Econometrics II students


Daily transactions in foreign exchange markets in a recent year were worth $430 billion, when the daily US GNP was $22 billion and total world trade was only about $11 billion (per day). Hence such a huge market volume is attributed to speculation and the question is whether it makes markets more or less efficient.

The name UIP, uncovered interest parity suggests that it is not covered by hedging in forward markets and interest parity is the interest differential between domestic and foreign interest rates. The empirically estimable equation for the UIP model is:

$$W_{t+5} = W_t - 3\hat{A}_3 + \%_{t+5}$$  (1)

where $W_t$ denotes (possibly log) spot dollar price of foreign exchange (say, DMarks) at time $t$, $\hat{A}_3$ denotes current 5-period dollar interest rate, $\%_{t+5}$ denotes 5-period foreign (DMarks) interest rate, and $\%_{t+5}$ are errors. The left side may be written as $W_{t+5}$ and represents currency depreciation over k periods. The parity condition is satisfied if $W_{t+5}$ and $\%_{t+5}$ are equal.

The name FDB, forward discount bias model uses so-called forward prices. In foreign exchange markets 'forward' refers to (possible log) today's dollar price of foreign exchange to be delivered at a specific date 5 time periods out in the future denoted by $O_{t+k}$. Since forward discount is simply another measure of interest differential, we can substitute it in the (1) leading to the estimable equation for the FDB model as:

$$W_{t+5} = W_t - 0_{t+k} + \%_{t}$$  (2)

We rewrite (1) as autoregressive distributed lag model ADL(1,1)

$$C_0 \%_{t+1} + \%_{t} = B_0 \%_{t}$$  (3)

Using $5 \%_{t+1} = C_0$ denotes spot exchange rates of DM at month $t$, and $B_0 \%_{t} = 3\hat{A}_3$ where $\%_{t}$ is a monthly interest rate starting with annualized three-month interest rates on DM's in Germany and $3\hat{A}_3$ is similar interest rate in the US$\%$. For example, if the annualized interest rate is 8%, $3\hat{A}_3 = 1.08^{1/3}$ satisfies the equation $1.08 \%_{t} = 3\hat{A}_3$ often researchers simply divide by 12 to obtain montly interest rate, although this is not appropriate if monthly transactions are contemplated.

Clearly we need "#\%_{t} and "; \%_{t+1} for (3) to reduce to (1). Now a $\eta$ test of the parity condition requires "; \%_{t+1} = \;f_\land "; \%_{t+1}$ and "; \%_{t} = \;f_\land "; \%_{t}$

Often one uses the log transformation and annualization of interest rate is done by simply
multiplying or dividing by 12 or 4 as the case may be.

Phillips, et al Jof Applied Etrics vol 11, pp1-22, 1996 discusses robust tests for forward market efficiency with empirical evidence from 1920’s. The model is

\[ f = a + b s + \epsilon, \quad \epsilon \sim N(0, \sigma^2) \]

where \( f \) is for log forward exchange rate for a given currency contracted at time \( t \) for delivery at time \( t+k \), \( s \) is for log spot exchange rate. Market rationality and zero mean risk premium leads to \( a=0 \) and \( b=1 \).

\[ f_i = a_i + b_i s_j + \epsilon_i, \quad \epsilon_i \sim N(0, \sigma_i^2) \]

where affixes \( i,j \) refer to currencies of country \( i \) and \( j \). This takes care of multi-currency effects.