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# Does Dollar Depreciation Cause Inflation?

**D**URING the past few years, the rate of inflation has risen from 1.1 percent in 1986, measured by the consumer price index, to 4.4 percent in 1988. Though this rate of price increase pales in comparison to the double-digit inflation of the mid-1970s and early 1980s, it is high enough to cause concern among economic analysts, financial market participants and policymakers. Among the various explanations for the recent acceleration in inflation is the decline in the foreign exchange value of the dollar since 1985.<sup>1</sup> According to this view, the decline in the value of the dollar raises the dollar price of imported goods and, therefore, the prices paid by U.S. citizens as well. The consequence is inflation. Or is it?

The purpose of this article is to provide a framework in which to evaluate the claim that a decline in the dollar's foreign exchange value raises the rate of inflation in the United States.

## THE RELATIONSHIP BETWEEN THE EXCHANGE RATE AND INFLATION

What is the foreign exchange rate? Simply put, the price of a unit of one currency in terms of another. Why would one want to purchase another currency? There are several reasons. One is the need of foreign currency to purchase foreign goods. Another is the need of foreign currency to trade in other countries' financial assets. Purchases of financial assets, like stocks or bonds, in another country can only be completed if one exchanges dollars for the foreign currency.

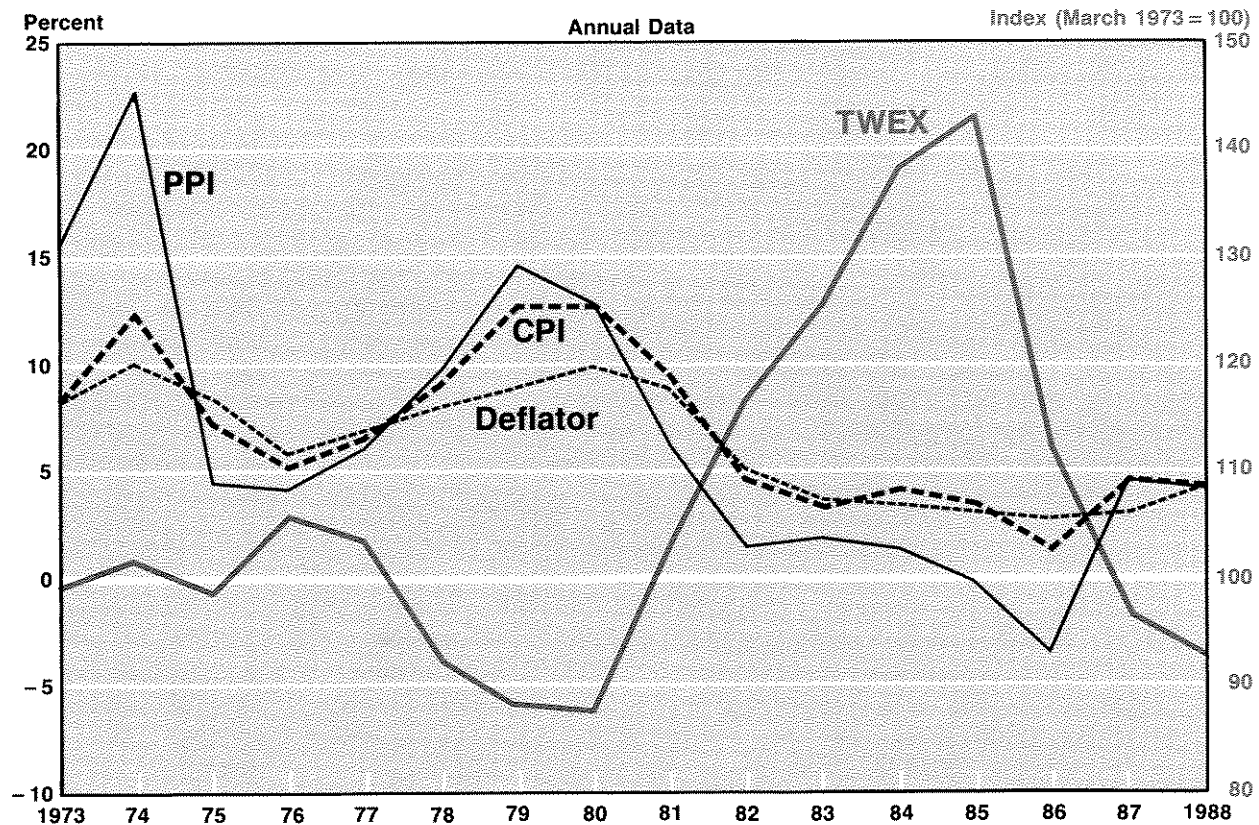
The dollar's foreign exchange value, commonly measured against a weighted average of foreign currencies, has varied considerably since 1973. To illustrate this, figure 1 plots the

<sup>1</sup>For example, John Paulus, chief economist for Morgan Stanley & Company, recently is quoted as saying that "the weak dollar is finally showing up as an inflation factor." (Uchitelle, 1989a) Lawrence (1989) attributes to two well-known economists the idea that without reducing the federal budget deficit and, therefore, the trade deficit, "a cheaper dollar would only bring higher U.S. inflation." Also, Boyd (1989) argues that "[w]hat the Fed thinks about the dollar feeds into its fight against inflation. . . ."

The behavior of the dollar also affects monetary policy discussions. For example, as stated in the Record of the

Federal Open Market Committee's December 15-16, 1987, meeting, "[t]he members recognized that the performance of the dollar in foreign exchange markets might have a key bearing on policy implementation in this period. No member wanted to tie monetary policy exclusively to the dollar, but some strongly emphasized that further substantial depreciation in the dollar could have highly adverse repercussions on domestic financial markets and the economy." (*Federal Reserve Bulletin*, 1988). For a related discussion, see Furlong (1989).

**Figure 1**  
**Trade-Weighted Exchange Rate and Inflation Rates**



Federal Reserve's trade-weighted exchange rate index (March 1973 = 100), which calculates the change in the value of the dollar against the currencies of 10 industrial countries.<sup>2</sup> As one can see, during the past 25 years the index has ranged from 87.4 in 1980 to a high of 143 in 1985. The 1980s have been characterized by two large swings: an appreciation of about 64 percent between 1980 and 1985, and a depreciation of about 35 percent since 1985. It is this recent downswing in the exchange rate that has sounded an inflationary alarm among some analysts.

One reason that the recent dollar decline has aroused inflation fears stems from the casual observation that the exchange rate and domestic inflation tend to move in opposite directions. To illustrate this negative correlation, figure 1 includes three commonly used measures of infla-

tion: the Consumer Price Index (CPI), the Producer Price Index (PPI) and the GNP deflator. These three differ in that they measure price changes at different levels of aggregation (the GNP deflator being the broadest measure) and for different baskets of goods and services. While some differences in measured rates of inflation during certain periods are noticeable, they typically follow the same general pattern. The simple correlations between the different inflation measures, as table 1 reports, range from 0.64 for the PPI-GNP deflator to 0.81 for the CPI-PPI over the full period.<sup>3</sup>

More important to the current discussion is the fact that these inflation measures typically fall when the exchange rate is rising and rise when the exchange rate is falling. As table 1 reports, the correlation between the exchange rate and CPI inflation is  $-0.55$ ; between the ex-

<sup>2</sup>The 10 countries are Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Sweden, Switzerland and the United States.

<sup>3</sup>The correlations are based on quarterly data.

**Table 1**  
**Correlation Coefficients Between**  
**Inflation Measures and the Exchange**  
**Rate**

Pairing	1973-88	Pairing	1973-88
CPI-DEF	0.81	TWEX-CPI	-0.55
CPI-PPI	0.73	TWEX-PPI	-0.50
PPI-DEF	0.64	TWEX-DEF	-0.58

NOTE: CPI denotes Consumer Price Index; PPI the Producer Price Index; DEF the GNP deflator; and TWEX is the Federal Reserve's trade-weighted exchange rate index. The correlation coefficients are all different from zero at the 5 percent significance level.

change rate and PPI inflation, it is  $-0.50$ ; between the exchange rate and inflation using the GNP deflator, it is  $-0.58$ . These negative and statistically significant correlations demonstrate that reductions in the exchange value of the dollar—the depreciation of the dollar—are associated with increases in domestic inflation.

### WHY SHOULD DEPRECIATION RAISE THE INFLATION RATE?

When the dollar depreciates relative to other currencies, the dollar prices of foreign goods increase relative to domestically produced goods, other things equal, making imports more expensive. Since imports make up part of the basket of goods purchased by consumers, measures of inflation based on that basket also will rise.

#### *Measuring the Direct Effect*

It often is argued that foreign exporters, facing higher dollar prices for their goods sold in

the United States, will simply pass on some or all of the depreciation-induced price increase to their U.S. customers. This is referred to as the “pass through” effect. To get a rough idea of how much a change in the exchange rate can directly impact inflation, the percentage of total consumer expenditures accounted for by imports can be used to derive a crude measure of the direct effect of a change in the dollar's value on the domestic inflation rate.<sup>4</sup> This effect is measured as the product of the percentage change in the exchange rate and the ratio of expenditures on imported consumer goods to total personal consumption expenditures. The impact on inflation can then be found by subtracting this direct effect from the reported rate of inflation.

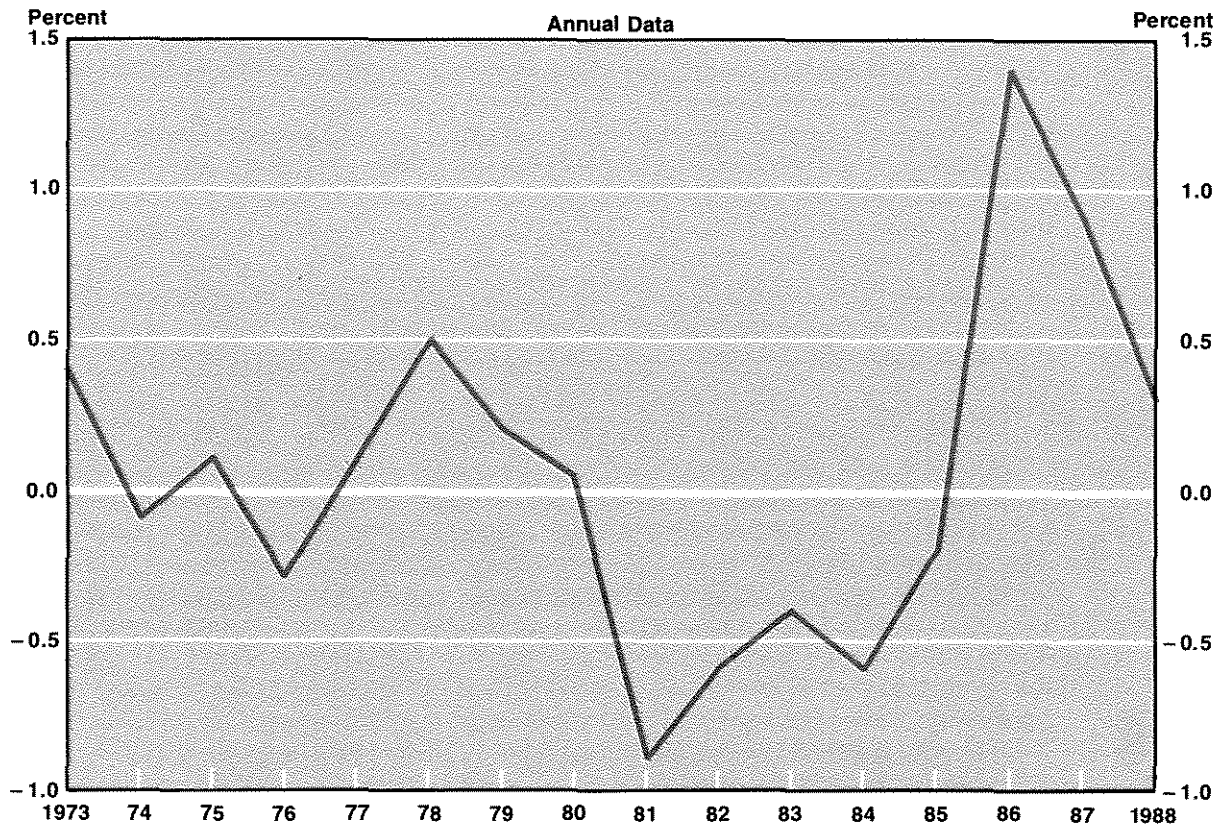
To better understand this calculation, consider 1986, when the dollar depreciated 21.7 percent against a basket of other currencies. Since imported consumer goods were 6.3 percent of total expenditures that year, the product of the two,  $-1.4$  percent, is a rough measure of the direct effect of the dollar's depreciation on inflation. Using this approach, if the dollar had not depreciated by almost 22 percent, inflation (measured using the CPI) would have been closer to zero percent than the reported value of 1.9 percent. In other words, the falling value of the dollar accounted for much of the observed inflation.

To illustrate how much of a direct impact movements in the dollar may have had on domestic inflation over time, figure 2 plots the effect on domestic inflation from a change in the exchange rate. As the figure shows, during periods when the exchange rate is rising, such as 1980-85, inflation is lower than it would have been in the absence of the dollar's appreciation. During the recent fall in the value of the dollar, the effect has turned positive, pushing inflation higher than it otherwise would have been.<sup>5</sup>

<sup>4</sup>This approach has been used often. See, among others, Solomon (1985) or Blinder (1979). It may be argued that the personal consumption expenditure (PCE) deflator is the appropriate measure to use in this calculation. We use the CPI because it is more widely recognized and discussed. Moreover, since the correlation between the CPI and PCE measures of inflation is over 0.90 for the 1973-88 period, there is no loss of generality by using one measure or the other. The data used extend through the third quarter of 1988 because of availability.

<sup>5</sup>One aspect of figure 2 that deserves mention is the fact that, after the exchange rate has fallen to a new level, the direct effect on domestic inflation diminishes. In other words, once the foreign exchange value of the dollar has stopped falling, the direct effect on domestic inflation tends toward zero. This shows that exchange rate changes do not impart a permanent effect on the inflation rate, but cause only temporary changes.

**Figure 2**  
**Direct Exchange Rate Effect on Domestic Inflation**



### *Foreign Exporters as "Price-Takers"*

There is another channel through which a fall in the dollar can affect the prices of U.S. imports and, hence, the domestic inflation rate. Consider a foreign manufacturer who exports to the United States. If we assume that the manufacturer is a price-taker in the U.S. market—that is, the individual producer does not influence the market price of the good—the decision on how much to produce and export to the United States will be determined by the given price and the cost of production.<sup>6</sup> As the upper panel of figure 3 shows, this representative manufacturer has the usual upward-sloping marginal cost curve. Since he is a price-taker in

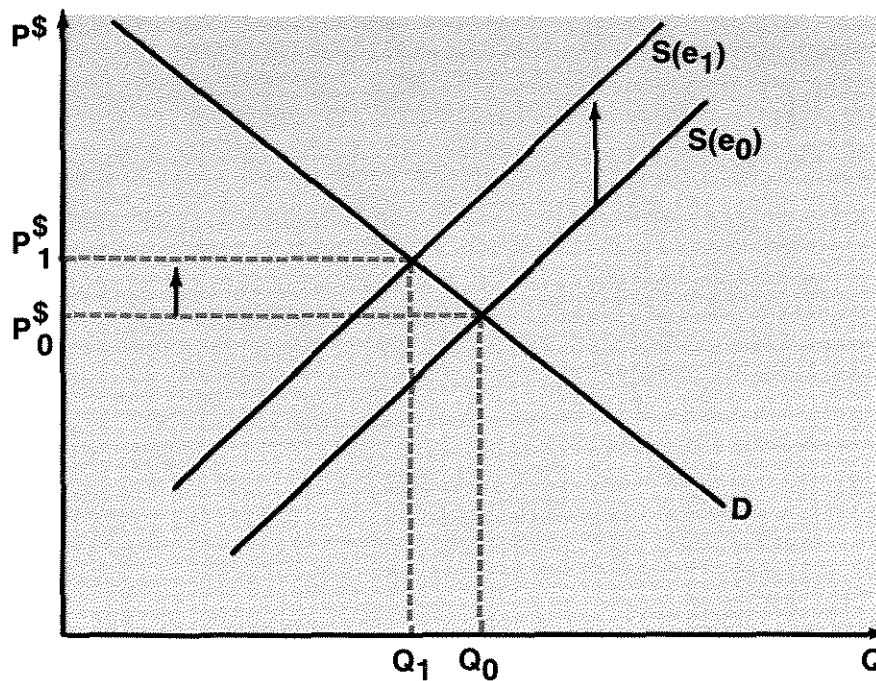
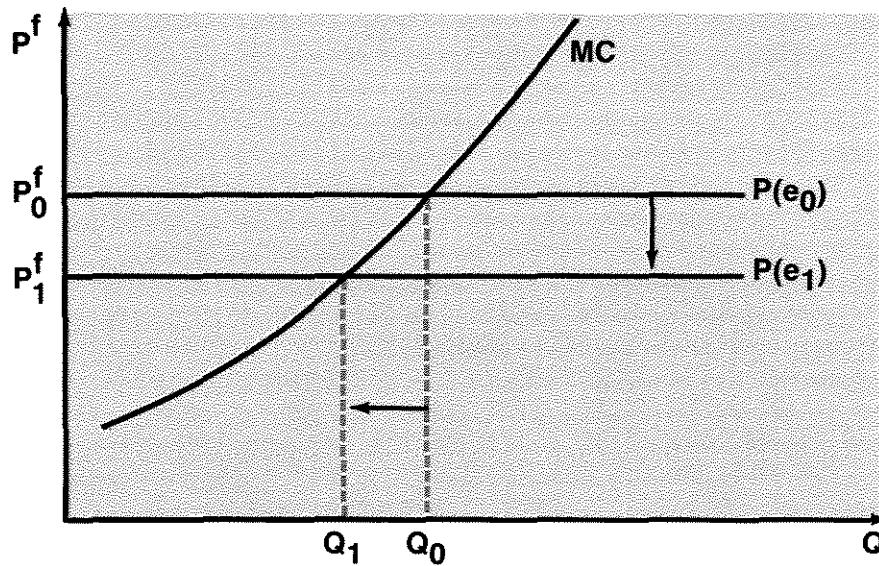
the U.S. market, the price in terms of the manufacturer's home currency is set at  $P_0$ . Given the position of the marginal cost curve, the quantity produced is given by the intersection of price and marginal cost, or at  $Q_0$ .

Now assume that the foreign exchange value of the dollar falls. This means that, other things equal, the U.S. price received by the manufacturer *in terms of his own currency* falls to  $P_1$ . If the manufacturer's costs of production have not changed, this fall in price means that the quantity produced for the U.S. market falls to  $Q_1$ , where marginal cost is equal to the new price. The dollar's depreciation thus has reduced the supply of goods sent by this representative foreign manufacturer to the United States.

<sup>6</sup>For a recent analysis of this, see Knetter (1989). His evidence, based on industry analysis, suggests that exporters to the United States perceive U.S. prices as given. Based on his study, Knetter notes that "[t]he variation in

the results across industries suggests that the link between currency values and domestic price levels is tenuous at best." (p. 209)

**Figure 3**  
**Price and Quantity Effects of a Decline**  
**in Dollar**



The effect of this reduction in imported goods is shown in the lower panel of figure 3. Here the supply and demand curves for the U.S. market in which the foreign manufacturer sells is shown. The market supply curve drawn is

the sum of domestic and foreign producers' individual supply curves. Other things the same, a reduction in the amount exported to the U.S. market results in a leftward shift in the supply curve. The effect on U.S. prices? Given the de-

mand for the good, the price paid by U.S. residents increases from  $P_0$  to  $P_1$ . In other words, a depreciation of the dollar increases the prices paid by U.S. residents for this good. Such an increase will result in a higher price level and, hence, at least a temporary increase in the rate of inflation.

### *Estimating the Total Effect*

One problem with the preceding approach is that it relies solely on the direct effects of the dollar's depreciation. An increase in the price of some imported goods, such as those used in the manufacturing process, also may lead to indirect increases in the prices of domestically produced goods. Consequently, measuring only the direct effect may underestimate the total effect of a depreciation in the dollar on the domestic inflation. We will return to this subject later in the paper.

### **WHY DOESN'T DOLLAR DEPRECIATION CAUSE INFLATION?**

The discussion thus far suggests that there is a direct relationship between a depreciation in the dollar and higher domestic inflation. Thus, if the prices of imports rise because of a fall in the value of the dollar, it is just arithmetic to show that U.S. inflation must increase. Unfortunately, while the simplicity of such a view is seductive, it is not correct. The reasons why are discussed in the remainder of this article.

### *What Causes the Exchange Rate to Change?*

An observed exchange rate is determined by the demand for and the supply of a currency in international exchange. Movements in the exchange rate reflect relative economic conditions between countries that, in turn, influence the demand and supply of the currencies. Moreover, because exchange rates are forward-looking, their adjustments reflect changes in ex-

pectations about future economic conditions. Consequently, it may be incorrect to impart a causal role to exchange rate movements in explaining domestic economic activity when the exchange rate merely reflects the underlying economic conditions, actual and expected, in different countries.

Over long periods of time, one key factor that influences the level of the exchange rate between two countries is their relative price levels. When one price level changes, the exchange rate will adjust accordingly to equate prices.<sup>7</sup> This notion, referred to as purchasing power parity, means that similar bundles of goods have a common price across international boundaries. If prices increase in only one country, the exchange rate between that country's currency and all other currencies will fall, *ceteris paribus*. Since in the absence of exchange rate changes the same basket of goods can be purchased elsewhere for a lower price, the demand for the country's goods and for its currency declines.<sup>8</sup> In unfettered foreign exchange markets, changes in the exchange rate may simply reflect changes in the countries' price levels.<sup>9</sup>

Exchange rate movements also may reflect differences in countries' economic activity. Because increased demand for imported goods is often associated with an increased level of economic activity, those countries experiencing faster growth may also find that their currency is depreciating in foreign exchange markets. Recall that one use of foreign currency is to purchase foreign goods and services. If the United States is growing faster than other countries, and its demand for imports is likewise increasing, then the demand by U.S. residents for foreign currency also is increasing. Consequently, there is relatively more demand for other currencies and their value appreciates relative to the dollar. Thus, movements in the exchange rate also may reflect differences in the relative economic conditions of two countries.

<sup>7</sup>The exchange rate can be defined as the ratio of dollar prices to prices measured in some foreign currency unit. If the foreign price rises and the U.S. price remains constant, the exchange rate will fall.

<sup>8</sup>To illustrate, suppose that pencils with identical characteristics sell for 75 cents in the United States and 93 yen each in Japan. This implies that the exchange rate is about 124 yen per dollar. If the price of pencils in Japan should rise to 150 yen, the dollar-equivalent price of pencils in Japan is now \$1.21. Unless the price in the United

States changes, demand will shift to U.S. pencil manufacturers. This lowers the demand for Japanese pencils and, other things the same, causes the yen-dollar exchange rate to depreciate.

<sup>9</sup>To abstract from price level changes, real exchange rates often are used. The real exchange rate is defined as the nominal exchange rate times the ratio of the two price levels, or  $e^r = e^*(P/P^*)$ . Note that for this measure, if the nominal exchange rate ( $e^*$ ) and the foreign price level ( $P^*$ ) double, the real exchange rate will remain unchanged.



Movements in the exchange rate also reflect differences in interest rates across countries, a channel of influence thought to be most important in explaining exchange rate movements over short time spans. For example, suppose that from an initial point of equality, interest rates on identical financial instruments, say bonds, in the United Kingdom rise 5 percent while those in the United States are unchanged. Other things the same, investors prefer the U.K. bond's rate of return to the U.S. bond. Pounds, therefore, will be in increased demand in order to purchase the U.K. bond, and the result is a depreciation of the dollar relative to the pound.

This discussion points out that movements of the exchange rate can reflect changes in either key economic factors between two countries or people's expectations. In a very direct way, these factors are related to changes in money growth and the process by which such changes are transmitted to the economy. For example, consider the effects of an increase in the growth of the money supply. If we assume that prices react somewhat slowly at first to this change, the brunt of the faster money growth will be evidenced in faster economic growth and in lower nominal interest rates. As noted earlier, faster economic growth in the United States relative to other countries leads to a fall in the value of the dollar. The decline in interest rates here relative to abroad also reduces the relative demand for dollar-denominated financial assets and, hence, the dollar's value falls.

But, as economic theory predicts and much empirical research shows, an increase in the growth rate of the money supply ultimately leads to an increase in the inflation rate. This movement to a higher rate of inflation reflects the increase in money growth, but also will occur at the same time that the dollar's value is falling in foreign exchange markets. In other words, the decline in the value of the dollar and the increase in inflation are both manifestations of the same thing, namely, the increase in the growth rate of the money stock. Hence, it is incorrect to assign exchange rate changes an independent role in determining permanent changes in inflation once the effects of changes in money growth have been taken into account.

## *How Is the Exchange Rate Measured?*

There are numerous exchange rate measures. As mentioned earlier, the one most often used in discussions of this issue is the Federal Reserve Board's trade-weighted exchange rate (TWEX). In calculating the change in the dollar's value against other industrial countries, the weight given each country in the index is the 1972-76 average world trade of that country divided by the average world trade of all countries combined. In this way, relatively large movements in the exchange rate between the United States and any one country are weighted by the size of the other country. Exchange rates also can be measured bilaterally, that is, the exchange rate between two countries only.

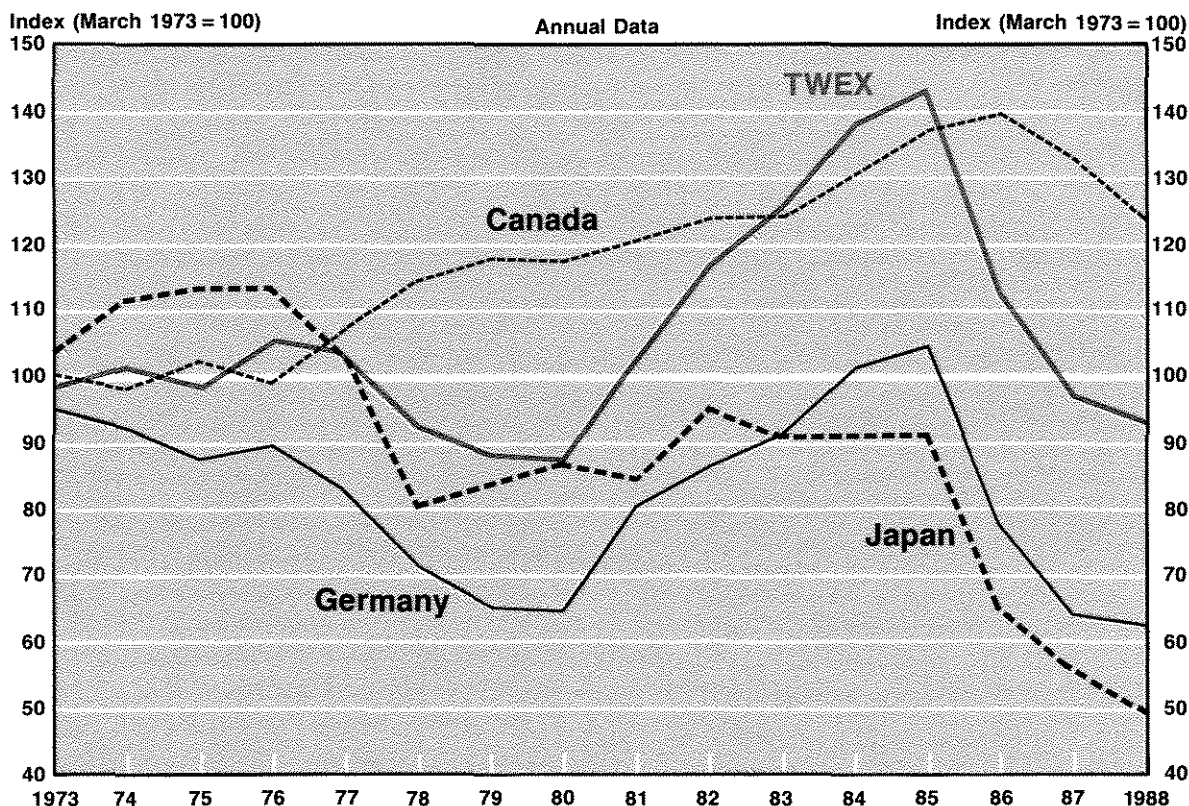
The fact that the exchange rate can be measured in different ways gives rise to different perspectives on exchange rate behavior. For example, consider figure 4, where the trade-weighted exchange rate and the bilateral exchange rates between the United States and three countries—Canada, Germany and Japan—are plotted for the period 1973 through 1988.<sup>10</sup> The TWEX declines from 1976 until 1980, when it begins to rise sharply. The appreciation of the dollar between 1980 and 1985 using this broad measure is 64 percent. Since 1985, however, the value of the dollar using the TWEX has declined about 35 percent.

How have bilateral exchange rates behaved relative to this overall exchange rate measure? The U.S.-Canadian exchange rate started appreciating in 1976, four years before the general upward movement in TWEX. Moreover, it has declined only since 1986. In percentage terms, the U.S. dollar was about 17 percent higher in 1985 than it was in 1980 against the Canadian dollar and has declined about 10 percent since then. These figures are much different from the measurement using the overall index.

The behavior of the U.S.-Germany and U.S.-Japan exchange rates also differs from the overall measure. During the first half of the 1980s, the dollar appreciated 62 percent against the German mark, but only 5 percent against the Japanese yen. Since 1985, the dollar has

<sup>10</sup>We use 1973 since it marks the beginning of the flexible exchange rate period. Also, March is the base period (i.e., = 100) for all exchange rates listed.

**Figure 4**  
**Trade-Weighted and Bilateral Exchange Rates**



depreciated 40 percent against the mark and 46 percent against the yen. Thus, movements in the foreign exchange value of the dollar clearly differ among countries.<sup>11</sup>

Since it is the changes in bilateral exchange rates that influence the prices of exports in those countries, how are changes in the bilateral exchange rates related to domestic U.S. inflation? Table 2 reports the correlations between the exchange rates used in figure 4 and the three measures of inflation. The results show that the correlations between U.S. inflation and the U.S.-Canadian exchange rate are similar to those found using the TWEX; for the U.S.-Germany exchange rate, they are much smaller. The Japanese result, however, is somewhat puzzling: it shows a positive relation-

ship, suggesting that a depreciation in the dollar relative to the yen is associated with a decline in inflation. The message from this comparison is that focusing on the TWEX-inflation connection may obscure bilateral relationships that influence import prices paid by U.S. residents.

### *Is It Really Inflation?*

Suppose that the value of the dollar declines and the dollar price of imported goods subsequently increases. Will this lead to inflation? To answer this question, it is necessary to define carefully what is meant by the term "inflation." A pragmatic definition of inflation is a persistent increase in the general level of prices of goods and services. There are two key aspects to this definition. First, virtually all prices, not simply

<sup>11</sup>This is the premise upon which broader exchange rate indexes are often constructed. For a discussion and comparison of alternative measures, see, among others,

Belongia (1986), Cox (1986), Rosenweig (1986) and Ott (1987).



Table 2  
**Correlation Coefficients Between Inflation Measures and  
 Exchange Rates: 1973-88**

Inflation measure	Exchange rate			
	TWEX	Canada	Germany	Japan
CPI	-0.55	-0.46	-0.24	0.30
PPI	-0.50	-0.56	-0.12	0.25
DEF	-0.58	-0.62	-0.14	0.38

one or two, have increased. Second, inflation defines price increases that persist over an extended period of time; it is not simply a once-and-for-all increase in the price level. A persistent increase in the price level occurs only when aggregate demand continues to grow faster than aggregate supply. Given considerable evidence showing that the main determinant of aggregate demand growth over time is the growth of the money supply, it is widely agreed that inflation is a monetary phenomenon.<sup>12</sup>

This definition of inflation is intended to be restrictive for a very good reason. If "inflation" is used to describe situations in which the price of only one good or a small set of goods increases, for example, import prices, the result will be a confusion between general inflation and relative price changes.

To see this, consider the fact that observed rates of inflation are measured as changes in an index of various prices. The price indexes used to measure inflation, such as the CPI or PPI, are a weighted average of prices covering a wide variety of goods and services. From one month to the next, some prices in the index inevitably will be rising while others will be falling. Because these price movements are weighted differently in the index, inflation measured as the percentage change in the index may reflect

nothing more than relative changes in certain individual prices that are weighted more heavily than others. This clearly is a different kind of "inflation" than the definition used above.

Recent discussions of the inflationary effect of the dollar's declining value are subject to this invalid line of reasoning. They confuse the transitory nature of a relative price shift with inflation and do not explain a persistent increase in the general level of prices.

### *Is "Pass-Through" Simply "Cost-Push?"*

Another way of interpreting the notion of the pass-through is in terms of so-called cost-push explanations of inflation.<sup>13</sup> According to this view, which focuses on the input costs of producing a product, if one of the input prices rises, then the price of the good must also. Hence, if depreciation of the dollar raises imported goods prices (in dollars), then prices on items produced with those goods also must rise. Since goods and services are more expensive, labor will demand higher wages which, being another cost of production, feeds into even higher prices. In this way, a fall in the value of the dollar, some argue, could start a process of

<sup>12</sup>The quantity theory equation written in logarithmic growth rate form is

$$\dot{M} + \dot{V} = \dot{P} + \dot{Q},$$

where M is the money stock, V is velocity, P is the price level and Q is the level of output. The dots above each letter denotes rate of change. According to this theory, because velocity and output are determined independently of money growth in the long run, there is a one-for-one relationship between changes in the growth rate of money

and changes in the rate of inflation. For recent evidence on this relationship using a sample of 62 countries, see Dwyer and Hafer (1988).

<sup>13</sup>For a discussion of cost-push theories of inflation, see Batten (1981).

cost-push inflation, with wages and prices spiraling upward.<sup>14</sup>

The notion of cost-push inflation stemming from a depreciating dollar has little economic foundation. Suppose that a rise in import prices increases the measured rate of inflation and leads consumers to re-evaluate their current money holdings. With an increase in the measured price level, individuals will desire to increase their nominal money holdings to maintain current purchasing patterns. If the money supply is not increased, the increased demand for money will not be accommodated. As a consequence, the demand for goods and services, both domestic and imported, will fall, reducing the upward price pressures and returning the rate of inflation to that determined by the relative growth of money supply and demand.<sup>15</sup> Thus, the view that an increase in one price (imports) causes inflation again confuses a relative price change with a persistent increase in the general price level.

The extent to which this higher dollar cost is passed through to imported goods that compete directly with domestically produced goods depends on economic circumstances.<sup>16</sup> For example, recently it has been noted that the falling value of the dollar since 1985 has not led to the price increases for imported goods many thought would occur.<sup>17</sup> One reason often cited is that foreign competitors relinquished profit margins for market share built up during the 1980-85 appreciation of the dollar. In other words, importers held dollar prices of their goods to levels competitive with U.S.-produced goods to hold their share of the U.S. market.

An interesting aspect of this argument is that it has been used to explain both the relatively small impact of the dollar's appreciation on domestic inflation during the 1980-85 period, as well as the relatively small impact on domestic inflation of the dollar's fall since then. This suggests that the pass-through is not a reliable indicator of domestic price pressures stemming from exchange rate movements. Indeed, it recently has been estimated that less than one-half of one percentage point of the 4.4 percent rise in the CPI during 1988 is attributable to the pass-through from a falling dollar.<sup>18</sup>

### *What About Substitution Effects?*

The cost-push view of the depreciating dollar's effect on domestic inflation also assumes that consumers do not reduce their purchases of the more expensive imported goods. Economic theory (and common sense) predicts, however, that they will buy more of the less-expensive, domestically produced items.<sup>19</sup> To examine whether there is a substitution effect at work, the percentage of total personal consumption expenditures spent on consumer imports was calculated.<sup>20</sup> This ratio is useful, because it allows us to determine whether consumers alter their consumption patterns of imports vs. domestic goods in the face of a change in the exchange rate.

In figure 5, we plot the ratio of consumer imports to total personal consumption expenditures along with the TWEX since 1973.<sup>21</sup> As one would expect, periods of an appreciating

<sup>14</sup>The notion of a wage-price spiral often is found in popular discussions. For example, Uchitelle (1989a), p. 1, states that "[i]nflationary spirals, however, cannot last long . . . unless they are fed by widespread wage increases that keep forcing up prices." Passell (1989) also has suggested that, on the basis of the nearly 12 percent PPI inflation rate in January 1989, "economists are shaken by the first signs of *self-perpetuating* cost push inflation." (italics added)

<sup>15</sup>For evidence that exchange rate movements have little effect on domestic prices once money supply and demand factors are accounted for, see Darby (1981).

<sup>16</sup>See, among others, Pigott and Reinhart (1985) for a discussion of this issue.

<sup>17</sup>For example, see Hooper and Mann (1987).

<sup>18</sup>This estimate was attributed to Catherine Mann, an economist at the World Bank, in Uchitelle (1989b).

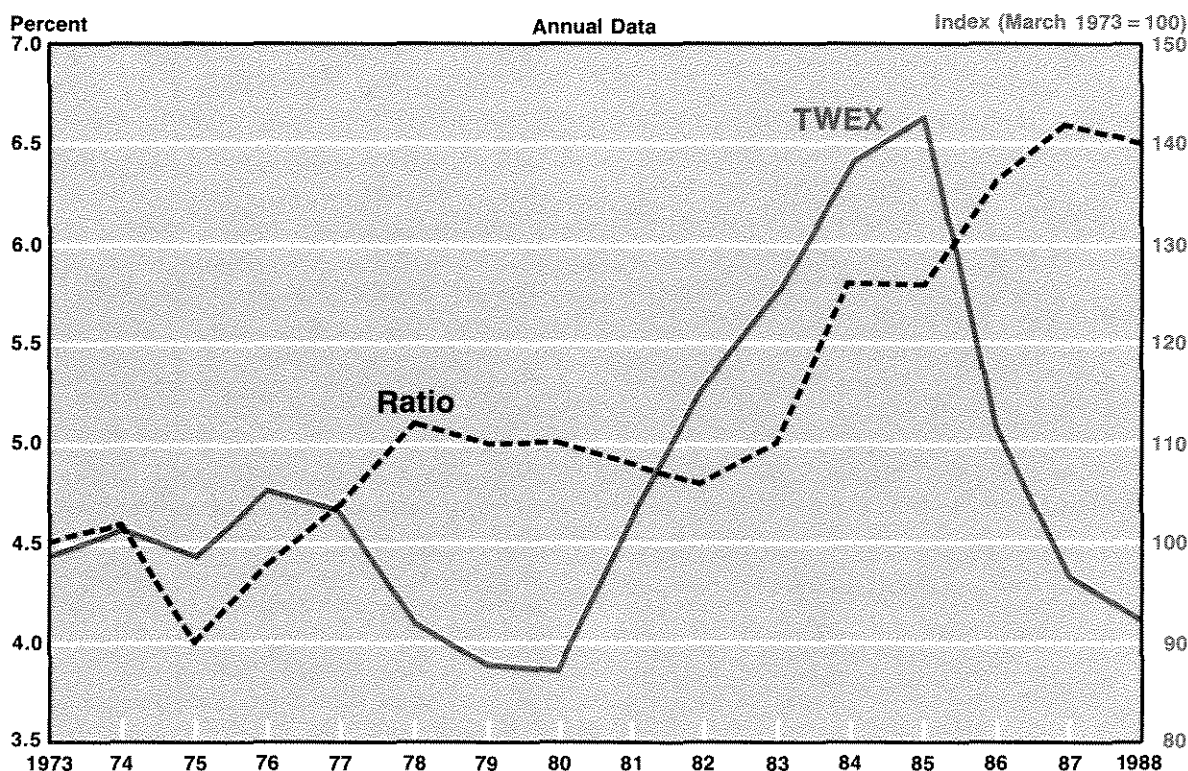
<sup>19</sup>Since the evidence presented earlier shows that bilateral exchange rate movements may be quite different from

changes in an exchange rate index like the TWEX, the substitution may be between domestically produced goods as well as between competing imported goods.

<sup>20</sup>For the purposes of this calculation, we follow Blinder (1979) and consider the following to be consumer imports: food, feed and beverages; passenger cars; other consumer merchandise; travel; passenger fares; and private payment for other services. Note that this measure probably overstates consumer spending. For example, passenger fares do not differentiate between pleasure travel and business travel—one the expense of consumers, the other of businesses. Also, the component, passenger cars, does not differentiate between business and private use. The source is *Survey of Current Business*, various issues. Values for 1988 are preliminary estimates.

<sup>21</sup>Nominal values of the measures are used since we use the nominal TWEX measure.

**Figure 5**  
**Trade-Weighted Exchange Rate and Consumer Imports**  
**as a Percent of Total Expenditures**



dollar are associated with an increase in the ratio of consumer imports to total expenditures. Since a rising dollar may mean lower imported prices, consumers would be expected to purchase larger amounts of imports relative to domestic goods and services. Note that the adjustment of consumer expenditures does not occur simultaneously with exchange rate changes. From figure 5, it appears that the adjustment in consumer expenditures is delayed about two years after the exchange rate changes course.<sup>22</sup>

The figure also shows that the recently falling dollar is associated with a decline in the ratio of imported consumer goods to total expenditures. Since the relative price of imported goods has been rising since 1985, along with the fall in the dollar, the response by consumers—shifting away from imported goods to domestic goods—is precisely what economic theory predicts.

Moreover, the percentage of consumer imports to total personal consumption expenditures actually is quite small. On average, consumer imports have accounted for only about 5 percent of total personal consumption expenditures since 1973, reaching a maximum value of about 6.6 percent in 1987. This evidence suggests that the role of dollar depreciation in initiating an inflationary spiral is dubious.

### EMPIRICAL EVIDENCE

To measure the complete effect of a change in the exchange rate on domestic prices, one strategy is to view the domestic price level as a function of wages, demand pressures and import prices.<sup>23</sup> In such models, changes in the exchange rate affect domestic prices through their effect on import prices. Hooper and Lowery

<sup>22</sup>This reflects the so-called J-curve phenomenon. See Meade (1988) for a discussion.

<sup>23</sup>Such price equations are oftentimes referred to as cost-markup models.

(1979) report that the various models they examined indicate that a 10 percent depreciation in the dollar, other things constant, produces a long-run increase in consumer prices on the order of 0.8 percent to 1.5 percent.

Another approach used by Whitt, Koch and Rosenweig (1986) is to regress the domestic price level on its own lagged values along with contemporaneous and lagged values of the exchange rate.<sup>24</sup> Based on this approach, the authors find that a 10 percent depreciation of the dollar produces a 1.6 percent increase in the price level after one year and a 4.6 percent increase after four years.

Other studies have attempted to capture the effects of a depreciation by developing structural models of the economy and gauge the effects of a dollar depreciation as it works through various channels, such as labor costs, input prices and economic activity. Hooper and Lowery (1979) also compare such models and find that a 10 percent dollar depreciation on average produces a 0.8 percent to 2.7 percent increase in consumer prices. Sachs (1985) estimates several versions of such a model, finding that a 10 percent depreciation leads to a 0.42 percent to 1.27 percent increase in the price level in the first year, and by the third year, a 1.67 percent to 2.56 percent increase. Compared with the direct effect approach used earlier, the results from these other procedures indicate that the inflationary effects of a dollar depreciation may persist for several years once the indirect effects are accounted for.

Some researchers have questioned the empirical effects of a dollar depreciation found in the preceding studies. For example, Woo (1984) argues that much of the inflation effect attributed to exchange rate movements really reflects oil price increases. These price shocks, which produce sizable but transitory increases in the inflation rate, follow periods of dollar depreciation. In contrast to the other findings, Woo estimates that, once oil price shocks are accounted for, a 10 percent depreciation in the

dollar produces a mere 0.02 percent increase in the price level in the first year, with no longer-term effects. Glassman (1985) also argues that exchange-rate effects on changes in the price level are overstated because of the high correlation between exchange rate movements and oil price shocks. Like Woo, he finds that changes in the foreign exchange value of the dollar have no appreciable effect on U.S. inflation after oil price effects are considered.

There also are several general criticisms about relating changes in domestic prices to exchange rate movements.<sup>25</sup> The exchange rate often is regarded as an exogenous variable. As noted earlier, however, movements in the exchange rate reflect relative economic conditions between different economies. Moreover, since economic theory suggests that exchange rates are forward-looking, reflecting market expectations, a finding that exchange rate movements appear to statistically "cause" inflation is merely an indication that they respond faster to changes in the relative economic conditions than do observed price levels.<sup>26</sup>

Another criticism is that the dynamic adjustments that may occur when the relative prices of imports rise are sometimes ignored.<sup>27</sup> Other things the same, unless the domestic monetary authority accommodates the relative price increase by expanding the money supply, desired expenditures on both imported and domestic goods must fall, offsetting any long-term effect of a dollar depreciation on domestic inflation.

Finally, so-called cost-markup models, while relevant in explaining the transitory movements in inflation, are not useful for explaining the underlying determinants of persistent changes in the price level. In a study of the effects of exchange rate changes on domestic inflation, it has been demonstrated that, once the influence of domestic money growth is accounted for, changes in the effective exchange rate provide no additional explanatory power.<sup>28</sup>

<sup>24</sup>They also estimate an equation that regresses the exchange rate on its own lag values and those of the price level. These results indicate that the price level does not help explain movements in the exchange rate.

<sup>25</sup>The following criticisms also are found in Bilson (1979).

<sup>26</sup>For example, expansionary monetary policy in one country may lead to an immediate response in foreign exchange markets as these agents' expectations for future inflation differentials have been altered. The effect on actual inflation differentials, however, may not change for some time.

<sup>27</sup>This point also is raised by Darby (1981).

<sup>28</sup>See Batten and Hafer (1986). This result holds for the GNP deflator. They also report that, when the PPI is used, there is a statistically significant effect. This result is not surprising, however, given the large tradeable-goods component in the PPI index relative to the GNP deflator.

## CONCLUSION

Does a falling foreign exchange value of the dollar mean higher U.S. inflation? Some commentators would argue in the affirmative. The analysis in this paper, however, indicates that this view is off the mark. Inflation is a persistent increase in the general level of prices. This definition provides a consistent framework in which to distinguish inflationary trends from transitory relative price shocks. While a depreciating dollar may cause an increase in the dollar price of some imported goods and services, these relative price increases are not inflationary nor do they promote an upward spiral of wages and prices in the future.

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