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Another Look at the Dollar's Trade-Weighted Value

By Michael P. Kercheval*

Business economists employ many tools to forecast U.S. trade flows. Because of its close correlation with subsequent changes in the trade balance, a key trade-forecasting variable is some aggregate measure of the dollar. Until recently, economists relied on two well-accepted measures of the trade-weighted value of the dollar — those published by Morgan Guaranty Trust and the Federal Reserve Board. By October 1986, these two indexes had fallen by as much as 30 percent from their respective 1985 peaks. The trade deficit meanwhile has shown no sustained signs of improvement. The possibility that the dollar is being incorrectly measured has generated a number of alternatives; each of the new measures shows very different results. This paper discusses currently used indexes as well as two additional indexes developed by the author.

IN PAST YEARS, followers of the trade-weighted value of the dollar relied principally on indexes prepared by the Federal Reserve Board and Morgan Guaranty Trust Company. Although their computation methods differ, their results have been roughly similar. Since early 1986, these two dollar measures have come under close scrutiny. A host of alternative trade-weighted-dollar indexes has emerged in an attempt to explain better the relationship between U.S. trade and fluctuations in the dollar's value. The following analysis compares six widely different measures of the dollar's trade-weighted value and describes why differences exist. Three of the indexes are prepared by different Federal Reserve entities: the Dallas Fed (X-131), the Atlanta Fed (ATLANTA), and the Federal Reserve Board (FRB). The other measures come from Morgan Guaranty (MORGAN) and two from the Equitable (T-15 and R-15). With the exception of the Equitable's R-15 index, all are nominal measures (i.e. not adjusted for inflation) of the U.S. dollar.

BACKGROUND

Since early 1985, when the value of the dollar is generally accepted to have begun declining, the U.S. trade deficit was expected to show some consistent signs of improvement. Most economists agree that time is required between when a nation's currency first depreciates and its trade balance improves. This effect, known as the "J-Curve", results when import volumes do not immediately fall and export volumes do not quickly rise in response to relatively higher foreign prices. When the U.S. dollar depreciates, more U.S. dollars initially are required to purchase the same quantity of relatively higher-priced imports (in foreign currency terms). Until import volumes decline, the total dollar amount of imports into the U.S. rises. Similarly, foreign buyers of U.S. exports do not immediately respond to lower relative prices of U.S. goods. Although they need fewer units of their currency to buy goods priced in dollars, they do not immediately increase the volumes of their purchases. On balance then, as the dollar depreciates, the initial response is a worsened U.S. trade balance. An improvement does not occur until relative prices generate a quantity change. Recent estimates of the time required range from twelve to

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twenty-four months.[1] Thus, evidence of a trade improvement should be visible after about a year. As of October 1986 — twenty months since the dollar's peak — the trade deficit has not yet shown any sustained signs of improving.

One possibility is that structural changes in U.S. and global trade patterns have prolonged the J-Curve effect. Another possibility, and the reason for this paper, is that the dollar is being incorrectly measured. As will be illustrated, two new Equitable dollar indexes offer a better explanation of why the U.S. trade balance has remained in a large deficit position by showing that the dollar has actually not significantly declined.

As shown in Table 1, the various dollar measures exhibit striking contrasts as to their declines since reaching a peak in the spring of 1985. (Although the most recent data available in November 1986 for all the indexes in March 1986, their differences are clearly illustrated.) The alternative indexes differ in three important ways: (1) currencies included in the sample; (2) base period used for calculating the trade weights; and (3) type of trade weights.

Table 1

Changes in Alternative Measures of the Dollar's Trade-Weighted Value

	Morgan	X-131	Atlanta	FRB	Equitable T-15	Equitable R-15*
Peak value, Spring '85, to March '86	−20.3%	−5.3%	−14.9%	−26.6%	−4.6%	−10.9%

*The Equitable R-15 Index is adjusted for relative inflation rates.

CURRENCIES REPRESENTED BY THE INDEXES

When creating a trade-weighted-dollar measure to project the U.S. trade balance, one would ideally select a sample of currencies that closely reflects U.S. trade patterns through impacts on export and import prices. This selection assumes that the principal motivation for international trade is relative prices. It must also be assumed that nonprice trade barriers, such as quotas, do not dominate.

The size of the sample is important, because it raises or lowers any one currency's impact on the total index. Of the six indexes compared here, the most extensive in terms of currencies is the X-131 Index from the Dallas Fed (see Table 2). It contains currencies of all the countries with which the United States trades. The narrowest index is the FRB index,

[1]See footnotes at end of text.

Table 2

Number of Currencies Included and Shares of 1985 Merchandise Trade Represented by Dollar Indexes

	Morgan	X-131	Atlanta	FRB	Equitable*
Number of Currencies	15	131	18	10	15
Share of 1985 Trade	60%	100%	70%	57%	75%

*Both Equitable Indexes (T-15 and R-15) use the same 15 currencies.

with only ten currencies. The remaining indexes contain from fifteen to eighteen currencies.

Data in Table 2 illustrate that simply increasing the number of currencies does not necessarily increase the share of trade reflected. The selection of currencies is most important while the number is somewhat arbitrary. By design, the countries included in the X-131 index exactly match actual international trade flows with the U.S. However, including only twenty countries would represent well over three-fourths of U.S. trade.

The MORGAN and FRB indexes are narrow in scope, but their greatest shortcoming is the currencies reflected, particularly their exclusion of the newly industrializing countries (NICs) of Southeast Asia — Taiwan, Hong Kong and South Korea — and all of Latin America. Both areas of the world have become increasingly important in U.S. trade. The two indexes also suffer from a certain degree of obsolescence. When they were last revised (MORGAN in the early 1980s and FRB in the mid 1970s), both indexes were more reflective of then-current trade flows. The ten "leading currencies" of the FRB Index[2] reflect only 57 percent of 1985 total trade. The 15 MORGAN currencies (the major OECD countries) are from nations responsible for only about 60 percent of U.S. trade in 1985.

The Atlanta Fed Index (ATLANTA) contains eighteen currencies of nations that together account for about 70 percent of total U.S. trade. The index represents the top eighteen U.S. trade partners, after excluding Mexico, Brazil, Venezuela and Indonesia. These major U.S. trade partners are omitted because of measurement problems related to high inflation in those countries.[3] This problem, which can be corrected, diminishes the value of the ATLANTA index.

The two Equitable indexes contain fifteen currencies (both indexes use the same currencies). The limited number of currencies is designed to ease the management of the database. Furthermore, by using currencies of the fifteen countries conducting the most bilateral trade with the U.S. in 1985, the two indexes represent more than 75 percent of U.S. trade that year, a reasonably comfortable sample.

IMPACTS OF HIGH INFLATION ON EXCHANGE-RATE INDEXES

The authors of the MORGAN, FRB and ATLANTA indexes all omit the Latin American nations, arguing in part that their inclusion creates biased results because of high domestic inflation within those countries. In a 1983 critique of their index, MORGAN went so far as to state that "including the principal Latin American currencies . . . [does] not greatly affect the dollar's measured real appreciation."[4] This comment was indeed true through early 1985 when the dollar was appreciating against most currencies. As the dollar began to depreciate, these currencies did make a difference.

While the technical complexities due to inflation are valid, these nations should nevertheless not be excluded from a dollar index. Mexico (the third largest U.S. trade partner), Brazil and Venezuela together accounted for 10 percent of U.S. trade last year.

Relative prices are a function of two parts: changes in relative domestic price levels between trading countries (inflation), and exchange rates. Consequently, a country with high inflation relative to its major trade partners typically will see its currency depreciate. When a currency is "devalued" to keep pace with domestic inflation, its real value remains unchanged although its nominal value declines, as has frequently occurred in many Latin American nations.

Including exchange rates of countries with high inflation in a dollar index without first adjusting for inflation will bias the index in the direction of overstating the dollar's appreciation vis-a-vis those currencies and thus understate the dollar's actual depreciation. This problem is a major shortcoming of the X-131 and Equitable T-15 indexes, both of which include nominal exchange rates for Latin American currencies in their sample.

To adjust for inflation, the Equitable's R-15 index "deflates" all fifteen currencies in the index by their respective domestic wholesale price measures for the measurement period 1980-86. From its 1985 peak, the R-15 index shows a 12 percent decline through August 1986, a 4 percent decline in the unadjusted T-15 index (see Table 3). Similarly, because of inflation biases, a Real X-131 index, not yet published, has been developed.[5] Its author reports that it too shows a somewhat greater decline in the dollar from its peak than the regular X-131 index, although the difference is reportedly less dramatic than the difference between Equitable's indexes.

Table 3

The Two Equitable Alternative Measures of the Dollar

Change in Value of the Dollar	T-15 Index (Not Adjusted)	R-15 Index (Inflation Adjusted)
Percent Decline from March 1985 Peak to August 1986	−3.7%	−12.2%

BASE PERIOD FOR TRADE WEIGHTS

Any base period will be arbitrary and influence the results. Trade is not in a "long-run equilibrium," no matter when one starts. Therefore, a current-year base offers some advantages is assessing changes from "today".[6]

Even prior to the present debate requests were made for both MORGAN and the FRB to update the base periods used for determining their trade weights. MORGAN continues to use trade weights derived from 1980 trade flows and FRB uses an average from 1972 to 1976 (see Table 4). The ATLANTA and Equitable indexes use year-average 1984 and 1985 trade data, respectively.[7] In an attempt to update the base year regularly, the X-131 Index uses moving annual averages of trade data.

Updated trade data are necessary to reflect changing trade patterns. An important case in point is the virtual explosion of trade between the U.S. and the Asian NICs. In only the past ten years, the share of U.S. trade conducted with these countries tripled from 5 percent to 15 percent as the actual volume of trade increased six-fold, from $11 billion in 1975 to roughly $65 billion so far in 1986. Meanwhile, our trade deficit with these countries has swollen from less than $500 million in 1975 to nearly $29 billion today.

Table 4

Source Period of Trade Data for Calculating Trade Weights

Morgan	X-131	Atlanta	FRB	Equitable*
1980 Average	Moving Annual Averages	1984 Average	1972-76 Average	1985 Average

*Both Equitable Indexes (the T-15 and R-15) use 1985 data.

TRADE WEIGHTS

Two types of trade weights are used in the indexes described in this paper, bilateral weights and multilateral weights. Bilateral trade weights are used in the MORGAN, X-131, ATLANTA, and Equitable indexes whereas multilateral weights are employed in the FRB index.

Bilateral trade weights represent shares of a coun-

try's total trade (sum of exports and imports) with the U.S. in relation to the total U.S. trade with all the countries included in the index. Consequently, the importance of each currency is proportional to its relative trade share of all countries in the index.

Multilateral trade weights are determined by a country's share of total world trade rather than its share of U.S. trade alone. This method allows for so-called third-country effects. Including third-country effects may appear desirable. However, multilateral weights have the undesirable property of placing undue emphasis on countries that happen to trade primarily with each other. In a practical example, multilateral weights of the FRB index give Belgium and the Netherlands a combined weight greater than Japan because they trade heavily with each other. Bilateral weighting would more accurately reflect the fact that Belgium and the Netherlands together account for only one-fifth the amount of trade the U.S. conducts with Japan. For this reason, bilateral weights were chosen for the Equitable indexes.

The selection of currencies, trade data source period and type of weighting scheme profoundly affect the resultant trade weights (see Table 5) and consequently the index itself. The MORGAN and FRB indexes, with heavy emphasis on Western European and Japanese currencies, show the greatest declines from their 1985 peaks as the dollar fell sharply against those currencies. On the other hand, because Western Hemisphere, Asian and Canadian currencies have fallen little, if at all, against the dollar, greater weights given those currencies in the X-131 and Equitable indexes lessen their overall declines.

Table 5

Trade Weights of Various Dollar Indexes vs. Actual 1985 Trade Shares

Country or Group	Morgan	X-131	Atlanta	FRB*	Equitable**	Actual U.S. Trade
Canada	30.3	20.7	28.8	9.1	26.9	20.7
Japan	23.3	16.8	21.3	13.6	21.9	16.8
Western Europe	44.1	25.2	29.9	77.3	25.1	25.2
Western Hemisphere	—	14.0	—	—	12.6	14.0
Asian NICs	—	13.7	15.7	—	11.7	13.7
Other	2.4	9.6	4.4	—	2.0	9.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

*FRB are multilateral weights, all others are bilateral.
**Both Equitable Indexes (the T-15 and R-15) use the same weights.

ISSUES AND COMMENTS

While the merits and characteristics of each index can be argued in terms of their construction, the key issue is whether or not the dollar has fallen enough to improve the U.S. trade balance from its record deficit position.

At the outset, this paper pointed out that the U.S. trade balance continued to worsen long after the dollar began to weaken in early 1985. Steep declines in the ATLANTA and the MORGAN and FRB dollar indexes, in particular, would indicate that the trade deficit should have improved by late 1986. Even after allowing for the adjustment period described by the J-Curve effect, those indexes likely overstate the extent of the dollar's depreciation.

The modest declines in the X-131 and two Equitable indexes, which more closely mirror actual trade results, may therefore be given more *prima facia* credibility as measures of the dollar's trade-weighted value. Furthermore, a preference ought to be given to the Equitable's R-15 index, which like the Equitable's T-15 index contains a manageable number of currencies to track (fifteen as against 131 in the X-131 index), but unlike all other indexes described here, takes into account the impact inflation has on relative exchange rates.

However, even the "best" index has limitations. First and foremost is the assumption, stated earlier, that international transactions occur only in response to price movements. Income changes are at least equally important.[8] To this extent, one would not expect U.S. exports to expand if incomes in other countries were contracting, even if relative prices remained the same. Incomes also are important on the import side. As incomes rise, imports also generally rise.

The impact of different relative income growth rates on the U.S. trade balance is an important explanation for why, even with the 5 percent or 11 percent declines in the Equitable's measures of the dollar since early 1985, we have not seen a comparable U.S. trade balance improvement eighteen months later. Incomes in the major U.S. trade partners are only now beginning to rise after stagnating since the early 1980s, when the U.S. was the only truly expanding major market for the world's goods. From 1980 through 1985, real total domestic demand in the U.S., a measure of income growth's purchasing power, grew at an annual rate of nearly 3.5 percent, compared with a rise of less than 2.3 percent for all industrial countries.[9] In 1986, this disparity seems to be ending, with real domestic demand in the U.S. slowing to about 3.4 percent and demand in all industrial nations rising to 3.6 percent.

A final qualification of all trade-weighted dollar indexes is that they cannot completely compensate for the assumption that all traded goods are substitutes for one another. Cases can be cited when this as-

sumption is valid, but product differentiation, perceived or actual, is at least as important among countries as within a country.

FOOTNOTES

[1]Between 1970 and 1980, when the U.S. experienced trade deficits, albeit smaller and less persistent than today's, they were eventually improved by a decline in the dollar. In the 1970-74 case, nearly three years of a declining dollar were required before a turning point in the deficit was reached. Similarly, in the 1977-80 case, five quarters of trade balance deterioration occurred before the J-curve bottomed out (See Sofianou, 1986). Rosanne Cahn estimates that the dollar's fluctuation does not start to impact exports for about six months and then takes over two years to complete. Her analysis further shows that import quantities take about two years to respond fully to currency changes, see Cahn. Other business economists also point to a one- to two-year lag associated with the J-curve. For examples, see Harris and Sinai.

[2]The FRB index includes the other nine members of the G10 group (i.e. excluding the United States) plus Switzerland for a total of ten currencies.

[3]Mexico, Brazil and Venezuela were excluded from the ATLANTA index because of inflation-adjustment problems, despite recognizing their importance in U.S. trade. See Rosensweig p. 14.

[4]Morgan expressed a number of concerns at that time about incorporating any developing nation's currency into its index. In addition to the inflation problem itself, measurement problems occur from multiple exchange-rate practices, often defective price data for deflating the currencies, and the economic interpretation of exchange rates in economies where controls, taxes and subsidies often are used on a broad scale to shield domestic industries. See Morgan Guaranty pp. 6-13.

[5]See Cox p. 27, f.n. 22.

[6]Theoretically, the base period for an index should be one in which absolute purchasing power parity holds and the countries used to construct the exchange rate index consume the same bundle of goods. In practice, this task is nearly impossible, complicated by issues of cultural heritage and resulting preferences for one type of commodity over another. Consequently, it is generally not possible to find a year in which absolute purchasing power parity held or actual consumption bundles across countries were identical. A second-best alternative is to select a base year that reflects current trade patterns. Doing so enhances an index's realism in projecting changes in the U.S. trade balance from today. Others have wrestled with this problem as well, with no immediate solution. For one discussion, see Belongia.

[7]The 1984 base period in ATLANTA's index was selected almost by default, claiming that "1984 is not considered an unusual year." See Rosensweig p. 14. Because trade patterns shifted little from 1984 to 1985, using either year makes little difference.

[8]For further theoretical discussion, see Yeager pp. 144-145 and Kahn.

[9]The total for all industrial nations of course includes the U.S. Excluding the U.S. would further widen the difference. See IMF p. 38.

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