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The Appreciation of the Dollar: An Analysis
of the Safe-Haven Phenomenon

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Summary

While many analysts have associated part of the dollar's appreciation since 1980 with changes in real interest differentials, virtually all have admitted to a large degree of ignorance under such labels as "safe-haven factors," "shifts in asset preferences," or "levitation effects." The latter part of the dollar's appreciation is the subject of this paper. The dollar's rise has accompanied a number of other notable events, including debt crises for the developing countries and their creditors, a marked improvement in the climate for investment in the United States, and a significant rise in unemployment and economic malaise in Europe. These events undoubtedly have led to significant reassessments of the relative attractiveness of holding assets in different countries.

Against this perspective, it is appealing to analyze the dollar's appreciation with a simple intertemporal consumption model that focuses on the consumer's choice of where to hold savings. Savings held in different countries are exposed to "penalties," where the term "penalty" is broadly defined to include formal taxation, the postponement of interest and principal payments, confiscation, destruction of property, and so forth. The model predicts that changes in the relative attractiveness of countries as safe havens generate changes in the relative prices of traded and non-traded goods. The intuition behind this result is that the relative price of traded goods changes as residents of high risk countries attempt to insure their future consumption by bidding for and exporting traded goods to store or exchange for assets in the relatively safe country. When augmented by an assumption concerning the stance of domestic stabilization policies, the relative price changes lead to predictable changes in nominal exchange rates.

* All views expressed are strictly the authors' and do not necessarily represent the views of the Fund or the Federal Reserve System.

1. Introduction and plan of study

The discussion is divided into four sections. Section 1 uses the intertemporal consumption framework to analyze the implications of the assumption that the United States has become considerably more attractive as a safe haven in recent years. It is shown that such a change in the economic environment would require declines in the prices of tradable goods relative to non-tradables within the United States and increases in the relative prices of tradable goods outside the United States. Given these changes in the relative prices of tradables, Section 2 relates the appreciation of the dollar's nominal exchange value to the stances of monetary policies in the United States and abroad. Section 3 emphasizes that the currency denomination of assets and liabilities is not a central feature of the analysis as it is in conventional portfolio balance models of exchange rate determination. Finally, Section 4 attempts to provide an empirical basis for judging whether the dollar has appreciated to irrational or unsustainable heights.

2. Safe havens and the relative prices of tradables

The safe-haven argument can be developed by considering a two-country world in which each country produces and consumes non-tradable and potentially tradable goods. Assume initially that there are no financial assets so that purchasing power can only be saved by storing goods. In the first country, goods can be stored for future consumption with no prospect of taxation or other penalties; in the second country, stored goods are subject to a significant likelihood of taxation. Under autarky, the prospect of taxation would tend to discourage the residents of the second country from saving in the first period.

The opportunities for international trade, however, can significantly expand the two-period consumption possibilities set for residents of the second country--not only through the traditionally emphasized channels of expanding the menu of goods and providing scope for exploiting comparative advantages in production, but also by creating opportunities to store goods in countries in which expected tax rates and other anticipated penalties are relatively low. In particular, the opportunity to export tradable goods, generate a trade surplus, and store purchasing power abroad raises the rate at which the residents of the second country can transform first-period consumption possibilities into second-period consumption possibilities. 1/ As a consequence, the opening up of trade will lead

1/ We are assuming that governments face difficulties in taxing goods (or purchasing power) stored abroad, not only while they are stored, but also when the owners attempt to enjoy their "second-period consumption." In reality, the prospect of immigration in order to enjoy "second-period consumption" may be quite important to the analysis of the safe-haven phenomenon.

residents of the country that taxes savings to bid up the first-period price of tradable goods relative to the price of non-tradables in their home country. The exports of the country that taxes, moreover, will add to the relative supply of tradables in the safe-haven country. To the extent that residents of the "unsafe" country sell their exports in order to store their purchasing power in the form of non-tradable goods (e.g., real estate)--or in the form of financial assets in an extended and more relevant model--the first-period price of tradables will decline relative to the price of non-tradables in the safe-haven country. These relative price movements will be greater, other things equal, the greater is the expected tax rate.

An implication of this simple analytic framework, which may be important for understanding the safe-haven elements of the dollar's appreciation since 1980, is that the relative prices of tradables and non-tradables will be affected by changes in the extent to which goods or assets stored in different countries are perceived to be exposed to taxation or other penalties. As noted above, the relevant concept of taxation includes formal taxes, confiscation, destruction of property, freezing of assets, failure to make interest payments or principal repayments--in general, anything that reduces the extent to which assets (or first-period savings) can be transformed into second-period consumption. 1/ In this context, it is widely contended that there have been substantial changes in recent years in the anticipated penalties associated with holding assets in the United States, Europe, the debt-burdened developing countries, and the rest of the world. Since 1980, changes in the U.S. tax and regulatory environment and the general political climate are alleged to have increased the attractiveness of storing purchasing power over future consumption within the United States. At the same time, rising unemployment and economic malaise may have reduced the attractiveness of Europe as a haven for accumulating wealth, and debt crises have provided strong incentives to shift wealth out of the developing countries. 2/

1/ The expected inflation tax can be separated from other forms of taxation in analyses that relate part of the dollar's appreciation to changes in expected real interest differentials.

2/ In reality, the world is complicated by the existence of multiple tax jurisdictions within single countries. Eurocurrency assets--to the extent that they fall outside the tax jurisdictions of national authorities--may have also become significantly more attractive to residents of Europe and the developing countries in recent years as instruments for protecting purchasing power over future consumption.

The mechanism through which changing perceptions of safety lead to relative price adjustment may be clarified by several examples. In the simplest case of a two-good model without financial assets, it seems obvious that an increase in the prospect of an earthquake in one part of the world would lead economic agents to bid down the relative price of non-tradables (real estate) in that part of the world and to bid up the relative price of non-tradables elsewhere, thereby setting in motion the type of relative-price adjustment that our analysis has stressed. It is important to emphasize, moreover, that residents of the quake-prone region could only obtain real estate elsewhere by exporting tradable goods in exchange.

Analogously, in a world in which financial assets are used as a medium of exchange and a vehicle for storing purchasing power, economic agents would try to shift out of financial holdings in one part of the world into financial holdings in the safe haven. Because there are two sides to every market transaction, however, economic agents as a group cannot shift their net financial assets from one part of the world to another without opposite current account flows. So even in a model with financial assets, relative prices of goods must adjust to generate the necessary current account flows if wealth holders are to be successful as a group in shifting the location of their net financial assets. Thus, the relative price of tradables must increase to generate a current account surplus outside the safe-haven country, while inside the safe-haven country the relative price of tradables must decrease to generate a current account deficit. ^{1/}

2. Nominal Exchange Rates Under Alternative Stabilization Policies

In this section changes in nominal exchange rates are related to the change in relative prices discussed above. We will derive a "reduced form" relationship between the exchange rate and the current account balance that appears quite familiar. However, it should be noted that in this framework changes in nominal exchange rates are not causing adjustments in the current accounts; they are simply endogenous variables responding to changes in the safe-haven status of different countries.

^{1/} We are making the normal assumption that a rise in the relative price of tradables encourages production and discourages absorption of tradables, and vice versa. As the movement of goods and services to the safe-haven country proceeds, it should be expected that real "yields" in the safe-haven country will fall, assuming that investment or storage opportunities are not perfectly elastically supplied; and the reverse will occur in the relatively unsafe country. These changes over time in the relative "yields" at the margin on capital inflows into the safe-haven country will be associated with changes over time in the relative prices of tradables and non-tradables.

In progressing from a discussion of relative price determination to the determination of nominal prices it is necessary to focus on the behavior of the monetary authorities. In particular, we maintain that the level and expected changes in dollar exchange rates have reflected rational market perceptions that policies in the United States and in other industrial countries were oriented toward stabilizing domestic-currency price indexes for broad composites of tradable and non-tradable goods. Thus, changes in prices of tradables relative to non-tradables were constrained to occur at low rates of general price inflation, which put downward pressure on the dollar prices of tradables in the United States and upward pressure on the home-currency prices of tradables abroad. As a first approximation--although a very poor one 1/--the change in the nominal exchange rate can be regarded as the change in the dollar price of tradables relative to the price of tradables measured in foreign currency units. Accordingly, under the given stances of stabilization policies, rational investors could predict that shocks that increased the attractiveness of holding assets in the United States would also lead to an appreciation of the exchange value of dollar-denominated assets. This statement does not deny that the appreciation of the dollar accompanied a shift in ex-ante demands for dollar-denominated assets, but rather suggests that the shift in these demands was an endogenous phenomenon. 2/

The point is emphasized by considering an alternative regime in which policies are oriented toward stabilizing the domestic-currency prices of tradable goods--somewhat analogous to commodity price stabilization rules. Such policies would not affect the behavior of non-tradable goods prices relative to tradable goods prices, or the changes in those relative prices in response to changes in the anticipated penalties from holding assets in different locations. Rather, such policies--if effective--would force relative price changes to occur through changes in the absolute prices of non-tradables, and would stabilize (to a first approximation) the nominal exchange rate. Consequently an appreciation of the dollar is not a necessary implication of an increase in the demand for assets located in the United States.

1/ There is now an extensive literature documenting that the "law of one price" holds poorly for even the most disaggregated categories of manufactured goods for which price data are available. There is also econometric evidence that changes in nominal exchange rates are not "passed through" completely into changes in the prices of tradable goods.

2/ It is interesting to note that investors must forecast both the relative price change and the policy response of the authorities. Given the complexity of this problem it is not surprising that the exchange rate adjustment has been drawn out over time as market participants assess likely outcomes.

3. The currency composition and country exposure of asset portfolios

It should also be emphasized that the framework we have suggested for analyzing the appreciation of the dollar since 1980 provides no role for the currency denomination of the financial assets and liabilities that were outstanding in 1980. To be sure, the stocks of moneys and other assets denominated in different currencies, and the rates of changes in those stocks, have had significant effects on nominal interest rates and on the actual and expected behavior of general price levels; part of the appreciation of the dollar since 1980 can be associated with relative inflation rates and changes in expectations about real interest differentials. But the focus of our analysis has been on the safe-haven phenomenon of exchange rate movements triggered by shocks which change the relative penalties anticipated from storing purchasing power in different countries. Such shocks to the perceived rates of transformation between current and future consumption possibilities lead, in the first instance, to changes in the stocks of assets that countries desire to accumulate in safe havens. Whether such shifts in preferences for assets held in different locations in turn induce shifts in preferences for assets denominated in different currencies depends, as we have noted, on the orientation of domestic stabilization policies. The derived nature of preferences for assets denominated in different currencies in the analysis of the safe-haven phenomenon, together with the failure of econometric efforts to find convincing evidence that exchange risk premia are significant in magnitude, suggests to us that existing portfolio-balance models of exchange rate determination have been misguided in defining preferences over the currency denomination of assets, rather than over the political jurisdictions or geographical locations within which portfolio holders choose to hold their claims over future consumption.

It is also our view that existing portfolio balance models place too much emphasis on changes in portfolio shares that arise through valuation effects. The United States in 1980 was a net creditor to the rest of the world, with U.S. claims and liabilities both denominated predominantly in dollars. Accordingly, it would seem inappropriate to argue that the appreciation of the dollar provided capital gains to the rest of the world in the aggregate. It was only through current account flows, rather than valuation effects, that foreigners as a group could substantially increase the share of their net worth held as net claims on the United States.

4. The rationality and sustainability of the dollar's appreciation

The analytical framework developed in this paper suggests that current account imbalances can result from changes in the stock of net claims on safe-haven countries that nonresidents desire to accumulate. The analysis suggests that an increase in the desired stock of such claims

will be followed, initially, by changes in the relative prices of tradable goods and an appreciation of the exchange value of the safe-haven country's currency. Since nonresidents as a group cannot instantaneously acquire additional net claims on the safe-haven country, the changes in the relative prices of tradables and the exchange rate play an important role in generating the current account imbalances through which the desired net claims can be accumulated over time.

Although safe-haven considerations can certainly explain the direction of the dollar's movement since 1980, the magnitude of the dollar's appreciation has raised questions about the rationality of market participants and the sustainability of the appreciation. In order to provide some empirical perspective on these questions, this section presents some calculations of the extent to which nonresidents would build up net claims on the United States under various assumptions concerning the paths for dollar exchange rates over the medium-term. One appealing assumption is that changes in dollar exchange rates over time will be consistent with the rates implicit in the current forward discounts (or premiums) of the dollar against other currencies. It may be noted that the dollar is currently at forward discounts of several percent per year against the yen and the mark.

On this basis, we consider whether a 2 to 4 percent per year depreciation of the dollar against other currencies, and its implications for current account flows, is consistent with building up over time a portfolio position that could conceivably be desired by market participants. More precisely, we are exploring the joint implications of the dollar's appreciation to date and a projected gradual depreciation. Although we have based the projected gradual depreciation on market forward rates, it is also consistent with our conceptual framework. Exchange rates "overshoot" initially in response to a reassessment of the returns (after "penalties") on investments in (or financial claims on) different countries, because slow adjustment of current account balances (or flows of goods and services) constrains the rate at which net assets can be built up in the safe-haven country. Subsequently, exchange rates can be expected to rebound in real terms toward the levels that prevailed before the reassessment. Within the conceptual framework, the expected depreciation of the dollar--and the associated changes in the relative prices of tradables in the United States and abroad--can be viewed to reflect a diminishing marginal utility of net claims on the United States as the stock of those net claims is built up over time through U.S. current account deficits.

Table 1 shows the calculations. The assumed rates of change in the prices and volumes of U.S. exports and imports are consistent with assumptions of 4 percent annual inflation and 3 percent annual activity growth in both the United States and abroad. The dollar price of U.S. exports

Table 1. Cumulative U.S. Current Account Deficits
for Alternative Exchange Rate Paths

Percent change per year in:	(1)	(2)	(3)
Dollar exchange rates	-2	-3	-4
U.S. inflation rate	4	4	4
Foreign inflation rate	4	4	4
U.S. real expenditure growth	3	3	3
Foreign real expenditure growth	3	3	3
Dollar price of U.S. exports	4	4	4
Dollar price of U.S. imports	6	7	8
Volume of U.S. exports	6.5	7.5	8.5
Volume of U.S. imports	2.5	1.5	0.5
Dollar value of U.S. exports	10.8	11.8	12.8
Dollar value of U.S. imports	8.7	8.6	8.5
Number of years until U.S. trade deficit is eliminated	19	13	10
Cumulative U.S. current account deficit (\$ trillions) <u>1/</u>	5	2-1/4	1-1/2

1/ In addition to the assumptions discussed in the text, the calculations assume a nominal interest rate of 7-1/2 percent, slightly greater than the projected growth rate of U.S. aggregate demand in nominal terms. In each year, the U.S. current account deficit is projected to change by the sum of the change in the trade deficit plus 7-1/2 percent of the previous year's addition to U.S. net external debt (i.e., the previous year's current account deficit.)

is assumed to increase at 4 percent annually, and the dollar price of U.S. imports at 4 percent plus the rate of depreciation. Based on volume elasticities of 1.5 with respect to activity growth and 1.0 with respect to relative price, the volume of U.S. exports is assumed to increase annually by 4.5 percent plus the rate of depreciation, while the volume of U.S. imports increases annually by 4.5 percent minus the rate of depreciation. These price and volume changes imply the annual percent changes shown in the table for the dollar values of exports and imports. 1/

The table indicates that, under these assumptions, at a 2 percent annual rate of depreciation it would take approximately 19 years to eliminate the U.S. trade deficit (column 1). Moreover, it is estimated that the cumulative current account deficit over that period would increase U.S. net liabilities to foreigners from around 0 at the end of 1984 to about \$5 trillion by the end of 2003, the year in which the trade deficit would be eliminated. On the other hand, at annual rates of depreciation of 3 or 4 percent, the U.S. trade deficit is eliminated in 13 and 10 years, respectively, with cumulative current account deficits of about \$2.25 trillion and \$1.5 trillion (columns 2 and 3). In all these cases the dollar depreciates very substantially, but in each case depreciation is gradual and prolonged.

The plausibility of sustaining a gradual 3 or 4 percent annual decline in the dollar over prolonged periods hinges on whether nonresidents would willingly accumulate the implied stocks of net claims on the United States. As a ballpark estimate, private nonresident net holdings of the public sector debts of their own countries plus claims on the United States plus tangible assets would be around \$25 trillion equivalent after 13 years if the dollar depreciated at 3 percent per year; 2/ thus private nonresidents' net claims on the United States might amount to no more than 10 percent of their net worth. That magnitude, in our

1/ The calculations define exports and imports to include goods plus non-investment-income services and assume that these flows will total \$275 and \$400 billion, respectively, in 1985. These assumptions make allowance for the lagged effects of the dollar's appreciation through early 1985.

2/ The public debt of the G-10 countries other than the United States can be projected to exceed \$9 trillion-equivalent in 13 years if general government debts remain about half as large as (or grow at the same rate as) gross domestic products, and if nominal dollar-equivalent GDPs grow at 10 percent annually (3 percent real, 7 percent prices translated into dollars). Moreover, if private foreign net savings remains in the neighborhood of 13 percent of GDP, cumulative savings over the 13 years will approach \$19 trillion, of which about \$9 trillion would be used to acquire additional claims on public sectors plus claims on the United States while about \$10 trillion would finance investments in tangible assets. The \$19 trillion cumulative flow of net savings adds to initial (end-1984) holdings of nearly \$3 trillion of claims on public sectors plus another \$3 trillion, perhaps, of tangible assets.

opinion, could quite plausibly be interpreted as a desired share, given our impression that events of the past four years have substantially increased the attractiveness of the United States as a haven for sheltering purchasing power over future consumption from relatively high expected levels of risks of taxation or other penalties on assets held elsewhere. 1/ Accordingly, our calculations challenge contentions that the dollar has risen to irrational heights and provide some support for predictions that the dollar's exchange value may decline only gradually over time.

1/ . The attractiveness of the United States as a safe-haven may be enhanced considerably to the extent that it has maintained a relatively open immigration policy toward wealthy foreigners.