*Chapter* **1**

# Introduction to the Currency Option Market

The topic of this book is the specialized area of options on foreign exchange. Attention will be focused on plain-vanilla European puts and calls on foreign exchange as well as on some of the more popular exotic varieties of currency options.

Commercial and investment banks run the currency option market. The same money-center dealers that constitute the core of the spot and forward foreign exchange market are the most powerful market makers of currency options. For this reason, this book generally uses the conventions and terminology of the interbank foreign exchange option market.

Currency options are used by currency hedgers, traders, speculators, portfolio managers, and, on occasion, central banks.

## History and Size of the Market

Trading in currency options began in the 1970s and 1980s in the venue of the listed futures and options markets of Chicago, Philadelphia, and London. Trading was concentrated in options and futures options on only a handful of major exchange rates. A structural change occurred in the 1990s, when the bulk of trading in currency options migrated "upstairs" to bank dealing rooms, to the detriment of the organized exchanges.

Once installed in the domain of the interbank foreign exchange market, option trading exploded in volume. What is more, currency options began to key off of the full gamut of exchange rates. In the mid 1990s, trading in exotic currency options began to develop at a rapid pace. Today, dealers routinely supply two-way bid-ask prices for a wide spectrum of exotic currency options. How-

DeRosa_001_122 11/10/99 1:17 PM Page 2



ever, the largest appetites for exotic currency options are for barrier options. The market for basket options, average rate currency options, compound currency options, and quantos options is smaller, yet not insignificant.

The currency option market can rightfully claim to be the world's only truly global, 24-hour option market. The currency option market is among the largest of the option markets by trading volume. It is impossible to be precise about its overall size because the majority of trading in currency options is done in the private interbank market. But some rough estimates are reported in a survey done by the Bank for International Settlements (BIS). The most recent BIS survey estimated that the daily volume of currency option trading was $86.9 billion in face value in April 1998. Notable is that the number was only $41.2 billion when the same survey was done in April 1995.

The BIS survey reported that the largest portions of currency option trading are done in U.S. dollar/Japanese yen and the German mark (against a variety of currencies). In January 1999, the launch of the first round of the European Monetary Union meant that the new common currency, the euro, began to replace the German mark in foreign exchange derivatives trading.

## Option Basics

The underlying asset for currency options is foreign exchange. The elementary foreign exchange transaction, called a spot deal, is a contract to deliver and receive sums of foreign currency for value in two bank business days.

Foreign exchange also trades on forward basis for value beyond the spot value date. Forward deals are routinely transacted for settlement on future spot value dates in one week, one month, three months, six months, and one year. The market exchange rate for forward dealing is called the forward outright.

Currency options are calls and puts on sums of foreign currency. They are the right but not the obligation to buy or sell a sum of currency at a fixed strike price on or before the option's expiration date.

Consider the following option on dollar/yen:

DeRosa_001_122 11/10/99 1:17 PM Page 3



*USD call/JPY put*

| | |
|---|---|
| Face amount in dollars | $10,000,000 |
| Option put/call | Yen put |
| Option expiry | 90 days |
| Strike | 120.00 |
| Exercise | European |

This option is a call option on the U.S. dollar (USD) or equivalently, a put option on the Japanese yen (JPY). It grants its owner the right but not the obligation to receive $10,000,000 in exchange for delivery of 1,200,000,000 yen ($10 million × 120.00) at option expiration. This is an example of a standard, or *vanilla,* currency option.

European exercise means that an option can be exercised only on the last day of its life. Upon exercise, a currency option triggers a spot foreign exchange transaction done at the strike price and for settlement on the spot value date.

Barring exceptional circumstances, this option should be exercised if the spot exchange rate is above 120.00 on the expiration date. Likewise, a USD put/JPY call struck at the 120.00 should be exercised at expiration if the spot exchange rate is below 120.00. Interbank currency options can be transacted at practically any strike, but the most popular exercise price is at the prevailing forward outright (this is called *at-the-money-forward*).

European exercise currency options are surprisingly well understood using a simple adaptation of the Black-Scholes option-pricing model. In fact, Black-Scholes concepts and terminology permeate the currency option market. Option prices are quoted not in terms of dollars and cents but rather in units of Black-Scholes implied volatility. Currency options themselves are identified by their Black-Scholes delta more frequently than by their actual strike price. Moreover, Black-Scholes concepts, like delta, gamma, theta, and vega, have become the basic vocabulary of option risk management.

Although the great mass of interbank currency options is European exercise, there are some American exercise currency options. By definition, an American exercise option can be exercised at any

DeRosa_001_122 11/10/99 1:17 PM Page 4



time in its life. American exercise currency options can be priced with the binomial option-pricing model and also with a variety of numerical approximation techniques.

## Exotic Options

An exotic currency option is an option that has some nonstandard feature that sets it apart from ordinary vanilla currency options. The foreign exchange market is a fertile ground for the invention of new exotic options.

The most popular exotic currency option is the barrier option. One type of barrier option is the *knock-out* option. A knock-out option is similar to a vanilla option except for the existence of a barrier exchange rate, called the *out-strike,* which when breached would cause the option to extinguish at any time during the option's life. For example, one could add an out-strike at 115.00 to the previously mentioned USD call/JPY put. This would mean that if dollar/yen were to trade at 115.00 before expiration, the option would cease to exist. Naturally, this option must cost less than its vanilla counterpart, which cannot be knocked out regardless of where dollar/yen trades.

There are also *double-barrier currency options*, which can be extinguished by either of two out-strikes.

A *binary option* pays a lump sum of cash if the option is in-the-money at expiration. Binary options too can have one or two barrier out-strikes.

Another exotic binary option is the one-touch. This option pays a lump sum of cash to the holder of the option if its barrier level is traded. A special form of binary exotic option, called the *double-barrier range binary,* has caught the attention of the trading community. This option pays a lump sum of cash at expiration provided that no barrier event takes place in the option's life. Double-barrier range binary options are used in volatility trading.

Although barrier currency options are mainly popular with traders and speculators, other types of exotic currency options are favorites with foreign exchange risk managers. A *basket* option is a put or a call on the aggregate value of a portfolio of foreign currencies. Basket options are popular because they offer economical

DeRosa_001_122 11/10/99 1:17 PM Page 5



solutions for hedging foreign exchange risk. *Compound options* are options on options. When one acquires a compound call option, one has the right but not the obligation to buy a vanilla call or put for a fixed compound strike price. *Average rate currency options* are cheap compared to vanilla options because their payoff at expiration is a function not of a single observation of the spot exchange rate but rather of an average of the spot exchange rate over a period of time. Still another exotic option for hedgers is the *quantos* option. The quantos option has a floating face amount that adjusts to the market value of the underlying portfolio that is the subject of the hedging program.