INTEREST RATES, EXCHANGE RATES
AND INTERNATIONAL ADJUSTMENT

Michael P. Dooley
David Folkerts-Landau
Peter M. Garber

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<u>ABSTRACT</u>

In this paper we examine the behavior of interest rates and exchange rates following a variety of shocks to the international monetary system. Our analysis suggests that real interest rates in the US and Europe will remain low relative to historical experience for an extended period but converge slowly toward normal levels. During this adjustment interval, the US absorbs a disproportionate share of world savings. After a substantial initial appreciation of floating currencies relative to the dollar, the dollar and other floating currencies remain constant relative to each other. An improvement in the investment climate in Europe during the adjustment period would generate an immediate depreciation of the euro relative to the dollar. In real terms, the dollar and the floating currencies will eventually have to depreciate relative to the managed currencies. But most of the adjustment in the US trade account will come as US absorption responds to increases in real interest rates.

Michael P. Dooley
Department of Economics
Engineering II
University of California, Santa Cruz
Santa Cruz, CA 95064
and NBER
mpd@ucsc.edu

David Folkerts-Landau
1331 21 Street, NW
Washington, DC 20036

Peter M. Garber
Deutsche Bank
60 Wall Street
New York, NY 10005
and NBER
vic2eroy@aol.com

Introduction

In this paper we set out in greater detail how we think about the emergence of China and Asia as major players in world capital and foreign exchange markets. Our approach, which has come to be known as Bretton Woods II, provides a coherent explanation for the current structure of interest rates, exchange rates and current account balances. The framework developed below also provides a guide to the dynamics of the system following a variety of changes in the economic environment.[1]

Conventional analyses are based on the assertion that the BW II system cannot hold together for much longer. This may or may not turn out to be correct but it does not offer any guidance if the system does survive for an extended time period, as we believe it will.

For simplicity, our framework divides the world into three regions, emerging Asia, the US, and Euroland.[2] Euroland includes all countries outside the US with open capital markets and market-determined exchange rates. We will use the euro to stand for the currencies of these countries since it is the dominant currency among them. Asia includes all countries with relatively closed capital markets and managed exchange rates and we use the renminbi to stand in for their currencies.

Some observers have questioned the usefulness of aggregating the managed rate countries into a single zone because of the differing incentives and constraints facing these countries. We agree, for example, that current account surpluses and reserve gains for China, oil-exporting countries and Japan are products of quite different developments and incentives and are likely to have different degrees of persistence over time (see Dooley, Folkerts-Landau and Garber, 2005 pp.158-160). Our forecast is that individual countries will join and exit the bloc of countries that manage their dollar exchange rates, and their management will find different degrees of success, but the bloc will nevertheless remain a lasting and economically important feature of the international monetary system.[3]

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[1] See Dooley, Folkerts-Landau and Garber, 2003, 2004a, 2004b, 2004c.

[2] Because there is no necessity of geographic contiguity, we have referred to these regions in other essays from the functional viewpoint as the trade account region, the center country, and the capital account region.

[3] We have consistently argued that the system, *not its current manifestation*, would last for the foreseeable future, "Fixed exchange rates and controlled financial markets work for twenty years and countries that follow this development strategy become an important periphery. These development policies are then overtaken by open financial markets and this, in turn, requires floating exchange rates. The Bretton Woods system does not evolve, it just occasionally reloads a periphery." (Dooley, Folkerts-Landau and Garber, 2003, p 3).

The analysis will lean on four assumptions. We believe these assumptions are realistic, and they dramatically simplify the dynamics of a three-region analysis:

1. Asian financial markets are assumed to be poorly integrated with the other two regions because of capital controls and the threat of sovereign interference with capital flows.   This allows Asia to manage the dollar-renminbi exchange rate so that the renminbi appreciates in real terms slowly over an adjustment period of many years.

2. The US and Euroland financial markets, in contrast, are assumed to be very well integrated and their respective assets very close substitutes, an assumption consistent with a great deal of empirical work. The US and Euroland do not manage the euro-dollar exchange rate.

3. The dominant change in the economic environment that is driving the main features of the world economy is the rapid growth of savings rates and the level of savings in Asia *and* their exportation to the rest of the world.

4. The US and Euroland differ in their capacities to utilize Asian savings, with the US having a much greater absorptive capacity.

Some of the significant departures of our analysis from the conventional approach include the following:

1a. Conventional analysis considers Asian financial markets sufficiently integrated with international markets so that Asian governments will not be able to manage real exchange rates at reasonable costs. Moreover, they will not want to distort real exchange rates for much longer to encourage export-led growth.

2a. Conventional analysis assumes that US and Euroland financial markets are not well integrated. Diversification of Asian reserves is thought to have an important effect on the dollar-euro exchange rate. This assumption seems to us inconsistent with substantial evidence that intervention and reserve management by US and Euroland authorities have not had a large or lasting effect on industrial country exchange rates.

3a. The conventional analysis usually identifies a fall in the US household savings rate or a rise in the government fiscal deficit rate as the driving force behind the US current account deficit.

4a. Interest rate movements have not been consistent with this assumption— falling instead of rising. To circumvent this contradiction, it is conventionally asserted that interest rates and asset prices are driven by incorrect expectations, a misunderstanding of the dangerous nature of the system, or bubbles.

The interesting results of our analysis following a sudden, long-term rise in exports of Asian savings include:

- There is a substantial *immediate* appreciation of the euro against the dollar.
- Real interest rates in the US and Euroland remain low relative to historical experience but converge slowly toward normal rates as Asian markets become integrated with international markets.
- The dollar and the euro gradually depreciate relative to the renminbi but, after the initial euro appreciation vs. the dollar, *remain constant relative to each other.*
- More rapid expected growth in Europe would *depreciate* the euro relative to the dollar and renminbi and raise interest rates in the US and Europe.
- More rapid expected growth in the US would tend to *depreciate* the dollar relative to the euro and renminbi. Because the dollar–renminbi is managed, the dollar would not fall immediately but would begin to depreciate more rapidly. The euro would appreciate immediately and then match the dollar's more rapid rate of depreciation against the renminbi.
- Shifts in currency composition of Asian reserves from dollars to euros would have little or *no lasting effect* on dollar-euro exchange rates.
- Effective protection in the US and Euroland or a fall in the savings rate in Asia would generate a stronger dollar in the long run. The immediate effect would be less rapid dollar depreciation against the renminbi. The euro could go either way against the dollar.
- A decision by Asian governments to manage their exchange rates relative to a dollar/euro basket would reduce the volatility of the dollar-euro exchange rate but not its current or long term level.
- In real terms, the dollar will eventually have to depreciate relative to the renminbi. But most of the adjustment in the US trade account will come as US absorption responds to increases in real interest rates. Slow adjustment in the composition of US output toward traded goods over an extended time period will not require unprecedented dollar depreciation.
- High oil prices and high consumption by oil exporters would generate a slower rate of dollar depreciation against the renminbi and higher interest rates in the US and Euroland. The dollar-euro rate could go either way.

Analysis

In our framework, the fundamental shock to the system is a change in the supply of savings from Asia and a suspension of the usual home bias in allocating these savings across world markets. It may not seem all that important to decide whether it was because US savings fell or Asian savings increased to drive the

pattern of current accounts we now see. But it is, in fact, crucial for understanding the system and the direction it will take.

The first obvious departure from the conventional analysis is the observation that Asian real exchange rates are not market-determined prices but are heavily and successfully managed by Asian governments. As noted above, the conventional analysis assumes this troublesome fact will soon go away. We argue that this policy behavior will *eventually* go away but is a central feature of Asian development policies and will not dissipate for a long time. It follows that if the rest of the world is to adjust now to a savings shock emanating from Asia the primary adjustment mechanism will not be changes in Asian real exchange rates.

To manage real exchange rates, Asian governments must intervene in foreign exchange markets. That part of the intervention that is sterilized is, in fact, intervention in credit markets. Asian finance ministries or central banks sell domestic securities reducing the supply of loanable funds to domestic borrowers and buy foreign securities, thereby increasing the supply of loanable funds in the US and Euroland. The resulting shift in interest differential is possible because of effective capital controls. That is, Asian governments can manage exchange rates and interest rates because their domestic assets are made imperfect substitutes for foreign assets in private portfolios by policy, if not by private preference.

Because Asian exchange rates are managed, adjustment must proceed through current account balances and real interest rates. To understand current accounts we have to understand savings and investment. The question is: how are savings and investment changed in the US, Euroland and elsewhere as Asian savings are offered to the rest of the world? In particular, can we understand why real interest rates might fall in both the US and Euroland while current account balances adjust by very different amounts? In our view, this is a very easy case to understand.

Figure 1
Current Account and Interest Rates
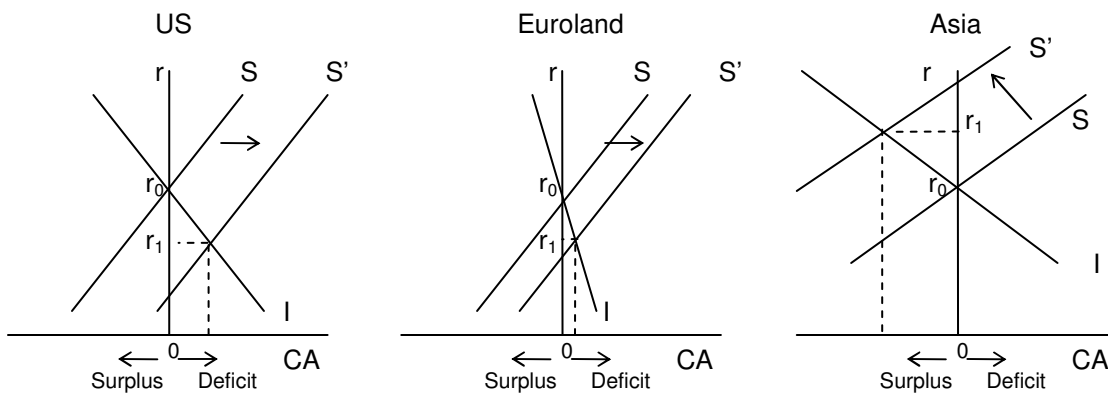
We can illustrate our approach first with a set of figures focusing on interest rates and current accounts for Asia, the US, and Euroland and then with another set focusing on net foreign debt positions and exchange rates.

Figure 1 shows real interest rates for the US, Euroland, and Asia on the vertical axes. The horizontal axes are the current accounts for these three regions. The upward sloping curves labeled S are national savings. The curves labeled S' are national savings augmented by imports or exports of savings. The downward sloping curves labeled I are investment. For convenience, we start with balanced current accounts at a common interest rate, but any starting point for the separate economies will do as long as real rates are the same in the US and Euroland.

A policy to divert Asian savings to the US and Euroland reduces the supply of savings available in Asia and shifts the Asian supply curve to the left. A current account surplus is generated and interest rates in Asia rise.

In the US and Euroland, savings supply curves shift to the right as Asian savings push in. The real interest rate in the US and Euroland falls as we move down the investment demand curves. The demand curves are downward sloping because investment increases relative to domestic savings as interest rates fall. Moreover, consumption rises with a fall in interest rates so domestic savings fall as well. The rise in consumption and investment is matched by an inflow of foreign savings and the current account deficit increases. The increase in Asia's current account surplus is matched by the sum of the increases in the current account deficits of the US and Euroland.

In the US, the increase in savings demanded is large because investment and savings are quite sensitive to the rate of interest.[4] Euroland sees the same

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[4] This means that there are many viable projects or confident consumers ready to go with a small improvement in financing costs relative to Euroland.

qualitative changes. But investment and the current account deficit increase only slightly because there are few profitable investment opportunities and consumption is not very responsive. The fundamental factor driving the different responses of the US and Euroland current account deficits is the different opportunities to efficiently utilize foreign savings as the interest rate falls in both regions.

An important aspect of the adjustment process is the equalization of real rates of return on capital invested in the US and Euroland through private arbitrage. When we turn to exchange rate determination below, we will use the result that real interest rates are equalized by flows of savings. It is clear, however, that expected rates of return on capital in the US and Euroland could be equalized by expected real exchange rate changes in addition to real interest rates.

This apparent indeterminacy between real interest rates and expected changes in real exchange rates during the adjustment period is resolved at the end of the period. When the new equilibrium is established there is no reason to predict that the real exchange rate between the euro and the dollar would continue to change over time. Since the capital stocks must have the same expected rate of return looking forward at the end of the adjustment period, it follows that real interest rates must be the same at that time. Arbitrage across time will ensure that any capital put in place in the US and Euroland during the adjustment period that will remain in place in a new steady state must have the same rate of return.

The optimal policy over time for Asian governments is to allow gradual real exchange rate appreciation. This reduces over time their intervention in credit markets and their exports of savings. By the end of the adjustment period real interest rates will have equalized across the three regions.

We now turn to the foreign exchange markets. There are three keys to understanding the three cross exchange rates.

First, for some years, Asian governments can and will manage the real dollar value of their currencies. They can do so because capital controls make Asian domestic assets imperfect substitutes for US and Euroland assets in private portfolios. Their ability to manage their real exchange rate will erode over time as capital controls become less effective and their domestic asset markets are integrated with international capital markets. Their desire to maintain the system will also erode as their surplus labor is absorbed. But they will manage rates as long as they can because undervaluation is an important part of their development strategy.

Second, in the long run, say ten years more or less, the real value of the three currencies will have to adjust to changes in the international investment positions of the three regions generated during the adjustment period. Asia's net asset

position will improve while the US and Euroland positions will deteriorate by relatively large and small amounts, respectively.

The relationship between the long run exchange rate and the net foreign debt position of each region is not controversial. As net foreign debt increases, larger trade balance surpluses are needed to service net debt (balance the current account). So a fall in net foreign assets is associated with a depreciation of the real exchange rate. The implication is that the dollar and the euro must depreciate against the renminbi, but the dollar must depreciate by more. Therefore, the dollar must depreciate against the euro.[5]

Third, exchange rates today would normally reflect these long run expectations to some degree. But intervention by Asian governments is sufficient to manage strictly the dollar-renminbi exchange rate. Intervention will not keep the renminbi undervalued forever, but it can extend the adjustment period. As we have argued elsewhere, the optimal path (from China's perspective) for Asian real exchange rates is a gradual appreciation toward their new long run values.

In contrast, the euro cross-rates both today and along the adjustment path are determined by private investors. The relevant context for these portfolio choices is that dollar and euro assets are perfect substitutes.[6] The key implication is that once the system comes to be understood the euro and the dollar must depreciate at the same rate over time relative to the renminbi. Recall that real interest rates on capital invested in the US and Euroland are equalized by net savings flows. It follows that investors must expect the euro-dollar exchange rate to remain unchanged. Put another way both currencies must depreciate, and be expected to depreciate, at the same rate against the renminbi.

The result of a shift in Asian savings exports is then an immediate euro appreciation against the dollar and the renminbi followed by a constant dollar/euro rate. This means that there will be immediate, maximal political pressure for relief in a Euroland unable to absorb the shock easily and continuous, though declining, pressure thereafter.

These results are illustrated in Figure 2. Starting from an initial value of the renminbi-dollar rate in the top panel and a renminbi-euro rate in the bottom panel, we can follow the effects of an increase in Asian savings and intervention. The increase in savings and intervention raises interest rates in Asia and lowers

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[5] In our view, the amount of the eventual dollar depreciation is often overestimated. Recall that the primary factor driving the increase in the US trade and current account deficit is the relatively strong response of US investment and consumption to a decline in interest rates. Over the adjustment period interest rates will rise, thereby causing an equally strong reverse effect; and this will help reduce the US deficit. The exchange rate adjustment therefore must be consistent with a slow shift in US output toward traded goods.

[6] See Henderson and Leahy (2005) for a three country analysis of intervention where imperfect asset substitution is assumed for all three regions.

Figure 2
Exchange Rates

RMB/ $

A

B

0   T

RMB/ €

E

C

D

0   T
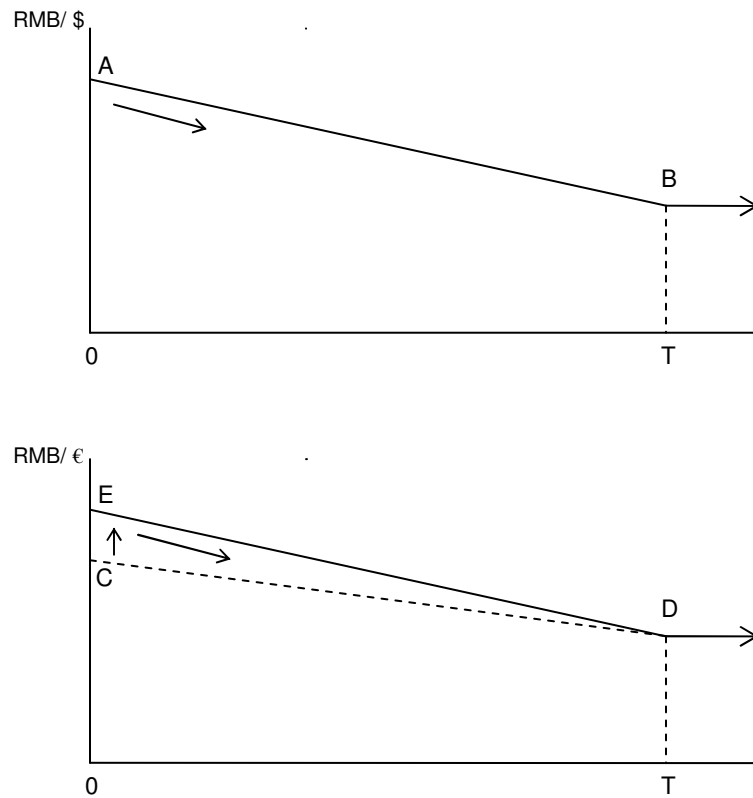
interest rates in the US and Euroland. Asia generates a current account surplus matched by deficits in the US and Euroland. This continues until Asian savings and intervention return to normal levels. In Figure 2, this interval is from 0 - T. The eventual fall in the dollar against the renminbi from A to B is required to generate the trade surplus needed to service the higher level of US debt at time T and after.

Without intervention, we would expect an immediate depreciation of the dollar; but this can and will be delayed by intervention.[7] Along the adjustment path AB, the dollar is supported by a flow of intervention. Private investors know the dollar will depreciate but nevertheless are willing to hold the stock of dollars, reduced by Asian purchases of US assets.[8] US debt to foreigners is growing more rapidly than it would have if the fall in interest rates had been partially offset by a market-determined depreciation of the dollar.

The renminbi-euro rate starts at C and must eventually move to D, a much smaller depreciation. Like the US, Euroland will accumulate debt (or reduce net assets below their previous path) during the adjustment period. But in this case Asian governments are not intervening to manage the exchange rate either at point C or along the adjustment path. The question is then: where will the market set euro exchange rates?

We can make our analysis more realistic and much more transparent by assuming that US and Euroland assets are close substitutes in private portfolios. This is an important departure from the usual portfolio balance model because it implies that the currency composition of Asian intervention is of secondary importance. If euro and dollar assets are close substitutes in private portfolios, Asian governments could intervene in either dollars or euros to stabilize the dollar value of their currencies. Moreover, diversification of Asian reserves would have little or no lasting effect on the dollar-euro exchange rates, contrary to a key conclusion of the conventional view.[9] The irrelevance of Asian reserve diversification is consistent with a very large body of empirical evidence that sterilized intervention has had no lasting effect on exchange rates among industrial countries.[10]

The practical importance of this assumption is that the two adjustment paths in Figure 2 must have the same slope. If they did not, more rapid dollar depreciation against the renminbi, relative to euro depreciation against the renminbi, implies expected depreciation of the dollar against the euro. Since interest rates in the US and Euroland are the same, arbitrage would be profitable. Private investors would immediately bid for euros against dollars and would do so until the euro jumps to E. From this initial appreciation the euro now depreciates against the renminbi at the same rate as the dollar. Note that along

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[7] We could replace time with net debt on the horizontal axis and have a diagram similar to that presented in Blanchard, Giavazzi and Sa (2005). The case we present here is similar to their discussion of intervention following a shift in preferences away from US goods. The interested reader is encouraged to work through their analysis of an imperfect substitutes model. Their analysis assumes that interest rates are unchanged and changes in absorption are assumed to be related to fiscal policies

[8] The portfolio balance equilibrium is based on the idea that residents of all countries prefer home assets but can be moved away from their preferred portfolio by differences in expected yields, that is, by interest differentials adjusted for expected changes in exchange rates.

[9] See Eichengreen (2005).

[10] We have also explored the effects of diversification under the assumption of imperfect substitution between dollar and euro assets. Our conclusion was that it is not in the interests of Asian governments to diversify and recent data from the IMF shows that they have not done so through the end of last year. See Dooley, Folkerts-Landau and Garber, 2004a. The argument presented here suggests that Asian governments can diversify if they choose to do so but that this would have no lasting effect on dollar exchange rates.

this adjustment path the euro remains "overvalued" relative to the dollar and the renminbi throughout the adjustment interval, although the degree of overvaluation shrinks over time.

We can now iterate through the current account analysis. The euro has appreciated against the renminbi and the dollar, so Euroland's current account deficit, already increased by the fall in interest rates, tends to widen. The dollar is unchanged against the renminbi and has depreciated against the euro so the already increased US current account deficit is reduced. The Asian surplus is increased by the euro's appreciation. These second round effects on the current account positions of the three regions would not alter our basic story assuming the reactions of absorption to interest rates is very different in the US and Euroland.

Where Are We Now?

The discussion above suggests that the dollar should have depreciated against the euro when market participants realized that US imports of savings from Asia would generate a substantial increase in US net investment income payments. But there has been no obvious correspondence between the US current account deficit or the increase in net US international debt and the value of the dollar. The current account deteriorated sharply and net debt began to grow at a historically unprecedented rate in 1996 but the dollar was strong until 2002.

One explanation is found in Chart 1, which shows US net investment income payments. As of mid 2004 the US still earned more on its stock of gross financial assets than it paid on its larger stock of gross international debt. Indeed, in the eight most recent quarters, Q2/2003-Q1/2005, US net earnings totaled $86 billion compared to $47 billion in the previous eight quarters.

The lesson is clear: it is not enough to forecast changes in the US net debt position but also stocks of gross international assets and liabilities and rates of return on these stocks. Our framework suggests that over time the growth in net US debt will generate net investment payments in part because we expect net debt to grow and US interest rates to rise over the adjustment period. But we also expect very substantial capital gains on US owned foreign direct investment and this tends to limit the growth in the market value of US net debt and reduces net investment income payments. Expectations of the long run value of net investment income payments require a difficult evaluation of the evolution of net and gross investment positions and rates of return.[11]

Moreover, it would not be surprising if market participants were uncertain about the durability of US deficits. The conventional story still insists that a speculative

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[11] See Gourinchas and Rey, (August 2005) for a detailed breakdown of the denomination of US gross foreign assets and liabilities.

attack on Asian currencies that will force a revaluation is long past due. If it had occurred, the path for US debt would have already started to reverse

Perhaps the best way to link the analysis with the experience of the past ten years is to assume that, as the US deficit has moved to a historically high level and stayed there for an extended period, market participants have placed increased weight on the probability that the very gradual appreciation of Asian currencies requires the substantial near-term rise of the euro against the dollar described above. It would not be surprising if this learning process has some way to go. If so, there may be periodic upward pressure on the euro. As the learning curve flattens, the euro should stabilize against the dollar.

Chart 1
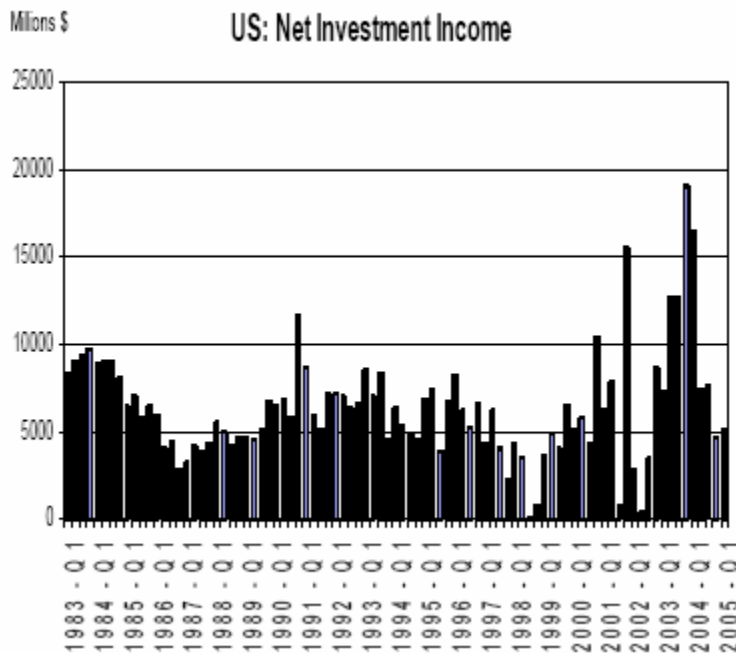
Interest and Exchange Rates during Adjustment

Of course, changes in many conditions will shift the dollar-euro exchange rates along the adjustment path set out in the previous section. The framework developed above is useful to evaluate changes in the economic environment during the adjustment process, and the peculiar nature of the global system produces some remarkable and unanticipated results.

1. A Stronger Euroland Outlook

Suppose, for example, that at time t_1 an improved outlook for profits in Euroland generates a positive shift in the demand for investment in Euroland. Figure 1

suggests that Asian savings will be shifted from the US to Euroland for the balance of the adjustment period and that interest rates in both regions will rise.

The effects on exchange rates are illustrated in Figure 3. With more Asian savings going to Euroland and less to the US, at the end of the adjustment period, at T, the euro will be weaker and the dollar stronger than would have been the case. If Asian intervention at t_1 keeps the dollar at F in Figure 3, the euro depreciates sharply at t_1 for two reasons. First, it must now reach level J at T and it must now depreciate more slowly to match the dollars reduced rate of depreciation.

2. A Weaker Euroland Outlook

A weaker outlook for Euroland investment would have symmetric effects. In this case there would be deterioration in the final expected debt position of the US and an improvement in the final debt position of Euroland. This would require a more rapid rate of dollar depreciation against the renminbi and another move up for the euro. Interest rates in both regions would fall.

3. A Stronger US Outlook

Changes in US growth and investment would have similar effects. As US growth increases, so does the expected stock of US debt. The greater long run depreciation would not affect the current level of the renminbi-dollar but would require a more rapid appreciation of the renminbi against the dollar for the balance of the adjustment period.

The euro would appreciate against the renminbi and the dollar for two reasons. First, its long run level would jump up and it would have to appreciate immediately in order to match the dollar's higher expected depreciation rate against the renminbi.

This is illustrated in Figure 4. The expected renminbi-dollar at T shifts down from G to B and the expected renminbi-euro moves up from D to K. The euro immediately jumps from H to I as again the change in the euro is amplified by arbitrage between dollar and euro assets. Interest rates in both regions would rise.

4. Katrina

A larger fiscal deficit and demand for capital following destruction of US capital increases US demand for foreign savings and will lead to an increased US indebtedness at T. Therefore, scenario 3 analysis applies. The euro appreciates against the dollar.

5. Protectionism Surges; Oil Exporters Start Consuming Asia's Surplus Savings

It turns out that all of these have the same impacts on interest and exchange rates.

5a. For example, effective protection against Asian exports in both the US and Euroland would reduce net savings transfers to the US and Euroland from Asia by forcing a reduction in Asia's net trade surplus.

5b. Similarly, a decline in net Asian savings exported to the US and Euroland would occur if a larger share of US, Euroland, and Asian income is transferred to oil exporters via terms of trade shifts. As the oil exporters start to consume a high fraction of this transfer, fewer excess savings are available to accumulate US and Euroland debt.

Each of these developments can be analyzed as illustrated in Figure 5.

In these events expected US debt at T is reduced, which reduces the terminal exchange rate from B to G. Euroland debt also falls, which reduces the renminbi-euro from D to K. We assume that the new path for the renminbi-dollar does not jump up at t_1, but the rate of dollar depreciation is reduced so that the new path for the renminbi-dollar is FG. The renminbi-euro must reach K at T and the path from t_1 must have the same slope as FG, that is, the renminbi-euro must have the same expected rate of depreciation as the renminbi-dollar. The conclusion is that the euro can either depreciate or appreciate immediately against the dollar depending on the relative change in debt stocks in response to the new environment. There is no necessary direction of effect for this key exchange rate. Interest rates will rise both in the US and Euroland because of the reduction in available savings.

A useful rule of thumb is that events that change expected US and Euroland debt stocks and real exchange rates in opposite directions generate large and immediate changes in the dollar/euro rate when expectations change. The market rate changes in the same direction as the change in the expected future rates. Events that move both expected debt stocks in the same direction have ambiguous effects on the exchange rate at the point where expectations change.

6. A Basket Peg

The results discussed above would be altered if Asian authorities adjusted the renminbi-dollar rate in reaction to changes in the dollar-euro rate. An interesting change would be adoption of a basket peg by the Asian authorities. In the absence of new shocks to the equilibrium path, a basket peg would have no effect because the dollar-euro exchange rate is constant during the adjustment period. However, in the face of the other shocks discussed above, a basket peg would tend to reduce the volatility of the dollar-euro rate and would either

increase or decrease the average real value of the renminbi depending on the nature of shocks. There is no implication that a move from a straight dollar peg to a basket peg would weaken the dollar.
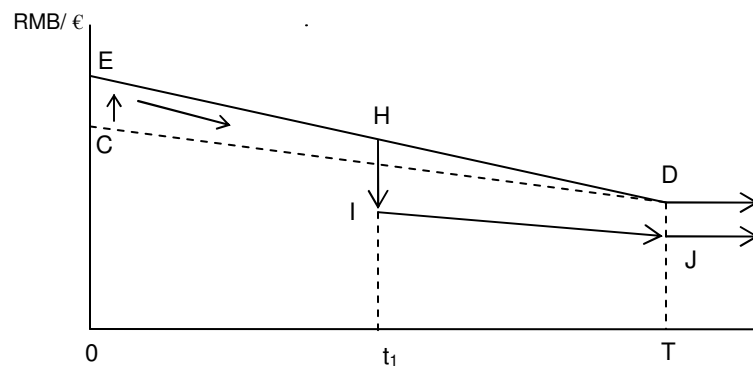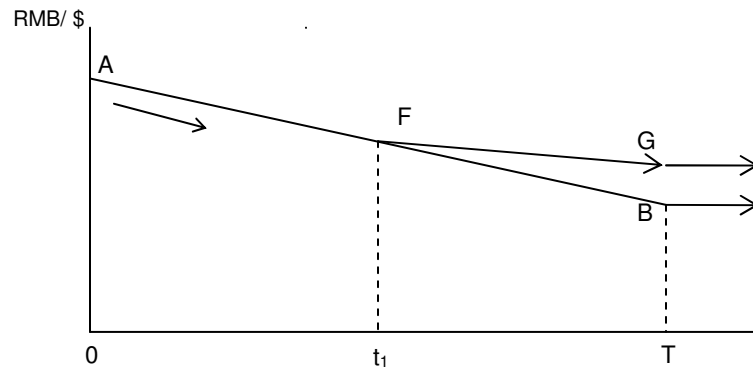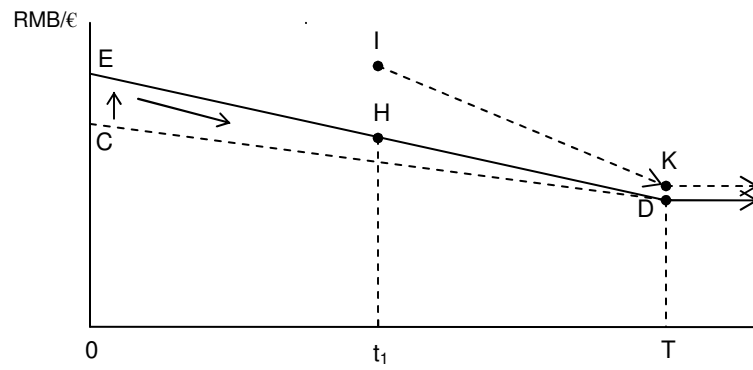
Figure 3
Exchange Rates

Figure 4
Exchange Rates

RMB/$

A

F

B

G

0   t₁   T

RMB/€

E

I

H

C

K

D

0   t₁   T

Figure 5
Exchange Rates

RMB/$

A

F

G

B

0   t_1 T

RMB/€

E

H

C

I

K

D

0   t_1 T

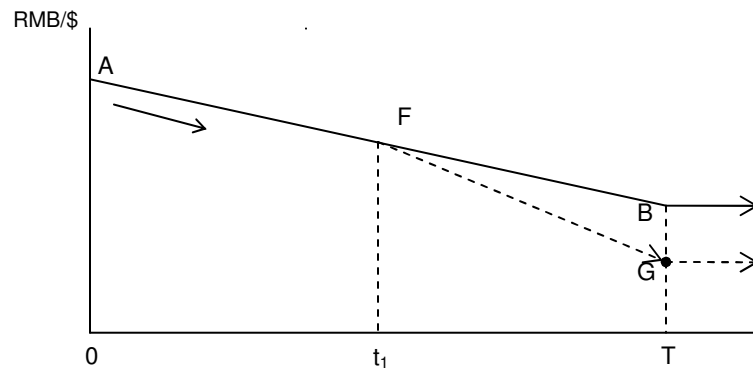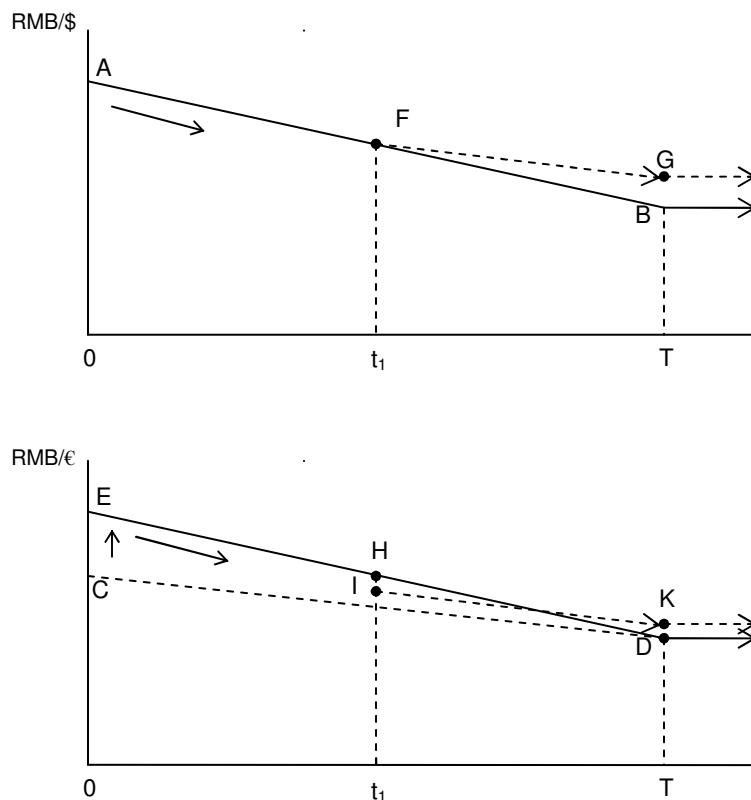## Further Thoughts on Asset Markets

The apparent failure of dollar exchange rates to respond to unprecedented recent and projected US current account deficits is an important challenge for economic analysis. It is generally agreed that a substantial increase in projected debt levels should be associated with expectations that the real exchange rate will eventually depreciate. If private investors regard financial assets denominated in different currencies and issued by residents of different countries as perfect or very close substitutes, then the current exchange rate should be tied to the expected future exchange rate through the interest parity condition. Taken together, these ideas suggest that the dollar should have declined several years ago against the floating currencies when expectations about future US debt levels were revised.

Suppose, for example, that some event generates a forecast that US debt will increase from zero to sixty percent of US GDP and then stabilize at that level at some arbitrary future date, T. Most analysts would agree that a real depreciation of the dollar by time T will be a part of the adjustment required to service this

higher level of debt.[12] If the dollar is expected to be lower at T, if interest parity holds, and if real interest rates are not affected by the shock that generated the increase in expected debt, then the real exchange rate must depreciate immediately and by the same amount as the long run expected value when expectations change.

Research on exchange rates since the early 1970s has been dominated by attempts to reconcile the data to this elementary notion. In the early years of floating rates the question was why exchange rates were much more variable than reasonable estimates of long run expected values. The current debate asks why market rates now are so stable in the face of strong presumption that the long run expectation has changed by a large amount.

To be sure, the market could have gotten it wrong then and could be getting it wrong now. If so, a crisis with sharply rising interest rates and sharply falling dollar exchange rates could be imminent, as conventional analysts predict. But it seems prudent to carefully consider alternative possibilities that are *currently* consistent with the salient evidence.

An Attempt to Reconcile Current Exchange Rates and Expectations

Market exchange rates need not move in lock step with expected exchange rates if interest rates change or if interest rate parity does not hold. An approach that was popular in the early 1980s to explain "excess volatility" of market exchange rates explored the assumption that interest parity may not hold if assets denominated in different currencies or issued in different countries are not perfect substitutes.[13] That is, if residents of a country for some reason prefer domestic assets, they would have to be compensated with higher expected yields to move away from their preferred portfolio. If rates of change toward a stable long run equilibrium varied, it follows that current exchange rates could be much more variable than long run expected exchange rates.   Moreover, sterilized intervention alters relative supplies of securities and could have some influence on expected rates of change and the levels of exchange rates.

In the current context, the implications of this portfolio balance approach are straightforward.   If foreign residents prefer home securities and those preferences are unchanged, US residents must pay a premium to finance a current account deficit. If we assume "domestic" interest rates are not affected by the shock that increases US foreign debt, foreign investors must be induced to hold the growing stock of dollar-denominated claims on the US by an extra expected return in the form of expected appreciation of the dollar. Since at T the

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[12] See Lane and Milesi-Ferretti, 2004, 2005 for discussion and evidence.

[13] See Branson and Henderson, 1985 for a survey.

dollar has to be below its current level because of increased US indebtedness to foreigners and since it must be expected to appreciate from now to T, the dollar must depreciate by even more now.

At first glance, this does not seem to help much in understanding the current situation where, it is argued, the dollar has not depreciated enough. But this can be rationalized by assuming the initial shock was a spontaneous increase in preferences for dollar assets. (Blanchard et al, 2005). If foreigners want dollar assets, they can obtain them through current account surpluses and in the interim will accept a lower expected yield on the dollar assets they do hold. It follows that even though the dollar is expected to be lower at T it may not fall much initially because an expected depreciation is consistent with an otherwise unsatisfied demand for dollars during the adjustment period.

Is Intervention a Plausible Driver of the System?

Identifying plausible reasons for a shift in preferences toward dollars remains a serious problem.[14] As one explanation, if changes in governments' balance sheets are not systematically offset by private investors the shift in currency preferences could be associated with government policies. In particular, sterilized intervention could account for expected increases in US net international debt but only gradual adjustment in dollar exchange rates.

But there are a number of reasons that the portfolio balance approach was placed on a back burner of the profession's research agenda. First, a very large empirical literature was unable to find any lasting effect of intervention on interest rates or exchange rates. Second, imperfect substitution is usually modeled as aversion to exchange rate volatility. But sensible estimates of the degree of risk aversion needed to match exchange rate data seemed implausible. Third, imperfect substitution could be related to default risk or capital controls, but this has generally been assumed to be irrelevant for industrial countries.

Finally, Dornbusch (1976) showed that monetary policy and associated changes in real interest rate differentials could account for exchange rate volatility with perfect substitution and stable long run expected values for real exchange rates. In an era where monetary policies were quite variable, this solved the theoretical puzzle of the day and moved portfolio balance models to the history of thought reading list.

Nevertheless, it is clear that home bias in goods, equities and other financial assets remains a central fact and puzzle for international economics.[15] Obstfeld

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[14] Cooper (2001, 2004) offers a compelling argument for a change in private preferences for US assets. We agree that this is part of the story but focus here on governments' portfolio choices.
[15] See Obstfeld and Rogoff (2000).

(2004) presents a thoughtful review of these issues and offers a guess that a new theoretical basis for the portfolio balance approach will emerge from his work with Ken Rogoff on the implications of imperfect goods market integration. This would be welcome, but in the interim we remain largely in the dark about the source of home bias for assets and its implications for models of portfolio behavior.

Our own home bias in these matters is that capital controls and the threat of sovereign interference with foreign investment is the most compelling argument behind a portfolio balance framework.[16] It follows that the portfolio balance approach is more likely to be useful in understanding the behavior of countries or groups of countries whose governments dominate private portfolio decisions through controls and intervention and manage their exchange rates.

In our framework, the shift in preferences toward dollars is not just *qualitative* but is *measured* by increases in international reserves of governments managing their exchange rates. Moreover, sterilized intervention is effective in altering interest differentials and exchange rates *between* managed economies and an integrated international capital market. But shifts in the composition of reserves do not change exchange rates *within* the larger integrated market.

While we use China/Asia and the renminbi as shorthand for the managed fixed rate region and its currency, we do not argue that China alone is large enough to dominate international interest and exchange rates. However, we estimate that countries that actively manage their exchange rates comprise about one third of world GDP and savings. The shock to the global system that we model is a substantial increase in savings rates and levels among this group. These are coupled with a decision of governments in the region to put a large share of the increase, about half, into foreign assets.

We could extend the portfolio balance model as well to economic relationships within the international capital market, i.e. to the relations between the US and Euroland, but we do not do so for two reasons. First, the reasons for rejecting this model in the past are still very powerful. Second a three zone portfolio balance model is very difficult to work with, particularly when we are interested in studying the endogenous responses of exchange rates and real interest rates to various shocks. Since such models have a low insight to equation ratio, we stick with the perfect substitutes model for the US and Euroland. Our guess is that introducing a little bit of home bias in these portfolios will do little violence to our results.

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[16] See Dooley and Isard, 1980.

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