

THE CAUSE OF THE DOLLAR DEPRECIATION

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An index of the value of the dollar against the currencies of other major industrialized countries fell from an average value of 89.7 in 1976 to a value of 84.0 in January 1978.¹ The depreciation of the dollar is often attributed to a surplus of dollars on the foreign exchange market caused by an excess of imports over exports for the United States as measured either by the trade balance or the current account balance.² (See Chart 1.) These payments imbalances are, in turn, attributed to two particular factors—the demand for oil imports and the faster economic recovery in the United States than abroad. These factors have caused the demand for United States imports to increase faster than its exports. This article presents evidence suggesting that the depreciation of the dollar, rather than being primarily a real phenomenon as just suggested, is primarily a monetary phenomenon. Before this evidence is examined, however, several popular views concerning the current account deficit and the depreciation of the dollar are discussed critically.

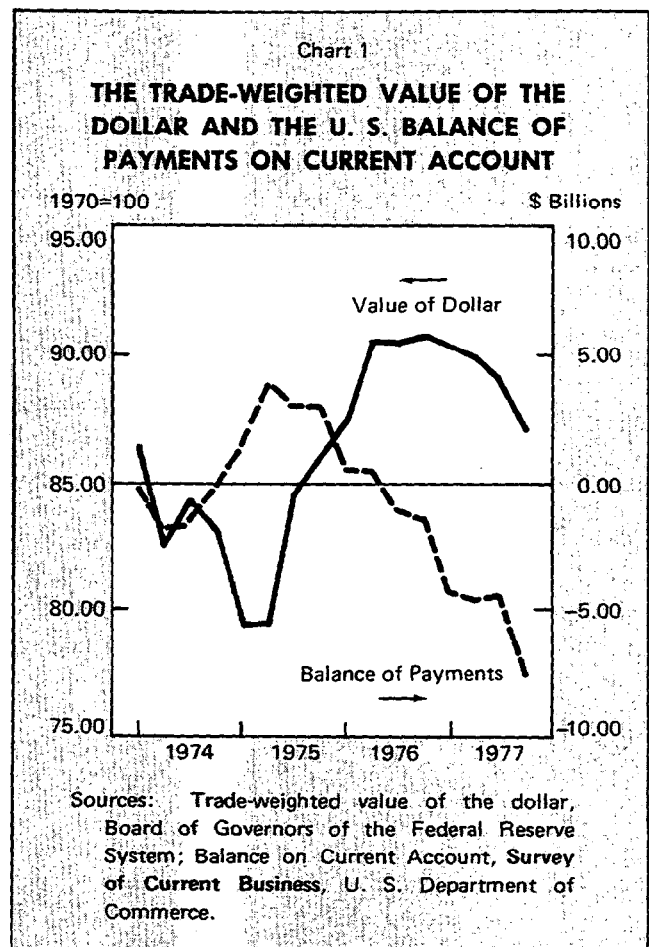
The Current Account and the Exchange Rate
Imports produce a supply of dollars and exports produce a demand for dollars on the foreign exchange market. It seems reasonable, therefore, to associate a current account deficit (an excess of imports over exports) with an excess supply of dollars on the foreign exchange market and consequently with a fall in the value of the dollar. A current account deficit need not, however, imply the existence of an excess supply of dollars on the foreign exchange market. The net supply of dollars coming onto the foreign exchange market because of a current account deficit can be offset by a net demand for dollars if foreigners desire to invest more in the United States than residents of the United States desire to invest abroad.

¹ The index referred to is the Federal Reserve Index of Currency Values. In this index, changes in the value of the U. S. dollar since May 1970 in terms of the currencies of 10 countries are weighted by each foreign country's 1972 worldwide exports plus imports relative to the 1972 worldwide exports plus imports of all 10 foreign countries. The countries are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland, and the United Kingdom.

² The former measure is the difference between merchandise exports and imports. The latter measure is the more inclusive and includes net military transactions, net investment income, net travel and transportation, net other services, and net unilateral transfers.

Direct foreign corporate investment in 1977 by United States residents exceeded by \$3.5 billion similar investment by foreigners in the United States. This amount, however, was undoubtedly outweighed by the investment by the oil-producing states of the Persian Gulf in dollar-denominated assets. The current oil revenues of these countries exceed the value of their merchandise imports and the surplus is invested mainly in dollar-denominated assets.

The net supply of dollars generated by a current account deficit may also be matched by a demand for dollars by foreign central banks motivated by a desire to maintain existing exchange rates. The current account deficit for the United States in 1977 was \$20.2 billion. The dollar holdings of foreign central banks, however, increased by \$37.4 billion in 1977. (In 1976 their dollar holdings increased by \$18 bil-



lion.)³ A comparison of the respective magnitudes of the current account deficit and the demand for dollars by foreign investors and foreign central banks renders implausible the simple statement that the current account deficit of the United States produced an excess supply of dollars on the foreign exchange market that, in turn, caused the dollar to depreciate.

The Foreign Exchange Market and the Exchange Rate It also appears reasonable that a depreciation in the value of a country's currency indicates that there is an excess supply of its currency on the foreign exchange market. Exchange rates may change, however, without excess supplies or demands ever appearing on the foreign exchange market. If the rate of growth of the money supply in the United States produces a seven percent rate of inflation here, and the rate of growth of the money supply in Germany produces a three percent rate of inflation there, then the dollar must depreciate by four percent each year in order to keep constant the real terms of trade between the United States and Germany. For example, if one unit of a United States commodity costs one dollar, one unit of a German commodity costs two marks, and one dollar exchanges for two marks, the rate of exchange between the commodities is one for one. If the dollar price of the United States commodity rises, the mark price of the dollar must fall proportionally in order to preserve the original rate of exchange between the commodities. It is important to note that changes in exchange rates occurring in order to compensate for differing rates of inflation across countries can take place without any balance of payments disequilibria or without any excess demands or supplies on foreign exchange markets. All that is necessary is that the inflation be anticipated.

Exchange Rate Changes and Invalid Association

Simple association between a present current account deficit (surplus) and a depreciation (appreciation) of the dollar does not necessarily imply that the payments imbalance is causing the change in the value of the dollar. Consider a country with balanced international accounts. Market participants come to believe that the price level will rise more rapidly than previously anticipated for one of its trading partners than for the home country, and as a result they begin to trade the home country's currency at an appreciated value. The home country's central bank uses domestic currency to buy foreign

currency in order to resist the appreciation. The overall balance of payments is an accounting identity that must equal zero; total imports must equal total exports. If the home country imports foreign currency as a consequence of the purchases of foreign exchange by the central bank, it must be a net exporter of securities, goods, and services.

The central bank may buy the foreign currency at the old rate. This intervention in the foreign exchange market increases the domestic money supply. The increase in the domestic money supply, if not offset, will raise the domestic price level and validate the old exchange rate. Market participants may, however, believe that the central bank will be unwilling to place its exchange rate objective above its domestic price level objective. They may conclude then that the central bank is only temporarily keeping the value of the home currency below its longer-run value and will willingly supply the central bank with foreign currency in return for the home country's currency. The acquired home currency will be held in liquid securities in anticipation of a windfall gain to be derived from the eventual appreciation of the home currency.

Alternatively, the market may anticipate that the efforts of the central bank to control the value of its currency will be useless and the exchange rate may move immediately to the level that the market views as the equilibrium level. There will be no advantage to placing the home currency received from the intervention of the central bank in the foreign exchange market into liquid securities because the exchange rate is viewed as having appreciated to its equilibrium value. The acquired home currency will be used to purchase not only securities, but also the goods and services of the home country. In this case, home country imports of foreign currency resulting from intervention by its central bank produce a surplus in its current account accompanied by an appreciation of its currency. The foreign country necessarily experiences a deficit in its current account accompanied by a depreciation of its currency.

This example suggests the following possibility. The recent depreciation of the dollar resulted from a belief by market participants that monetary phenomena would lower the equilibrium value of the dollar. Fruitless attempts by foreign central banks to resist the appreciation of their currencies put their currencies into the hands of United States residents who used them to purchase foreign goods and services. The depreciation of the dollar is in this sense a cause of the present United States current account deficit, not a consequence of the deficit. The fact that the

³ The figures are from the U. S. Department of Commerce.

dollar holdings of foreign central banks increased by \$37.4 billion in 1977 means this view must be considered seriously.

Expectations and Exchange Rates Investors can, other things equal, increase the rate of return on their portfolios by moving into a currency before it appreciates and by moving out of it after the appreciation has occurred and, of course, by reversing the process in the case of a depreciation. They will try to anticipate changes in exchange rates and alter their portfolios accordingly. If a widespread change in anticipations occurs, the resulting portfolio adjustments will cause the exchange rate to move independently of excess supplies or demands in the foreign exchange market. This idea and the assertion that forces exist that motivate the market to form its anticipations in such a way that the exchange rate is moved in the direction of its longer-run equilibrium value are discussed in the following section. The reader with an interest in economic theory should read this section. Others may skip to the section entitled "Examination of the Data."

Theoretical Section The basic ideas of this section are introduced initially by analogy in a discussion of the market for long-term bonds. At a given point in time, there is a given stock of bonds outstanding (stock supply) and a given demand for these bonds (stock demand) that depends on their price. At a given price, the difference between the stock demand for bonds and the stock supply of bonds is called the stock excess demand for bonds, and this difference is defined as of a given point in time. There is also a new issue market for bonds. Over an interval of time, the difference between new issues and maturations of old issues give the net flow of stocks (flow supply) for investors to absorb into their portfolios. Over the same interval investors will want to change their bond holdings by an amount (flow demand) that depends on the price of bonds. At a given price, the difference between the flow demand and flow supply is called the flow excess demand for bonds, and this difference is defined over an interval of time.

Assume that at time t_1 market participants come to anticipate that at time t_2 the rate of inflation will increase by some discrete amount. Holders of long-term bonds will now demand an inflation premium to compensate for the expected decrease in the future purchasing power of the dollars with which coupons are redeemed and principal is paid. Issuers of bonds will be willing to pay this premium because they will need to surrender fewer real resources in order to

obtain dollars in the future. The price of bonds drops immediately. If the price had remained at its old level, there would be a stock excess supply of bonds. No one will buy the old bonds at the old price when new ones can be obtained for less. The price of bonds changed without a flow excess supply ever having developed, that is, without bond houses first having to accumulate undesired inventories at the old price.

The exchange rate, similarly with the price of bonds, must equilibrate two kinds of markets, those characterized by stock excess demands and those characterized by flow excess demands. The first kind of market includes the market for the stock of assets denominated in domestic currency and the market for the stock of assets denominated in foreign currency. Such assets include cash balances, securities of all maturities, stocks and real estate. The second kind of market is the market for foreign exchange, that is, the supply and demand for dollars arising over time as a consequence of international transactions.

It will be argued in this section that the dollar may depreciate as a consequence of a change in the expectations of asset holders. This depreciation is necessary in order to maintain equilibrium in the markets characterized by stock excess demands. A depreciation of the dollar is not necessarily a sign of an excess supply of dollars on the foreign exchange market. Consequently the depreciation cannot necessarily be halted by measures conceived of solely as "mopping up" excess supplies of dollars on the foreign exchange market, for example, by central bank intervention.

The rate of return to holding assets denominated in a foreign unit of account, calculated using the domestic unit of account, is affected by changes in the exchange rate. If one believes that foreign currency will appreciate, he will, other things equal, want to hold more assets denominated in the foreign currency and less in the domestic currency. Everyone cannot do so, however, because at a particular point in time the stocks of domestically-denominated and foreign-denominated assets are fixed and exactly these amounts must be held. Given the level of the exchange rate expected to prevail in the future, the current exchange rate will have to adjust in order that the difference between the current and future rate is such that asset holders are willing to hold these fixed stocks. The current exchange rate must be such that there is no advantage anticipated from shifting between foreign- and domestically-denominated assets.

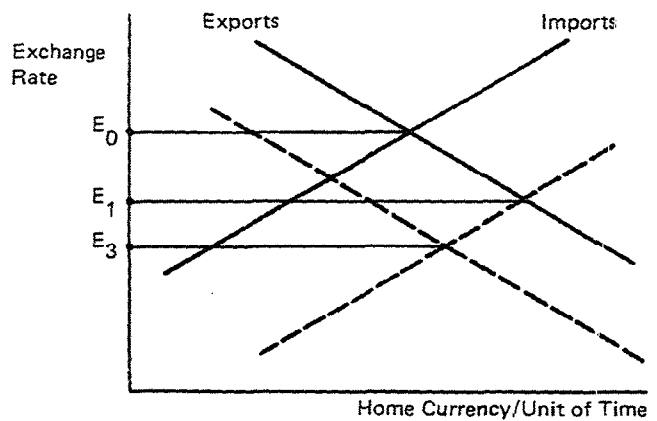
The anticipated value of the future exchange rate determines the current rate. Given this anticipated value, the level of the current rate must be such that asset holders are willing to hold the given stocks of foreign- and domestically-denominated assets. Expectations do not, however, constitute a bootstraps theory of exchange rate determination. The current exchange rate must equilibrate over time the flow demands and supplies in the foreign exchange market. If it fails to do so, the asset holders of the country with the payments surplus will accumulate an excess stock of liquid foreign-denominated assets. When they try to dispose of these assets, the foreign currency will depreciate and inflict capital losses on these asset holders. Asset holders will be unwilling to accumulate the assets that buffer short-lived discrepancies in exports and imports unless they believe the current exchange rate over time will produce overall payments balance. The determinants of the exchange rate anticipated by market participants to prevail in the future must, as a consequence, be those factors, real and monetary, that determine the future value of the exchange rate necessary to achieve over time flow equilibrium in the foreign exchange market.

The following example is provided in order to illustrate how the exchange rate is determined as a consequence of the need to maintain equilibrium in the market for the stock of assets and in the market for the flow of foreign exchange. Assume that in the home country the recent rate of growth of the money supply has been above its trend value, but that, because of past experience, the public expects an offsetting period during which the rate of growth of the money supply will be below trend. Something then occurs that causes the public to believe that the higher rate of growth of the money supply will continue indefinitely. The public then revises upward by a discrete amount the domestic price level anticipated to prevail in the future. Alternatively, the public at some point comes to realize that a natural resource important in that country's exports and in its domestic consumption will be depleted at some future time. For expositional simplicity, these assumptions are summarized by saying that at time t_1 the public comes to anticipate the occurrence of a phenomenon at time t_2 that will cause the exchange rate that equilibrates the flow demand and supply of foreign exchange to fall by some discrete amount.

Figure 1 depicts the demand schedule for home currency arising from the home country's exports of goods and securities and the supply schedule of home currency arising from its imports of foreign goods and securities. A fall in the foreign exchange value

Figure 1

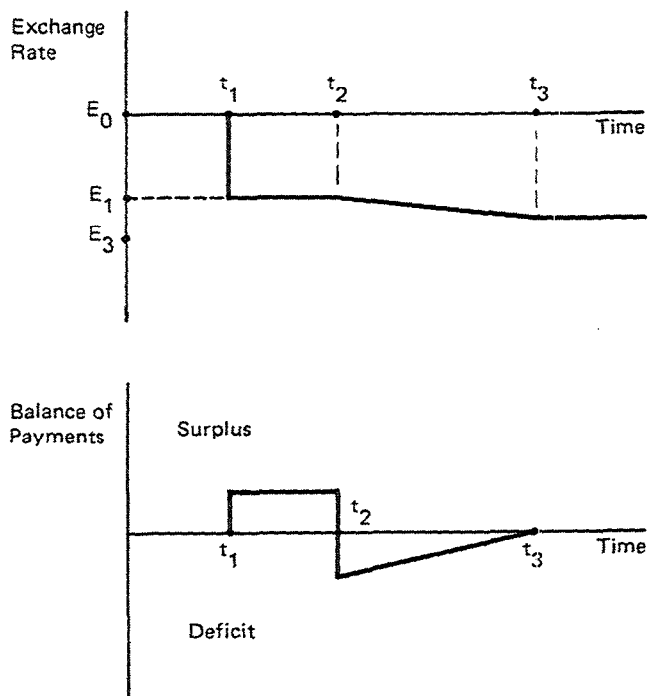
EXPORT AND IMPORT DEMAND SCHEDULES



of the home currency makes exports less expensive abroad and increases the demand for home currency. It makes imports more expensive and, it is assumed, causes less home currency to be offered on the foreign exchange market. The schedules do not include the flow of liquid assets that buffer short-lived discrepancies between the flow of exports and imports. At time t_1 these schedules are represented by the solid lines. At time t_2 they shift to the position indicated by the dashed lines. Figure 2 shows the behavior over time of the exchange rate and the balance of

Figure 2

EXCHANGE RATE AND BALANCE OF PAYMENTS



payments apart from international flows of liquid assets. Initially, the behavior of the exchange rate over time is described, then the rationale behind this behavior is provided.

At time t_1 the public comes to anticipate the occurrence of a phenomenon at time t_2 that will cause the exchange rate that equilibrates the flow demand and supply of foreign exchange to fall. At the old exchange rate E_0 , there is now an excess stock supply of domestically-denominated assets and an excess stock demand for foreign-denominated assets because asset holders anticipate a windfall gain from holding assets denominated in the foreign currency. The exchange rate must fall immediately (E_1). The foreign exchange market is characterized at t_1 by the solid lines shown in Figure 1 and the home country's balance of payments moves into a position of surplus. The surplus will be financed by an accumulation by residents of the home country of liquid assets denominated in the foreign currency. At time t_2 the export and import demand schedules shift to the position shown by the dashed lines in Figure 1 as anticipated. At the exchange rate existing at t_2 (E_1), the home country develops a balance of payments deficit. The exchange rate then depreciates over time until it reaches its long-run equilibrium value. As shown in Figure 2, the deficit is eliminated by this further depreciation, but it persists long enough in order to offset the previous surplus. The initial accumulation of foreign-denominated liquid assets is matched by a corresponding reduction.

What keeps the exchange rate on the path shown in Figure 2? Between time t_1 and t_2 , the home country experiences a trade surplus and between time t_2 and the time when the final rate of exchange is attained, a trade deficit. The home country first accumulates foreign-denominated securities and then reduces them as a result of the deficit. This accumulation represents no risk of capital loss from changes in exchange rates because the foreign-denominated assets will subsequently be used to pay for foreign goods. If, however, the initial depreciation is too small, eventually it will become evident that the exchange rate will fall further than anticipated. Domestic holders of foreign assets could have increased the rate of return on their portfolios by holding more foreign-denominated assets. Their attempt to do so will drive the exchange rate down. If, on the other hand, the initial depreciation is too large, over time it will become evident that when the exchange rate reaches its long-run equilibrium value, asset holders will still be left with foreign-denominated assets. The

deficit following the surplus in the balance of payments is smaller than anticipated. Domestic holders of foreign assets will experience a capital loss because the exchange rate will appreciate when they unload their foreign-denominated assets. Their attempt to decrease their holdings of foreign-denominated assets will drive the exchange rate up. Between time t_2 and t_3 , the exchange rate is prevented from falling immediately to its long-run level because home residents are unloading foreign-denominated securities, but it must fall. Otherwise, a discrete appreciation of the foreign currency would occur in the future. This possibility increases the demand for foreign-denominated assets and forces the exchange rate downward.

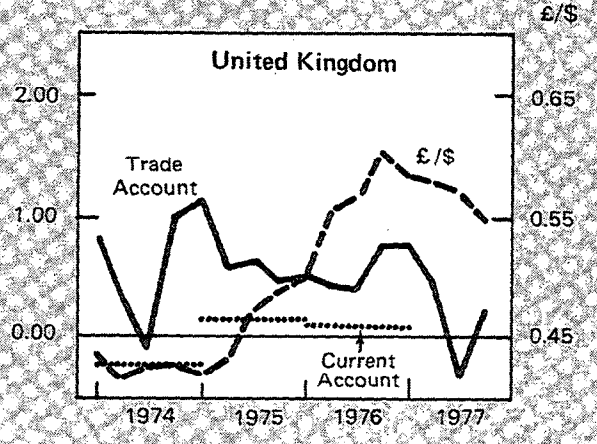
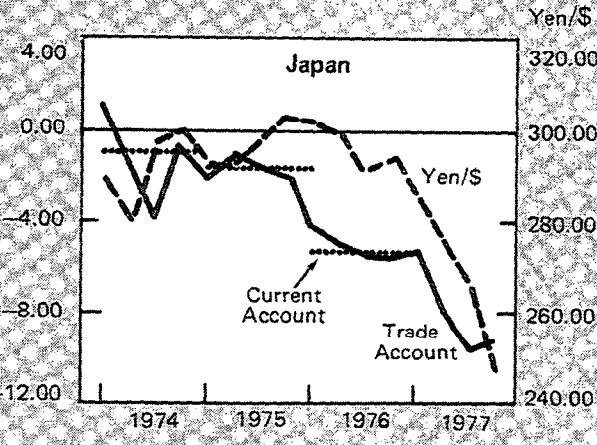
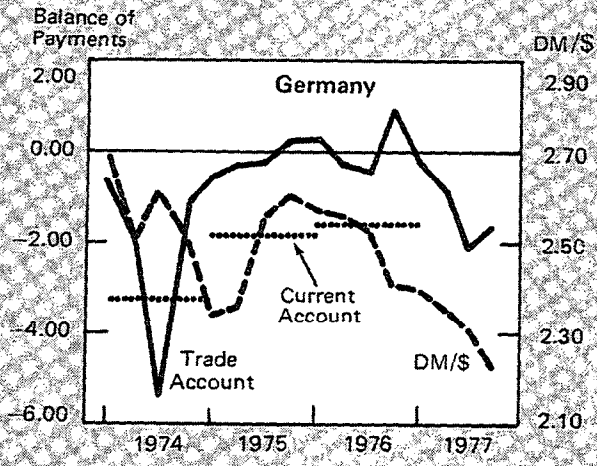
If the event anticipated to occur at t_2 does not occur, the domestic currency will appreciate above its former level while domestic residents run down the foreign-denominated assets accumulated because of the surplus, and then it will return to its old level. Holders of foreign-denominated assets incur a loss. If the event at t_2 causes a greater deficit at the existing exchange rate than anticipated, the domestic currency will depreciate further. Holders of foreign-denominated assets forego gains that could have been earned by holding even more of these assets.

The anticipated future exchange rate is a major determinant of the current exchange rate, but the former will be the rate that the market anticipates will equate over time the flow demands and supplies for foreign exchange arising out of international transactions. In general, if the exchange rate is set at a lower (higher) level, the payments surplus (deficit) will have to be financed by accumulations (reductions) of foreign-denominated assets. These portfolio shifts lower the rate of return earned by holders of these assets when the exchange rate moves to its equilibrium value. (The exchange rate must at some point move to its equilibrium value because individuals cannot accumulate or reduce assets to offset a payments imbalance indefinitely.) The self-interest of market participants motivates them to form expectations of the exchange rate that will assure over time equilibrium in the foreign exchange market. Note finally, once more, that expectations can cause changes in exchange rates even without imbalances in the foreign exchange market.

Examination of the Data It has been the depreciation of the dollar against the German mark, the Japanese yen, and the British pound that has aroused the most concern. Evidence is presented in this

Chart 2

BILATERAL BALANCE OF PAYMENTS ON TRADE AND CURRENT ACCOUNT AND THE BILATERAL EXCHANGE RATE



Note: Trade figures are in billions of dollars at annual rates.
Sources: Balance of payment figures, Survey of Current Business; Exchange rates, Federal Reserve Bulletin.

section concerning the value of the dollar measured in marks, yen, and pounds. The first question examined is whether the balance of payments on current account has been a major determinant of exchange rate movements.

Current Account Imbalance The solid line in Chart 2 shows for each of the three countries the ratio at which its currency exchanges for one dollar, so that declines represent a depreciation of the dollar. The broken lines measure the bilateral balance of payments of the United States with each country measured on a trade account basis (quarterly observations) and on a current account basis (annual observations).⁴ The United States has consistently had a bilateral current account deficit with Japan and Germany since 1974; yet, from 1974 I to 1976 IV for Japan and from 1974 II to 1976 III for Germany, the dollar failed to depreciate against the currency of either country. It may be objected of course that countries need only to balance their international payments across all their trading partners, not bilaterally with each, in order to maintain equilibrium in the foreign exchange market.

Chart 1 plots the balance on current account for the United States and an index of the weighted-average exchange value of the dollar against the currencies of other major industrialized countries. In only slightly more than half the quarters shown is either a surplus associated with a significant appreciation of the dollar, a deficit associated with a significant depreciation of the dollar, or approximate balance in the current account associated with no change in the value of the dollar. It has been argued, however, that even if these associations were present uniformly it is not necessarily valid to assume that the then-existing trade imbalance was causing the change in the exchange rate because central banks were trying to offset the change by intervention in the foreign exchange market.

Differential Movements in Real Income It is possible to test the belief that differential rates of growth in real income between the United States and Germany, Japan, and the United Kingdom have produced a depreciation of the dollar by causing the demand for imports into the United States to increase

⁴ The bilateral trade surplus or deficit figures refer to the value of exports of U. S. merchandise plus reexports of foreign merchandise, minus imports of that country's merchandise into the U. S. customs area.

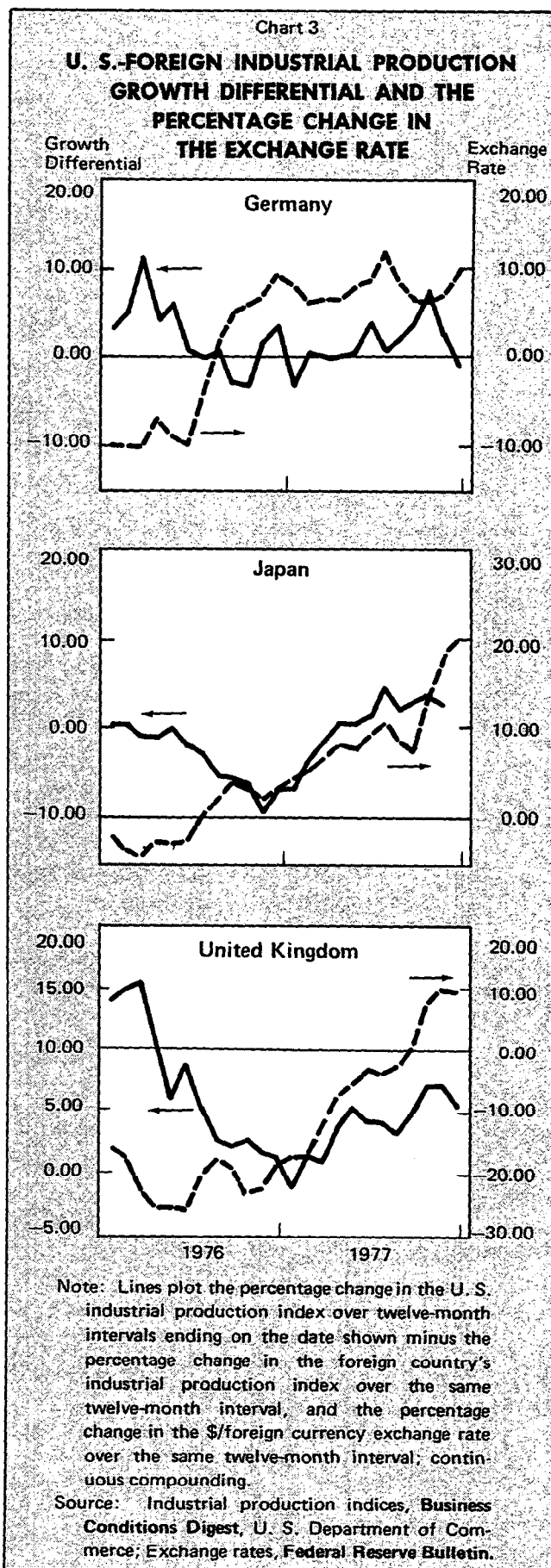
faster than the demand for exports from the United States.⁵

A test of this belief is also a test of the more particular belief that oil imports are a cause of the depreciation of the dollar.⁶ The argument is that the United States is recovering from the trough of the recession faster than other countries. This fact is causing its oil imports to rise faster than other countries' oil imports. If the OPEC countries were willing to invest the receipts from their exports to the United States in United States securities or to import exclusively from the United States, then the dollar need not depreciate against any currency. OPEC countries, however, are using part of the receipts to buy goods from other countries. In order to achieve overall balance in international payments, the United States will, therefore, have to run surpluses in its trade account with other non-OPEC countries. Its currency will have to depreciate vis-a-vis these other currencies in order to generate such surpluses.

Charts 3 and 4 present evidence bearing on the hypothesis that higher rates of growth in real income in the United States than abroad have caused the dollar to depreciate. In Chart 3, the solid line is the percentage change in industrial production in the United States over the twelve-month interval ending in the month shown on the horizontal-axis minus the percentage change in industrial production in the foreign country over the same interval. The dashed line measures the depreciation (positive height) or appreciation (negative height) of the dollar over the same twelve-month interval. The hypothesis requires that these lines rise and fall sympathetically. This behavior is not as a general rule visible in the graphs. It fails to hold for any of the countries for the twelve-month intervals ending in 1976. In 1977, economic activity increased more strongly in the United States than in Germany, Japan, and the United Kingdom.

⁵ It should be noted that the assumed relationship must refer to behavior over a business cycle, not secular behavior. If a country is growing faster secularly than its trading partners, so will its demand for money. For given rates of growth in the nominal money supply, the faster growing country will experience relatively slower growth in its domestic price level. This effect works to increase the foreign-exchange value of the country's currency.

⁶ Oil imports in themselves do not explain a depreciation of the dollar, however. The rise in the price of oil increased the cost to all countries of importing oil. Because the United States is relatively self-sufficient in the production of energy relative to Germany and Japan, the increase in the cost of importing oil cannot explain a depreciation of the dollar against the mark and the yen. Furthermore, the OPEC surpluses are invested mainly in dollar-denominated assets. This fact would indicate an appreciation of the dollar.



For Germany, there was little corresponding increase in the rate at which the mark was appreciating. For Japan, the yen did begin to appreciate at an accelerated pace. For the United Kingdom, the pound depreciated less rapidly and then appreciated against the dollar. In these two cases, however, the upward movement in the line representing percentage changes in the exchange rate preceded the upward movement in the line representing differences in economic activity.

Chart 4 extends the period of observation and employs the more general measure of real income—real gross national product. Observations represent percentage changes over four-quarter intervals ending in the third quarter of the year indicated.⁷ The horizontal distance represents the percentage change of real gross national product in the United States minus the percentage change of real gross national product in the foreign country.⁸ The vertical distance measures the depreciation (positive height) or appreciation (negative height) of the dollar. The hypothesis requires that these points fall along an upward sloping line. When the 1974 observation is ignored in the case of Japan and the United Kingdom, lines passing through the observations would be upward sloping. Ignoring 1974 may be justifiable because the effects of the oil embargo, the rise in the price of oil, and uncertainty over national policies toward energy unquestionably introduced large movements into exchange rates unrelated to differences in real income growth across countries. Chart 4 offers some evidence to support the hypothesis that the foreign exchange value of the dollar is determined by differential rates of growth of real income, but Chart 3 indicates that the evidence is not strong.

Differential Rates of Inflation Chart 5 is useful for deciding whether movements in the foreign exchange value of the dollar are explainable by reference to divergent behavior in the rate of inflation in the United States and abroad. It is constructed in the same way as Chart 3 except that the solid line represents percentage changes in the consumer price index in the United States over twelve-month intervals minus percentage changes in the consumer price index in the foreign country over the same twelve-month intervals. The dashed line, as before, is the percentage change in the exchange rate over twelve-

⁷ Only third quarter 1977 data were available for all countries at the time this article was written.

⁸ For the United Kingdom, the horizontal distance of each point is the percentage changes of real gross national product in the U. S. minus the percentage changes of real gross domestic product in the U. K.

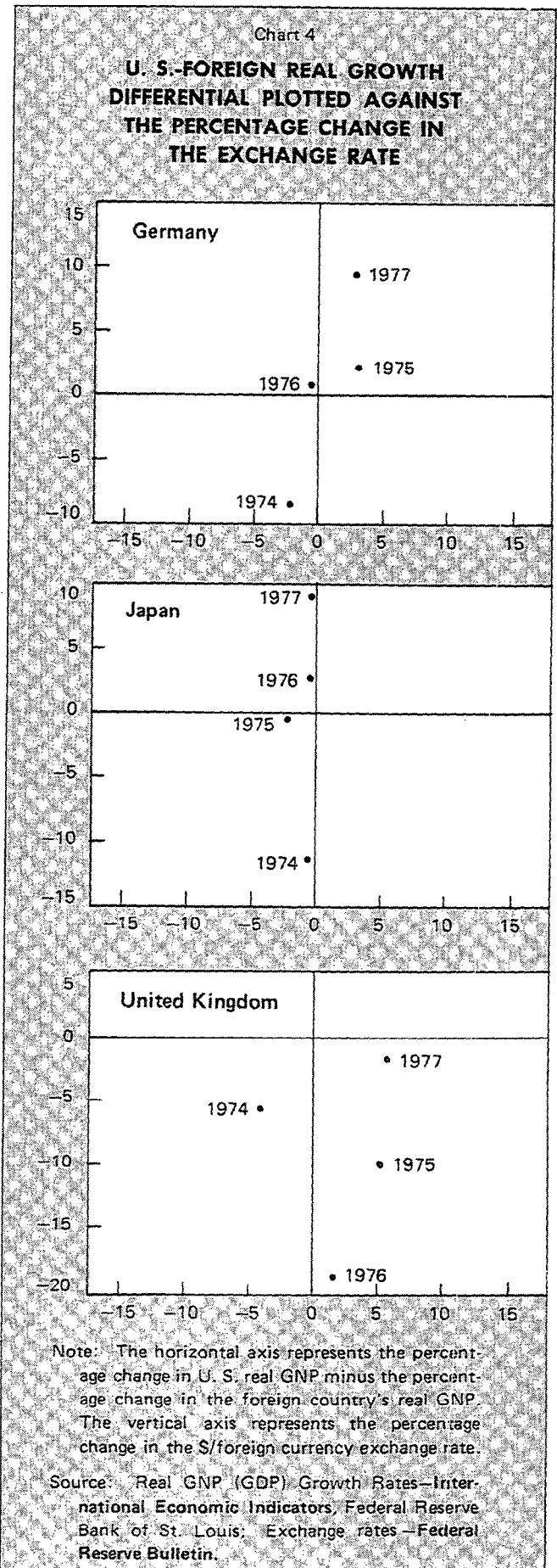
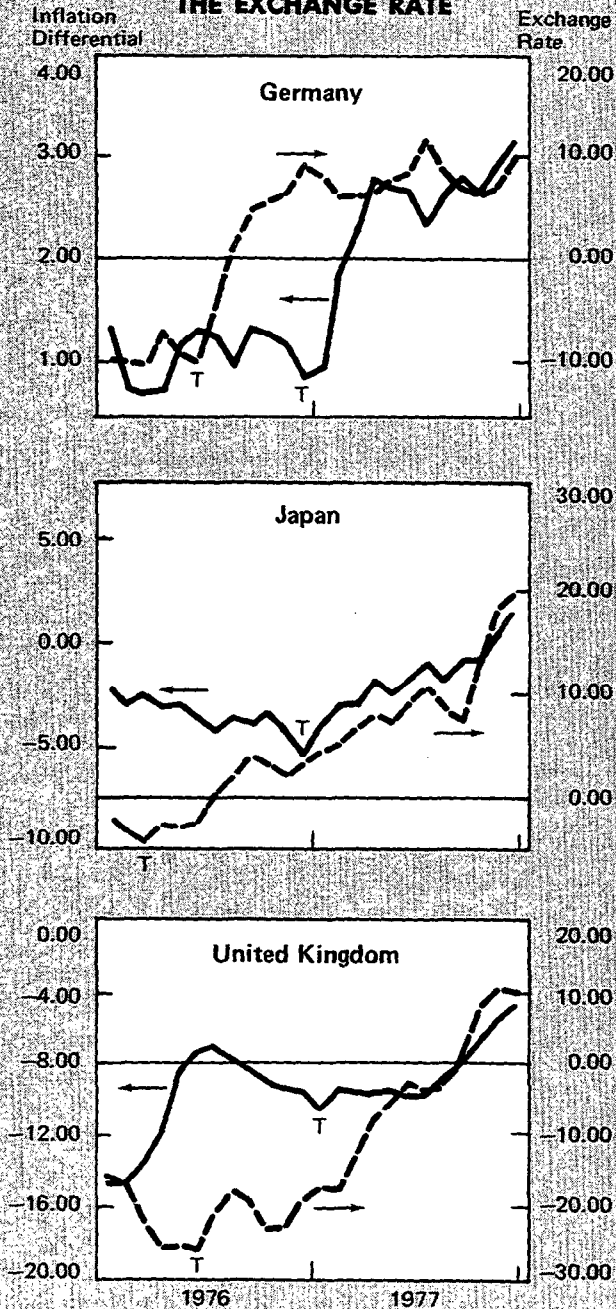


Chart 5

U. S.-FOREIGN INFLATION DIFFERENTIAL AND THE PERCENTAGE CHANGE IN THE EXCHANGE RATE



Note: Lines plot the percentage change in the U. S. consumer price index over twelve-month intervals ending on the date shown minus the percentage change in the foreign country's consumer price index over the same twelve-month interval; and the percentage change in the \$/foreign currency exchange rate over the same twelve-month interval; continuous compounding.

Source: Consumer price indices, *Business Conditions Digest*; Exchange rates, *Federal Reserve Bulletin*.

month intervals. The two lines do not exhibit similar contemporaneous movements. It is, however, possible that exchange rate movements reflected anticipations of future differential rates of inflation. If the line plotting percentage changes over twelve-month intervals in the exchange rate is a predictor of differential rates of inflation over future twelve-month intervals, its predictive power may be tested by moving it rightward and comparing it with the line plotting differential rates of inflation. A rightward movement of the line representing the exchange rate does increase the similarity in movement between the two lines. In particular, the troughs of the lines can be made to coincide by this rightward movement. Given the difficulty of predicting future rates of inflation, it is, however, probably unreasonable to expect that movements in exchange rates should predict any better than is indicated by Chart 5.

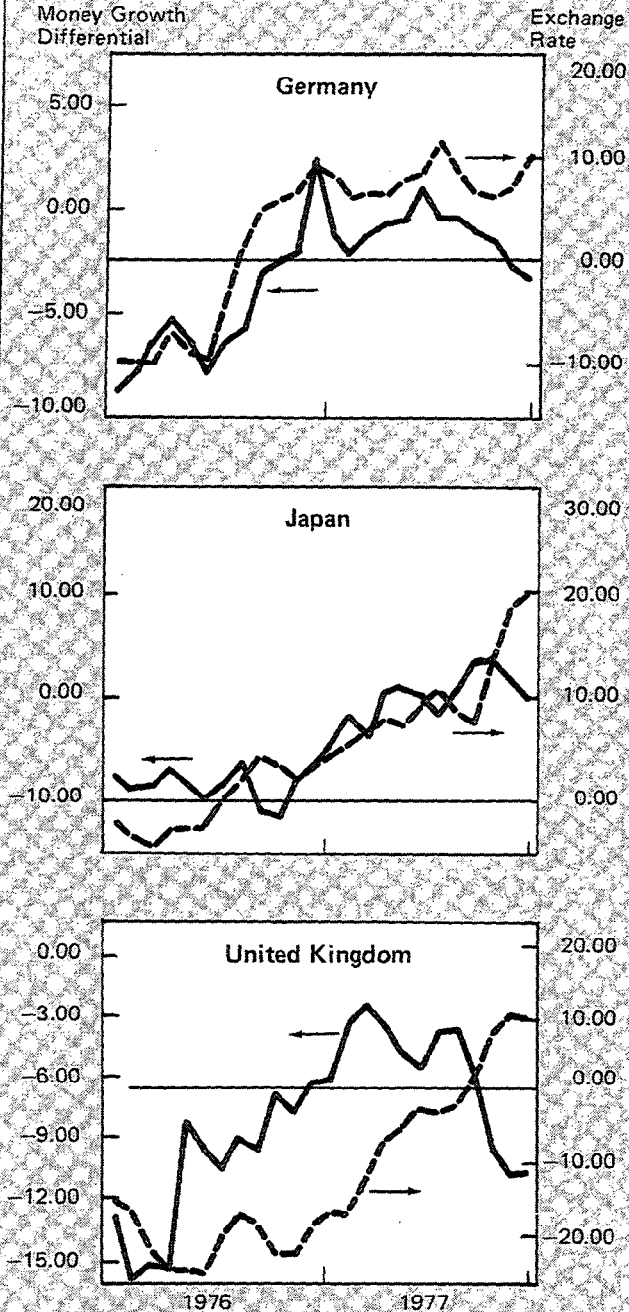
The rate of growth of the money supply offers information about future rates of inflation. Chart 6 is useful in examining whether differential rates of growth in the money supply between the United States and foreign countries are a determinant of movements in the foreign exchange value of the dollar. It is constructed in the same way as Charts 3 and 5 except that the solid line represents percentage changes in the money supply in the United States over twelve-month intervals minus percentage changes in the money supply in the foreign country over the same twelve-month intervals.⁹ The dashed line, as before, is the percentage change in the exchange rate over twelve-month intervals.

Shifts in United States-German and United States-Japanese money growth rate differentials lead to changes in the percentage changes of the foreign exchange value of the dollar as predicted. The exception is the end of 1977. During this time, Germany and Japan were using their currencies to buy dollars in an effort to resist the appreciation of their currencies. This intervention has the effect of raising the rate of growth of the money supply in Germany and Japan relative to the United States, causing a downturn of the solid line in Chart 6. An explanation for the failure of the mark and the yen to appreciate less rapidly or to depreciate against the dollar as a result of this downturn is that market participants believe that the upsurge in the rates of growth of the money supply in Germany and Japan will be reversed

⁹ The money supply used for all countries is M₁, or currency plus demand deposits. U. S. money growth rates are based on monthly averages of daily M₁ figures, German and Japanese money growth rates are calculated using end-of-month figures, and U. K. money growth rates are based on M₁ figures for the third Wednesday of each month.

Chart 6

U. S.-FOREIGN MONEY GROWTH DIFFERENTIAL AND THE PERCENTAGE CHANGE IN THE EXCHANGE RATE



Note: Lines plot the percentage change in the U. S. money supply (M_1) over twelve-month intervals ending on the date shown minus the percentage change in the foreign country's money supply (M_1) over the same twelve month interval, and the percentage change in the \$/foreign currency exchange rate over the same twelve-month interval; continuous compounding.

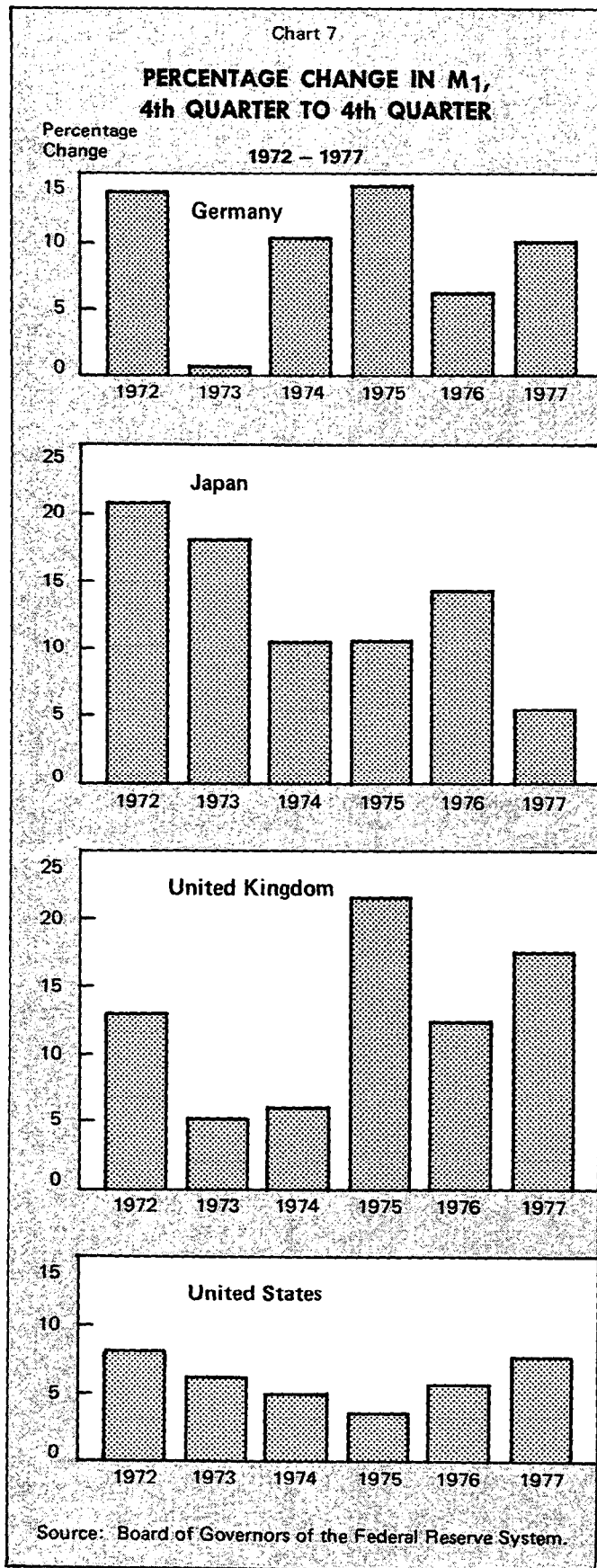
Source: Board of Governors of the Federal Reserve System.

shortly. The increase in the rate of growth of their money supplies would, if not reversed, frustrate the desire of the German and Japanese central banks to maintain low rates of inflation. If a movement in the line representing differential rates of money growth is expected to be reversed shortly after it occurs, it will have no effect on the exchange rate. Such a movement will not affect differential rates of inflation. Furthermore, if the exchange rate were to follow any such predictable pattern, speculative activity would soon eliminate the pattern.

For the United Kingdom, the slowdown in the rate of growth of its money supply relative to the rate of growth in the United States money supply that lasted until early 1977 is reflected by a slowdown in the rate at which the pound was depreciating against the dollar. Over most of 1977, however, the rate of growth of the money supply in the United Kingdom rose in relation to the rate of growth of the money supply in the United States while the pound continued to depreciate more slowly and finally appreciated vis-a-vis the dollar. The explanation for the similar discrepancy in the cases of Germany and Japan may also apply here. Also, in the United Kingdom, the rate of growth of the money supply is closely related to the size of the government deficit. The opening of the North Sea oil wells may have been expected to reduce or eliminate this deficit and to slow the rate of growth of the money supply in the United Kingdom. The current behavior of the dollar-pound exchange rate may be dominated by expectations of slower future growth rates in the British money supply.

The evidence presented in Charts 3 through 6 suggests that both real and monetary phenomena have influenced the value of the dollar in the last three years. A comparison of Charts 3 and 6 suggests that monetary phenomena have been relatively more important than real phenomena in determining the value of the dollar.

Expectations Because of a lack of a direct measure of expectations, it is difficult to say whether the expectations market participants form about the exchange rate necessary to equilibrate the market for foreign exchange over future intervals of time explain the depreciation of the dollar. Chart 7 plots the rate of change of the money supply from the fourth quarter of the preceding year to the fourth quarter of the year shown. These annual growth rates decrease and then increase for the United States. For the United Kingdom, they exhibit an upward trend, although as mentioned above, there are reasons that may be causing asset holders to anticipate a fall in



this series in the future. The series for Germany appears trendless. The series for Japan exhibits a downward trend. Only for Japan does a comparison of these series across countries strongly support the hypothesis that the dollar has depreciated because asset holders expect monetary policy to be more inflationary in the future in the United States than abroad. Asset holders are undoubtedly concerned more about future than past rates of growth of the money supply, however, and historical growth rates of the money supply probably offer less information on this question than a complex of nonquantifiable domestic considerations.

Concluding Comments There is evidence to support the view that the depreciation of the dollar is primarily a monetary phenomenon. Acceptance of this view has several implications. First, the depreciation of the dollar is not necessarily a self-limiting process. Although a discrete change in the expectations of asset holders may cause a large one-time depreciation of the dollar, a continual depreciation of smaller magnitude can continue indefinitely, if necessary, in order to compensate for a faster rate of inflation domestically than abroad. Second, the depreciation of the dollar cannot be dealt with using policy tools designed to deal with real phenomena, that is, phenomena pertaining to particular markets in the real sector of the economy. For example, a tariff or quota on imports might strengthen the dollar temporarily by reducing the demand for imports, but the effect would only be temporary. Furthermore, intervention by foreign central banks in the foreign exchange market that puts foreign currencies into the hands of United States citizens will, if these currencies are used to purchase foreign goods, produce a current account deficit for the United States.

A depreciation of the dollar need not indicate a current flow excess supply of dollars in the foreign exchange market. It may rather be a result of anticipations by the market that at the old exchange rate a flow excess supply of dollars would develop in the future. Many of the current proposals for ending the depreciation of the dollar concentrate entirely on the presumed current flow excess supply of dollars in the foreign exchange market.

For example, one proposal is for the United States Treasury to float a mark-denominated bond and to use the proceeds to buy dollars. Deposits of German banks decrease when the bonds are purchased, but increase to their original level when the Treasury uses the marks it has obtained to purchase dollars. The purchase of marks with dollars decreases the

deposits of United States banks. The operations of the Federal Reserve necessary to preserve its Federal funds rate target will, however, bring these deposits back to their original level. If the Treasury uses the dollars it obtains in this operation in order to retire debt, asset holders end up with fewer dollar-denominated securities and more mark-denominated securities. They may be willing simply to accept this alteration in the relative shares of their portfolios denominated in marks versus dollars in order to profit from an anticipated appreciation of the mark. The operation has no effect on the equilibrium value of the exchange rate.

Intervention in the foreign exchange market in

itself need have no effect on the value of the dollar. It is necessary for this intervention to change the expectations of asset holders about the foreign-exchange value of the dollar that will equilibrate the market for foreign exchange not only over the current time interval, but also over future time intervals. For example, what will be of concern to market participants will be how intervention affects the long-run behavior of the money supply domestically and abroad. Intervention in the market for foreign exchange in order to affect the exchange value of the dollar cannot be viewed in isolation, but must be viewed as an integral part of a more comprehensive set of policies.

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13. Rottenberg, I. "Inventories and the Inventory Valuation Adjustment." *Quarterly GNP Estimates Revisited in a Double-Digit Inflationary Economy*, BEA Staff Paper No. 25, U. S. Department of Commerce, Bureau of Economic Analysis, October 2, 1974, pp. 29-33.
14. ———; M. Foss; and G. Fromm. "Improving the Measurement of Business Inventories." *American Statistical Association Proceedings*, 1977, pp. 186-90.
15. Shoven, J., and Bulow, J. "Inflation Accounting and Nonfinancial Corporate Profits: Physical Assets," *Brookings Papers on Economic Activity*, (3: 1975), pp. 557-611.
16. ———. "Inflation Accounting and Nonfinancial Corporate Profits: Financial Assets and Liabilities," *Brookings Papers on Economic Activity*, (1: 1976), pp. 15-66.
17. Stevenson, J. *Methods of Inventory Valuation and Their Effect on Balance Sheets and Operating Statements*, Submitted to the Graduate School of Banking conducted by the American Bankers Association, Rutgers University, June 1952.
18. Tatom, J. "Inventory Investment in the Recent Recession and Recovery." *Review*, Federal Reserve Bank of St. Louis, (April 1977), pp. 2-9.
19. Touche Ross and Co. *Current Value Accounting, Economic Reality in Financial Reporting, A Program for Experimentation*, 1975.
20. von Furstenberg, G. "Corporate Taxes and Financing Under Continuing Inflation." *Contemporary Economic Problems*. Edited by W. Fellner. American Enterprise Institute for Public Policy Research, 1976, pp. 225-54.
21. ———, and Malkiel, B. "Financial Analysis in an Inflationary Environment." *The Journal of Finance*, (May 1977), pp. 575-92.

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