

Measuring the External Value of the Dollar

By Mark Wynne



and Adrienne Mack



how much is a dollar worth? The value of a dollar is most generally defined in terms of its purchasing power over the goods and services that households and individuals consume on a regular basis. As goods and services become more expensive, the purchasing power—or value—of the dollar falls. Over long periods of time, the tendency has been for most goods and services to become more expensive in dollar terms. The result is that the purchasing power of a dollar in 2014 is a lot less than the purchasing power of a dollar in 1914.

One way to keep track of changes in the purchasing power of the dollar is by monitoring measures such as the Consumer Price Index or the deflator for Personal Consumption Expenditures. These measures attempt to summarize in a single statistic the changes in all of the prices confronted by consumers in the United States. To a first approximation, we might think of these indexes as tracking changes in the internal purchasing power of the dollar.¹

But we might also be interested in the external purchasing power of the dollar—the ability of a dollar to purchase a bundle of goods and services in another country. Since most countries use their own currencies rather than the dollar, an important determinant of the external purchasing power of the dollar will be the exchange rate of the dollar against other currencies. If the dollar depreciates against other currencies, goods and services produced overseas will become more expensive for American consumers. If the dollar appreciates against other currencies, goods and services produced overseas will become cheaper for American consumers.

How do we track the value of the dollar against other currencies over time? Each week the Federal Reserve's H.10 statistical release reports the daily noon New York City buying rates for some 23 currencies against the dollar. The *Wall Street Journal* reports the bilateral value of the dollar against 53 currencies every day. In combin-

ing these different exchange rates in a single measure that captures the movement in the value of the dollar against other currencies, we contrast the traditional approach to a new method that recognizes the extraordinary growth of financial globalization over the past two decades.

Dollar's Value Based on Trade Flows

There are approximately 200 states in the world, and almost all of them issue currency. Some currencies (such as the dollar and the euro) are used by more than one state, and some states (typically those that have experienced episodes of high inflation) use more than one currency. So there is a dollar exchange rate against a large number of currencies.

One option for combining the various bilateral exchange rates of the dollar is to construct a simple average value of the dollar's movements. For example, if the dollar appreciated by some amount against half the currencies (that is, it took fewer dollars to purchase them) and depreciated by the same amount against the other half, we might say that on average the value of the dollar was unchanged. However, some exchange rate movements are more important than others. For example, a 10 percent appreciation of the dollar against the Zambian kwacha might be regarded as less significant in terms of its implications for the U.S. economy than a 10 percent appreciation of the dollar against the euro. Zambia's economy is a lot smaller than that of the euro area, and U.S. trade and investment relations with Zambia are on a much smaller scale than those with the euro area.

Movements in the value of the dollar against other currencies are relevant because these shifts have implications for international trade flows and—through their impact on trade—domestic economic activity and employment. A decline in the dollar's value will in some circumstances make U.S. imports more expensive and U.S. exports less expensive. So, one approach to constructing a single measure of the dollar's value against differ-

ent currencies is to weight the currencies by the importance in U.S. international trade.

Since the 1970s, the Federal Reserve System Board of Governors has published a broad measure of the value of the dollar against a large number of currencies.² The weight each currency gets in the index (or rather, indexes, because there is more than one) is based on its importance in U.S. international trade. Importantly, the weights are allowed to change over time to capture changing trade patterns. The weights assigned to the currencies of different countries have evolved since the index was created in the 1970s (*Chart 1*). When the index first appeared, U.S. international trade was dominated by the countries that subsequently became the euro area, along with Canada and Japan. Since then, trade with emerging markets, such as Mexico and especially China, has grown in importance. As of today, the Chinese renminbi has the largest weight in the index, surpassing the euro in 2008.

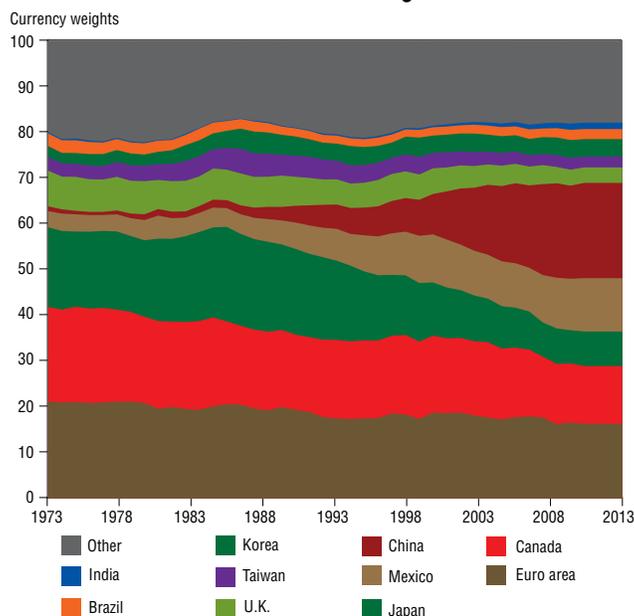
The Board of Governors reports both a nominal and a real trade-weighted measure of the dollar's value. The nominal trade-weighted value of the dollar is simply the trade-weighted average of the various bilateral exchange rates. The real trade-weighted value includes an adjustment for changes in the overall level of prices in each country as well and is arguably the more appropriate measure for assessing the importance of exchange rate movements for international trade. (Simply put, a decline in the value of the dollar that is accompanied by an equal-sized increase in U.S. prices might not give U.S. exporters much of an edge in overseas markets.)

Chart 2 plots the evolution of the trade-weighted value of the dollar since 1973, along with sub-indexes for major currencies and other important trading partners. This offers some perspective on recent concerns that extraordinary policy actions by the Fed have debased the currency.

There was a significant appreciation of the dollar in 2008, driven by safe-haven capital flows to the U.S. at the height of the financial crisis. These

Chart 1

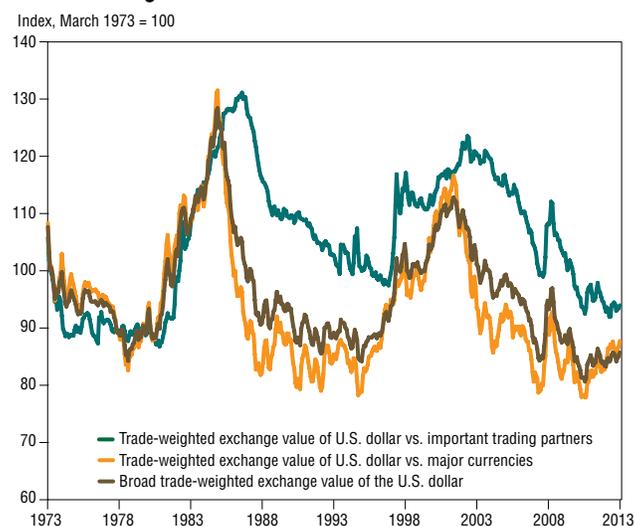
U.S. Trade Patterns Reflected in Trade-Weighted Value of the Dollar



SOURCE: Federal Reserve Board.

Chart 2

Real Trade-Weighted Value of the U.S. Dollar Since 1973



SOURCE: Federal Reserve Board.

Movements in the value of the dollar matter for more than international trade flows. The liberalization of capital accounts over the past three decades has produced a massive increase in international financial flows.

flows have now been largely reversed, and the real trade-weighted value of the dollar as of December 2013 was 84.91, compared with 86.69 in August 2008, immediately prior to the worst phase of the financial crisis and the launch of unconventional monetary policy. That is, between August 2008 and December 2013, the broadest measure of the value of the dollar declined about 2 percent.

These movements in the value of the dollar are dwarfed by what happened in the 1980s, when the dollar appreciated 31 percent between June 1980 and March 1985 before declining 42 percent between March 1985 and April 1988.³ During the 1990s, the dollar appreciated 7 percent, peaking at 112.82 in February 2002 and declining 34 percent between February 2002 and April 2008.

An Alternative Approach

But movements in the value of the dollar matter for more than international trade flows. The liberalization of capital accounts—investments—over the past three decades has produced a massive increase in international financial flows. The U.S. simultaneously borrows a lot from the rest of the world and invests a lot overseas. Changes in the value of the dollar against a foreign currency then create valuation effects depending on how important that currency is in U.S. international borrowing and lending. And the importance of a currency in international financial transactions may not be the same as its importance in international trade.

U.S.-owned assets overseas were valued at \$20.8 trillion at year-end 2012, while foreigners owned assets in the U.S. totaling \$25.2 trillion. The U.S. is a net debtor to the rest of the world by just less than \$5 trillion, and it has been a net debtor since 1986. Movements in the dollar's value against the currencies in which these assets and liabilities are denominated generate capital gains and losses that in turn affect the purchasing power of U.S. consumers.

Suppose, for example, that all U.S. international liabilities were denominated in dollars,

while all of our international assets were denominated in foreign currencies. An unanticipated appreciation of the dollar would generate a capital loss for the U.S.: We would still owe the same amount in dollars to our overseas creditors, but our foreign assets would now be worth less in dollar terms. Likewise, an unanticipated depreciation of the dollar would generate a capital gain. If the situation were reversed—that is, our liabilities were all denominated in foreign currencies, while our foreign assets were somehow denominated in dollars—an unanticipated appreciation of the dollar would generate a capital gain for the U.S.

It turns out that, in practice, almost all U.S. foreign liabilities are denominated in dollars, while about 70 percent of our foreign assets are denominated in foreign currencies.⁴ The currency composition of U.S. international assets and liabilities differs in important ways. Moreover, international financial relationships tend to be more complex than international trade relationships. For example, it seems reasonable to assume that U.S. foreign direct investment in the euro area will fluctuate in value with fluctuations in the dollar–euro exchange rate. More concretely, it seems reasonable to assume that fluctuations in the value of foreign direct investment positions in specific countries will be tied to fluctuations in the values of those countries' currencies against the U.S. dollar.⁵

However, the denomination of foreign debt held by U.S. investors may not be the same as the currency of the issuing country. For example, firms in the euro area may issue debt denominated in euros, dollars or pounds sterling. So the value of a bond issued by a French company but denominated in pounds sterling will be determined more by movements in the dollar–pound exchange rate than by movements in the dollar–euro exchange rate.

Chart 3 plots the currency composition of U.S. foreign assets over time. For purposes of constructing this chart, the countries depicted

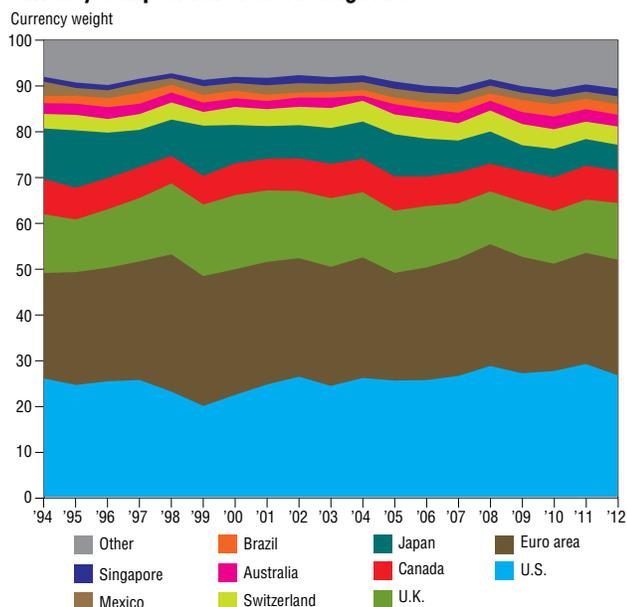
are limited to those also included in the trade-weighted value of the dollar index produced by the staff of the Fed Board. Note that about one-quarter of U.S. assets are denominated in U.S. dollars and, thus, unaffected by changes in the dollar's exchange rate. Second, note the prominent and relatively stable shares of the euro area, the U.K., Canada and Japan (or rather, the euro, the pound sterling, the Canadian dollar and the yen). The Chinese renminbi barely registers ("other"), in marked contrast to its importance in the U.S. trade relationship seen in Chart 1.

We can construct a similar chart showing the evolution of the currency composition of U.S. foreign liabilities over time (Chart 4). The bulk of U.S. foreign liabilities are denominated in U.S. dollars, with the euro the only other currency registering a significant share. Thus, fluctuations in the external value of the dollar have a minimal impact on the ability of the U.S. to service its external debt, in marked contrast to countries whose external liabilities are denominated in a foreign currency.⁶

Recently, researchers have proposed constructing financial exchange rates to complement the well-known trade-weighted measures shown in Chart 2.⁷ The idea behind these indexes is to weight currencies by their importance to the U.S. international investment position. To capture how exchange rates affect the net financial position, two separately weighted indexes are constructed: one weighted by the currency composition of international assets, the other by international liabilities. These two indexes are then used to create a third, net asset index that captures the currency composition of the U.S. net financial position.

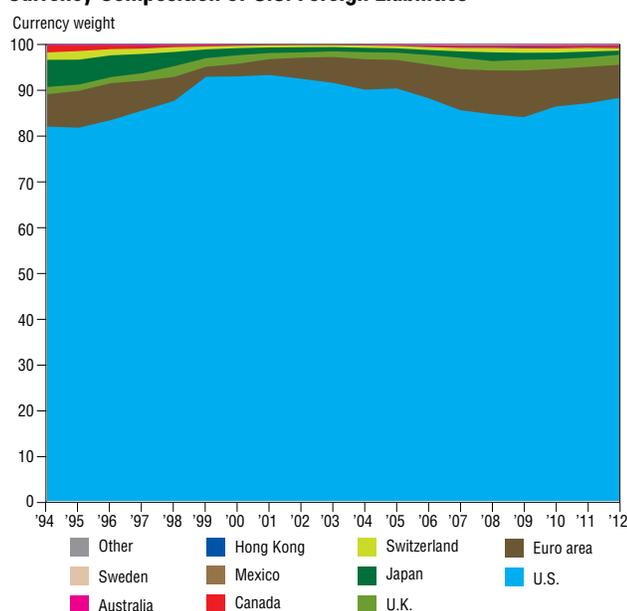
Chart 5 plots five different measures of the foreign exchange value of the U.S. dollar based on different weighting schemes.⁸ The four financial exchange rate indexes are based on asset weighting of currencies, liability weighting, total investment position (assets plus liabilities) and net liabilities (liabilities minus assets). For the sake of

Chart 3
Currency Composition of U.S. Foreign Assets



SOURCES: "Monthly Estimates of U.S. Cross-Border Securities Positions," by Carol C. Bertaut and Ralph W. Tryon, International Finance Discussion Paper no. 2007-910, Federal Reserve Board, 2007; Bureau of Economic Analysis; U.S. Treasury; Bank for International Settlements; authors' calculations.

Chart 4
Currency Composition of U.S. Foreign Liabilities

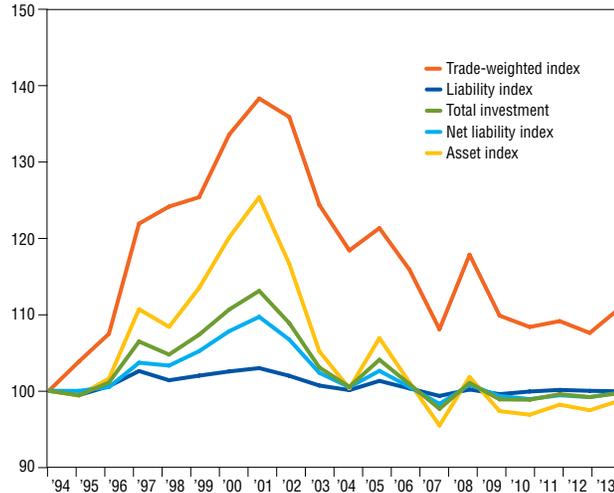


SOURCES: "Monthly Estimates of U.S. Cross-Border Securities Positions," by Carol C. Bertaut and Ralph W. Tryon, International Finance Discussion Paper no. 2007-910, Federal Reserve Board, 2007; Bureau of Economic Analysis; U.S. Treasury; Bank for International Settlements; authors' calculations.

Chart 5

Five Measures of the International Value of the Dollar

Index, 1994 = 100



SOURCES: "Monthly Estimates of U.S. Cross-Border Securities Positions," by Carol C. Bertaut and Ralph W. Tryon, International Finance Discussion Paper no. 2007-910, Federal Reserve Board, 2007; Bureau of Economic Analysis; U.S. Treasury; Bank for International Settlements; authors' calculations.

On a financially weighted basis—whether by assets, liabilities, total investment position or net liabilities—the value of the dollar in 2013 was about the same as it was in 1994.

comparison, we also include the trade-weighted value of the dollar, recomputed to conform to the exchange rate convention used to calculate the financial indexes and rebased to equal 100 in 1994.

The chart shows that the largest movements in the external value of the dollar arise when different currencies are weighted based on their importance in U.S. international trade. The dollar cost of a unit of foreign currency declined more than 27 percent between 1994 and 2001 on a trade-weighted basis but only 21 percent on an asset-weighted basis. On a financial liability basis, the decline in cost was less than 3 percent over the same period because the bulk of U.S. international liabilities are denominated in dollars.

A second important point to note is that on a financially weighted basis—whether by assets, liabilities, total investment position or net liabilities—the value of the dollar in 2013 was about the same as it was in 1994. However on a trade-weighted basis, relative to 1994, the dollar

cost of foreign currency in 2013 was about 10 percent lower.

Properly Valuing the Dollar

There is no unique "right" way to combine different exchange rates into a single measure of the dollar's external value; it all depends on the question you want that measure to address. The value of the Chinese renminbi against the U.S. dollar has important implications for international trade given the importance of China as a trading nation. However, movements in the value of the renminbi against the U.S. dollar have limited implications for capital gains and losses on U.S. international investments. China holds a large amount of U.S. debt, but all of it is denominated in U.S. dollars. A change in the value of the dollar against the renminbi has no implications for the U.S. in terms of its international liabilities; it simply determines whether China experiences capital gains or losses on its U.S. debt holdings.⁹

Recent movements in the value of the dollar

(over the past five years) are remarkably small in comparison with some historical episodes, as seen in Chart 2. Switching the focus from international trade to international investments offers a different interpretation of exchange rate movements. If different currencies are weighted by their importance in U.S. assets and liabilities rather than their importance to U.S. international trade, the dollar is worth about as much in 2013 as it was in 1994. Financial globalization necessitates that new measures be added to the toolkit for tracking international developments.

More information about the methodology used in this article can be found online at www.dallasfed.org/institute/annual/index.cfm.

Notes

¹ We say to a first approximation because the basket of goods and services consumed by the typical U.S. household will usually include some imported products as a result of globalization, and the prices of these goods will be determined in part by changes in the value of the dollar against other currencies, or the external value of the dollar.

² The methodology behind the Board's indexes is described in "Indexes of the Foreign Exchange Value of the Dollar," by Mico Loretan, *Federal Reserve Bulletin*, Winter 2005, pp. 1–8.

³ The dramatic appreciation of the dollar in the first half of the 1980s took place against the background of Volcker disinflation.

⁴ Data found in "From World Banker to World Venture Capitalist: U.S. External Adjustment and the Exorbitant Privilege," by Pierre-Olivier Gourinchas and H  l  ne Rey, in *G7 Current Account Imbalances: Sustainability and Adjustment*, Richard H. Clarida, ed., Chicago: University of Chicago Press, 2007.

⁵ This is not to imply that there is a unique causal relationship from exchange rate movements to the value of foreign direct investment positions. Capital flows (of all types) also affect exchange rates.

⁶ The debt crises experienced by many Latin American countries during the 1980s were due in no small part to the fact that essentially all of their external debt was denominated in dollars rather than pesos, *reals*, etc.

⁷ See "Financial Exchange Rates and International Currency Exposure," by Philip R. Lane and Jay C. Shambaugh,

American Economic Review, vol. 100, no. 1, 2010, pp. 518–40.

⁸ To compute the financial weighted exchange rates, we follow Lane and Shambaugh (2010) and measure all of the exchange rate series in units of dollars per unit of foreign currency. Thus, a decline in one of the exchange rate indexes corresponds to an increase in the value of the dollar—fewer dollars are needed to purchase a unit of foreign currency. This convention is followed rather than the alternative convention of measuring exchange rates in units of foreign currency per dollar so as to facilitate the calculation of the financial exchange rates. By measuring exchange rates this way, a rapidly depreciating foreign currency converges toward zero rather than infinity. We then invert them to make them comparable to the trade-weighted value of the dollar.

⁹ Of course, financial linkages and trade linkages are not independent. For example, the value of foreign direct investment by U.S. firms in China will be affected by changes in the U.S. dollar–renminbi exchange rate: A depreciation of the renminbi will make those investments less valuable. But if the U.S. firm is producing in China for export to the U.S., a cheaper renminbi will also make the goods produced at the Chinese facilities cheaper in the U.S., which will give the firm a competitive edge and potentially raise its value.

Financial globalization necessitates that new measures be added to the toolkit for tracking international developments.