INTERNATIONAL FINANCE

4. Course: The Quotation of Exchange Rate, Cross Exchange Rate, arbitrage.

Basic definitions

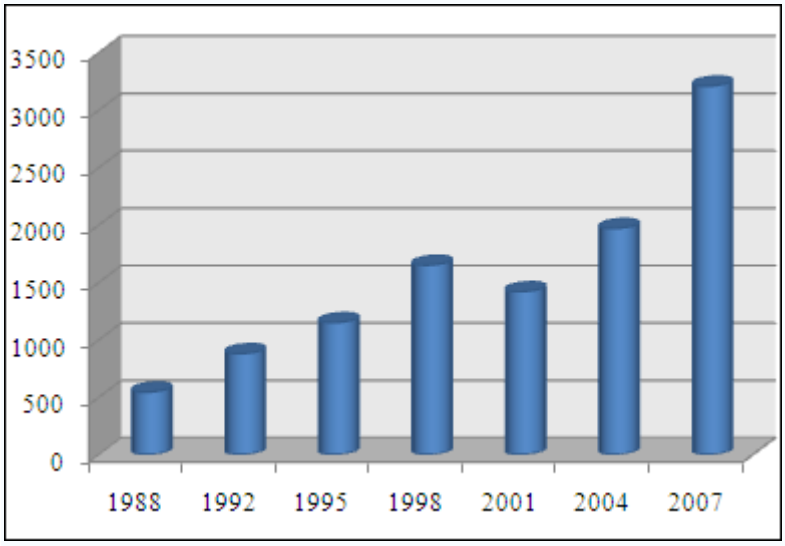
The exchange rate (also known as the foreign-exchange rate) between two currencies specifies how much one currency is worth in terms of the other.

The foreign exchange (currency or forex or FX) market exists wherever one currency is traded for another. It is by far the largest financial market in the world, and includes trading between large banks, central banks, currency speculators, multinational corporations, governments, and other financial markets and institutions. The average daily trade in the global forex and related markets currently is over US$ 3 trillion. Retail traders (individuals) are a small fraction of this market and may only participate indirectly through brokers or banks.

The foreign exchange market is unique because of

- its trading volumes,
- the extreme liquidity of the market,
- the large number of, and variety of, traders in the market,
- its geographical dispersion,
- its long trading hours: 24 hours a day (except on weekends),
- the variety of factors that affect exchange rates.
- the low margins of profit compared with other markets of fixed income (but profits can be high due to very large trading volumes)

Global foreign exchange rate market turnover (USD trillion)



For example an exchange rate of 23 Slovak crown (SKK) to the United States dollar (USD) means that SKK 23 is worth the same as USD 1.

The spot exchange rate refers to the current exchange rate. The forward exchange rate refers to an exchange rate that is quoted and traded today but for delivery and payment on a specific future date.

An exchange rate quotation is given by stating the number of units of "term currency" or "price currency" that can be bought in terms of 1 *unit currency* (also called *base currency*). For example, in a quotation that says the EURUSD exchange rate is 1.3 (1.3 USD per 1EUR), the term currency is USD and the base currency is EUR.

There is a market convention that determines which is the base currency and which is the term currency. In most parts of the world, the order is: EUR - GBP - AUD - NZD - USD - *** (where *** is any other currency). Thus if you are doing a conversion from EUR into AUD, EUR is the base currency, AUD is the term currency and the exchange rate tells you how many Australian Dollars you would pay or receive for 1 Euro.

Cyprus and Malta, which were quoted as the base to the USD, were recently removed from this list when they joined the Euro. In some areas of Europe and in the non-professional market in the UK, EUR and GBP are reversed so that GBP is quoted as the base currency to the Euro. In order to determine which is the base currency where both currencies are not listed

(i.e. both are ***), market convention is to use the base currency which gives an exchange rate greater than 1.00. This avoids rounding issues and exchange rates being quoted to more than 4 decimal places. There are some exceptions to this rule e.g. the Japanese often quote their currency as the base to other currencies.

Quotes using a country's home currency as the *price currency* (EUR 1.00 = $1.45 in the US) are known as *direct quotation* or *price quotation* (from that country's perspective) and are used by most countries.

Quotes using a country's home currency as the *unit currency* (£0.4762 = $1.00 in the US) are known as *indirect quotation* or *quantity quotation* and are used in Great Britain and are also common in Australia, New Zealand and the Eurozone.

- **direct quotation: 1 foreign currency unit = x home currency units**
- **indirect quotation: 1 home currency unit = x foreign currency units**

Note that, using direct quotation, if the home currency is strengthening (appreciating, or becoming more valuable) then the exchange rate number decreases. Conversely if the foreign currency is strengthening, the exchange rate number increases and the home currency is depreciating.

When looking at a currency pair such as EURUSD, the first component (EUR in this case) will be called the base currency. The second is called the term currency. For example: EURUSD = 1.33866, means EUR is the base and USD the term, so 1 EUR = 1.33866 USD.

Currency pairs are often incorrectly quoted with a "/" (forward slash). In fact if the slash is inserted, the order of the currencies should be reversed. This gives the exchange rate. e.g. if EUR1 is worth USD1.35, Euro is the base currency and Dollar is the term currency so the exchange rate is stated EURUSD or USD/EUR. To get the exchange rate divide the USD amount by the Euro amount e.g. 1.35/1.00 = 1.35

Exchange rate regime

If a currency is free-floating, its exchange rate is allowed to vary against that of other currencies and is determined by the market forces of supply and demand. Exchange rates for such currencies are likely to change almost constantly as quoted on financial markets, mainly by banks, around the world. A movable or adjustable peg system is a system of fixed exchange rates, but with a provision for the devaluation of a currency.

For example, between 1994 and 2005, the Chinese yuan renminbi (RMB) was pegged to the United States dollar at RMB 8.2768 to $1. China was not the only country to do this; from the

end of World War II until 1970, Western European countries all maintained fixed exchange rates with the US dollar based on the Bretton Woods system.

Fluctuations in exchange rates

A market based exchange rate will change whenever the values of either of the two component currencies change. A currency will tend to become more valuable whenever demand for it is greater than the available supply. It will become less valuable whenever demand is less than available supply (this does not mean people no longer want money, it just means they prefer holding their wealth in some other form, possibly another currency).

Increased demand for a currency is due to either an increased transaction demand for money, or an increased speculative demand for money. The transaction demand for money is highly correlated to the country's level of business activity, gross domestic product (GDP), and employment levels. The more people there are unemployed, the less the public as a whole will spend on goods and services. Central banks typically have little difficulty adjusting the available money supply to accommodate changes in the demand for money due to business transactions.

The speculative demand for money is much harder for a central bank to accommodate but they try to do this by adjusting interest rates. An investor may choose to buy a currency if the return (that is the interest rate) is high enough. The higher country's interest rates, the greater the demand for that currency. It has been argued that currency speculation can undermine real economic growth, in particular since large currency speculators may deliberately create downward pressure on a currency in order to force that central bank to sell their currency to keep it stable (once this happens, the speculator can buy the currency back from the bank at a lower price, close out their position, and thereby take a profit).

Nominal and real exchange rates

- The nominal exchange rate e is the price in domestic currency of one unit of a foreign currency.
- The real exchange rate (*RER*) is defined as RER = e x (P^* / P), where P is the domestic price level and P^* the foreign price level. P and P^* must have the same arbitrary value in some chosen base year. Hence in the base year, $RER = e$.

The RER is only a theoretical ideal. In practice, there are many foreign currencies and price level values to take into consideration. Furthermore, the model is based on purchasing power parity (PPP), which implies a constant RER.

Arbitrage

In economics and finance, arbitrage is the practice of taking advantage of a price differential between two or more markets: a combination of matching deals are struck that capitalize upon the imbalance, the profit being the difference between the market prices.

An arbitrage is a transaction that involves no negative cash flow at any probabilistic or temporal state and a positive cash flow in at least one state; in simple terms, a risk-free profit. *A person who engages in arbitrage is called an arbitrageur*. The term is mainly applied to trading in financial instruments, such as bonds, stocks, derivatives, commodities and currencies.

If the market prices do not allow for profitable arbitrage, the prices are said to constitute an arbitrage equilibrium or arbitrage-free market. An arbitrage equilibrium is a precondition for a general economic equilibrium. The assumption that there is no arbitrage is used in quantitative finance to calculate a unique risk neutral price for derivatives.

Conditions for arbitrage

Arbitrage is possible when one of three conditions is met:

1. The same asset does not trade at the same price on all markets ("the law of one price").
2. Two assets with identical cash flows do not trade at the same price.
3. An asset with a known price in the future does not today trade at its future price discounted at the risk-free interest rate (or, the asset does not have negligible costs of storage; as such, for example, this condition holds for grain but not for securities).

Arbitrage is not simply the act of buying a product in one market and selling it in another for a higher price at some later time. The transactions must occur *simultaneously* to avoid exposure to market risk, or the risk that prices may change on one market before both transactions are complete. In practical terms, this is generally only possible with securities and financial products which can be traded electronically.

Examples

- Suppose that the exchange rates (after taking out the fees for making the exchange) in London are £5 = $10 = ¥1000 and the exchange rates in Tokyo are ¥1000 = £6 = $12. Converting ¥1000 to $12 in Tokyo and converting that $12 into ¥1200 in London, for a profit of ¥200, would be arbitrage. In reality, this "triangle arbitrage" is so simple that it almost never occurs. But more complicated foreign exchange arbitrages, such as the spot-forward arbitrage are much more common.

- A common arbitrage involves borrowing at lower short term rates and investing at higher long term interest rates while pocketing the spread. The risk is that short term loan rates rise higher.
- One example of arbitrage involves the New York Stock Exchange and the Chicago Mercantile Exchange. When the price of a stock on the NYSE and its corresponding futures contract on the CME are out of sync, one can buy the less expensive one and sell the more expensive. Because the differences between the prices are likely to be small (and not to last very long), this can only be done profitably with computers examining a large number of prices and automatically exercising a trade when the prices are far enough out of balance. The activity of other arbitrageurs can make this risky. Those with the fastest computers and the smartest mathematicians take advantage of series of small differentials that would not be profitable if taken individually.

Price convergence

Arbitrage has the effect of causing prices in different markets to converge. As a result of arbitrage, the currency exchange rates, the price of commodities, and the price of securities in different markets tend to converge to the same prices, in all markets, in each category. The speed at which prices converge is a measure of market efficiency. Arbitrage tends to reduce price discrimination by encouraging people to buy an item where the price is low and resell it where the price is high, as long as the buyers are not prohibited from reselling and the transaction costs of buying, holding and reselling are small relative to the difference in prices in the different markets.

Arbitrage moves different currencies toward purchasing power parity. As an example, assume that a car purchased in the United States is cheaper than the same car in Canada. Canadians would buy their cars across the border to exploit the arbitrage condition. At the same time, Americans would buy US cars, transport them across the border, and sell them in Canada. Canadians would have to buy American Dollars to buy the cars, and Americans would have to sell the Canadian dollars they received in exchange for the exported cars. Both actions would increase demand for US Dollars, and supply of Canadian Dollars, and as a result, there would be an appreciation of the US Dollar. Eventually, if unchecked, this would make US cars more expensive for all buyers, and Canadian cars cheaper, until there is no longer an incentive to buy cars in the US and sell them in Canada. More generally, international arbitrage opportunities in commodities, goods, securities and currencies, on a grand scale, tend to change exchange rates until the purchasing power is equal.

Factors affecting currency trading

Although exchange rates are affected by many factors, in the end, currency prices are a result of supply and demand forces. The world's currency markets can be viewed as a huge melting pot: in a large and ever-changing mix of current events, supply and demand factors are constantly shifting, and the price of one currency in relation to another shifts accordingly. No other market encompasses (and distills) as much of what is going on in the world at any given time as foreign exchange.

Supply and demand for any given currency, and thus its value, are not influenced by any single element, but rather by several. These elements generally fall into three categories: economic factors, political conditions and market psychology.

1. Economic factors

These include economic policy, disseminated by government and central banks, economic conditions, generally revealed through economic reports, and other economic indicators.

Economic policy comprises government fiscal policy (budget/spending practices) and monetary policy (the means by which a government's central bank influences the supply and "cost" of money, which is reflected by the level of interest rates).

Economic conditions include:

Government budget deficits or surpluses: The market usually reacts negatively to widening government budget deficits, and positively to narrowing budget deficits. The impact is reflected in the value of a country's currency.

Inflation levels and trends: Typically, a currency will lose value if there is a high level of inflation in the country or if inflation levels are perceived to be rising. This is because inflation erodes purchasing power, thus demand, for that particular currency. However, a currency may sometimes strengthen when inflation rises because of expectations that the central bank will raise short-term interest rates to combat rising inflation.

Economic growth and health: Reports such as gross domestic product (GDP), employment levels, retail sales, and a country's economic growth and health.

2. Political conditions

Internal, regional, and international political conditions and events can have a profound effect on currency markets.

For instance, political upheaval and instability can have a negative impact on a nation's economy. The rise of a political faction that is perceived to be fiscally responsible can have the opposite effect. Also, events in one country in a region may spur positive or negative interest in a neighboring country and, in the process, affect its currency.

3. Market psychology and trader perceptions influence the foreign exchange market in a variety of ways:

Flights to quality: Unsettling international events can lead to a "flight to quality," with investors seeking a "safe haven". There will be a greater demand, thus a higher price, for currencies perceived as stronger over their relatively weaker counterparts.

Long-term trends: Currency markets often move in visible long-term trends. Although currencies do not have an annual growing season like physical commodities, business cycles do make themselves felt. Cycle analysis looks at longer-term price trends that may rise from economic or political trends.

Economic numbers: While economic numbers can certainly reflect economic policy, some reports and numbers take on a talisman-like effect: the number itself becomes important to market psychology and may have an immediate impact on short-term market moves. "What to watch" can change over time. In recent years, for example, money supply, employment, trade balance figures and inflation numbers have all taken turns in the spotlight.

Technical trading considerations: As in other markets, the accumulated price movements in a currency pair such as EUR/USD can form apparent patterns that traders may attempt to use.

Literature:

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