All About...
the Foreign Exchange Market in the United States

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CHAPTER 2

1. WHY WE NEED FOREIGN EXCHANGE

Almost every nation has its own national currency or monetary unit—its dollar, its peso, its rupee—used for making and receiving payments within its own borders. But foreign currencies are usually needed for payments across national borders. Thus, in any nation whose residents conduct business abroad or engage in financial transactions with persons in other countries, there must be a mechanism for providing access to foreign currencies, so that payments can be made in a form acceptable to foreigners. In other words, there is need for “foreign exchange” transactions—exchanges of one currency for another.

2. WHAT “FOREIGN EXCHANGE” MEANS

“Foreign exchange” refers to money denominated in the currency of another nation or group of nations. Any person who exchanges money denominated in his own nation’s currency for money denominated in another nation’s currency acquires foreign exchange. That holds true whether the amount of the transaction is equal to a few dollars or to billions of dollars; whether the person involved is a tourist cashing a traveler’s check in a restaurant abroad or an investor exchanging hundreds of millions of dollars for the acquisition of a foreign company; and whether the form of money being acquired is foreign currency notes, foreign currency-denominated bank deposits, or other short-term claims denominated in foreign currency. A foreign exchange transaction is still a shift of funds, or short-term financial claims, from one country and currency to another.

Thus, within the United States, any money denominated in any currency other than the U.S. dollar is, broadly speaking, “foreign exchange.”

Foreign exchange can be cash, funds available on credit cards and debit cards, traveler’s checks, bank deposits, or other short-term claims. It is still “foreign exchange” if it is a short-term negotiable financial claim denominated in a currency other than the U.S. dollar.

But, in the foreign exchange market described in this book—the international network of major foreign exchange dealers engaged in high-volume trading around the world—foreign exchange transactions almost always take the form of an exchange of bank deposits of different national currency denominations. If one bank agrees to sell dollars for Deutsche marks to another bank, there will be an exchange between the two parties of a dollar bank deposit for a DEM bank deposit. In this book, “foreign exchange” means a bank balance denominated in a foreign (non-U.S. dollar) currency.

3. ROLE OF THE EXCHANGE RATE

The exchange rate is a price—the number of units of one nation’s currency that must be surrendered in order to acquire one unit of another nation’s currency. There are scores of “exchange rates” for the U.S. dollar. In the spot market, there is an exchange rate for every other national currency.
traded in that market, as well as for various composite currencies or constructed monetary units such as the International Monetary Fund’s “SDR,” the European Monetary Union’s “ECU,” and beginning in 1999, the “euro.” There are also various “trade-weighted” or “effective” rates designed to show a currency’s movements against an average of various other currencies (see Box 2-1). Quite apart from the spot rates, there are additional exchange rates for other delivery dates, in the forward markets. Accordingly, although we talk about the dollar exchange rate in the market, and it is useful to do so, there is no single, or unique dollar exchange rate in the market, just as there is no unique dollar interest rate in the market.

A market price is determined by the interaction of buyers and sellers in that market, and a market exchange rate between two currencies is determined by the interaction of the official and private participants in the foreign exchange rate market. For a currency with an exchange rate that is fixed, or set by the monetary authorities, the central bank or another official body is a key participant in the market, standing ready to buy or sell the currency as necessary to maintain the authorized pegged rate or range. But in the United States, where the authorities do not intervene in the foreign exchange market on a continuous basis to influence the exchange rate, market participation is made up of individuals, nonfinancial firms, banks, official bodies, and other private institutions from all over the world that are buying and selling dollars at that particular time.

The participants in the foreign exchange market are thus a heterogeneous group. Some of the buyers and sellers may be involved in the “goods” market, conducting international transactions for the purchase or sale of merchandise. Some may be engaged in “direct investment” in plant and equipment, or in “portfolio investment,” dealing across borders in stocks and bonds and other financial assets, while others may be in the “money market,” trading short-term debt instruments internationally. The various investors, hedgers, and speculators may be focused on any time period, from a few minutes to several years. But, whether official or private, and whether their motive be investing, hedging, speculating, arbitraging, paying for imports, or seeking to influence the rate, they are all part of the aggregate demand for and supply of dollars in the market.
of the currencies involved, and they all play a role in determining the market exchange rate at that instant.

Given the diverse views, interests, and time frames of the participants, predicting the future course of exchange rates is a particularly complex and uncertain business. At the same time, since the exchange rate influences such a vast array of participants and business decisions, it is a pervasive and singularly important price in an open economy, influencing consumer prices, investment decisions, interest rates, economic growth, the location of industry, and much else. The role of the foreign exchange market in the determination of that price is critically important.

### 4. Payment and Settlement Systems

Just as each nation has its own national currency, so also does each nation have its own payment and settlement system—that is, its own set of institutions and legally acceptable arrangements for making payments and executing financial transactions within that country, using its national currency. “Payment” is the transmission of an instruction to transfer value that results from a transaction in the economy, and “settlement” is the final and unconditional transfer of the value specified in a payment instruction. Thus, if a customer pays a department store bill by check, “payment” occurs when the check is placed in the hands of the department store, and “settlement” occurs when the check clears and the department store’s bank account is credited. If the customer pays the bill with cash, payment and settlement are simultaneous.

When two traders enter a deal and agree to undertake a foreign exchange transaction, they are agreeing on the terms of a currency exchange and committing the resources of their respective institutions to that agreement. But the execution of that exchange—the settlement—does not take place until later.

Executing a foreign exchange transaction requires two transfers of money value, in opposite directions, since it involves the exchange of one national currency for another. Execution of the transaction engages the payment and settlement systems of both nations, and those systems play a key role in the operations of the foreign exchange market.

Payment systems have evolved and grown more sophisticated over time. At present, various forms of payment are legally acceptable in the United States—payments can be made, for example, by cash, check, automated clearinghouse (a mechanism developed as a substitute for certain forms of paper payments), and electronic funds transfer (for large value transfers between banks). Each of these accepted forms of payment has its own settlement techniques and arrangements.

By number of transactions, most payments in the United States are still made with cash (currency and coin) or checks. However, the electronic funds transfer systems, which account for less than 0.1 percent of the number of all payments transactions in the United States, account for more than 80 percent of the value of payments. Thus,
Electronic funds transfer systems represent a key and indispensable component of the payment and settlement systems. It is the electronic funds transfer systems that execute the inter-bank transfers between dealers in the foreign exchange market. The two electronic funds transfer systems operating in the United States are CHIPS (Clearing House Interbank Payments System), a privately owned system run by the New York Clearing House, and Fedwire, a system run by the Federal Reserve (see Box 2-2).

Other countries also have large-value interbank funds transfer systems, similar to Fedwire and CHIPS in the United States. In the United Kingdom, the pound sterling leg of a foreign exchange transaction is likely to be settled through CHAPS—the Clearing House Association Payments System, an RTGS system whose member banks settle with each other through their accounts at the Bank of England. In Germany, the Deutsche mark leg of a transaction is settled through EAF—an electronic payments system where settlements are made through accounts at Germany’s central bank, the Deutsche Bundesbank. A new payment system, named TARGET, has been designed to link RTGS systems within the European Community, to enable participants to handle transactions in the euro upon its introduction on January 1, 1999.

Globally, more than 80 percent of global foreign exchange transactions have a dollar leg. Thus, the amount of daily dollar settlements is huge, one trillion dollars per day or more. The settlement of foreign exchange transactions accounts for the bulk of total dollar payments processed through CHIPS each day.

The matter of settlement practices is of particular importance to the foreign exchange
market because of “settlement risk,” the risk that one party to a foreign exchange transaction will pay out the currency it is selling but not receive the currency it is buying. Because of time zone differences and delays caused by the banks’ own internal procedures and corresponding banking arrangements, a substantial amount of time can pass between a payment and the time the counter-payment is received—and a substantial credit risk can arise. Efforts to reduce or eliminate settlement risk are discussed in Chapter 8.
The foreign exchange market is by far the largest and most liquid market in the world. The estimated worldwide turnover of reporting dealers, at around $1\frac{1}{2}$ trillion a day, is several times the level of turnover in the U.S. Government securities market, the world’s second largest market. Turnover is equivalent to more than $200 in foreign exchange market transactions, every business day of the year, for every man, woman, and child on earth!

The breadth, depth, and liquidity of the market are truly impressive. Individual trades of $200 million to $500 million are not uncommon. Quoted prices change as often as 20 times a minute. It has been estimated that the world’s most active exchange rates can change up to 18,000 times during a single day. Large trades can be made, yet econometric studies indicate that prices tend to move in relatively small increments, a sign of a smoothly functioning and liquid market.

While turnover of around $1\frac{1}{2}$ trillion per day is a good indication of the level of activity and liquidity in the global foreign exchange market, it is not necessarily a useful measure of other forces in the world economy. Almost two-thirds of the total represents transactions among the reporting dealers themselves—with only one-third accounted for by their transactions with financial and non-financial customers. It is important to realize that an initial dealer transaction with a customer in the foreign exchange market often leads to multiple further transactions, sometimes over an extended period, as the dealer institutions readjust their own positions to hedge, manage, or offset the risks involved. The result is that the amount of trading in the interbank market often accounts for a very small share of that institution’s total foreign exchange activity.

Among the various financial centers around the world, the largest amount of foreign exchange trading takes place in the United Kingdom, even though that nation’s currency—the pound sterling—is less widely traded in the market than several others. As shown in Figure 3-1, the United Kingdom accounts for about 32 percent of the global total; the United States ranks a distant second with about 18 percent, and Japan is third with 8 percent. Thus, together, the three largest markets—one each in the European, Western Hemisphere, and Asian time zones—account for about 58 percent of global trading. After these three leaders comes Singapore with 7 percent.

**Figure 3-1**

**Shares of Reported Global Foreign Exchange Turnover, 1998**

Source: Bank for International Settlements.
Note: Percent of total reporting foreign exchange turnover, adjusted for intra-country double-counting.
The large volume of trading activity in the United Kingdom reflects London's strong position as an international financial center where a large number of financial institutions are located. In the 1998 foreign exchange market turnover survey, 213 foreign exchange dealer institutions in the United Kingdom reported trading activity to the Bank of England, compared with 93 in the United States reporting to the Federal Reserve Bank of New York.

In foreign exchange trading, London benefits not only from its proximity to major Eurocurrency credit markets and other financial markets, but also from its geographical location and time zone. In addition to being open when the numerous other financial centers in Europe are open, London's morning hours overlap with the late hours in a number of Asian and Middle East markets; London's afternoon sessions correspond to the morning periods in the large North American market. Thus, surveys have indicated that there is more foreign exchange trading in dollars in London than in the United States, and more foreign exchange trading in marks than in Germany. However, the bulk of trading in London, about 85 percent, is accounted for by foreign-owned (non-U.K. owned) institutions, with U.K.-based dealers of North American institutions reporting 49 percent, or three times the share of U.K.-owned institutions there.

2. It Is a Twenty-Four Hour Market

During the past quarter century, the concept of a twenty-four hour market has become a reality. Somewhere on the planet, financial centers are open for business, and banks and other institutions are trading the dollar and other currencies, every hour of the day and night, aside from possible minor gaps on weekends. In financial centers around the world, business hours overlap; as some centers close, others open and begin to trade. The foreign exchange market follows the sun around the earth.

The international date line is located in the western Pacific, and each business day arrives first in the Asia-Pacific financial centers—first Wellington, New Zealand, then Sydney, Australia, followed by Tokyo, Hong Kong, and Singapore. A few hours later, while markets remain active in those Asian centers, trading begins in Bahrain and elsewhere in the Middle East. Later still, when it is late in the business day in Tokyo, markets in Europe open for business. Subsequently, when it is early afternoon in Europe, trading in New York and other U.S. centers starts. Finally, completing the circle, when it is mid- or late-afternoon in the United States, the next day has arrived in the Asia-Pacific area, the first markets there have opened, and the process begins again.

The twenty-four hour market means that exchange rates and market conditions can change at any time in response to developments that can take place at any time. It also means that traders and other market participants must be alert to the possibility that a sharp move in an exchange rate can occur during an off hour, elsewhere in the world. The large dealing institutions have adapted to these conditions, and have introduced various arrangements for monitoring markets and trading on a twenty-four hour basis. Some keep their New York or other trading desks open.
The Foreign Exchange Market in the United States

However, foreign exchange activity does not flow evenly. Over the course of a day, there is a cycle characterized by periods of very heavy activity and other periods of relatively light activity. Most of the trading takes place when the largest number of potential counterparties is available or accessible on a global basis. (Figure 3-2 gives a general sense of participation levels in the global foreign exchange market by tracking electronic conversations per hour.) Market liquidity is of great importance to participants. Sellers want to sell when they have access to the maximum number of potential buyers, and buyers want to buy when they have access to the maximum number of potential sellers.

Business is heavy when both the U.S. markets and the major European markets are open—that is, when it is morning in New York and afternoon in London. In the New York market, nearly two-thirds of the day’s activity typically takes place in the morning hours. Activity normally becomes very slow in New York in the mid- to late afternoon, after European markets have closed and before the Tokyo, Hong Kong, and Singapore markets have opened.

Given this uneven flow of business around the clock, market participants often will respond less aggressively to an exchange rate development that occurs at a relatively inactive time of day, and will wait to see whether the development is confirmed when the major markets open. Some institutions pay little attention to developments in less active markets. Nonetheless, the twenty-four hour market does provide a continuous “real-time” market assessment of the ebb and flow of influences and attitudes with respect to the traded currencies, and an opportunity for a quick judgment of unexpected events. With many traders carrying pocket monitors, it has become relatively easy to stay in touch with market conditions around the clock.
developments at all times—indeed, too easy, some harassed traders might say. The foreign exchange market provides a kind of never-ending beauty contest or horse race, where market participants can continuously adjust their bets to reflect their changing views.

3. THE MARKET IS MADE UP OF AN INTERNATIONAL NETWORK OF DEALERS

The market consists of a limited number of major dealer institutions that are particularly active in foreign exchange, trading with customers and (more often) with each other. Most, but not all, are commercial banks and investment banks. These dealer institutions are geographically dispersed, located in numerous financial centers around the world. Wherever located, these institutions are linked to, and in close communication with, each other through telephones, computers, and other electronic means.

There are around 2,000 dealer institutions whose foreign exchange activities are covered by the Bank for International Settlements’ central bank survey, and who, essentially, make up the global foreign exchange market. A much smaller sub-set of those institutions account for the bulk of trading and market-making activity. It is estimated that there are 100-200 market-making banks worldwide; major players are fewer than that.

At a time when there is much talk about an integrated world economy and “the global village,” the foreign exchange market comes closest to functioning in a truly global fashion, linking the various foreign exchange trading centers from around the world into a single, unified, cohesive, worldwide market. Foreign exchange trading takes place among dealers and other market professionals in a large number of individual financial centers—New York, Chicago, Los Angeles, London, Tokyo, Singapore, Frankfurt, Paris, Zurich, Milan, and many, many others. But no matter in which financial center a trade occurs, the same currencies, or rather, bank deposits denominated in the same currencies, are being bought and sold.

A foreign exchange dealer buying dollars in one of those markets actually is buying a dollar-denominated deposit in a bank located in the United States, or a claim of a bank abroad on a dollar deposit in a bank located in the United States. This holds true regardless of the location of the financial center at which the dollar deposit is purchased. Similarly, a dealer buying Deutsche marks, no matter where the purchase is made, actually is buying a mark deposit in a bank in Germany or a claim on a mark deposit in a bank in Germany. And so on for other currencies.

Each nation’s market has its own infrastructure. For foreign exchange market operations as well as for other matters, each country enforces its own laws, banking regulations, accounting rules, and tax code, and, as noted above, it operates its own payment and settlement systems. Thus, even in a global foreign exchange market with currencies traded on essentially the same terms simultaneously in many financial centers, there are different national financial systems and infrastructures through which transactions are executed, and within which currencies are held.

With access to all of the foreign exchange markets generally open to participants from all countries, and with vast amounts of market
The dollar is by far the most widely traded currency. According to the 1998 survey, the dollar was one of the two currencies involved in an estimated 87 percent of global foreign exchange transactions, equal to about $1.3 trillion a day. In part, the widespread use of the dollar reflects its substantial international role as: “investment” currency in many capital markets, “reserve” currency held by many central banks, “transaction” currency in many international commodity markets, “invoice” currency in many contracts, and “intervention” currency employed by monetary authorities in market operations to influence their own exchange rates.

In addition, the widespread trading of the dollar reflects its use as a “vehicle” currency in foreign exchange transactions, a use that reinforces, and is reinforced by, its international role in trade and finance. For most pairs of currencies, the market practice is to trade each of the two currencies against a common third currency as a vehicle, rather than to trade the two currencies directly against each other. The vehicle currency used most often is the dollar, although by the mid-1990s the Deutsche mark also had become an important vehicle, with its use, especially in Europe, having increased sharply during the 1980s and '90s.

Accordingly, a bank in the United States is likely to trade foreign exchange at least as frequently with banks in London, Frankfurt, and other open foreign centers as with other banks in the United States. Surveys indicate that when major dealing institutions in the United States trade with other dealers, 58 percent of the transactions are with dealers located outside the United States. The United States is not unique in that respect. Dealer institutions in other major countries also report that more than half of their trades are with dealers that are across borders; dealers also use brokers located both domestically and abroad.

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Thus, a trader wanting to shift funds from one currency to another, say, from Swedish krona to Philippine pesos, will probably sell krona for U.S. dollars and then sell the U.S. dollars for pesos. Although this approach results in two transactions rather than one, it may be the preferred way, since the dollar/Swedish krona market, and the dollar/Philippine peso market are much more active and liquid and have much better information than a bilateral market for the two currencies directly against each other. By using the dollar or some other currency as a vehicle, banks and other foreign exchange market participants can limit more of their working balances to the vehicle currency, rather than holding and managing many currencies, and can concentrate their research and information sources on the vehicle.
Use of a vehicle currency greatly reduces the number of exchange rates that must be dealt with in a multilateral system. In a system of 10 currencies, if one currency is selected as vehicle currency and used for all transactions, there would be a total of nine currency pairs or exchange rates to be dealt with (i.e., one exchange rate for the vehicle currency against each of the others), whereas if no vehicle currency were used, there would be 45 exchange rates to be dealt with. In a system of 100 currencies with no vehicle currencies, potentially there would be 4,950 currency pairs or exchange rates [the formula is: \(n(n-1)/2\)]. Thus, using a vehicle currency can yield the advantages of fewer, larger, and more liquid markets with fewer currency balances, reduced informational needs, and simpler operations.

The U.S. dollar took on a major vehicle currency role with the introduction of the Bretton Woods par value system, in which most nations met their IMF exchange rate obligations by buying and selling U.S. dollars to maintain a par value relationship for their own currency against the U.S. dollar. The dollar was a convenient vehicle, not only because of its central role in the exchange rate system and its widespread use as a reserve currency, but also because of the presence of large and liquid dollar money and other financial markets, and, in time, the Euro-dollar markets where dollars needed for (or resulting from) foreign exchange transactions could conveniently be borrowed (or placed).

Changing conditions in the 1980s and 1990s altered this situation. In particular, the Deutsche mark began to play a much more significant role as a vehicle currency and, more importantly, in direct “cross trading.”

As the European Community moved toward economic integration and monetary unification, the relationship of the European Monetary System (EMS) currencies to each other became of greater concern than the relationship of their currencies to the dollar. An intra-European currency market developed, centering on the mark and on Germany as the strongest currency and largest economy. Direct intervention in members’ currencies, rather than through the dollar, became widely practiced. Events such as the EMS currency crisis of September 1992, when a number of European currencies came under severe market pressure against the mark, confirmed the extent to which direct use of the DEM for intervening in the exchange market could be more effective than going through the dollar.

Against this background, there was very rapid growth in direct cross rate trading involving the Deutsche mark, much of it against European currencies, during the 1980s and ’90s. (A “cross rate” is an exchange rate between two non-dollar currencies—e.g., DEM/Swiss franc, DEM/pound, and DEM/yen.) As discussed in Chapter 5, there are derived cross rates calculated from the dollar rates of each of the two currencies, and there are direct cross rates that come from direct trading between the two currencies—which can result in narrower spreads where there is a viable market. In a number of European countries, the volume of trading of the local currency against the Deutsche mark grew to exceed local currency trading against the dollar, and the practice developed of using cross rates between the DEM and other European currencies to determine the dollar rates for those currencies.

With its increased use as a vehicle currency and its role in cross trading, the Deutsche mark was involved in 30 percent of global currency turnover in the 1998 survey. That was still far below the dollar (which was involved in 87 percent of global turnover), but well above the Japanese yen (ranked third, at 21 percent), and the pound sterling (ranked fourth, at 11 percent).
Until the 1970s, all foreign exchange trading in the United States (and elsewhere) was handled “over-the-counter,” (OTC) by banks in different locations making deals via telephone and telex. In the United States, the OTC market was then, and is now, largely unregulated as a market. Buying and selling foreign currencies is considered the exercise of an express banking power. Thus, a commercial bank in the United States does not need any special authorization to trade or deal in foreign exchange. Similarly, securities firms and brokerage firms do not need permission from the Securities and Exchange Commission (SEC) or any other body to engage in foreign exchange activity. Transactions can be carried out on whatever terms and with whatever provisions are permitted by law and acceptable to the two counterparties, subject to the standard commercial law governing business transactions in the United States.

There are no official rules or restrictions in the United States governing the hours or conditions of trading. The trading conventions have been developed mostly by market participants. There is no official code prescribing what constitutes good market practice. However, the Foreign Exchange Committee, an independent body sponsored by the Federal Reserve Bank of New York and composed of representatives from institutions participating in the market, produces and regularly updates its report on Guidelines for Foreign Exchange Trading. These Guidelines seek to clarify common market practices and offer “best practice recommendations” with respect to trading activities, relationships, and other matters. The report is a purely advisory document designed to foster the healthy functioning and development of the foreign exchange market in the United States.

Although the OTC market is not regulated as a market in the way that the organized exchanges are regulated, regulatory authorities examine the foreign exchange market activities of banks and certain other institutions participating in the OTC market. As with other business activities in which these institutions are engaged, examiners look at trading systems, activities, and exposure, focusing on the safety and soundness of the institution and its activities. Examinations deal with such matters as capital adequacy, control systems, disclosure, sound banking practice, legal compliance, and other factors relating to the safety and soundness of the institution.

The OTC market accounts for well over 90 percent of total U.S. foreign exchange market activity, covering both the traditional (pre-1970) products (spot, outright forwards, and FX swaps) as well as the more recently introduced (post-1970) OTC products (currency options and currency swaps). On the “organized exchanges,” foreign exchange products traded are currency futures and certain currency options.

Trading practices on the organized exchanges, and the regulatory arrangements covering the exchanges, are markedly different from those in the OTC market. In the exchanges, trading takes place publicly in a centralized location. Hours, trading practices, and other matters are regulated by the particular exchange; products are standardized. There are margin payments, daily marking to market, and cash settlements through a central clearinghouse. With respect to regulation, exchanges at which currency futures are traded are under the jurisdiction of the Commodity Futures Trading Corporation (CFTC); in the case of currency options, either the CFTC or the Securities and Exchange Commission serves...
as regulator, depending on whether securities are traded on the exchange.

Steps are being taken internationally to help improve the risk management practices of dealers in the foreign exchange market, and to encourage greater transparency and disclosure. With respect to the internationally active banks, there has been a move under the auspices of the Basle Committee on Banking Supervision of the BIS to introduce greater consistency internationally to risk-based capital adequacy requirements. Over the past decade, the regulators of a number of nations have accepted common rules proposed by the Basle Committee with respect to capital adequacy requirements for credit risk, covering exposures of internationally active banks in all activities, including foreign exchange. Further proposals of the Basle Committee for risk-based capital requirements for market risk have been adopted more recently. With respect to investment firms and other financial institutions, international discussions have not yet produced agreements on common capital adequacy standards.
CHAPTER 4

1. FOREIGN EXCHANGE DEALERS

Most commercial banks in the United States customarily have bought and sold foreign exchange for their customers as one of their standard financial services. But beginning at a very early stage in the development of the over-the-counter market, a small number of large commercial banks operating in New York and other U.S. money centers took on foreign exchange trading as a major business activity. They operated for corporate and other customers, serving as intermediaries and market makers. In this capacity, they transacted business as correspondents for many other commercial banks throughout the country, while also buying and selling foreign exchange for their own accounts. These major dealer banks found it useful to trade with each other frequently, as they sought to find buyers and sellers and to manage their positions. This group developed into an interbank market for foreign exchange.

While these commercial banks continue to play a dominant role, being a major dealer in the foreign exchange market has ceased to be their exclusive domain. During the past 25 years, some investment banking firms and other financial institutions have become emulators and direct competitors of the commercial banks as dealers in the over-the-counter market. They now also serve as major dealers, executing transactions that previously would have been handled only by the large commercial banks, and providing foreign exchange services to a variety of customers in competition with the dealer banks. They are now part of the network of foreign exchange dealers that constitutes the U.S. segment of the foreign exchange market. Although it is still called the “interbank” market in foreign exchange, it is more accurately an “interdealer” market.

The 1998 foreign exchange market turnover survey by the Federal Reserve Bank of New York covered the operations of the 93 major foreign exchange dealers in the United States. The total volume of transactions of the reporting dealers, corrected for double-counting among themselves, at $351 billion per day in traditional products, plus $32 billion in currency options and currency swaps, represents the estimated total turnover in the U.S. over-the-counter market in 1998.

To be included in the reporting dealers group surveyed by the Federal Reserve, an institution must be located in the United States and play an active role as a dealer in the market. There are no formal requirements for inclusion, other than having a high enough level of foreign exchange trading activity. Of course, an institution must have a name that is known and accepted to enable it to obtain from other participants the credit lines essential to active participation.

Of the 93 reporting dealers in 1998, 82 were commercial banks, and 11 were investment banks or insurance firms. All of the large U.S. money center banks are active dealers. Most of the 93 institutions are located in New York, but a number of them are based in Boston, Chicago, San Francisco, and other U.S. financial centers. Many of the dealer institutions have outlets in other countries as well as in the United States.

Included in the group are a substantial number of U.S. branches and subsidiaries of major foreign banks—banks from Japan, the United Kingdom, Germany, France, Switzerland, and elsewhere. Many of these branches and agencies specialize in dealing in the home currency of their parent bank. A substantial share of the foreign exchange activity of the
the main participants in the market

According to the 1998 survey, as shown in Figure 4-1, 49 percent of the foreign exchange trading activity in the over-the-counter market represented “interdealer” transactions, that is, trading by the 93 reporting dealers among themselves and with comparable dealers abroad. Of the remaining 51 percent of total foreign exchange transactions, financial (non-dealer) customers accounted for 31 percent, and non-financial customers 20 percent.

The range of financial and nonfinancial customers includes such counterparties as: smaller commercial banks and investment banks that do not act as major dealers, firms and corporations that are buying or selling foreign exchange because they (or the customers for whom they are acting) are in the process of buying or selling something else (a product, a service, or a financial asset), managers of money funds, mutual funds, hedge

2. FINANCIAL AND NONFINANCIAL CUSTOMERS

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FIGURE 4-1

Composition of U.S. Foreign Exchange Transactions, 1998

Note: Chart shows percentage share of 1998 foreign exchange market turnover of $3 trillion.
funds, and pension funds; and even high net worth individuals. For such intermediaries and end-users, the foreign exchange transaction is part of the payments process—that is, a means of completing some commercial, investment, speculative, or hedging activity.

Over the years, the universe of foreign exchange end-users has changed markedly, reflecting the changing financial environment. By far the most striking change has been the spectacular growth in the activity of those engaged in international capital movements for investment purposes. A generation ago, with relatively modest overseas investment flows, foreign exchange activity in the United States was focused on international trade in goods and services. Importers and exporters accounted for the bulk of the foreign exchange that was bought from and sold to final customers in the United States as they financed the nation's overseas trade.

But investment to and from overseas—as indicated by the capital flows, cross-border bank claims, and securities transactions reported in Chapter 1—has expanded far more rapidly than has trade. Institutional investors, insurance companies, pension funds, mutual funds, hedge funds, and other investment funds have, in recent years, become major participants in the foreign exchange markets. Many of these investors have begun to take a more global approach to portfolio management. Even though these institutions in the aggregate still hold only a relatively small proportion (5 to 10 percent) of their investments in foreign currency denominated assets, the amounts these institutions control are so large that they have become key players in the foreign exchange market. In the United States, for example, mutual funds have grown to more than $5 trillion in total assets, pension funds are close to $3 trillion, and insurance companies about $2 1/2 trillion. The hedge funds, though far smaller in total assets, also are able to play an important role, given their frequent use of high leverage and, in many cases, their investors' financial strength and higher tolerance for risk.

Given the large magnitudes of these institutions' assets, even a modest shift in emphasis toward foreign investment can mean large increases in foreign exchange transactions. In addition, there has been a tendency among many funds managers worldwide to manage their investments much more actively, and with greater focus on short-term results. Rapid growth in derivatives and the development of new financial instruments also have fostered international investment.

Reflecting these developments, portfolio investment has come to play a very prominent role in the foreign exchange market and accounts for a large share of foreign exchange market activity. The role of portfolio investment may continue to grow rapidly, as fund managers and investors increase the level of funds invested abroad, which is still quite modest, especially relative to the corresponding levels in many other advanced economies.

### 3. Central Banks

All central banks participate in their nations' foreign exchange markets to some degree, and their operations can be of great importance to those markets. But central banks differ, not only in the extent of their participation, but also in the manner and purposes of their involvement. The
The role of the Federal Reserve in the foreign exchange market is discussed more fully in Chapter 9. Intervention operations designed to influence foreign exchange market conditions or the exchange rate represent a critically important aspect of central banks' foreign exchange transactions. However, the intervention practices of individual central banks differ greatly with respect to objectives, approaches, amounts, and tactics.

Unlike the days of the Bretton Woods par value system (before 1971), nations are now free, within broad rules of the IMF, to choose the exchange rate regime they feel best suits their needs. The United States and many other developed and developing nations have chosen an "independently floating" regime, providing for a considerable degree of flexibility in their exchange rates. But a large number of countries continue to peg their currencies, either to the U.S. dollar or some other currency, or to a currency basket or a currency composite, or have chosen some other regime to limit or manage flexibility of the home currency (Figure 4-2). The choice of exchange rate regime determines the basic framework within which each central bank carries out its intervention activities.

The techniques employed by a central bank to maintain an exchange rate that is pegged or closely tied to another currency are straightforward and have limited room for maneuver or change. But for the United States and others with more flexible regimes, the approach to intervention can be

<table>
<thead>
<tr>
<th>Regime</th>
<th>Number of Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independently Floating</td>
<td>51</td>
</tr>
<tr>
<td>Managed Floating</td>
<td>47</td>
</tr>
<tr>
<td>Limited Flexibility</td>
<td>16</td>
</tr>
<tr>
<td>European Monetary System(^1)</td>
<td>12</td>
</tr>
<tr>
<td>Other</td>
<td>4</td>
</tr>
<tr>
<td>Pegged to</td>
<td>67</td>
</tr>
<tr>
<td>U.S. dollar</td>
<td>21</td>
</tr>
<tr>
<td>French franc</td>
<td>15</td>
</tr>
<tr>
<td>Other currency</td>
<td>9</td>
</tr>
<tr>
<td>Composite(^2)</td>
<td>22</td>
</tr>
<tr>
<td>Total</td>
<td>181</td>
</tr>
</tbody>
</table>

\(^*\)The International Monetary Fund classification of exchange rate regimes with "independently floating" representing the highest degree of flexibility, followed by "managed floating". Of the seven largest industrial democracies, four (United States, Japan, Canada, and United Kingdom) belong to the independently floating group, and three (France, Germany, and Italy) participate in the European Monetary System arrangement.

\(^1\)Refers to the arrangement under the European Monetary System covering Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain.

\(^2\)Refers to countries where exchange rates are pegged to various "baskets" of currencies, including two countries (Libya and Myanmar) that peg their currencies to the SDR basket.
varied in many ways—whether and when to intervene, in which currencies and geographic markets, in what amounts, aggressively or less so, openly or discreetly, and in concert with other central banks or not. The resolution of these and other issues depends on an assessment of market conditions and the objectives of the intervention. As discussed in Chapter 9, the United States, operating under the same broad policy guideline over a number of years, has experienced both periods of relatively heavy intervention and periods of minimal activity.

Foreign exchange market intervention is not the only reason central banks buy and sell foreign currencies. Many central banks serve as their government’s principal international banker, and handle most, and in some cases all, foreign exchange transactions for the government as well as for other public sector enterprises, such as the post office, electric power utilities, and nationalized airline or railroad. Consequently, even without its own intervention operations, a central bank may be operating in the foreign exchange market in order to acquire or dispose of foreign currencies for some government procurement or investment purpose. A central bank also may seek to accumulate, reallocate among currencies, or reduce its foreign exchange reserve balances. It may be in the market as agent for another central bank, using that other central bank’s resources to assist it in influencing that nation’s exchange rate. Alternatively, it might be assisting another central bank in acquiring foreign currencies needed for the other central bank’s activities or business expenditures.

Thus, for example, the Foreign Exchange Desk of the Federal Reserve Bank of New York engages in intervention operations only occasionally. But it usually is in the market every day, buying and selling foreign currencies, often in modest amounts, for its “customers” (i.e., other central banks, some U.S. agencies, and international institutions). This “customer” business provides a useful service to other central banks or agencies, while also enabling the Desk to stay in close touch with the market for the currencies being traded.

4. Brokers

In the Over-the-Counter Market
The role of a broker in the OTC market is to bring together a buyer and a seller in return for a fee or commission. Whereas a “dealer” acts as principal in a transaction and may take one side of a trade for his firm’s account, thus committing the firm’s capital, a “broker” is an intermediary who acts as agent for one or both parties in the transaction and, in principle, does not commit capital. The dealer hopes to find the other side to the transaction and earn a spread by closing out the position in a subsequent trade with another party, while the broker relies on the commission received for the service provided (i.e., bringing the buyer and seller together). Brokers do not take positions or face the risk of holding an inventory of currency balances subject to exchange rate fluctuations. In over-the-counter trading, the activity of brokers is confined to the dealers market. Brokers, including “voice” brokers located in the United States and abroad, as well as electronic brokerage systems, handle about one-quarter of all U.S. foreign exchange transactions in the OTC market. The remaining three-quarters takes the form of “direct dealing” between dealers and other institutions in the market. The present
24 percent share of brokers is down from about 50 percent in 1980 (Figure 4-3). The number of foreign exchange brokers in the United States was 9 in 1998, including voice brokers and the two major automated order-matching, or electronic brokerage systems. The number of brokers surveyed is down from 17 in 1995.

The share of business going through brokers varies in different national markets, because of differences in market structure and tradition. Earlier surveys showed brokers’ share averages as low as 10-15 percent in some markets (Switzerland and South Africa) and as high as 45-50 percent in others (France, Netherlands, and Ireland). Many U.S. voice broker firms have branches or affiliations with brokers in other countries. It is common for a deal to be brokered between a bank in the United States and one in London or elsewhere during the period of the day when both markets are active.

In the OTC market, the extent to which brokering, rather than direct dealing, is used varies, depending on market conditions, the currency and type of transaction being undertaken, and a host of other factors. Size is one factor—the average transaction is larger in the voice brokers market than in the market as a whole. Using a broker can save time and effort, providing quick access to information and a large number of institutions’ quotes, though at the cost of a fee. Operating through a broker can provide at least a degree of confidentiality, when a trader wants to pursue a particular strategy without his name being seen very widely around the market in general (counterparties to each transaction arranged by a broker will, of course, be informed, but after the fact). The brokers market provides access to a wide selection of banks, which means greater liquidity. In addition, a market maker may wish to show only one side of the price—that is, indicate a price at which the market maker is willing to buy, or a price at which the market maker is willing to sell, but not both—which can be done in the brokers market, but generally not in direct dealing. Of course, a trader will prefer to avoid paying a broker’s fee if possible, but doesn’t want to miss a deal just to avoid a fee.

Foreign exchange brokerage is a highly competitive field and the brokers must provide service of high quality in order to make a profit. Although some tend to specialize in particular currencies, they are all rivals for the same business in the inter-dealer market. Not only do brokers compete among themselves for broker business—voice brokers against each other, against voice brokers located abroad, and against electronic broking systems—but the broker community as a whole competes against banks and other dealer institutions that have the option of dealing directly with each other, both in their local markets and abroad, and avoiding the brokers and the brokers’ fees.
Voice Brokers
Skill in carrying out operations for customers and the degree of customers’ confidence determine a voice broker’s success. To perform their function, brokers must stay in close touch with a large number of dealers and know the rates at which market participants are prepared to buy and sell. With 93 active dealers in New York and a much larger number in London, that can be a formidable task, particularly at times of intense activity and volatile rate movements. Information is the essential ingredient of the foreign exchange market and the player with the latest, most complete, and most reliable information holds the best cards. As one channel, many voice brokers have open telephone lines to many trading desks, so that a bank trader dealing in, say, sterling, can hear over squawk boxes continuous oral reports of the activity of brokers in that currency, the condition of the market, the number of transactions occurring, and the rates at which trading is taking place, though traders do not hear the names of the two banks in the transaction or the specific amounts of the trade.

Automated Order-Matching, or Electronic Broking Systems
Until 1992, all brokered business in the U.S. OTC market was handled by voice brokers. But during the past few years, electronic broker systems (or automated order-matching systems) have gained a significant share of the market for spot transactions. The two electronic broking systems currently operating in the United States are Electronic Brokerage Systems, or EBS, and Reuters 2000-2. In the 1998 survey, electronic broking accounted for 13 percent of total market volume in the United States, more than double its market share three years earlier. In the brokers market, 57 percent of turnover is now conducted through order-matching systems, compared with 18 percent in 1995.

With these electronic systems, traders can see on their screens the bid and offer rates that are being quoted by potential counterparties acceptable to that trader’s institution (as well as quotes available in the market more broadly), match an order, and make the deal electronically, with back offices receiving proper notification.

The electronic broking systems are regarded as fast and reliable. Like a voice broker, they offer a degree of anonymity. The counterparty is not known until the deal is struck, and then only to the other counterparty. Also, the systems can automatically manage credit lines. A trader puts in a credit limit for each counterparty that he is willing to deal with, and when the limit is reached, the system automatically disallows further trades. The fees charged for this computerized service are regarded as competitive. The automated systems are already widely used for certain standardized operations in the spot market, particularly for smaller-sized transactions in the most widely traded currency pairs. Many market observers expect these electronic broking or order-matching systems to expand their activities much further and to develop systems to cover additional products, to the competitive disadvantage, in particular, of the voice brokers. Some observers believe that automated systems and other technological advances have substantially slowed the growth in market turnover by reducing “daisy chaining” and the “recycling” of transactions through the markets, as well as by other means. (Electronic broking is discussed further in Chapter 7.)
In the Exchange-Traded Market

In the exchange-traded segment of the market, which covers currency futures and exchange-traded currency options, the institutional structure and the role of brokers are different from those in the OTC market.

In the exchanges, orders from customers are transmitted to a floor broker. The floor broker then tries to execute the order on the floor of the exchange (by open outcry), either with another floor broker or with one of the floor traders, also called “locals,” who are members of the exchange on the trading floor, executing trades for themselves.

Each completed deal is channeled through the clearinghouse of that particular exchange by a clearing member firm. A participant that is not a clearing member firm must have its trades cleared by a clearing member.

The clearinghouse guarantees the performance of both parties, assuring that the long side of every short position will be met, and that the short side of every long position will be met. This requires (unlike in the OTC market) payment of initial and maintenance margins to the clearinghouse (by buyers and sellers of futures and by writers, but not holders, of options). In addition, there is daily marking to market and settlement. Thus, frequent payments to (and receipts from) brokers and clearing members may be called for by customers to meet these daily settlements.
Chapter 3 noted that the United States has both an over-the-counter market in foreign exchange and an exchange-traded segment of the market. The OTC market is the U.S. portion of an international OTC network of major dealers—mainly but not exclusively banks—operating in financial centers around the world, trading with each other and with customers, via computers, telephones, and other means. The exchange-traded market covers trade in a limited number of foreign exchange products on the floors of organized exchanges located in Chicago, Philadelphia, and New York.

This chapter describes the foreign exchange products traded in the OTC market. It covers the three “traditional” foreign exchange instruments—spot, outright forwards, and FX swaps, which were the only instruments traded before the 1970s, and which still constitute the overwhelming share of all foreign exchange market activity. It also covers two more recent products in which OTC trading has developed since the 1970s—currency swaps and OTC currency options.

The next chapter describes currency futures and exchange-traded currency options, which currently are traded in U.S. exchanges.

1. SPOT

A spot transaction is a straightforward (or “outright”) exchange of one currency for another. The spot rate is the current market price, the benchmark price.

Spot transactions do not require immediate settlement, or payment “on the spot.” By convention, the settlement date, or “value date,” is the second business day after the “deal date” (or “trade date”) on which the transaction is agreed to by the two traders. The two-day period provides ample time for the two parties to confirm the agreement and arrange the clearing and necessary debiting and crediting of bank accounts in various international locations.

Exceptionally, spot transactions between the Canadian dollar and U.S. dollar conventionally are settled one business day after the deal, rather than two business days later, since Canada is in the same time zone as the United States and an earlier value date is feasible.

It is possible to trade for value dates in advance of the spot value date two days hence (“pre-spot” or “ante-spot”). Traders can trade for “value tomorrow,” with settlement one business day after the deal date (one day before spot); or even for “cash,” with settlement on the deal date (two days before spot). Such transactions are a very small part of the market, particularly same day “cash” transactions for the U.S. dollar against European...
or Asian currencies, given the time zone differences. Exchange rates for cash or value tomorrow transactions are based on spot rates, but differ from spot, reflecting in part, the fact that interest rate differences between the two currencies affect the cost of earlier payment. Also, pre-spot trades are much less numerous and the market is less liquid.

A spot transaction represents a direct exchange of one currency for another, and when executed, leads to transfers through the payment systems of the two countries whose currencies are involved. In a typical spot transaction, Bank A in New York will agree on June 1 to sell $10 million for Deutsche marks to Bank B in Frankfurt at the rate of, say, DEM 1.7320 per dollar, for value June 3. On June 3, Bank B will pay DEM 17.320 million for credit to Bank A’s account at a bank in Germany, and Bank A will pay $10 million for credit to Bank B’s account at a bank in the United States. The execution of the two payments completes the transaction.

there is a buying price and a selling price

In the foreign exchange market there are always two prices for every currency—one price at which sellers of that currency want to sell, and another price at which buyers want to buy. A market maker is expected to quote simultaneously for his customers both a price at which he is willing to sell and a price at which he is willing to buy standard amounts of any currency for which he is making a market.

how spot rates are quoted: direct and indirect quotes, European and American terms

Exchange rate quotes, as the price of one currency in terms of another, come in two forms: a “direct” quotation is the amount of domestic currency (dollars and cents if you are in the United States) per unit of foreign currency and an “indirect” quotation is the amount of foreign currency per unit of domestic currency (per dollar if you are in the United States).

The phrase “American terms” means a direct quote from the point of view of someone located in the United States. For the dollar, that means that the rate is quoted in variable amounts of U.S. dollars and cents per one unit of foreign currency (e.g., $0.5774 per DEM1). The phrase “European terms” means a direct quote from the point of view of someone located in Europe. For the dollar, that means variable amounts of foreign currency per one U.S. dollar (or DEM 1.7320 per $1).

In daily life, most prices are quoted “directly,” so when you go to the store you pay x dollars and y cents for one loaf (unit) of bread. For many years, all dollar exchange rates also were quoted directly. That meant dollar exchange rates were quoted in European terms in Europe, and in American terms in the United States. However, in 1978, as the foreign exchange market was integrating into a single global market, for convenience, the practice in the U.S. market was changed—at the initiative of the brokers community—to conform to the European convention. Thus, OTC markets in all countries now quote dollars in European terms against nearly all other currencies (amounts of foreign currency per $1). That means that the dollar is nearly always the base currency, one unit of which (one dollar) is being bought or sold for a variable amount of a foreign currency.

There are still exceptions to this general rule, however. In particular, in all OTC markets around the world, the pound sterling continues to be quoted as the base currency against the dollar and other currencies. Thus, market makers and brokers everywhere quote the pound sterling at x dollars and cents per pound, or y DEM per pound, and so forth. The
United Kingdom did not adopt a decimal currency system until 1971, and it was much easier mathematically to quote and trade in terms of variable amounts of foreign currency per pound than the other way around.

Certain currencies historically linked to the British pound—the Irish, Australian, and New Zealand currencies—are quoted in the OTC market in the same way as the pound: variable amounts of dollars and cents per unit. The SDR and the ECU, composite currency units of the IMF and the European Monetary Union, also are quoted in dollars and cents per SDR or ECU. Similarly, it is expected that the euro will be quoted in dollars and cents per euro, at least among dealers. But all other currencies traded in the OTC market are quoted in variable amounts of foreign currency per one dollar.

Direct and indirect quotes are reciprocals, and either can easily be determined from the other. In the United States, the financial press typically reports the quotes both ways, as shown in the excerpt from The New York Times in Figure 5-2 at the end of the chapter.

The third and fourth columns show the quotes for the previous two days in “European terms”—the foreign currency price of one dollar—which is the convention used for most exchange rates by dealers in the OTC market.

The first and second columns show the (reciprocal) quotes for the same two days in American terms—the price in dollars and cents of one unit of each of various foreign currencies—which is the approach sometimes used by traders in dealings with commercial customers, and is also the convention used for quoting dollar exchange rates in the exchange-traded segment of the U.S. foreign exchange market.

There Is a Base Currency and a Terms Currency
Every foreign exchange transaction involves two currencies—and it is important to keep straight which is the base currency (or quoted, underlying, or fixed currency) and which is the terms currency (or counter currency). A trader always buys or sells a fixed amount of the “base” currency—as noted above, most often the dollar—and adjusts the amount of the “terms” currency as the exchange rate changes.

The terms currency is thus the numerator and the base currency is the denominator. When the numerator increases, the base currency is strengthening and becoming more expensive; when the numerator decreases, the base currency is weakening and becoming cheaper.

In oral communications, the base currency is always stated first. For example, a quotation for “dollar-yen” means the dollar is the base and the denominator, and the yen is the terms currency and the numerator; “dollar-swissie” means that the Swiss franc is the terms currency; and “sterling-dollar” (usually called “cable”) means that the dollar is the terms currency. Currency codes are also used to denote currency pairs, with the base currency usually presented first, followed by an oblique. Thus “dollar-yen” is USD/JPY; “dollar-swissie” is USD/CHF; and “sterling-dollar” is GBP/USD.

Bids and Offers Are for the Base Currency
Traders always think in terms of how much it costs to buy or sell the base currency. A market maker’s quotes are always presented from the market maker’s point of view, so the bid price is the amount of terms currency that the market maker will pay for a unit of the base currency; the offer price is the amount of terms currency the market maker will charge for a unit of the base currency. A market maker asked for a quote on “dollar-swissie” might respond “1.4975-85,” indicating a bid price of CHF...
1.4975 per dollar and an offer price of CHF 1.4985 per dollar. Usually the market maker will simply give the quote as “75-85,” and assume that the counterparty knows that the “big figure” is 1.49. The bid price always is offered first (the number on the left), and is lower (a smaller amount of terms currency) than the offer price (the larger number on the right). This differential is the dealer’s spread.

**Quotes Are in Basis Points**

For most currencies, bid and offer quotes are presented to the fourth decimal place—that is, to one-hundredth of one percent, or 1/10,000th of the terms currency unit, usually called a “pip.” However, for a few currency units that are relatively small in absolute value, such as the Japanese yen and the Italian lira, quotes may be carried to two decimal places and a “pip” is 1/100 of the terms currency unit. In any market, a “pip” or a “tick” is the smallest amount by which a price can move in that market, and in the foreign exchange market “pip” is the term commonly used.

**Cross Rate Trading**

Cross rates, as noted in Chapter 3, are exchange rates in which the dollar is neither the base nor the terms currency, such as “mark-yen,” in which the DEM is the base currency; and “sterling-mark,” in which the pound sterling is the base currency. In cross trades, either currency can be made the base, although there are standard pairs—mark-yen, sterling-swissie, etc. As usual, the base currency is mentioned first.

There are both derived cross rates and directly traded cross rates. Historically, cross rates were derived from the dollar rates of the two named currencies, even if the transaction was not actually channeled through the dollar. Thus, a cross rate for sterling-yen would be derived from the sterling-dollar and dollar-yen rates. That continues to be the practice for many currency pairs, as described in Box 5.1, but for other pairs, viable markets have developed and direct trading sets the cross rates, within the boundary rates established by the derived cross rate calculations.

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**Box 5-1**

**Deriving Cross Rates From Dollar Exchange Rates**

There are simplified, short-cut ways to derive cross rates from the dollar exchange rates of the two cross currencies, by cross dividing or by multiplying.

There are three cases—the case in which the dollar exchange rates of both of the cross rate currencies are quoted indirectly; the case in which both currencies are quoted directly; and the case in which one is quoted indirectly and the other is quoted directly.

- **Cass 1.** If both of the cross rate currencies are quoted against the dollar in the more common indirect or European terms, for example, “dollar-Swiss franc” and “dollar-yen,” to get a Swiss franc-yen derived cross rate, cross divide as follows:
  - for the cross rate bid: divide the bid of the cross rate terms currency by the offer of the base currency;
  - for the cross rate offer: divide the offer of the terms currency by the bid of the base currency.

Thus, if the dollar-swissie rate is 1.5000-10 and the dollar-yen rate is 100.00-10, for a Swiss franc-yen derived cross rate: the bid would be 100.00 divided by 1.5010, or 66.6223 yen per Swiss franc, and the offer would be 100.10 divided by 1.5000, or 66.7333 yen per Swiss franc.
During the 1980s and ’90s, there was a very large expansion of direct cross trading, in which the dollar was not involved either as metric or as medium of exchange. Much of this direct cross trading activity involved the Deutsche mark. Direct trading activity between the mark and other European currencies developed to the point where most trading of currencies in the European Monetary System took place directly through cross rates, and the most widely direct-traded crosses came to be used to quote rates for other, less widely traded currency pairs. By the mid-1990s, mark-yen, sterling-mark, mark-French franc (or mark-Paris), and mark-Swiss all were very actively traded pairs.

Deutsche mark cross trading with European currencies developed to the point where rates in the New York market for dollar-lira, dollar-French franc, etc., were usually calculated from the mark-lira, mark-French franc, etc., particularly during the afternoon in New York, when European markets were closed.
As direct cross currency trading between non-dollar currencies expanded, new trading opportunities developed. Various arbitrage opportunities became possible between the cross rate markets and the direct dollar markets. Traders had more choices than they had in a system in which the dollar was virtually always the vehicle currency.

With the launching of the euro in 1999, major structural changes in cross trading activity can be expected. With the euro replacing a number of European currencies, much of the earlier cross trading will no longer be required. What role the euro itself may play as a vehicle currency remains to be seen.

2. OUTFRONT FORWARD

An outright forward transaction, like a spot transaction, is a straightforward single purchase/sale of one currency for another. The only difference is that spot is settled, or delivered, on a value date no later than two business days after the deal date, while outright forward is settled on any pre-agreed date three or more business days after the deal date. Dealers use the term “outright forward” to make clear that it is a single purchase or sale on a future date, and not part of an “FX swap” (described later).

There is a specific exchange rate for each forward maturity of a currency, almost always different from the spot rate. The exchange rate at which the outright forward transaction is executed is fixed at the outset. No money necessarily changes hands until the transaction actually takes place, although dealers may require some customers to provide collateral in advance.

Outright forwards can be used for a variety of purposes—covering a known future expenditure, hedging, speculating, or any number of commercial, financial, or investment purposes. The instrument is very flexible, and forward transactions can be tailored and customized to meet the particular needs of a customer with respect to currency, amount, and maturity date. Of course, customized forward contracts for non-standard dates or amounts are generally more costly and less liquid, and more difficult to reverse or modify in the event of need than are standard forward contracts. Also, forward contracts for minor currencies and exotic currencies can be more difficult to arrange and more costly.

Outright forwards in major currencies are available over-the-counter from dealers for standard contract periods or “straight dates” (one, two, three, six, and twelve months); dealers tend to deal with each other on straight dates. However, customers can obtain “odd-date” or “broken-date” contracts for deals falling between standard dates, and traders will determine the rates through a process of interpolation. The agreed-upon maturity can range from a few days to months or even two or three years ahead, although very long-dated forwards are rare because they tend to have a large bid-asked spread and are relatively expensive.

Relationship of Forward to Spot—Covered Interest Rate Parity

The forward rate for any two currencies is a function of their spot rate and the interest rate differential between them. For major currencies, the interest rate differential is determined in the Eurocurrency deposit market. Under the covered interest rate parity principle, and with the opportunity of arbitrage, the forward rate will
tend toward an equilibrium point at which any difference in Eurocurrency interest rates between the two currencies would be exactly offset, or neutralized, by a premium or discount in the forward rate.

If, for example, six-month Euro-dollar deposits pay interest of 5 percent per annum, and six-month Euro-yen deposits pay interest of 3 percent per annum, and if there is no premium or discount on the forward yen against the forward dollar, there would be an opportunity for "round-tripping" and an arbitrage profit with no exchange risk. Thus, it would pay to borrow yen at 3 percent, sell the yen spot for dollars and simultaneously resell dollars forward for yen six months hence, meanwhile investing the dollars at the higher interest rate of 5 percent for the six-month period. This arbitrage opportunity would tend to drive up the forward exchange rate of the yen relative to the dollar (or force some other adjustment) until there were an equal return on the two investments after taking into account the cost of covering the forward exchange risk.

Similarly, if short-term dollar investments and short-term yen investments both paid the same interest rate, and if there were a premium on the forward yen against the forward dollar, there would once again be an opportunity for an arbitrage profit with no exchange risk, which again would tend to reduce the premium on the forward yen (or force some other adjustment) until there were an equal return on the two investments after covering the cost of the forward exchange risk.

In this state of equilibrium, or condition of covered interest rate parity, an investor (or a borrower) who operates in the forward exchange market will realize the same domestic return (or pay the same domestic cost) whether investing (borrowing) in his domestic currency or in a foreign currency, net of the costs of forward exchange rate cover. The forward exchange rate should offset, or neutralize, the interest rate differential between the two currencies.

The forward rate in the market can deviate from this theoretical, or implied, equilibrium rate derived from the interest rate differential to the extent that there are significant costs, restrictions, or market inefficiencies that prevent arbitrage from taking place in a timely manner. Such constraints could take the form of transaction costs, information gaps, government regulations, taxes, unavailability of comparable investments (in terms of risk, maturity, amount, etc.), and other impediments or imperfections in the capital markets. However, today's large and deregulated foreign exchange markets and Eurocurrency deposit markets for the dollar and other heavily traded currencies are generally free of major impediments.

Role of the Offshore Deposit Markets for Euro-Dollars and Other Currencies

Forward contracts have existed in commodity markets for hundreds of years. In the foreign exchange markets, forward contracts have been traded since the nineteenth century, and the concept of interest arbitrage has been understood and described in economic literature for a long time. (Keynes wrote about it and practiced it in the 1920s.) But it was the development of the offshore Eurocurrency deposit markets—the markets for offshore deposits in dollars and other major currencies—in the 1950s and '60s that facilitated and refined the process of interest rate arbitrage in practice and brought it to its present high degree of efficiency, closely linking the foreign exchange market and the money markets of the major nations, and equalizing returns through the two channels.
With large and liquid offshore deposit markets in operation, and with information transfers greatly improved and accelerated, it became much easier and quicker to detect any significant deviations from covered interest rate parity, and to take advantage of any such arbitrage opportunities. From the outset, deposits in these offshore markets were generally free of taxes, reserve requirements, and other government restrictions. The offshore deposit markets in London and elsewhere quickly became very convenient for, and closely attached to, the foreign exchange market. These offshore Eurocurrency markets for the dollar and other major currencies were, from the outset, handled by the banks’ foreign exchange trading desks, and many of the same business practices were adopted. These deposits trade over the telephone like foreign exchange, with a bid/offer spread, and they have similar settlement dates and other trading conventions. Many of the same counterparties participate in both markets, and credit risks are similar. It is thus no surprise that the interest rates in the offshore deposit market in London came to be used for interest parity and arbitrage calculations and operations. Dealers keep a very close eye on the interest rates in the London market when quoting forward rates for the major currencies in the foreign exchange market. For currencies not traded in the offshore Eurocurrency deposit markets in London and elsewhere, deposits in domestic money markets may provide a channel for arbitraging the forward exchange rate and interest rate differentials.

How Forward Rates are Quoted by Traders
Although spot rates are quoted in absolute terms—say, x yen per dollar—forward rates, as a matter of convenience are quoted among dealers in differentials—that is, in premiums or discounts from the spot rate. The premium or discount is measured in “points,” which represent the interest rate differential between the two currencies for the period of the forward, converted into foreign exchange. Specifically, points are the amount of foreign exchange (or basis points) that will neutralize the interest rate differential between two currencies for the applicable period. Thus, if interest rates are higher for currency A than currency B, the points will be the number of basis points to subtract from currency A’s spot exchange rate to yield a forward exchange rate that neutralizes or offsets the interest rate differential (see Box 5-2). Most forward contracts are arranged so that, at the outset, the present value of the contract is zero.

Traders in the market thus know that for any currency pair, if the base currency earns a

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**BOX 5 - 2**

**Calculating Forward Premium/Discount Points**

- Formulas for calculating forward premiums and discounts, expressed as points of the spot rate, equate the two cash flows so that the forward premium or discount neutralizes the differential between interest rates in the two currencies. A generalized formula is:

  \[
  \text{Points} = \frac{1 + \text{Terms Currency} \times \text{Forward Days}}{1 + \text{Interest Rate Year}} \times \frac{\text{Interest Rate}}{\text{Interest Rate Year}} - 1
  \]

- Thus, if the dollar is the base currency, with a Euro-dollar (offshore) interest rate of 5 percent,
and the Swiss franc is the terms currency, with 6 percent interest in the offshore market, and the spot rate is CHF 1.6000 per dollar, then the points for a six-month (181-day) forward rate would be 78. (Most currencies use a 360-day interest rate year, except the pound sterling and a few others, which use a 365-day year.)

\[
\text{Points} = \frac{1 + [ .06 \times (181) ]}{1 + [ .05 \times (180) ]} - 1 = 78
\]

The six month outright forward rate would be CHF 1.6078 per dollar.

The above generalized formula takes no account of the differences between borrowing and lending rates in the offshore deposit market. In pricing possible forward transactions, a trader would take account of those differences, calculate the costs of putting together the deal, determine the “boundary” rates, and perhaps shade the price to reflect competitive quotes, perspectives on market performance, the trader’s own portfolio of existing contracts, and other factors.

Higher interest rate than the terms currency, the base currency will trade at a forward discount, or below the spot rate; and if the base currency earns a lower interest rate than the terms currency, the base currency will trade at a forward premium, or above the spot rate. Whichever side of the transaction the trader is on, the trader won’t gain (or lose) from both the interest rate differential and the forward premium/discount. A trader who loses on the interest rate will earn the forward premium, and vice versa.

Traders have long used rules of thumb and shortcuts for calculating whether to add or subtract the points. Points are subtracted from the spot rate when the interest rate of the base currency is the higher one, since the base currency should trade at a forward discount; points are added when the interest rate of the base currency is the lower one, since the base currency should trade at a forward premium. Another rule of thumb is that the points must be added when the small number comes first in the quote of the differential, but subtracted when the larger number comes first. For example, the spot CHF might be quoted at “1.5020- 30,” and the 3-month forward at “40-60” (to be added) or “60-40” (to be subtracted). Also, the spread will always grow larger when shifting from the spot quote to the forward quote. Screens now show positive and negative signs in front of points, making the process easier still.

Non-Deliverable Forwards (NDFs)

In recent years, markets have developed for some currencies in “non-deliverable forwards.” This instrument is in concept similar to an outright forward, except that there is no physical delivery or transfer of the local currency. Rather, the agreement calls for settlement of the net amount in dollars or other major transaction currency. NDFs can thus be arranged offshore without the need for access to the local currency markets, and they broaden hedging opportunities against exchange rate risk in some currencies otherwise considered unhedgeable. Use of NDFs with respect to certain currencies in Asia and elsewhere is growing rapidly.
In the spot and outright forward markets, one currency is traded outright for another, but in the FX swap market, one currency is swapped for another for a period of time, and then swapped back, creating an exchange and re-exchange.

An FX swap has two separate legs settling on two different value dates, even though it is arranged as a single transaction and is recorded in the turnover statistics as a single transaction. The two counterparties agree to exchange two currencies at a particular rate on one date (the “near date”) and to reverse payments, almost always at a different rate, on a specified subsequent date (the “far date”). Effectively, it is a spot transaction and an outright forward transaction going in opposite directions, or else two outright forwards with different settlement dates, and going in opposite directions. If both dates are less than one month from the deal date, it is a “short-dated swap”; if one or both dates are one month or more from the deal date, it is a “forward swap.”

The two legs of an FX swap can, in principle, be attached to any pair of value dates. In practice, a limited number of standard maturities account for most transactions. The first leg usually occurs on the spot value date, and for about two-thirds of all FX swaps the second leg occurs within a week. However, there are FX swaps with longer maturities. Among dealers, most of these are arranged for even or straight dates—e.g., one week, one month, three months—but odd or broken dates are also traded for customers.

The FX swap is a standard instrument that has long been traded in the over-the-counter market. Note that it provides for one exchange and one re-exchange only, and is not a stream of payments. The FX swap thus differs from the interest rate swap, which provides for an exchange of a stream of interest payments in the same currency but with no exchange of principal; it also differs from the currency swap (described later), in which counterparties exchange and re-exchange principal and streams of fixed or floating interest payments in two different currencies.

In the spot and outright forward markets, a fixed amount of the base currency (most often the dollar) is always traded for a variable amount of the terms currency (most often a non-dollar currency). However, in the FX swap market, a trade for a fixed amount of either currency can be arranged.

There are two kinds of FX swaps: a buy/sell swap, which means buying the fixed, or base, currency on the near date and selling it on the far date; and a sell/buy swap, which means selling the fixed currency on the near date and buying it on the far date. If, for example, a trader bought a fixed amount of pounds sterling spot for dollars (the exchange) and sold those pounds sterling six months forward for dollars (the re-exchange), that would be called a buy/sell sterling swap.

Why FX Swaps Are Used

The popularity of FX swaps reflects the fact that banks and others in the dealer, or interbank, market often find it useful to shift temporarily into or out of one currency in exchange for a second currency without incurring the exchange rate risk of holding an open position or exposure in the currency that is temporarily held. This avoids a change in currency exposure, and differs from the spot or outright forward, where the purpose is to change a currency exposure. The use of FX swaps is similar to actual borrowing and lending of currencies on a collateralized basis. FX swaps provide a way of using the foreign exchange
The Foreign Exchange Market in the United States

markets as a funding instrument and an alternative to borrowing and lending in the Euro-dollar and other offshore markets. They are widely used by traders and other market participants for managing liquidity and shifting delivery dates, for hedging, speculation, taking positions on interest rates, and other purposes.

Pricing FX Swaps

The cost of an FX swap is determined by the interest rate differential between the two swapped currencies. Just as in the case of outright forwards, arbitrage and the principle of covered interest rate parity will operate to make the cost of an FX swap equal to the foreign exchange value of the interest rate differential between the two currencies for the period of the swap.

The cost of an FX swap is measured by swap points, or the foreign exchange equivalent of the interest rate differential between two currencies for the period. The difference between the amounts of interest that can be earned on the two currencies during the period of the swap can be calculated by formula (see Box 5-4). The counterparty who holds for the period of the swap the currency that pays the higher interest rate will pay the points, neutralizing the interest rate differential and equalizing the return on the two currencies; and the counterparty who holds the currency that pays the lower interest will earn or receive the points. At the outset, the present value of the FX swap contract is usually arranged to be zero.

The same conditions prevail with an FX swap as with an outright forward—a trader who pays the points in the forward also pays them in the FX swap; a trader who earns the points in the forward also earns them in the FX swap.

For most currencies, swap points are carried to the fourth decimal place. A dollar-swissie swap quoted at 244-221 means that the dealer will buy the dollar forward at his spot bid rate less 0.0244 (in Swiss francs), and sell the dollar forward at his spot offer rate less 0.0221 (in Swiss francs), yielding an (additional) spread of 23 points (or 0.0023).

The FX swap is the difference between the spot and the outright forward (or the difference between the two outright forwards). When you trade an FX swap you are trading the interest rate differential between the two currencies. The FX swap is a very flexible and convenient instrument that is used for a variety of funding, hedging, position management, speculation, and other purposes. FX swaps are extremely popular among OTC interbank dealers, and now account for nearly half of total turnover in the U.S. OTC foreign exchange market. Among its uses are those described in Box 5-3:

Some Uses of FX Swaps

Managing positions and changing settlement dates. FX swaps can be very helpful in managing day-to-day positions. Of particular convenience and interest to professional market making and dealing institutions are the “spot-next” swap and the “tom-next” swap, which are used by traders to roll over settlements and to balance maturing buys and sells of particular currencies in their books. A dealer who knows on, say June 1, that he has to pay out a certain

(continued on page 42)
currency on June 3, may find it convenient or profitable to extend the settlement for a day, for example, when he may be scheduled to receive balances of that currency. The dealer can enter into a “spot-next” swap on the deal date, June 1, and extend the June 3 settlement to June 4. Alternatively, on June 2, the day before the June 3 settlement, the dealer might arrange a “tom-next” swap, to extend that settlement until June 4, which is the spot settlement date for June 2, and a more liquid market. The cost of these one-day swaps would reflect the points (the value of one day’s interest differential), or “cost of carry,” which would be added to or subtracted from the spot rate. If it then looked as though a June 4 settlement would be difficult, the dealer might roll over the transaction for another day, or longer.

The interest rate differential is also important in calculating “pre-spot” rates—“value tomorrow” transactions, which are settled one day before spot and “cash,” which are settled two days before spot, or on the deal date.

To calculate (approximate) “pre-spot” rates, you work backwards. Thus, assume that dollar-swissie were trading spot at 1.5000-10. Assume that the points for a “tom-next” swap were 3/5, reflecting one day’s interest rate differential—the price of extending settlement from day 2 to day 3. To calculate a “value tomorrow” quote—shifting settlement from day 3 to day 2, you would turn the points around (to 5/3) and reverse the sign (in this case subtract them from, rather than add them to, the spot rate), for a quote of 1.4995-97. (In shifting a settlement forward, the higher interest rate currency moves to discount; in shifting backward to “cash” or “value tomorrow,” the higher interest rate currency moves to premium.)

**Hedging interest rate differential risk.** A dealer, for example, who has agreed to buy pounds sterling one year forward faces both an exchange rate risk (that the exchange rate may change) and an interest rate differential risk (that the interest rate differential on which the transaction was priced may change). The dealer can offset the exchange rate risk by selling sterling spot (to offset the forward purchase), but he would still have an interest rate differential risk. That risk can be offset in two ways: either by borrowing and investing in the off-shore deposit (Euro-currency) markets, or by entering into a new swap (an “unwind”) that is the opposite of his outstanding position (that is, the trader can enter into a buy/sell sterling swap for a one-year period to offset the position resulting from his forward sterling purchase and spot sterling sale). If neither of the two interest rates nor the spot rate has changed between the time of the trader’s initial forward purchase of sterling and the time when the trader’s hedging activities are put in place, the trader can cover risk in either the FX swap market or the offshore deposit market—the trader has a “perfect” hedge—but the swap may be carried “off-balance-sheet” and thus may be “lighter” on the trader’s balance sheet than the borrowing and lending.

**Speculating on interest rate differentials.** A dealer who expects an interest rate differential to widen would enter into an FX swap in which the dealer pays the swap points now (when the differential is small), and—after the interest rate differential has widened—would then enter
into another FX swap in the opposite direction (an unwind), in which case the trader would earn more swap points from the wider differential than he is paying on the initial swap. A trader who expects interest rate differentials to narrow would do the reverse—arrange swaps in which he earns the swap points now, when the differential is wide, and pays the swap points later, after the differential narrows.

*Arbitraging the foreign exchange market and the interest rate market*. When the two markets are in equilibrium, a dealer may be more or less indifferent whether he invests through the offshore deposit market (borrowing/lending currencies) or through the foreign exchange market (FX swaps). But there are times when swap points in the foreign exchange market are not precisely equivalent to interest rate differentials in the offshore deposit market, and arbitrageurs can use FX swaps together with deposit borrowing and lending operations to fund in the lower-cost market and invest in the higher-return market.

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**Box 5-4**

**Calculating FX Swap Points**

A market maker will calculate swap points on the basis of borrowing and lending rates in the offshore deposit markets:

A. Bid Side Swap Points = Spot Rate

\[
\frac{1+ \left( \text{ODBRTC} \times \text{Swap Days} \right)}{360 \text{ or } 365} - 1
\]

B. Offer Side Swap Points = Spot Rate

\[
\frac{1+ \left( \text{ODLRTC} \times \text{Swap Days} \right)}{360 \text{ or } 365} - 1
\]

where ODBRTC = offshore deposit borrowing rate in terms currency, ODLRTC = offshore deposit lending rate in base currency, ODBRBC = Euro borrow rate in base currency, and ODLRBC = offshore deposit lending rate in base currency. Assume that offshore deposit $ rates = 5 - 5.25, offshore deposit DEM rates = 6.25 - 6.50, the swap period = 62 days, and the spot rate = DEM 1.600 per dollar. Then, swap points can be calculated as:

A. Bid Side Points = \(1.600 \frac{360}{1+ \left( .0625 \times 62 \right)} - 1 = 28\)

B. Offer Side Points = \(1.600 \frac{360}{1+ \left( .05 \times 62 \right)} - 1 = 41\)

(continued on page 44)
A currency swap is structurally different from the FX swap described above. In a typical currency swap, counterparties will (a) exchange equal initial principal amounts of two currencies at the spot exchange rate, (b) exchange a stream of fixed or floating interest rate payments in their swapped currencies for the agreed period of the swap, and then (c) re-exchange the principal amount at maturity at the initial spot exchange rate. Sometimes, the initial exchange of principal is omitted. Sometimes, instead of exchanging interest payments, a “difference check” is paid by one counterparty to the other to cover the net obligation.

The currency swap provides a mechanism for shifting a loan from one currency to another, or shifting the currency of an asset. It can be used, for example, to enable a company to borrow in a currency different from the currency it needs for its operations, and to receive protection from exchange rate changes with respect to the loan.

The currency swap is closely related to the interest rate swap. There are, however, major differences in the two instruments. An interest rate swap is an exchange of interest payment streams of differing character (e.g., fixed rate interest for floating), but in the same currency, and involves no exchange of principal. The currency swap is in concept an interest rate swap in more than one currency, and has existed since the 1960s. The interest rate swap became popular in the early 1980s; it subsequently has become an almost indispensable instrument in the financial tool box.

Currency swaps come in various forms. One variant is the fixed-for-fixed currency swap, in which the interest rates on the periodic interest payments of the two currencies are fixed at the outset for the life of the swap. Another variant is the fixed-for-floating swap, also called cross-currency swap, or currency coupon swap, in which the interest rate in one currency is floating (e.g., based on LIBOR) and the interest rate in the other is fixed. It is also possible to arrange floating-for-floating currency swaps, in which both interest rates are floating.

**Purposes of Currency Swaps**

The motivations for the various forms of currency swap are similar to those that generate a demand for interest rate swaps. The incentive may arise from a comparative advantage that a borrowing company has in a particular currency or capital market. It may result from a company’s desire to diversify and spread its borrowing around to
different capital markets, or to shift a cash flow from foreign currencies. It may be that a company cannot gain access to a particular capital market. Or, it may reflect a move to avoid exchange controls, capital controls, or taxes. Any number of possible “market imperfections” or pricing inconsistencies provide opportunities for arbitrage.

Before currency swaps became popular, parallel loans and back-to-back loans were used by market participants to circumvent exchange controls and other impediments. Offsetting loans in two different currencies might be arranged between two parties; for example, a U.S. firm might make a dollar loan to a French firm in the United States, and the French firm would lend an equal amount to the U.S. firm or its affiliate in France. Such structures have now largely been abandoned in favor of currency swaps.

Because a currency swap, like an interest rate swap, is structurally similar to a forward, it can be seen as an exchange and re-exchange of principal plus a “portfolio of forwards”—a series of forward contracts, one covering each period of interest payment. The currency swap is part of the wave of financial derivative instruments that became popular during the 1980s and ‘90s. But currency swaps have gained only a modest share of the foreign exchange business. It has been suggested that the higher risk and related capital costs of instruments involving an exchange of principal may in part account for this result. In the 1998 global turnover survey, turnover in currency swaps by reporting dealers was estimated at $10 billion per day. In the United States, turnover was $1.4 billion, well behind the United Kingdom—at $5 billion—and six other countries.
In the discussion below, the focus is narrowed from the foreign exchange market as a whole to how a dealer institution operates within the market.

In the United States, each of the 93 institutions regarded as active dealers—the 82 commercial banks and 11 investment banks and other institutions surveyed by the Federal Reserve—is an important participant in the foreign exchange market. But there are major differences in the size, scope, and focus of their foreign exchange activities. Some are market makers; others are not. Some engage in a wide range of operations covering all areas of foreign exchange trading; others concentrate on particular niches or currencies. They vary in the extent and the nature of the trading they undertake for customers and for their own accounts.

The bulk of foreign exchange turnover is handled by a small number of the 93 active dealers. Ten institutions—about 11 percent of the total—account for 51 percent of foreign exchange turnover in the United States. In other countries, there is comparable concentration. In the U.K. market, the market share of the top ten institutions also was 50 percent.

The very largest dealers in the United States compete with each other, and there are major changes in rankings over time. Only six of the top ten firms in 1995 remained in the top 10 in 1998.

1. TRADING ROOM SETUP

In appearance, the trading rooms of many major dealer institutions are similar in many respects. All have rows of screens, computers, telephones, dedicated lines to customers and to brokers, electronic dealing and brokering systems, news services, analytic and informational sources, and other communications equipment. All have various traders specializing in individual currencies and cross-currencies, in spot, forwards, swaps, and options; their specialists in offshore deposit markets and various bond markets; and their marketing groups. There are funds managers and those responsible for proprietary transactions using the dealer’s own funds. All have their affiliated “back offices”—not necessarily located nearby—where separate staffs confirm transactions consummated by the traders and execute the financial payments and receipts associated with clearance and settlement. Increasingly, there are “mid-office” personnel, checking on the validity of valuations used by the traders and other matters of risk management.

The equipment and the technology are critical and expensive. For a bank with substantial trading activity, which can mean hundreds of individual traders and work stations to equip, a full renovation can cost many, many millions of dollars. And that equipment may not last long—with technology advancing rapidly, the state of
how dealers conduct foreign exchange operations

A dealer bank or other institution is likely to be undertaking various kinds of foreign exchange trading—making markets, servicing customers, arranging proprietary transactions—and the emphasis on each will vary among institutions.

Market making is basic to foreign exchange trading in the OTC market. The willingness of market makers to quote both bids and offers for particular currencies, to take the opposite side to either buyers or sellers of the currency, facilitates trading and contributes to liquidity and price stability, and is considered important to the smooth and effective functioning of the market. An institution may choose to serve as a market maker purely because of the profits it believes it can earn on the spreads between buying and selling prices. But it may also see advantages in that the market-making function can broaden in an important way the range of banking services that the institution can offer to clients. In addition, it can give the market-

2. THE DIFFERENT KINDS OF TRADING FUNCTIONS OF A DEALER INSTITUTION

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The basic objectives and policy with respect to foreign exchange trading are set by senior management. They must decide which services the foreign exchange trading function will provide and how it will provide those services—often as part of a worldwide operation—in light of the bank’s financial and human resources and its attitude toward risk. The senior management must determine, in short, the bank’s fundamental business strategy—which includes, among other things, the emphasis to be placed on customer relationships and service vis-a-vis the bank’s trading for its own account—and how that strategy will deal with changing market conditions and other factors.

The trading rooms are the trenches where the battle is joined, where each trader confronts the market, customers, competitors, and other players, and where each institution plays out its fundamental business strategy and sees it succeed or fail. A winning strategy and a sound battle plan are essential, and teamwork—with each trader being aware of the actions of others in the group and of developments in related markets—is of enormous importance to success.
making institution access to both market information and market liquidity that are valuable in its other activities.

Much of the activity in trading rooms is focused on marketing services and maintaining customer relationships. Customers may include treasurers of corporations and financial institutions; managers of investment funds, pension funds, and hedge funds, and high net worth individuals. A major activity of dealer institutions is managing customer business, including giving advice, suggesting strategies and ideas, and helping to carry out transactions and approaches that a particular customer may wish to undertake.

Dealers also trade foreign exchange as part of the bank’s proprietary trading activities, where the firm’s own capital is put at risk on various strategies. Whereas market making is usually reacting or responding to other people’s requests for quotes, proprietary trading is proactive and involves taking an initiative. Market making tends to be short-term and high volume, with traders focusing on earning a small spread from each transaction (or at least from most transactions)—with position-taking limited mainly to the management of working balances and reflecting views on very short-term forces and rate movements. A proprietary trader, on the other hand, is looking for a larger profit margin—in percentage points rather than basis points—based on a directional view about a currency, volatility, an interest rate that is about to change, a trend, or a major policy move—in fact, any strategic view about an opportunity, a vulnerability, or a mispricing in a market rate. Some dealers institutions—banks and otherwise—put sizeable amounts of their own capital at risk for extended periods in proprietary trading, and devote considerable resources to acquiring the risk analysis systems and other equipment and personnel to assist in developing and implementing such strategies. Others are much more limited in their proprietary trading.

3. TRADING AMONG MAJOR DEALERS—DEALING DIRECTLY AND THROUGH BROKERS

Dealer institutions trade with each other in two basic ways—direct dealing and through the brokers market. The mechanics of the two approaches are quite different, and both have been changed by technological advances in recent years.

Mechanics of Direct Dealing
Each of the major market makers shows a running list of its main bid and offer rates—that is, the prices at which it will buy and sell the major currencies, spot and forward—and those rates are displayed to all market participants on their computer screens. The dealer shows his prices for the base currency expressed in amounts of the terms currency. Both dollar rates and cross-rates are shown. Although the screens are updated regularly throughout the day, the rates are only indicative—to get a firm price, a trader or customer must contact the bank directly. In very active markets, quotes displayed on the screen can fail to keep up with actual market quotes. Also, the rates on the screen are typically those available to the largest customers and major players in the interbank market for the substantial amounts that the interbank
market normally trades, while other customers may be given less advantageous rates.

A trader can contact a market maker to ask for a two-way quote for a particular currency. Until the mid-1980s, the contact was almost always by telephone—over dedicated lines connecting the major institutions with each other—or by telex. But electronic dealing systems are now commonly used—computers through which traders can communicate with each other, on a bilateral, or one-to-one basis, on screens, and make and record any deals that may be agreed upon. These electronic dealing systems now account for a very large portion of the direct dealing among dealers.

As an example of direct dealing, if trader Mike were asking market maker Hans to give quotes for buying and selling $10 million for Swiss francs, Mike could contact Hans by electronic dealing system or by telephone and ask rates on “spot dollar-swissie on ten dollars.”

Hans might respond that “dollar-swissie is 1.4585-90;” or maybe “85-90 on 5,” but more likely, just “85-90," if it can be assumed that the “big figure” (that is, 1.45) is understood and taken for granted. In any case, it means that Hans is willing to buy $10 million at the rate of CHF 1.4585 per dollar, and sell $10 million at the rate of CHF 1.4590 per dollar. Hans will provide his quotes within a few seconds and Mike will respond within a few seconds. In a fast-moving market, unless he responds promptly—in a matter of seconds—the market maker cannot be held to the quote he has presented. Also, the market maker can change or withdraw his quote at any time, provided he says “change” or “off” before his quote has been accepted by the counterparty.

It can all happen very quickly. Several conversations can be handled simultaneously on the dealing systems, and it is possible to complete a number of deals within a few minutes. When he hears the quotes, Mike will either buy, sell, or pass—there is no negotiation of the rate between the two traders. If Mike wants to buy $10 million at the rate of CHF 1.4590 per dollar (i.e., accept Hans’ offer price), Mike will say “Mine” or “I buy” or some similar phrase. Hans will respond by saying something like “Done—I sell you ten dollars at 1.4590.” Mike might finish up with “Agreed—so long.”

Each trader then completes a “ticket” with the name and amount of the base currency, whether bought or sold, the name and city of the counterparty, the term currency name and amount, and other relevant information. The two tickets, formerly written on paper but now usually produced electronically, are promptly transmitted to the two “back offices” for confirmation and payment. For the two traders, it is one more deal completed, one of 200-300 each might complete that day. But each completed deal will affect the dealer’s own limits, his bank’s currency exposure, and perhaps his approach and quotes on the next deal.

The spread between the bid and offer price in this example is 5 basis points in CHF per dollar, or about three one-hundredths of one percent of the dollar value. The size of the spread will, other things being equal, tend to be comparable among currencies on a percentage basis, but larger in absolute numbers the lower the value of the currency unit—i.e., the spread in the dollar-lira rate will tend to be wider in absolute number (of lire) than the spread in dollar-swissie, since the dollar sells for a larger absolute number of lire than of Swiss francs. The width of the spread can also be affected by a large number of other factors—the amount of liquidity in the market, the size of the transaction, the number of players, the time of day, the volatility of market conditions, the trader’s own
position in that currency, and so forth. In the United States, spreads tend to be narrowest in the New York morning-Europe afternoon period, when the biggest markets are open and activity is heaviest, and widest in the late New York afternoon, when European and most large Asian markets are closed.

*Mechanics of Trading Through Brokers: Voice Brokers and Electronic Brokering Systems*

The traditional role of a broker is to act as a go-between in foreign exchange deals, both within countries and across borders. Until the 1990s, all brokering in the OTC foreign exchange market was handled by what are now called live or voice brokers.

Communications with voice brokers are almost entirely via dedicated telephone lines between brokers and client banks. The broker’s activity in a particular currency is usually broadcast over open speakers in the client banks, so that everyone can hear the rates being quoted and the prices being agreed to, although not specific amounts or the names of the parties involved.

A live broker will maintain close contact with many banks, and keep well informed about the prices individual institutions will quote, as well as the depth of the market, the latest rates where business was done, and other matters. When a customer calls, the broker will give the best price available (highest bid if the customer wants to sell and lowest offer if he wants to buy) among the quotes on both sides that he or she has been given by a broad selection of other client banks.

In direct dealing, when a trader calls a market maker, the market maker quotes a two-way price and the trader accepts the bid or accepts the offer or passes. In the voice brokers market, the dealers have additional alternatives. Thus, with a broker, a market maker can make a quote for only one side of the market rather than for both sides. Also, a trader who is asking to see a quote may have the choice, not only to hit the bid or to take (or lift) the offer, but also to join either the bid or the offer in the brokers market, or to improve either the bid or the offer then being quoted in the brokers market.

At the time a trade is made through a broker, the trader does not know the name of the counterparty. Subsequently, credit limits are checked, and it may turn out that one dealer bank must refuse a counterparty name because of credit limitations. In that event, the broker will seek to arrange a name-switch—i.e., look for a mutually acceptable bank to act as intermediary between the two original counterparties. The broker should not act as principal.

Beginning in 1992, electronic brokerage systems (or automated order-matching systems) have been introduced into the OTC spot market and have gained a large share of some parts of that market. In these systems, trading is carried out through a network of linked computer terminals among the participating users. To use the system, a trader will key an order into his terminal, indicating the amount of a currency, the price, and an instruction to buy or sell. If the order can be filled from other orders outstanding, and it is the best price available in the system from counterparties acceptable to that trader’s institution, the deal will be made. A large order may be matched with several small orders.

If a new order cannot be matched with outstanding orders, the new order will be entered into the system, and participants in the system from other banks will have access to it. Another player may accept the order by pressing a “buy” or “sell” button and a transmit button. There are other buttons to press for withdrawing orders and other actions.
Electronic brokering systems now handle a substantial share of trading activity. These systems are especially widely used for small transactions (less than $10 million) in the spot market for the most widely traded currency pairs—but they are used increasingly for larger transactions and in markets other than spot. The introduction of these systems has resulted in greater price transparency and increased efficiency for an important segment of the market. Quotes on these smaller transactions are fed continuously through the electronic brokering systems and are available to all participating institutions, large and small, which tends to keep broadcast spreads of major market makers very tight. At the same time electronic brokering can reduce incentives for dealers to provide two-way liquidity for other market participants. With traders using quotes from electronic brokers as the basis for prices to customers and other dealers, there may be less propensity to act as market maker. Large market makers report that they have reduced levels of first-line liquidity. If they need to execute a trade in a single sizeable amount, there may be fewer reciprocal counterparties to call on. Thus, market liquidity may be affected in various ways by electronic brokering.

Proponents of electronic brokering also claim there are benefits from the certainty and clarity of trade execution. For one thing there are clear audit trails, providing back offices with information enabling them to act quickly to reconcile trades or settle differences. Secondly, the electronic systems will match orders only between counterparties that have available credit lines with each other. This avoids the problem sometimes faced by voice brokers when a dealer cannot accept a counterparty he has been matched with, in which case the voice broker will need to arrange a “credit switch,” and wash the credit risk by finding an acceptable institution to act as intermediary. Further, there is greater certainty about the posted price and greater certainty that it can be traded on. Disputes can arise between voice brokers and traders when, for example, several dealers call in simultaneously to hit a given quote. These uncertainties are removed in an electronic process. But electronic brokering does not eliminate all conflicts between banks. For example, since dealers typically type into the machine the last two decimal points (pips) of a currency quote, unless they pay close attention to the full display of the quote, they may be caught unaware when the “big figure” of a currency price has changed.

With the growth of electronic brokering, voice brokers and other intermediaries have responded to the competitive pressures. Voice brokers have emphasized newer products and improved technology. London brokers have introduced a new automated confirmation system, designed to bring quick confirmations and sound audit trails. Others have emphasized newer products and improved technology. There have also been moves to focus on newer markets and market segments.

The two basic channels, direct dealing and brokers—either voice brokers or electronic brokering systems—are complementary techniques, and dealers use them in tandem. A trader will use the method that seems better in the circumstances, and will take advantage of any opportunities that an approach may present at any particular time. The decision on whether to pay a fee and engage a broker will depend on a variety of factors related to the size of the order, the currency being traded, the condition of the market, the time available for the trade, whether the trader wishes to be seen in the market (through direct dealing) or wants to operate more discreetly (through brokers), and other considerations.
Typically the foreign exchange department of a bank will meet each morning, before trading starts, review overnight developments, receive reports from branches and affiliated outlets in markets that opened earlier, check outstanding orders from customers, discuss their views toward the market and the various currencies, and plan their approaches for the day. As market events unfold, they may have to adapt their view and modify their approach, and the decisions on whether, when, and how to do so can make the difference between success and failure.

Each institution has its own decision-making structure based on its own needs and resources. A chief dealer supervises the activities of individual traders and has primary responsibility for hiring and training new personnel. The chief dealer typically reports to a senior officer responsible for the bank’s international asset and liability area, which includes, not only foreign exchange trading, but also Eurodollar and other offshore deposit markets, as well as derivatives activities intimately tied to foreign exchange trading. Reporting to the chief dealer are a number of traders specializing in one or more currencies. The most actively traded currencies are handled by the more senior traders, often assisted by a junior person who may also handle a less actively traded currency. But the actions of any trader, regardless of rank, commit the bank’s funds. All need to be on their toes. Even a day trader whose objective may be simply to buy at his bid price and sell at his offer is in a better position to succeed if he is well informed, and can read the market well, see where rates may be headed, and understand the forces at play. He must have a clear understanding of his currency position, his day’s net profit or loss, and whether and by how much to shade his quotes in one direction or the other.

Many senior traders have broad responsibility for the currencies they trade—quoting prices to customers and other dealers, dealing directly and with the brokers market, balancing daily payments and receipts by arranging swaps and other transactions, and informing and advising customers. They may have certain authority to take a view on short-term exchange rate and interest rate movements, resulting in a short or long position within authorized limits. The chief dealer is ultimately responsible for the profit or loss of the operation, and for ensuring that management limits to control risk are fully observed.

Most large market-making institutions have “customer dealers” or “marketers” in direct contact with corporations and other clients, advising customers on strategy and carrying out their instructions. This allows individual traders in spot, forwards, and other instruments to concentrate on making prices and managing positions. If the client deals, the marketer must make sure that all of the various traders involved in the transactions are informed of the particulars.

The 1998 Federal Reserve turnover survey indicated that brokers handled 41 percent of spot transactions, and a substantially smaller percentage of outright forwards and FX swaps. Altogether, 24 percent of total U.S. foreign exchange activity in the three traditional markets was handled by brokers. In the brokers market, 57 percent of turnover is now conducted through automated order-matching systems, or electronic brokering, compared with 18 percent in 1995.
When a customer asks a market-making institution for the rates at which it is willing to buy and sell a particular currency, the response will be based on a number of factors. In deciding what bid and offer prices to quote, the trader takes into account the current quotations in the market, the rates at which the brokers are transacting business, the latest trends and expectations, whether the bank is long or short the currency in question, and views about where rates are headed. The trader is expected to be knowledgeable about both “fundamental” analysis (broad macroeconomic and financial trends underlying the supply and demand conditions for currencies that are being traded) and “technical” analysis (charts showing price patterns and volume trends). The trader also should be aware of the latest economic news, political developments, predictions of experts, and the technical position of the various currencies in the market. In bid and offer price quotes, the trader also may be influenced by the size of the trade—on the one hand, a small trade may call for a less favorable rate to cover fixed costs; on the other hand, a large trade may be much more difficult to offset.

When making quotes on outright forwards and FX swaps, in addition to understanding all the factors that may be influencing the spot rate, the trader must know the interbank swap rates for the currency in question—since the swap rate will reflect the interest rate differential between the two currencies being traded, and is the critical factor in determining the amount of premium or discount at which the forward exchange rate will trade. The trader, in addition, must be aware of the maturity structure of the contracts already outstanding in his bank’s foreign exchange book, and whether the proposed new transaction would add to or reduce the mismatches. Of course, in offering a quote for an option, a trader must consider other complex factors. The trader will have loaded into his computer various formulas for estimating the future volatility of the currency involved, along with spot and forward exchange rates and interest rates, so that he can very quickly calculate and quote the price of the premium when given the particulars of the transaction.

On top of all this, in setting quotes, a trader will take into account the relationship between the customer or counterparty and his institution. If it is a valued customer, the trader will want to consider the longer-term relationship with that customer and its importance to the longer-term profitability of the bank. Similarly, when dealing with another market maker institution, the trader will bear in mind the necessity of being competitive and also the benefit of relationships based on reciprocity.

When asked for a quote, the trader must respond immediately, making an instantaneous assessment of these thousand and one factors. Quotes have to be fine enough to attract customers and to win an appropriate share of the business—but also not too fine, since the trader wants to avoid excessive or inappropriate risk and to make profits. A trader wants to be an active participant in the market—it’s helpful in keeping abreast of what’s going on, and he wants others to think of him as a potential counterparty—but he doesn’t want to “over-trade” or feel he must be in on every trade.

As the traders in a foreign exchange department buy and sell various currencies throughout the day in spot, forward, and FX swap transactions, the trading book or foreign exchange position of the institution changes, and long and short positions in individual currencies arise. Since every transaction involves an exchange of one currency for another, it results in
Every time a deal to buy or sell foreign exchange is agreed upon by two traders in their trading rooms, a procedure is set in motion by which the “back offices” of the two institutions confirm the transaction and make the necessary funds transfers. The back office is usually separated physically from the trading room for reasons of internal control—but it can be next door or thousands of miles away.

For each transaction, the back office receives for processing the critical information with respect to the contract transmitted by the traders, the brokers, and the electronic systems. The back offices confirm with each other the deals agreed upon and the stated terms—a procedure that can be done by telephone, fax, or telex, but that is increasingly handled electronically by systems designed for this purpose. If there is a disagreement between the two banks on a relevant factor, there will be discussions to try to reach an understanding. Banks and other institutions regularly tape record all telephone conversations of traders. Also, electronic dealing systems and electronic broking systems automatically record their communications. These practices have greatly reduced the number of disputes over what has been agreed to by the two traders. In many cases, banks participate in various bilateral and multilateral netting arrangements with each other, instead of settling on the basis of each individual transaction. As discussed in Chapter 8, netting, by reducing the amounts of gross payments, can be both a cheaper and safer way of settling.
Payments instructions are promptly exchanged—in good time before settlement—indicating, for example, on a dollar-yen deal, the bank and account where the dollars are to be paid and the bank and account where the yen are to be paid. On the value date, the two banks or correspondent banks debit-credit the clearing accounts in response to the instructions received. Since 1977, an automated system known as SWIFT (Society for the Worldwide Interbank Financial Telecommunications) has been used by thousands of banks for transferring payment instructions written in a standardized format among banks with a significant foreign exchange business.

When the settlement date arrives, the yen balance is paid (for an individual transaction or as part of a larger netted transaction) into the designated account at a bank in Japan, and a settlement occurs there. On the U.S. side, the dollars are paid into the designated account at a bank in the United States, and the dollar settlement—or shift of dollars from one bank account to another—is made usually through CHIPS (Clearing House Interbank Payments System), the electronic payments system linking participating depository institutions in New York City.

After the settlements have been executed, the back offices confirm that payment has indeed been made. The process is completed. The individual, or institution, who wanted to sell dollars for yen has seen his dollar bank account decline and his bank account in yen increase; the other individual, or institution, who wanted to buy dollars for yen has seen his yen bank deposit decline and his dollar bank account increase.
In simple terms, it is the interaction of supply and demand factors for two currencies in the market that determines the rate at which they trade. But what factors influence the many thousands of decisions made each day to buy or sell a currency? How do changes in supply and demand conditions explain the path of an exchange rate over the course of a day, a month, or a year?

This complex issue has been extensively studied in economic literature and widely discussed among investors, officials, academicians, traders, and others. Still, there are no definitive answers. Views on exchange rate determination differ and have changed over time. No single approach provides a satisfactory explanation of exchange rate movements, particularly short- and medium-term movements, since the advent of widespread floating in the early 1970s.

Three aspects of exchange rate determination are discussed below. First, there is a brief description of some of the broad approaches to exchange rate determination. Second, there are some comments on the problems of exchange rate forecasting in practice. Third, central bank intervention and its effects on exchange rates are discussed.

1. Some Approaches to Exchange Rate Determination

*The Purchasing Power Parity Approach*

Purchasing Power Parity (PPP) theory holds that in the long run, exchange rates will adjust to equalize the relative purchasing power of currencies. This concept follows from the *law of one price*, which holds that in competitive markets, identical goods will sell for identical prices when valued in the same currency.

The law of one price relates to an individual product. A generalization of that law is the *absolute* version of PPP, the proposition that exchange rates will equate nations’ overall price levels. More commonly used than absolute PPP is the concept of *relative* PPP, which focuses on changes in prices and exchange rates, rather than on absolute price levels. Relative PPP holds that there will be a *change* in exchange rates proportional to the *change* in the ratio of the two nations’ price levels, assuming no changes in structural relationships. Thus, if the U.S. price level rose 10 percent and the Japanese price level rose 5 percent, the U.S. dollar would depreciate 5 percent, offsetting the higher U.S. inflation and leaving the relative purchasing power of the two currencies unchanged.

PPP is based in part on some unrealistic assumptions: that goods are identical; that all goods are tradable; that there are no
transportation costs, information gaps, taxes, tariffs, or restrictions of trade; and — implicitly and importantly — that exchange rates are influenced only by relative inflation rates. But contrary to the implicit PPP assumption, exchange rates also can change for reasons other than differences in inflation rates. Real exchange rates can and do change significantly over time, because of such things as major shifts in productivity growth, advances in technology, shifts in factor supplies, changes in market structure, commodity shocks, shortages, and booms.

In addition, the relative version of PPP suffers from measurement problems: What is a good starting point, or base period? Which is the appropriate price index? How should we account for new products, or changes in tastes and technology?

PPP is intuitively plausible and a matter of common sense, and it undoubtedly has some validity — significantly different rates of inflation should certainly affect exchange rates. PPP is useful in assessing long-term exchange rate trends and can provide valuable information about long-run equilibrium. But it has not met with much success in predicting exchange rate movements over short- and medium-term horizons for widely traded currencies. In the short term, PPP seems to apply best to situations where a country is experiencing very high, or even hyperinflation, in which large and continuous price rises overwhelm other factors.

Other approaches have focused on the balance of payments on current account, or on the balance of payments on current account plus long-term capital, as a guide in the determination of the appropriate exchange rate. But in today’s world, it is generally agreed that it is essential to look at the entire balance of payments — both current and capital account transactions — in assessing foreign exchange flows and their role in the determination of exchange rates.

John Williamson and others have developed the concept of the “fundamental equilibrium exchange rate,” or FEER, envisaged as the equilibrium exchange rate that would reconcile a nation’s internal and external balance. In that system, each country would commit itself to a macroeconomic strategy designed to lead, in the medium term, to “internal balance” — defined as unemployment at the natural rate and minimal inflation — and to “external balance” — defined as achieving the targeted current account balance. Each country would be committed to holding its exchange rate within a band or target zone around the FEER, or the level needed to reconcile internal and external balance during the intervening adjustment period.

The concept of FEER, as an equilibrium exchange rate to reconcile internal and external balance, is a useful one. But there are practical problems in calculating FEERs. There is no unique answer to what constitutes the FEER; depending on the particular assumptions, models, and econometric methods used, different analysts could come to quite different results. The authors recognize this difficulty, and acknowledge that some allowance should be made by way of a target band around the FEER. Williamson has suggested that FEER calculations could not realistically justify exchange rate bands narrower than plus or minus 10 percent.

The Balance of Payments and the Internal-External Balance Approach
PPP concentrates on one part of the balance of payments — tradable goods and services — and postulates that exchange rate changes are determined by international differences in prices, or changes in prices, of tradable items.
The IMF, while generally agreeing that it is not possible to identify precise “equilibrium” values for exchange rates and that point estimates of notional equilibrium rates should generally be avoided, does use a macroeconomic balance methodology to underpin its internal IMF multilateral surveillance. This methodology, which is used for assessing the “appropriateness” of current account positions and exchange rates for major industrial countries, embodies four steps:

- applying a trade-equation model to calculate the underlying current account positions that would emerge at prevailing market exchange rates if all countries were producing at their potential output levels;
- using a separate model to estimate a normal or equilibrium level of the saving-investment balance consistent with medium-run fundamentals, including the assumption that countries were operating at potential output;
- calculating the amount by which the exchange rate would have to change, other things being equal, to equilibrate the underlying current account position with the medium-term saving-investment norm; and
- assessing whether the estimates of exchange rates consistent with medium-term fundamentals suggest that any currencies are badly misaligned.

The IMF, while generally agreeing that it is not possible to identify precise “equilibrium” values for exchange rates and that point estimates of notional equilibrium rates should generally be avoided, does use a macroeconomic balance methodology to underpin its internal IMF multilateral surveillance. This methodology, which is used for assessing the “appropriateness” of current account positions and exchange rates for major industrial countries, is described in Box 11-1.7

**The Monetary Approach**

The monetary approach to exchange rate determination is based on the proposition that exchange rates are established through the process of balancing the total supply of, and the total demand for, the national money in each nation. The premise is that the supply of money can be controlled by the nation’s monetary authorities, and that the demand for money has a stable and predictable linkage to a few key variables, including an inverse relationship to the interest rate—that is, the higher the interest rate, the smaller the demand for money.

In its simplest form, the monetary approach assumes that: prices and wages are completely flexible in both the short and long run, so that PPP holds continuously, that capital is fully mobile across national borders, and that domestic and foreign assets are perfect substitutes. Starting from equilibrium in the money and foreign exchange markets, if the U.S. money supply increased, say, 20 percent, while the Japanese money supply remained stable, the U.S. price level, in time, would rise 20 percent and the dollar would depreciate 20 percent in terms of the yen.
In this simplified version, the monetary approach combines the PPP theory with the quantity theory of money—increases or decreases in the money supply lead to proportionate increases or decreases in the price level over time, without any permanent effects on output or interest rates. More sophisticated versions relax some of the restrictive assumptions—for example, price flexibility and PPP may be assumed not to hold in the short run—but maintain the focus on the role of national monetary policies.

Empirical tests of the monetary approach—simple or sophisticated—have failed to provide an adequate explanation of exchange rate movements during the floating rate period. The approach offers only a partial view of the forces influencing exchange rates—it assumes away the role of non-monetary assets such as bonds, and it takes no explicit account of supply and demand conditions in goods and services markets.

Despite its limitations, the monetary approach offers very useful insights. It highlights the importance of monetary policy in influencing exchange rates, and correctly warns that excessive monetary expansion leads to currency depreciation.

The monetary approach also provides a basis for explaining exchange rate overshooting—a situation often observed in exchange markets in which a policy move can lead to an initial exchange rate move that exceeds the eventual change implied by the new long-term situation. In the context of monetary approach models that incorporate short-term stickiness in prices, exchange rate overshooting can occur because prices of financial assets—interest and exchange rates—respond more quickly to policy moves than does the price level of goods and services. Thus, for example, a money supply increase (or decrease) in the United States can lead to a greater temporary dollar depreciation (appreciation) as domestic interest rates decline (rise) temporarily before the adjustment of the price level to the new long-run equilibrium is completed and interest rates return to their original levels.

The Portfolio Balance Approach
The portfolio balance approach takes a shorter-term view of exchange rates and broadens the focus from the demand and supply conditions for money to take account of the demand and supply conditions for other financial assets as well. Unlike the monetary approach, the portfolio balance approach assumes that domestic and foreign bonds are not perfect substitutes. According to the portfolio balance theory in its simplest form, firms and individuals balance their portfolios among domestic money, domestic bonds, and foreign currency bonds, and they modify their portfolios as conditions change. It is the process of equilibrating the total demand for, and supply of, financial assets in each country that determines the exchange rate.

Each individual and firm chooses a portfolio to suit its needs, based on a variety of considerations—the holder’s wealth and tastes, the level of domestic and foreign interest rates, expectations of future inflation, interest rates, and so on. Any significant change in the underlying factors will cause the holder to adjust his portfolio and seek a new equilibrium. These actions to balance portfolios will influence exchange rates.

Accordingly, a nation with a sudden increase in money supply would immediately purchase both domestic and foreign bonds, resulting in a decline in both countries’ interest rates, and, to the extent of the shift to foreign bonds, a depreciation in the nation’s home currency. Over time, the depreciation in the home currency would lead to
growth in the nation’s exports and a decline in its imports, and thus, to an improved trade balance and reversal of part of the original depreciation.

As yet, there is no unified theory of exchange rate determination based on the portfolio balance approach that has proved reliable in forecasting. In fact, results of empirical tests of the portfolio balance approach do not compare favorably with those from simpler models. These results reflect both conceptual problems and the lack of adequate data on the size and currency composition of private sector portfolios.

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**Box 11-2**

**Measuring the Dollar’s Equilibrium Value:**

► A Look at Some Alternatives

As the discussion above indicates, there are various ways of estimating the dollar’s “equilibrium” value, and they can yield a wide range of possible results.

In its 1998 annual report, the Bank for International Settlements (BIS) looks at three calculations of the dollar’s long-run equilibrium rate, which can be compared with the dollar’s market rates.

The three calculated rates considered by the BIS are (1) Purchasing Power Parity (PPP), (2) PPP adjusted for productivity, and (3) Fundamental Equilibrium Exchange Rates (FEER).8

As of mid-May 1998, on the basis of a straight calculation of PPP, the dollar appeared to be undervalued in the market (see table below). On May 11, 1998 the dollar was trading at 1.77 DEM and 132 yen. But to reach parity in PPP terms, the dollar would have had to command about 15 percent more DEM and about 30 percent more yen, using end-1996 measures of PPP.

The calculations for PPP adjusted for productivity show a different picture. Some analysts contend that differences in productivity across countries distort international comparisons of broad consumption baskets used in PPP calculations. The argument is made that countries such as Japan with higher productivity in the traded goods sector than in the non-traded goods sector tend to have real exchange rate appreciation, which makes their PPP appear to be higher than it really is; and that there should be an adjustment for this “productivity bias.” One such adjustment calculated by Goldman Sachs suggests that the dollar was not undervalued in “adjusted-PPP” terms, but was overvalued by some 5-15 percent.

The third approach has been calculated by Swiss Bank Corporation, using FEER, or fundamental equilibrium exchange rate concepts. This calculation also suggests that the dollar was overvalued in the market in early 1998 by as much as 20-30 percent against the DEM and the yen. As noted above, both PPP calculations and FEER calculations can vary on the basis of the assumptions, models, and techniques used.

In recent years, the United States has run substantial current account deficits—a deficit of more than $200 billion is expected in 1998—which might suggest an overvalued dollar. But the fact that those current account deficits have been so easily financed by capital inflows may indicate that the dollar is still considered a bargain at present levels.

*(continued on page 112)*
Nevertheless, the portfolio balance approach offers a useful framework for studying exchange rate determination. With its focus on a broad menu of assets, this approach provides richer insights than the monetary approach into the forces influencing exchange rates. It also enables foreign exchange rates to be seen like asset prices in other markets, such as the stock market or bond market, where rates are influenced, not only by current conditions, but to a great extent by market expectations of future events. As with other financial assets, exchange rates change continuously as the market receives new information—information about current conditions and information that affects expectations of the future. The random character of these asset price movements does not rule out rational pricing. Indeed, it is persuasively argued that this is the result to be expected in a well-functioning financial market. But in such an environment, exchange rate changes can be large and very difficult to predict, as market participants try to judge the expected real rates of return on their domestic assets in comparison with alternatives in other currencies.

**How Good Are the Various Approaches?**

The approaches noted above are some of the most general and most familiar ones, but there are many others, focusing on differentials in real interest rates, on fiscal policies, and on other elements. The research on this topic has been of great value in enhancing our understanding of long-run exchange rate trends and the issues involved in estimating "equilibrium" rates. It has helped us understand various aspects of exchange rate behavior and particular exchange rate episodes.

Yet none of the available empirical models has proved adequate for making reliable predictions of the course of exchange rates over a period of time. Research thus far has not been able to find stable and significant relationships between exchange rates and any economic fundamentals capable of consistently predicting or explaining short-term rate movements.
Most of the approaches to exchange rate determination tell only part of the story—like the several blindfolded men touching different parts of the elephant’s body—and other, more comprehensive explanations cannot, in practice, be used for precise forecasting. We do not yet have a way of bringing together all of the factors that help determine the exchange rate in a single comprehensive approach that will provide reliable short- to medium-term predictions.

The exchange rate is a pervasive and complex mechanism, influencing and being influenced by many different forces, with the effects and the relative importance of the different influences continuously changing as conditions change. To the extent that trade flows are a force in the market, competitiveness is obviously important to the exchange rate, and the many factors affecting competitiveness must be considered. To the extent that the money market is a factor, the focus should be on short-term interest rates, and on monetary policy and other factors influencing those short-term interest rates. To the extent that portfolio capital flows matter, the focus should be broadened to include bond market conditions and long-term interest rates. Particularly at times of great international tension, all other factors affecting the dollar exchange rate may be overwhelmed by considerations of “safe haven.” Indeed, countless forces influence the exchange rate, and they are subject to continuous and unpredictable changes over time, by a market that is broad and heterogenous in terms of the participants, their interests, and their time frames.

With conditions always changing, the impact of particular events and the response to particular policy actions can vary greatly with the circumstances at the time. Higher interest rates might strengthen a currency or weaken it, by a small amount or by a lot—much depends on why the interest rates went up, whether a move was anticipated, what subsequent moves are expected, and the implications for other financial markets, decisions, or government policy moves. Similarly, the results of exchange rate changes are not always predictable: Importers might expect to pay more if their domestic currency depreciates, but not if foreign producers are “pricing to market” in order to establish a beachhead or maintain a market share, or if the importers or exporters had anticipated the rate move and had acted in advance to protect themselves from it.

Nonetheless, those participating in the market must make their forecasts, implicitly and explicitly, day after day, all of the time. Every piece of information that becomes available can be the basis for an adjustment of each participant’s viewpoint, or expectations—in other words, a forecast, informal or otherwise. When the screen flashes with an unexpected announcement that, say, Germany has reduced interest rates by a quarter of one percent, that is not just news, it is the basis for countless assessments of the significance of that event, and countless forecasts of its impact in number of basis points.

Those who forecast foreign exchange rates often are divided into those who use “technical” analysis, and those who rely on analysis of “fundamentals,” such as GDP, investment, saving, productivity, inflation, balance of payments position, and the like. Technical analysis assumes certain short-term and longer-term patterns in exchange rate movements. It differs from the “random walk” philosophy—the belief that all presently available information has been absorbed into the present exchange rate, and that the next
In the end, it is up to each market participant to decide, in each particular situation, which factors are likely or not likely to move an exchange rate, and what the impact on market expectations will be. It is a matter of judgment; market participants must read the market, decide which data are important, how much weight to give them, and whether and in what way to react—and often these assessments must be made very quickly. Among the considerations to keep in mind in assessing a new piece of information:

1. The Institutional Setting
   - Does the currency float, or is it managed—and if so, is it pegged to another currency, basket, or other standard?
   - What are its intervention practices? Are they credible, sustainable?

2. Fundamental Analysis
   - Does the currency appear overvalued or undervalued in terms of PPP, balance of payments, FEER?
   - What is the cyclical situation, in terms of employment, growth, savings, investment, and inflation?
   - What are the prospects for government monetary, fiscal, and debt policy?

3. Confidence Factors
   - What are market views and expectations with respect to the political environment, and the credibility of the government and central bank?

4. Events
   - Are there national or international incidents in the news; possibility of crises or emergencies; governmental or other important meetings coming up?

5. Technical Analysis
   - What trends do the charts show? Are there signs of trend reversals?
   - At what rates do there appear to be important buy and sell orders? Are they balanced? Is the market over-bought, over-sold?
   - What are the thinking and expectations of other market players and analysts?

Nearly all traders acknowledge their use of technical analysis and charts. According to surveys, a majority say they employ technical analysis to a greater extent than “fundamental”
As in some other major industrial nations with floating exchange rate regimes, in the United States there is considerable scope for the play of market forces in determining the dollar exchange rate. But also, as in other countries, U.S. authorities do take steps at times to influence the exchange rate, via policy measures and direct intervention in the foreign exchange market to buy or sell foreign currencies. As noted above, in practice, all foreign exchange market intervention of the U.S. authorities is routinely sterilized—that is, the initial effect on U.S. bank reserves is offset by monetary policy action.

No one questions that monetary policy measures can influence the exchange rate by affecting the relative attractiveness of a currency and expectations of its prospects, although it is difficult to find a stable and significant relationship that would yield a predictable, precise response. But the question of the effectiveness of sterilized intervention, which has been extensively studied and debated, is much more controversial. Some economists contend that sterilized intervention can have, at best, a modest and temporary effect. Others say it can have a more significant effect by changing expectations about policy and helping to guide the market. Still others believe that the effect depends on the particular market conditions and the intervention strategy of each situation.

3. Official Actions to Influence Exchange Rates

As in some other major industrial nations with floating exchange rate regimes, in the United States there is considerable scope for the play of market forces in determining the dollar exchange rate. But also, as in other countries, U.S. authorities do take steps at times to influence the exchange rate, via policy measures and direct intervention in the foreign exchange market to buy or sell foreign currencies. As noted above, in practice, all foreign exchange market intervention of the U.S. authorities is routinely sterilized—that is, the initial effect on U.S. bank reserves is offset by monetary policy action.

No one questions that monetary policy measures can influence the exchange rate by affecting the relative attractiveness of a currency and expectations of its prospects, although it is difficult to find a stable and significant relationship that would yield a predictable, precise response. But the question of the effectiveness of sterilized intervention, which has been extensively studied and debated, is much more controversial. Some economists contend that sterilized intervention can have, at best, a modest and temporary effect. Others say it can have a more significant effect by changing expectations about policy and helping to guide the market. Still others believe that the effect depends on the particular market conditions and the intervention strategy of each situation.
Given the present size of U.S. monetary aggregates, balance of payments flows, and the levels of activity in the foreign exchange market and other financial markets, it is widely accepted that any effects of sterilized intervention are likely to be through indirect channels rather than through direct impact on these large aggregates. Empirical tests of sterilized intervention have focused on two main channels through which such intervention might indirectly influence the exchange rate: the \emph{portfolio balance channel} and the \emph{expectations, or signaling, channel}.

The \emph{portfolio balance channel} postulates that the exchange rate is determined by the balance of supply and demand for available stocks of financial assets held by the private sector. It holds that sterilized intervention will alter the currency composition of assets available to the global private sector, and that if dollar and foreign currency-denominated assets are viewed by investors as imperfect substitutes, sterilized intervention will cause movements in the exchange rate to re-equilibrate supply and demand for dollar assets. The size of this portfolio balance effect would depend on the degree of substitutability between assets denominated in different currencies and on the size of the intervention operation.

The \emph{expectations, or signaling, channel} holds that sterilized intervention may cause private agents to change their expectations of the future path of the exchange rate. Thus, intervention could signal information about the future course of monetary or other economic policies, signal information about, or analysis of, economic fundamentals or market trends, or influence expectations by affecting technical conditions such as bubbles and bandwagons.

A considerable number of studies have found no quantitatively important effects of sterilized intervention through the portfolio balance channel. Some studies have found expectations or signaling effects of varying degrees of significance. Others conclude that the effectiveness depends very much on market conditions and intervention strategy.

There are serious data and econometric problems in studying this question. To assess success, the researcher needs to know the objective of the intervention and other specific details—was the aim to ameliorate a trend, stop a trend, reverse a trend, show a presence, calm a market, discourage speculation, or buy a little time? The researcher also needs to know the counterfactual—what would have happened if the intervention had not taken place. Also, research on this issue must be placed in the broader context of research on exchange rate determination, which, as noted above, indicates that it has not been possible to find stable and significant relationships between exchange rates and any economic fundamentals.

As a practical matter, it is difficult to make sweeping assessments about the success or failure of official intervention operations. Some intervention operations have proven resoundingly successful, while others have been dismal failures. The success or failure of intervention is not so much a matter of statistical probability as it is a matter of how it is used and whether conditions are appropriate. Is the objective reasonable? Does the market look technically responsive? Is intervention anticipated? Will an operation look credible? What is the likely effect on expectations?

In 1983, the Working Group on Foreign Exchange Market Intervention established at the Versailles summit of the Group of Seven warned against expecting too much from official intervention, but concluded that such
intervention can be a useful and effective tool in influencing exchange rates in the short run, especially when such operations are consistent with fundamental economic policies. Unquestionably, intervention operations are more likely to succeed when there is a consistency with fundamental economic policies, but it may not always be possible to know whether that consistency exists.

Although attitudes differ, monetary authorities in all of the major countries intervene in the foreign exchange markets at times when they consider it useful or appropriate, and they are likely to continue to do so. The current attitude toward foreign exchange market intervention is summarized in the following excerpt from the June 1996 report of the finance ministers of the Group of Seven nations:

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**CONTINUING CLOSE G7 COOPERATION IN EXCHANGE MARKETS**

Exchange rate misalignments can heighten uncertainty in the global economy and can be detrimental to growth and trade. When exchange rates appear to move out of line with underlying fundamentals, close monitoring is necessary and coordinated responses may be required.

We should continue our close cooperation in exchange markets in this foundation, taking into account the fact that:

- A clear and consistent articulation of a common G7 view can have a stabilizing influence and help reinforce the credibility of our commitment to cooperate in the exchange market when circumstances warrant;

- interventions can be effective in certain circumstances, especially when they reinforce changes in policies and/or underlying fundamentals that lead to changes in market expectations about future exchange rates;

- the instrument of intervention must be used judiciously, given its implications for monetary policy and the amount that the authorities can mobilize relative to the size of international capital markets. Nevertheless, these factors do not impede our joint ability to send a clear message to the markets, if and when appropriate;

- interventions are more likely to be effective when they are concerted and reflect a common assessment;

- an important condition for success is the appropriate timing of intervention.