The Unsustainable US Current Account Position Revisited*

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Four years ago, we published a paper (Obstfeld and Rogoff 2000a) arguing that the United States current account deficit—then running at 4.4% of GDP—was on an unsustainable trajectory over the medium term, and that its inevitable reversal would precipitate a change in the real exchange rate of 12-14% if the rebalancing were gradual, but with significant potential overshooting if the change were precipitous. Though the idea that global imbalances might spark a sharp decline in the dollar was greeted with considerable skepticism at the time, the view has since become quite conventional. Indeed, when Federal Reserve Chairman Alan Greenspan gave a speech last November arguing that the US current account would most likely resolve itself in quite a benign manner, that once conventional view was greeted as contrarian.[1]

The aim of this paper is twofold. First, we update our previous calculations, taking into account not only the present nexus of global imbalances and exchange rates, but newer estimates of exchange rate pass-through and other factors that might contribute to overshooting. Second, and more importantly, we deepen or previous analytical framework in a number of important dimensions, including taking into account general equilibrium considerations resulting from the United States' large size in the global economy, and generalizing our model to incorporate terms of trade changes (to the relative price of exports and imports), in addition to the relative price of traded and nontraded goods. Both analytical changes point to a steeper dollar decline, with the general equilibrium considerations being particular significant.

Under most reasonable scenarios, the rise in relative United States saving required to close up the current account deficit implies a negative demand shock for US-produced nontraded goods. The same forces, however, imply a positive demand shock for foreign nontraded goods, and this general equilibrium effect turns out to imply a much larger change—more than 50% larger—in the real dollar exchange rate than in our earlier partial equilibrium calculation. Overall, taking into consideration current data, as well as our improved analytical framework, we conclude that the US current account poses a larger potential decline in the dollar than we had earlier speculated. Moreover, we now believe that some of the potential rebalancing shocks are considerably more adverse than one might have imagined in 2000 (in view of the increased long-term security costs that the United States now faces as well as its open-ended government budget deficits). Thus, our overall take is that the United States current account problem poses much more significant risks today than it did when we first raised the issue four years ago.[2]

The general equilibrium perspective of this paper also offers helpful insights into what sorts of traumas the US and foreign economies might experience, depending on the nature

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[1]See Greenspan (2003).

[2]For another early examination of US external deficit sustainability, see Mann (1999).

of the shocks that lead to global current account rebalancing. For example, a common perception is that a global rebalancing in demand risks setting off a dollar depreciation that might be catastrophic for Europe and Japan. But as the model makes clear, this is not necessarily the case. It is true that a dollar depreciation will likely shift demand towards United States exports and away from exports in the rest of the world, although this effect is mitigated to the extent there is home bias in consumers preferences over tradables. However, ceterus paribus, global rebalancing of demand will give a large boost to foreign nontraded goods industries relative to United States nontraded goods industries, and this has to be taken into account in assessing the overall impact of the dollar depreciation. Another widespread belief in the policy literature is that a pickup in foreign productivity growth rates, relative to United States rates, should lead to a closing of global imbalances. Our analytical framework shows that would only be the case if the relative productivity jump were in nontradable goods production, rather than tradable goods production where generalized productivity gains usually first show up.

In the first section of the paper we review some basic statistics on the size and current trajectory of the United States current account deficit, the country's net international investment position, and the dollar's real exchange rate. Compared to similar charts and tables in our 2000 paper, we find that the US current account position has worsened somewhat, whereas the trade-weighted dollar has moved very little (appreciating until February 2002, and unwinding that appreciation since). The path of US net international indebtedness has been somewhat different from that of cumulated current accounts, in part due to the rate-of-return effect highlighted by Gourinchas and Rey (2004): that US current account deficits historically predict high dollar returns on US foreign assets compared to US foreign liabilities.[3] As Tille (2003) observed, the composition of US foreign assets and liabilities—with US assets only partly linked to the dollar and liabilities almost entirely dollar-denominated—implies that a depreciation of the US dollar helps strengthen the United States's net foreign asset position. In the United States, however, the bond-market rally associated with the onset of recession in 2001 worked to increase net foreign debt, an effect that will play out in reverse if long-term dollar interest rates rise relative to foreign rates. While these considerations are important for determining the timing of the United States current account's ultimate reversal—and has almost certainly prolonged the present nexus of flow imbalances—it turns out not to be very important in determining the ultimate requisite fall in the dollar whenever global current accounts finally close up. The reason is that the main impact on the dollar comes from a global rebalancing of demand, rather than any change in the transfer necessitated by interest payments on global net debt positions.

A few further points merit mention, both by way of introduction to the present analysis and clarification of our earlier paper. First, our framework should not be thought of in terms of asking the question:"What depreciation in the dollar is needed to rebalance the current account?" Though wildly popular, this view is misguided. In fact, most empirical and theoretical models (including ours) suggest that even very large autonomous exchange rate movements will not go far toward closing a current account gap of the magnitude presently observed in the case of the United States. The lion's share of the adjustment has to come from saving and productivity shocks that help equilibrate global net saving levels, and imply dollar change largely as a by-product (though our model of course implies simultaneous determination of exchange rates and current accounts.) That is, although we allow terms of trade levels to adjust, the relative price of imports and exports plays only a relatively minor quantitative role in the adjustment process. Second, it is important to note that our model assumes that labor and capital cannot

[3]In general, the rate of return on US foreign assets has exceeded that on US foreign liabilities; see Lane and Milesi-Ferretti (2003).

move freely across sectors in the short run. To the extent factors are mobile, domestically as well as internationally, and to the extent that the closing of the current account gap plays out slowly over time (allowing factors of production more time to relocate), the real exchange rate effects of global rebalancing will be smaller than we calculate here. Third, the sanguine view that capital markets are deep and the US current account can easily close up without great pain ignores the adjustment mechanism highlighted here, which depends more on goods-market than capita-market integration. The US current account may amount to "only" 5% of *total* US production, but it is likely 20% or more of US *traded* goods production (at least according to the calibration suggested by Obstfeld and Rogoff 2000a). Our view is consistent with the empirical findings of Edwards (2004), whose study of current account reversals in emerging markets finds that an economy's level of trade to be the major factor in determining the size of the requisite exchange rate adjustment. Calvo, Izquierdo, and Talvi (2003), who adopt a framework nearly identical to that of Obstfeld and Rogoff (2000a), arrive at a similar conclusion. Parenthetically, we note that most studies of current account reversals (including IMF 2002) focus mainly on experiences in small open economies. But as our model shows, the fact the United States is a large economy considerably levers up the potential effects.

Finally, we note that although our analysis points to a large potential move in the dollar—at least 20% in our baseline long-term calculation with overshooting possibly leading to more than a 40% change—it does not necessarily follow that the adjustment will be painful. As we previously noted, the end of the 1980s witnessed a 40% decline in the trade weighted dollar as the Reagan-era current account deficit closed up. Yet, the change was arguably relatively benign (though some would say that Japan's macroeconomic responses to the sharp appreciation of the yen helped plant the seeds of its later growth collapse.) However, it may ultimately turn out that the early-1970s dollar collapse accompanying the breakdown of the Bretton Woods system is a closer parallel. Then, like now, the United States was facing open-ended security costs, rising energy prices, twin deficits, and the need to rebalance monetary policy. Though there is no official Bretton Woods system today, some have argued (Dooley, Folkerts-Landau, and Garber 2003, 2004) that the current Asian exchange rate pegs constitute a Bretton Woods II system. Though we do not delve into this issue here in any great depth, we intend to expand on this theme in the follow-up to this paper.

1 The Trajectory of the US Current Account: Stylized Facts

Figure 1 shows the trajectory of the United States current account as a percentage of GDP since 1970. As is evident from the chart, the recent spate of large deficits exceeds even those of the Reagan era. Indeed, in recorded US history, the US current account never appears to have been larger than the 5.1% experienced in 2003 (our 2004 baseline is 5%). Even in the late nineteenth century, when the US was still an emerging market, its deficit never exceeded 4% of GDP according to Obstfeld and Taylor (2004). Figure 2 shows the net foreign asset position of the United States, also as a percentage of GDP. The reader should recognize that this series is intended to encompass all type of assets, including stocks, bonds, bank loans, and direct foreign investment. Uncertainty about the US net foreign asset position is high, however, because it is difficult firmly to ascertain capital gains and losses on US positions abroad, not to mention foreign positions in the United States. But the latest end-2003 figure of 23% is close to the all-time high level that the United States is estimated to have reached in 1894, when assets located in the US accounted for a much smaller share of the global wealth portfolio. Figure 3, which updates a similar figure from our 2000 paper, shows the likely trajectory of the US net

foreign asset position, assuming continuing external deficits of 5% of GDP and continuing 3.5% GDP growth. The graph also shows various benchmarks reached by other, much smaller, countries, in many cases prior to major debt problems. We do not anticipate the United States having a Latin-style debt crisis, of course, but these benchmarks are nevertheless informative. We note that our figure does not allow for any exchange rate depreciation which—assuming foreign citizens did not receive compensation in the form of higher nominal interest payments on dollar assets—would slow down the rate of debt accumulation along the lines emphasized by Tille (2003) and by Gourinchas and Rey (2004).

Figure 4 shows the US Federal Reserve's "broad" real dollar exchange-rate index, which measures the real value of the trade weighted dollar against a large group of US trading partners. As we asserted in the introduction, the index has moved relatively little since we presented our 2000 paper. Although the nexus of current accounts and exchange rates has changed only slightly over the past four years, other key factors have changed dramatically.

Figure 5 highlights the dramatic changes witnessed in the fiscal positions of the major economies. The swing in the United States fiscal position has been particularly dramatic, from near balance in 2000 to a situation today where the consolidated government deficit roughly matches the size of the current account deficit. That fact is highlighted in figure 6, which breaks down the US current account deficit trajectory into the component attributable (in an accounting sense) to the excess of private investment over private saving, and the component attributable government dissaving. One change not indicated in this diagram is the changing composition of the private net saving ratio. From the mid 1990s until the end of 1999, the US current account deficit was largely a reflection of exceptionally high levels of investment. Starting in 2000, but especially by 2001, investment collapsed. Private saving also collapsed, however, so there was no net improvement in the current account prior to the recent swelling of the fiscal deficit.

Finally, figure 7 illustrates another important change, the rising level of Asian central bank reserves (most of which are in dollars). At the end of 2003, foreigners held 37% of all US Treasuries. Netting out the Treasuries held by the US Social Security Trust administration and by the Federal Reserve System, the remaining Treasuries held privately are roughly the same order of magnitude as foreign central bank reserves. These reserves are mostly held by Asia (though Russia, Mexico, and Brazil are also significant), and mostly held in dollars. Indeed, at times during 2003 and 2004, foreign central bank acquisition of Treasuries has equaled or exceeded the entire US current account deficit. .

We acknowledge that these data do not necessarily imply any immediate end to the sequence of US current account deficits. It is possible that they will go on for an extended further period as the world adjusts to more globalized security markets, with foreign agents having a rising preference for holding United States assets. We do not believe, however, that this is the most likely scenario, particularly now that the composition of foreign flows into the United States is increasingly in the form of bonds rather than equity, and particularly now that the twin deficits problem of the 1980s has resurfaced. In the next section of the paper, we turn to an update of our earlier model that aims to ask what a change in the US current account might do to global demand and exchange rates. We note that the model is calibrated on a version of our "six puzzles" paper (Obstfeld and Rogoff, 2000b) that attempts to be consistent with observed levels of OECD capital market integration and saving-investment imbalances

2 The Model

The model here is a two-country extension of the small-country endowment model presented in Obstfeld and Rogoff (2000a), in which one can flexibly calibrate the relative size of the two countries. We go beyond our earlier model by differentiating between home and foreign produced tradables, in addition to our earlier distinction between tradable and nontradable goods. We further extend our previous analysis by exploring more deeply the alternative shocks that might drive the ultimate closing of the US current account gap.

Otherwise, the model is similar in spirit to our earlier paper on this topic. We draw the reader's attention to two features: First, by assuming that endowments are given exogenously for the various types of outputs, we are implicitly assuming that capital and labor are not mobile between sectors in the short run. To the extent global imbalances only close slowly over long periods (admittedly not the most likely case based on experience), then factor mobility across sectors will mute any real exchange rate effects (Obstfeld and Rogoff 1996). Second, our main analysis assumes that nominal prices are completely flexible. That assumption—in contrast to our assumption on factor mobility—leads one to sharply understate the likely real exchange rate effects of a current account reversal. As we discuss later, with nominal rigidities and imperfect pass-through from exchange rates to prices, the exchange rate will need to move much *more* than in our baseline case in order to maintain employment stability.

The Home consumption index depends on Home and Foreign tradables, as well as domestic nontradables. (Think of the United States and the rest of the world as the two countries.) It is written in the nested form

$$C = \left[\gamma^{\frac{1}{\theta}} C_T^{\frac{\theta-1}{\theta}} + (1-\gamma)^{\frac{1}{\theta}} C_N^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}},$$

where C_N represents nontradables consumption and C_T is an index given by

$$C_T = \left[\alpha^{\frac{1}{\eta}} C_H^{\frac{\eta-1}{\eta}} + (1-\alpha)^{\frac{1}{\eta}} C_F^{\frac{\eta-1}{\eta}}\right]^{\frac{\eta}{\eta-1}}.$$

where C_H is the home consumption of Home-produced tradables., and C_F is home consumption of Foreign-produced tradables. Foreign has a parallel index, but with a weight α ($\alpha > \frac{1}{2}$) on consumption of its own export good. This assumption of "mirror symmetric" rather than identical tradables baskets generates a home consumption bias within tradables.[4] The corresponding price indexes are

$$P = \left[\gamma P_T^{1-\theta} + (1-\gamma) P_N^{1-\theta}\right]^{\frac{1}{1-\theta}}$$

where

$$P_T = \left[\alpha P_H^{1-\eta} + (1-\alpha) P_F^{1-\eta}\right]^{\frac{1}{1-\eta}}.$$

To start, we want to assume the law of one price for tradables. The terms of trade are

$$\tau = \frac{P_F}{P_H}$$

and the real exchange rate is

$$q = \frac{\mathcal{E} P^*}{P}.$$

[4] Warnock (2003) also takes this approach.

Note that because of the home bias in consumption of tradables, purchasing power parity does not hold for the differing preferred baskets of tradables in each country, even if the law of one price holds for individual tradable goods. That is, $P_T \neq \mathcal{E}P_T^*$, Indeed, the ratio $\mathcal{E}P_T^*/P_T$ is given by

$$\frac{\mathcal{E}P_T^*}{P_T} = \frac{\left[\alpha\tau^{1-\eta} + (1-\alpha)\right]^{\frac{1}{1-\eta}}}{\left[\alpha + (1-\alpha)\tau^{1-\eta}\right]^{\frac{1}{1-\eta}}},$$

and the real exchange rate q is

$$q = \frac{\mathcal{E}P_T^*}{P_T} \times \frac{\left[\gamma + (1-\gamma)(P_N^*/P_T^*)^{1-\theta}\right]^{\frac{1}{1-\theta}}}{\left[\gamma + (1-\gamma)(P_N/P_T)^{1-\theta}\right]^{\frac{1}{1-\theta}}}.$$

For $\alpha > \frac{1}{2}$, the measured real exchange rate depends positively on the terms of trade (that is, $\mathrm{d}q/\mathrm{d}\tau > 0$).

Noting that the assumed utility function implies constant elasticity of demand for each of the endowment goods, we can conclude that the global market for the home produced good clears when

$$Y_H = \alpha\gamma\left(\frac{P_H}{P_T}\right)^{-\eta}\left(\frac{P_T}{P}\right)^{-\theta} C + (1-\alpha)\gamma\left(\frac{P_H/\mathcal{E}}{P_T^*}\right)^{-\eta}\left(\frac{P_T^*}{P^*}\right)^{-\theta} C^*$$

where Y_H is home's endowment of its tradable good. There is a corresponding market-clearing condition for the foreign tradable supply, Y_F. For Home nontradables we have

$$Y_N = (1-\gamma)\left(\frac{P_N}{P}\right)^{-\theta} C$$

and, of course, there is again a corresponding foreign condition.

Now, suppose we temporarily abstract from the underlying determinants of savings and consumption, and take as given C, C^* in addition to the endowments Y_H, Y_F, Y_N, Y_N^*. Then the preceding market-equilibrium conditions allow us to solve for relative prices. For example, we can rewrite the equilibrium condition for the home export's market as

$$Y_H = \alpha\left(\frac{P_H}{P_T}\right)^{-\eta} C_T + (1-\alpha)\left(\frac{P_H/\mathcal{E}}{P_T^*}\right)^{-\eta} C_T^*$$

implying that the price indices must be governed by

$$P_H Y_H = \alpha\left(\frac{P_H}{P_T}\right)^{1-\eta} P_T C_T + (1-\alpha)\left(\frac{P_H}{\mathcal{E}P_T^*}\right)^{1-\eta} \mathcal{E}P_T^* C_T^*. \tag{1}$$

Residually, we can calculate Home's current account surplus, measured in Home dollars, as

$$CA = P_H Y_H + iF - P_T C_T,$$

where F is the net Home's foreign debt (in home currency units). For Foreign, the corresponding relationship is

$$\mathcal{E}CA^* = \mathcal{E}P_F^* Y_F - iF - \mathcal{E}P_T^* C_T^* = -CA.$$

As a first pass to understanding the exchange rate impact of global current account rebalancing, we will consider the effects of shocks that make $CA = 0$. (If there is no production effect, such shocks as best thought of as shocks to relative home and foreign

demand. When we move later to consider supply shocks, we will allow relative outputs to move simultaneously.) Substituting for $P_T C_T$ and $\mathcal{E}P_T^* C_T^*$ in eq. (1) and its Foreign-tradable analog, one gets

$$P_H Y_H = \alpha \left(\frac{P_H}{P_T}\right)^{1-\eta} (P_H Y_H + iF - CA) + (1-\alpha) \left(\frac{P_H}{\mathcal{E}P_T^*}\right)^{1-\eta} (P_F Y_F - iF + CA)\,, \quad (2)$$

$$P_F Y_F = (1-\alpha) \left(\frac{P_F}{P_T}\right)^{1-\eta} (P_H Y_H + iF - CA) + \alpha \left(\frac{P_F}{\mathcal{E}P_T^*}\right)^{1-\eta} (P_F Y_F - iF + CA)\,, \quad (3)$$

for tradables. while, for the nontradables markets, one can show that

$$P_N Y_N = \frac{1-\gamma}{\gamma} \left(\frac{P_N}{P_T}\right)^{1-\theta} P_T C_T = \frac{1-\gamma}{\gamma} \left(\frac{P_N}{P_T}\right)^{1-\theta} (P_H Y_H + iF - CA)\,, \quad (4)$$

$$\mathcal{E}P_N^* Y_N^* = \frac{1-\gamma}{\gamma} \left(\frac{P_N^*}{P_T^*}\right)^{1-\theta} (\mathcal{E}P_F^* Y_F - iF + CA)\,. \quad (5)$$

Of the preceding conditions, three are independent, allowing solution for the terms of trade τ, $\frac{P_N}{P_T}$, $\frac{P_N^*}{P_T^*}$, and hence the real exchange rate, q. Notice the presence of a transfer effect in the equations above. Unless $\alpha = \frac{1}{2}$, the stock of net foreign assets influences equilibrium relative prices. It will be most helpful to rewrite the equations in terms of ratios to nominal tradable GDP, $P_H Y_H$, etc., the ratios of nontradable to tradable supplies, and the relative sizes of the two countries' tradables. sectors. Let $ca = CA/(P_H Y_H)$ and $f = F/(P_H Y_H)$ .Let $\sigma_T = Y_H/Y_F$, $\sigma_N = Y_N/Y_H$, and $\sigma_N^* = Y_N^*/Y_F$. Finally, let $x = P_N/P_T$ and $x^* = P_N^*/P_T^*$. Then we can write eqs. (2)-(5) as:

$$1 = \alpha \frac{1}{[\alpha + (1-\alpha)\tau^{1-\eta}]} (1 + if - ca) + (1-\alpha) \frac{1}{[\alpha\tau^{1-\eta} + (1-\alpha)]} \left(\frac{\tau}{\sigma_T} - if + ca\right), \quad (6)$$

$$\begin{aligned} 1 \quad = \quad & (1-\alpha) \frac{\tau^{1-\eta}}{[\alpha + (1-\alpha)\tau^{1-\eta}]} \left(\frac{\sigma_T}{\tau} + i\frac{\sigma_T}{\tau} f - \frac{\sigma_T}{\tau} ca\right) \\ & + \alpha \frac{\tau^{1-\eta}}{[\alpha\tau^{1-\eta} + (1-\alpha)]} \left(1 - i\frac{\sigma_T}{\tau} f + \frac{\sigma_T}{\tau} ca\right), \end{aligned}$$

$$\sigma_N = \left(\frac{1-\gamma}{\gamma}\right) x^{-\theta} (1 + if - ca)\,,$$

$$\sigma_N^* = \left(\frac{1-\gamma}{\gamma}\right) (x^*)^{-\theta} \left(1 - i\frac{\sigma_T}{\tau} f + \frac{\sigma_T}{\tau} ca\right).$$

Thus, the real exchange rate q is given by

$$q = \frac{\left[\alpha\tau^{1-\eta} + (1-\alpha)\right]^{\frac{1}{1-\eta}}}{\left[\alpha + (1-\alpha)\tau^{1-\eta}\right]^{\frac{1}{1-\eta}}} \times \frac{\left[\gamma + (1-\gamma)(x^*)^{1-\theta}\right]^{\frac{1}{1-\theta}}}{\left[\gamma + (1-\gamma)x^{1-\theta}\right]^{\frac{1}{1-\theta}}}.$$

3 The Exchange Rate Impacts of Rebalancing Global Current Accounts

One can potentially do a number of alternative experiments within the preceding framework. For example, as already discussed, just letting CA go to zero gives a pure relative demand-driven current account reduction (that is, rebalancing of current accounts because US aggregate demand falls while foreign aggregate demand rises). And, as we have also already alluded, one can simulate any accompanying effects of a relative productivity shocks by varying Home and Foreign relative output at the same time as we let the current account go to zero.

Other exercises include trying to simulate the effects of a rise in US government war expenditures. To parametrize that exercise, we need to ask how military spending is allocation between tradables. and nontradables, as well as between Home and Foreign. We are assuming that international debt is denominated in dollars, but that assumption is easily relaxed. Finally, we can vary the relative size of the US economy within the global economy.

In our calibration, we will assume that $P_H Y_H/(P_H Y_H + P_N Y_N) = 0.25$ so that the deficit-tradables ratio is $CA/P_H Y_H = -0.2$. We take net foreign debt divided by the value of traded goods output, $P_H Y_H$, to be -0.8 and the nominal interest rate to be 0.05 per year. Also, $Y_H/Y_F = 0.5$: the US produces one-third of the world's tradables. I take $\eta = 6$, $\gamma = 0.25$ and $\alpha = 0.7$ This calibration is broadly consistent consistent with the calibration we deduced in Obstfeld and Rogoff (2000b), where we argued that large trade costs (here a large share of nontraded goods in consumption) can explain the degree of international capital market integration we actually observe among the OECD countries, both qualitatively and quantitatively. Our calibration also requires an assumption about the elasticity in consumption of substitution between tradables. and nontradables, θ. In our 2000a paper, we argued that a unit elasticity was a reasonable base case, and that the empirical literature would even support a lower estimate. Since it will turn out that the exchange rate change is larger the smaller θ, and since we want to include a conservative benchmark, we allow for θ as large as 2, in order to see how a higher elasticity of intranational substitution might reduce the exchange rate effects.[5]

In table 1, we ask what happens if the US accounts for 1/3 of world GDP and a relative demand shock suddenly closes its current account deficit from 5% of GDP to full balance. (Suppose, for example, that an end to the housing boom in the United States reduces consumption there, while improving growth expectations lead to higher consumption levels in Europe, Japan, and China.) In our base case of $\theta = 1$, the real exchange rate needs to move by 28%, roughly twice the effect we found in our earlier small-country model with flexible prices. (Our favored estimate, which allows for nominal rigidities, is going to be higher still, see below.). Why is the effect so large? A small part of it comes from the fact that we are now allowing for terms of trade changes, which reinforce the effects of the relative price of nontraded goods on the real exchange rate. (The shift in the locus of global demand away from the United States leads to a relative drop in demand for US traded goods because US citizens are assumed to have a relative preference for US-produced tradables.) Some of the difference comes from the fact that whereas the

[5]The only technical issue in the simulation below comes in solving eq. (6), which we write as

$$1 = \alpha \frac{1}{z}(1 + if - ca) + (1-\alpha)\left[\frac{1-\alpha}{\alpha(z-\alpha)+(1-\alpha)^2}\right]\left(\frac{\tau}{\sigma_T} - if + ca\right).$$

Given τ, this is a quadratic equation in z. One can solve for z using the quadratic formula, then extract the implicit solution for a τusing $z = \left[\alpha + (1-\alpha)\tau^{1-\eta}\right]$, then substitute the τ back into the quadratic, solve again for z, and iterate to convergence.

US current account was 4.4% of GDP in 2000, it is 5% today, so closing up the gap leads to a bigger exchange rate movement. But the main difference arises because we are now allowing for general equilibrium effects. In the United States, the elimination of the current account deficit implies roughly a 20% fall in the demand for traded goods in the United States (since the current account deficit is 5% of GDP, while traded goods production accounts for about 25% of GDP). Thus, the relative price of traded goods needs to fall by 20% when the elasticity of intranational substitution is 1. But now, we must also take into account the fact that abroad, the price of nontraded goods must *rise* in parallel to the effect in the United States. If the two regions are assumed roughly equal in size, then in our general equilibrium model, the real exchange rate change must be twice that in the partial equilibrium model. If the US were to account for only 1/3 of global traded output—so that a US current account deficit of 5% of GDP corresponded to a foreign current account surplus of 2.5% of foreign GDP—the effect would be roughly 50% larger instead of double. .

A Pure Relative Demand Shock

Table 1: Effect of Return to CA Balance, Outputs Constant

Value of θ	Fall in Terms of Trade	Real Currency Depreciation
$\theta = 1$	2.5 percent	28.0 percent
$\theta = 2$	2.5 percent	15.3 percent

Table 2 asks what happens if the shock that closes up current accounts is associated with a large relative *rise* is US productivity in tradables. production. This will, of course, mute the real exchange rate effect since the tradables. consumption that the United loses by no longer running a deficit is compensated by higher domestic production. In our base case, the real exchange rate changes only by 12.9%, but remember this is in the face of a gigantic increase in traded goods production (20%). The effect is approximately linear so for realistic values of the productivity shock (e.g. $\mathbf{\Delta Y}_H/\mathbf{Y}_H = \mathbf{0.02}$), the effect would be to reduce the exchange rate movement by only a couple of percent.

Global Imbalances are Closed by a Rise in US Tradables Productivity

Table 2: Effect of Return to CA Balance, $\mathbf{\Delta Y}_H/\mathbf{Y}_H = \mathbf{0.2}$

Value of θ	Fall in Terms of Trade	Real Currency Depreciation
$\theta = 1$	4.9 percent	12.9 percent
$\theta = 2$	4.9 percent	7.9 percent

It may seem anomalous to the reader that it takes a *rise* in relative US productivity in tradables. to mute the exchange rate effect, but in fact this is perfectly logical. Policy analysts frequently argue that what is needed is a rise in relative productivity in the rest of the world to mute the exchange rate impact of global current account rebalancing, but this is only correct if the productivity rise is in nontradable goods production (plausible, but not usually thought to be the normal case.)

The last table looks at the US current account going to 1% deficit instead of balance. We see that the effects are approximately linear.

A Pure Relative Demand Shock Shrinking US Current Account Deficit to 1%

Table 3: Effect of Return to CA /GDP = – 0.01, Outputs Constant

Value of θ	Fall in Terms of Trade	Real Currency Depreciation
$\theta = 1$	2.0 percent	21.7 percent
$\theta = 2$	2.0 percent	12.0 percent

Some readers, of course, will be more interested in understanding what happens to the nominal exchange rate as opposed to the real exchange rate. To make this translation, we must, of course, make an assumption about monetary policy. The simplest assumption is that central banks target CPI inflation rates in which case, under flexible prices, $\Delta \log \mathcal{E} = \Delta \log q$. (This actually gives slightly smaller exchange rate responses than if we assumed that central banks are targeting GDP deflators, in which case, $\Delta \log \mathcal{E} \cong 1.15 \Delta \log q$.)

All of the above assumes flexible prices and complete pass-through from exchange rates to final goods prices. We intend to allow for both those factors in the next version of this paper. However, based on the results obtained in our earlier small-country model, we can already ascertain the main thrust of the results. If pass-through from exchange rates to prices is 50% (a generous assumption, it is probably much less even after one year), the requisite nominal exchange rate change will have to be roughly double that calculated in the tables above, assuming central banks target inflation and allow the exchange rate to move to maintain full employment in the nontraded goods sector. If we add a broader range of nominal rigidities (including to the domestic price of nontradables), it turns out that the requisite fall in the real exchange rate can be three to four times larger than in the tables. This issue is more complicated in our present model than the earlier paper, due to terms of trade effects, but we anticipate getting qualitative results similar to those of our earlier paper.

4 Parallels with the 1970s

Given our analysis, why then do some, such as Greenspan (2003), argue that a decline in the United States current account deficit is likely to be benign? Greenspan points to the fact that capital markets are becoming increasingly integrated, and cites reductions in home bias in equities, the secular waning of the Feldstein-Horioka puzzle, and other factors considered in our 2000b paper on the six major puzzles in international macroeconomics, as well as in our 2000a paper. But our calibration here is totally consistent with the current degree of integration of capital markets, and indeed is consistent with the calibration of our earlier paper. What matters for the exchange rate effect here is not the depth of international capital markets, but the costs of adjusting to lower tradables consumption in the *goods* markets. If the nontraded sector accounts for 75% of GDP, this is fully consistent with what we observe in capital markets.

The real question is not whether there needs to be a big exchange rate adjustment when the US current account closes up. For most plausible shocks leading to global rebalancing, this is a given. The real question is how drastic the real effects are likely to be. This is an open question. We agree with Greenspan's argument that some markets are becoming more flexible, and that this should allow the world economy to absorb the blow better than it might have otherwise. But whereas US markets may have achieved an impressive degree of flexibility, Europe (and to a lesser extent Japan) certainly has not. The rest of the world is not going to have an easy time adjusting to a massive dollar depreciation. It is also the case that world derivatives markets have exponentially expanded in comparison with even ten years ago. With little reliable data on counterparty risk, there has to be concern that a massive dollar movement could lead to significant financial problems that are going to be difficult to foresee before they unfold (e.g., along the lines of the collapse of Long Term Capital Management in 1998). Of course, the optimists can point to the dollar's relatively benign fall in the late 1980s (though arguably it was a critical trigger in the events leading up to Japan's collapse in the 1990s). But perhaps the greatest concern is that today's environment has more parallels to the dollar collapse of the 1970s than to the 1980s. Again, we intend examine

this issue more closely in our future research. We note, however some broad similarities. During the Nixon years 1971-72 (in the run-up to the November 1972 election), the United States ran large budget deficits, had soft monetary policy, and faced open ended security costs (back then it was Vietnam). There were twin deficits (albeit smaller than today) and energy prices were a major factor (albeit the 1974 oil price hike was much greater than anything seen yet in 2004, when measured in real terms.) The year 1973 saw a final breakdown of the Bretton Woods fixed exchange rate system (mainly involving European countries and Japan), but today America is the center of a quasi- fixed exchange rate system with much of East Asia.

Broadly speaking, one has to be concerned that if the United States current account closes up under a backdrop more like the 1970s than like the 1980s, the outcome may be much more severe than it seemed to be during the 1980s dollar collapse.

5 Conclusions

In the paper, we have generalized our discussion in Obstfeld and Rogoff (2000a) to take account of general equilibrium effects and terms of trade changes. We find that looking at the rebalancing of the United States current account in a global model, rather than a partial equilibrium model as in our earlier analysis, points to a much larger requisite change in the long-run real dollar exchange rate than we had previously estimated. Although a number of factors may mitigate (a higher elasticity of substitution between tradables and nontradables than in our baseline, and a greater degree of factor mobility across sectors), it still seems quite reasonable to suppose that the trade weighted dollar needs to depreciate another 15-20% as the current account rebalances, with a large potential overshoot in the event of a rapid reversal, with the trade weighted dollar falling by 40% or more.

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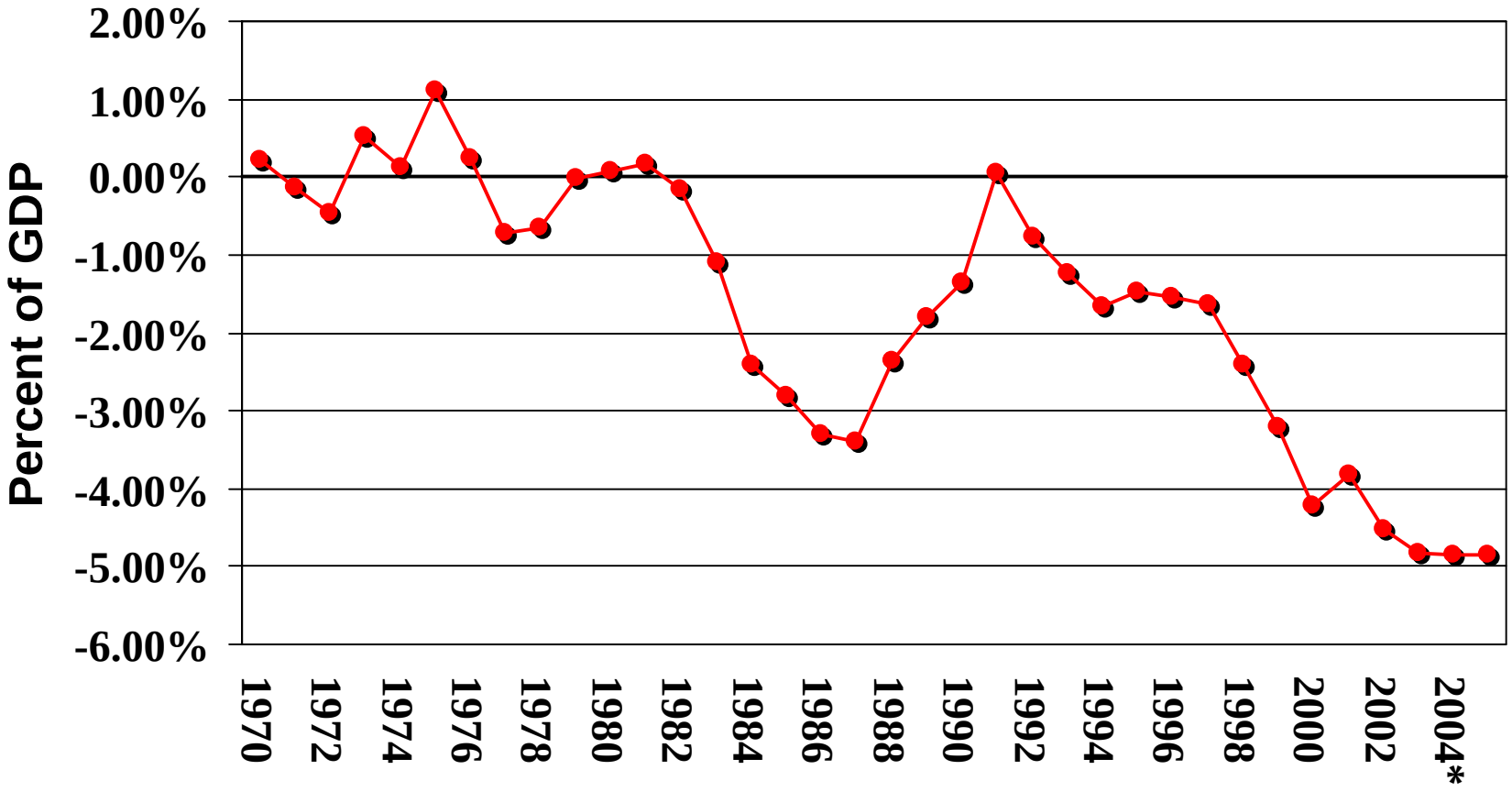
Fig. 1: U.S Current Account: 1970-2005



*Projected

Fig 2: U.S Net International Investment Position: 1976-2003

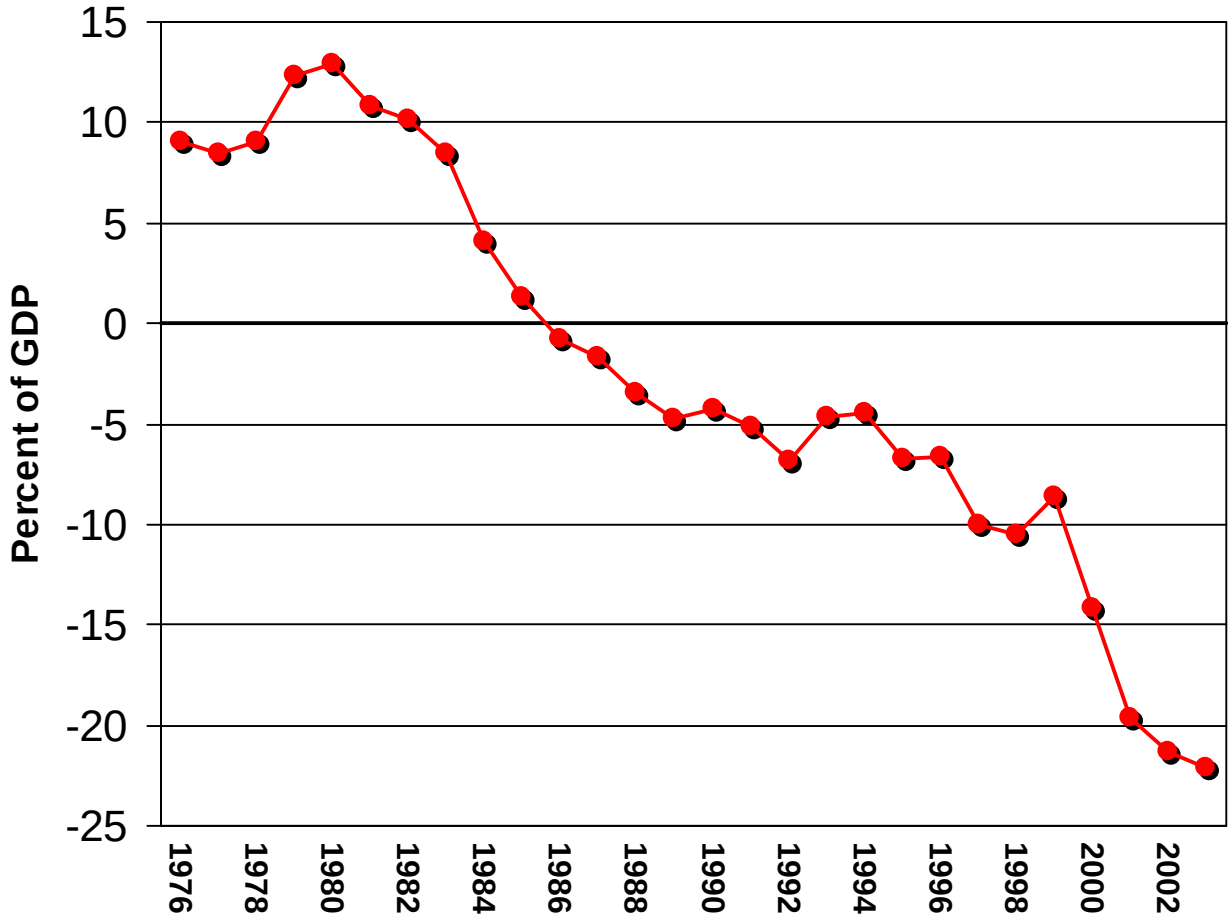
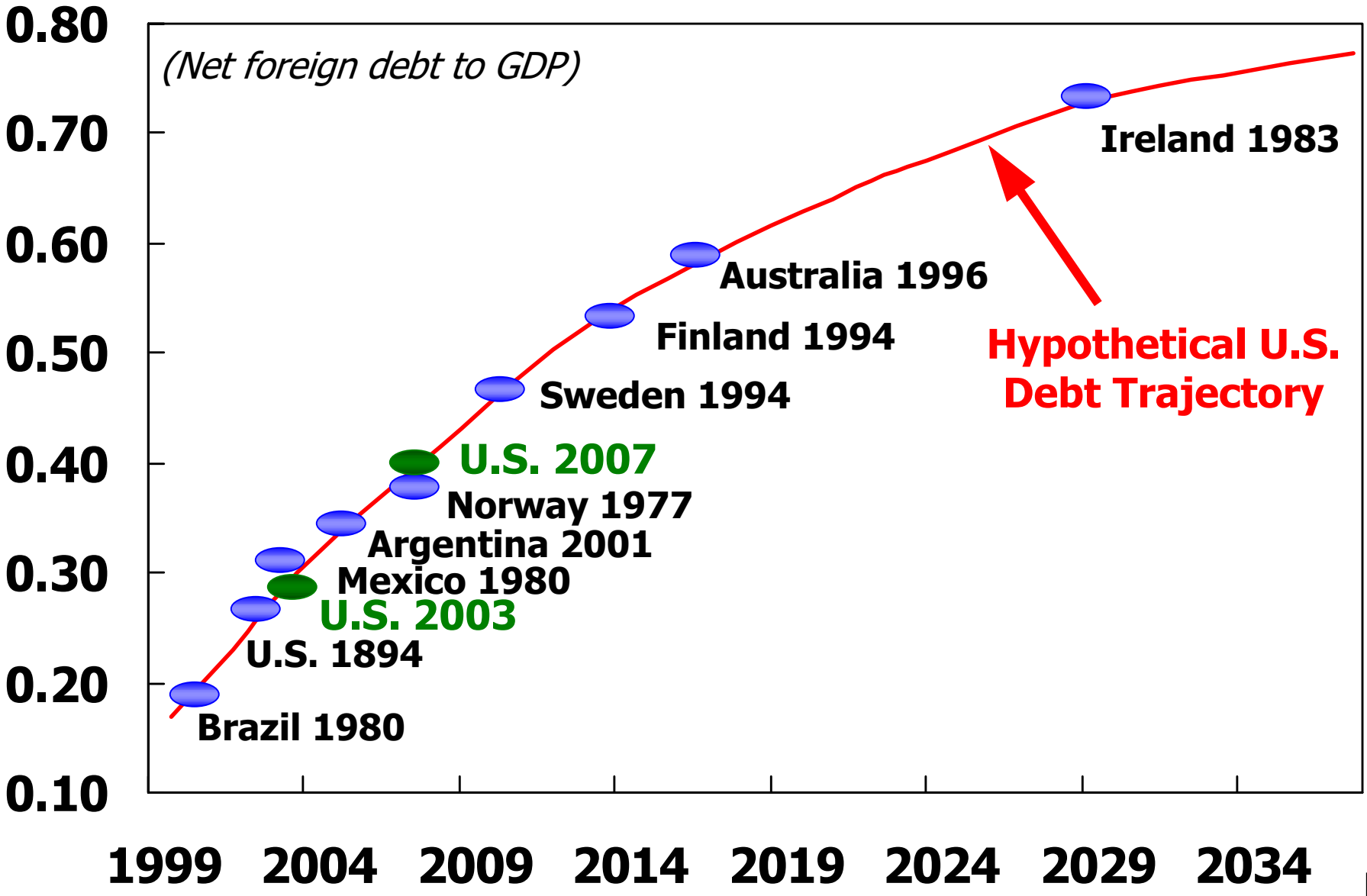


Fig. 3: Up the Debt Ladder?

Projected U.S. Net Foreign Debt



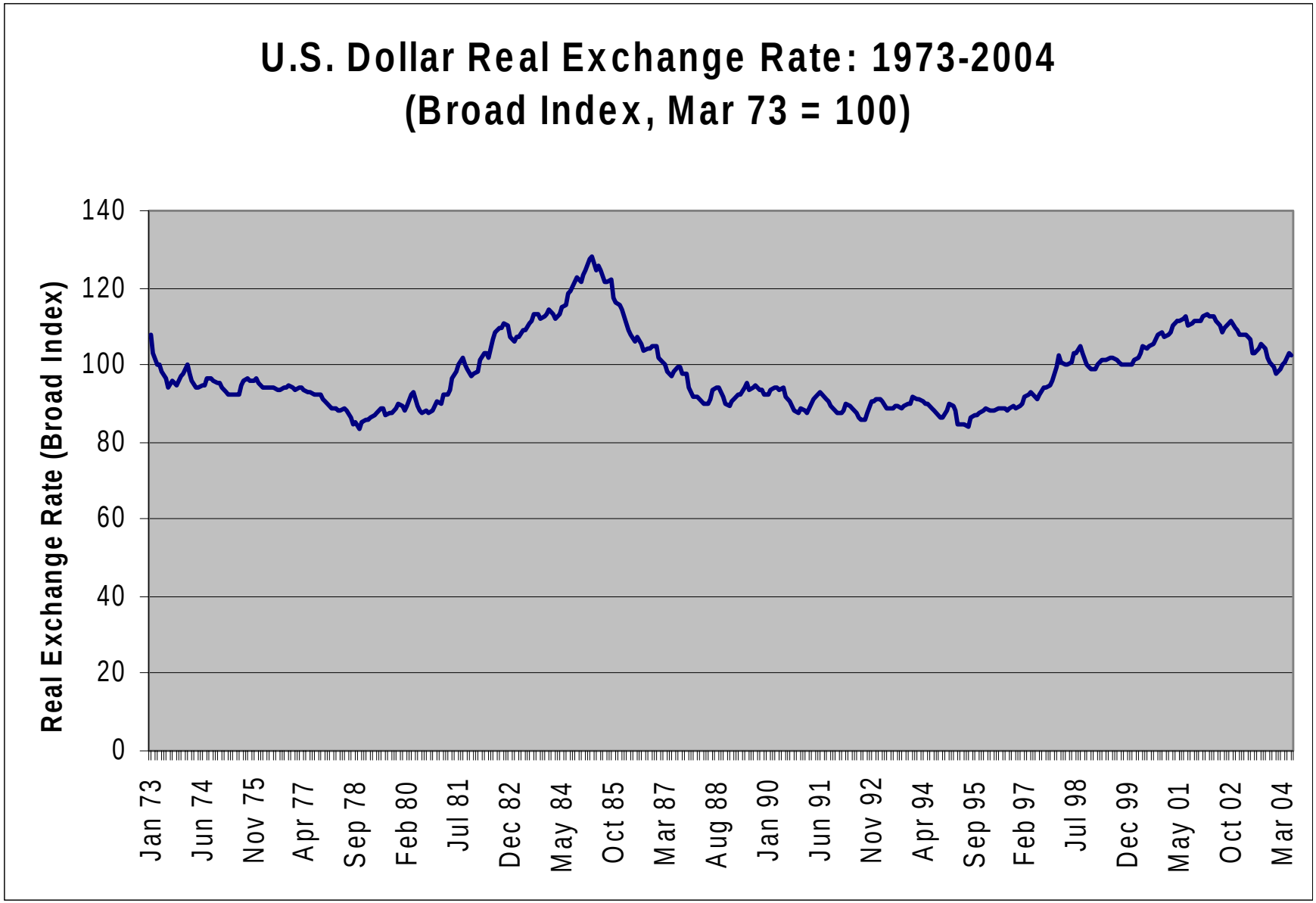
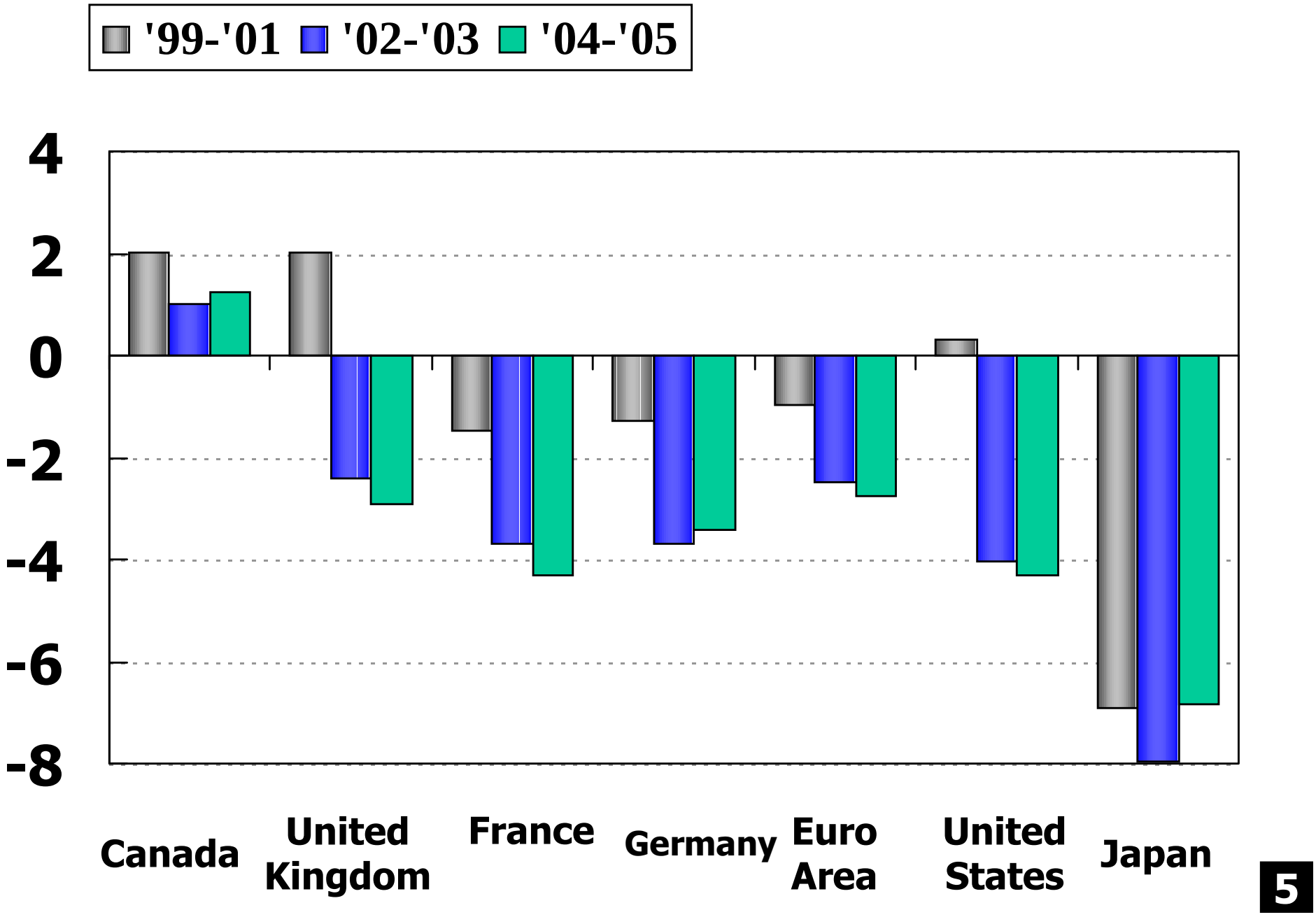

U.S. Dollar Real Exchange Rate: 1973-2004
(Broad Index, Mar 73 = 100)
Real Exchange Rate (Broad Index)
140
120
100
80
60
40
20
0
Jan 73
Jun 74
Nov 75
Apr 77
Sep 78
Feb 80
Jul 81
Dec 82
May 84
Oct 85
Mar 87
Aug 88
Jan 90
Jun 91
Nov 92
Apr 94
Sep 95
Feb 97
Jul 98
Dec 99
May 01
Oct 02
Mar 04

Fig. 5: Fiscal Balances in Major Economies (% GDP)



U.S. Current Account Balance and Saving-Investment

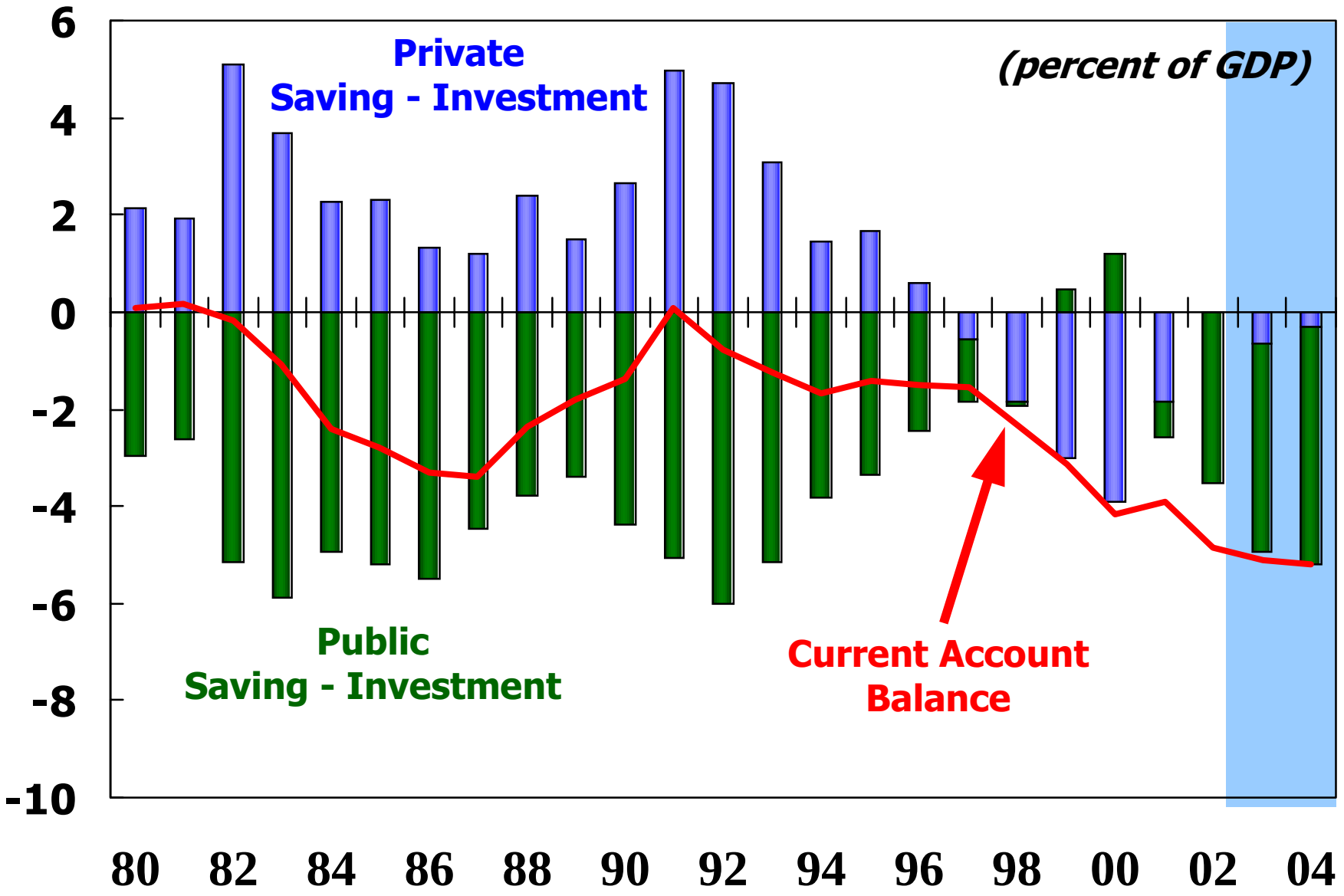


Fig 7: Foreign Exchange Reserves