is entered into bonded warehouses or Foreign Trade Zones under Customs custody.

Imports for consumption. Imports for consumption are the merchandise that has physically cleared Customs either entering consumption channels immediately or entering after withdrawal from bonded warehouses under Customs custody or from Foreign Trade Zones.

Total exports. Total exports are domestic exports plus foreign exports.

Total f.a.s. export value. The total f.a.s. value is the value of exports at the U.S. port, based on the transaction price, including inland freight, insurance, and other charges. This excludes the cost of loading the merchandise or further costs.

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EXCHANGE RATES

Lawrence H. Officer

Definition of Exchange Rate

An exchange rate is the price of one currency in terms of another, that is, the number of units of the second currency per unit of the first currency. The currency roles can be reversed. Thus the price of the dollar in terms of a foreign currency (for example, the number of yen per dollar) is the inverse of the price of the foreign currency in terms of the dollar (the number of dollars per yen). If 200 is the price of the dollar in terms of the yen (200 yen per dollar, the exchange value of the dollar), then $\frac{1}{200} = 0.005$ is the price of the yen in terms of the dollar (0.005 dollar per yen, the exchange value of the yen). The exchange rate can also be written as an equation: 200 yen = \$1, or \$0.005 = 1 yen.

Almost all the series in Tables Ee612–683 follow the standard convention in expressing the exchange rate as the number of units of foreign currency per dollar, that is, they show the exchange value of the dollar. Expressing the exchange rate in this way, as the exchange rate increases (decreases), the dollar appreciates (depreciates) in the foreign-exchange market. In other words, the dollar becomes "stronger" ("weaker") – is worth more (less) compared to the foreign currency.

There are three exceptions to the rule that exchange rates be the exchange value of the dollar. These exceptions involve the U.K. pound, the Irish pound, and special drawing rights (SDR). The exchange rate involving the U.K. pound is expressed as the number of dollars per pound (rather than the number of pounds per dollar) both in the tables and in the data source. The proximate explanation for this definition of the exchange rate is tradition. The ultimate explanation is threefold. First, in the nineteenth century, among currencies traded against the dollar in the United States, the British pound was the only unit "larger than the dollar" (worth more than one dollar). Thus, to avoid an exchange rate below unity, the number of dollars per pound rather than its inverse was the exchange-rate expression.[1] Second, the pound sterling (British pound) was of overwhelming importance in the U.S. foreign-exchange market. Third, the pound was the dominant currency in world trade and payments.

Because of its close connection to the U.K. pound, the Irish pound is also expressed as the number of dollars per pound, both in the tables and in the data source. The final exception is the SDR. Because of its role in the international monetary system, this basket of currencies is of special interest. Therefore the pertinent exchange rate is the number of dollars per SDR rather than the inverse, even though the data source presents both the direct and the inverse exchange rate.

When the exchange rate is defined as for the exceptions (number of dollars per unit of foreign currency), a higher (lower) exchange rate now means a weaker (stronger) dollar: the dollar depreciates (appreciates); it is worth less (more) in terms of foreign currency.

Use of Exchange Rate

The primary importance of exchange rates lies in conversion of a price or value from one currency to another. The product of a dollar price or value and the foreign-currency–dollar exchange rate yields the equivalent foreign-currency price or value. The division of a foreign-currency price or value by the foreign-currency–dollar exchange rate yields the equivalent dollar price or value. Such computations are essential to international trade and payments.

The implication of a higher exchange value of the dollar (higher foreign-currency–dollar exchange rate) is that foreign

[1] This is the explanation offered in Myers (1931), p. 347.

goods, services, and capital assets are cheaper for Americans, while American goods, services, and capital assets are more expensive for foreigners. The implication of a lower exchange value of the dollar (lower foreign-currency–dollar exchange rate) is that foreign goods, services, and capital assets are more expensive for Americans, while American goods, services, and capital assets are cheaper for foreigners.

Either the current exchange rate or exchange-rate parity can be used for the purpose of converting prices or values between a dollar denomination and a foreign-currency expression (in either direction).

Exchange-Rate Parity

Exchange-rate parity in the form of dollar–sterling parity (number of dollars per pound sterling) is the subject of Table Ee612–614. Parity is a hypothetical rather than actual or quoted exchange rate. It is a norm value of the exchange rate. Traditionally, there are two types of parity. The first is mint parity, which implies gold (or silver) coinage in the countries. Mint parity is the ratio of the gold (or silver) content of the pound to the gold (or silver) content of the dollar; it is the number of grains of gold (or silver) coined per pound divided by the number of grains of gold (or silver) coined per dollar.[2] The result is the gold (or silver) parity. The second concept of parity is legal parity, involving government or central-bank declaration of a parity value and not requiring gold or silver coinage.

Dollar-sterling parity has a long history, going back to 1704, when Queen Anne declared that the Spanish dollar had a "just Proportion" to British coin of 4 shillings and 6 pence (see Officer 1996, p. 50). With 12 shillings per pence and 20 shillings per pound, the pound is equivalent to $\frac{240}{54} = 4.44\frac{4}{9}$ Spanish dollars. Because this parity emanated from a royal proclamation, it was a legal parity. However, the proclaimed value of the Spanish dollar in terms of British coin was based on the relative silver content of the Spanish dollar and British coin, implying that the parity was also mint (silver) parity. Indeed, from colonial times to the mid-1790s, there was no U.S. mint that produced coined money, and the dominant coin in the United States was the Spanish silver dollar. The country was on a silver standard.

Because the Spanish dollar is the forerunner of the American dollar – and indeed, when the U.S. dollar was created in 1792, it was declared equal in value to the Spanish dollar – the parity of $\$4.44\frac{4}{9}$ per pound was the original dollar–sterling exchange-rate parity and was the parity of custom until 1873. Termed "nominal par" in the nineteenth century, this original mint and legal parity was succeeded by the values listed in series Ee612 as mint parity and by the figures in series Ee613–614 as legal parity. Deviations of the U.S. legal and mint parities from nominal par occurred from their inception, as the series show. Yet, remarkably, until Congressional legislation of 1873, exchange-rate quotations were expressed as a percentage deviation or index number with respect to nominal par as the base (see Officer 1996, p. 59). The use of nominal par was a legal fiction; it was known to contemporaries that it was not the true or applicable parity.

[2] A grain is one 480th of a Troy ounce, or one 437.5th of an avoirdupois ounce. Precious metals are measured in Troy weight; other substances are measured in avoirdupois weight (in the United States) or in metric weight (in most other countries and in international trade).

The longevity of nominal par gave rise to the equivalent terminology "technical par" and "customary par." Gold parity was called "real par" and computable even when the United States was on an effective silver standard, that is, prior to July 31, 1834 (see the discussion that follows). Until that date, gold par, at $4.5657, was itself expressed as 2.73 percent above nominal par. From July 31, 1834, gold par was identical to true mint parity. From July 31, 1834, to January 17, 1837, gold par was 9.50 percent over nominal par. From January 18, 1837, to January 30, 1934, it was 9.59 percent over nominal par.

Dollar–Sterling Exchange Rate, 1791–1914

Two features of the dollar–sterling exchange rate from colonial times to World War I are indisputable. First, the British pound was the overwhelmingly important foreign currency in the American foreign-exchange market; therefore, dollar–sterling was the dominant exchange rate. Second, the dollar–sterling foreign-exchange market was located not in London but rather in various American cities, with the dominant location originally Boston, then Philadelphia, possibly Baltimore at the turn of the nineteenth century, and then New York by the early 1820s. So in a fundamental sense the American dollar–sterling exchange market represented not only the American foreign-exchange market but also the dollar–sterling world market (Cole 1929)

Other elements of the dollar–sterling exchange rate are controversial or have been subject to changing views over time. (1) The transatlantic cable was laid in 1866, but there was a half-century delay before the cable transfer became the dominant foreign-exchange instrument, succeeding the sight bill of exchange. Some observers claim in effect that the delay was shorter (Perkins 1975). (2) Traditional exchange-rate series are quoted or advertised rates. Some modern authors consider such series unreliable and insist on series that represent market rates, that is, prices at which actual transactions occur. (3) An exchange-rate series can refer to one exchange-market instrument throughout (for example, sixty-day bill of exchange, sight bill, or cable transfer – these three instruments involve immediate dollar payment but differ on the time at which pounds are received), or it can pertain to the dominant instrument at the time (for example, switching from sixty-day to sight when the latter replaced the former as the primary medium). (4) If time bills of exchange are to be converted to a sight-equivalent basis, it is controversial whether the rate of discount (that is, the rate of interest) should pertain to the drawer city (for example, Philadelphia or New York, where bills are created) or the drawee city (for example, London, where bills are payable). Most modern authors opt for the latter. (5) Exchange rates are generally expressed as the price at which foreign exchange is purchasable; a superior alternative is the midpoint of the buying and selling price, with broker's commission constituting the difference in the prices. (6) An exchange-rate series can be left in pristine form, thereby reflecting whatever monetary standard or exchange-rate system is in existence. Alternatively, the series can be corrected for the depreciation of the dollar (pound) in terms of the metallic standard of Britain (United States) when a gold or silver standard is temporarily relinquished by the United States (Britain) in favor of a paper standard – what is today called a "floating exchange rate." The resulting exchange-rate series permits mint parity to serve as the norm value about which "gold points" are expected to contain the exchange rate.

Table Ee615–620 exhibits six pre–World War I dollar–sterling series, each of which involves a stance on some or all of these issues. The period 1791–1914 encompassed by these series covers a variety of monetary standards for the United States. The monetary standard is important because it affects the range of exchange-rate fluctuations. One must distinguish between the legal and the effective monetary standard (Nussbaum 1950). Legally, the Mint Act of 1786 provided for a bimetallic (both gold and silver) standard, but the Act was not put into effect. The Mint Act of 1792 again established legal bimetallism, which reigned until the legislation of February 12, 1873, which ended coinage of the silver dollar, and June 22, 1874, which limited the legal-tender property of existing silver coin to $5 in any payment. These Acts demonetized silver, thus replacing the legal bimetallic standard with a gold standard, which was confirmed by the Gold Standard Act of March 14, 1900.

The effective monetary standard of the United States was somewhat different from the legal stipulation. The 1792 Act undervalued gold and overvalued silver compared to world markets, and so the country remained on an effective silver standard. The Act of June 28, 1834, did the opposite, placing the United States on an effective gold standard.

Metallic (gold or silver) standards generally confine a country's exchange rate to the neighborhood of mint parity, the range delimited by "gold points." So the exchange rate is fairly stable during these standards, indeed becoming more stable over time as gold points become closer to mint parity (reflecting decreased costs of shipping gold internationally). However, the U.S. metallic standards of 1791–1913 were occasionally disrupted by "paper standards," during which gold points became inoperative and the exchange rate could undergo considerable fluctuation. These periods were August 30, 1814–February 19, 1817; May 10, 1837–March 17, 1842; October 14–December 13, 1857; and the famous "greenback period" of December 30, 1861–December 31, 1878.

Bilateral Exchange Rates, 1913–1999

With World War I, the American foreign-exchange market became diffused in terms of currencies, and the dominance of sterling ended. The market also was to become diffused in location, with the dollar traded actively not only in New York but also often in the foreign country's financial center. Tables Ee621–661 present dollar exchange rates for all foreign currencies for which Federal Reserve publications provide at least one annual exchange-rate observation in the post–World War II period. Presumably, these are the currencies deemed to trade most actively against the dollar.

The period 1913–1999 witnessed a paper standard from April 6, 1917, to March 17, 1922, and again from March 6, 1933, to January 30, 1934. Indeed, the U.S. gold standard was legally terminated by the Act of January 30, 1934, and gold coin could no longer circulate as money. From January 31, 1934, to February 12, 1973, the United States was on a limited international (but no longer domestic) gold standard, with the exchange rate restricted within "parity points" (except for bilateral exchange cases when the other country elected to have a floating exchange rate – for example, Canada in 1950–1962). After World War II, this standard was formalized in the "Bretton Woods," or International Monetary Fund (IMF), system, which broke down temporarily from August 15 to December 17, 1971, and then permanently beginning February 13, 1973. The floating exchange rates that began on that date in 1973 continued to the end of the twentieth century and beyond.

The six issues concerning the pre–World War I dollar–sterling exchange rate, the subject of Table Ee615–620, may be revisited from the perspective of post–World War I dollar exchange rates. (1) With rare exceptions, exchange rates are for cable transfer, that being the dominant exchange-market instrument after World War I. (2) Whenever possible, the series pertain to market rates. Sometimes official rates are used, where data on market rates are unavailable. (3) The cable transfer was dominant through 1999. (4) Time-bill data are not used, and so the issue is not applicable. (5) The primary data source, Federal Reserve publications, provides buying rates for foreign exchange. The secondary data source, the IMF, generates exchange rates that are the midpoints of buying and selling prices of the dollar. Although this treatment is inconsistent, the practices of the respective sources are followed because information on buy–sell spreads is unavailable. Certainly, spreads are much lower in the twentieth century than they were in the nineteenth century, and they exhibit a trend decline over time (see Officer 1996, p. 75). So the inconsistency is of lesser importance in Tables Ee621–661 than it is in Table Ee615–620. (6) The exchange rates are in pristine form; that is, they reflect the current monetary standard or exchange-rate system. There is no correction for depreciation or appreciation of the dollar or foreign currencies with respect to gold. The reason is that the gold standard no longer serves as the norm. Its abandonment by all countries in the 1920s and 1930s marked the termination of the gold standard (Eichengreen 1992).[3]

A seventh issue concerns the expression of the exchange rate when there is a change in the currency unit of a country. This situation does not apply to dollar–sterling exchange rates (Table Ee615–620) because the United States has not experienced a change in its currency unit since the dollar was adopted as the unit of account in 1792, and Britain's pound has remained its primary currency unit.

However, many currencies presented in Tables Ee621–661 have undergone changes in their currency unit since 1913, sometimes multiple changes. Two examples may be considered: France and Germany. In 1960, the new franc replaced the old franc as the monetary unit of France, at the rate 1 new franc = 100 old francs. In 1924, the reichsmark succeeded the mark as the German currency unit, at the rate 1 reichsmark = 1,000,000,000,000 marks; in 1948 the reichsmark was superseded by the deutsche mark, at the rate 1 deutsche mark = 10 reichsmarks. Generally, as in the French and German cases, a new currency unit is worth a multiple of the former currency unit – which might be termed a domestic (as distinct from exchange-market) appreciation of the currency because a lesser amount of the currency is now needed to purchase a given commodity or asset. Exceptional situations are Australia, New Zealand, and South Africa in the 1960s, when the Australian, New Zealand, and South African pound were replaced by the Australian dollar, New Zealand dollar, and South African rand, at the rate 1 dollar or 1 rand = 2 pounds.

How should an exchange-rate series be expressed under such changes in currency unit? There are two sensible choices, and both are selected, each being alternative to the other. One possibility is to adopt the standpoint of contemporaries and accept whatever currency unit is in place at a given time. This is the focus of

[3] For a complete list of countries on the gold standard and the periods during which they were on it, see Officer (2001), Tables 1–2.

Tables Ee621–661. For example, in Table Ee621–636, the French-currency–dollar exchange rate is the number of old francs per dollar for 1913–1959 and the number of new francs per dollar for 1960–1999. Another example: the German-currency–dollar exchange rate is the number of marks per dollar for 1913–1924, the number of reichsmarks per dollar for 1925–1941, and the number of deutsche marks per dollar for 1950–1999 (there are gaps in the series). In leaving undisturbed the part of the exchange-rate series prior to alteration of the currency unit, the entire series reflects the perspective of the contemporary observer: it is how the exchange rate was actually measured at the time. Certainly, this is a useful characteristic of an exchange-rate series. To the layperson who wants to know the actual foreign-currency–dollar exchange rate in a given year or to the historian who is interested in a time period that does not span beyond an unchanged currency unit, exchange-rate series in contemporary currency units are necessary; hence Tables Ee621–661.

However, these tables have the disadvantage that the exchange-rate series is not a consistent series: observations are not comparable over a change in currency unit. When multiple changes in currency unit occur, the series becomes more akin to a collection of subseries rather than a true time series. The analyst who is interested in calculating changes in exchange rates over time (for example, in comparison with price-index movements: "purchasing-power-parity" computations) requires exchange-rate series that are consistent over the time period of interest (as, of course, the price indexes should be). Therefore, the alternative is to express an entire exchange-rate series in terms of a given currency unit. Logically, this would be the most recent currency unit. A consistent series is thereby achieved. This is the basis of Table Ee662–678, which provides exchange rates in consistent currency units for those countries (in Tables Ee621–661) that experienced one or more changes in currency unit. In Table Ee662–678, for example, the French-currency–dollar exchange rate is the number of new francs per dollar and the German-currency–dollar exchange rate is the number of deutsche marks – throughout 1913–1999. This uniformity is achieved by converting the contemporary exchange rates into the most recent currency-unit expression.

Consider the French-currency–dollar exchange rate in 1959. In terms of the contemporary currency unit, the old franc, the exchange rate is 490.6771 old francs per dollar (series Ee625). In terms of the most recent currency unit, the new franc, the exchange rate is 4.9068 new francs per dollar (series Ee665); the equivalence 1 new franc = 100 old francs implies that the new-franc–dollar exchange rate is 490.6771/100 = 4.9068 (except for rounding).

The German case is more complex, but it is just as logical. Consider the German-currency–dollar exchange rate in 1920. The contemporary exchange rate is 57.1102 marks per dollar (series Ee626), the mark being the currency unit then in effect. To obtain the corresponding exchange rate in deutsche marks per dollar, the equivalence between the mark and deutsche mark must be obtained. For this purpose, and also to express the exchange rate, scientific notation is convenient.[4] Then: 1 reichsmark = 1,000,000,000,000 marks = 1.0E + 12 marks and 1 deutsche mark = 10 reichsmarks, implying that 1 deutsche mark = 1.0E + 13 marks. Therefore, 57.1102 marks per dollar is equivalent to 57.1102/(1.0E + 13) = 57.1102E–13 = 5.711E–12 deutsche marks per dollar (series Ee666).

Often, a country changes its currency unit (undertakes a domestic appreciation of its currency) because it has undergone massive inflation that greatly reduces the exchange value of its currency or, equivalently, that greatly increases the exchange value of the dollar versus its currency. Before the inflation occurred, the former currency unit was much stronger against the dollar (the dollar was much weaker against it); and so the consistent (as distinct from contemporary) exchange rate (exchange value of the dollar) is very low prior to the inflation. The preceding example of the German-currency–dollar exchange rate in 1920 illustrates this point: 5.7110E–12 deutsche marks per dollar (the deutsche mark is very strong against the dollar) but only 57.1102 marks per dollar (the contemporary currency unit, the mark, is much weaker against the dollar). The Latin American changes in currency unit are generally of this nature (compare the pertinent series in Tables Ee637–645 and Ee662–678), as is some European experience. Conspicuous cases in which a change in currency unit occurred in the absence of massive inflation are France in 1960 (discussed earlier), South Africa in 1961, Australia in 1966, and New Zealand in 1967.

Multilateral Exchange Rates, 1967–1999

Bilateral exchange rates are the rates observed in the foreign-exchange market, but they relate the dollar to only one foreign currency at a time. If the dollar appreciates against some currencies and depreciates against others, it is logical to inquire whether it appreciates or depreciates in total. Even if the dollar moves in the same direction against a collection of foreign currencies, the magnitudes of the changes may differ, and an average amount of dollar depreciation or appreciation is of interest. Multilateral exchange rates, which are combinations or averages of bilateral rates, provide the series that deal with these issues. In Table Ee679–683, five multilateral exchange rates for the dollar, representing two different methodologies, are presented: a basket of currencies (SDR) and effective exchange rates. They are arbitrary constructs, in the sense that the weights of the currencies composing the basket or effective rate are determined by the creator of the multilateral rate (the IMF and Board of Governors of the Federal Reserve Board, respectively). For more institutional detail, see the annual IMF report, *Exchange Arrangements and Exchange Restrictions.*

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[4] In scientific notation, "E + x" following a number means "move the decimal point x places to the right," while "E–y" following a number means "move the decimal place y places to the left."