June 29, 95; addendum revised July 12, 95.

Is The Dollar Losing its Role as a Reserve Currency and If So, What Does This Mean?

or

Reports of the Dollar's Demise Are Greatly Exaggerated

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The use of the dollar as an international currency has been declining gradually for over twenty years. In the past year, however, the issue suddenly became a topical one, as foreign exchange traders and financial journalists search for an explanation of recent declines in the value of the dollar, versus the mark and yen. (These two are the leading rivals of the U.S. currency for "international currency" status.) The discussion was in part stimulated by the February 25, 1995, issue of *The Economist*, which included an article and leader arguing that "the dollar's dominance is waning," at the

expense of the DM in particular. Typical of the subsequent articles lamenting the decline of the dollar (though far better argued than most) is one by Kindleberger (1995, p.6), which concludes that the dollar may be "going the way of sterling, the guilder, the ducat and the bezant."

We need to define international currency, look at the various ways one measures the international currency status of the dollar and its rivals, enumerate conditions that make a currency well-suited to this status, and consider pros and cons of being an international currency. Our conclusion is that *reports of the demise of the dollar as the world's leading international currency have been greatly exaggerated.* Neither of its rivals, the mark or the yen, satisfies the conditions necessary to take its place. Indeed, the latest figures reveal that *the dollar's share of central bank reserve holdings, contrary to widespread impression, has actually risen over the last few years.* In our judgment, it is not likely that another currency will overtake the dollar between now and 2020. This is not to say that the gradual trend away from the dollar will not resume in the future. We conclude in an addendum with some sample calculations to illustrate the impact that a decline in dollar holdings in central banks' currency reserves could have on the exchange rate.

First, the definition. An international currency is one that is used outside its home country. Official uses of international currencies include:

- the pegging of minor currencies, and
- the holding of foreign exchange reserves by central banks. (This function is called "reserve currency" status.)

Private-sector uses of international currencies include:

- invoicing and payment for imports and exports,
- denominating financial transactions, and
- a medium for foreign exchange trading. (The medium-of-exchange function of international currency status is called "vehicle currency".)

MEASURES OF RESERVE CURRENCY STATUS

Most measures show a gradual decline in international use of the dollar. Reserve currency use, perhaps the most important measure, is shown in Figure 1. The dollar's share of central bank reserve holdings declined from 76.1 % in 1973, to 73.2 in 1979.[1] During the following decade, the dollar's share declined more dramatically, from 69.4% in 1980 to 56.0 % in 1990.[2] Central banks gradually shifted their portfolio shares into marks

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[1] In that year, the European Monetary System was created, and along with it the European Currency Unit, backed in part by dollars. If one counts the ECU as a new reserve currency, then the dollar's share takes an abrupt drop in 1979. In the numbers reported here, we count the dollar portion of ECUs as dollar reserves, which the authorities have traditionally considered the preferred method.

[2] The figures differ from those reported in past IMF Annual Reports because of new revisions.

and yen.

It is worth pointing out that more than half of the shift can be interpreted as a simple valuation effect, as opposed to physical shifting of holdings. If central banks held 3/4 of their portfolios in dollars and 1/4 in DM in 1973, when the DM/$ exchange rate was 2.703, then *even if they don't dump a single dollar or buy a single DM*, their portfolio in 1993, when the exchange rate is 1.726, will be 65.8% in dollars and 34.2% in marks. To this extent, the central banks are passively going along with private market sentiment. It is true that the change in portfolio shares has at times gone beyond this, to actual purchases of marks and yen. But most of this shift took place between 1973 and 1980.[3]

The latest figures have just become available. Contrary to widespread belief, they show that the dollar's share in reserve holdings was virtually flat in 1994, and substantially <u>up</u> relative to 1990. (The dollar share's share was 63.1 % at the end of 1994.) The yen share, again contrary to expectations, is *down* slightly in 1994. The mark's share was approximately flat in 1994, but it is down since 1990.[4] In short, the recent data show no

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[3] Of the change in portfolio shares between 1981 and 1993, again more than half of it could be explained by the valuation effect.

[4] The figures for the end of 1994 will be available in the 1995 IMF <u>Annual Report</u>, forthcoming in October 1995. Again, these figures count the dollar-backed portion of ECUs as dollars. If the ECUs are counted separately, then the qualitative conclusions are similar: The dollar in 1994 is virtually flat -- actually up by a tiny 0.1 per cent -- and is clearly up relative to 1990. The mark is also up by 0.1 per cent, but clearly down relative to 1990. The yen is down slightly

acceleration in the 1990s of the longstanding downward trend in the dollar's share. If anything, they show the reverse. What is going on?

What is going on is that the Bank of Japan and major European central banks have in the 1990s bought up dollars on the foreign exchange market, in order to prevent the value of the dollar from falling more against their own currencies than it otherwise would. They may not be happy with this situation, but they find it preferable to the alternative. It is the same thing that they have done regularly for three decades. Will they continue to do so? In the third section we will consider the attributes that determine whether a currency is fit for the greatness of reserve-currency status, and then consider in this light what is in store for the dollar.

There are reports that East Asian central banks, stung by past losses on their dollar holdings, have recently begun to switch their reserve-holdings from dollars to yen on a large scale, notwithstanding the numbers in Figure 1. Assuming the reports are true, there are two possible ways of reconciling this conflicting information. The first possibility is that the statistics that are reported to the IMF are in error. One major omission is known. Taiwan is not included in the statistics of Figure 1, because it is not a member of the IMF. Yet its $93.2 billion of reserve holdings are the second highest in the world (after Japan). It is reported to have recently been reducing its dollar holdings by about 4 percentage points in each of the last several years [to about 57 per cent of its total at the end of 1994, and 54 per cent at the end of March 1995]. Even when one makes the appropriate adjustment, however, the true worldwide dollar share is still above the 1990

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relative to either 1993 or 1990.

level.

The second possibility is that large shifts out of the dollar have taken place since the end of 1994. Reports of such shifts in early 1995 have come from such countries as China and Thailand.[5] It is quite possible that 1995 figures will show a substantial drop in the dollar share. Central banks would have to dump a lot of dollars in 1995, however, before the reported share fell below the level in 1989-91.

OTHER MEASURES OF INTERNATIONAL USE OF THE MAJOR CURRENCIES

Other major measures of international currency status are shown in Tables 1 and 2. Overall, they tend to show the same thing: the dollar still on top, despite a gradual decline in its use versus the mark and yen over the last twenty years. The trend is so gradual that is hard to detect it over the four-year gap represented by these two tables.

• The first column in each table reports the popularity of major currencies among smaller countries choosing a peg for their currencies. It is still the case that no currencies anywhere are pegged to the yen. One currency (the Estonian kroon) is now pegged to the mark, however. The mark also plays a central, if unofficial, role in the European Monetary System. Elsewhere

[5] The central bank of China has revealed that it raised the non-dollar component of its reserves to 25 per cent in early 1995, from 10 per cent, where it stood at the end of 1994. The implications are considered in an addendum to this article.

(Africa) the French franc is still the most common choice as a peg (30 per cent of peggers), after the dollar (50 per cent). If one broadens the test to include countries that peg to a weighted basket, whether tightly or loosely, one again gets the conclusion that the dollar remains dominant. Even among East Asian countries, where the yen occasionally has a statistically significant weight, the weight placed on the dollar is always far higher.[6]

• In the past, almost all trades in the foreign exchange market involved the dollar, as the currency either bought or sold. As recently as the mid-1980s, if a firm wanted to exchange pound sterling for Deutschemarks, it had to trade pounds for dollars, and then dollars for marks. These days, the firm would be more likely than before to be able to go directly from pounds to marks.[7] Largely as a result, only 83 per cent of foreign exchange transactions in April 1995 involved the dollar, as opposed to 90 per cent only six years earlier. The figures are reported in the third column of the tables [divided by two so that the total does not exceed 100 per cent].

• The various measures of use of currencies to denominate private international financial transactions -- loans, bonds, and deposits -- still show the dollar as the dominant currency. But the yen has gained a bit in terms of external bank loans, and the mark in terms of external bond issues.

• Figures on the use of international currencies as substitutes in local cash transactions, are not generally available. The two leaders are certainly the

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[6] Frankel and Wei (1993).

[7] Bank of England (1992) or Bank for International Settlements (1993).

dollar, for which internationally-circulating cash has been estimated by the Fed at 60 percent of U.S. currency outstanding, and the mark, for which international circulation has been estimated by the Bundesbank at 35-40 percent of German paper currency outstanding. Thus there were about 240 billion dollars and 66.8 billion marks, in cash, circulating in third-countries in 1995. At the October exchange rate, the dollar's share of this market works out to 78.2% and the mark's to 21.8%, counting other entries at zero.

CONDITIONS FOR AN INTERNATIONAL CURRENCY

Will the dollar in the future maintain its global role? There are four major sorts of conditions that determine whether a currency is an international currency.[8]

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(1) Patterns of output and trade. The currency of a country that has a large share in international output, trade and finance has a natural advantage. By such measures, Japan should clearly be number 2, ahead of Germany. The U.S. economy is still the world's largest, however, in terms of output and trade. Alarmist fears notwithstanding, it is not very likely that Japan, a country with half the population and far less land area or natural resources, will surpass the United States in sheer economic size.

If the measure of being a vehicle currency is how often it is used in the invoicing and financing of international trade, then other aspects of the pattern of trade may also be relevant. The fact that much of Japan's

[8] Bergsten (1975), Tavlas and Ozeki (1991), Frankel (1992), and Hale (1995).

imports are oil and other raw materials and that much of its exports go to the Western Hemisphere, for example, helps explain why a disproportionately small share of trade is invoiced in yen as opposed to dollars. Raw materials still tend heavily to be priced in dollars.

(2) History. There is a strong inertial bias, in favor of using whatever currency has been the vehicle currency in the past. An individual (exporter, importer, borrower, lender, or currency trader) is more likely to use a given currency in his or her transactions if everyone else is doing so. For this reason, the world's choice of international currency is characterized by multiple stable equilibria.[9] The pound remained an important international currency even after the United Kingdom lost its position as an economic superpower early in the century. In the present context, the inertial bias favors the continued central role of the dollar.

(3) The country's financial markets. Capital and money markets must be not only open and free of controls, but also deep and well-developed. The large financial marketplaces of New York and London clearly benefit the dollar and pound relative to the deutschemark. It is true that Tokyo financial markets came a long way in the 1980s.[10] But Tokyo still lags

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[9] Krugman (1984).

[10] Many of the steps that the U.S. side urged onto the Japanese in the 1984 Yen/Dollar negotiations were designed to encourage the development of markets in Tokyo in hedging instruments, bankers' acceptances, commercial paper, short-term government securities, and offshore banking. The explicit goal was precisely to facilitate the internationalization of the yen. While such steps have been taken in Japan over the last ten years, these markets remain as yet relatively

behind New York and London as a financial center, while Singapore and Hong Kong have been gaining on it.

It has also been argued that a strong central bank, and large financial sector to counterbalance the political influence of the trade sector, are important. The point is to be able to resist political pressure in favor of depreciating the currency to help sell goods.[11]

(4) Confidence in the value of the currency. Even if a key currency were used only as a unit of account, a necessary qualification would be that its value not fluctuate erratically. As it is, a key currency is also used as a form in which to hold assets (firms hold working balances of the currencies in which they invoice, investors hold bonds issued internationally, and central banks hold currency reserves). Here confidence that the value of the currency will be stable, and particularly that it will not be inflated away in the future, is critical. The monetary authorities in Japan, Germany and Switzerland, in the 1970s established a better track record of low inflation than did the United States, which helps their bids for international currency status.

Given the good U.S. inflation performance over the last ten years, this is no longer such a concern as it was formerly. A more important negative for the dollar is the fact that the United States is now a large-scale debtor country. Indeed, 1994 was the first year when the country actually paid

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less developed. (The U.S. campaign of ten years ago is ironic, in light of current concerns about the declining international role of the dollar.)

[11] See, for example, Hale (1995).

out more in interest, dividends, and repatriated profits to foreigners, on their past U.S. investments, than it received on its own past investments abroad. Even if the Federal Reserve never succumbs to the temptations or pressures to inflate away the U.S. debt, the continuing U.S. current account deficit is always a possible source of downward pressure on the dollar. Such fears work to make dollars unattractive.[12]

In light of these desiderata for a would-be international currency, what is the prognosis for the dollar? We believe that the likelihood is small that some other currency will supplant it as the world's premier currency by the year 2020. The dollar will still be the world's favorite currency for holding reserves, pegging minor currencies, invoicing imports and exports, and denominating bonds and lending. There is no plausible alternative for the number one position.

It is not that the dollar is ideally suited for this role. It has some characteristics that mar its appeal. Most importantly the United States is a debtor country with a large current account deficit. But an international currency is one that people use because everyone else is using it. Three of the four determinants of reserve currency status -- economic size, developed financial markets, and historical inertia -- support the dollar. The fourth determinant could in principle disqualify the dollar, if the Federal Reserve launched a high-inflation strategy, but this is unlikely to happen.

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[12] A contrary viewpoint is possible. As argued by Triffin, *only if a country like the United States <u>does</u> run a deficit* will other countries be able to run a surplus and thereby earn the dollars they need to match reserve growth with real economic growth.

Over the period 1970-1992, U.S. GDP fell from 24 per cent of Gross World Product, evaluated at PPP rates, to 20 per cent. It is possible that one can explain much of the downward trend in the dollar's share of world reserve holdings over the last 25 years, and the upward trends in the yen and mark shares, by the falling share of U.S. GDP in the world economy, and the rising share of the Japanese and German GDPs. A careful econometric study of the determinants of central bank reserve holdings is beyond the scope of this article. But a crude analysis of the role of relative growth rates may be worthwhile.[13]

We have estimated econometrically that for every one percentage point of economic growth increase that a major country experiences as a share of Gross World Product (measured at PPP rates), its currency experiences a 1.33 percentage point increase in its share of central bank reserve holdings. [For every percentage point increase in that the country experiences as a share of Gross World Product measured *at actual exchange rates*, its currency experiences an estimated .55 percentage point increase in share.] In a statistical sense, one can explain a decline of the dollar share over the period 1970-1992 of 5 percentage points by the shift in GDPs. [One can explain a decline of 3 percentage points in the dollar share by the shift in GDPs

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[13] Tests that added the lagged rate of dollar depreciation did not produce a significant coefficient. A thorough analysis would require access to reserve holdings by individual central banks as in Heller and Khan (1978) or Dooley, Lizondo, and Mathieson (1989). These data have never been made available outside the IMF, however [and are usually not available for research even <u>inside</u> the IMF].

evaluated at actual exchange rates (the U.S. share having gone from 32 per cent to 26 per cent.)] One can also explain increases in the mark and yen shares of 1 percentage point and 5 percentage points, respectively.

What does the regression equation predict for the future? (This calculation should be regarded as merely illustrative.) The United States is estimated to have a permanently higher constant term than the mark or yen. [This difference is presumably attributable to the second and third of the conditions listed above: the openness and development of its financial markets, and the inertial bias]. At current exchange rates the aggregate GDP of the EC 12 is approximately equal to that of the United States (which is 26.1 per cent of Gross World Product). At PPP exchange rates, EC GDP is slightly smaller than that of the U.S. (which is a share of 22.5). Japan's share is smaller, but has been gaining on the U.S. rapidly, when evaluated at current exchange rates. To take an extremely pessimistic scenario, from the viewpoint of the dollar, imagine that by the start of the next century, the Japanese economy is as large as the United States, and the mark has become the common currency throughout a Western Europe of the same size. If the aggregate size of the three regions together, evaluated at PPP, remains the same (one half of GWP in 1992), then each becomes one-sixth of the world economy. Our regression equation predicts that the dollar's share of world reserves would in that case fall to 62 per cent (from 63 per cent currently), the mark's share would rise to 28 per cent (from 16 per cent), and the yen's share to 17 per cent (from 9 per cent). This would indeed be a continuation of the trend of the 1970s and 1980s. Yet the dollar would remain in the number one position by a large margin.

The nature of the calculation rules out *a priori* the possibility of a sudden

"tipping" phenomenon that would render the old constant terms obsolete. But why would the world equilibrium converge on a non-dollar currency? This would only happen in the event of a drastic change in some of the conditions enumerated above, such as either Japan or a DM-dominated area actually surpassing the United States in economic size, which is unlikely.

Thus even if U.S. economic power were to decline over the next century to as great an extent as envisioned by the most alarmist of "op-ed" writers, the dollar might still survive as the world's unit of account. (To pose an analogy, one would expect English to survive as the world's international language.) It would not be the first time in history that rising powers had adopted some of the institutions of the declining power.

ADVANTAGES OF HAVING A KEY CURRENCY

Does it matter whether the dollar remains the leading international currency? Of course central banks' reserve currency holdings have important implications for the determination of the exchange rate. But this is another question (to which we return in the addendum). What about the global role of the dollar per se? One can think of four advantages to a country of having its currency used internationally.

(1) <u>Convenience for residents</u>. It is certainly more convenient for a country's exporters, importers, borrowers and lenders to be able to deal in its own currency than foreign currencies. The global use of the dollar, as with the global use of the English language, is a natural advantage that American

businessmen tend to take for granted.[14]

(2) More business for the country's banks and other financial institutions. There need be no firm connection from the currency in which banking is conducted to the nationality of the banks (nor from the nationalities of the savers and borrowers to the nationality of the intermediating bank). British banks, for example, continued to do well in the Eurodollar market after the pound lost its international role. Nevertheless, it stands to reason that U.S. banks have a comparative advantage at dealing in dollars. Only U.S. banks have access to the safety net provided by U.S. regulatory authorities (access to the discount window, and so forth).

(3) Seignorage. This is thought by some to be perhaps the most important advantage of having other countries hold one's currency. They must give up real goods and services, or ownership of the real capital stock, in order to add to the currency balances that they use. Just as American Express reaps profits whenever people hold its travelers' checks, which they are willing to do without receiving interest, so the United States profits whenever people in Argentina or Russia hold dollars that do not pay interest. Wherever hyperinflation or social disorder undermine the public's faith in the local currency, the American dollar is the preferred alternative. (The drug trade and other illegal activities is another source of demand, of course.) Federal Reserve Board Governor Lawrence Lindsay, in a 1994 speech that

[14] One had to wonder what the reaction of American manufacturers and farmers would be in 1984 when Treasury Secretary Don Regan berated the members of the Keidanren for paying for their imports in dollars rather than yen.

reminded Americans of the benefits of international currency status, estimated the cumulative additional currency seignorage accrued to the Fed since 1981 to be some $64 billion from increased public holdings of the currency. This is a growing source of revenue for the country. Another calculation suggests that the United States now derives about $12 billion a year in seignorage from foreign holdings of U.S. currency, which are conservatively estimated at 60 per cent of total dollar currency in circulation.[15]

There is an another (much smaller) component of seignorage in addition to the currency component. Most foreign central banks and other investors hold their dollars in the form of interest-paying treasury bills. To the extent that the reserve currency role of the dollar allows the U.S. Treasury to pay a lower interest rate on its liabilities than must other borrowers, the difference is a further source of seignorage.[16]

(4) Political power and prestige. The benefits of "power and prestige" are decidedly nebulous. Nevertheless, the loss of key currency status and the loss of international creditor status have sometimes been associated, along with such non-economic factors as the loss of colonies and military power, in discussions of the historical decline of great powers. As with most of the

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[15] With total currency outstanding in 1995 at $358 billion, foreign holdings are about $215 billion. One simply multiplies by the Treasury bill interest rate, to get the $12 billion.

[16] This was the basis of European resentment against the dollar standard and against the U.S. basic balance deficit in the 1960s, to the extent that the European need to acquire dollars was the fundamental origin of that deficit.

other benefits and conditions mentioned above, causality flows both from key currency status to power and prestige and in the opposite direction as well.

DISADVANTAGES OF HAVING A KEY CURRENCY

One can think of two disadvantages from the viewpoint of a key-currency country. They explain why Japan, Germany and Switzerland, have in the past been reluctant to have its currency held and used widely.

(1) Larger fluctuations in demand for the currency. It is not automatically clear that having one's currency held by a wide variety of people around the world will result in greater variability of demand. Perhaps such instability is more likely to follow from the increase in the degree of capital mobility described under condition (3) above (the openness of financial markets), than from key currency status per se. In any case, central banks are particularly concerned that internationalization will make it more difficult to control the money stock. This problem need not arise if they do not intervene in the foreign exchange market. But the central bank may view letting fluctuations in demand for the currency be reflected in the exchange rate as being just as undesirable as letting them be reflected in the money supply.

(2) An increase in the average demand for the currency. This is the other side of seignorage. In the 1960s and 1970s, the Japanese government, like the German government, was particularly worried about the possibility that if assets were made available to foreign residents, an inflow

of capital would cause the currency to appreciate and render exporters uncompetitive on world markets. While Japan has become much more confident about its ability to export (it could hardly think otherwise!), at 85 yen to the dollar, talk of further substantial appreciation is not welcome.

IS A MULTIPLE KEY CURRENCY SYSTEM IN THE WORLD INTEREST?

It might be argued that a monetary system that rested more evenly on several currencies would be more stable than the current single-currency system. For example, there is the old argument that the "dollar overhang," in reserve holdings outside the United States, represents a potential source of instability. (The danger of a "dollar strike" is probably more real now than it was in earlier decades; but this has more to do with the U.S. overborrowing of the 1980s than with earlier accumulation by central banks of dollar reserves.) Fred Bergsten and John Williamson have argued the other way, that a multiple reserve currency system may be <u>less</u> stable than a dollar system.

From a more microeconomic perspective, it is clear that there are large economies of scale with respect to transactions costs in the choice of vehicle currency. As McKinnon (1979) and Krugman (1984), among others, have pointed out, an implication is that it is more efficient for the world economy to have a single vehicle currency. Assuming that world trade and finance continue to become more highly integrated, the importance of international transactions costs and the need to economize on them may grow. Thus it might be counterproductive to promote the yen or mark as a secondary vehicle currency.

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Addendum: Illustrative Impact on the Exchange Rate

In this addendum, we consider quantitative estimates of the possible effects on the dollar exchange rate of recent developments with regard to central bank reserve holdings. Take a concrete example. The central bank of China has revealed that it raised the non-dollar component of its reserves to 25 per cent, from 10 per cent (*Financial Times, May 10, 1995*). This $8.7 billion shift reduces the dollar's share of the world total by 0.8 per cent, relative to the latest statistics at the IMF.

Let us consider the implications of dollar sales like this one. For simplicity, we will assume that the shift is into yen (although in truth the Bank of China shift was reportedly more heavily into marks).

$$\text{Let } x_{\$} = \frac{\text{(QUANTITY of \$ outstanding)}}{\text{(TOTAL WORLD RESERVES, expressed in \$)}},$$

i.e., the share of their portfolios that investors wish to hold in the form of dollars, and

$$\text{and } x_{¥} = \frac{\text{(\$/¥ exchange rate)(QUANTITY of ¥ outstanding)}}{\text{(TOTAL WORLD RESERVES, expressed in \$)}},$$

i.e., the share of their portfolios that investors wish to hold in the form of yen.

The simplest possible model of exchange rate determination in this

context would crudely take the ratio of the shares, and solve for the exchange rate:

(1) ($/¥ exchange rate) =

($x_{¥}$ / $x_{\$}$) / [(QUANTITY of ¥ outstanding)/(QUANTITY of $ outstanding).

The model is very simplistic. But the advantage is that the intuition is easy to see. The exchange rate is the price of yen assets in terms of dollar assets. In a free marketplace, the exchange rate should be determined by the relative supply and demand for these assets, just as the price of bananas is determined by the supply and demand for bananas. If there is an increase in the QUANTITY of ¥ outstanding, it is an increase in the supply of yen, and so should cause a fall in the price of the yen, just as an increase in the supply of bananas causes a fall in the price of bananas. Conversely, an increase in investors' demand for yen should cause an increase in the price of the yen, just as an increase in the demand for bananas causes a rise in the price of bananas.

The demanded portfolio shares, $x_{¥}$ and $x_{\$}$, depend on a host of factors: the expected future rate of change of the exchange rate, the riskiness of the two currencies, the real GNPs of the two countries which determine their citizens' demands for transaction balances, and so forth. It is impossible to predict effects on the exchange rate without making assumptions about these demands. Our assumptions shall inevitably be arbitrary ones.

There is an open question whether we want to view the Bank of China as essentially a private investor. (Central banks like this one do not feel the same responsibility for maintaining the world monetary system that G-10

central banks feel, and thus act largely in response to expected returns, as a private speculator would.) Here we assume that the Bank of China is a central bank just like the Bundesbank.

Assume that the Bank of China, or other central banks, shift their holdings out of dollars into yen, thereby increasing (QUANTITY of $ outstanding) in the hands of the public, and decreasing (QUANTITY of ¥ outstanding). Let us assume for the moment that the portfolio demands coming from private investors, $x_{¥}$ and $x_{\$}$, are unchanged. This means, for example, that there has been no change in expected returns, in perceived risk, or in international transactions-demand for yen versus dollars. Then it follows from the equation that the change in the exchange rate is simply proportionate to the change in the relative supplies of the two assets. Assume a $6 billion, or one per cent, increase in the supply of dollars, from $600 billion to $606 billion. The corresponding decrease in the supply of yen is ¥600 billion [=$6b*100¥/$], from ¥8,000 billion to ¥7,400 billion, or 7.5 per cent [= ¥600/¥8000]. Then the equation implies a simple 8.5 per cent depreciation in the yen/dollar exchange rate, equal to 1.0 per cent plus 7.5 per cent. It is worth repeating that, under the terms of the experiment, the observed portfolio shares will not change (which, in fact, is what happened in 1994, according to the figures).

Now let us ask what happens if private investors who respond to rates of return (perhaps including central banks of developing countries) decide today that the dollar is likely to depreciate in the future. One reason they might decide this is if they have in the past observed shifts like the one just described, resulting in a depreciation of the dollar, and they fear a repeat in the future. Then the investors will shift their portfolio demands out of dollars and into yen and other assets. The result will be precisely the

depreciation of the dollar that was feared, but in the present rather than just in the future. The magnitude of the shift is extremely sensitive to what one assumes about the expected rates of return. If investors expect a one-time shift of the sort described in the preceding paragraph, then most of the two per cent depreciation of the dollar will occur today. [The further off into the future is the expected shift, the less of the depreciation will occur today, due to discounting.] If investors fear that the shift will not be a one-time event, but will be repeated each year, then the effect on the exchange rate might be much larger.

Currently $x_{¥}$ is about .08, and $x_{\$}$ is about .60. Let us assume a large shift by private investors of their portfolio demands, so that the first number goes up to .09 and the second down to .59. Then the ratio of the two rises from .1333 to .1524, an increase of 13 per cent. If the Fed, Bank of Japan, and other G-10 central banks do not change the quantities of dollars and yen outstanding, then it follows from equation (1) that this 13 per cent increase in the relative demand for yen will directly cause a 13 per cent appreciation of the yen against the dollar.

If the investors shifted out of dollars into other currencies in addition to the yen, then the effect on the \$/¥ exchange rate would be smaller. Currently x_{DM} is about .15. If investors use only 1/3 of the dollars they sell to buy yen, and 2/3 to buy DM, then the result is that the \$/¥ and \$/DM exchange rates each rise by 6 per cent.

These tentative calculations have been based on an extremely stylized model. Further elaboration is possible, to model the possible roles of other assets, interest rates, overshooting, and so forth. But the basic insights, the uncertainty regarding quantitative predictions, and in particular the great sensitivity of such predictions to what is assumed about expected rates of

return, would all little changed.

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