Foreign currency futures: reducing foreign exchange risk

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The wide fluctuations in foreign exchange rates since the 1971 breakdown of the Bretton Woods System of fixed exchange rates have introduced a new element of risk into international transactions. The possibility of large losses has forced most corporations to turn to the forward market to limit the adverse effects of exchange rate movements. Major international banks have traditionally provided forward cover to their international customers as a means of hedging foreign exchange exposures. In recent years, however, the International Monetary Market in Chicago has emerged as a significant alternative facility for reducing foreign exchange risk by offering contracts in foreign currencies for future delivery.

A hypothetical transaction is helpful in demonstrating the nature of this risk. Suppose that a U.S. firm, through its foreign subsidiary, had contracted at the beginning of 1982 to sell machine tools to a Japanese firm for 200 million yen, the tools to be delivered and paid for at the end of June. At the yen/dollar exchange rate prevailing in early January, the total revenue received by the U.S. firm, after selling the yen for dollars in the foreign exchange market, would have been 200 million yen divided by 218.45 yen/dollar, or $915,541.31. Assuming production and transportation cost of $800,000, the sale would have yielded a profit of $115,541.31. However, at the exchange rate prevailing at the end of June when payment in yen was actually made, 254.95 yen/dollar, the revenue received by the U.S. firm would have been only $784,467.54 turning what otherwise would have been a substantial profit into a not inconsiderable net loss of $15,532.46.

To have specified that the payment be fixed in dollars would not have eliminated the risk, but would only have transferred it from the U.S. firm to the Japanese firm. Clearly, the risks associated with movements in exchange rates are too large to be ignored in business decision making. An overview of foreign exchange market trading in general and of currency futures in particular illustrates how these contracts can help reduce such risks.

Fixed and floating exchange rates

An exchange rate is simply the price of one country's currency in terms of another. Like the prices of other goods and commodities, exchange rates are determined by market forces of supply and demand. Unlike other goods and commodities, however, foreign currencies are not generally purchased for their own sake; they are used as a medium of exchange for foreign goods, services, and securities.

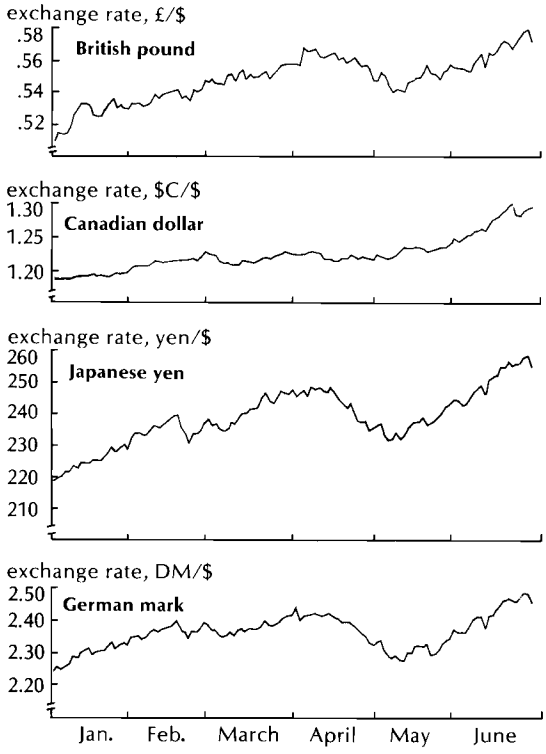
The quantity of foreign goods and services demanded varies over time due to changes in prices and tastes. These changes alter the demand and supply of foreign currencies and thus their prices. Because exchange rates reflect basic economic forces, they are inherently unstable in a world of unexpected economic changes.

Instability of exchange rates traditionally has been viewed as an important deterrent to international commerce. Varying exchange rates cause the effective prices of foreign goods and services to fluctuate, introducing an element of uncertainty and risk into international transactions. The desire to reduce this uncertainty led to the adoption of the Bretton Woods International Monetary System of relatively fixed exchange rates in 1945.

While the fixed exchange rate system may have been desirable from a commercial viewpoint, its rigid exchange rates failed to reflect the divergent economic trends in the postwar world. The resulting pressures brought the system down in 1971. After a period of turmoil that lasted from 1971 to 1973, an international monetary system based on relatively freely fluctuating exchange rates emerged.

The exchange rate volatility that characterized the resulting system increased the need for foreign exchange facilities capable of protecting operating capital from the risks of adverse exchange rate movements. That need was met by the expansion of the forward market in foreign currencies.

Figure 1: The dollar rose sharply against other major currencies in the first half of 1982



The forward market

The interbank forward market developed as a medium for hedging foreign exchange risks incurred by banks. Trading takes place on a 24-hour worldwide market with participants linked by telecommunications. Access to the market is generally limited to financial concerns dealing in very large quantities of foreign exchange at a "wholesale" level. Major banks in the United States and other countries, along with some multinational corporations and wholesale brokers, form the core of the interbank market.

The two basic types of foreign exchange operations on the interbank market are "spot" and "forward" transactions. In a typical spot transaction, a bank's customer may require one million Deutsche marks to settle an import bill. He requests Bank A in Chicago to purchase the marks for him. The bank purchases the marks from Bank B in Frankfurt, West Germany, at a rate of $.5000/DM. Bank A credits $500,000 to Bank B's account on its books (DM1,000,000×$.5000/DM) while Bank B credits one million Deutsche marks to Bank A's account in Frankfurt. Bank A then settles its customer's bill by transferring the balance from its DM account at Bank B to the account of the German exporter at Bank C in Bonn, Germany. This transaction typically takes two days to complete.

A forward transaction differs from a spot transaction in that the delivery date of a particular amount of foreign currency takes place at a specified date in the future. The maturity of a forward contract can be days, weeks, or months in the future, with the size and delivery date of the contract tailored to the individual needs of the customer. The ability to contract future delivery of a currency eliminates foreign exchange risk.

Consider for example, an importer in the United States who wants to purchase 500 motorcycles from a German manufacturer. He places an order on June 1 with payment in marks due September 1. He is faced with the possibility that the German mark may appreciate against the U.S. dollar between June and

September, raising the importer's costs in terms of dollars.

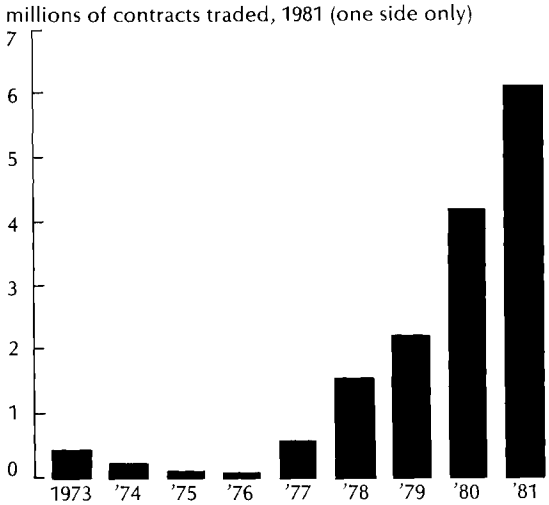
To avoid the risk, the importer can enter into a contract in June to have the marks delivered in September at an exchange rate that is fixed at the time the contract is made. The importer's bank would either use its own resources or arrange with another bank for the delivery of marks on September 1. On the maturity date of the contract, the U.S. bank accepts delivery of the marks at a German bank and makes the balance available to the importer who then settles his import bill. By hedging his exchange exposure through a forward transaction, the importer locks in an exchange rate and frees himself from the risk of an adverse exchange rate movement.

Forward contracts created by banks traditionally provided good protection against foreign exchange risk at minimal cost for many corporations involved in international transactions.[1] Access to the forward market, however, was limited to those customers who maintained regular banking relationships with banks writing the forward contracts. Smaller companies involved in international transactions and those wishing to take a position in foreign currencies for speculative and other nontrade purposes were largely excluded from the market.

An alternative: futures in foreign exchange

Futures trading in foreign currencies was introduced by the Chicago Mercantile Exchange through the establishment of the International Monetary Market (IMM) as an alternative to the regular forward contracts offered by commercial banks. The IMM was conceived as an extension of the already well-established commodity futures markets in which specific quantities of corn, wheat, soybeans, and other commodities were bought and sold for delivery at specified future dates. Trading in futures contracts in foreign exchange began in May 1972.

Figure 2: Currency futures trading has grown rapidly on the IMM



SOURCE: IMM Division of Chicago Mercantile Exchange.

Trading on the IMM has grown rapidly, particularly since the system of freely floating exchange rates of major currencies was adopted in early 1973. The number of currency contracts traded on the IMM reached 436,000 in 1973 and grew to more than 6 million by 1981.

The growth in foreign currency futures trading indicates that the IMM has fulfilled a market need that was not fully met by major foreign exchange trading banks. The IMM has grown by catering to individuals, businesses, and financial concerns that find the interbank market impractical or unsuitable for their needs.

The structure of IMM

The International Monetary Market is a division of the Chicago Mercantile Exchange (CME). Futures contracts traded on the CME

[1] A currency may be sold for future delivery at a rate that may be either higher or lower than the spot rate of that currency, depending mostly on the relative interest rates on assets denominated in the two relevant currencies. For example, if interest rates were higher in Germany than in the United States at the time the forward contract is executed, the German mark for delivery in three months would most likely be sold at a discount from the spot rate, say, at $.4980/DM rather than at the spot rate of $.5000/DM.

include major agricultural commodities such as pork bellies and cattle. The IMM division provides trading facilities for the purchase and sale for future delivery of precious metals such as gold, and financial instruments such as foreign currencies and U.S. Treasury bills.

The IMM operates within the organizational structure of the CME. The CME itself is composed of the Exchange administration, members, clearing members, and the Clearing House. Each plays a specific role in the operation of the markets.

The Exchange administration is responsible for the day-to-day operation of trading facilities. Professional staff and employees in its five major departments collect and distribute data on the various markets, ensure the technical operation of trading facilities, and enforce regulations necessary to maintain orderly markets and preserve the financial integrity of the Exchange.

There are approximately 600 CME members and 700 IMM members who act as floor brokers in the execution of trades. Members have trading floor privileges and voting rights, may serve on Exchange committees, and, as associate brokers of member firms, receive a percentage of trading commissions. Members who trade for accounts other than their own must be licensed by the Commodity Futures Trading Commission (CFTC). All members must carry accounts with clearing members in order to conduct personal transactions.

A clearing member is one of approximately 85 firms that have qualified for membership in the CME or IMM Clearing House. Clearing members represent major securities and commodities firms, subsidiaries of bank holding companies, and commercial trading organizations. Clearing firms play a central role in the operation of the market since all trades must be carried on the books of a clearing member. The CME does not deal directly with public customers. All trading activity is conducted through clearing members. They, in turn, deal directly with the Exchange.

The Clearing House is an important regulatory body of the CME and a guarantor of the Exchange's financial integrity. The Clearing House is party to all trades, and guarantees performance on all contracts by assuming the opposite side of each transaction in an intermediary role. At the conclusion of each trading session, clearing firms (which the Clearing House regards as the actual buyers and sellers of contracts since all public transactions are ultimately carried on the books of clearing members) settle their accounts with the Clearing House.

The Clearing House verifies and matches all transactions by assuring that clearing firms on both sides agree. It then redistributes money from "losers" to "winners." Customers' accounts are settled daily in cash to reflect real profits or losses, thereby limiting debt exposure to one day's market fluctuations. Since the Clearing House becomes, in effect, buyer for every seller, and seller for every buyer, customers need not concern themselves with the identity of the party assuming the opposite side of a transaction. Each party may liquidate its position without contact with the individual with whom the original trade was made.

The currency futures contracts

The basic unit of foreign exchange on the IMM is the currency futures contract. The futures contract provides for the future delivery of a specified amount of a foreign currency at a particular date, time, and place. Fulfillment of a contract, depending on whether one is a buyer or seller, is satisfied by accepting or by making delivery of the specified currency on the value date of the contract. A buy or sell position can also be closed out by making an offsetting purchase or sale of an equivalent contract prior to the expiration of trading for the contract.

Every futures contract must be backed by a margin deposit. Margin is simply a security deposit that guarantees performance on one's side of a contract. The exchange sets initial margin requirements and subsequent maintenance levels based on the price volatility of the various commodities. An adverse price movement greater than the difference be-

Figure 3: Trading on the IMM is heaviest in German mark, Swiss franc, and British pound

*Fewer than 5,000 contracts.
SOURCE: IMM Division of Chicago Mercantile Exchange.

tween the initial margin and the maintenance margin would require the trader to bring his account balance up to the initial margin level.

Foreign exchange trading on the IMM is limited to eight major currencies, with contract sizes and minimum and maximum daily price fluctuations specified by the Exchange. Contracts are set for delivery on the third Wednesday of March, June, September, and December. Price quotations are in terms of U.S. dollars per unit of foreign currency.

Hedgers and speculators

Participants in futures trading are divided between hedgers and speculators. Foreign exchange hedgers include banks, brokers, multinational corporations, and other commercial and financial concerns that require protection against adverse exchange rate movements. The hedger expects his profits to come from managerial skill in conducting his business activities, not from incidental fluctuations in exchange rates. The hedger uses the futures market as a management tool for fixing the exchange rates that affect his business activities. For the hedger, the currency futures contract works as an insurance policy.

A hedger may place his contract with another hedger who wishes to cover his currency needs in the opposite direction. Typically, however, the other party to the contract is a speculator. The speculator plays a vital role in the futures market by assuming the risk of the hedger. His presence gives the market liquidity and continuity and eases entry and exit. The speculator buys and sells currency contracts in the hope of profiting from exchange rate movements.

Speculation offers potentially large profits due to the highly leveraged nature of futures trading. Since margin requirements are typically about 5 percent of the value of a contract, it is possible to control large amounts of currencies with relatively little capital. For example, a contract for delivery of 125,000 German marks may be controlled for $1,500. If a speculator bought a German mark contract at a price of $.5000/DM, a rise in the value of the DM of 2 percent would result in a profit to the speculator of $1,250. However, the same leverage could lead to equally substantial losses.

Futures trading

Like a forward contract, a currency futures contract can be used to fix the level of an exchange rate for some time in the future. For example, consider the IMM contract in Deutsche marks (DM). The contract is for DM125,000. At a rate of $.5000/DM the contract's current value would be $.5000/DM x DM125,000, or $62,500. An import company needing DM125,000 three months from now would purchase a contract through a broker after depositing an initial margin of $1,500.[2] The value of the contract would fluctuate daily based on the movement of the exchange rate as determined in the market.

Suppose the German mark begins to rise in value relative to the dollar on the world's foreign exchange markets. The futures price

[2]Brokers may require account levels significantly higher than the minimum margin levels set by the Exchange.

on the IMM would typically move in sympathy with the movement of the spot exchange rate. Suppose that the price of the German mark for delivery in March rises from $.5000/DM to $.5060/DM, the maximum daily fluctuation permitted under the rules of the Exchange. As a result of the appreciation, the value of the DM125,000 contract is now $63,250, $750 higher than the initial price of $62,500.

If the price of the German mark remains at that level until March, the individual who sold the contract to the importer must spend $63,250 to purchase the amount of marks he contracted to deliver. The clearing member through which the contract was sold will require him to add $750 (the amount by which the value of the contract has increased) to his account. The money is then channeled through the Clearing House to the broker who arranged the contract for the import company. Such settlements take place daily based on price fluctuations that occur as the contract progresses to maturity.

Suppose that, at the time the contract matures, German marks can be purchased on the world's spot foreign exchange market at an exchange rate of $.6000/DM. The import company has two options: (1) it can ask the seller of the contract to deliver DM125,000 to the company for $62,500 as contracted; (2) it can liquidate the contract on the last trading day. Choosing the latter option, the company would "sell back" or liquidate the contract by obtaining from the broker the deposit (less some agreed-upon commission) plus the $12,500 that the broker collected from the seller as the value of the contract appreciated.[3]

The company then enters the spot market and purchases the DM125,000 it needs at a cost of $75,000. This is $12,500 more than the same amount of marks cost three months ago when the rate was at $.5000/DM. The increase in cost exactly matches the amount that the company received from the resale of the contract ($75,000 - $62,500 = $12,500). By using a futures contract, the company has achieved its goal of protecting itself against a possible loss arising from a fluctuation in the exchange rate in essentially the same way as if it had purchased the currency for future delivery in the forward market.

While the principle of protection against currency price fluctuations is the same in the future and forward markets, there are two major features that differentiate the two markets.[4] First, the forward market offers contracts for specific amounts of currencies tailored to particular needs, while the futures market offers only standardized contracts in the predetermined amounts noted in the table above. As a result, a customer wanting to protect his account payable of, for example, DM200,000 could only cover a portion of the risk (DM125,000) in the futures market but could arrange for full coverage in a single contract in the forward market.

The second difference concerns the maturities of forward and futures contracts. A forward contract can be written for the exact date when the foreign currency is needed or is to be disposed of. The futures contract has a standardized delivery date. If a user wishes to lift his hedge before the expiration date of the futures contract, he must be prepared to assume some risk of a currency price fluctua-

[3]Accrued profits are available at any time, not exclusively at the time the contract is offset.

[4]Several other differences arise from the particular structural features of the futures and forward markets. First, most forward contracts are settled by actual delivery of a specific currency on the value date of a contract. In contrast, since the futures market offers only four major delivery dates each year, most futures contracts are liquidated prior to their expiration dates. Second, the futures market, unlike the forward market, has a central clearing body. Customer's accounts are settled daily upon the conclusion of trading to reflect real profits or losses. Debt exposure is limited to one day's market fluctuations. Moreover, the Exchange guarantees performance on all contracts. Performance on a forward contract, in contrast, is contingent upon the financial integrity of the party assuming the opposite side of the contract. Third, information costs may be lower in the futures market than in the forward market. For example, if a bank is asked to write a forward contract for a customer, it might contact several different banks and brokers in search of the best exchange rate. In the futures market, however, a customer need not search for the best rate since the market rate on the most recent futures transaction is the best rate available to the customer at that time.

tion between the time when the foreign currency is actually needed for the settlement of the transaction and the delivery date of the contract. However, since prices in the spot and futures markets generally move in the same direction by similar amounts due to arbitraging between the two markets, this risk can be minimized in a properly structured hedge, as the following examples illustrate.

Forward pricing hedge

On December 1, a firm in the United States is considering importing 5,000 Swiss watches at a cost of SF125,000 with payment and delivery due on March 1. The Swiss currency is presently selling for $.5395/SF in the spot market and $.5417/SF in the futures market for delivery next March 15. Given the other costs of marketing the watches, the importer decides that the futures exchange rate is low enough for him to purchase the watches and make a profit on the transaction. However, the importer must pay for the watches on March 1, though the expiration date of the futures contract is March 15. He can hedge most of his exposure by purchasing a March Swiss franc contract on December 1 with the intention of lifting the hedge on March 1.

December 1

	Spot market	Futures market (for March 15 delivery)
Exchange rate:	$.5395/SF	$.5417/SF
Cost of SF125,000:	$67,437.50	$67,712.50
Action taken:	None	Purchase March 15 contract

At the existing futures market price of $.5417/SF, the importer has now assured himself that the cost of SF125,000 will be $67,712 (SF125,000 x $.5417/SF) on March 15. He has locked in the approximate cost of the watches that he is importing. The only risk he still faces arises from the difference in the value of the contract on March 1 when he must liquidate it, and its value on its March 15 maturity date. How this risk is covered is illustrated below.

Suppose that by March 1 the Swiss franc has appreciated and is selling in the spot foreign exchange market at a rate of $.6442/SF. On the futures market, the price of the Swiss franc for delivery on March 15 has risen to $.6450/SF so that the contract for delivery of 125,000 Swiss francs now trades for $80,625. The importer takes the following actions:

March 1

	Spot market	Futures market (for March 15 delivery)
Exchange rate:	$.6442/Sf	$.6450/SF
Cost of SF125,000:	$80,525	$80,625
Action taken:	Buy SF125,000	Sell March 15 contract

On March 1, the importer purchases SF125,000 in the spot market and settles his import bill. The $80,525 expenditure for spot francs, however, is higher than the $67,712.50 approximate anticipated cost based on the futures contract he purchased on December 1 ($80,525 - $67,712.50). However, the value of the futures contract he sold on March 1 is $12,912.50 higher than its original value on December 1. The $12,912.50 gain from the futures transaction more than offsets the difference between his anticipated cost and his actual cost. The risk that the importer assumed on December 1 by purchasing a contract whose maturity did not coincide with the March 1 usage date of the currency resulted in a windfall gain of $100. The gain arose from the difference between the spot rate and the futures rate (the "basis") prevailing on the day the contract was liquidated (SF125,000 x $.0008/SF).

The basis, unlike the spot exchange rate itself, is relatively stable and narrows toward zero as the contract moves toward maturity. For example, the basis on December 1 was $.0022/SF ($.5417/SF - $.5395/SF) while by March 1 it had shrunk to $.0008/SF ($.6450/SF-$.6442/SF). The degree of uncertainty about the futures price diminishes further as the contract approaches its March 15 expiration

date. On that date, the futures price coincides with and, in effect, becomes the spot exchange rate.

In the preceding example the $.0008/SF basis on March 1 accounted for the windfall gain of $100. This gain might easily have been a loss of a similar magnitude had the exchange rate of the Swiss franc depreciated during the period in which the contract was outstanding. The important point, however, is that the importer was protected from any major loss regardless of exchange rate movements. For example, if the importer had not purchased the futures contract and instead waited to buy the necessary SF125,000 on the day he needed them (March 1) the watches would have cost an additional $12,812.50.[5] Aside from the relatively minor risk associated with changes in the basis, the futures contract protected the importer just as a purchase of forward currency in the foreign exchange market would have done.

Selling hedge

Another use to which the forward and futures markets in foreign currencies may be put is in hedging a future sale of currency. Suppose that on December 15 a Chicago investor decides to invest $1 million in excess funds in a three-month British sterling certificate of deposit (CD) presently yielding 20 percent at an annual rate. He expects to realize a $50,000 return on his investment, more than he could have realized by investing in the domestic market. The investor buys British pounds in the spot market and purchases the CD from a British bank. At the same time, he sells enough British pounds in the futures market to cover the principal and accrued interest at the time of maturity of the CD. By hedging his exposure, he effectively locks in an exchange rate for three months in the future and assures that the income from the deposit will not be lost in reconverting back to U.S. dollars even if the British pound subsequently falls in value. The following table summarizes the transaction:

December 1

	Spot market	Futures market (for March 15 delivery)
Exchange rate:	$2.0000/£	$2.0050/£
Cost of £500,000:	$1,000,000	$1,052,625
Action taken	Bought £500,000	Sold March contracts for £525,000*

*£500,000 principal plus £25,000 anticipated interest earnings.

Suppose that by March 15 the British pound has depreciated so that on the day the investor's contract matures the exchange rate is $1.8500/£. The investor undertakes the following transactions:

March 15

	Spot market	Futures market (for March 15 delivery)
Exchange rate:	$1.8500/£	$1.8500/£
Cost of £525,000:	$971,250	$971,250
Action taken.	Sold £525,000	Bought matured contracts for £525,000* (offset)

The $81,375 difference between the cost of the contract when it was sold in December and the cost at which it was liquidated in March ($1,052,625 - $971,250) is more than enough to compensate the investor for the lower-than-expected receipt from his spot transaction. Had the investor not hedged his investment, he would have suffered a loss of $28,750 on the transaction ($1,000,000 - $971,250). By locking in the higher $2.0050/£ exchange rate on the future British pound in December, he realized the anticipated return of $50,000 on his investment and also obtained a windfall profit of $2,625 ($81,375 gain on futures transaction minus $50,000 accrued interest minus $28,750 loss on spot transaction).

[5]Of course, had the Swiss franc depreciated, his profits would have been higher than anticipated.

Conclusion

The establishment of the International Money Market by the Chicago Mercantile Exchange some ten years ago has proved to be a milestone in the evolution of futures markets. The introduction of futures trading in foreign currencies represented a dramatic departure from the traditional use of futures markets as mechanisms for hedging the price risk of transactions in commodities such as wheat, corn, and soybeans.

Futures trading in foreign exchange marked the beginning of futures markets in a wide range of financial instruments, including Treasury Bills, government notes and bonds, Eurodollars, bank certificates of deposit, and stock market indexes. The rapid growth of trading on these markets indicates that the innovation of financial futures satisfied a real and growing need.

The development of foreign currencies futures trading has provided a valuable supplement to the forward market by offering a lower-cost hedging facility to users who find the forward market impractical or unsuitable for their needs. Accordingly, the IMM has contributed to the expansion of international commerce and, in doing this, has benefited consumers.