could easily fix the yen at 360 to the dollar with the Ministry of Finance (MOF) tightly controlling international capital flows.

Only in the 1980s, after Japan had loosened its exchange controls and its capital markets became more developed and open, under President Ronald Reagan did the U.S. run large fiscal and

current account deficits. Then, as now, high-saving Japan was (and is) co-opted into running more or less chronic current-account surpluses corresponding to U.S. current-account deficits. Because of international currency asymmetry under the dollar standard, however, Japan doesn't lend much in yen. Instead Japan builds up dollar claims within its financial system—a currency mismatch that led (leads) to potential portfolio instability between holding yen and dollar assets.

Unlike Japan in its high-growth phase of more than 30 years ago, today's China—while still in its "catch-up" stage of very rapid economic growth, capital controls, underdeveloped domestic financial markets, and low per capita income—has become a major international creditor. Figure 2 shows China's multilateral current account surplus becoming positive and then rising sharply after 1995 to reach 6 percent of China's GDP in 2005. Japan has been running substantial multilateral current account surpluses since 1980—averaging about 3 percent of Japan's GDP (Figure 2). However, because the slow-growing Japanese economy is still much larger than China's, they each had about the same size (US$168 billion) multilateral current account surplus in 2005. How does the consequent buildup of dollar claims (China doesn't lend much in renminbi) affect equilibrium in China's financial markets compared to Japan's? Let us consider China's international balance sheet first.

<Figure 2 about here>

2.1 China's Dollar Overhang

China's current account surplus reflects its very high saving—private plus government—even relative to its very high domestic investment. In addition China has attracted a very large amount of Foreign Direct Investment (FDI). Net FDI flows into China had grown to about 3 percent of GDP in the year 2005 (Figure 3). Because FDI results in relatively illiquid liabilities of indefinite duration to foreigners, the liquidity effect of the counterpart build up of highly liquid dollar assets by domestic nationals is not offset.[4] Thus the ongoing current-account surplus *coupled with* huge net inflows of FDI have a double-barreled impact on increasing China's dollar liquidity.

<Figure 3 about here>

China's build up of international liquidity can be characterized by a simple balance-of-payments identity. Let CA be the current account surplus and let FDI be the net annual inflow of foreign direct investment. FDI inflows in the form of joint ventures with local enterprises were (are) generally exempt from capital controls. But other foreign financial flows into, or out of, China were more restricted. Let ΔOER be the change in official exchange reserves, largely U.S. Treasury bonds; and let ΔPFA be the change in private foreign assets—largely dollar claims against banks:

$$\Delta PFA = CA + FDI - \Delta OER \quad (1)$$

Integrating backward to 1990 and assuming no asset valuation adjustments, we then get China's international balance sheet position.

CHINA: INTERNATIONAL BALANCE SHEET

Liquid Assets	*Liabilities and Net Worth*
Official Exchange Reserves (OER)	Cumulated Foreign Direct Investment (FDI)
Private Foreign Assets (PFA)	Cumulated Current Account Surpluses (CA)

Table 1 approximates each side of this international balance sheet in more detail. We can estimate China's private and official net holdings of liquid foreign assets both directly and indirectly. The right hand side of Table 1 provides *indirect* estimates of China's liquid foreign exchange assets. From being negligible in 1990, China's cumulated current account surpluses (column 6) and net FDI inflows (column 7) sum up to 958 billion dollars in 2005 (column 8).

<Table 1 about here>

The left hand side of Table 1 shows *direct* estimates of Chinese holdings of liquid foreign assets. Column 1 is simply current stocks of official net foreign exchange reserves which have grown to

[4] Of course, there would be no liquidity effect if China had a current account deficit that matched the inflow of FDI.

819 billion dollars at the end of 2005. (They are well over 900 billion dollars so far in 2006.) Column (2) is the officially reported net foreign asset position of Chinese commercial banks and other financial institutions. This foreign lending arises of internal dollar bank deposits held by Chinese nationals, 158 billion dollars in 2005. Column 3 shows cumulative "errors and omissions" that we have reclassified as "cumulative unrecorded capital outflows."[5] By the end of 2005, these cumulative unrecorded capital outflows amounted to US$ 100 billion, but had declined from their peak of $US 153 billion in 2001. From 2001 to 2005, there had been net repatriation of dollar assets that had previously been held abroad. The total of columns (1) to (3) was US$1,077 billon at the end of 2005 (column 4). This very rough direct estimate of China's holding of liquid foreign currency claims on foreigners is the same order of magnitude as our indirect estimate of $958 billion from the right hand side of Table 1, and corresponds to about 50% of GDP.

In 2005, China's "private" (non-state sector) held only about 24 percent of net liquid claims on foreigners with official exchange reserves amounting to the other 76 percent. In the face of threats to have the dollar depreciate against the renminbi, enterprises and households in China have become increasingly reluctant to hold dollar-denominated assets so that the share of official reserves is increasing (Column 5, Table 1).

2.2 Japan's Dollar Overhang

Because of the way in which national income accounts are constructed, Table 2 presents Japan's international asset position in way that is similar but not identical to what is presented in Table 1 for China. Because of Japan's much longer experience as an international creditor country, Table 2 looks at the accumulation of claims on foreigners from 1980 to 2005. Column 1 cumulates Japan's current account surpluses since 1980, and column 2 cumulates flows of net *outward* (with negative signs) foreign direct investment from Japan to the rest of the world. So unlike China, the domestic liquidity effect of current account surpluses in Japan is somewhat offset by outward foreign direct investment. In 2005, Japan's cumulative current-account surplus was US$2226.2

[5] For instance, un-repatriated export earnings, surreptitious transfers of money into foreign bank accounts in Hong Kong etc.

billion, and if one subtracts its cumulative net outward FDI of US$516.2, we get a rough estimate of liquid claims on foreigners to be US$1710.0 (column 3).

<Table 2 about here>

Then columns (4), (5), and (6) of Table 2 partition these total liquid claims on foreigners into official exchange reserves, the net foreign assets of banks, and an estimate of nonbank (mainly other financial institutions such as insurance companies) private foreign assets. Because direct estimates of nonbank private financial assets are hard to get, column (6) is only a residual: total liquid foreign assets minus official exchange reserves minus the net foreign asset holdings of banks gives the implied holding of private foreign liquid assets by nonbanks In 2005, we see that the private sector held just 52 percent of Japan's net liquid international financial assets—down from a peak of 85 percent in 1992. In effect, there has been some net disintermediation by the private sector from financing Japan's current account surpluses—with more intermediating been done by the build up of official exchange reserves, for example the very sharp run up of official exchange reserves from 2002 to 2004.

2.3 The Dollar Exchange Rate Trap and Conflicted Virtue

Why should the central banks of both China and Japan accumulate huge volumes of exchange reserves beyond an almost any conceivable precautionary need to cover imports or overcome a banking crisis with capital flight? A rule of thumb sometimes applied by international agencies is that prudent governments should be able to cover 3 to 4 months of imports from their official reserves. Even if export earnings went suddenly to zero, China has enough official exchange reserves to cover more than one year's imports at current levels, and Japan (with its relatively more closed economy) could cover two year's imports. This "excess" official accumulation in China and Japan—and in many other Asian countries—can only be explained by appealing to the way in which the world dollar standard works and the associated problem of what we call *conflicted virtue*.

Outside of Europe, the dollar is the prime invoice currency (unit of account) in international trade in goods and services. Virtually all primary products are invoiced in dollars. True, several mature

industrial countries invoice some of their exports of services and manufactured goods in their own currencies. Even for highly industrialized Japan, however, almost half of its exports and three quarters of its imports are invoiced in dollars. But less developed East Asian countries use dollar invoicing more intensively. In Korea for example, about 87 percent of its exports and 81 percent of its imports are invoiced in dollars. Whereas in the trade of China and smaller East Asian countries, the proportion of dollar invoicing is even higher. The upshot is that the East Asian countries collectively are a natural dollar area (McKinnon 2005).

Thus, each East Asian country acting individually has a strong incentive to peg to the dollar—either formally or informally. First, as long as the US price level remains stable, pegging to the dollar anchors the domestic price level. The ambit of dollar invoiced trade with neighbors in East Asia is now much greater than that with the United States itself (McKinnon and Schnabl 2004a). Thus the anchoring effect for any one country pegging to the dollar is stronger because East Asian trading partners are pegging to the dollar as well. Second, East Asian countries are strong competitors, particularly in manufactures, in each other's markets as well as in the Americas and Europe. No one East Asian country wants its currency to suddenly appreciate. This would lead to a sharp loss in mercantile competitiveness in export markets, followed by a general slowdown in its economic growth and possibly deflation. Third, with a large and growing internal overhang of dollar assets, a "free' float could trigger a sell off: a run *into* the domestic currency resulting in an upward spiral in the exchange rate with no well-defined upper bound (McKinnon 2005).

The Unpredictable Effects of Appreciation on Trade Surpluses

For an international creditor as are most East Asian economies, the macroeconomic 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. True, an appreciation would cause its exports to become more expensive in dollar terms, so they would decline. But as the economy slows, it imports less. Thus, the impact on the net trade balance is unpredictable (McKinnon and Ohno, 1997 chs. 6 and 7; Schnabl 2000, ch. 4; and Qiao 2005). When Japan was forced into appreciating the yen several times from the mid-1980s into the mid-1990s, it was thrown into a decade-long deflationary slump with no obvious decline in its large trade surplus relative to its GDP—a surplus which still persists (Figure 2).

McKinnon and Schnabl (2006) show the fallacy in the common presumption that devaluing the dollar against America's principal trading partners would reduce its trade deficit. 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 changing an exchange rate discretely, it is seriously incomplete.

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. Because an appreciating country's exports obviously become more expensive in world markets and decline, whereas imports become cheaper 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 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 relative 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 reduced. The upshot is that both inward foreign direct investment (FDI) and national investment could slump in response to an 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—and thus one would expect is be stronger in Japan (Table 2) than in China (Table 1), where a higher proportion of liquid claims on foreigners are held as official exchange reserves[6].

In summary, depressed domestic spending offsets the relative price effect of an appreciation so as to leave the effect on the net trade balance indeterminate.[7] 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).

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[6] 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.

[7] 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

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. 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 2004b, McKinnon 2005). Countries that are "virtuous" by having a high saving rate (like Japan, China or South Korea, but unlike the 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.[8] 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

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1997-98. Their current accounts went from being sharply negative before the crisis to positive immediately afterwards.

8 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

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, shown in column 3 of Table 1 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 in Table 1 also indicates increasing reluctance by China's non-state sector to accumulate liquid dollar assets.[9]

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 unsterilized[10] 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

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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.

9 In 2005-06 higher US interest rates provided a stronger incentive to keep dollar assets rather than convert into yuan.

10 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.

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 (Figure 4). 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—as China had been doing up to mid 2005.

[Figure 4 about here]

2.3. The Negative Risk Premium and Zero-Interest Liquidity Trap

However, in the hopes of defusing foreign mercantile pressure, on July 21, 2005, China did "unhook" its exchange rate which immediately appreciated by 2.1 percent against the dollar. Since then, the People's Bank of China (PBC) has allowed a slow upward crawl cumulating to just 3.28 percent through mid-July 2006—while implying that the renminbi would go higher in the future. But heavy official intervention to control the rate remains in place—as shown by the PBC's huge accumulation of foreign exchange reserves.

The expectation of an ever higher renminbi tends to bid down 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

$$i = i^* + E(\hat{e}) + \varphi \qquad (2)$$

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.

However, 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.

Suppose the exchange rate were credibly pegged to the U.S. dollar as is almost the case for the Hong Kong dollar. Then both $E(\hat{e})$ and φ equal zero and short-term (money market) interest rates in Hong Kong converge towards the U.S. federal funds rate. By contrast in China's case, suppose the exchange rate remains pegged but investors face the risk that the renminbi will appreciate. For portfolio equilibrium, the interest rate on renminbi assets must be less that on dollar assets by $|E(\hat{e}) + \varphi|$. The term $|E(\hat{e}) + \varphi|$ reflects the size of any expected appreciation, the probability that it will occur, how distant is the event, and what would be the subsequent turmoil in exchange market fluctuations. Although written in equation (2) simply as an interest rate differential, $|E(\hat{e}) + \varphi|$ would be complex to derive algebraically by precisely laying out all of its components.

Because the dollar is the dominant currency in international capital markets (outside of Europe), we assume that the dollar interest rate(s), i^*, in equation (2), is given exogenously to any portfolio choices made in China. Thus, the only way the necessary interest differential for securing portfolio balance can be established is for the interest rates on renminbi assets to fall below those on dollar assets. At shorter terms to maturity, the fall in interest rates can be hastened by unsterilized foreign exchange intervention: as the domestic monetary base increases, short-

[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.

term rates are bid down. An easy money policy reduces the incentive for financial capital to flow inward, and thus reduces the scale of the intervention necessary to secure the exchange rate.[12]

Apart from monetary interventions that reduce short-term interest rates, in the absence of capital controls, pressure from free international financial arbitrage between dollar bonds and renminbi bonds would also nudge down interest rates at longer maturities. Chinese holders of dollar bonds (arising out of the current account surpluses) would sell them off in favor of renminbi bonds until the interest rate on the latter fell below that on the former by the expected appreciation plus the negative risk premium. Of course, the two avenues for putting downward pressure on China's internal interest rates, at different terms to maturity, are intertwined.

<Figure 5 about here>

Figure 5 shows the overnight interbank interest rates for the United States, China, and Japan. The U.S. Federal Funds rate, coming off all time lows of 1 percent in early 2004, rose to 5.25 percent by July 2006. China's interbank interest rate, starting at above 2 percent in early 2004, fell slightly to 1.84 percent by July 2006. (China's interbank interest rate is fairly freely determined and is not pegged like domestic bank deposit and loan rates.) Japan's overnight interest rate, the Gensaki rate, remained at zero from the mid 1990s up to mid July 2006—reflecting Japan's infamous liquidity trap. So, using equation (2), our task is to explain why interest rates on renminbi and yen assets are now so much lower than on dollar assets. Consider China first.

<Figure 6 about here>

Looking at slightly longer maturities, Figure 6 compares interest rates on China's one-year central bank bills to that on one-year LIBOR interest rates in dollars—all annualized. The levels and differences are similar, although not identical, to the overnight rates shown in Figure 5. Then Figure 7 compares these interest differentials to the actual appreciation of the renminbi from July 21, 2005 to the end of June 2006, which was 3.28 percent . Remarkably, these interest spreads

[12] In contrast, sterilized intervention, accompanied by selling central bank bonds, prevents domestic interest rates from falling and so fails to dampen inflows of foreign capital.

vary between 3.16 percent on one–year bonds to 3.39 percent for overnight interest rates so as to just bracket the renminbi's actual year-over-year appreciation!

<Figure 7 about here>

From equation 2, $E(\hat{e})$ is just the expected change in the exchange rate. From Figure 7, the markets had begun to anticipate appreciation of the renminbi early in 2005 as Chinese interest rates fell below American well before actual appreciation began on July 21. Ex ante, bond traders could not know *when* appreciation would actually begin, but they made a fairly accurate guess as to what the cumulative amount would eventually be over the course of a year or more. Consequently, arbitrage has been such that, over the past year, there was no net gain in holding RMB bonds over the higher yielding dollar bonds, adjusted for the dollar's depreciation.

The whole of the interest differential between dollar bonds and renminbi bonds can be explained by the open interest parity condition embedded in $E(\hat{e})$. How then can one explain the absence of our 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 or expected 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 7). Whence the absence of a significant negative risk premium in China's financial markets—unlike those in Japan, as we shall soon see.

Looking forward, if China's financial liberalization proceeds and appreciation expectations become sustained, the probability is high that Chinese interest rates will remain below those in the United States--as has been the case since early 2005. As long as U.S. interest rates keep rising, Chinese interest rates are likely to rise as well but to stay 3 to 4 percentage points below American. However, if U.S. interest rates again fell, or the PBC allows faster appreciation, the likelihood increases that China would fall into zero-interest rate liquidity trap much like Japan's.

Notice that just letting the renminbi float upward, or appreciate discretely, would worsen the dilemma. Actual appreciation would lead to actual deflation, and uncertainty regarding the degree of appreciation would create a negative risk premium, with further downward pressure on domestic interest rates. Drawing on Japan's earlier experience of continual but erratic yen appreciations, interest rates on yen assets were compressed toward zero in the ensuing deflation.

The earlier experience of Japan with currency risk from anticipated yen appreciation is instructive. After the mid 1980s, Japan's financial markets were more developed and more open to international arbitrage than China's are now. Japanese short term (interbank) interest rates fell toward zero in the late 1990s and then remained there into the new millennium (Figure 4). 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 mid 2006, the yield on JGBs is about 1.6 percent when that on U.S. Treasuries is about 5.1 percent.

<Figure 8 about here>

How can one best explain this persistent interest differential between dollar and yen assets? 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 1). 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 tendency toward secular appreciation against the dollar. So why did Japanese interest

rates remain so much lower than American? 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.

From equation (2), the interest differential $i = i^*$ 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 (Table 2) to be held by the economy are much greater relative to GNP then they were back in 1980s—and they are continually growing. 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 additional dollar claims to be acquired primarily by the private sector may require an increasing interest rate differential—reflecting an increasingly negative risk premium.

But after the collapse of the high tech bubble in 2001, U.S. interest rates came down sharply — and became very low in 2003 and 2004 (Figure 5). 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 the private sector and a sharp jump in official exchange reserves (Table 2). 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 thrown out by the current account surplus. 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 are not low enough)—and 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 with conflicted virtue (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 reflating the economy to escape from slump. True, by 2006, Japan's price level has stopped falling, and the economy is growing modestly—mainly on the back of increased exports, particularly to China . But this has been a long time to wait, and the economy remains fragile.

In the long run, the preferred solution for both China and Japan is exchange rate stabilization against the dollar to prevent a low interest rate, and potentially deflationary, trap. For China, stabilization is needed to escape from the expectation of an ever-higher renminbi. 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 interest rates. (In the short run in 2006, the situation is complicated by inflation in the center country, i.e., the United States, that we discuss further in Section 4 below.)

3 Adjustment in Labor Markets

Despite China's extraordinary growth since 1980 and the large absolute size of its GDP, real output and wages per capita—as well as the overall price level (CPI)—are still much less than in mature industrial economies. Today's huge disparity in the *level* of money wages between China and the United States reflects the large difference in the average level of labor productivity—

although China is catching up. Balancing international competitiveness requires real wages in China to increase much faster than those in the United States to reflect China's much higher growth in labor productivity. What monetary mechanism best promotes and sustains high growth in Chinese wages?

Traditional models of international adjustment such as in Meade (1951) and Friedman (1953) see a flexible exchange rate as a valuable substitute for wage rigidity in the face of externally generated shocks. When nominal wages are rigid, a negative domestic productivity shock or external terms of trade shock warrants offsetting currency depreciation. Real wages are reduced by increasing the domestic prices of tradable goods. Similarly, for countries with positive trade shocks, an appreciation is warranted to balance international competitiveness by increasing effective real wages.

However, this traditional static approach to wage rigidity and the need for exchange rate flexibility in rapidly growing economies is misplaced in two major respects. First, we showed in Section 2.3 that a discrete appreciation by a creditor economy with conflicted virtue would cause a recession and a decline of imports and therefore has no predictable effects on the trade surplus. Second, for an economy with rapid (labor productivity) growth—as in China today—expected appreciation(s) could depress growth in nominal wages below the *natural rate* warranted by its high productivity growth in tradable activities. In effect, wages are not rigid in a high growth economy. Whether wages increase at 5 or 15 percent year has a first order impact on wage levels within a fairly short period of time.

In contrast, if the exchange rate is safely fixed, wage growth can be highly responsive to varying rates of labor productivity growth so as to better balance international competitiveness. Based on the "Scandinavian Model" of wage adjustment, we show that fixing the nominal exchange rate to a stable external monetary anchor facilitates faster adjustment (growth) in real wages than leaving the exchange rate "flexible" with the threat of appreciation..

3.1 The Scandinavian Model of Wage Adjustment

In a "small" open economy with high productivity growth, the evolution of domestic wages and prices under alternative exchange rate regimes can be described by the Scandinavian Model of

wage adjustment. Under the Bretton Woods System of fixed dollar parities, Sweden along with Norway and Denmark, were among Western Europe's fastest growing economies. The writings of several earlier Scandinavian authors were summarized by Lindbeck (1979) with the simple equation system developed below.[13]

The first assumption of the Scandinavian Model is that relative purchasing power parity holds for tradable goods: domestic price inflation in tradables converges to the world (dollar) rate of inflation plus the rate of currency depreciation $\hat{e}$.

$$\hat{p}_T^A = \hat{p}_T^W + \hat{e} \tag{3}$$

Where $\hat{p}_T^A$ is inflation in tradable goods prices of country A and $\hat{p}_T^W$ is "world" price inflation measured in terms of the world's dominant money, which was (and is) the dollar. As the Scandinavian authors were writing in the 1960s when dollar exchange rates were tightly fixed under the Bretton Woods Agreement,[14] we assume the exchange rate is credibly fixed ($\hat{e} = 0$). Given stable exchange rates, arbitrage in international markets for tradable goods is sufficiently robust that inflation in the traded goods sector of country A converges to inflation in the dollar prices of traded goods on world markets.

Lindbeck (1979) further assumed that wage bargaining (in the Swedish economy) was initiated in the tradable goods sector, where labour productivity grew faster—particularly in manufacturing--than in non-tradables which were largely services. Let $\hat{q}_T^A$ represent the growth of labour productivity in tradables as if the economy had only one factor of production. This productivity growth reflects increasing stocks of human and physical capital that are not being explicitly modelled. The mighty Swedish trade unions were able to capture these productivity gains for both skilled and unskilled labour so that

$$\hat{w}_T^A = \hat{p}_T^A + \hat{q}_T^A \tag{4}$$

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[13] The Scandinavian model can also an be seen as an time-series extension of the Balassa-Samuelson model (Balassa 1964, Samuelson 1964).

[14] One of the big surprises of the era of fluctuating exchange rates after 1971 was the persistent deviations from (relative) purchasing power once exchange rates were no longer tethered.

where $\hat{w}_T^A$ is the average rate of the increase in nominal money wages paid to workers in the open, or what the Swedes called the "unsheltered", tradables sector.

This wage bargaining was constrained by the fixed exchange rate. If unions bargained for nominal wage increases greater than shown in (4), they risked making Swedish industry uncompetitive in world markets with a fall in employment. Thus (4) defines the *natural* rate of increase nominal wages in an open economy. As long as inflation in world prices, $\hat{p}_T^W$, remains low and fairly predictable,[15] workers are content to bargain in money terms reflecting *concurrent* trends in productivity growth and in inflation. That is, there is no formal indexing of real wage levels or wage growth, nor any attempt to adjust for anticipated changes in the exchange rate.

In a more competitive labour market, such as that in high-growth modern China discussed below, unions are not important. However, employers are willing to bid aggressively for workers—particularly skilled or semi-skilled—so that the average wage for these heterogeneous workers increases according to (4), still reflecting the fixed exchange rate constraint. In part, $\hat{w}_T^A$, reflects a return to workers' increasing skills from on-the-job training and education—as well as a rising marginal product of labour from capital deepening.

Labour "solidarity" as well as the mobility of labour between the manufacturing sector and the non-tradable (NT) sectors of the economy transmits the manufacturing wage increases ($\hat{w}_T^A$) to wage increases in the non-tradable sectors ($\hat{w}_{NT}^A$). As the non-tradable sectors were widely shielded from world markets, prices in these sectors would not be driven by international competition but would be based on domestic labour costs. Because the productivity increases in the non-tradable (service) sector were assumed to have been smaller than in the manufacturing sector, the price increases ($\hat{p}_{NT}^A$) in the non-tradable sector tend to be driven by wage increases ($\hat{w}_{NT}^A$) minus the productivity gains in the non-traded goods sector ($\hat{q}_{NT}^A$):

$$\hat{p}_{NT}^{A} = \hat{w}_{NT}^{A} - \hat{q}_{NT}^{A} \text{ with } \hat{q}_{NT}^{A} < \hat{q}_{T}^{A} \quad (5)$$

The equations (2), (4) and (5) yield equation (6) that shows the impact of world market prices, exchange rate changes, and relative sectoral productivity gains, on non-traded goods prices. Note that the differential in productivity increases between the traded and non-traded goods sectors contributes to inflation and that, under the Bretton Woods system, exchange rates were fixed so that $\hat{e} = 0$:

$$\hat{p}_{NT}^{A} = \hat{p}_{T}^{W} + \hat{e} + \hat{q}_{T}^{A} - \hat{q}_{NT}^{A} \text{ with } \hat{e} = 0 \quad (6)$$

In the Scandinavian model, the wage bargaining and price adjustment process in the traded and non-traded goods sectors would affect general inflation ($\hat{p}^{A}$), which is defined as a composite of traded goods price inflation and non-traded goods price inflation given the respective weights α and (1-α):

$$\hat{p}^{A} = \alpha\hat{p}_{T}^{A} + (1-\alpha)\hat{p}_{NT}^{A} \quad (7)$$

Equations (1), (6) and (7) yield equation (8) which can be interpreted as a measure for supply driven inflation:

$$\hat{p}^{A} = (\hat{p}_{W}^{T} + \hat{e}) + (1-\alpha)(\hat{q}_{T}^{A} - \hat{q}_{NT}^{A}) \quad (8)$$

In equation (8) the term $\hat{p}_{W}^{T} + \hat{e}$ is equivalent to imported inflation. If world market prices in the traded goods sector rise and or the exchange rate depreciates (exchange rate induced inflation) this would fuel into inflation. The term $\hat{q}_{T}^{A} - \hat{q}_{NT}^{A}$ describes the structural component of CPI inflation which is mainly in line with Balassa-Samuelson effect of supply driven inflation (Balassa 1964 and Samuelson 1964). Higher productivity gains in the traded goods sector—both

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[15] The US wholesale price level, "the world's nominal anchor for tradable goods" was remarkably stable in the 1950s to the late 1960s, the period in which the Scandinavian Model was developed. Then, in the 1970s and 1980s, there was turmoil from high inflation and painful disinflation. But stability was regained in the 1990s.

higher than in the non-traded goods sector and higher than abroad—are translated via the wage bargaining process into higher CPI inflation. The larger the weight of the non-tradable goods sector, the larger is the impact of the Balassa-Samuelson effect on inflation. Even if the exchange rate is fixed, inflation can differ among countries due to different productivity growth. The money supply is endogenous and national monetary policy is geared to maintaining the fixed exchange rate.

The upshot is that, within the Scandinavian model of wage adjustment, the bidding of trade unions for higher wages is constrained by the fixed exchange rate. Trade unions could reap the full benefits of productivity gains and equilibrate the international competitiveness between Sweden and the United States. The trade unions would, however, not want to ask for wage increases above the domestic productivity gains as this would damage the country's international competitiveness. Thus, the peg to the dollar provided a welfare enhancing environment for wage adjustment during the economic catch-up process.

3.2. The Japanese Experience

In order to better understand if international competitiveness is better balanced when the nominal exchange rate is fixed rather than fluctuating, Japan provides a useful case study. When the yen was fixed at 360 to the dollar from 1950 to 1971, the importance of relative wage adjustment between Japan and the United States was pronounced. Driven by the faster growth of productivity in the Japanese manufacturing sector, wages prices grew substantially faster than in the U.S. (Figure 9). Money wages, the balancing item for international competitiveness, grew at a rate of 10 percent per year in Japan and only 4.5 percent in the U.S.—see Table A1 in the Appendix.

<Figure 9 about here>

Keeping the yen at 360 per dollar anchored Japan's price level for tradable goods as Japanese wholesale prices rose at about the same speed as U.S. wholesale prices (Table A1). Because the bulk of world trade was invoiced in dollars, fixing the exchange rate to the dollar was (is) a stronger anchor for the price level than the size of Japanese bilateral trade with the United States would suggest.

Employers in Japan's manufacturing export sector, with its extremely high growth in labor productivity, then bid vigorously for both skilled and unskilled workers subject to remaining internationally competitive at the fixed exchange rate.[16] Wages rose rapidly in manufacturing so that workers received the main fruits from the productivity growth there. But then, as in the Scandinavian Model, these high wage settlements spread into the rest of the economy, such as nontradable services, where productivity growth was much lower. The result was that, within Japan, the price of services rose relative to goods prices. For 1950-71, Japan's CPI, which includes services as well as goods, increased at about 5 percentage points faster per year than its wholesale price index (which contains only goods) and faster than the U.S. CPI. (Table A1). However, Japan's international competitiveness in its high-growth tradables sector remained balanced with the United States.

In Japan's bygone high-growth era, finding a purely domestic monetary anchor would have been more difficult. As in China today, restrictions on domestic interest rates proliferated; and the rate of growth in narrow money was high and unpredictable as Japanese households rebuilt their financial assets after the war. Thus having the Bank of Japan simply key on the dollar exchange rate was the most convenient instrument for stabilizing Japan's tradable goods price level while promoting high growth in money wages.

By the end of the 1960s, however, American monetary policy became too inflationary and the Bretton-Woods-System collapsed. For two decades after August 1971 up to the late 1980s, productivity growth in Japan remained high relative to that in the United States. But Japan bashing and ongoing yen appreciation eventually undermined the system of relative wage adjustment. As employers began to anticipate further yen appreciation, growth in Japanese wages slowed down—albeit with a lag. Before 1975, money wage growth in Japan remained much higher than in the United States. Subsequently, as relative deflation in Japan set in, Japan's money wage growth slowed sharply—the bold line in Figure 9. From the 1980s into the new millennium, wage growth in Japan became even lower than that in the United States. So, besides damaging the Japanese economy in a macroeconomic sense while failing to reduce its trade

[16] Note that in contrast to China the supply of labor in Japan is traditionally limited.

surplus, the erratically appreciating yen undermined the natural process of relative wage adjustment for balancing international competitiveness.

The changes in the wage adjustment mechanism are also related to Japanese monetary policy, which became less predictable as the monetary policy target tended to "switch" between domestic inflation and the exchange rate (Schnabl and Danne 2005). In times of when the yen was weaker in the foreign exchanges, monetary policy decision making focused on the domestic market—similar to the US and (by then) Germany. However, when the yen was appreciating, the Japanese monetary authorities were unable to neglect targeting the exchange rate (McKinnon and Ohno 1997). The successive attempts to stop appreciation by foreign exchange intervention led to the buildup of a huge stock of foreign reserves (Figure) and near-zero domestic interest rates.

3.3. Wage Adjustment in China under a Fixed Exchange Rate

China's period of a resolutely fixed nominal exchange rate, from 1994 up to July 2005, was somewhat shorter than in Japan's great high-growth fixed-exchange-rate era of the 1950s and 1960s. However, as shown in Figure 10, fixing the exchange rate against the dollar helped stabilize inflation. Before 1996, Chinese CPI inflation was high and volatile, but then declined as it converged close to the U.S. level. Because of a potential Balassa-Samuelson effect, however, one might expect equilibrium inflation in high-growth China to be greater than that in the U.S.. Apparently, because of high productivity growth in China's nontradable sectors, the Balassa-Samuelson effect is muted compared to Japan's earlier experience with a rising CPI (Table A2 in the appendix). Thus the small differential in CPI inflation rates between the two countries can be seen as an equilibrium in the sense of the *relative* purchasing power parity—as per equation (3).

<Figure 10 about here>

In addition Figure 11 shows that (together with the rising degree of economic openness) the volatility of inflation was accompanied by a more stable growth path. While before 1995 real growth rates fluctuated widely, after 1995 they stabilized around a level of approximately 9 percent. Figure 11 is consistent with the hypothesis that a nominal exchange rate peg provides a stable framework for price and wage adjustment during the economic catch-up process.

How did China's dollar peg affect the wage bargaining process? Although productivity growth in China remains difficult to measure, it is undisputed that over the past decade Chinese productivity growth was and is substantially larger than in the U.S. Our estimate based on real value added in manufacturing since 1994 suggests that Chinese productivity grew by 9.4 percent. In contrast, U.S. labor productivity in manufacturing grew by about by about 2.68 percent during the same time 1994-2004 period (Table A2). To preserve the exchange rate anchor and to balance international competitiveness, nominal wages had to grow in line with the rapid productivity growth and thereby much faster than in the U.S. Figure 12 shows the wage growth in the Chinese economy across different sectors has been much faster than average wage growth in the U.S. Between 1994 and 2004 nominal wages in Chinese urban areas grew by about 11.7 percent per year, while US wages grew by about 3 percent (Table A2).

<Figure 12 about here>

Much of this extraordinary increase of Chinese nominal wages reflects the upgrading of skills in the Chinese manufacturing sector and elsewhere. The wage growth of unskilled migrant workers from rural areas is likely to lag behind, and many of these workers are absorbed by the construction industry where wage growth is slowest among all the sectors. However, Figure 13 shows a remarkable tendency for Chinese money wage growth to be high across all sectors during the decade of fixed exchange rates from 1994 to 2004.

Under the fixed exchange rate regime, China's international competitiveness seems to be balanced as the Scandinavian model would suggest. At a fixed exchange rate, wage growth was substantially higher than in the U.S. reflecting the China's higher productivity growth. In contrast to the earlier experience of Japan, consumer price inflation in China has become similar to that in the U.S.. The Balassa-Samuelson effect in China has been quite limited, perhaps because China is a more open economy than Japan was. Much foreign direct investment has gone into service activities thus enhancing productivity growth there—very unlike the early Japanese experience where service activities remained cosseted and backward.[17] But like in Japan under the Bretton-

[17] Zhang (2003) argues that excessive market entry has consumer prices held low.

Woods-System, China's fixed exchange rate from 1994-2004 provided a stable framework for wage adjustment in the economic catch-up process.

<Figure 13 about here>

3.4. Wage Adjustment with Threatened Currency Appreciation

After July 21, 2005 when China abandoned it fixed exchange rate, it adopted a slow upward crawl (Figure 7) that has led to expected of further appreciations. Because the future exchange rate is now uncertain, risk-averse employers in the export sector face greater uncertainty in wage bargaining for workers. To negotiate the appropriate wage today, they have to guess how much exchange appreciation will occur in the future. Chinese export enterprises could suffer losses and possible bankruptcy if they bid up wages too strongly and find that the yuan has appreciated more than expected. Let us call this additional uncertainty the negative risk premium in wage bargaining ψ, where $\psi < 0$. Assuming for simplicity that inflation is close to zero (as it was in 2005 in China), then:

$$\hat{w}^A = E(\hat{\pi}) + E(\hat{e}) + \psi \qquad (8)$$

The desired growth in nominal wages of (skilled) Chinese workers $\hat{w}^A$ is equivalent to expected productivity growth, where $E(\hat{\pi}) > 0$, minus expected appreciation (remembering that $E(\hat{e}) < 0$) and minus the risk premium in the wage bargaining process. ψ becomes larger (more negative) when expected future volatility in exchange rates increases. If the exchange rate of the yuan would stay tightly pegged to the dollar, both the expected mean appreciation and the wage risk premium ψ would be zero. Nominal wage growth would then accurately reflect the ongoing growth in real labor productivity.

However, suppose instead that the exchange rate is expected to appreciate along some well known pre-determined path—say 3 percent per year. That is, the degree of appreciation is certain. Then the risk premium ψ would be zero, and nominal wage would grow at the same rate as

productivity *minus* the expected appreciation. On a balanced deflation path (falling price level) from a known rate of currency appreciation, *real* wages would still grow with productivity.

Now suppose that the degree of appreciation is uncertain. Then real wages would grow less than productivity because the negative wage risk premium is higher than under a stable exchange rate regime. Paradoxically, there could be a shortfall in real wage growth that makes the economy even more competitive internationally. But how this works itself out, with all the various lags involved, requires a more complete macro economic model. However, from the earlier Japanese experience, we know that, after 1974, nominal wage growth slumped and wages grew slower than in the U.S. thereafter (Figure 9). The erratically appreciating yen undermined the process of relative wage adjustment for balancing international competitiveness between Japan and the U.S.

4. A Concluding Note on Monetary Control in China

For countries in the economic catch-up process with underdeveloped capital markets, foreign exchange risk is more worrisome than for the more developed United States or euro area. And this is true for countries that are either international creditors or debtors.

First, for a creditor country like China, a credibly fixed exchange rate against the dollar better promotes domestic asset market equilibrium in the presence of financial arbitrage with the United States at the center of the world dollar standard. By fixing the exchange rate, deflationary pressure and the fall into a zero interest rate liquidity trap is circumvented. A detrimental stop-and-go in monetary policy is avoided, which further contributes to a stable growth performance.

Second, in labor markets, uncertainty is reduced under fixed exchange rates because workers (possibly represented by trade unions) and enterprises can more easily keep wage settlements in line with productivity growth. To this end, China might do well to keep its exchange rate tightly pegged to the dollar as long as economic catch-up continues with high productivity and wage growth, but with capital markets that remain underdeveloped.

However, pegging to the dollar means that the national monetary policy in the country (China) on the dollar standard's periphery must, in the not-so-long run, be subordinated to maintaining the exchange rate. That is, the rate of national money growth becomes endogenous. When GNP is

growing very fast, say near 10 percent per year as in China, and the desired build up of financial wealth by Chinese is even higher (reflecting China's incredibly high saving rate), the demand for money may well grow at 16-18 percent per year and still be consistent with a stable domestic price level. Under fixed exchange rates, such high money growth rates were observed in Japan in the 1950s and 1960s (Table A1) and in China in the last decade (Table A2).

But on the money supply side in the Chinese case, we know that large current account and FDI surpluses leads to a huge build up of official exchange reserves. When the Peoples Bank of China (PBC) enters the foreign exchange market to prevent the renminbi from appreciating by buying dollars and selling renminbi, the initial effect is to expand the monetary base correspondingly. Only by accident would such a monetary expansion exactly match the increased demand for domestic base money.

If new supplies of base money coming through the foreign exchanges are insufficient to accommodate the rising demand for it, the PBC would have to use discounting or domestic open-market operations to expand the monetary base further. However, if the creation of base money coming through the foreign exchanges is even greater than the rapid increase in demand (as seems to be the case at present), then the excess money issue has to be sterilized one way or another. The PBC has been issuing its own central bank bonds (see the interest rate quotes in figure 6) to mop up much of the excess liquidity—and, in more intense crisis periods, may actually increase bank reserve requirements as well as imposing lending constraints on the banks.

New PBC bond issues may be soaking up (retiring) up to half of new base money creation coming through the foreign exchanges. Can this go on indefinitely? Yes, because of the very low interest rates on renminbi assets arising out of expected appreciation. Like the Bank of Japan , the PBC makes a profit out of its foreign exchange operations. The PBC sells central bank yuan-denominated bonds to the good burghers of Shanghai[18] while buying dollar bonds with yields that are (in 2006) about 3 full percentage points higher than the interest it must pay on its own central bank bills (Figure 6) . (If the risk premium was positive rather than negative, then the fiscal cost of such sterilization operations would be considerable as in, say, Brazil.)

[18] We are indebted to Gerhard Illing for this felicitous phrase

Although they have to work at it, the governors of the PBC can indeed control money growth to be consistent with a stable price level and a fixed exchange rate. Of course, this regime becomes more complex to administer once the renminbi begins to appreciate erratically and reduces the incentives of the non-state sector to accumulate dollar claims sufficient to cover the surplus in the balance of payments.

Is there any *economic* case for allowing the renminbi to appreciate? Yes, if inflation in the center country becomes substantial. In the past year, inflation in the United States has been too high. As of July 2006, both the U.S. consumer and producer price indexes increased at 4 to 4.5 percent year-over-year. And indications are in July 2006 that the U.S. Federal Reserve Bank is failing to take resolute steps to end the inflation anytime soon. With the benefit of hindsight, the People's Bank of China has been right to allow a gradual appreciation of the renminbi over the past year of about 3 percent (Figure 7) while, coincidentally or not, China's CPI increased just 1.4 percent—about 3 percentage points less than America's! Relative purchasing power parity lives on.

However, the case for limited renminbi appreciation must be carefully hedged. If the price level in the center country had remained stable with correspondingly low interest rates, jettisoning the fixed exchange rate of 8.28 yuan/dollar and introducing the expectation of appreciation—if only mild—would have been an economic mistake. By the first-year anniversary (July 21, 2006) of untethering the exchange rate, Chinese interest rates would have been forced to zero. Instead, the appreciation over the past year, although politically motivated to placate the Americans, helped to insulate China from higher price inflation and interest rates emanating from the United States.

So, politics aside, what should China's interim monetary strategy now be? The PBC could announce a continuation of the smooth upward crawl in the renminbi by the amount U.S. inflation exceeds its target for China. But the PBC would also announce that this upward crawl would slow and then end when, and if, American inflation returned to a more satisfactory level—say 1.5 to 2 percent per year.

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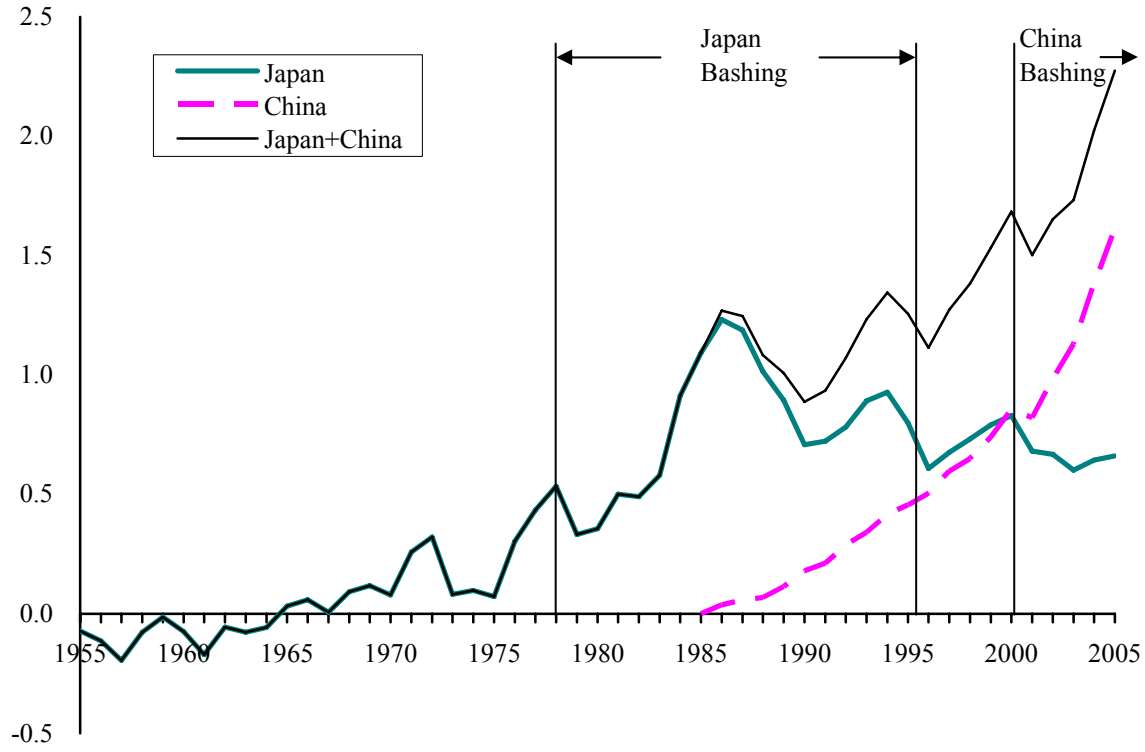
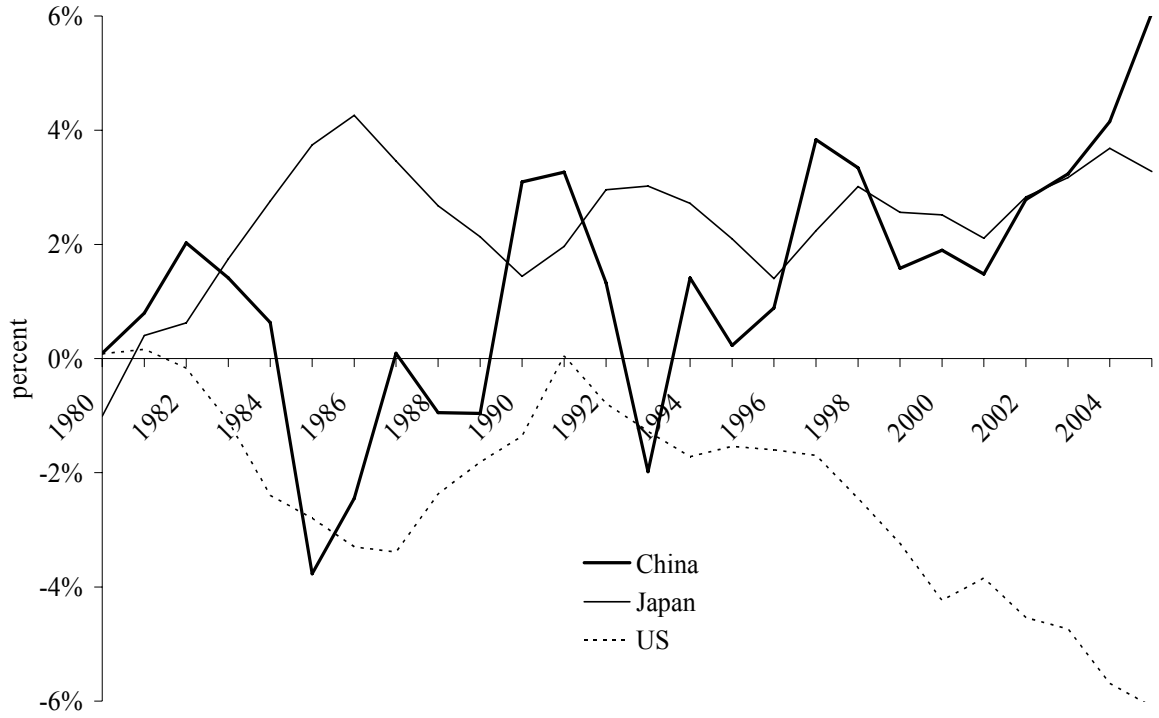
Figure 1: Bilateral Trade Surpluses of Japan and China with the U.S., 1955-2005 (proportion of U.S. GDP)



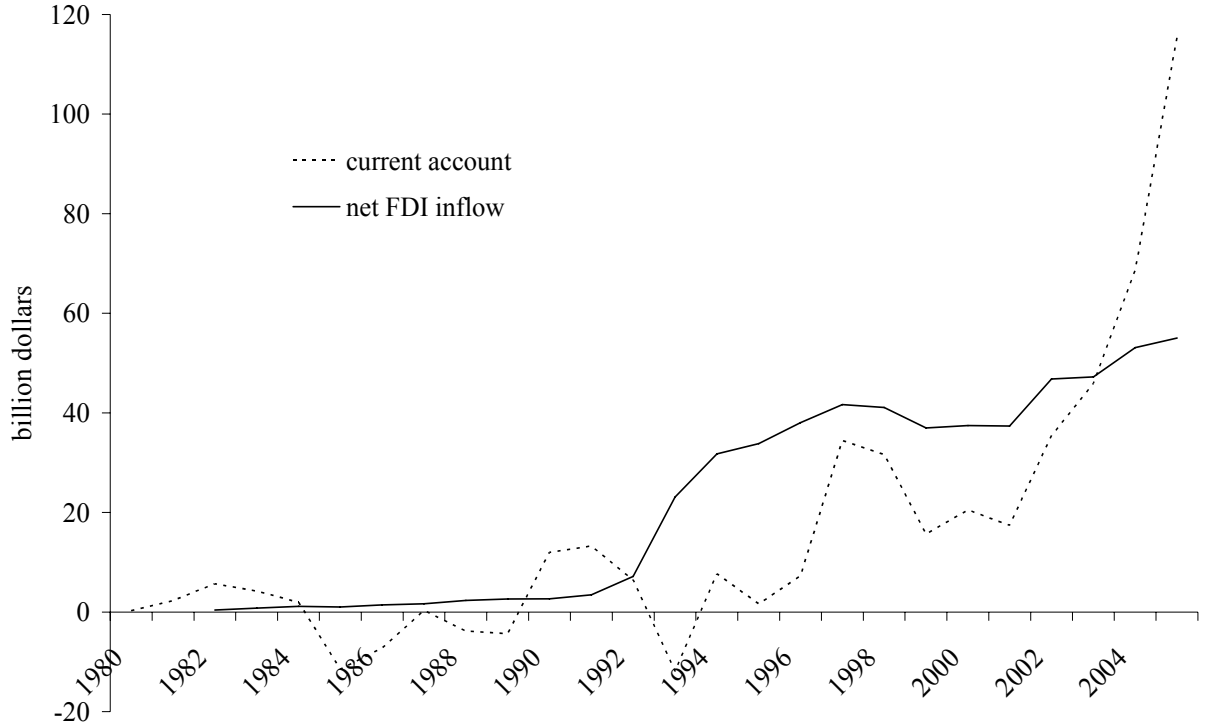
Source: Kenichi Ohno, IMF

Figure 2: Current Accounts of China, Japan and US, 1980-2005 (percent of GDP)



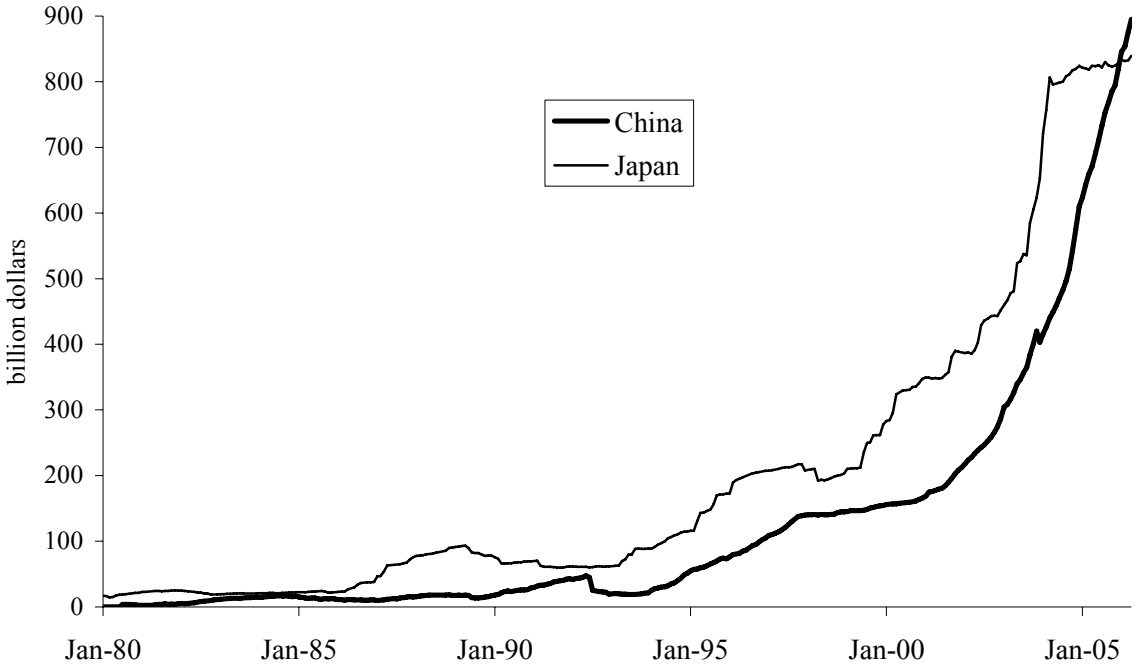
Source: IMF.

Figure 3: China: Current Account and Net FDI Inflows, 1980-2005



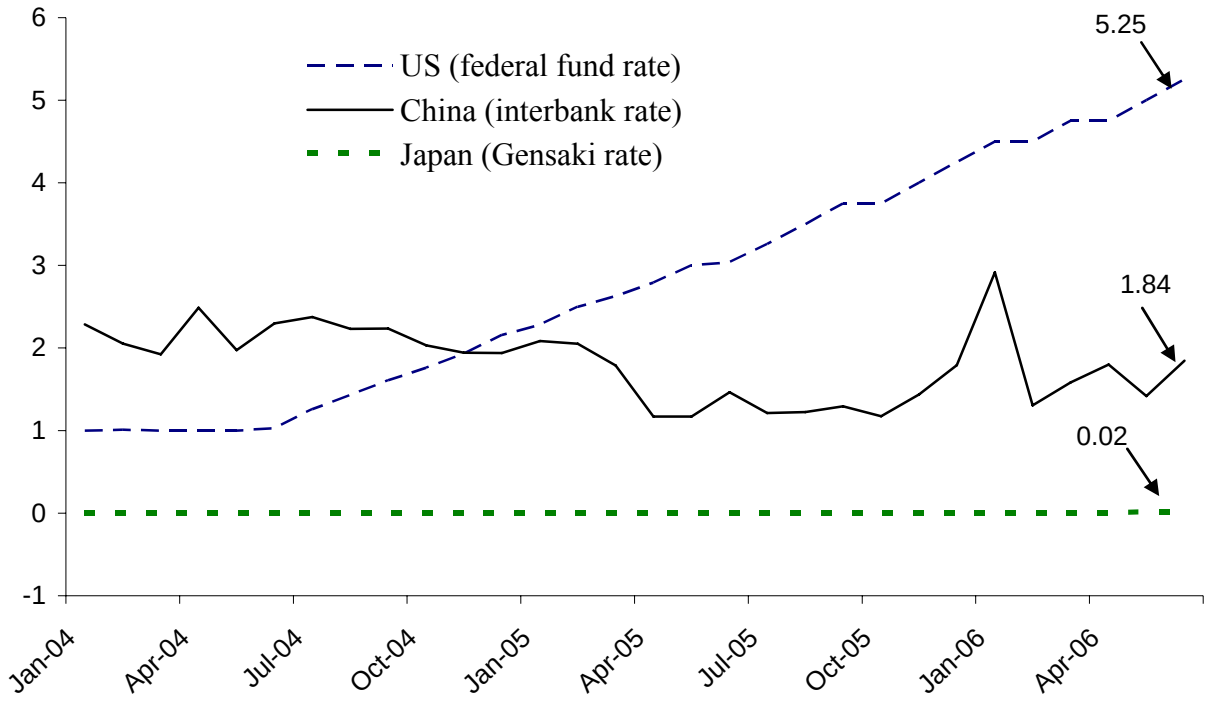
Source: IMF. Net FDI Inflows=Gross FDI Inflows-Gross FDI Outflows

Figure 4: Official Foreign Reserves of China and Japan, 1980-2006



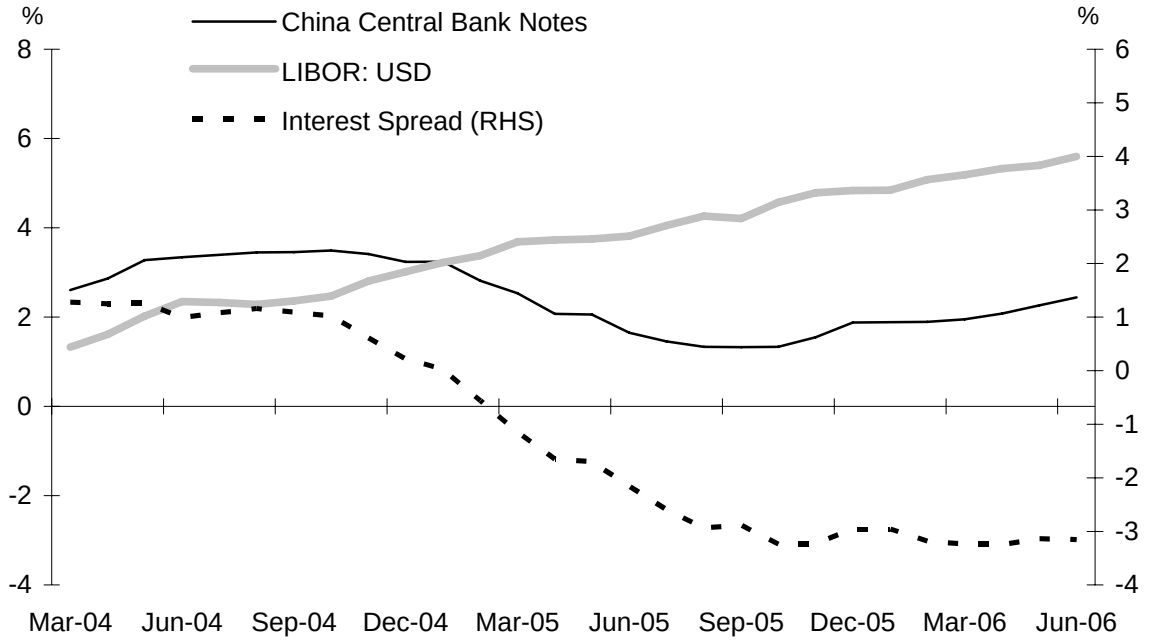
Source: IMF.

Figure 5: Overnight Interest Rates in the U.S., China and Japan, 1990-2006



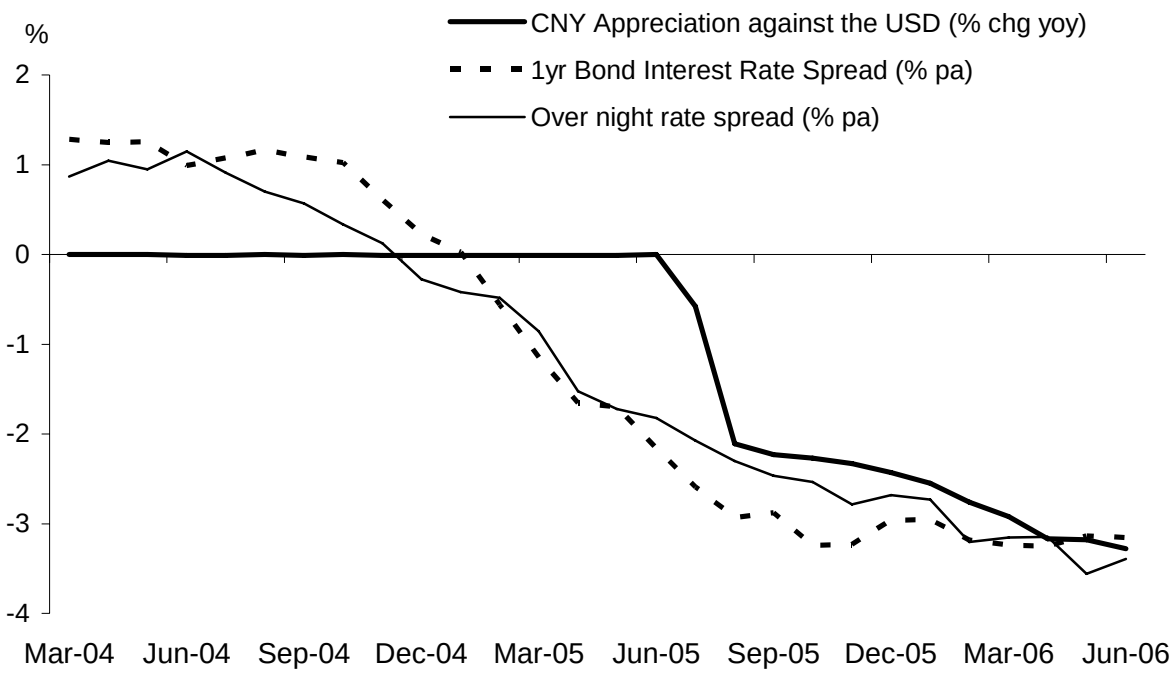
Source: Bloomberg

Figure 6: Interest Spread between China's Central Bank Bill and LIBOR (one year maturities)



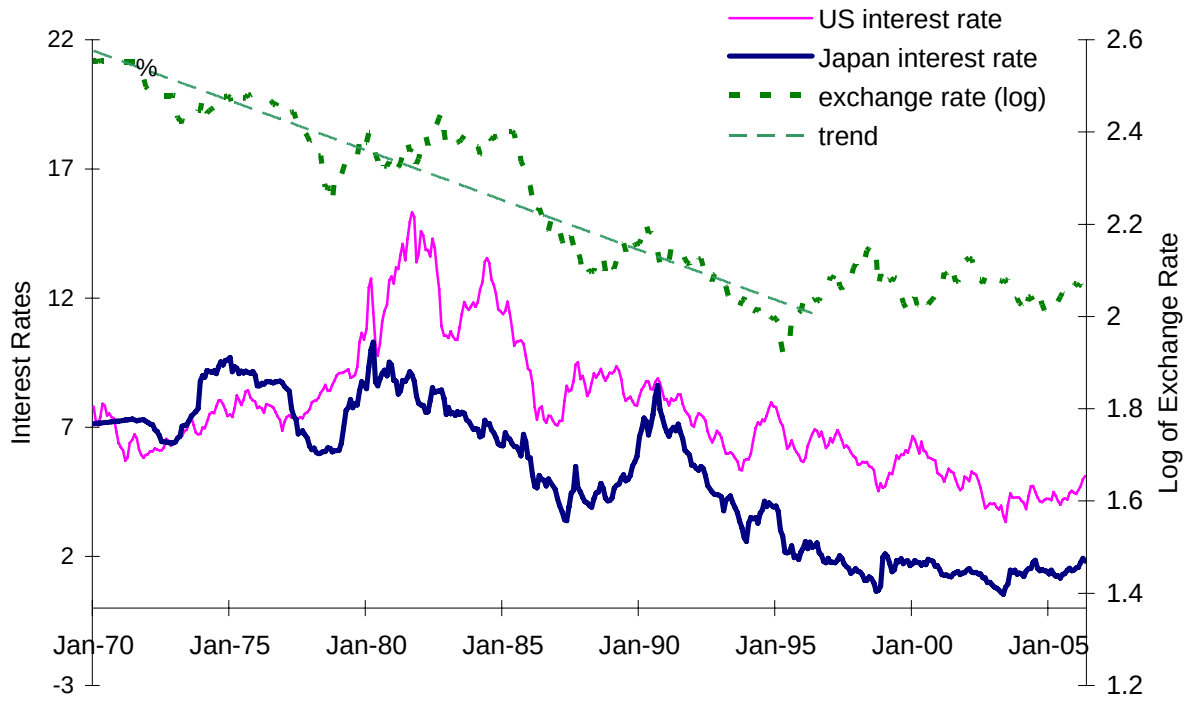
Source: Helen Qiao, Goldman Sachs

Figure 7: Interest Rate Differential vs. Renminbi Appreciation



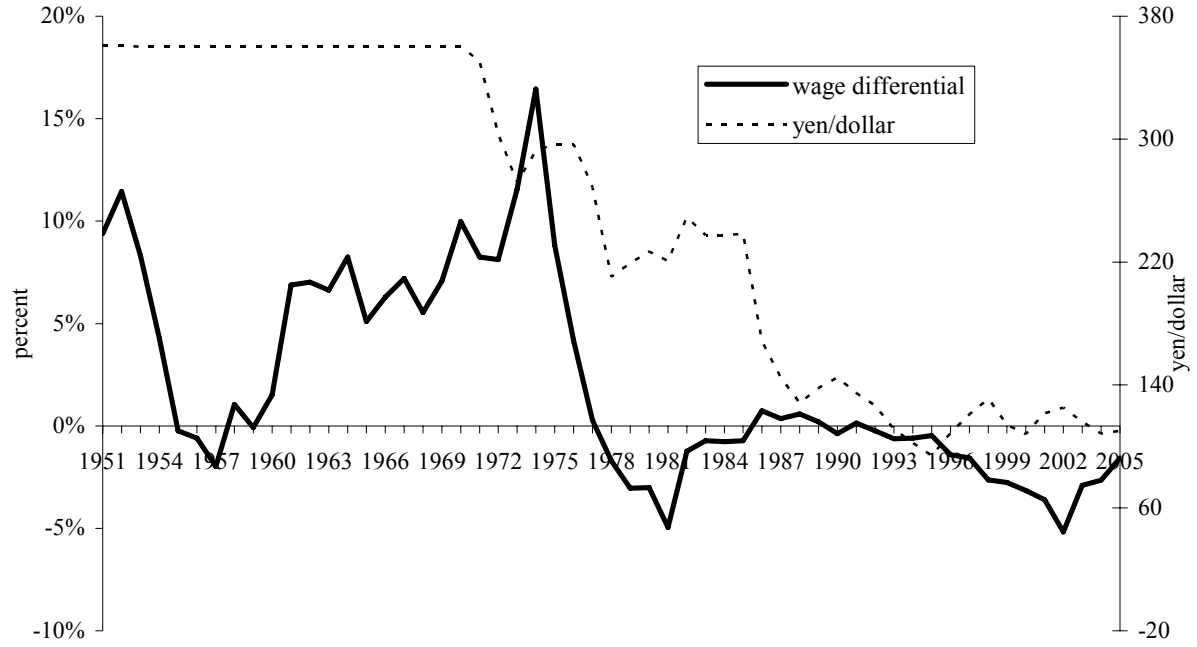
Source: Helen Qiao, Goldman Sachs

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



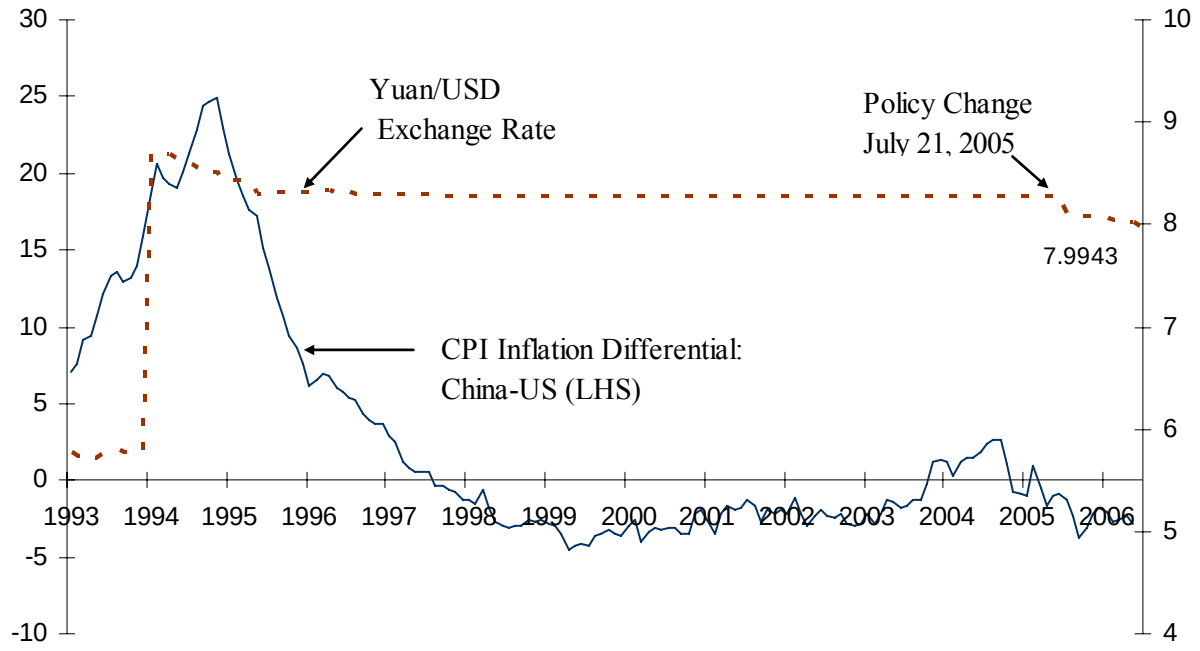
Source: IMF

Figure 9: The Yen/Dollar Exchange Rate and Differential Wage Growth between Japan and the U.S., 1951-2005



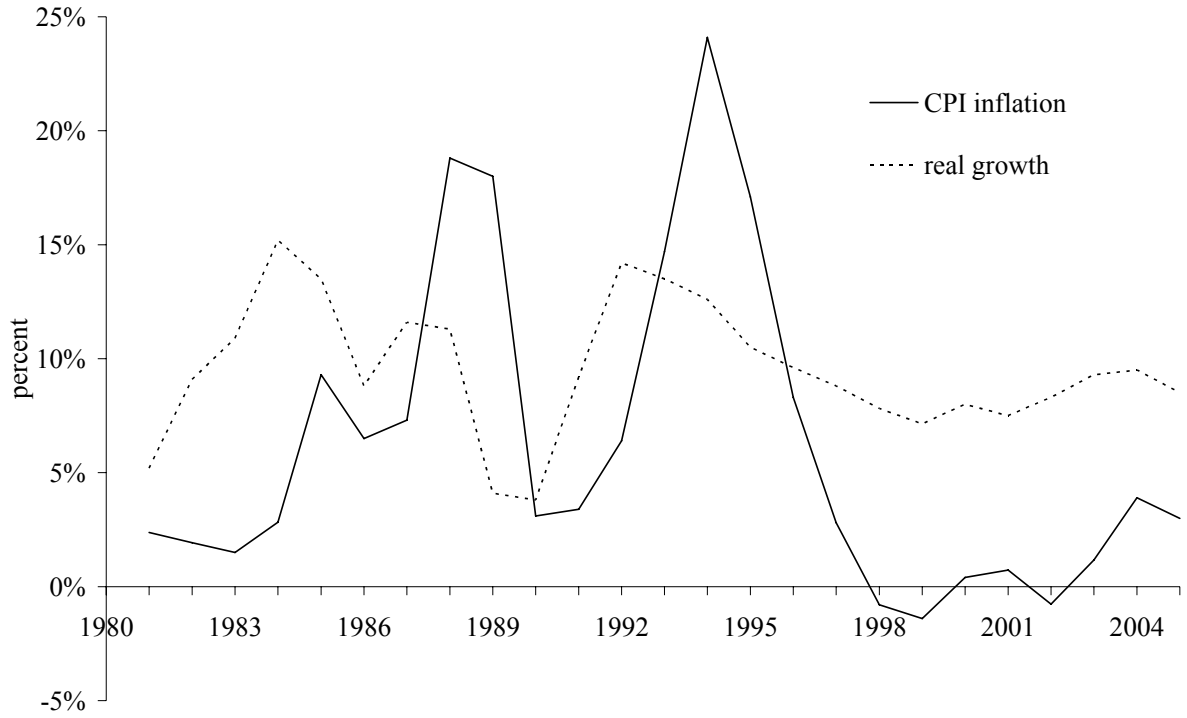
Source: IMF.

Figure 10: Yuan/Dollar Exchange Rate and CPI inflation Differential, 1993-2006



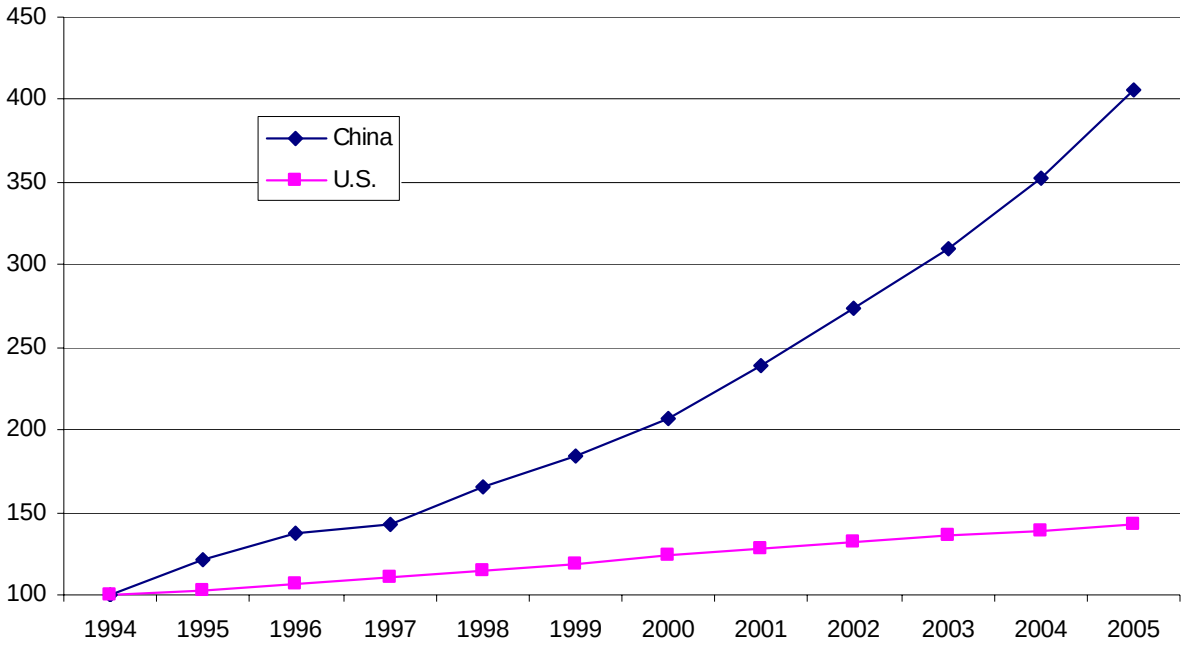
Source: IMF.

Figure 11: Real Growth and Inflation in China, 1980-2005



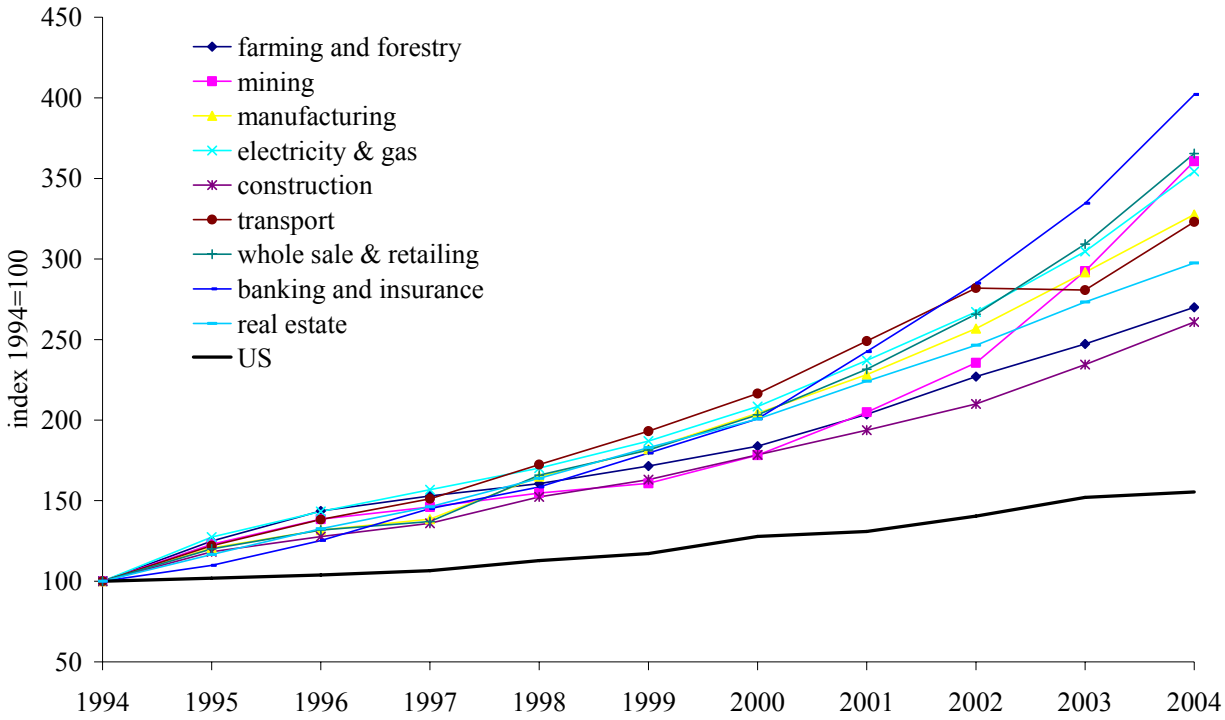
Source: IMF.

Figure 12: Nominal Wages in China and the United States, 1994-2005



Source: EIU

Figure 13: China Nominal Wage Increases across Different Sectors in Comparison to the US Overall Nominal Wage Increases, 1994-2004



Source: IMF, CEIC Database.

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

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

Appendix:

A1: Japan and the United States, 1950-1971, with the Yen Fixed at 360 per dollar, (average annual percent changes)

Wholesale prices		Money wages (Mfg)		Consumer prices		Industrial production	
U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan
1.63	0.69[a]	4.52	10.00	2.53	5.01	4.40	14.56
Real GDP		Nominal GDP		Narrow money		Labor productivity	
U.S.	Japan	U.S.	Japan	U.S.	Japan	U.S.	Japan
3.84	9.45[a]	6.79	14.52[a]	3.94	16.10[b]	2.55	8.92[c]

Source: IFS, Japan Economic Yearbook, Economic Survey of Japan, OECD Economic Surveys and Bureau of Labor Statistics.
a1952-1971.
b1953-1971.
c1951-1971.

A2: China and the United States, 1994-2004, with the Renminbi fixed at 8.28 Yuan per dollar (average annual percent changes)

Wholesale prices		Money wages (Mfg)		Consumer prices		Industrial production	
U.S.	China	U.S.	China	U.S.	China	U.S.	China
2.03	1.86[a]	2.98	11.74	2.46	3.09	3.14	10.44[b] 12.12[c]
Real GDP		Nominal GDP		Narrow money		Labor productivity	
U.S.	China	U.S.	China	U.S.	China	U.S.	China
3.23	8.64	5.20	11.47	4.61	17.64	2.68	9.41[d]

Source: IFS, China Statistical Yearbook, World Development Indicator Database and Bureau of Labor Statistics.
a Ex-factory price index.
b value added industrial production, WDI
c 1994-2001 IFS, IMF
d Calculated by using value added industrial production from WDI and the employment of secondary industry from China statistics yearbook