STEPHEN P. MAGEE*

University of Chicago

Currency Contracts,

Pass-through, and

Devaluation

THE EVENTS OF THE PAST TWO YEARS have marked a departure from the
relative stability in international markets since World War II. The diffi-
culties began with the deterioration in the United States merchandise trade
balance in 1971. Large movements of short-term capital also occurred as
anxiety over the dollar increased. The result was imposition of an import
surcharge and suspension of gold convertibility by the United States on
August 15, 1971. Throughout the fall of 1971, the dollar depreciated on
foreign exchange markets relative to most major currencies. With the
Smithsonian agreement in December 1971, the U.S. import surcharge was
removed and a new set of fixed parities was agreed upon, with wider bands
than had existed previously. In June 1972, a sterling crisis erupted, leading
to a float of the British pound. Even though the monthly trade balance for
the United States improved little in 1972, two events stimulated confidence
in the dollar after the sterling crisis: Late in August, U.S. money market
rates rose significantly, and the efforts of the United States to halt inflation
appeared to be achieving some success while inflation was worsening in
Western Europe.[1]

However, late 1972 was marked by mounting apprehension over the
strength of the dollar. Some Western European countries began to tighten

1. "Treasury and Federal Reserve Foreign Exchange Operations," *Federal Reserve
Bulletin*, Vol. 59 (March 1973), pp. 142–45.

their monetary policies. Confidence in the dollar eroded further in the middle of December, when U.S. trade figures for November revealed that the monthly merchandise trade deficit had grown to $663 million from an average of $497 million for the previous six months. A number of factors reinforced the pressure on the dollar in January 1973: intensified apprehension over renewed inflationary pressures in the United States, a sharp drop in U.S. stock prices, concern that U.S. interest rates might not rise sufficiently to maintain external balance, introduction of a two-tier market for the weakening Italian lira and the related floating upward of the Swiss franc, release of the December U.S. trade balance figures, which showed another bad month (ironically, the initially reported deficit of $563 million was later revised downward to $441 million), and the release of German data indicating substantial growth in that nation's trade surplus during 1972.[2] In February the German mark reached its ceiling, forcing both American and German monetary authorities to intervene (on Friday, February 2, the last of the available mark balances held by the Federal Reserve were sold); and Chairman Wilbur D. Mills of the U.S. House Ways and Means Committee called for a further devaluation of the dollar and urged the convocation of an international monetary conference to realign the major currencies.[3] It is reported that the German central bank bought more than $6 billion in an effort to prevent another unilateral revaluation of the mark, swelling its reserves to the equivalent of $32.4 billion by Friday, February 9.[4] On Monday, February 12, U.S. Treasury Secretary George P. Shultz announced the 10 percent devaluation of the dollar and the government's understanding that the Japanese yen would temporarily join those currencies then floating. The crisis continued into March, however, and exchange markets in Europe were officially closed during the week of March 5–9 with the dollar quoted below its new floor rates.[5] The result of these events has been the float that now prevails.

What has been learned from the developments in foreign exchange markets that culminated in the February 12 devaluation of the dollar? The lesson is that it is becoming increasingly difficult, if not impossible, for

2. *Ibid.*, pp. 143–44; *Wall Street Journal*, February 26, 1973, p. 1; *Economic Indicators* (January 1973), p. 23.

3. "Treasury and Federal Reserve . . . Operations," p. 144, and *Wall Street Journal*, February 8, 1973, p. 5.

4. *Wall Street Journal*, February 14, 1973, p. 3.

5. "Treasury and Federal Reserve . . . Operations," p. 145.

central banks to maintain a fixed parity system when the official rates deviate significantly from the market rates. The first reason is increased private capital mobility: The amount of liquid funds held by large multinational corporations is growing rapidly and may be sufficiently large relative to the reserves of central banks to swamp the effects of intervention by national monetary authorities in crises. A recent study by the U.S. Tariff Commission shows that at the end of 1971, private institutions internationally controlled some $268 billion in short-term liquid assets.[6] By comparison, the reserves of the world's major central banks equaled less than $68 billion. A second new factor in the foreign exchange markets is the presence of rather substantial holdings of foreign exchange reserves by Middle Eastern and African oil countries placed mostly in the Eurodollar market. These moneys moved very rapidly in the recent crisis from weak currencies into strong currencies.[7] Such profit-maximizing behavior contrasts with that of European central banks, who engage in counter-speculative activity.

Short-run Effects of Exchange Rate Changes on Trade

This chronology of the recent crisis serves as a background for a discussion of the short-run effects of exchange rate changes on trade based on the elasticities approach.[8]

Two topics are treated in this section: "currency-contract analysis" and the "pass-through" problem. Currency-contract analysis deals with that brief period immediately following a devaluation (or appreciation) in which contracts negotiated prior to the change fall due. As used here, pass-through analysis refers to the behavior of international prices on contracts agreed upon after the devaluation has taken place but before it has effected significant changes in quantities. Thus, both topics are addressed to the

6. *Wall Street Journal*, February 13, 1973, p. 2.

7. The *Wall Street Journal*, March 1, 1973, p. 1, cites one study showing that of the $15 billion in central bank holdings in the Eurodollar market, approximately one-half came from Middle Eastern and North African countries.

8. Several theoretical approaches to devaluation have greater macroeconomic consistency and better general equilibrium properties than does the elasticities approach. However, the latter is used in this paper because of the short-run, partial equilibrium nature of the present analysis and because it is richer than the others in its detailed implications for changes in both import and export prices.

short-run price effects of devaluation before quantities begin to respond. The final section of the paper will deal briefly with the initial portion of the quantity-adjustment period.

On both short-run topics, the press has made confusing and misleading statements, which need clarification. Moreover, the short-run analysis may shed some light on the empirical question of why the U.S. trade balance deteriorated so much in 1972 despite the devaluation of the dollar in 1971.

Branson reported a year ago that both the Armington and Magee models pointed to a favorable effect of devaluation within at most two years. On the other hand, Gerard Adams and Lawrence Klein—the self-styled "elasticity pessimists"—expected no significant improvement in the U.S. trade balance as a result of devaluation.[9] Developments in 1972 disappointed the expectations of elasticity optimists and adherents to the monetary approach to the balance of payments.[10] The annual U.S. trade balance deteriorated from a surplus of $2.2 billion in 1970 to deficits of $2.7 billion in 1971 and $6.8 billion in 1972.[11]

The performance in 1972 has been explained by several factors. The first argument is that the rapid increase in domestic activity in the United States relative to activity abroad in 1972 swamped any favorable effects that the devaluation might have generated. The importance of the level of economic

9. See William H. Branson, "The Trade Effects of the 1971 Currency Realignments," *Brookings Papers on Economic Activity* (1:1972), pp. 15–58, and, in the same volume, Lawrence R. Klein, "Comments and Discussion," pp. 59–65. Hereafter, this document will be referred to as *BPEA*, followed by the date.

10. The monetarist approach argues that the increased price of both exportables and importables in terms of the devaluing country's currency will lead to a decline in the country's real balances. Efforts to rebuild these balances will result in flow excess demands for money and flow excess supplies of goods and securities. For the United States, no evidence of the former emerged, although there is the following evidence on adjustments in securities markets.

The 1971 devaluation of the dollar reduced the foreign currency price of assets denominated in dollars. Net foreign purchases of U.S. securities jumped to $4.6 billion in 1972, up from $2.3 billion in 1971. Two-thirds of this rise was due to increased buying of U.S. stocks. Foreign purchases of U.S. bonds also increased: In 1972, foreigners purchased $2.0 billion, against $1.2 billion in 1971. Similarly, the dollar price of securities denominated in foreign currency increased when the dollar was devalued. As a result, net U.S. purchases of foreign securities fell from $0.9 billion in 1971 to less than $0.6 billion in 1972 (*Wall Street Journal*, February 15, 1973, p. 3). As a result of the most recent devaluation, anxiety over foreign takeovers of U.S. firms rose (a reverse Servan-Schreiber effect).

Thus, while the effect of the 1971 devaluation on trade is open to question, some stock adjustment (albeit infinitesimal) has been made in the long-term capital accounts in the expected directions.

11. *Wall Street Journal*, February 15, 1973, p. 3.

activity as the key short-run determinant of trade flows has been well established.[12] The relationship between the U.S. trade balance and the differential growth of foreign and U.S. industrial production from 1967 to 1973 is shown in Figure 1. In 1969 and early 1970, the growth of foreign industrial activity generally strengthened relative to that of the United States, with an accompanying increase in the U.S. trade balance. From 1970:2 to 1972:3, the growth of foreign industrial activity moved down relative to U.S. activity, and the U.S. trade balance fell substantially. Thus, part of the explanation for the deterioration in the 1972 trade balance is simply rapid U.S. expansion relative to foreign expansion.
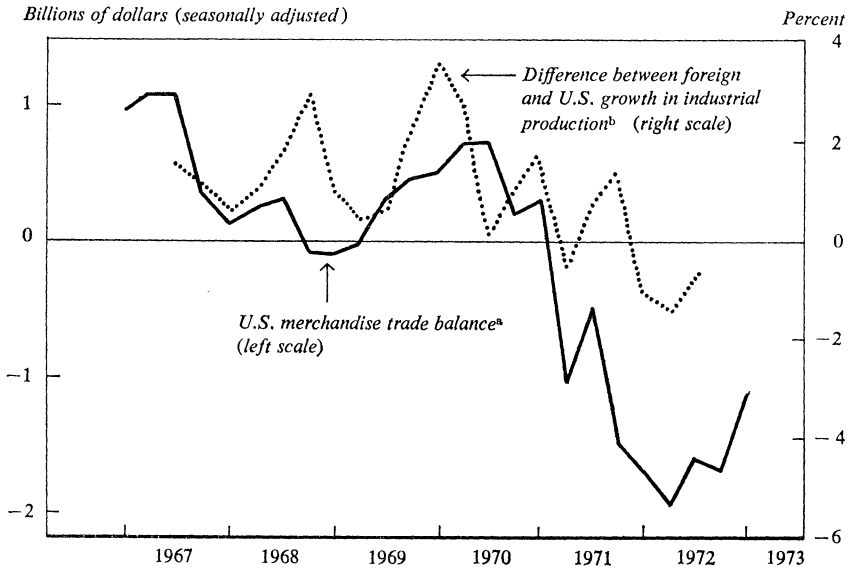
A second explanation of the 1972 experience is that the expansion of real exports and the retardation of real imports occur only after substantial lags. Junz and Rhomberg have identified at least five lags in the process between changes in exchange rates and their ultimate effects on real trade: lags in *recognition* of the changed situation, in the *decision* to change real variables, in *delivery* time, in the *replacement* of inventories and materials, and in *production*.[13] Their empirical evidence supports lags of up to five years in the effects of exchange rate changes on market shares of countries in world trade.

Qualitative evidence on lags has been presented in several areas. Borg-Warner Corporation is reported to export many highly engineered items in which buying decisions are made over a fairly long time. For air conditioning compressors for autos, at least a one-year lead time is required to put a

12. This is confirmed in most econometric studies of trade flows. See William H. Branson, "The Balance of Payments in 1970," *BPEA* (1:1971), pp. 219–25; H. S. Houthakker and Stephen P. Magee, "Income and Price Elasticities in World Trade," *Review of Economics and Statistics*, Vol. 51 (May 1969), pp. 111–25; and Arthur B. Laffer, "Monetary Policy and the Balance of Payments," *Journal of Money, Credit and Banking*, Vol. 4 (February 1972), pp. 13–22. A chart similar to Figure 1 has been published by Arthur B. Laffer in "Do Devaluations Really Help Trade?" in the *Wall Street Journal*, February 5, 1973, p. 10, and shows an even closer relationship between the trade balance and relative growth rates in gross national product (on an annual basis) than is shown in Figure 1. It should be emphasized that the casual empiricism pursued here should be supplanted by analysis using a full-scale model of world trade of the sort under way in Project LINK. A final observation is that the proper functional relationship is between the flows of trade and the flows of income (or industrial production). Thus, relative changes in the activity flows should be related to changes in the trade balance, rather than the trade balance itself. This should be kept in mind in analyzing Figure 1, where, for pedagogical reasons, I have plotted the trade balance.

13. Helen B. Junz and Rudolf R. Rhomberg, "Price Competitiveness in Export Trade Among Industrial Countries," in American Economic Association, *Papers and Proceedings of the Eighty-fifth Annual Meeting, 1972 (American Economic Review*, Vol. 63, May 1973), pp. 412–18.

Figure 1. U.S. Trade Balance and Differential Growth of Foreign and U.S. Industrial Production, 1967–73

Billions of dollars (seasonally adjusted)   *Percent*

← Difference between foreign
and U.S. growth in industrial
production[b]   (right scale)

U.S. merchandise trade balance[a]
(left scale)

1967   1968   1969   1970   1971   1972   1973

Source: *Survey of Current Business*, various issues.
a. Excludes military grants.
b. Two-quarter moving average.

model into production. Makers of complicated production machinery also cite substantial lags between orders and shipments. Dow Chemical has been cited as a company that will probably build facilities in the United States that might have been built overseas if the dollar had not been devalued.[14]

The implications frequently drawn from the events following the 1971 devaluation of the dollar are that (1) improvement in the trade balance depends on whether the devaluation affects the real volume of trade, and (2) a trade balance must get worse after a devaluation before it can get better. While some ex post support can be found for these propositions, they are by no means inevitable theoretically. Proposition (2) implies the widely discussed "J-curve" of a country's trade balance after devaluation. The idea of the J-curve has been developed in light of the adverse short-run movements of the trade balance after both the 1967 British and the 1971 U.S. devaluations. The following quotation from the *Wall Street Journal* illustrates the view:

14. *Wall Street Journal*, March 8, 1973, p. 14.

Plotting the J-Curve

The worsening U.S. trade deficit in the months after devaluation hasn't really been unexpected. Economists say that only in the long run are international trading patterns affected by new currency values. "Buying patterns don't change overnight because prices have changed," a U.S. trade expert says.

The effect on a nation's trade caused by devaluation of its currency can be plotted in what economists call a J-curve, because the trade picture worsens before showing improvement. "But when devaluation takes hold," a British official says, recalling the pound's devaluation in 1967, "the change can come quite suddenly."[15]

The analysis of this report will emphasize that in the period before the quantities of trade start adjusting to a devaluation (that is, during the currency-contract and pass-through periods), there is no logical necessity for a country's trade balance to deteriorate, any more than for it to improve or remain constant.

CURRENCY-CONTRACT ANALYSIS

I shall now develop a taxonomy of the possible effects on the U.S. trade balance of a devaluation of the dollar during the currency-contract period.

First examine the effect of a devaluation of the dollar on the value of U.S. *exports* in both dollars ($) and foreign currencies (FC). Assume for simplicity that the foreign exchange rate before devaluation is $1 = FC1. Suppose a U.S. exporter agrees to sell, and a foreign importer to buy, one hundred units of a product for $1 per unit or, equivalently, FC1 per unit. Assume that during the period between the time the contract is entered into and the time final payment is made the United States devalues the dollar from $1/FC to $1.25/FC. The important question after the devaluation is whether the contract is denominated in the foreign currency or in dollars. If the contract is denominated in foreign currency (alternative XFC), then the U.S. exporter receives FC100, which now equals $125, thus obtaining a $25 capital gain. In that case, the price of U.S. exports rises 25 percent in dollars and is unchanged in foreign currencies.

However, if the contract is denominated in dollars (alternative X$), U.S. exporters receive $100; but foreign importers pay only FC80 and have a capital gain of FC20 due to the dollar devaluation.

Consider now the effect on U.S. *imports* of the devaluation of the dollar. As before, the results depend on whether the contract is denominated in the

15. *Wall Street Journal*, December 18, 1972, p. 1.

foreign currency (alternative MFC) or dollars (alternative M$). If an initial contract for one hundred units of imports is denominated in foreign currency at FC1 per unit, U.S. importers must pay $125 after the devaluation, sustaining a capital loss of $25. If, on the other hand, the contract is denominated in dollars, U.S. importers pay $100 and foreign exporters get only FC80, thus absorbing a capital loss equal to FC20.

The moral of the preceding analysis is that a *seller* in world markets prefers payment in currencies expected to strengthen; that is, he will wish to denominate export contracts in a currency expected to appreciate. But the preference of the *buyer* is just the reverse: The importer wishes to pay in currencies that are expected to weaken in order to get a capital gain or avoid a capital loss.

The two alternatives for exports and the two for imports suggest an overall taxonomy of four possible cases of contracting for exports and imports. These are shown in Table 1. Case 1, combining alternatives XFC and M$, assures an improvement in the U.S. trade balance, whether measured in dollars or in foreign currency, since exports increase in dollars, while imports fall in foreign currency (a bar over either X or M means it is unchanged with devaluation). Case 2, which combines alternatives XFC and MFC, involves no change in the U.S. trade balance in foreign currency. However, it goes up or down, or stays constant in dollars, depending on whether the initial situation was a surplus, deficit, or balance. Case 3, which combines X$ and M$, is similar: no change in dollars and a three-way possibility in foreign currencies. Case 4—the combination of X$ and MFC—yields an unambiguous deterioration: A capital loss is experienced on U.S. exports in foreign currency and on imports in dollars.

Thus, the initial portion of the J-curve—the decline in the U.S. trade balance measured in dollars in the currency-contract period—is inevitable only in case 4, and is possible in only one other case—case 2—providing U.S. trade was initially in deficit. To generalize, a necessary condition for the initial decline measured in dollars is that U.S. import contracts are in foreign currency.

Even the mechanical classification system in Table 1 can help clarify some confusion in the press over currency contracts and devaluation. The following statement, made two days after the most recent devaluation of the dollar, is illustrative:

Many analysts are skeptical that devaluation will significantly narrow this [U.S. trade] gap. In fact, the immediate impact will be to worsen the [U.S.] deficit.

Table 1. Four Possible Short-run Effects, during the Currency-contract Period, of Devaluation of the Dollar on the U.S. Trade Balance, in Dollars and in Foreign Currency[a]

U.S. exports	U.S. imports	
	Contracts in dollars	*Contracts in foreign currency*
Contracts in foreign currency	*Case 1* TB in \$ increases $\begin{cases} X\uparrow \\ \bar{M} \end{cases}$ TB in FC increases $\begin{cases} \bar{X} \\ M\downarrow \end{cases}$	*Case 2* TB in \$ $\begin{cases} X\uparrow \\ M\uparrow \end{cases}$ Increases if initial TB surplus / Constant if initial TB balance / Decreases if initial TB deficit TB in FC remains constant $\begin{cases} \bar{X} \\ \bar{M} \end{cases}$
Contracts in dollars	*Case 3* TB in \$ remains constant $\begin{cases} \bar{X} \\ \bar{M} \end{cases}$ TB in FC $\begin{cases} X\downarrow \\ M\downarrow \end{cases}$ Increases if initial TB deficit / Constant if initial TB balance / Decreases if initial TB surplus	*Case 4* TB in \$ decreases $\begin{cases} \bar{X} \\ M\uparrow \end{cases}$ TB in FC decreases $\begin{cases} X\downarrow \\ \bar{M} \end{cases}$

Source: Based on discussion in the text of currency-contract analysis.

a. FC = foreign currency; \$ = dollars; TB = trade balance; M = value of imports; X = value of exports; a bar over M or X signifies it is unchanged with devaluation.

That's because goods contracted for at pre-devaluation prices by U.S. importers will require more dollars in payment, and exports already in the stream of trade will earn fewer dollars.[16]

Three comments are in order. First, deterioration of the U.S. trade balance in dollars is not inevitable: It occurs only in cases 2 and 4 in Table 1. Second, goods imported into the United States cost more in dollars only on that portion of contracts denominated in foreign currency. In general, the percentage increase in the dollar value of U.S. imports, $\%\Delta M$, as a result of a dollar devaluation, equals the summation across countries of the products of the following three variables: the share country j takes of U.S. imports, s_j^m, the proportion of contracts that is denominated in that country's currency for exports to the United States, c_j^m, and the proportional increase in the dollar value of the currency of country j, d_j:

$$(1) \qquad\qquad \%\Delta M = \sum_j s_j^m c_j^m d_j (100).$$

For example, if foreign importers responsible for three-tenths of U.S. imports have five-tenths of their exports to the United States contracted for in their own currencies, a devaluation of the dollar of 25 percent vis-à-vis these countries would generate a 3.75 percent increase in the value of U.S. imports. Small values of any one of the variables s_j^m, c_j^m, and d_j can make the increase in the value of U.S. imports from country j small. Third, the statement in the quotation that "exports already in the stream of trade will earn fewer dollars" is simply false. There is no way in which the value of U.S. exports in dollars contracted for before devaluation can decrease. For contracts in foreign currencies (cases 1 and 2), U.S. exports increase, while contracts in dollars exhibit no effect. As in the case of imports, the percentage increase in the value of exports equals

$$(2) \qquad\qquad \%\Delta X = \sum_j s_j^x c_j^x d_j (100).$$

The condition under which the trade balance deteriorates in the currency-contract period following devaluation is that

$$(3) \qquad\qquad \sum_j (s_j^x c_j^x d_j X_j^0 - s_j^m c_j^m d_j M_j^0) < 0.$$

16. *Wall Street Journal*, February 14, 1973, p. 1.

This condition is more likely to obtain, the larger the share of import contracts relative to export contracts denominated in foreign currencies $(c_j^m > c_j^x)$; it also depends on the relation of these shares to the patterns of deficits and devaluations.

Thus far, the analysis has been mechanical and taxonomic. What economic analysis can be brought to bear on the most likely empirical cases? The currency in which contracts are denominated is likely to be determined by the relative market power of traders. Price makers would tend to denominate contracts so that they would get the capital gain (or minimize the capital loss) on anticipated devaluations. In the absence of market power on either side, the results are ambiguous and adjustments would probably show up in timing, with a slowing of U.S. exports before an anticipated devaluation of the dollar (as U.S. exporters and foreigners waited to obtain a capital gain) and an acceleration of U.S. imports (as both sides attempted to avoid possible capital losses).

Since countries tend to be more specialized in their exports than in imports, they might be expected to have more market power in their export markets than in import markets. In terms of the polar cases considered in Table 1, case 2 thus might be the most likely empirically. For the United States, this suggestion implies a deterioration in the trade balance expressed in dollars, since the devaluation after August 15, 1971, occurred in a deficit situation. I could find little qualitative or survey evidence on the denomination of contracts. The multinational corporations presumably possess market power and speculate through currency contracts. For example, Dow Chemical's division in Midland, Michigan, which exported $275 million in plastics and chemicals last year, reports that it writes contracts and sells in foreign currencies.[17] This practice indicates profit maximization on Dow's part, since the last two devaluations of the dollar would have given it capital gains. A crude examination of data on U.S. import and export prices might give another clue as to the most likely empirical case. If U.S. export contracts are denominated in foreign currencies, a large increase in U.S. export prices in dollars would occur immediately, while if they are denominated in dollars, there would be no significant change in export prices immediately after devaluation.

As might be expected, the price data are not conclusive. Export unit values increased by 3.2 percent for all of 1971 and by 3.3 percent for all of

17. *Wall Street Journal*, March 8, 1973, p. 14.

1972.[18] However, in September 1971, they rose 0.7 percent and in October, 1.1 percent. If most contracts are for ninety days, the bulk of contracts in effect on August 15 would have fallen due in September and October. At mid-December, the Smithsonian accord was reached and the dollar was devalued again relative to the prevailing market rates for several curren- cies. In January 1972, U.S. export prices rose 0.4 percent, and in February, 1.1 percent (they fell by 0.9 percent in March, however). I interpret the rises as weak and somewhat ambiguous confirmation of the idea that many U.S. export contracts are denominated in foreign currency.

For U.S. imports, foreign currency contracts would imply rapid dollar price increases immediately after the devaluation, while contracts denomi- nated in dollars would imply no change then. For a frame of reference, import unit values increased by 5.2 percent in 1971 and by 7.5 percent in 1972. In September 1971, import prices fell by 0.5 percent, but they rose by 2.0 percent in October and by 0.5 percent in November. After the Smith- sonian devaluation, U.S. import prices rose by 0.4 percent in January 1972, 2.4 percent in February, and 1.8 percent in March. These are above average increases, suggesting that many U.S. import contracts are also denominated in foreign currency; they also conform to the price-maker argument dis- cussed above.[19]

Thus, there is the mild suggestion that, of the polar cases in Table 1, case 2 may be the most likely one when there is expectation of a dollar deval- uation—that is, both export and import contracts for the United States tend to be denominated largely in foreign currency. But such a conclusion must be tentative in light of the widely held belief that most trade contracts are in dollars and because dock strikes and other special factors may have distorted the evidence for the fall of 1971.

These results indicate that the U.S. trade balance might deteriorate in dollars in the currency-contract period after dollar devaluation—tracing a declining segment of the J-curve—because of the initial deficit and some rather complicated market forces, and *not* because of some theoretical

18. The source of the U.S. unit value series used here is the *Survey of Current Business*, Vol. 52 (March 1972), and Vol. 53 (January 1973) and (April 1973), p. S23 in each.

19. A final implication of the currency-contract approach is that if the last two devaluations of the dollar cause it to be undervalued at some future date and revalued, a profit-maximizing strategy for U.S. exporters would be to switch from denominating contracts in foreign currency to denominating them in dollars. Similarly, U.S. importers would wish to switch from denominating contracts in dollars to denominating them in foreign currency.

inevitability. That deterioration is consistent with the actual decline in the quarterly U.S. trade balance from 1971:3 to 1972:2 depicted in Figure 1, although the activity variable could account for some of that movement.

PASS-THROUGH

In Branson's terminology, "successful" pass-through means that "in devaluing countries the domestic currency price index of imports should be rising substantially, while in upvaluing countries it should be falling."[20] Pass-through is important because buyers have incentives to alter their purchases of foreign goods only to the extent that the prices of these goods change in terms of their domestic currency following a devaluation. That in turn depends on the willingness of exporters to allow the devaluation to affect the prices they charge for their products, measured in terms of the buyer's currency. Branson concluded regretfully that these changes were not taking place in full after August 1971:

. . . Japanese and German exporters are, to a large extent, not passing through the exchange rate changes, but rather are holding dollar prices fairly constant while home currency prices fall a bit. . . . This means that, in addition to the possibility of a short-run increase in import payments in U.S. dollars due to the short-run inelasticity of demand, the favorable effects of the devaluation on the import side may take substantially longer to appear than econometric evidence on normal price lags would suggest.[21]

Thus successful pass-through in Branson's sense means a larger and prompter response in the quantities of trade, which would abet the success of the devaluation in improving the trade balance, providing the Marshall-Lerner conditions are met. But the implications of pass-through for the very short run, in which quantities are essentially fixed, is very different: "Successful" pass-through implies an "unsuccessful" result for the trade balance in that brief interval.

I shall analyze pass-through in the brief period following devaluations in which it can be assumed that the quantities of exports and imports have not yet had time to adjust. The constancy of quantities in that "pass-through period" can result from either of two situations. First, supply might be perfectly inelastic for a while because exporters cannot instantly alter their output or their sales abroad. Alternatively, demand might be

20. "Trade Effects," p. 53.
21. *Ibid.*, p. 55.

perfectly inelastic because importers require time to substitute among commodities and to change their flow of orders.

Consider the situation in which the supply of U.S. exports is perfectly inelastic for some interval after a devaluation of the dollar, while demand has some elasticity. The demand curve of foreign buyers for U.S. goods would be unchanged in terms of their own currency, and therefore the price in dollars would be driven up by the amount of the devaluation. Thus there would be no pass-through of the devaluation into lower prices of U.S. exports measured in foreign currencies. On the other hand, if demand is completely inelastic while supply has some elasticity, the dollar price of U.S. exports would not change and the price in foreign currency would fall, yielding full pass-through. For U.S. imports, perfectly inelastic demand again means that the devaluation is passed through into the prices of buyers—the dollar price (and, with fixed quantities, the total value) of imports rises by the full amount of the devaluation. On the other hand, inelastic supply implies no pass-through—the dollar price of imports remains unchanged as the foreign currency price of U.S. imports falls.

As in the currency-contract case, there are four possible combinations of results—two each on the side of imports and exports. These are shown in Table 2, which is the equivalent for the pass-through period of the Table 1 taxonomy for the currency-contract period.

The worst result for the U.S. trade balance in the pass-through period is case 4, which has full pass-through on both sides. In that case, the U.S. trade balance deteriorates in both dollars and foreign currencies precisely because foreign suppliers absorb none of the loss due to the dollar devaluation in their profit margins, while U.S. exporters exploit none of the gain by raising the dollar price of their products. What may be most favorable for the quantity-adjustment period is least favorable for the pass-through period. On the other hand, the absence of any pass-through in the period in which quantities are fixed leads to case 1, which assures improvement in the U.S. trade balance after a dollar devaluation.

Consider the following statement:

Another reason for the disappointing lack of impact of past exchange-rate adjustments has been that they weren't always reflected in the final prices of exports and imports. For example, following the last upward valuation of the Japanese yen, many Japanese exporters simply absorbed the increase, reducing their profit margins instead of raising prices. And many American international companies took the last dollar devaluation as an opportunity to increase the profit margins of their overseas affiliates instead of cutting prices.[22]

22. *Wall Street Journal,* February 14, 1973, p. 13.

Table 2. Four Possible Short-run Effects, during the Pass-through Period, of Devaluation of the Dollar on the U.S. Trade Balance, in Dollars and Foreign Currency[a]

U.S. exports	U.S. imports	
	Supply inelastic	*Demand inelastic*
	Case 1	*Case 2*
Supply inelastic	TB in $ increases $\begin{cases} X\uparrow \\ \overline{M} \end{cases}$ TB in FC increases $\begin{cases} \overline{X} \\ M\downarrow \end{cases}$	TB in $ $\begin{cases} X\uparrow \\ M\uparrow \end{cases}$ Increases if initial surplus / Constant if initial balance / Decreases if initial deficit TB in FC constant $\begin{cases} \overline{X} \\ \overline{M} \end{cases}$
	Case 3	*Case 4*
Demand inelastic	TB in $ constant $\begin{cases} \overline{X} \\ \overline{M} \end{cases}$ TB in FC $\begin{cases} X\downarrow \\ M\downarrow \end{cases}$ Increases if initial deficit / Constant if initial balance / Decreases if initial surplus	TB in $ decreases $\begin{cases} \overline{X} \\ M\uparrow \end{cases}$ TB in FC decreases $\begin{cases} X\downarrow \\ \overline{M} \end{cases}$

Source: Based on discussion in the text on analysis of pass-through period.
a. For definition of symbols used, see Table 1.

For U.S. imports, this means that payments in dollars are constant while payments in foreign currency fall. For exports, there is no change in dollars or in foreign currency since the American corporation still quotes the same dollar price for the exports to the subsidiary and it reports the same foreign currency price to the customs authorities abroad. (The increased payment to the United States in dollars occurs only when foreign earnings are re-patriated: This helps the current account, but not the trade balance.) Thus, the trade balance is constant in dollars and improves in foreign currency. If the U.S. export transaction had been at arm's length, dollar payments for U.S. exports would have increased, leading to case 1 in Table 2,[23] the best possible case for the United States.[24]

Evidence was cited earlier that Japanese exporters were permitting siz-able decreases in the yen prices of their goods sent to the United States. This practice will minimize the short-run increase in the dollar value of U.S. imports. The following evidence indicates that sizable capital gains on exports can be expected as a result of the devaluations:

Only about one-third of American products exported to West Germany, for instance, cost less in marks, a U.S. embassy trade official says. Although the mark was revalued upward by 13.57% against the dollar, most exporters continue to charge their German customers the same prices as before devaluation. Thus, in effect, they are either raising their own profits or retaining margins that would have been pared by rising costs.[25]

If these two small bits of evidence permit generalizations, case 1 in Table 1 appears the most likely case empirically (that is, both export and import supply are relatively inelastic in the short run). Thus, the U.S. trade bal-ance should improve in the (fixed-quantity) pass-through period.

The Quantity-adjustment Period

What can be expected once quantities start to adjust? Figure 2 shows the supply and demand for U.S. exports expressed in dollars (2a) and foreign currency (2b), as well as for imports in dollars (2c) and foreign currency

23. While the quotation dealt with sales from foreign affiliates, I have translated them into exports so that they fit the analysis in Table 2.

24. Using "best" here implies a mercantile, and not necessarily a welfare, point of view with regard to the trade balance.

25. *Wall Street Journal*, December 18, 1972, p. 1.

(2d). In all these cases the equilibrium prior to devaluation is denoted by point E. The currency-contract and pass-through periods analyzed above may be viewed as the intervals in which quantities remain fixed at either QX_0 or QM_0. In the currency-contract period, the price either stays at E or moves straight up or down to $E_\$$ or E_f, depending on whether the contracts are denominated in dollars or in foreign currencies, respectively. Similarly, in the pass-through period the situation may be at E, E_f, or $E_\$$, depending on whether the constancy of quantities is the result of perfectly inelastic supply or perfectly inelastic demand over that interval. In the pass-through period, if export supply is perfectly inelastic, the dollar price of U.S. exports rises to E_f in Figure 2a while the foreign currency price stays at E in Figure 2b; if export demand is inelastic, the dollar prices remain at E in 2a and the foreign currency prices fall to $E_\$$ in 2b. The reverse is true for inelastic import supply (dollar prices stay at E in 2c and foreign currency prices fall to $E_\$$ in 2d) and inelastic import demand (dollar prices rise to E_f in 2c and foreign currency prices stay constant at E in 2d). An important point here is that trade balance behavior and the path of adjustment in the quantity-adjustment period depend on what happened in the pass-through period. Since case 1 was found to be a likely possibility in the pass-through period, it is worth examining in some detail.

Consider the U.S. trade balance in dollars. Case 1 of Table 2 corresponds to a short-run increase in export prices to E_f in Figure 2a and no change in import prices at E in Figure 2c. The quantities of exports start increasing as the vertical short-run supply curve for exports begins to rotate clockwise through point E in Figure 2a. Whether the value of exports increases or decreases depends on the elasticity of the short-run demand curve.

There is some persuasive evidence that the short-run demand curve is inelastic and its rotation takes a fairly long time. Thus, as quantities begin to adjust, the dollar value of U.S. exports is likely to decline. The quantities of imports will start to decline as a result of devaluation after the currency-contract–pass-through period. Again, assume that the demand for imports is inelastic. Rotation of the previously vertical supply curves S and S' through E in Figure 2c results in an increased dollar payment for imports. As a result, based on the assumptions of what occurred in the pass-through period, the expectation might be for a deterioration in the U.S. trade balance early in the quantity-adjustment period.
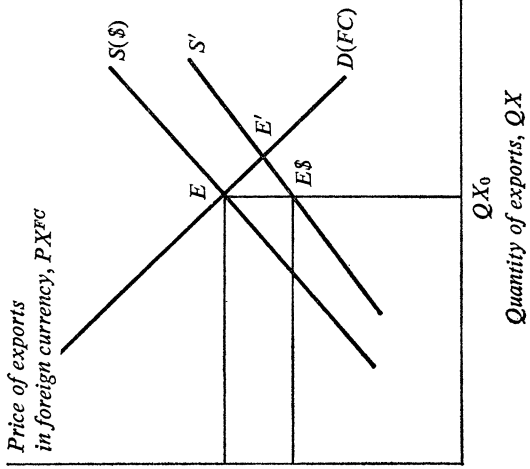
The preceding analysis is very tentative since the adjustment from one

Figure 2. Supply and Demand for U.S. Exports and Imports, in Dollars and in Foreign Currency
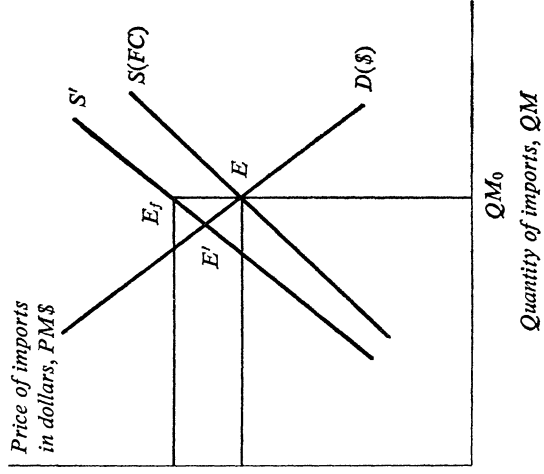
2a. Value of U.S. exports in dollars
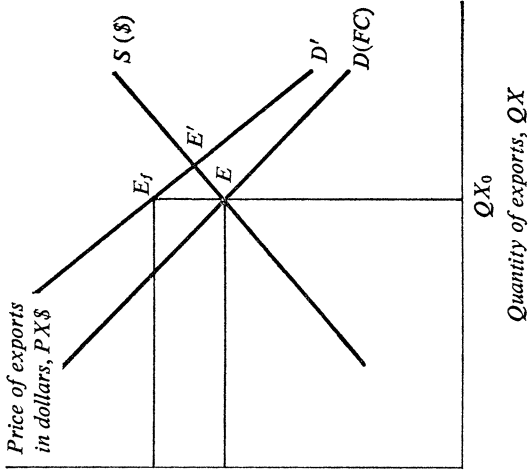
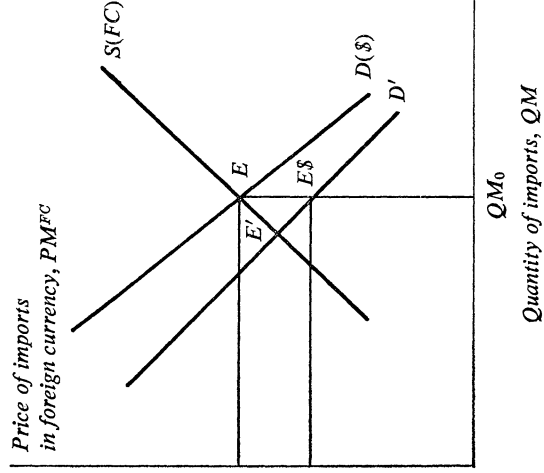2b. Value of U.S. exports in foreign currency

Source: Adapted from Charles P. Kindleberger, *International Economics* (5th ed., Richard D. Irwin, 1973), p. 327. See discussion of the figures in the text.

Figure 2 (continued)

2c. Value of U.S. imports in dollars

Price of imports
in dollars, PM\$

S'

S(FC)

E_j

E'

E

D(\$)

QM_0

Quantity of imports, QM

2d. Value of U.S. imports in foreign currency

Price of imports
in foreign currency, PM^{FC}

S(FC)

E

E'

E\$

D(\$)

D'

QM_0

Quantity of imports, QM

equilibrium point (E) to another (E') is a complicated matter: Almost any
pattern of movement can occur with little variation in the plausibility of
the assumptions. Empirical verification of the results for the pass-through
and quantity-adjustment periods is difficult here since a fairly sophisticated
model is required to determine when the pass-through period ends and the
quantity-adjustment period begins. It is worth noting that the currency-
contract period for the Smithsonian dollar devaluation probably ended at
the end of the first quarter of 1972. Thereafter there was a trend improve-
ment in the U.S. trade balance until October. The average monthly trade
balance for November 1972, through February 1973, was disappointingly
below trend.

These data are not inconsistent with the hypothesized deterioration in
the U.S. trade balance during the currency-contract period (case 2), im-
provement during a hypothetical pass-through period from March through
October 1972 (as implied in case 1), and a subsequent decline early in the
quantity-adjustment period. However, this conclusion was drawn in the
absence of a systematic examination of the quantity side, the data may have
been affected by special factors, and the results may be influenced by move-
ments of the trade balance in the direction predicted by the activity variable
in Figure 1 since 1971:4.

The Emergence of the W-Curve

The purpose of this paper has been to examine in some detail the possible
movements in a country's trade balance after devaluation. The short-run
adjustment process was divided into three parts: the currency-contract
period, the pass-through period, and the quantity-adjustment period. Most
of the analysis dealt with the first two periods. Theoretically, the trade
balance can go either way in each period. Thus, in addition to J-curves,
I-, L-, M-, N-, V-, and W-curves, plus their inversions, might be a minimum
for a proper alphabet-soup analysis of the short-run trade effects of devalu-
ation.[26] I hypothesized that for the 1971 dollar devaluations, some likely
empirical results were deterioration during the currency-contract period,
improvement during the pass-through period, and further deterioration in

26. Some of these require nonmonotonicity of effects on the trade balance during the
quantity-adjustment period.

the early part of the quantity-adjustment period. If this analysis is correct and if devaluation, other things equal, eventually leads to an improvement in the U.S. trade balance, a W-curve merits some investigation.

Discussion

SEVERAL PARTICIPANTS COMMENTED on Magee's interpretation of the currency speculations and the ensuing devaluation early in 1973. Walter Salant distinguished between two types of "rational" speculation: one kind justified by nonexpectational or objective factors, which can be rational for speculators as a group; and another based on expectations of what other speculators will do, which can be rational for any individual speculator who correctly assesses the prevailing mood.

Lawrence Krause argued that the speculation of early 1973 was quite rational in the first sense as a response to a fundamental disequilibrium for the Japanese yen, if not for the dollar. In his judgment, the tranquillity of world money markets late in 1972 was predicated on confident expectation that the yen would be appreciated shortly after the Japanese elections. When it subsequently became clear that the Japanese had no intention of revaluing, the stage was set for a currency crisis. Paul Samuelson added that Japanese experts had been predicting a change in the exchange ratio between dollars and yen for many months; they had become "elasticity pessimists," concluding that the adjustments to the Smithsonian revaluation had been essentially completed by late in 1972, and had failed to restore equilibrium. Thus, many transactions of Japan with the United States were conducted with a revalued exchange rate in mind; this led to the kinds of anticipatory transactions that Magee discusses. But Samuelson noted that such anticipatory behavior can result in a reverse J-effect for an appreciating country, with its surplus exaggerated shortly before the change in exchange rates, and the deterioration exaggerated for an interval thereafter.

Concerning the more immediate causes of the dollar devaluation, Samuelson pointed to the U.S. decision to relax wage-price controls, which evoked a strong negative reaction abroad. The proclamations of some U.S. officials in favor of flexible exchange rates may also have contributed to it.

In general, Samuelson doubted that bootstrap speculation—with no objective basis—would significantly alter exchange rates. He noted that international traders and financiers have had strong objective reasons to take bearish positions on the dollar throughout the past dozen years, and the dollar has been chronically weak.

Samuelson, Alan Greenspan, and Frank Schiff questioned Magee's emphasis on the three- or four-to-one ratio of mobile assets held privately to those held by central banks. Samuelson saw no way to appraise the safety, normality, or optimality of any particular ratio of this type. On the other hand, several agreed that a fixed parity system is increasingly crisis-prone. Greenspan suggested that the rapid growth of privately held liquid assets deserved stress, since it introduced a dynamic volatility into currency markets. Schiff felt that the $268 billion estimate of privately held foreign liquid assets was highly questionable as a measure of "mobile" funds, noting, for example, that it omitted the possibility of money flowing out of U.S. domestic holdings. He thought that the Smithsonian agreement had convinced the world financial community that major changes in exchange rates can occur, increasing the sensitivity of responses to uncertainties. This greater sensitivity could be even more important than the growth in the quantity of mobile funds.

On the question of contract denomination, Schiff reported hearing of a number of companies that have recently switched both their import and export contracts into foreign currency denominations. These reports tended to support Magee's inferences about the currency-contract period. John Kareken doubted that the denomination of contracts could be uniquely linked to market power. A monopolist might use his market power fully in setting the price in terms of a given currency, and then have no extra bargaining power to exact a further concession in terms of the currency in which the contract is to be denominated.

Walter Salant accepted Magee's conclusion that the presence of the J-curve effect depends partly on the currency in which past contracts are denominated (what Magee called the "contract" problem); but he emphasized that the currency in which prices are quoted is irrelevant to contracts made after the devaluation (the "pass-through" problem). Whatever the currency in which prices were previously being quoted, they presumably will be changed to take into account the effects of the exchange rate change on demand, on the seller's costs, and on competition from other suppliers. Thus, the pass-through problem is not economically comparable to the

contract problem. Further, Salant noted that the market power of a country selling to a devaluing country, which was the one economic factor included in Magee's analysis of the pass-through problem, does not depend on the degree to which the selling country specializes in that product. Its market power depends on the degree of competition in selling the product, both among its own sellers and between them and sellers of other countries. Moreover, in the absence of competition it could have great market power even without specialization. Thus, a country's specialization is neither a sufficient nor a necessary condition for market power.

On another issue, Salant wondered whether the relationship between differential growth rates and the trade balance depicted in Magee's Figure 1 had held up prior to 1967. Magee replied that the relationship was also close between 1960 and 1967. Hendrik Houthakker felt that a scatter diagram (or some other more analytical presentation) of that relationship would be more illuminating than the graphical presentation that had been offered.