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Measuring the Dollar's Strength

Ever since the adoption of floating exchange rates in 1973, the value of the dollar relative to other currencies has been the subject of much discussion. In recent years, the strong dollar has been blamed for the decline in the competitiveness of U.S. products, which, in turn, has engendered a wave of protectionist sentiment in the United States. By contrast, the weak dollar of the late 1970s was the cause of much resentment abroad. Clearly, the exchange value of the dollar is a matter of worldwide concern.

Discussions of the dollar's value assume the existence of an accurate measure of changes in its strength. While such a measure may exist for comparing the dollar to a particular currency, it is much more difficult to derive when dealing with several currencies at once. If the dollar appreciates one percent in relation to the Japanese yen, but depreciates one percent in relation to the German mark, has the dollar on balance strengthened or weakened? To answer this question, we need some means of determining the relative importance to the U.S. of changes in the value of the Japanese yen in comparison to changes in the German mark. Specifically, we need some criteria for weighting the different exchange rates in order to obtain an appropriate average value of the U.S. dollar. The resulting measure is known as the effective exchange rate.

This *Letter* will discuss the principal indices of effective exchange rates in use and how each is constructed. Ultimately, the value of an index must depend on its empirical usefulness. Judging from that criterion, there is little evidence to suggest that any one index is the best.

Index construction

An effective exchange rate index is essentially a price index. As with all price indices, it measures the weighted average level of the prices of a basket of goods in different periods relative to that in a base period. The "basket" in this case is a collection of selected currencies, the prices of which are stable in terms of the U.S. dollar. Thus, the construction of an effective exchange rate index involves the selection of the currencies to be included in the "basket" and the assignment of weights to the individual exchange rates.

On selecting currencies to be included in the index, it might appear that more currencies would make the index more meaningful. In the extreme, one might ask, why not include all currencies? Aside from the cost involved in keeping track of a large number of exchange rates, there are at least two reasons that a more selective approach is preferable. First, in the case of certain primary commodities, the world prices of which are determined by producers' cartels unrelated to domestic costs of production, changes in the exchange value of the primary producing countries' currencies have little impact on the international competitiveness of U.S. goods and services. A prime example is crude petroleum. Because its world price is quoted in U.S. dollars, a depreciation of the Saudian riyal, for instance, against the dollar would have no effect on the U.S. dollar price of crude petroleum.

Second, very large depreciations in the currencies of a number of countries, e.g., many Latin American nations, against the U.S. dollar have occurred because of high inflation rates in those countries. These large depreciations have a smaller effect on the international competitiveness of U.S. goods and services than might be suggested by their importance in U.S. or world trade. In the ideal case, this situation argues for calculating an index of *real* exchange rates — i.e., exchange rate changes adjusted for relative changes in respective national price levels. However, a much simpler method is to exclude those countries known to have high inflation.

The selection of currencies is inseparably related to the assignment of weights to individual exchange rates. For an effective exchange rate index to reflect changes in the international competitiveness of U.S. goods and services caused by exchange rate changes, the criteria for currency selection and weight assignment must take into account the relative importance of the respective countries' products in both the U.S. export market

and in U.S. markets that compete with imports. Broadly speaking, there are three approaches to weighting: bilateral trade weights, multilateral trade weights, and model simulation weights.

Bilateral trade weights

The method of bilateral trade weights selects those countries with which the United States has the largest total trade (value of exports plus imports) and assigns weights to the dollar exchange rates of their currencies in proportion to their shares in the U.S. bilateral total trade during a base period. The approach is based on the considerations that these weights measure the respective countries' relative importance to total U.S. foreign trade during the base period, and that the relative effects of individual exchange rate changes on U.S. output, employment, and prices should be in rough proportion to their weights during the same period.

A problem with this approach is that the focus on bilateral trade does not take into consideration competition in "third" markets — i.e., markets outside the U.S. and the foreign countries included in the index. For instance, although Sweden and the United States trade relatively little with each other, they are both major participants in the world market for telecommunications equipment. A depreciation in the Swedish kronor in relation to the U.S. dollar therefore may have significant effects on the U.S. trade balance by affecting U.S. competitiveness in third markets, such as the United Kingdom. A bilateral trade-weighted index, which focuses on the importance of U.S. trade with Sweden within the context of total U.S. foreign trade, would not capture this effect. Neither does it consider the relative sensitivity of U.S. exports and imports to changes in the different exchange rates.

Multilateral trade weights

To emphasize the significance of the effects of exchange rate changes on a country's trade competitiveness in the world market (including the third markets), the multilateral approach assigns weights according to each country's share in total world trade during a base period. The presumption is that the larger a country's share in world trade, the more its products compete with other nations' products. An index so constructed emphasizes effects on world competitiveness, rather than those on the domestic economy.

The weakness of multilateral trade-weighting is that it cannot account for trading patterns specific to a country. For example, the multilateral weighting scheme implicitly assumes that if the U.S. currency depreciated with respect to the Canadian dollar and thereby reduced the demand for automobile imports from Canada, automobiles from other major trading countries such as Italy would act as an important substitute and dampen the favorable effects on the U.S. trade balance. The weighting neglects that Canadian automobile exports to the U.S. are not easily replaced by Italian automobiles. Multilateral weighting would tend to overstate the importance of Italy to the U.S. trade balance by focusing exclusively on the size of Italy's external sector without regard to the specific products traded. Moreover, like bilateral trade-weighting, it too does not consider the market responsiveness of U.S. trade to changes in different exchange rates.

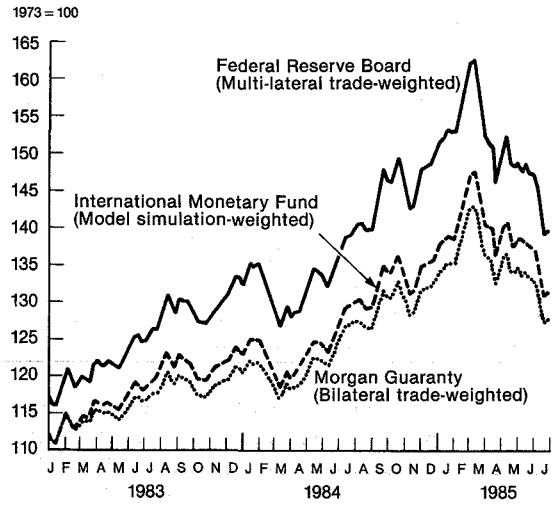
Model simulation weights

The model simulation approach seeks to account for the relative sensitivity of U.S. foreign trade to changes in different exchange rates by explicitly modeling the effects of exchange rate changes on both the demand and supply of U.S. exports and imports and by distinguishing among commodity groups and major trading partners.

By considering supply responsiveness, the approach includes the effects of domestic price changes that follow exchange rate changes. And by explicitly modeling price competition among various countries' products in different regions, it encompasses both the "own-markets" and the "third markets" effects. The interaction of all these effects is used to simulate the impact of a change in a country's exchange rate on the U.S. trade balance. The impact, in turn, determines the weight assigned to the country's currency in calculating an index of the effective exchange rate for the U.S. dollar.

This approach obviously requires the construction of very large econometric models of world trade. The International Monetary Fund's (IMF) Multilateral Exchange Rate Model (MERM), for instance, contains 2,400 product demand functions. It serves as the basis for the IMF's indices of the effective exchange rates of its member countries'

Effective Exchange Rate of the Dollar



currencies. Although the approach in concept is more general than either the bilateral and the multilateral trade-weighted approaches, its application has required simplifying assumptions about the demand for and supply of U.S. exports and imports that are not necessarily less arbitrary than those underlying either of the other two approaches.

Comparison of the results

Each of the three approaches has been used in widely cited indices: the bilateral approach by the Morgan Guaranty Trust Co., the multilateral approach by the Federal Reserve Board (FRB), and the model-simulation approach by the IMF. (See Chart.) All three use only the exchange rates of industrial countries. Because the countries included differ from case to case, the resulting weights are not strictly comparable. However, on the whole, the Morgan and the IMF indices for the U.S. dollar both assign considerably larger weights to Canada and Japan (major U.S. trading partners) than the FRB index, which gives the largest weights to Germany and Japan (the largest world trading nations outside the U.S.)

How do these differences in weights and rankings affect the resulting indices? A comparison of the movement of the indices since 1976 reveals the following:

1. The multilateral trade index employed by the FRB shows wider swings (its standard deviation is larger) than the bilateral or the IMF index. Thus, we may infer that the multilateral index assigns a larger weight to currencies that fluctuated relatively more in relation to the U.S. dollar. In particular, both the bilateral and the IMF indices assign larger weights to the currencies of Canada and Japan, whose value in relation to the U.S. dollar has been comparatively stable. Because the German mark has weakened considerably with respect to the dollar, its larger weight in the FRB index accounts for the stronger recorded rise in the dollar under that approach.

2. The correlation coefficients among the three indices all exceed 99 percent, although the bilateral Morgan and IMF indices were more closely correlated to each other than they were to the FRB index. The close correlation indicates that, notwithstanding differences in average levels, as well as in the size of the swings, all indices tended to move in the same direction. It also implies that although the indices represent different theoretical approaches, the differences do not matter much in practice as long as the user does not switch among indices indiscriminately.

Conclusion

The three approaches described in this article emphasize different criteria for constructing an index of the U.S. dollar's effective exchange rate. Although the model-simulation approach is more general in concept, its application also involves many arbitrary assumptions. Moreover, for the years since 1980, the movements of an index using this approach have been very close to those obtained from the much simpler bilateral trade-weighted approach. Ultimately, the usefulness of an effective exchange rate index is its ability to explain changes in other economic variables (such as exports, imports, output, prices). The close correlations among the indices reviewed here imply that it makes little difference which index is used, as long as it is used consistently. Each index, based on a different method of weighting, should explain economic activities just as well.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT
(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 11/13/85	Change from 11/6/85	Change from 11/14/84 Dollar	Change from 11/14/84 Percent[7]
Loans, Leases and Investments[1] [2]	197,229	− 81	10,179	5.4
Loans and Leases[1] [6]	178,423	42	9,899	5.8
Commercial and Industrial	51,203	102	− 985	− 1.8
Real estate	65,572	125	4,015	6.5
Loans to Individuals	37,814	− 31	7,100	23.1
Leases	5,398	− 4	333	6.5
U.S. Treasury and Agency Securities[2]	11,602	− 176	34	0.2
Other Securities[2]	7,204	52	248	3.5
Total Deposits	202,863	1,343	10,569	5.4
Demand Deposits	50,393	1,432	4,653	10.1
Demand Deposits Adjusted[3]	31,795	− 1,492	2,258	7.6
Other Transaction Balances[4]	14,428	− 187	1,963	15.7
Total Non-Transaction Balances[6]	138,042	97	3,952	2.9
Money Market Deposit Accounts—Total	45,769	195	6,431	16.3
Time Deposits in Amounts of $100,000 or more	38,552	− 8	− 2,397	− 5.8
Other Liabilities for Borrowed Money[5]	24,142	− 589	1,270	5.5

Two Week Averages of Daily Figures	Period ended 11/4/85	Period ended 10/21/85
Reserve Position, All Reporting Banks		
Excess Reserves (+)/Deficiency (−)	25	52
Borrowings	17	54
Net free reserves (+)/Net borrowed(−)	8	− 2

1 Includes loss reserves, unearned income, excludes interbank loans
2 Excludes trading account securities
3 Excludes U.S. government and depository institution deposits and cash items
4 ATS, NOW, Super NOW and savings accounts with telephone transfers
5 Includes borrowing via FRB, TT&L notes, Fed Funds, RPs and other sources
6 Includes items not shown separately
7 Annualized percent change