MANAGING SPOT RISK

Let us begin with looking at the hedging activities of a market maker in the US Dollar versus Japanese Yen spot foreign exchange (or to adopt the terminology of that market, USD - JPY FX). In terms of instruments used, this represents the simplest type of trading possible — it is completely one-dimensional, the trader’s position at any point in time can be represented as either long or short a certain quantity of JPY (or, completely equivalently, short or long a certain quantity of USD). In a more complex spot market, like the commodities market for wheat, a trader’s position would need to reflect being long or short different grades of wheat. But there are no grades in currencies — $1 million is $1 million, whether it is made up of 1,000 $100 bills or 10,000 $10 bills or 100,000,000 pennies.

Our market maker will be receiving orders throughout the day from customers who are either looking to sell JPY and buy USD or looking to sell USD and buy JPY. Each customer will state the quantity of USD they wish to sell and ask for a bid of the quantity of JPY which the market maker will exchange for it, or else state the quantity of JPY they wish to sell and ask for a bid of the quantity of USD the market maker will exchange for it. The market maker has available at all times trading screens which show the best bids currently available from other market makers for selling JPY in exchange for USD and for selling USD in exchange for JPY and is constantly submitting his/her own bids for these two trades for the consideration of other market makers. When a customer’s inquiry is for a small enough quantity, the market maker can guarantee a profit by quoting a bid just slightly higher than the best bid currently quoted on the trading screen — if the customer accepts the bid, the market maker will immediately be able to close out the position created by hitting the bid quoted on the trading screen and making as profit the small differences between the two. The only decision making required of the market maker is a judgment of how much of a margin to build in to the quote to the customer — the higher the margin, the higher the profit but the greater the chance that the customer will turn down the quote and seek a quote from another market maker. The size of margin quoted must depend on the market maker’s knowledge of the customer — how likely is this customer to be polling a large number of market makers simultaneously rather than just coming to a single firm seeking a quote. In practice, the decision making at a firm will probably be divided up between a trader and a salesperson, with the salesperson, who has close knowledge of and a continuing relationship with the customer, bearing primary responsibility for determining the size of margin quoted. The trader will only be credited, in the internal record keeping of the firm, with a small portion of this margin.

A trader who followed this risk-averse strategy would be unlikely to retain a job for long. The firm would probably judge that the profit the trader was making for the firm was not worth the opportunity cost of the trading “seat.” Higher profits would be likely to come from giving the seat to a more aggressive trader who would choose to take some risk by not closing positions out immediately. True that the more aggressive trader is running the risk that prices will move against him/her, but, assuming that the firm sees a decent flow of customer orders, it is likely that a customer order will soon come in on the
other side, and, on average, over time, the spread between the bid on each side of the market will be greater than losses from price movement through time.

When a large customer order comes in, then the market maker has no choice but to take some risk — the only choice is how to divide the risk between the liquidity risk of trying to offset the position immediately and the basis risk of offsetting the position over time. With a large order, the trader can no longer count on being able to close the position out at the price posted on the trading screen since this quote will only be for a reasonably small size transaction. Of course, the customer will be charged a premium for the liquidity risk posed by the size of the order, which will provide some cushion to the trader against the risk which must be taken. The trader needs to make a judgment as to the relationship of this large customer order to overall market conditions. Is it an order which simply reflects idiosyncratic circumstances of this one customer, perhaps a payment that needs to be made in the customer’s business? In this case, there is unlikely to be a relationship between the order and any price trend in the market. Unless the trader has some other reason to believe that the market will be trending in a direction which will cause losses to this position, it will be better to close the position slowly, relying on customer orders and small trades with other market makers, minimizing liquidity risk. On the other hand, if the large customer order is likely to be part of a large movement, such as a customer wanting protection against announcement of economic data which may impact the market, it may be better to close the position more quickly, bearing some liquidity cost in order to reduce the exposure to market trend. Almgren and Chriss’ article “Optimal Liquidation” shows how to calculate the efficient frontier of strategies which have the optimal tradeoff between the liquidity costs of offsetting the position in large blocs and the volatility risk (which we term basis risk) that the price at which the offset occurs differs from the price at which the position was put on. In the absence of price drift, the strategy with minimum liquidity cost is the one which spreads out the position covering over as long a period of time as possible, minimizing transaction size, and the strategy which minimizes volatility risk is the one in which the entire position is offset at once, with as little chance for prices to change as possible.

Thus far, we have pointed out two advantages to a market making firm of seeing good customer order flow — the increased likelihood of closing out positions at the favorable side of the bid spread and knowledge about the motives behind large orders. There are other advantages as well. Working with customers closely can allow a firm to anticipate a large order and to allow positions to accumulate through customer flow to meet part of the order in advance, thereby further lowering liquidity risk. When a firm’s traders have a market view and want to put on a position, customer order flow allows them to both put positions on and close out the positions more cheaply than if all positioning had to be done by aggressively seeking bids from other market makers. All of these advantages of customer order flow and tradeoffs of liquidity versus basis risk are present in all market making activities, but can be observed in their purest form in spot risk market making, where other complicating factors do not intrude.

Even for the simplest spot product, FX spot, there are other possible ways of closing positions over time. For example, another source of liquidity is to spread out the closing
of the position between the spot FX market and forward FX markets. This introduces a new basis risk in the form of risk of unfavorable interest rate movements between the time the forward position is put on and the time it is closed out, but lowers the time basis risk. The trader must judge which is the most favorable risk mix. A trader in the currency of a smaller economy, let us say one trading Danish Krone against USD might choose to temporarily hedge some of a position by a Euro-USD trade which will eventually be closed out by a Danish Krone-Euro trade. Adding a leg to the trade adds transaction costs, but adding another source of trading reduces liquidity risks and the trader’s judgment may be that the basis risk of a Danish Krone-Euro position is considerably smaller than that of a Danish Krone - USD position, given the closer tie of the Danish economy to the economy of the Eurobloc countries than to the US economy. When we move to more complex spot products like commodities or equities, the potential avenues for redirecting basis risk multiply enormously. A position in IBM stock could be temporarily hedged by an S&P index future, judging this basis risk to be smaller than an outright IBM stock position. A position in one grade of wheat could be temporarily hedged with a position in another grade of wheat which trades with greater liquidity.

Firm level risk management for spot risk is relatively straightforward. The more liquid spot positions can be marked-to-market by directly obtaining market prices. As a result, there is no need to utilize models for valuation and no need to establish reserves against possible model error. Most spot markets are sufficiently liquid that prices can be obtained from trading screens or closing prices on public exchanges, so it is not even necessary to arrange for price collection from brokers. For market making trading desks with reasonable customer order flow, positions should be marked to mid-market, since the presumption is that, on average, most positions can be unwound without needing to aggressively seek bids from other market makers. The possible adjustments to mid-market levels called for by the G-30 recommendations rarely apply to spot positions, since they can be closed out in a relatively short time frame and so do not give rise to significant administrative expenses or credit risk of maintaining a position. The only adjustment which might arise with any frequency is a close-out cost adjustment in the form of a reserve against liquidity risk if a spot position grows sufficiently large relative to the size of customer order flow that significant liquidity costs may arise in closing the position. For proprietary trading desks, positions should generally be marked to the side of the bid-offered spread which is least favorable for the position, since, in the absence of customer order flow, it should be presumed that position close-out will require aggressively seeking bids from market makers.

Less liquid spot markets may require some form of modeling for mark-to-market purposes. For example, an over-the-counter stock which does not trade very often or a commodity grade which is thinly traded may not have readily available price quotes. A model may need to be established which relates the price to a price of a more liquid instrument. For example, the over-the-counter stock price could be priced in relationship to a stock index or a less liquid commodity grade could be priced as a spread to a more liquid commodity grade. In this way, the MTM can be updated daily based on quotes for the more liquid instruments, with the relationship re-estimated less frequently, as reliable trading prices for the less liquid instrument are obtained. When models of this type are
used, a reserve is needed against the statistical uncertainty of the relationship between liquid and less liquid price being utilized. Liquidity reserves need to be considered against less liquid spot positions whether they are MTM using models or directly from price quotations. A particular form of liquidity reserve which firms often utilize for less liquid spot positions is a reserve against aged positions defined as positions in which no significant trading activity has recently taken place, since the most reliable way of pricing less liquid positions is to actually observe prices at which they can be transacted.

Issues of non-statistical limits and risk reporting to senior management for spot positions center completely around issues of which positions should be grouped together, since the position in any particular spot instrument is a single number. To illustrate this point, we’ll confine ourselves to the example of FX spot risk. Certainly a US dollar based firm will want to limit and to report to senior management its net FX spot exposure to USD. It will want to have individual currency limits for FX spot exposure for every currency it trades, with limit sizes set relative to the overall liquidity of the market for that currency and the firm’s degree of customer order flow in that currency, to assure that traders have explicit management approval to build up positions which will require large time periods to reverse. However, senior management would probably need to be informed only of positions in the most major currencies. What is open to question is which currency groupings does it make sense to have limits on net FX spot exposure for and to report to senior management on. For example, does a grouping of all Asian currencies make sense? A grouping of all Asian currencies excluding Yen, Australian Dollar, and New Zealand Dollar? Should Asian currencies be divided into groupings based on national GDP per head? Each firm will reach its own conclusions based on economic theory, trading experience, and perhaps, statistical analysis of which currency movements tend to occur together.