

Is the Strong Dollar Sustainable?

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The strong and strengthening dollar of the past five years has been a source of surprise and puzzlement to many observers, who had grown accustomed during the 1970s to the fact of a weakened dollar and the prospect of further depreciation. As recently as 1980 some of the world's leading international economists pointed to reasons which they believed ensured a secularly weak dollar: competition from Japan and the newly industrializing countries, slow productivity growth, and an inflation-biased economy. Since then the trade-weighted dollar has risen more than 40 percent. As the dollar has risen ever higher, economists (and others) have split between those who argue that the dollar's new-found strength represents a speculative bubble soon to burst, and those who argue that the changed exchange rate represents a fundamental shift in the situation which will reverse itself gradually if at all.

The purpose of this paper is to provide a framework for discussing the sustainability of the strong dollar, and to use that framework to make an assessment. Along the way the paper also attempts to clarify some related issues which have been the source of considerable confusion.

The paper is based on a particular interpretation of what we mean by asking whether the dollar is sustainable. The issue, I will argue, is not whether the dollar can continue indefinitely at its present level; most if not all commentators agree that over the long run market forces must eventually drive the dollar down to a level consistent with something approximating current account balance. Nor is the issue one of "hard landing" versus "soft landing." Few would dispute that new information such as a sharp change in U.S. fiscal policy could lead to an abrupt change in exchange rates. Instead, the question is whether a reasonable future path for the exchange rate, given what we now know, requires that the dollar decline *more steeply than the market now expects*. If this is the case, then even without new information, market participants will at some point be forced into a revision of their expectations, leading to a plunge in the dollar's value. (This might, for

example, occur immediately following the presentation of this paper.)

To assess the sustainability of the strong dollar, then, we need to ask three questions. First, what expectations about the future course of the exchange rate lie behind the current value of the dollar? Second, what would be the consequences for U.S. foreign trade and investment if the exchange rate were in fact to follow these expectations? Third, are these consequences possible--or will a plunge in the dollar happen at some point instead?

What I will show in this paper is that we can give fairly definite answers to the first two questions, and a less definite answer to the third. The essential conclusions can be summarized as follows:

(a) The current strength of the dollar, given that there **are** only modest differences between real interest rates in the U.S. and in other industrial countries, amounts to an implicit forecast on the part of international investors that the dollar will decline only slowly, at a rate averaging less than three percent per year for the indefinite future.

(b) A dollar decline this slow would ensure huge U.S. current account deficits for more than two decades. As a ratio to exports or GNP, U.S. indebtedness to foreign countries would reach a level comparable to that of Brazil or Mexico.

(c) Whether one believes the strong dollar is sustainable depends on whether one views this level of U.S. external indebtedness as feasible. If, as I believe, such a level of debt is not feasible, at some point the market will realize that the dollar must fall more rapidly than it now expects. When this happens, by the usual logic of asset markets, the dollar will fall immediately.

The bulk of this paper is concerned with putting some analytical and statistical flesh on this skeleton argument. In addition I consider some important counter-arguments and qualifications. The paper is in five parts. The first part asks what we mean by questioning the sustainability of the strong dollar, and sketches out the major reasons which may place limits on the persistence of a high exchange rate. The second part sets out a framework for testing the consistency of the market's expectations. In the third part numbers **are** placed into this framework, yielding the results to which I have already alluded, namely, that the implicit exchange rate expectations of the market would require massive U.S. accumulation of external debt. The fourth part examines the implications of uncertainty. Finally, the fifth part of **the paper** asks what might set off a plunge in the dollar, and how far the dollar might fall.

General considerations

In spite of the heated debate engendered by the strong dollar, many issues remain surprisingly confused. There is no general agreement on what it

means to say that the exchange rate is or is not sustainable; nor is there any agreement on the nature of the constraints which may eventually force the dollar down. As a preliminary step, then, it is important to get our minds clear on these questions. First, we need a clear statement of what we mean when we talk of the dollar's sustainability. Second, we need a clear idea of the constraints on exchange rate.

The meaning of sustainability

The question of the sustainability of the dollar may be broken into a series of smaller questions. First, is the strength of the dollar a permanent or temporary phenomenon? Second, if the exchange rate is only temporarily high, is this a reflection of market fundamentals or a speculative bubble? Third, when the dollar comes down, will it be a gradual "soft landing" or a sudden "hard landing?" I will argue that the second question, the possibility that the dollar is at least in part floating on a speculative bubble, is in fact the crucial and controversial question.

Is *the strong dollar permanent*? Almost nobody who has seriously studied the issue believes that the U.S. real exchange rate can remain indefinitely at its present level. A permanently higher real dollar could only be the result of some shift in the world economy which increased the relative demand for U.S.-produced goods and services. There is no evidence of any such shift; the rise in the dollar has been associated with a rise in the U.S. current account deficit roughly consistent with what one would have expected from econometric estimates which pre-date that rise. There have been some attempts to argue that the actual rise in the U.S. current account deficit is not as large as the measured rise, due to unreported service export earnings; but these arguments have not received wide acceptance, and in any case the possible measurement error has been swamped by the size of the deficit.

In the absence of a shift of world demand toward U.S. goods, a permanently high dollar would mean a permanent U.S. trade deficit and, because of interest payments on accumulated debt, an ever-growing U.S. current account deficit. Nobody believes this is possible forever; thus any serious analysis of the exchange rate must presume that the dollar will eventually come down.

The next question then becomes whether the temporary strength of the dollar represents an appropriate market reaction to the current economic situation, given the forces which must eventually push the dollar down again; or whether the rise in the dollar at least to some extent constitutes a speculative bubble—by which we mean that it is based on market expectations which are inconsistent with the long-run constraints on the balance of payments.

Is the strong dollar a bubble? If there is a bubble component to the strength of the dollar, it is not of the same order as **tulipmania** or South Sea shares. The desire of international investors to hold increasing claims on U.S. residents need not be explained by an expectation that the dollar will continue to rise, because dollar-denominated assets offer both nominal and real yields higher than securities denominated in the currencies of other industrial countries. As documented below, at the time of writing the long-term real interest rate in the United States was about two and a half percentage points higher than the rate in a weighted average of U.S. trading partners.

If the strength of the dollar does in part represent a speculative bubble, then, it is not a case of wild speculative fever. The case for a bubble, on the contrary, is in fact the argument that there is *insufficient* speculation. The argument runs as follows: the huge trade deficits engendered by the strong dollar will eventually push the dollar down. If international investors recognized this, the expected future depreciation of the dollar would act as a deterrent to holding of dollar-denominated assets, and the dollar would be weaker now. **However**, market participants are myopic, and pay more attention to the higher yield on dollar securities than to the forces which must eventually weaken the dollar. Thus the dollar is high because investors pay too little attention to the prospect of future exchange rate changes, not too much.

One way to make this point is to consider the inconsistency between what econometric forecasters typically assume about the future path of the exchange rate and the behavior of international investors. Shortly before this paper was written, DRI released its medium-term world economic forecast. In that forecast it was assumed that the dollar will decline by eight percentage points per year over the next five years; DRI believed that such a decline was needed to avoid implausible U.S. accumulation of external debt. But suppose international investors were to agree. Then the less than three percent higher yield on dollar-denominated securities as opposed to other industrial country currencies would be more than offset by the expected depreciation, and the dollar would not be as strong as it is.

Turning this around, what we can say is that the strength of the dollar given only modest interest differentials in favor of the U.S. amounts to an implicit forecast on the part of the market that the dollar will decline only slowly. If you believe, like the forecasters at DRI, that the exchange rate must in fact fall faster than this, you must conclude that the dollar has overreacted to the interest differential due to insufficiently forward-looking expectations. It is this overreaction, if it exists, which is the "speculative bubble" component of the dollar's strength.

Speculative bubbles eventually burst. In this case, what would have to happen is that at some point international investors see that the dollar cannot actually remain as strong for as long as they had thought. As soon as they

realize this and try to shift out of dollar assets, the dollar will in fact fall. Thus the argument that the dollar is supported in part by a speculative bubble is also an argument that the dollar must at some point plunge.

It is tempting to argue that the reverse is also true—that predicting an eventual sharp drop in the dollar is equivalent to arguing for a failure or irrationality of market expectations. This equivalence, if valid, would make the issue of a speculative bubble the same as the issue of whether the dollar will decline gradually or suddenly—the issue of a "soft landing" versus a "hard landing."

In fact, however, while there is a relationship between the view that the dollar has overshot its appropriate level and the view that it is likely to come down with a bump, these are not quite the same. To see why, we need to discuss the hard landing versus soft landing distinction on its own.

Soft versus hard landings. Two recent discussions of the prospects for the dollar, by **Steckler** and **Isard** (1985) and **Marris** (1985), have laid considerable stress on the issue of whether the dollar can decline gradually over time or must fall sharply (arriving at opposite conclusions.) In each case the issue is seen as whether a gradually declining path is actually feasible.

The problem with this interpretation is that one could easily believe that the current exchange rate represents a rational market interpretation of a situation which includes some probability of a sharp fall in the dollar. Suppose, for example, that investors see a small probability in any given year that the U.S. and other OECD countries will agree on a joint program of fiscal reform-contraction in the U.S., and expansion in Japan, Germany, and the U.K.

The announcement of such a program would almost surely lead to an immediate sharp decline in the dollar. It is fully conceivable, however, that the probability of this happening in any one year is small enough that the expected loss from a dollar plunge is offset by higher interest rates on dollar assets, so that the possibility of an abrupt fall in the exchange rate need not be inconsistent with rational market behavior. Further, a rational market could produce a strong dollar even if the cumulative probability of a dollar crash over time is large enough that the strong dollar is more likely to end with a bang than a **whimper**—so long as the likelihood of a bang in any given year is not too high.

The point is that if "news" is likely to arrive in large lumps rather than a steady stream, a sharp fall in the dollar will eventually happen whether or not the current level represents a bubble. In fact, large pieces of news can lead to sudden exchange rate changes whether or not the current exchange rate is far from equilibrium. The view that when the dollar falls, it will fall fast, could be a statement about how information arrives rather than a statement that the dollar is currently overvalued.

We should note, however, that if the market believes that there is always

some possibility of a sharp fall in the dollar, the burden of arguing that the market's implicit forecast is reasonable becomes considerably harder. The market must believe that if the dollar does not fall sharply, it will fall even more gradually than the interest differential. As I will argue at greater length in the fourth section of this paper, "Allowing for uncertainty," in this case the market's forecast makes sense only if this more gradual decline is itself feasible. Even if news leading to a sudden fall of the dollar is likely to come in at some point, the market must also have a consistent view of what happens if this news does not come in. As I will show below, even a modest probability of a plunge raises sharply the level of U.S. indebtedness which we must regard as feasible if we are to discount the argument for a speculative bubble.

What is the issue? We have broken the question of sustainability into three sub-questions: permanent versus temporary sustainability, rational markets versus speculative bubble, and hard versus soft landing. All three are important for a proper understanding of the situation, and all are important for policy. As Sachs (1985) has pointed out, the conclusion that the exchange rate must come down means that the inflation benefits of a strong dollar must eventually be repaid; if the descent is rapid, policymakers had better be prepared to deal with an inflation bulge somewhere down the line. All this is true whether or not the dollar's current strength reflects myopic behavior on the part of international investors.

Nonetheless, for the remainder of this paper I will focus on the question of whether the dollar is riding on a speculative bubble. The reason for emphasizing this question is not that it is necessarily the most important issue, but simply that the other issues are not, or should not be, controversial. There is no reasonable case for arguing that there has been a major permanent improvement in U.S. competitiveness, so that there is (among reasonable observers) a consensus that the strength of the dollar is a sometime thing. There is also no question that major changes in the underlying policy environment could produce a sharp fall in the dollar. The controversial issue is whether an eventual dollar plunge will occur even without such changes. The resolution of this issue depends on whether the market's implicit exchange rate forecast is in fact feasible. This is a quantitative question. As a preliminary step, however, we need some idea of criteria for feasibility.

Constraints on the exchange rate

The argument that the dollar is stronger than fundamentals warrant depends, as we have seen, on a judgment that the implicit market forecast of the future course of the dollar is not feasible. That is, this forecast violates some constraint on the dollar's path. What we need to know to make this judgment are the nature and position of these constraints. As will become

clear, the real dispute about the dollar's future is largely about these constraints.

We can roughly categorize possible constraints on the exchange rate into three types. First are **flow** constraints: sustaining the strong dollar might require U.S. trade deficits or capital inflows larger than feasible. Second are **stock** constraints: the eventual level of U.S. external indebtedness implied by a slowly declining dollar might be more than foreign investors are willing to hold. Finally (not wholly distinct from the first two) are **political** constraints: the consequences of a sustained strong dollar might be politically unacceptable, leading to government action which if properly foreseen would have brought the dollar down already.

Flow constraints. The argument for a flow constraint on the dollar was for obvious reasons more popular two or three years ago than it is now. The argument was that the strength of the dollar reflected a failure of international investors to believe what economic forecasters were telling them about the eventual consequences of the exchange rate for U.S. competitiveness. Once triple-digit trade deficits became a reality, the argument went, the markets would be surprised into a run on the dollar. In particular it was argued that the United States could not in fact attract capital inflow at the rates necessary to sustain the dollar in the face of current account deficits exceeding 100 billion dollars.

This simple view of a flow constraint has clearly been falsified by events. Perhaps there is a maximum rate of capital inflow which can be attracted to the U.S., but it is higher than the levels we have seen. And this constraint is not likely to be tested. If the dollar declines gradually from this point on, the trade deficit as a share of GNP can also be expected to decline (though it may first rise somewhat due to lagged effects.) So if a flow constraint has not yet been binding on the dollar, it is unlikely to become binding in the future.

The one way in which the idea of a flow constraint could be sustained is by arguing for what we might call an "average" flow constraint. This might say that, for example, one year of triple-digit deficits is all right, but five years is not. It is hard, however, to see how such a constraint might be justified, other than as either a stock constraint in disguise or a political constraint.

Stock constraints. In contrast to a flow argument which stresses the size of required annual capital flows to the United States, a stock argument that the exchange rate is **unsustainable** would stress the size of the external indebtedness the U.S. must eventually acquire if the dollar declines only gradually. The question then is why some level of debt would be "too much."

An extreme possibility would be one of actual U.S. insolvency. In the current context this possibility might be stated as follows. Suppose that the

implicit forecast of the market turns out to be for a dollar decline so slow that the burden of interest payments on accumulating U.S. debt rises more rapidly than the trade deficit declines. In that case the market would implicitly be forecasting an explosion of U.S. debt which would eventually become impossible to service. We will see later that a rather simple criterion can be constructed to test whether this will happen. The U.S. appears to lie well inside this point, although uncertainty about the future policy environment could make solvency an issue (see "Allowing for uncertainty.")

If solvency is not the problem, we must ask what would limit accumulation of U.S. external debt short of this point. One possibility is that foreign investors would be **unwilling** to hold as large a proportion of their wealth in the form of claims on the U.S. as would be required to allow a slow dollar decline. Steckler and Isard (1985) posed the question this way, **arriving** at a projection that foreign countries will eventually have to hold ten percent of their net worth as claims on the U.S. The projections reported below yield higher debt accumulations, but the difference is probably not crucial. What is crucial is whether there are strong portfolio preferences over the national composition of asset holdings.

It is hard to see why there should be. Attempts to apply capital-asset-pricing-model type calculations suggest that securities in different currencies ought to be very good substitutes (Krugman 1980, Frankel 1984.) At the same time, empirical tests for effects of relative asset supplies and wealth distribution on the exchange rate have turned up negative (Frankel 1982.) So we can tentatively dismiss the suggestion that foreign investors would be unwilling to put so much of their wealth in the U.S.—**although** their governments may be unwilling to allow them to do so.

This does not eliminate the possibility of a stock constraint, however. Even if claims on the U.S. remain an acceptably low fraction of foreign wealth, they might become an unacceptably high fraction of U.S. income. This is the kind of constraint which provoked the third-world debt crisis. That is, the problem was not that Brazil's debt became too large a proportion of OECD portfolios; it was that it began to be perceived as too large relative to Brazil's earning capacity.

What makes some **debt/GNP** or **debt/export** ratio too large? The usual argument is that once external debt becomes large enough there is a temptation on the part of the debtor country government to interfere with debt service. Thus the constraint once again becomes political, requiring us now to turn to the issue of political constraints.

Political constraints; In the end, the sustainability issue seems to come down to politics. Given our lack of a good analytical framework for thinking about political decisions, we can safely be quite confident in pronouncing on political constraints, since we **need** have no fear of contradiction. Basically there seem to be three main ways in which political constraints could

make the strong dollar unsustainable.

First is the possibility that the consequences of the dollar for U.S. international competitiveness will eventually lead to a change in U.S. monetary and fiscal policies which drives the dollar down. At the time of writing there seems to be a long-delayed surge in political awareness of the extent of the effects of a sustained high dollar, suggesting that action may actually be coming. On the other hand, as suggested in "Allowing for uncertainty," if the political response is protectionist it may validate the strong dollar rather than drive it down.

The second possibility is that foreign governments will limit their export of capital to the U.S. They might do this for several reasons. To name only two, those nations might be concerned about the export of savings they would prefer to see invested at home; or they might be concerned about the protectionist sentiment generated in the U.S. by the trade deficit.

Finally, U.S. policy toward foreign investors might change once the U.S. becomes a massive debtor country which must run a trade surplus to service its foreign debt. This kind of concern is at the heart of the modern theory of international debt, as argued in the seminal work of Eaton and Gersovitz (1981.) The Eaton-Gersovitz theory is, in short, that governments have an incentive to repudiate foreign debt when it becomes large, and that they cannot credibly renounce this option. Since lenders are aware of the possibility of debt repudiation, they will attempt to ration loans to a level where the cost of repudiation to a country exceeds the benefits. A debt crisis arises when lenders decide that the level they have already lent is in fact too large (Sachs 1984, Krugman 1985.)

Could the United States be the subject of a debt crisis? At first one might dismiss the idea—the U.S. is not Brazil: As we will see shortly, however, the implicit market forecast of the exchange rate implies that in time the U.S. will in effect become Brazil, at least as far as quantitative measures go. A decline of the dollar gradual enough to justify the current level of the exchange rate would lead to U.S. debt/GNP and debt/export ratios comparable to those of Brazil or Mexico.

It might still be argued that the U.S. is too stable politically and too much the guardian of the market system to be an unreliable haven for funds. I am skeptical about this assertion. The U.S. is, we know, fully capable of adopting policies toward foreign goods which are both nationalistic and self-destructive. If the U.S. can be xenophobic about foreign goods, why should we expect it to be more solicitous toward foreign capital? If we turn to a calculation of costs and benefits, we might note that the U.S., by virtue of its size, is less vulnerable to sanctions and retaliation than LDC debtors. So we cannot dismiss the possibility of a U.S. debt crisis out of hand.

Summary

In this part of the paper I have attempted a clarification of the basic issues involved in the question of the sustainability of the strong dollar. The following conclusions emerged:

—The issue is not whether the dollar can remain indefinitely at current levels. Any reasonable analysis must allow for an eventual return of the exchange rate to a level consistent with something like current account balance.

—The issue is instead whether the current exchange rate is too high given the underlying economic situation, so that part of the dollar's strength represents a speculative bubble which will eventually burst. We can conclude that this is the case if we can show that the current exchange rate is implicitly based on an infeasible forecast for the future exchange rate.

—The constraints on feasibility **are** essentially political. How much of their savings will foreign governments be willing to see converted into claims on the U.S. rather than domestic investment? How much external debt can the U.S. acquire before nationalistic policies toward foreign investors become a temptation?

A framework for assessing sustainability

In our discussion of the meaning of sustainability, we argued that the key issue is whether the current strength of the dollar is excessive given the underlying economic situation. We can **make** this assessment **in principle** in two stages. First, we can look at the current exchange rate, interest rates, and other data to infer the market's implicit forecast for the future path of the exchange rate. Second, we can then examine the consequences of the forecast path for the U.S. **balance** of payments and external indebtedness, and ask whether these seem feasible.

Of course in practice the procedure is not quite as straightforward as it may sound. Questionable assumptions **are** needed to carry out both stages. Let us consider each stage in turn.

The market's implicit forecast. At first sight, determining what the market expects may seem simple; just look at the forward rate. Because covered interest parity holds, this is equivalent to using the interest differential as the forecast of the exchange rate.

There are **three** basic problems which complicate the task of assessing market expectations. First, for balance of payments and indebtedness calculations what matters is not the nominal but the real exchange rate, implying that we should use real rather than nominal interest differentials. This poses

a problem because inflation expectations **are** not so easily measurable. Second, the task is complicated by consideration of risk aversion and portfolio balance. Finally, we need to realize that the market's expectations **are** presumably probabilistic rather than deterministic.

Using real interest differentials. If international investors **are** close enough to risk neutrality, and if concerns about expropriation **are** not an issue (see later discussion of the safe haven argument), the real interest differential will be the market's forecast of the future change in the real exchange rate.

The problem here is in **identifying** inflation expectations. Ordinarily we proxy for these by using recent past rates of inflation. This is reasonable if we are looking only a short distance ahead, but not if we **are** looking at a longer term. Unfortunately, the long-term expectations of the market **are** what we need for our sustainability analysis.

What gives this problem special salience is that the nominal long-term interest differential between the U.S. and **Germany** or Japan is substantially higher than the short-term differential. Does this reflect expectations about **real** rates or about inflation? I find it hard to understand why the market should expect either a further rise in the U.S. real interest rates or a fall in real rates in other industrial countries, so a tentative conclusion might be that inflation expectations **are** the culprit. The point, however, is that we really don't know.

For the purpose of this paper I will adopt a less than satisfactory solution. This is to construct an estimate of the implicit market forecast by using long-term bond rates and recent inflation rates. **If** the excess of U.S. long-term over short-term rates actually reflects market fears of renewed inflation, this gives a lower bound to the market's real exchange rate forecast—which is what we want to test for **sustainability**.

Portfolio balance. If risk aversion leads to low sustainability among assets denominated in different currencies, the procedure of taking the interest differential as the market's forecast of the change in the exchange rate will not be valid. We can argue, however, that the bias is probably not large and, furthermore, that it biases us toward finding the exchange rate sustainable.

We have already noted that such quantitative evidence as there is does not support the view either that international investors should view securities denominated in different currencies as poor substitutes or that shifts in relative asset supplies or wealth distribution have noticeable exchange rate effects. If this evidence is right, we should not be too concerned about using the interest differential as a proxy for exchange rate expectations.

To the extent that portfolio balance is a consideration, note that as foreigners **are** required to hold increasing claims on the U.S., they will want higher relative returns on these claims. This means that if we think that cur-

rently the interest differential is equal to the expected rate of exchange rate change, as U.S. indebtedness grows it will become an *overestimate* of expected dollar depreciation, and projecting interest differentials forward will again yield a lower bound to the implicit market forecast. The only way to avoid this conclusion is to assert that international investors are currently willing to hold dollar assets with a lower expected yield than other assets. To argue this, we must assert that there has been a substantial shift in portfolio preferences in the last few years. This brings us to the "safe haven" argument, which is part of the general issue of uncertainty.

Uncertainty and diffuse forecasts. Nobody pretends to have an exact exchange rate forecast. The current value of the dollar reflects not a point expectation but a probability distribution.

Discussions about the exchange rate seem to point out two major sources of uncertainty in market expectations. The first is concern that political developments outside the U.S. could lead to at least partial expropriation of assets. This is presumably a low-probability event, but not much probability need be attached to drastic events to make them potent for asset markets. The other is the prospect that eventually OECD governments will do something about the underlying causes of the strong dollar, widely believed to be the divergence in fiscal policies.

These sources of uncertainty cannot be neglected. However it will be useful to postpone their consideration until the fourth section of this paper, "Allowing for uncertainty." There we will see that the safe haven argument works in favor of dollar sustainability, but can be discounted on empirical grounds. The prospect of a policy change, on the other hand, actually makes it harder to believe that the dollar's strength is appropriate given the fundamentals.

A model of the balance of payments and external indebtedness

The upshot of our discussion so far has been that as a first pass it makes sense to proxy for market expectations by assuming that the real exchange rate will depreciate steadily at the current real interest differential. What we need next is a framework for converting this exchange rate forecast into a forecast of the U.S. balance of payments and exchange rate. What we will develop here is a simplified model which lends itself easily to manipulation and analysis.

Assumptions of the model. Let E be the natural logarithm of the U.S. real exchange rate, measured against some appropriately weighted basket of foreign currencies. Then the assumption of our analysis will be that the implicit market forecast of E is that it will decline at a rate equal to the differential between U.S. and foreign rates of return:

$$(1) \dot{E} = -(r-r^*)$$

The U.S. balance of payments will depend on E . Let us define B as the current account deficit exclusive of interest payments, measured as a *fraction of GNP*. (Loosely, we can call this the trade deficit as a share of GNP.) We will assume that B is a linear function of E . There will be some level of $E = \bar{E}$, for which $B = 0$; thus we can write

$$(2) B = (E - \bar{E})$$

That is, the trade deficit as a share of GNP is proportional to the percentage "overvaluation" of the dollar $E - \bar{E}$.

Let CA be the inflation-adjusted U.S. current account deficit as a share of GNP; this may be written

$$(3) CA = B + rD$$

where D is the ratio of external debt to GNP.

Finally, the growth of the debt-GNP ratio will reflect both the current account deficit and the growth of GNP itself:

$$(4) \dot{D} = CA - gD = B + (r-g)D$$

It is important to stress once again that the purpose of this model is not to make a forecast. Rather, it is to draw out the implications of the exchange rate forecast implicit in the current value of the dollar. If these implications turn out to be implausible, we must argue that the market is wrong and substitute some other forecast.

Dynamics of the model. The model just described has two sources of change over time. First is the "extrinsic" dynamics of exchange depreciation. Second is the "intrinsic" dynamics of debt accumulation.

The joint impact of these dynamics can most easily be understood by focusing on the **debt/GNP** ratio D . This may be analyzed as follows. First, suppose that a trade deficit of B_t is incurred in period t . How much will this contribute to the **debt/GNP** ratio in a later period T ? The answer depends on two components. The deficit **compounds** at a rate r , increasing the numerator of the ratio; but the growth of the economy raises the denominator at the rate g . The result then is that the contribution of the deficit B_t to D_T is

$$B_t e^{(r-g)(T-t)}$$

Suppose that the economy starts with net debt D_0 . It then follows that

$$(5) D_T = \int_0^T B_t e^{(r-g)T-t} + D_0 e^{(r-g)T}$$

At the same time, the market's implicit forecast (1) implies that the exchange rate is determined by

$$(6) E_t = E_0 - (r-r^*)t$$

and thus that the trade balance is

$$(7) B_t = (E_0 - \bar{E}) - \gamma(r-r^*)t$$

This may be substituted back into (5) and the result integrated. A closed-form solution can be derived by integrating by parts: it is'

$$(8) D_T = \frac{\gamma}{r-g} e^{(r-g)T} \left\{ [1 - e^{-(r-g)T}] [E_0 - \bar{E} - \frac{r-r^*}{r-g}] \right. \\ \left. + \frac{r-r^*}{r-g} T e^{-(r-g)T} \right\} + D_0 e^{(r-g)T}$$

Equation (8) is fairly nasty-looking, but having this closed-form solution is helpful as a way of isolating several key variables.

One question we might ask is whether the decline in the exchange rate is rapid enough to eventually balance U.S. accounts, or whether growing **interest** payments on accumulated debt will outpace the improvement in the trade balance. Suppose that we believe that the U.S. currently has roughly zero net debt. By inspecting (8), we can then see that D_T will explode upward if $E_0 - \bar{E} > \frac{r-r^*}{r-g}$. Thus this in effect becomes a test of whether the market's **expectations** are consistent with solvency. Note that $E_0 - \bar{E}$ is the percentage (logarithmically measured) by which the exchange rate initially exceeds the level which would yield trade balance. This suggests that our discussion should focus on the extent of dollar "overvaluation" in this sense, on the real interest differential, and on the extent to which the real interest rate exceeds the growth rate.

If the exchange rate passes the solvency test, we would still like to know how much debt the U.S. would have to accumulate if market expectations are to be confirmed. As it turns out, the same three variables play a crucial role. To see this, note that (8) gives us D_T as a function of time T . If the solvency test is passed, the debt-GNP ratio eventually reaches a maximum, then turns down. How long does it take to reach

this maximum? If $D_0 = 0$, the time of maximum D , T_{\max} , can be shown to be

$$(9) T_{\max} = \frac{1}{r-g} \ln \left[\frac{r-r^*}{r-r^* - (E_0 - E)(r-g)} \right]$$

T_{\max} is positive if and only if our solvency criterion is satisfied, which should not be surprising.

Once we know T_{\max} , we can plug it in to get D_{\max} , the maximum debt-export ratio implied by market expectations.

All (all!) that we need to do to assess the feasibility of the exchange rate expectations implicit in the current exchange rate is to derive estimates of four variables. These are the real interest differential $r-r^*$; the real interest-growth differential $r-g$; the overvaluation of the exchange rate relative to its trade-balance level $E - E_0$; and a fourth variable which we have not yet emphasized, the responsiveness of the trade balance to the exchange rate, δ . Once we have these variables we can plug them in, determine the path of debt, and ask whether it looks possible.

The market's implicit forecast (May 1985)

We have now seen how to use a few pieces of data plus a lot of assumptions to derive the balance of payments and debt consequences of the exchange rate forecast which implicitly underlies the current strength of the dollar. The next step is to fill in the data--or more accurately, to discuss some-alternative proxies for the data we would like to have. Then we can solve for the implied path of debt and the balance of payments, and ask whether it is feasible.

Data

We have seen that the dynamics of the debt-export ratio given the market's implicit forecast depend on four parameters: the overvaluation of the dollar relative to the level which would produce trade balance, the real interest differential, the difference between the real interest rate and **growth**, and the sensitivity of the trade balance to the real exchange rate: None of these is as well-defined a number in practice as in our model, but we can provide some reasonable estimates.

Dollar overvaluation. By dollar overvaluation we mean the excess of the exchange rate over the level which would produce current account balance. This should not be taken either as a statement about market failure or about desirable policy. We want to test whether the dollar's overvaluation is reasonable given other data, not assert that any

overvaluation in this sense is unreasonable or undesirable:

The procedure I will use for measuring overvaluation is the simple one of assuming that in a base period $E - E_0$ was equal to zero. The base period I will use is 1980, a year in which the U.S. in fact had an approximately zero current account.

This choice is subject to three main objections. First, although 1980 was a year of current balance, at the time many observers believed that if the dollar had remained at that level the U.S. would over time have moved into substantial current surplus—i.e., that in a longer run sense the dollar was undervalued in that year. Second, and working in the opposite direction, the world economic environment has shifted since 1980 in such a way as to reduce the demand for U.S. exports. Sluggish growth in Europe and the third-world debt crisis would, other things equal, require a depreciation in the dollar to leave the U.S. current account unchanged. Third, in 1980 the U.S. current account was in part sustained by earnings on foreign assets; the cumulative current account deficit since then is widely believed to have eliminated the U.S. net creditor position.

On balance, my guess is that the second and third factors outweigh the first. That is, the real dollar appreciation since 1980 represents a minimum estimate of the real depreciation which would be necessary to restore current account balance.

This still leaves the problem of measuring the real appreciation. As Table 1 shows, real appreciation has been very uneven vis-a-vis different countries, posing a serious index number problem. Roughly speaking, we can think of this as a three-part problem. Against Canada, which because of geography and trade agreements is a disproportionately important U.S. trading partner, the U.S. has had only a mild real appreciation. Against Japan the U.S. has had what until recently we would have considered a massive real appreciation. Even this, however, is dwarfed by the rise of the dollar against European countries.

There are several widely used exchange rate indexes which assign weights to countries based either on bilateral or multilateral trade. For the purposes of the paper, however, it is crucial to be sure that we are consistent in our measurement of exchange rates and interest differentials (see below.) Thus it is useful to "roll our own" real exchange rate index.

The estimate of $E - E_0$ in Table 2 weights the data in Table 1 by 1980 bilateral trade weights, yielding an estimated dollar "overvaluation" of .33.

The real interest differential. The first major problem in measuring the real interest differential is that of finding a proxy for expected inflation. A variety of measures have been compared by Blanchard and Sum-

Is the Strong Dollar Sustainable?

TABLE 1

Real Depreciation and Real Interest Differentials

	Real depreciation against U.S. dollar 1980-May 1985^a	Real interest differential against U.S., May 1985^b
Canada	7.7	-0.2
Japan	27.3	-1.97
Belgium	101.8	-1.9
France	90.0	-3.5
Germany	86.3	-3.0
Italy	63.6	-3.4
Netherlands	90.6	-2.5
U.K.	78.4	-2.4

Change in exchange rate from 1980 average to May 10, 1985, deflated by change in consumer prices from 1980 average to February 1985.

Sources: International Financial Statistics, The *Economist*.

^b Difference in long term government bond rates, May 10, 1985 minus difference in CPI inflation, year ending February 1985.

Sources: Ibid.

TABLE 2

Parameter estimates and simulation results

Parameter estimates

$E_0 - E : 0.33$

$r - r^* : 0.024$

$r - g : 0.05$

$\gamma : 0.1$

Simulation results

Number of years
before debt/GNP
ratio stabilizes: 23.3

Maximum debt/GNP
ratio: 45.7

mers (1984) and Frankel (1985); unfortunately the results are quite sensitive to the measure chosen. For the purposes of this paper the real interest rate will be measured by the difference between the government bond rate and the one-year rate of consumer price inflation. The problems with this measure are obvious, but it is not clear that we can do much better.

Beyond this problem, we also have an index number problem, as Table 1 shows. The U.S. appears to have approximately the same real interest rate as Canada, but substantially higher rates than Germany and Japan. Thus as in the case of overvaluation it is necessary to choose weights.

What are the appropriate weights? It should be apparent on reflection that if we take the real interest differential as the market expectation of real depreciation, and we want to estimate the consequences of market expectations for the trade balance, then national interest rates should be weighted according to the same scheme as real exchange rates. It may at first sight seem reasonable to use some alternative weighting, oriented toward financial as opposed to trade importance, but in fact this makes no sense.

Table 2, then, reports an estimate of the real interest differential which uses the same weights as are used to compute dollar overvaluation.

The interest-growth differential. This applies purely to domestic U.S. data and thus poses no index number problems. The major concerns are how to measure the real interest rate—a problem which we have already considered, if not solved—and how to estimate the long-run U.S. real growth rate. In Table 2, the number reported uses the U.S. real interest rate as computed for the interest differential, and assume a long-run growth rate of three percent.

The sensitivity of the trade balance to the exchange rate. This parameter could be derived from econometric estimation. However, such estimates are sensitive to the choice of exchange rate index. Furthermore, there is an implied consistency between the estimate of overvaluation, the current trade deficit, and the assumed sensitivity of trade to exchange rates. That is, according to the model, we should have $(E_0 - E) = B_0$, where B_0 is the current trade deficit as a share of GNP.

This suggests that we can simply invert the relationship and estimate $= B_0/(E_0 - E)$. Essentially this is what I do, but with a modification to take account of lags in trade balance adjustment.

In 1984 the current account deficit was 2.6 percent of GNP, but this gap could be expected to widen: the May 1985 exchange rate was higher than the 1984 average, and the 1984 deficit surely did not reflect the full effects of that year's rate. What I will assume, somewhat arbitrarily, is that a persistence of the May 1985 rate would eventually lead to a non-factor-service deficit of 3.3 percent of GNP. It is arguable that owing to

long-term substitution effects even this number is a serious understatement.

Simulating U.S. debt

We can now use the data in Table 2, together with Equations (8) and (9), to calculate the path of U.S. external debt resulting from the market's implicit forecast of the exchange rate. It is possible to calculate the entire path, but the essential numbers we need to know are only two: how many years does it take before the debt/GNP ratio stabilizes, and how high does this ratio go?

These numbers are reported on the last two lines of Table 2. The calculation finds that the debt to GNP ratio will not stabilize for 23 years, and that the implied ratio is nearly one-half.

These are clearly striking numbers. They imply an extremely persistent U.S. external deficit, and an eventual level of U.S. external indebtedness relative to GNP comparable to that of Mexico or Brazil. Two questions immediately present themselves. First, how sensitive are the calculations to possible source of error? Second, if we accept the calculations, is this a feasible outcome? The calculations reported in Table 2 could be wrong for two reasons: the parameters could be badly estimated, or the whole approach could be wrong.

TABLE 3

Sensitivity tests

		Number of years until debt/ GNP ratio stabilizes	Maximum debt/GNP ratio
$r - r^*$:	.034	13	24.3
	.024*	23	45.7
	.019	41	88.1
$E_0 - E$:	.014		
	.23	13	23.9
	.33*	23	45.7
	.43	45	100.6

*Baseline estimates

Thanks to the simplicity of the analytical framework, assessing sensitivity to parameters is quite straightforward. Table 3 reports some sensitivity tests. (Note that in these tests the initial deficit B_0 is held fixed, and

the estimate of the sensitivity of the deficit to the exchange rate θ is adjusted as necessary.) The most distressing feature of the table is the high sensitivity of the results to the estimate of the real interest differential. A one percentage point increase in our estimate of this differential substantially reduces the time until the debt ratio stabilizes and the level at which it stabilizes. On the other hand, a one percentage point reduction in our estimate pushes us over the boundary of the solvency test: interest payments rise faster than the trade deficit falls, and the debt ratio rises without limit. Since we have emphasized the uncertainty of our real interest rate estimates, this is alarming.

The question is which way an estimate of the expected inflation differential between the U.S. and Germany or Japan based on recent inflation experience is likely to be biased. Many businessmen in the U.S. seem to place at least some weight on the possibility of a resurgence of inflation; suggesting that the real interest differential is smaller, not larger, than the estimate.

More important than questions about the parameters, however, are doubts about whether the framework is right. Most economists, presented with calculations like these, reply by arguing that it is unlikely that things will get this far—something will be done to bring the dollar down long before debt reaches such levels. As I will argue below, this argument actually reinforces the case for viewing the dollar's strength as a speculative bubble.

The remaining question is whether the paths of debt described above are in fact feasible. There is no way to settle this definitively. Essentially one must ask whether the presumed political stability of the U.S. exempts it from Latin-style crises of confidence, or whether on the contrary the size of the U.S. makes it impossible for it to engage in Latin-level external borrowing. At least we should recognize that the level of the dollar does imply a forecast of an eventual accumulation of immense debt—and that it is unlikely that many international investors have thought this through.

Allowing for uncertainty

A decline of the dollar slow enough to justify its current strength would lead in the long run to a huge U.S. foreign debt. In the long run, however, we are all... When the unacceptable consequences of the strong dollar lie many years in the future, it seems natural to discount them on the grounds that something will happen long before we reach that point.

It is certainly true that we should allow for uncertainty in assessing the sustainability of the strong dollar. However, it is important to be careful

in specifying the nature of the uncertainty. Uncertainty about the security of foreign assets—the safe haven **argument**—**does** mitigate the consequences of the calculations reported above. The expectation that sometime in the next **25** years something will be done about the dollar, on the other hand, reinforces the argument.

The safe haven argument

The safe haven argument holds that capital flows into the U.S. are motivated not merely by interest differentials but also by a perception that the U.S. is a more secure place in which to invest. In principle this is a reasonable argument. It is usually, however, stated loosely in a way which fails to show its limitations.

First, we must bear in mind that what needs explaining is the strength of the dollar vis-a-vis other industrial country currencies not vis-a-vis cruzeiros or pesos. A useful safe haven argument must explain why an international investor would hold dollar securities rather than mark securities even if the expected rate of dollar depreciation exceeds the interest differential.

Second, the relevant margin of choice is between interest-bearing securities. This means that the general consideration which safe haven advocates often invoke, such as differences in national growth prospects, are relevant only if they affect the prospects for repayment on these securities. An investor may feel that America is reinvigorated while Europe is stagnant, but this only affects our calculations in the last section if European stagnation translates into an increased probability that bonds issued by European governments will not be honored.

To put it bluntly: the safe haven argument, to help explain the strength of the dollar, must be an argument that the market attaches a significant probability to the prospect that claims on Europeans or Japanese will at some point be repudiated or expropriated.

If we grant this argument, it is a powerful one. Suppose that there is a perceived three percent chance in any given year that the Red Army will overrun Europe and the Red Navy overrun Japan. Then international investors would be willing to hold U.S. assets even at an expected return differential of minus **three percentage** points. Turning this around, the market's implicit forecast for the real exchange rate if Russia does *not* attack is for a decline at **5.4** percent per year, rather than **2.4 percent**—sharply reducing the implied debt accumulation.

We could argue about whether this scenario is plausible. The important question, however, is whether the market **believes** that claims on European countries are really subject to more political risk than claims on the United States. Here there is a major piece of counter-evidence:

Eurodollar interest rates do not significantly differ from U.S. rates. This constitutes *prima facie* evidence that the role of political risk does not allow us to dismiss calculations that suggest that a sustained high dollar will lead to heavy debt accumulation.

Possibility of a dollar stabilization

The most common argument against long-term calculations of the kind reported in the third part of this paper, "The market's implicit forecast (May 1985)," is that given the uncertainty in the world we will never see that long run, and that it should therefore not be a source of concern. As we have just seen, one type of uncertainty, fears of expropriation, does in principle allow us to downplay the importance of long-run issues. We have rejected the safe haven argument for the dollar's strength; but it may seem plausible to imagine that other forms of uncertainty will be similar in their implications.

One particularly common argument is that long-term forecasts of the effects of a strong dollar are irrelevant because government policy will not in fact allow the strong dollar to go on indefinitely. On this argument, in any given year there is some probability that the underlying causes of the strong dollar will be eliminated. The U.S. will finally deal with its budget deficit, other industrial countries will adopt more expansionary fiscal policies, and so on. If this probability is high enough in each year, the likelihood that the strong dollar will go on long enough to produce the results described above will be small—and the argument is that therefore the long run can be disregarded.

Although this argument may seem plausible, however, it is in fact wrong. Indeed, the possibility that something will be done about the exchange rate makes it more likely, not less, that the current strength of the dollar represents in part a speculative bubble.

One way to get some intuition on this is to imagine first that there were no possibility of a change in policy that would bring the dollar down. In the absence of a speculative bubble the market's implicit forecast, as constructed earlier, would have to imply feasible paths for deficits and external debt. Now suppose that we add to this situation the possibility of a sudden fall in the dollar due to changes in policy. Surely the effect of this addition, given rational expectations, would be to *lower* the exchange rate. This makes it very peculiar to turn around and argue that an exchange rate which seems to imply infeasible debt accumulation does not represent a bubble because there is a possibility of a plunge in the exchange rate somewhere along the way.

To see the right way to think about this issue, it is useful to draw an analogy with a somewhat similar issue, the pricing of gold. In a classic

analysis of the pricing of gold under rational expectations, Salant and Henderson (1978) pointed out that the market is always facing some probability of a gold auction by governments, which would depress the price. What they showed was that with rational expectations, the price of gold between auctions must obey the following rules: (a) the price must rise at a rate exceeding the interest rate by an amount which just compensates investors for the risk of capital loss if an auction occurs; and (b) given this rate of price increase, the level of the price must be such that the path of prices if *no auction occurs* is just *feasible*—in their context, the consumption of gold over time must just exhaust the initial stock of gold.

How does this analogy apply to the dollar? If there is a probability of sudden decline in the dollar due to a change in policy, and we have rational expectations, then (a) the market must expect that if the dollar does not plunge it will decline at a rate which is *less* than the interest differential, by an amount which compensates investors for the expected capital loss from a plunge, and (b) this path **must** itself be feasible.

Suppose, for example, that the real interest differential is three percentage points, and that the market believes that there is a five percent chance that in any given year the dollar will plunge by 40 percent. Then investors must expect that during years in which the dollar does not plunge it will fall at only one percent per year, so that they are compensated for the expected two percent capital loss. And if the investors are behaving appropriately, they must believe that a path on which the dollar declines only one percent per year is itself feasible.

We have already seen evidence to suggest that it will be hard to reconcile any significant probability of action to bring the dollar down with a feasible path for U.S. external debt. Even if the dollar declines by the full amount of the interest differential, the accumulation of debt will be extremely large, and we have seen that the eventual accumulation is very sensitive to the expected rate of decline. At the same time, the dollar is sufficiently above the level that would produce current account balance that a fall to that level would impose a very large capital loss on holders of dollar securities. What this means is that even a small probability of such a fall will require a much more gradual decline or even a rise in the dollar until the decline takes place, implying rapid accumulation of debt.

The market's implicit forecast when dollar stabilization is a possibility

We have just argued that introducing a significant probability of a dollar stabilization means that the market is implicitly forecasting very rapid debt accumulation until this stabilization occurs. The purpose of this section is to confirm this argument with illustrative simulation exercises.

Unfortunately it is not possible to state this problem in a way that leads to a closed-form expression like that in "A framework for assessing sustainability." Thus we will shift here to a discrete-time framework. This means that the results do not correspond exactly with the results in "The market's implicit forecast (May 1985)", although they are quite close.

The discrete-time model is set up as follows. First, we have a debt accumulation equation,

$$(10) D_t = (E_t - \bar{E}) + (1 + r - g) D_{t-1}$$

where D and E are defined as before.

On the exchange rate side, we now allow for the possibility of a dollar stabilization. It is assumed that there is a constant probability that policy actions will bring the dollar down to a level which stabilizes the **debt/ GNP** ratio D . Let \tilde{E}_t be this exchange rate; it is clearly defined by

$$(11) \tilde{E}_t = \bar{E} - \frac{r-g}{\gamma} D_{t-1}$$

Our equation for exchange rate dynamics must have the expected capital loss from dollar decline just equal the interest differentials. If the dollar is not stabilized, the capital loss is $E_{t-1} - E_t$. If the dollar is stabilized, it is $E_{t-1} - \tilde{E}_t$. Thus until stabilization takes place we must have

$$(12) (1-\pi)(E_{t-1} - E_t) + \pi(E_{t-1} - \tilde{E}_t) = r = r^*$$

which may be rearranged to yield

$$(13) E_t - \bar{E} = \frac{\pi}{1-\pi} \frac{r-g}{\gamma} D_{t-1} + \frac{1}{1-\pi} (E_{t-1} - \bar{E}) - \frac{1}{1-\pi} (r-r^*)$$

Equations (10) and (13) define an easily simulated system in E and D .

We can now turn to the issue we raised: what are the effects of introducing some risk of a dollar stabilization? Table 4 reports the results of two simulations. In the first simulation π is set equal to 0.067, implying a 50 percent chance of dollar stabilization within 10 years; in the second simulation it is set at 0.129, implying a 50 percent chance of dollar stabilization within five years.

The right way to read the table is as a series of statements of the following kind: "If I believe that there is a 50 percent probability that something will be done about the dollar in the next five years, and if I also

TABLE 4

Debt/GNP ratios under uncertainty

	50% probability of dollar stabilization within:	
	10 years	5 years
Debt/GNP ratio after 10 years if no stabilization:	43	71
³ Debt/GNP ratio after 20 years if no stabilization:	135	460

believe that the current value of the dollar is justified, then I must believe that it is feasible for U.S. external debt to grow to 71 percent of GNP within ten years, since there is a 25 percent chance that nothing will be done about the dollar over that time.”

The results are clearly striking. To understand them, note that if there is a substantial probability that the dollar will fall sharply, investors will hold dollar securities only if they otherwise yield a substantial premium over foreign assets. Even in the low Π case, this turns out to require an actual rise in the dollar as long as the stabilization does not occur; and this rise takes place at an accelerating rate. The result is snowballing U.S. external debt.

The point of this exercise should be made clear. Once again, the exercise is not an actual forecast. Instead, it aims to draw out the necessary implications of beliefs about the exchange rate. In this case, what the exercise says is that if you believe that the probability of dollar stabilization is high enough that we need not worry about very long run forecasts, you must either believe that expected capital losses from a declining dollar exceed the interest differential—i.e., that the market has got it wrong—or that it is possible for the U.S. to have a very rapid growth of external debt.

Protectionism as a policy response

We have now seen that introducing the possibility of action to correct the exchange rate makes it harder to argue that the market is justified in valuing the dollar as high as it does. To conclude this part of the paper, however, it might be useful to point out that “doing something about the

dollar" might involve treating symptoms rather than causes—and that this might in a peculiar way help justify the dollar's strength.

Suppose that governments are not in fact willing to address what most economists regard as the causes of the strong dollar, but instead try to insulate their economies from the consequences of the exchange rate. Suppose, for example, that the U.S. imposes import tariffs and export subsidies, or that other countries impose exchange controls which give rise to a divergence between commercial and financial rates of exchange. Then the result would be to break the link between the market's implicit exchange rate forecast and any necessary balance of payments consequences.

What this amounts to saying is that it is possible to justify the strong dollar if one believes that market participants expect the overvalued exchange rate to be validated by protectionism.

There is no simple way to test whether this is true. All that one can say is that the idea of a protectionist validation for the dollar is not common currency among businessmen. Strong proponents of efficient markets may argue that investors act as if they knew things they do not appear consciously to understand; against this argument there is no defense except that of plausibility.

Prospects for the dollar

"The market's implicit forecast (May 1985)," presented earlier in this paper offered evidence that the dollar is stronger than warranted by the interest differential between the United States and other industrial countries. "Allowing for uncertainty" went on to argue that the nature of the uncertainty facing international investors is such as to reinforce the conclusion that the strength of the dollar in some degree represents a speculative bubble. The obvious next questions are when the bubble will burst, and how far the dollar will fall.

Inevitably the answers to these questions are both for the most part the disappointing one that we don't know. This paper will not yield any hot tips to be used for immediate speculative purposes. The best we can do is, first, to explain *why* no definite answer can be given, and second, to provide at least some bounds on the extent of the plunge.

When will the bubble burst?

The method used in this paper is by nature ill-suited to predicting the actual future path of the dollar. We began by adopting as the maintained hypothesis the assumption that the market is in fact making a rational forecast, then argued that the market's implicit forecast is not feasible.

This shows that rational expectations is not the right model, but gives us no clue to what the right model is.

The point is that we have very little idea of how to model asset markets other than via the assumption of rational expectations. The historical record has been described by such authors as Kindleberger (1978), and vivid literary discussions such as the famous essay of Keynes (1937) may be found, but these are not as helpful as we might like.

All that we can say with any assurance is that when the dollar does decline it will reveal its speculative component either by plunging for no apparent reason or by reacting disproportionately to whatever change in the fundamentals appears to set it off.

How much will the dollar decline?

As a preliminary to asking how much the dollar will decline when it finally does, it seems natural to ask how much of the dollar's current strength represents a speculative bubble. As we will *argue* in a *moment*, this is not necessarily a good indicator of what will happen when the bubble bursts. Nonetheless, it is surely an interesting question in its own right.

What we have argued is that given the combination of a fairly small interest differential and some probability of a sharp decline in the dollar when policy is changed, the current value of the dollar would lead to an infeasible level of U.S. indebtedness. To estimate the "bubble component" of the exchange rate, then, what we need to do is to decide how high a debt level is feasible and how high a probability of a policy change there is in any given year, then find the level of the exchange rate which would keep debt within this bound while offering investors compensation for the expected capital loss.

Of course we do not in fact know what level of debt is too much or how likely a policy shift is. The best we can do is to present a menu. This is done in Table 5.

The table asks how much the exchange rate would have to depreciate given several different estimates of the probability of policy change, measured by the probability of something being done within the next five years, and for several different estimates of the maximum sustainable U.S. *debt/GNP* ratio. As in Table 4 it is assumed that the effect of a policy change would be to lower the dollar to precisely the point at which the *debt/GNP* ratio stabilizes.

Two important points can be learned from this table. The first is that for plausible values the speculative bubble component of the dollar's strength is substantial. If one believes that there is a 50 percent chance that the dollar will be brought down over the next five years, and that the

TABLE 5

Speculative bubble component of dollar

	<u>Maximum allowable debt/GNP ratio</u>		
	<u>20</u>	<u>40</u>	<u>60</u>
Zero probability of dollar stabilization	.06	—	—
50% probability of dollar stabilization within 10 years	.14	.12	.
50% probability of dollar stabilization within 5 years	.19	.19	.

U.S. cannot accumulate an external debt of more than 20 percent of GNP, the dollar should be 19 percent lower than it now is.

The second lesson, however, is that there is still a substantial justified component to the dollar's strength. For the same case, even if the speculative bubble were eliminated, the dollar would still be at a level 14 percent above the level which would produce a balanced current account.

It is tempting to argue from this that when the dollar falls it will fall only part of the way, and that therefore fears of a plunge to below 1980 levels are unjustified. The problem is that if one accepts the argument of this paper, the market has not been behaving as if it makes a rational assessment of long-term prospects. What will happen when the market revises its opinion is unlikely to be a sudden access of rational expectations. Rather, the market will simply go make a new set of mistakes. These mistakes could, though they need not be, in the opposite direction, leading to an excessively weak dollar rather than an excessively strong one. Thus it is possible, though not certain, that we will see an abrupt shift from an overvalued to an undervalued dollar.

What we can say with greater certainty is that the longer the strong dollar persists, the farther it is likely to fall. The reason is simply growing indebtedness. The formula for E , the exchange rate which would stabilize the debt-GNP ratio, makes this clear: every percentage point added to the debt-GNP ratio reduces E by half a percentage point. Since a continuation of the current exchange rate would imply a debt-GNP ratio of nearly 20 percent by 1990, this is not a negligible factor.

Conclusions

This paper has committed what is usually regarded as a cardinal sin in economics. It has argued that a major financial market has simply made a mistake, failing to make proper use of information available to it. I have attempted to demonstrate that given the relatively modest incentives to hold dollars, and especially given the possibility of an eventual exchange rate stabilization which brings the dollar down, the willingness of international investors to acquire growing claims on the U.S. is misguided. It appears that the market has simply not done its arithmetic, and has failed to realize that its expectations about continued dollar strength are not feasible.

Making a pronouncement like this violates the normal practice of economics. It is a well-established rule in economics that one should always assume that the participants in a market understand it better than you do—after all, they have both more resources and stronger incentives. To second-guess investors with so much at stake is a gross violation of this rule. Yet perhaps we can offer some support for breaking the rule this one time.

First, we should notice that the strong dollar **lies** well outside the range of experience of anyone in the marketplace. No matter how much experience an exchange trader or portfolio manager has had, **he/she** has never seen anything like this. The assumption of market efficiency is often justified on an evolutionary basis: over time market participants develop instincts or rules of thumb which enable them to act "as if" they were solving optimal forecasting problems. When the event lies outside previous experience, this evolutionary argument will not work.

Second, the type of analysis required to assess the sustainability of the dollar is economic analysis. The important things to consider are macro variables such as deficits and debt, not details of the financial markets. In other words, the necessary talents required are those of a professional economist rather than an exchange trader or a portfolio manager.

All of this brings us to the final point. Some economists must sometimes be willing to say that the market is **wrong**. If the market has nothing to go on but economic analysis—which is the case here—and economists always assume that the market is right, we have a circularity which allows the exchange rate to drift at will. And perhaps that is just what has happened.

References

Blanchard, O. J. and L. Summers (1984): "Perspectives on High World

- Real Interest Rates," *Brookings Papers on Economic Activity*, 2: 1984.
- Eaton, J.** and M. Gersovitz (1981): "Debt with Potential Repudiation: Theoretical and Empirical Analysis," *Review of Economic Studies* 48 (no. 152), pp. 289-309.
- Frankel, J.** (1982): "Monetary and Portfolio - Balance Models of Exchange Rate Determination," in J. Bhandari and B. Putnam, eds., *Economic Interdependence under Flexible Exchange Rates*, MIT Press.
- (1985): "**The Dazzling Dollar**," *Brookings Papers on Economic Activity*, 1:1985.
- Keynes, J.M. (1937): "The General Theory of Employment," *Quarterly Journal of Economics*, 51, pp. 209-23.
- Kindleberger, C. (1978): *Manias, Panics, and Crashes*, Basic Books.
- Krugman, P.** (1980): "Consumption Preferences, Asset Demands, and Distribution Effects in International Financial Markets," NBER Working Paper No. 651.
- (1985): "International Debt Strategies in an Uncertain World," in J. Cuddington and C. Smith, eds., *International Debt and the Developing Countries*, World Bank.
- Marris, S.** (1985): "The Decline and Fall of the Dollar: Some Policy Considerations," *Brookings Papers on Economic Activity*, 1:1985.
- Sachs, J. (1984): *Theoretical Notes on International Borrowing*, Princeton Essays in International Finance.
- (1985): "The Monetary-Fiscal Mix and the Dollar," *Brookings Papers on Economic Activity*, 1:1985.
- Salant, S. and D. Henderson (1978): "Market Anticipations and the Price of Gold," *Journal of Political Economy*.
- Stekler, L. and P. Isard (1985): "U.S. International Capital Flows and the Dollar: Recent Developments and Concerns," *Brookings Papers on Economic Activity*, 1:1985.