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“Foreign exchange”

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The *foreign exchange market* is where foreign currency – e.g., the yen or euro or pound – is traded for domestic currency – e.g., the U.S. dollar. It is not a centralized location, but a decentralized network, that is nevertheless highly integrated, via modern information and telecommunications technology.

According to a triennial survey, average daily global turnover in traditional foreign exchange markets reached \$1.9 trillion in April 2004.¹ In addition, there was \$1.2 trillion of trading in *derivatives* such as forwards and options. In the spot market, parties contract for delivery of the foreign exchange immediately. In the forward market, they contract for delivery at some point such as 3 months in the future. In the option market, they enter a contract that allows one party to buy or sell foreign exchange in the future, but does not require it. Most of the trading is among banks, either on behalf of customers or on their own account. The counterparty to the transaction could be another dealer, another financial institution, or a non-financial customer. The survey reported that 89% of the trading involved the dollar on one side of the transaction or the other. (That the dollar is used as a *vehicle currency* explains why its trading volume is so high: if someone wants to go from Malaysian ringgit to South African rand, they pass through the dollar on the way.) Next, 37% of foreign exchange transactions involved the euro, 20% the yen, 17% the British pound, 6 % the Swiss franc, 5% the Australian dollar, 4% the Canadian dollar, and so on. London is the world’s largest center for trading foreign exchange at 31% of turnover. Next comes the United States, at 19%, Japan at 8%, and Singapore and Germany at 5% each.

The exchange rate is the price of foreign currency. For example, the exchange rate between the United Kingdom and the United States is usually stated in dollars per pound sterling (\$/£); an *increase* in this exchange rate is a *depreciation* of the dollar. Some countries *float* their exchange rate, which means the central bank (the country’s monetary authority) does not buy or sell foreign exchange, and the price is instead determined in the private marketplace. Like other market prices, the exchange rate is determined by supply and demand – in this case supply and demand for foreign exchange.

Some countries, instead of floating, *fix* their exchange rate, at least for periods of time. To do so, the central bank buys (or sells) however much foreign exchange is left over after the private market trades. The result is to prevent the price from falling

¹ In the most recent survey from the Bank for International Settlements, published September 2004, Basel.

(or rising). This “excess demand” (or “excess supply”) for foreign exchange is the same thing as the *balance of payments deficit* (or surplus). It adds together purchases and sales of foreign exchange on the current account (e.g., for imports and exports of goods and services), and purchases and sales on the capital account (e.g., lending abroad or borrowing from abroad). If a central bank is running an overall balance of payments surplus, it is adding to its holdings of foreign exchange (reserves) over time, and in turn paying out domestic exchange to the public. If it runs a balance of payments deficit, it is running down its holdings of foreign exchange reserves, and taking in domestic exchange. An increase in foreign exchange reserves will add to the money supply, which could lead to inflation, if it is not offset by the monetary authorities via what are called *sterilization* operations.

Still other countries follow some regime *intermediate* between pure fixing and pure floating. (Examples include bands or target zones, basket pegs, crawling pegs, and adjustable pegs) central bank may, for example, *intervene* in the foreign exchange market by *leaning against the wind*: it would sell foreign exchange when the exchange rate is going up, thereby dampening its rise, and conversely when it is going down. The motive is to reduce the variability in the exchange rate (Private speculators may do the same thing. Such “stabilizing speculation” – buying low and selling high – is more likely to be profitable than the reverse strategy!).

Until the 1970s, exports and imports of merchandise were the most important sources of supply and demand for foreign exchange. Today financial transactions overwhelmingly dominate. When the exchange rate goes up, it is generally because market participants decided to buy the currency in the hope of good returns. Economists believe that macroeconomic fundamentals determine exchange rates in the long run. The value of a country’s currency is thought to react positively, for example, to: an increase in the growth rate of the economy, an increase in its trade balance, a fall in its inflation rate, or an increase in its interest rate (its real interest rate, i.e., inflation-adjusted).

One simple model determining long-run equilibrium exchange rate is based on the quantity theory of money. The domestic version of the quantity theory says that a one-time increase in the money supply is soon reflected as a proportionate increase in the domestic price level. The international version says that the increase in the money supply is also reflected as a proportionate increase in the exchange rate. The exchange rate, as the relative price of money (domestic per foreign) can be viewed as determined by the demand for money (domestic relative to foreign), which is in turn influenced (positively) by the rate of growth of the real economy, and (negatively) by the inflation rate.

One elegant theory of exchange rate determination is the “*overshooting model*” of Rudiger Dornbusch. In this theory, an increase in the real interest rate, due for example to a tight monetary policy, causes the currency to appreciate more in the short run than it will in the long run. An advantage of this theory (over the international quantity theory of money) is that it can account for fluctuations in the

real exchange rate, not simply the nominal exchange rate. The real exchange rate is defined as the nominal exchange rate deflated by price levels (foreign relative to domestic). It is the real exchange rate that matters most for the real economy. If a currency has a high value in real terms, this means that its products are selling at less competitive prices on world markets, which will tend to discourage exports and encourage imports. If the real exchange rate were constant, then *purchasing power parity* would hold: the exchange rate would be proportionate to relative price levels. Purchasing power parity does not in fact hold in the short run, not even approximately. But there does seem to be some tendency for it to hold in the long run.


It is extremely difficult to predict *ex ante* the direction in which exchange rates will move in the short run. Often they are viewed as following a random walk, implying that a future increase is as likely as a decrease. Short-run fluctuations are difficult to explain even after the fact. Some short-run movements no doubt reflect attempts by market participants to ascertain the future direction of macroeconomic fundamentals. But many short-run movements are hard to explain, and may be due to ineffable determinants such as speculative bubbles or “market sentiment.” Those who trade foreign exchange for a living generally look at economists’ models of fundamentals when thinking about horizons of one year or longer. At horizons of a month or less they tend to rely more on “technical analysis” or other methods unrelated to economic fundamentals.

Exchange rate volatility is very high. Thus even those with strong and well-founded theories about the likely direction of future movements must acknowledge the high level of uncertainty. But economists often focus on the concept of the mean or *expected value* of the distribution of possible future outcomes. Forecasts differ, even among knowledgeable observers. Indeed, it is the differences in opinion that give rise to much of the very high volume of trade in foreign exchange. In other words, in every transaction there is a buyer and a seller, and usually they have opposite views regarding likely future movements in the exchange rate.

The most common way of trying to ascertain what average opinion is to look at the forward exchange rate. The forward exchange market is where participants exchange dollars for foreign currency for delivery, say, one year in the future, but at a price determined today. If a currency is selling at a forward premium against the dollar, i.e., the dollar price of the currency is higher on the one-year forward market than on the spot market, the situation is sometimes described as “the forward market thinks the currency will appreciate against the dollar” over the coming year. Unfortunately, the forward rate seems in practice to be a bad predictor of the future exchange rate. The future spot rate tends, if anything, to move in the *opposite* direction from that forecasted by the forward rate, at least as often as in the indicated direction! Researchers have never been able to decide definitively whether this is a sign of irrationality on the part of speculators or something else. The usual technical explanation is called an *exchange risk premium*. Exchange risk premiums are compensation that risk-averse investors require in order to expose themselves to risk.

Risk premiums may be small. But they are positively influenced both by *uncertainty* and by the quantity of assets such as *bonds* that are issued by government and that investors must thereby hold. Economists find it convenient to assume that markets are efficient, which means that speculators are rational, and also that transactions costs are low and all markets exist (e.g., forward exchange is in principle attainable in currency and at any maturity). The implication of the *efficient markets hypothesis* would be that the market exchange rate reflects all the information available to traders.

Possible barriers to the movement of capital across national borders include transactions costs, government controls, and risk of default. Industrialized countries had all but eliminated such barriers by the 1990s. Typical developing countries, despite a degree of market opening, still have substantial barriers. In the absence of such barriers, we say that capital is highly mobile, i.e., financial markets are highly integrated. In this case *arbitrage* is free to operate: investors buy assets in countries where they are cheap and sell them where they are expensive, and thereby bring prices into line. Arbitrage works to bring interest rates into parity across countries. The surest form of arbitrage brings about *covered interest parity*. It drives the forward discount into equality with the differential in interest rates.

It is less clear if *uncovered* interest parity holds. If it did, the differential in interest rates would equal  only the forward discount, but also the expected rate of future change in the exchange rate. One reason uncovered interest parity could easily fail is the existence of an exchange risk premium. If uncovered interest parity holds, then countries can finance unlimited deficits by borrowing abroad, so long as they are willing and able to pay the going world rate of return. But if uncovered interest parity fails, then countries will find that the more they borrow, the higher the rate of interest that they must pay.