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Valuing the Renminbi

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China has achieved extraordinary economic growth over the past quarter century, and more recently it has emerged as a significant force in the global economy. That emergence, however, has been accompanied by controversy. Some observers see the progress of China as a threat to the economic welfare of their own or other countries. In recent years, there has been an effort to identify this fast-growing economy as the source of global deflation pressures. More specifically, attention has focused on what many maintain is an undervalued Chinese exchange rate that gives it an unfair advantage in global trade. Others promote a more strained argument that the Renminbi (RMB), by being fixed to the dollar, complicates the process of reducing an unsustainable U.S. trade deficit. It discourages other Asian countries from accepting an appreciation of their own currencies against the U.S. dollar since the appreciation implies a loss of their competitive position vis-à-vis China.

The purpose of this paper is to examine the debate surrounding Chinese exchange rate policy. What is the basis for arguing that China's exchange rate is undervalued? After first reviewing recent trends in the Chinese exchange rate and trade, the paper assesses the exchange rate in the context of several conceptual frameworks that are commonly used to evaluate exchange rates relative to their sustainable or 'fundamental

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equilibrium' values. As we shall see, the notion of an equilibrium or 'correct' exchange rate is not a particularly clear concept nor can it be easily quantified. The determinants of exchange rates and their link to any underlying notion of economic fundamentals are not well-understood nor capable of being accurately predicted by economists. However, we can discuss the behavior of the Chinese exchange rate relative to several norms that have been applied to other countries in the past.

I focus on three perspectives. The first is purchasing power parity (PPP), which hypothesizes that the nominal exchange rate should be equal to the ratio of the domestic and foreign price levels, an application of the law of one price. While absolute PPP is often rejected on the basis that domestic and foreign products are only imperfect substitutes, there is more support for a notion of relative PPP in which changes in exchange rates are proportionate to changes in relative price levels, particularly over extended time intervals.

A second approach, used by the International Monetary Fund in its assessments of prevailing exchange rates among the industrial economies, attempts to relate exchange rates to underlying economic fundamentals. A central idea is that the appropriate current account position (external balance) can be associated with the country's equilibrium or medium-term saving- investment position (internal balance). Various trade models are then used to calculate how much the real exchange rate would have to change to equate the external balance with the domestic fundamentals. While this framework is normally limited to the assessment of the exchange rates of industrial countries, it can provide an alternative means of assessing China's situation.

A third perspective is provided by those observers who simply note that China has been accumulating foreign exchange reserves at a rapid pace, and infer from that that the Renminbi must be undervalued. The focus on ‘excessive’ reserve accumulation also leads some to argue for a move to a market-determined floating rate, an action that would require China to permit the free inflow and outflow of financial capital.

Background Information

Over the past decade, China has emerged as a major participant in the world trading system. It has greatly liberalized its trade regime as part of a process leading to its admission into the WTO, and it has seen its trade with the rest of the world grow at an average 15 percent annual rate. During the same period, China has also made substantial progress in transforming its exchange control regime into a market-based system. In 1994, it unified the prior dual exchange rate system and established a nation-wide interbank market for foreign exchange. The unification was accompanied by a substantial devaluation of the official exchange rate. While the current system is sometimes described as a managed-float, the exchange rate has been essentially fixed at 8.3 RMB to the U.S. dollar since mid-1995. China’s currency is now fully convertible for current account transactions, but it continues to maintain significant restrictions on cross-border capital flows.

Exchange rate measures. The notion of a fixed nominal link between the Renminbi and the U.S. dollar, however, is not particularly informative about China’s competitive position in a multilateral trading system, particularly in light of the wide fluctuations in the international value of the dollar over the past decade. Instead, it is

vital to assess exchange rates in a multilateral context. The evolution of the Chinese exchange rate on a trade-weighted basis is shown in figure 1. The JP Morgan nominal and real indexes, which are based on bilateral trade weights, provide the most comprehensive coverage, and past work has demonstrated a significant correlation with trade flows.² The nominal appreciation of the RMB on a trade-weighted basis since 1995 simply follows that of the dollar; and as shown in figure 2a, the two indexes are very highly correlated – an R^2 of 0.96. In this case, the differences in partner trade weights of the two countries have not been important. From the middle of 1995 to its peak in February of 2002, the trade-weighted index rose by 37 percent compared to a 36 percent increase in the corresponding index for the dollar. Similarly the two indexes have declined by similar amounts since the peak, 13 percent between February 2002 and November of 2003.

There is more evidence, however, of independent movement in the real exchange rate measures of the two countries: the R^2 declines to 0.74 (figure 2b). A rapid rate of domestic price inflation drove up the Chinese rate in the mid-1990s, but its inflation rate has slowed to the average of its trading partners since 1998. In contrast, the United States had a domestic inflation rate well below those of its trading partners in the early portion of the decade that more than offset the rise in the nominal rate, but inflation differentials narrowed substantially after 1998. Over the full period since unification of the currency, China has experienced a real rate appreciation about ten percent more than that of the United States, but the Chinese increase was concentrated in the mid-1990s.

² The JP Morgan exchange rate indexes, together with an explanation of the most recent revisions, are available from its web site: <http://www2.jpmorgan.com/MarketDataInd/Forex/currIndex.html>. The broad real indexes cover a much larger set of 59 countries, compared with 38 in the narrow. Nominal indexes are of limited value for countries with very high inflation. The JP Morgan price indexes are normally producer prices of manufactures, excluding food and fuel.

Trade patterns. China's trade performance has been a source of considerable public confusion. Representatives of both industrial and developing economies express fears of competition from China's fast growing exports, while ignoring the equally rapid expansion of the market for imports. The United States also views the issue through the distorted lens of its own bilateral trade deficit with China, while ignoring the fact that it has a bilateral trade deficit with nearly everyone.

The U.S-China trade balance plays a disproportionate role in the discussion of trade in part because some observers infer that a large bilateral trade surplus with the United States implies a large overall surplus. In addition, the United States and China publish quite different estimates of their bilateral trade. The trade balances of China and the United States with their major trade partners are shown in table 1. Because much of China's trade is transshipped through Hong Kong, we have combined the trade of the two. The role of Hong Kong as a middleman is particularly important for Chinese exports to the United States. For example, Mainland China reports a bilateral surplus with the United States of \$42 billion for 2002. With the addition of Hong Kong, the surplus rises to \$74 billion, but that is still far short of the \$109 billion bilateral deficit reported by the United States.

Several studies have sought to identify the sources of the trade discrepancies.³ In part, it reflects a problem with the trade data of all countries: exports are reported on a f.o.b. (freight on board) basis whereas imports are reported on a c.i.f. (cost, insurance and freight) basis. Thus, the importing country always reports a larger number. Most of the studies apply a discount of 10 percent of the c.i.f. values to convert to f.o.b.

³ Lardy (1994), Feenstra et. al. (1999), and Fung and Lau (2001, 2003).

In addition, both the United States and China seek to assign the ultimate origin of imports to the country of principle manufacture. Thus, exports to Hong Kong that are re-exported to either Mainland China or the United States are reclassified by the importing country.⁴ Rather than simply combining the trade of Mainland China and Hong Kong as we have done, Fung and Lau (2003) identify the volume of China's trade that passes through Hong Kong together with the markup of the Hong Kong middlemen. They then convert the U.S. data to an f.o.b. basis and remove the portion of imports that should be attributed to value added in Hong Kong. With their adjustments, they reduce the 2002 bilateral imbalance to -\$77 billion.⁵ This is close to the value shown in table 1 for the combination of Mainland China and Hong Kong in 2002, but their estimate of the U.S.-China bilateral deficit shows a larger increase over time.

Balance of payments. The measurement of the bilateral trade imbalance is an interesting issue, but the important question for a consideration of the appropriate exchange rate is China's overall balance with the world economy. From this perspective, its surplus with the United States is largely offset by persistent deficits with Japan, Taiwan, and the rest of Asia. China also has a rapidly growing volume of petroleum imports. Furthermore, it is the United States, not China, that displays the abnormal trade pattern – large trade deficits with every major region of the world. China is only one among many countries with which the United States has a trade deficit.

⁴ The large discrepancy in the reported bilateral trade between mainland China and Hong Kong implies that China reassigns about 85 percent of its imports from Hong Kong, and about 40 percent of its exports. Since the reassignments of trade by the Mainland and Hong Kong do not match, our combining of the trade data for Hong Kong and the mainland also introduces errors.

⁵ A similar issue of the reassignment of some imports may arise with some of Taiwan's trade with the United States and Mainland China.

As shown in table 2, a portion of China's overall merchandise trade surplus is offset by a deficit on trade in services and large income outflows associated with earnings on the extensive volume of foreign investments in China. On the other hand, transfers constitute a large net inflow. Over the period of 1990-2002, the current account balance has averaged 1.8 percent of GDP, and ranged from a surplus of 4 percent in 1997, to a deficit of -2.7 percent in 1993. Most recently, the balance declined to \$11 billion in the first half of 2003 or about one percent of GDP.⁶

Thus far, this review suggests that China's net economic relationship with the rest of the world has changed remarkably little in recent years. On a trade-weighted basis, the real exchange rate is about equal to its average of the prior ten years. The current account shows a small and declining surplus, and both exports and imports have been growing at double-digit rates for many years. However, much of the controversy over China's exchange policy originates from developments on the financial side of the economic relationship. Together with a modest current account surplus, China has been the recipient of very large capital inflows. As shown in table 3, inflows of foreign direct investment (FDI) have averaged over four percent of GDP during the past ten years. While a substantial part of that inflow is now being offset by the outflow of foreign earnings on prior investments (table 2), FDI still contributes a large net inflow of foreign finance.

The combination of the current account balance plus FDI implies a persistent capital inflow that has averaged 6 percent of GDP over the past decade (table 3). That inflow must be offset by changes in other components of the balance of payments. In

⁶ Preliminary projections of the Asian Development Bank (2003) show a zero balance for 2003 and a deficit in 2004. The IMF forecasts a balance of 1.5 percent of GDP for both 2003 and 2004. The OECD (2003) forecasts the 2003 balance at 1.2 percent of GDP and 0.6 for 2004.

prior years, an unreported capital outflow (errors and omissions) counterbalanced a substantial portion of the inflows, an average of 1.9 percent of GDP over the 1994-2000 period. However, with growing expectations of exchange rate appreciation, the net balance of unrecorded flows has changed sign.

In addition, as discussed more fully in a later section, a surprisingly large portion of the past financial inflow was also accumulated in foreign exchange accounts within onshore banks, an average of 2.4 percent of GDP during the 1994-2000 period. Funds in these accounts have also plummeted, since no one wants to be caught with foreign currency in the event of an appreciation. In table 3, these concerns are reflected in a large swing in the net of non-reserve financial transactions from a positive 1.4 percent of GDP in 2002 to -1.6 percent in the first half of 2003.⁷

Exchange rate assessment

The perception that the RMB is seriously undervalued is wide-spread. A recent survey of 33 prominent analysts found that supporters for the view that the RMB is undervalued outnumbered the doubters by more than a two-to-one ratio (*International Economy*, 2003). In the United States, economists with the Institute of International Economics have argued for a revaluation in the range of 15-25 percent.⁸ The U. S. Treasury has avoided an outright call for revaluation, but in its advocacy of a flexible exchange rate policy, it appears to believe that the result would be an appreciation of the rate (Taylor, 2003). In Japan, the Ministry of Finance has estimated the undervaluation at

⁷ Of course, these non-reserve transactions include much more than foreign currency accounts, but the concerns are similar.

⁸ See Goldstein and Lardy (2003a, 2003b), Preeg (2003), and Williamson (2003).

14 percent,⁹ and C.H. Kwan (2003) of the Research Institute of Economy, Trade, and Industry (RIETI) has also argued for an appreciation.

Purchasing Power Parity. A PPP exchange rate, based on the law-of-one-price, provides the most obvious and straightforward measure of the appropriate exchange rate for the RMB. In an open competitive market, identical goods should sell for the same price. Thus, the International Comparison Program (ICP), sponsored by a number of international statistical organizations, seeks to collect price information on a standard market basket of products across a wide range of countries.¹⁰ The data are used to convert individual components of national accounts to a common international price. The PPP exchange rate can then be computed as the ratio of GDP in national currency to GDP in international prices.

However, for a number of reasons, absolute PPP does not hold across nations of sharply differing levels of development. The most important are the existence of non-traded goods and services and the existence of significant transactions costs – transport, trade barriers, taxes, and information costs. Thus, while PPP measures may be very useful for measuring the extent of differences in living costs, they provide a limited basis for inferring the extent of currency misalignment.

The magnitude of the discrepancies between observed market and PPP-based exchange rates is illustrated in figure 3. According to these estimates, which are taken from the 2003 edition of World Development Indicators (WDI), the RMB would have to appreciate by a factor of four to bring China's price level into line with that of the United

⁹ Quoted in Takeuchi (2003).

¹⁰ Information on the ICP is available at <http://unstats.un.org/unsd/methods/icp/index.htm>.

States. However, there is a systematic tendency for the disparity to be inversely related to levels of income. In part, that reflects the “Harrod-Balassa-Samuelson effect ,” which states that even if the law-of-one-price held for tradable goods, non-tradables would still be cheaper in low-income countries.¹¹

The systematic portion of the yuan’s undervaluation that is related to its level of development can be removed by estimating, as in figure 3, a simple linear relationship between the level of income per capita and the degree of undervaluation. The result of that adjustment is to reduce the magnitude of estimated misalignment to about 40 percent. However, even this measure is highly suspect. The WDI estimates of PPP for China are of necessity crude because China has never participated in the International Comparison Project.¹² Furthermore, it is notable that the magnitude of departure from PPP is even larger for India, a country whose exchange rate has attracted little claim of being undervalued.

Doubts about the accuracy of the PPP measure have led some commentators to base their calculations on the price of a single product, the ‘Big Mac’ on the grounds that it represents a standardized product sold in many different markets. However, as discussed in Parsley and Wei (2003), the Big Mac exchange rates embody many of the same problems found in the more aggregate comparisons including the combination of both tradables and nontradables. In any case, the Big Mac index yields a spread of conversion rates that is less related to variations in income per capita, but also very

¹¹ Harrod (1933), Balassa (1964), and Samuelson (1964).

¹² The most extensive recent analysis is Ruoen and Kai (1995). They produced an estimated PPP exchange rate of between 0.87 and 1.18 RMB/\$ based on their collection of matching price data in China and the United States for 1986. This compares with the estimate of 0.99 for 1986 in the WDI. A discussion of PPP estimates for China is available on the web site of the Penn-World-Tables <http://pwt.econ.upenn.edu/>.

disparate (figure 4). Somewhat surprisingly, the estimated magnitude of misalignment of the Renminbi is nearly identical to that shown in figure 3.

Most researchers would consider the measures of absolute PPP too imperfect to provide a reliable basis on which to compute appropriate exchange rates.¹³ However, there is substantial evidence that nominal exchange rates are systematically related to differences in relative inflation rates, or what is often called ‘relative PPP.’ As shown in figure 5, the correlation is particularly evident when the calculations are based on multilateral exchange rates. These comparisons are based on the trade-weight indexes of JP Morgan. They are also limited to 21 OECD countries with relatively low inflation rates so that the results are not dominated by extreme cases. The first panel shows the comparison of 5-year changes over the period of 1970 to 2000 (126 observations). There is a strong negative correlation that is close to one-to-one and accounts for about 43 percent of the variation in nominal exchange rates, but there are a considerable number of large outliers -- France and Portugal in the 1970s, in particular. Over a 10-year period, the correlation rises significantly, but there are still a few outliers. The correlation increases again for changes over a 30-year time span and the observations are very closely grouped along the 45-degree line. It is also evident from the fourth panel that it makes little difference whether the comparison is based on consumer or producer prices.

The problem with relative PPP is that it only provides an index of changes or a measure of over or undervaluation relative to a base period. For industrial countries, it has value as a measure of deviations from a norm based on a historical average. For China, the real exchange rate index (figure 1) is useful in indicating that there has been

¹³ The large deviations from the law of one price are highlighted in a survey by Rogoff (1996).

no significant trend to the real exchange over the past decade. If it has been undervalued by a PPP standard, it has been undervalued for many years. However, the historical past does not provide much of a norm, given the enormous changes in the trade regime since 1980.

Macroeconomic Balance. The major alternative to PPP-based exchange rate norms is to derive an estimate of an exchange rate that would be consistent with macroeconomic balance. This approach underlies much of the exchange rate work of the International Monetary Fund. It is also closely related to the concept of ‘fundamental equilibrium exchange rates ‘ (FEERs) used by Williamson and others.¹⁴ It is rooted in the national accounts identity that a nation’s current account balance with the rest of the world (CA) is equal to the balance between national saving (S) and domestic investment (I):

$$(1) \quad CA = S - I .$$

It also explicitly recognizes a fundamental dependency of the current account balance on a country’s real exchange rate, as the appropriate measure of changes in its competitiveness in global markets. The determination of the target exchange is a multi-stage process of: (1) estimating a domestic saving-investment balance that is consistent with a medium-term outlook for the economy, (2) determining a current account balance that is consistent with the prevailing exchange rate, and (3) calculating how much the exchange rate will have to change to bring the current account (external balance) into line with the projected S-I balance (internal balance).

¹⁴ The topic has generated a huge research literature, but recent surveys with extensive references include Isard et. al. (2001) and Hinkle and Montiel (1999).

The framework is illustrated in figure 6 where the vertical S-I line defines domestic balance and is assumed to be unaffected by changes in the exchange rate. The position of the line representing external balance is determined first by the current value of the real exchange rate and an estimate of the associated balance after taking account of lags in the response of trade to recent changes in the exchange rate and projected growth of domestic and foreign incomes over the medium term. Its slope is determined by empirical estimates of the sensitivity of trade flows to variations in the real exchange rate.

While this framework is most often applied to that of industrial countries, it can offer some insights into China's situation. The most important feature of the Chinese economy is that it displays extraordinarily high rates of both saving and investment. As shown in figure 7, the rate of national saving has averaged near 40 percent of GDP over the past two decades, and has generally exceeded domestic capital formation investment; hence the historical pattern of current account surpluses.

However, the early years were marked by very large estimates of inventory accumulation. Thus, the underlying rate of investment in fixed assets shows a strong upward trend. To a large extent, the measure of inventory accumulation in the Chinese national accounts probably represents a residual estimate of the discrepancy between the expenditure and production side estimates of GDP. It also includes the unsaleable portion of output in the state sector. Its rapid decline over the last two decades seems consistent with the move to a more efficient market-based economy, and the reduced importance of the state enterprises.

Using data from the national accounts, it is possible to calculate a sustainable rate of fixed investment for China in future years. As shown in table 4, China's capital-output

ratio has averaged about 2.3 over the past two decades, is largely free of trend, and is very similar to that of other countries. A balance growth path would imply a need to maintain that ratio going forward. Thus, we can anticipate a growth of the capital stock that essentially parallels that of output. This can be readily translated into a required investment rate by noting that the investment rate (I/Y), is related to the rate of output growth (g), the rate of depreciation (d), and the capital-output ratio (k):

$$(2) \quad I/Y = k(g + d).$$

The historical average of 2.3 provides a reasonable estimate of the capital-output ratio for future years, and the capital stock is constructed with an assumed geometric rate of depreciation of 0.05.

Normally, future growth would be computed on the basis of expected growth in the labor force and improvements in total factor productivity, a supply-side measure. However, that framework is not useful for China because of the continued existence of large numbers of unemployed or underemployed workers in the rural areas and state enterprises. Alternatively, the future growth rate might be projected to continue near the average of the past quarter century. A GDP growth rate in the range of 8 to 10 percent annually would be an optimistic target for the next decade, based on the averages shown in table 4. A 10 percent growth rate implies that the required investment rate would be about 35 percent of GDP ($2.3 \times (.10 + .05)$). A lower estimate of 8 percent growth would reduce the required rate to 30 percent.

The historical rates of saving, reported in figure 7, suggest that China can finance these investment needs out of its own internal saving. The projected investment rates

might be increased slightly to include an explicit allowance for inventory accumulation. However, unless the national saving rate were to suddenly decline, it is difficult to project a future scenario in which China would need to cover a domestic saving-investment shortfall with a deficit on the current account. In fact, recent rates of investment near 40 percent of GDP seem excessive relative to even a 10 percent growth rate target; yet, national rates of saving have been even higher.

Some potential for currency misalignment does arise out of the second stage of the analysis, the determination of a current account balance consistent with the prevailing real exchange rate. Because the RMB has been pegged to a depreciating U.S. dollar, the real exchange rate has fallen by 10 percent since the end of 2001, with most of that decline in the last 12 month. Particularly if the dollar continued to fall, the Chinese current account balance could be driven into a larger surplus, a trend that is not warranted by internal developments. However, the Chinese trade balance is very hard to forecast in view of the many liberalizations and other actions introduced as part of the country's emergence into the WTO. We can only observe that there is no evidence of a growing surplus in the most recently available trade data. In fact, the most recent information suggests a declining current account balance.

Overall, the macroeconomic balance framework does not support the notion that the Chinese exchange rate is fundamentally undervalued. The internal balance of saving and investment would suggest a target of balance or a small surplus on the current account. A revaluation of the RMB would do nothing to lower internal saving; and, if it reduces investment incentives, it will make the trade situation worse. In common with the development history of other East Asian economies, China exhibits a remarkable high

level of internal saving that obviates the usual argument that developing economies should have current account deficits.

Foreign Exchange Reserve Accumulation. Many of the recent calls for a revaluation of the RMB have been justified by pointing to the remarkable accumulation of foreign exchange reserves. It is often the case that reserve accumulation can serve as a proxy for a current account surplus, particularly in a situation of a fixed exchange rate and restrictions on capital outflows. However, the Chinese situation is more complex.

China is distinguished by a small current account surplus, but a very large capital inflow, principally from FDI (table 3). A repeated lesson of Latin America and other East Asian economies is that these inflows can easily become too large for the domestic financial system to absorb safely. Furthermore, as discussed above, China already has an extraordinary level of investment fully financed by domestic saving. Thus, it is not evident that China can absorb the large magnitudes of foreign capital without inducing excessive investment and asset price bubbles.

To a surprising extent, the capital inflows were offset during the 1990s by private capital outflows, despite the existence of capital controls (table 3). The outflows were accomplished through two primary processes: circumventions of the controls as shown by the large negative values for errors and omissions in the balance of payments, and a large buildup of onshore foreign exchange claims in locally-owned banks. From a balance of payments perspective, the accumulation of foreign exchange claims in onshore banks is equivalent to a capital outflow.

However, both of these flows have reversed in recent years. The swing in the errors and omissions alone between 1999 and 2003 is the equivalent of 2½ percent of

GDP. In addition, a recent paper by Ma and McCauley (2003) highlights the importance of the foreign currency accounts. As shown in table 5, they are able to document the sources and uses of foreign currency flows for the 1999-2000 period. On the sources side, foreign currency deposits plus the repayment of foreign currency loans by Chinese firms accounted for a very large proportion of the total in 1999, and reserve account purchases by the central bank were only \$10 billion out of a total of \$38 billion. However, in recent years the role of the private accounts has declined dramatically and in 2002, they were a negative source of foreign currency.¹⁵

Presumably, both of these changes are a reflection of increased expectations of a currency appreciation. On the asset side, individuals would prefer to hold RMB over foreign currency and Chinese firms have much less of an incentive to repay foreign currency loans. Ma and McCauley are able to demonstrate that both transactions have been sensitive to interest rate differentials and exchange rate expectations.

The result of these declines on unrecorded outflows and other foreign exchange transactions has been an extraordinary surge in the residual of official reserves, even though little or nothing has happened to the magnitude of basic inflow. This is highlighted in figure 8. Prior to 2000, only about one third of the capital inflow was absorbed by reserve accumulation. By 2002, that had increased to 90 percent, and it reached 150 percent in the first half of 2003. That is, much of the recent surge in official reserves should be interpreted as a reallocation of foreign currency assets within China, probably due to increased speculation about a possible appreciation.

¹⁵ It is also interesting to note that Ma and McCauley were able to identify from BIS banks and other foreign institutions a very large proportion of the uses. The uses (foreign) and sources(domestic) are in very close agreement.

Given its commitment to a fixed rate, China has no choice but to purchase the excess foreign exchange. However, it does have choices about how to fund those purchases. Normally, the central bank purchases would be financed by an expansion of the reserve base with a consequent increase in the money supply. Under a fixed exchange rate regime, these non-sterilized interventions provide an endogenous adjustment mechanism: sustained reserve accumulation should lead to an expansion of the money supply and ultimately a higher rate of inflation, which will in turn lead to an appreciation of the real exchange rate. Under the alternative of sterilized intervention, the central bank could avoid the monetary consequence by financing the reserve purchases through the issuance of other liabilities, such as bonds; hence avoiding the induced increase in the price level and the ultimate rise in the real exchange rate. Thus, countries that engage in extensive sterilization are often accused of short-circuiting the adjustment process.

China appears to have adhered closely to the ‘rules’ of a fixed-exchange-rate regime, allowing the accumulation of foreign exchange reserves to pass through to the monetary base,. Since 1999, it has financed its purchases of 1.5 trillion yuan of foreign exchange through an equal increase in the monetary base (table 8). Sterilized interventions through bond issues have been limited to a few hundred billion yuan and offset by changes in other liabilities.¹⁶ The result has been a rapid increase in the domestic money supply, whether measured by M1 or M2, shown at the bottom of the table. Both measures have expanded at a 15 percent rate since 1999. However, there is

¹⁶ A striking aspect of the asset-liability accounts of China’s central bank is the near-complete absence of holdings of government debt on the asset side. Most countries finance large portions of their public debt through the central bank. Instead, the Peoples’ Bank of China finances its issuance of reserve money through the accumulation of high-quality foreign assets.

not a close correlation between the changes in reserve money and the money supply in the short run because of substantial variation in the money multiplier.

The high rates of money supply growth have translated into some reductions in interest rates and a very strong expansion of both loan demand and GDP growth. However, the impact on the domestic price level remains very modest. While both the consumer and industrial price indexes rose in 2003, the amount of increase is little more than would be expected from the rise in international commodity prices. Thus far, China has avoided serious inflationary problems because of the large surplus of underemployed labor and the rapid creation of new capacity.

Policy Options.

China is faced with an unusual challenge of an excess of foreign capital inflows. However, it is not a problem that can be easily solved by a currency appreciation. Given current high rates of domestic saving, and a rate of domestic investment that may already be above a sustainable level, China cannot absorb additional inflows of foreign saving. Despite its low income, it has an excess of savings. A currency appreciation could actually have the perverse effect of worsening the internal balance. While the impact on national saving is uncertain, a currency appreciation is highly likely to reduce domestic investment, shifting the S-I balance toward a larger surplus, and potentially saddling China with a lower rate of growth. China's growth is not capital constrained, and thus much of the policy advice offered to developing economies does not apply.

As discussed previously, the surplus of inflowing capital is largely the result of financial account transactions since China's current account balance has been

consistently small and in line with the domestic balance of saving and investment.

However, it is a large and rapidly growing economy that is likely to attract foreign capital for many years to come. Most multinational firms believe that a sustained presence in China is critical to their future growth. Thus, there is an important issue of how to deal with a persistent capital inflow.

If China were fully open to international capital, we might argue that the whole issue could be resolved through markets. However, even in that case, countries have feared that they might fall victim to something similar to “Dutch Disease,” as large capital inflows result in excessive currency appreciation. Furthermore, China does not yet have domestic financial markets of sufficient depth to manage the inflows efficiently, and most financial analysts have concurred with the need to make full capital account convertibility conditional on progress in strengthening the domestic financial system. The problem of managing capital inflows has been addressed in several research papers, but usually from the perspective of their potential for sudden reversal and the instability that might cause. China’s problem is a bit different in that the inflow is likely to be persistent. There is some similarity to the case of Korea in the 1990s, but Korea’s inflows were predominantly in the form of debt instruments.¹⁷

Thus far, China has managed the problem through a combination of the two options discussed above, official reserve accumulation and informal private capital outflows. However, speculation about the possibility of a currency appreciation has made the informal outflows channel surprisingly unstable, necessitating an ever-growing role for official reserve accumulation.

¹⁷ The Korean experience is evaluated in Dooley and Shin (2000).

What other options are open to China? I have argued against the most popular outside option, an exchange rate appreciation, thereby offsetting the financial capital inflows with a current account deficit. This prescription ignores the fact that the internal saving and investment balance is already in surplus. The Chinese current account balance cannot be transformed into deficit without simultaneous actions to either reduce saving or increase investment. Instead, the strong internal real sector balance suggests that the management of the capital inflows should focus on financial-side actions. Those policies would be aimed at curtailing the *net* financial inflow: reducing the inflows and broadening the range of offsetting outflows.

On the inflows side, China should not want to discourage FDI: it benefits from the technology, management skills, and access of foreign firms to international markets. However, it could relax its restrictions against foreign firms financing their investments through local financial markets. With low market interest rates and low inflation, the cost of debt finance in China is comparable to that abroad. For firms intending to produce and sell in China, local financing reduces their exposure to exchange rate risks. Even though expectations of a future exchange rate appreciation may remain strong, foreign firms might prefer a hedged position, passing up the opportunity to speculate on the currency.

The experience of other countries suggests that China should be very cautious about opening its capital account prior to the reform and strengthening of the financial system. Much of that concern, however, is related to the risks of equity capital inflows and extensive foreign borrowing by domestic banks and enterprises. However, China's capital inflows are concentrated in FDI for which the risks of excessive speculation in local real estate and equity markets seem much less. Second, flows of FDI are less

vulnerable to sudden reversal. Third, unlike the countries that got caught up in the 1997 financial crisis, China has built up large reserves of foreign exchange with which it can counter any potential runs against its currency. These conditions suggest that China might be able to move toward capital account convertibility in an incremental fashion that would serve in the short run to recycle some of the capital inflows back into global markets.

Examples of the liberalization of capital outflows are provided by the actions that China has already taken to raise the limits on the amount foreign exchange that citizens can purchase for travel. In addition, it can take further steps to relax requirements that exporting firms must convert all of their proceeds to RMB. While maintaining restrictions on foreign equity inflows and borrowing in a foreign currency, China can gradually allow Chinese residents to invest abroad.

There is also room for some modest adjustments of the exchange rate regime. Thus far, a fixed exchange rate regime has served China well in terms of the certainty it has provided for foreign exchange transactions; but it would work nearly as well against a basket of currency versus the current focus on the U.S. dollar. The earlier analysis suggested there was little room for currency appreciation, but at the same time China does not need the depreciation implied by a continued tie to a falling dollar. The use of a basket of currencies would defuse much of that criticism.

Second, some of the burden of clearing the market for foreign exchange could be shifted away from the central bank by allowing the exchange rate to float within a narrow band. However, China needs to be cautious in not allowing repetitive rounds of currency

appreciation to push it into a deflationary spiral.¹⁸ However, changes in the exchange rate regime should not distract attention from nor serve as substitute for a far more important program of liberalization of the trade regime. To a first approximation, anything that an appreciation of the RMB can do, trade reform would do better.

Finally, China's saving rate is surprisingly high for a country at its stage of development. The reasons for the high saving rate of Chinese households are not obvious, though some studies attribute it to the unusually low youth dependency rate that has emerged from the one-child policy (Higgins and Williamson, 1997). It is a bit of an outlier, even by East Asian standards. Policies that reduced the rate of saving would provide room within the domestic economy to absorb a shift of the current account balance toward deficit. However, it is not at all clear why China would want to discourage saving by its citizens.

Summary

This paper has examined the debate over the Chinese exchange rate from a variety of perspectives. A comparison with a PPP exchange rate suggests that the RMB is undervalued. However, a consideration of the extraordinarily high level of national saving suggests the current value of the real exchange rate is consistent with longer term balance of the economy. Contrary to common perceptions, China does not have a large current account surplus in its trade with other countries.

Instead, China's foreign exchange problems are the result of a large inflow of foreign financial capital that is linked to the large investments of foreign companies in

¹⁸ This theme is developed more fully in McKinnon (2003).

China. This is a capital inflow that it does not need and cannot safely absorb given its own high rate of saving and underdeveloped financial markets. More than a currency appreciation, China needs to find a way to redirect the foreign capital back into international markets, without cutting itself off from the technical, managerial, and marketing skills of western multinational companies. Continued pressures to revalue the RMB run the risk of disrupting the internal balance of saving and investment, and pushing China onto a path of slower economic growth.

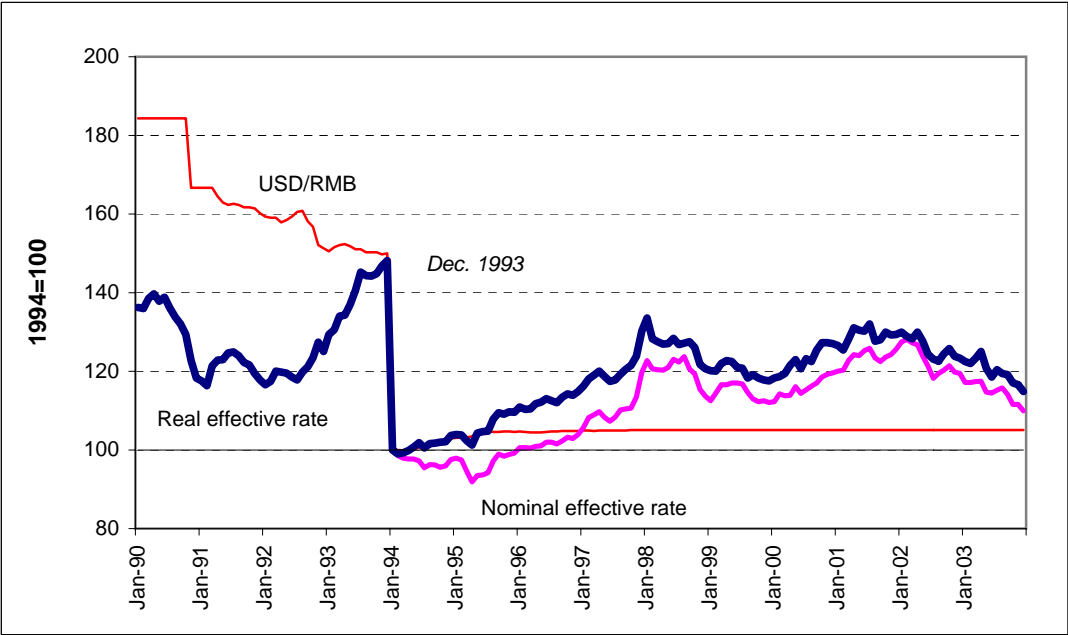
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Figure 1. China's nominal and real effective and real bilateral exchange rates
Index, January 1994=100



Source: JPMorgan trade-weighted currency indexes and IMF *International Financial Statistics* (January 2004)

Figure 2a. Nominal effective exchange rates

Index, January, 1994 = 100

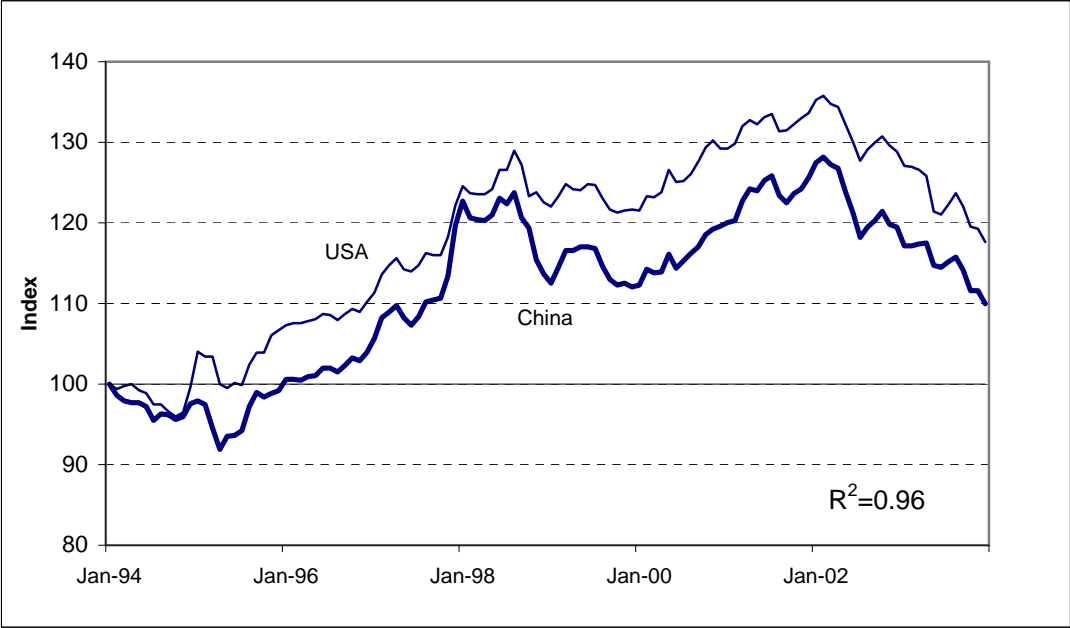
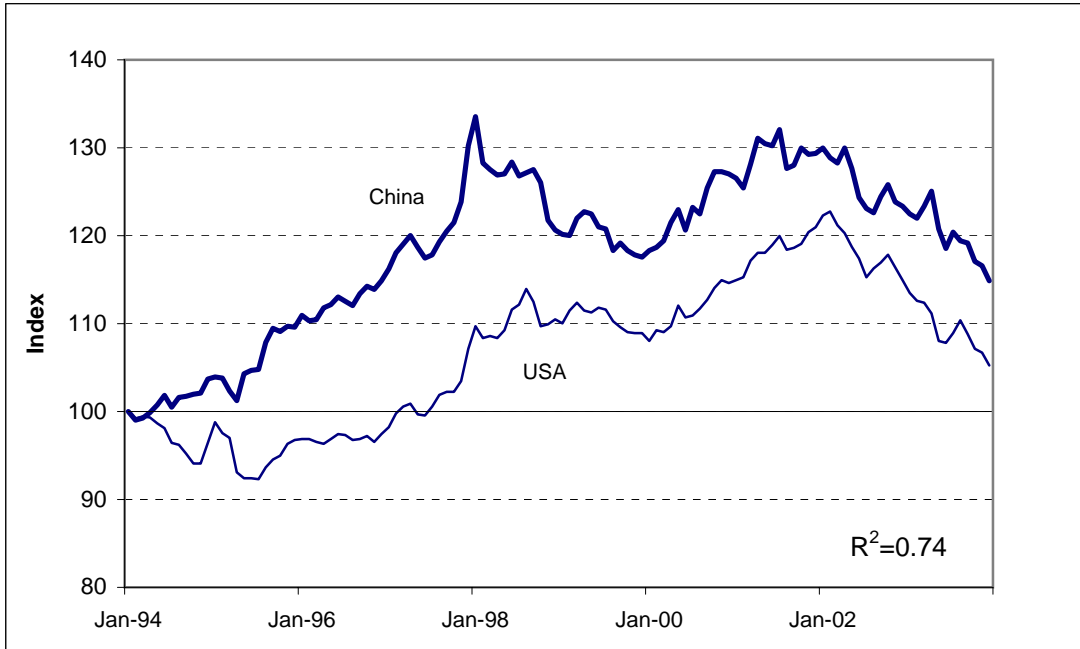


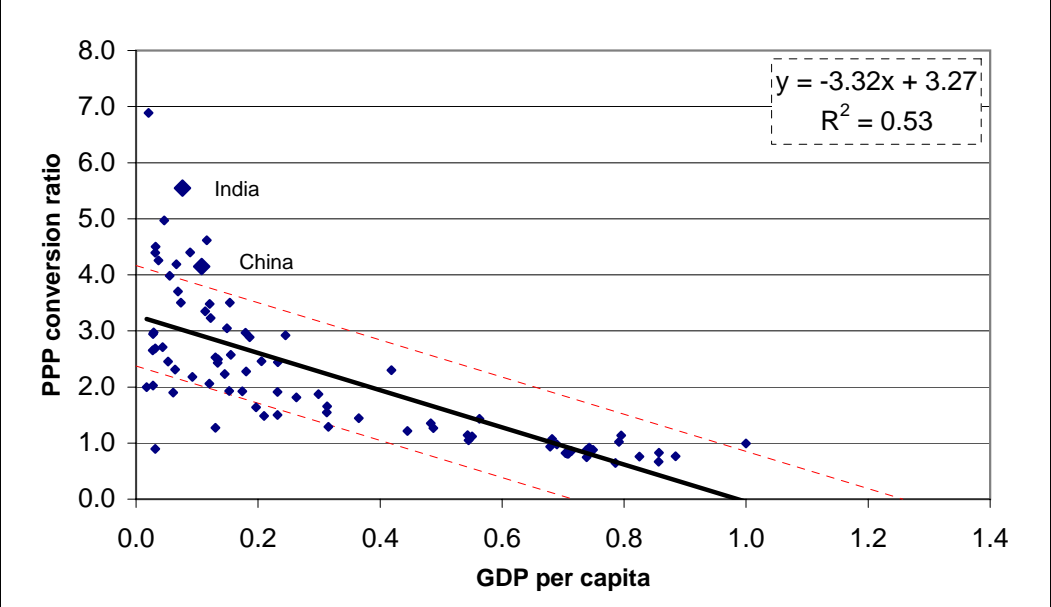
Figure 2b. Real effective exchange rates

Index, January, 1994 = 100



Source: JP Morgan trade-weighted currency indexes (January 2004)

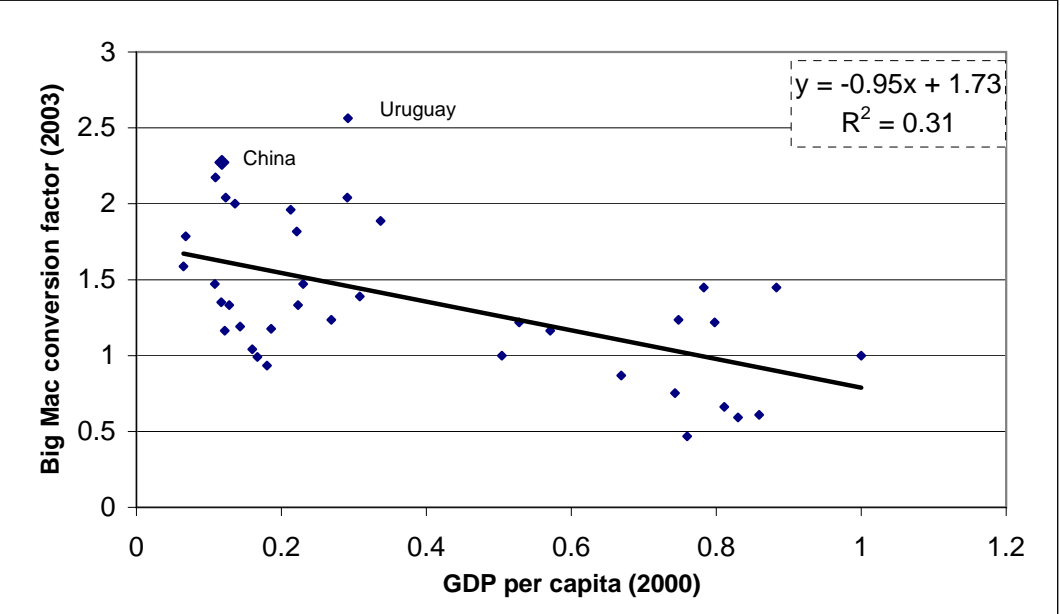
Figure 3. PPP Conversion Factors and GDP Per Capita 1995-2000^a



Source: *World Development Indicators* (2003) and author's calculations. The conversion rate is the ratio of the PPP exchange rate to the official exchange rate.

Notes: (a) PPP conversion factor is measured as the ratio of PPP (international dollars) to US Dollars, over Chinese RMB to US dollars. GDP per capita is real income per capita as a ratio to the United States (US=1.0).

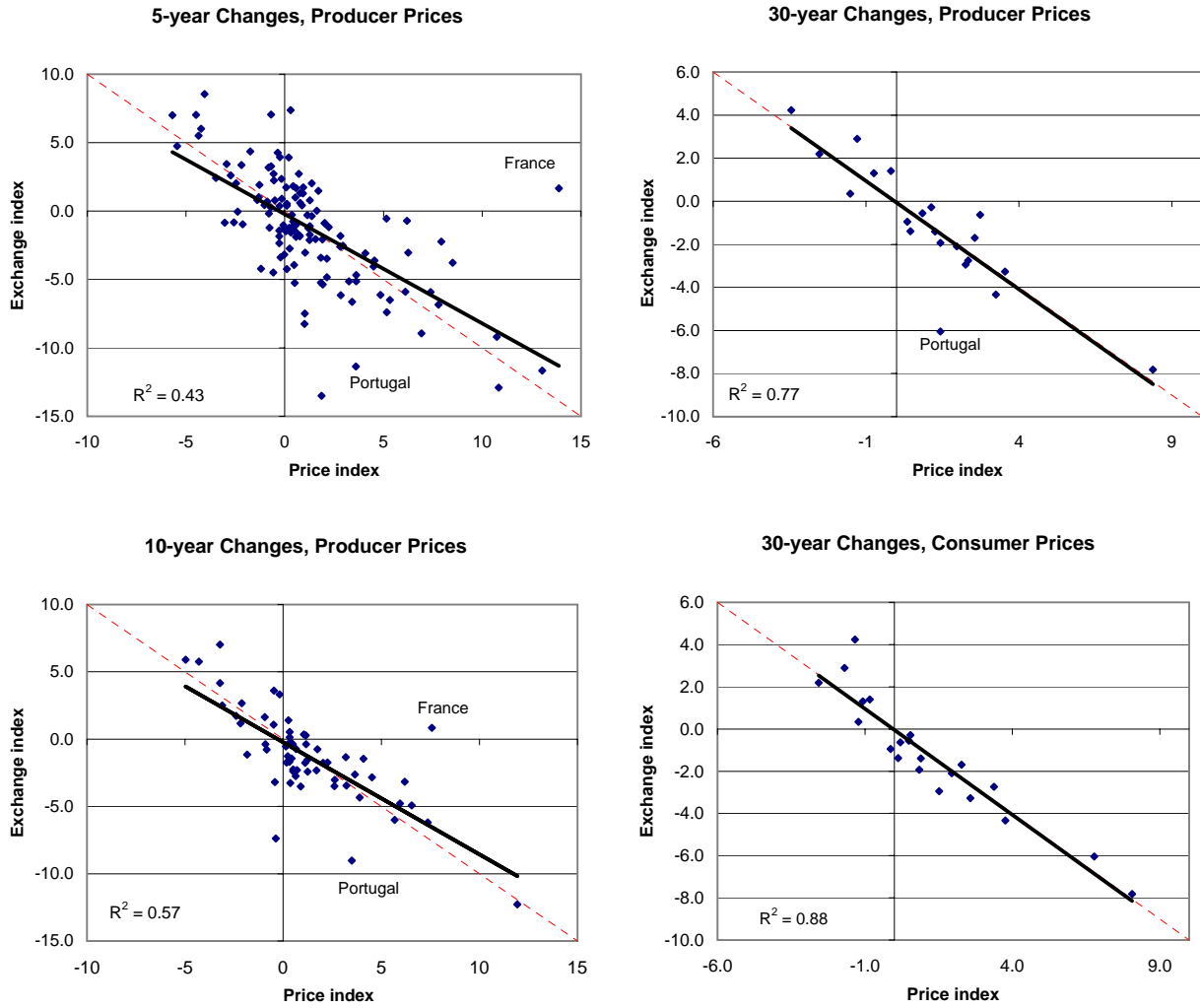
Figure 4. Big MAC PPP Conversion Rates and Gap Per Capita^a



Source: *World Development Indicators* (2003) and the Economist Intelligence Unit.

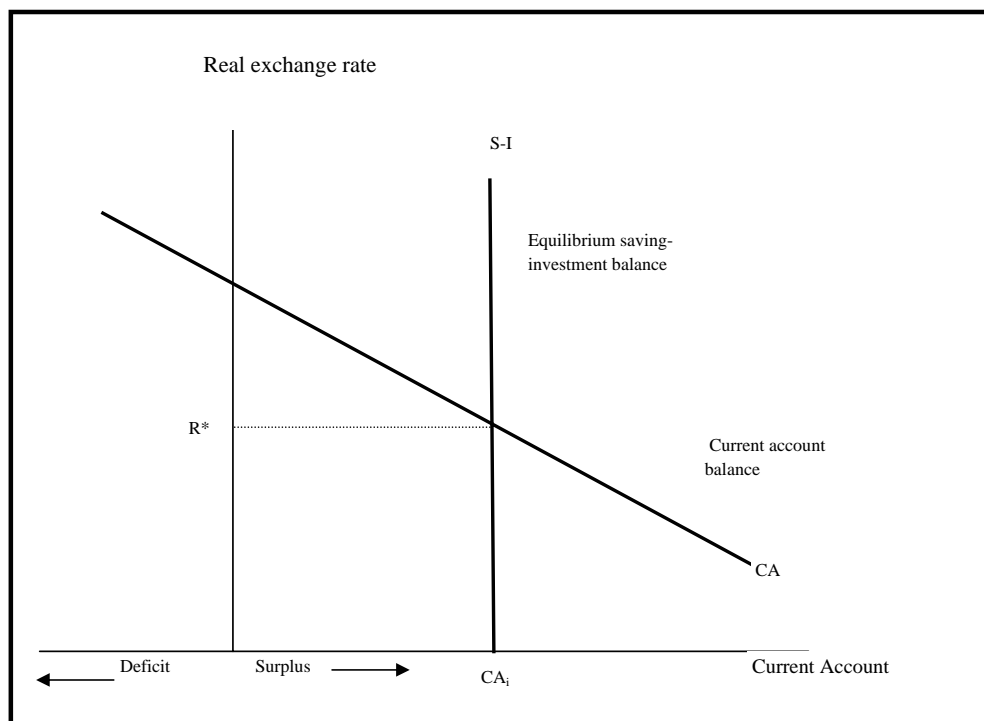
Notes: (a) Big Mac conversion factor is measured as the ratio of the national price of a Big Mac relative to the US price, over the exchange rate of Chinese RMB to US dollars. GDP per capita is real income per capita as a ratio to the United States (US=1.0).

Figure 5. Nominal Exchange Rate Changes Versus Inflation Differentials, 21 Industrial Countries
 annual rates of change



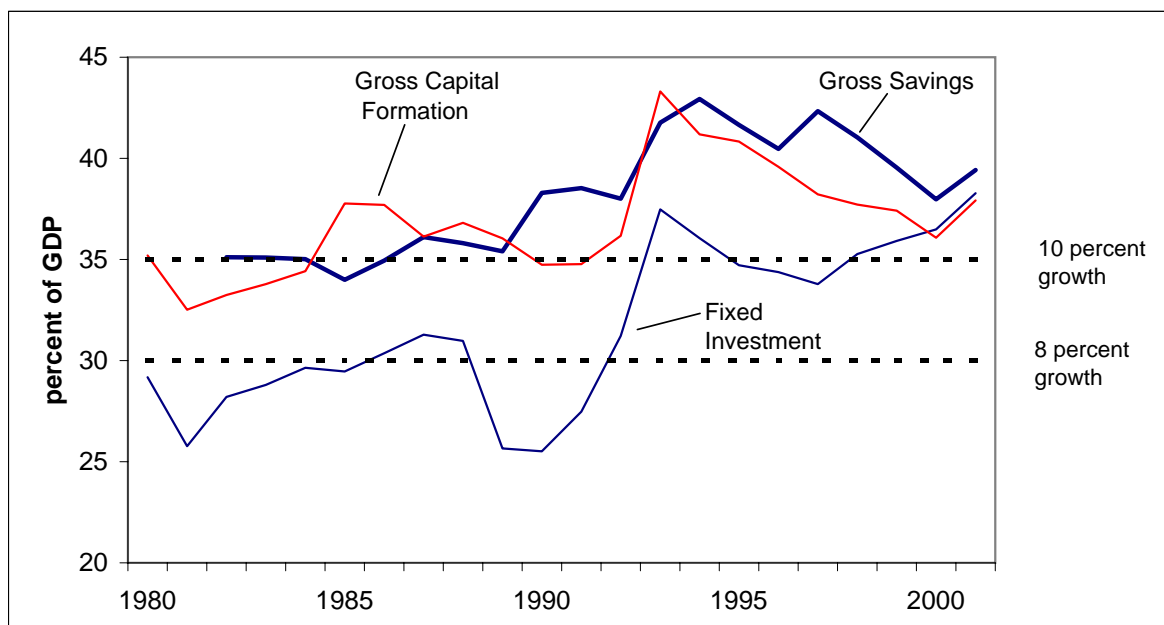
Source: Trade-weighted price and exchange rate indexes computed using data from JPMorgan for 21 industrial countries from 1970 to 2000. Consumer price indexes are from *International Financial Statistics* (2004).

Figure 6. External and Internal Balance and the Real Exchange Rate



Source: Isard et. al. (2001).

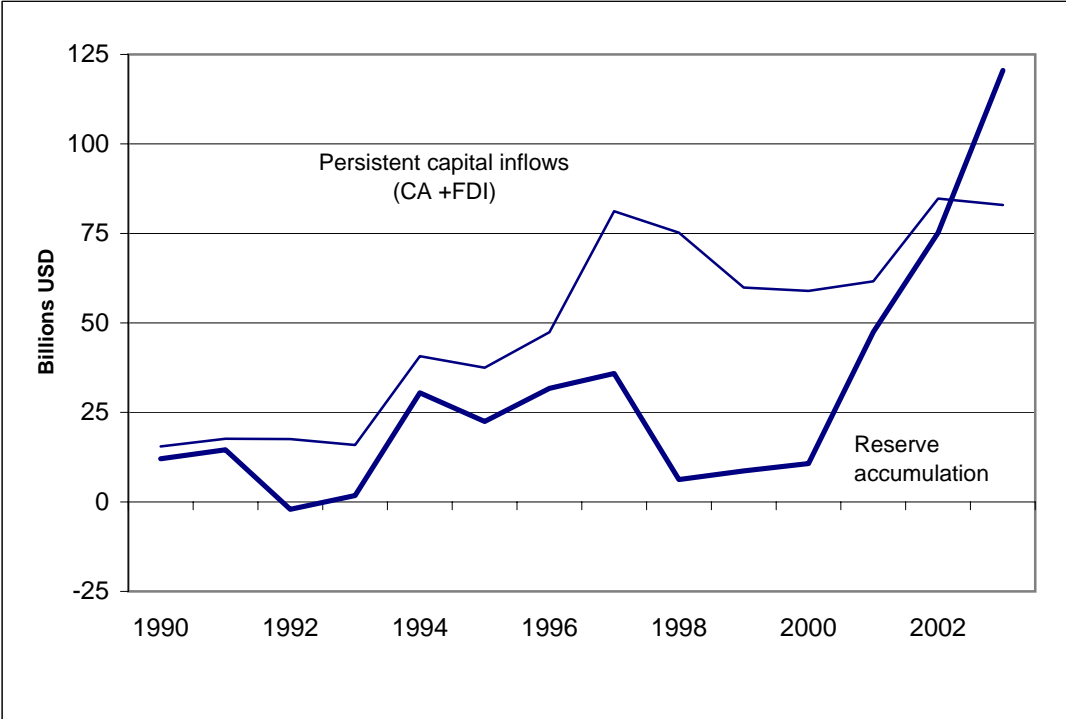
Figure 7. Investment and Saving in China 1982-2001
percent of GDP



Source: *World Development Indicators* (2003)

Figure 8. Persistent Capital Inflows and Reserve Accumulation, 1990-2003

Billions of US dollars



Source: *International Financial Statistics* (2004).

Table 1. Trade Balances of China and United States, 1990-2002

billions of US Dollars

	1990	1995	2000	2002
<i>China and Hong Kong with:</i>				
USA	11.9	31.6	62.4	73.9
Japan	-7.0	-18.5	-14.3	-17.7
Other Industrial Countries	2.6	1.5	17.8	16.9
Taiwan	-5.9	-23.8	-31.3	-41.9
Other Asia	0.7	-13.9	-30.9	-33.8
Other Developing Countries	3.8	5.2	-3.9	-9.0
Total	6.0	-17.9	-0.3	-11.7
<i>USA with:</i>				
China and Hong Kong	-14.6	-33.3	-87.5	-108.6
Japan	-44.5	-62.9	-85.0	-73.2
Other Industrial Countries	-8.5	-31.9	-113.4	-142.4
Taiwan	-12.4	-10.9	-18.1	-15.1
Other Asia	-16.5	-30.4	-72.8	-69.7
Other Developing Countries	-27.5	-18.2	-89.4	-100.2
Total	-123.9	-187.5	-466.2	-509.2

Source: *Direction of Trade Statistics* (2003)**Table 2. China's current account, 1990-2002**

billions of US Dollars

	1990	1995	2000	2002
Current account balance	12.0	1.6	20.5	35.4
Balance in goods	9.2	18.1	34.5	44.2
Balance in services	1.5	-6.1	-5.6	-6.8
Balance in factor incomes	1.1	-11.8	-14.7	-14.9
Net Transfers	0.3	1.4	6.3	13.0
<i>Credits</i>	60.8	154.3	299.0	387.5
Good exports	51.5	128.1	249.1	325.7
Service exports	5.9	19.1	30.4	39.7
Factor income	3.0	5.2	12.5	8.3
Transfers	0.4	1.8	6.9	13.8
<i>Debits</i>	-48.8	-152.6	-278.5	-352.1
Good imports	-42.4	-110.1	-214.7	-281.5
Service imports	-4.4	-25.2	-36.0	-46.5
Factor income	-2.0	-17.0	-27.2	-23.3
Transfers	-0.1	-0.4	-0.5	-0.8
Current account (percent GDP)	3.4	0.2	1.9	2.9

Source: *Balance of Payments* (2003)

Table 3. The Financing of Persistent Inflows of Capital, 1994-2003
percent of GDP

	1994-2000	2001	2002	2003 1st half
Persistent capital inflows	6.7	5.2	6.9	4.7
Current account balance	2.1	1.5	2.9	1.3
FDI inflows	4.6	3.7	4.0	3.4
<i>Absorbed by:</i>				
Non-reserve financial transactions ^a	2.4	0.8	1.4	-1.6
Net reserves ^a	2.4	4.0	6.1	6.8
Errors and omissions ^a	1.9	0.4	-0.6	-0.5

Source: *Balance of Payments* (2003), values for first half of 2003 from China's State Administration of Foreign Exchange (SAFE). Notes: (a) The signs of these items are reversed relative to values in the Balance of Payments.

Table 4. A Comparison of Capital Formation in China and Related Countries, 1980-2001

Country	Capital-output ratio		Investment rate (%)	
	1980-2001	1990-2001	1980-2001	1990-2001
China	2.3	2.3	31.3	33.0
Korea	2.3	2.6	30.1	33.0
Japan	3.1	3.4	28.0	28.6
Taiwan	1.7	1.8	20.9	22.4
United States	2.2	2.4	17.9	21.1
	Annual growth rate			
	Capital stock		GDP	
	1980-2001	1990-2001	1980-2001	1990-2001
China	9.8	11.1	9.6	9.8
Korea	9.8	8.7	7.2	5.9
Japan	4.4	3.6	2.6	1.3
Taiwan	8.6	8.8	6.7	5.6
United States	3.4	3.8	3.1	2.9

Source: Bosworth and Collins (2003).

Table 5. China's Foreign Currency Liquidity Flows, 1999-2002
changes, in billions of US dollars

	1999	2000	2001	2002	1999-2002
Sources¹	38	45.7	58.8	67.9	210.4
Foreign exchange reserves	9.7	10.9	46.6	74.3	141.5
Deposits in onshore banks ²	15.4	26.4	7.9	15.8	65.5
Less loans of onshore banks ²	12.9	8.4	4.3	-22.2	3.4
Uses¹	24.8	55.6	45.4	71.5	197.1
Net claims on BIS reporting banks	9.7	34.1	-4.2	5.7	45.3
<i>of which: on banks in Hong Kong</i>	<i>3.8</i>	<i>14.4</i>	<i>-4.2</i>	<i>2.2</i>	<i>16.2</i>
Net purchases of US debt securities	15.1	20.5	44.1	65.3	144.8
Treasury bonds and notes	8.2	-4.0	19.1	24.1	47.4
Agency bonds	8.3	18.8	26	29.3	82.4
Corporate bonds	0.5	0.8	6.7	6	14
Money market instruments	-2.0	4.8	-7.7	5.9	1
Net purchases of German securities	1.4	2	1.8	0.9	6.1
Net purchases of Japanese securities	-1.4	-1.0	3.7	-0.4	0.9

Sources: Ma and McCauley (2003), updated by the authors.

¹ Sources do not include the corporate and non-deposit finance sectors; uses are also incomplete. ² At both domestic and foreign banks. Onshore loans fell, thus adding to sources.

Original sources: The People's Bank of China; Deutsche Bundesbank; Hong Kong Monetary Authority; Bank

Table 6. Foreign Exchange Reserve, Reserve Money, and the Money Supply, 1994-2003

billions of yuan

	End of Year		September	Change:	
	1994	1999	2003	1994-2003	1999-2003
FOREIGN ASSETS (+)	445	1486	2994	2549	1509
Claims on central government (+)	169	158	306	137	148
All other claims (+)	1145	1931	1984	839	53
Non-reserve liabilities (-)	-37	-96	-322	-285	-226
Reserve money (=)	1722	3479	4963	3241	1484
				(Annual percent change)	
Money supply	1967	4698	8206	18	16
Money plus quasi-money	2725	7407	13440	20	17
M1/res	1.14	1.35	1.65	4	6
M2/res	1.58	2.13	2.71	6	7

Source: *International Financial Statistics* (2004).