

Foreign Exchange Markets And Forward Exchange Rates

Market efficiency is a concept that is controversial and attracts strong views, pros and cons, partly because of differences between individuals about what it really means and partly because it is a core belief that, in large part, determines how an investor approaches investing. This report provides a simple definition of market efficiency considers the implication of an efficient market for investors and summarizes some of the basic approaches that are used to investment schemes, thereby proving or disproving market efficiency. Besides this, in this report I am going to examine whether the forward exchange rates are unbiased predictors of future spot rates or not. As foreign exchange markets are composed of various theories and internationally accepted principles there are no consensus about the theories and implications.

Efficient market

Levich (1983) defines an efficient market as a market, where prices fully reflects all available public and private information. Efficient market is the market in which the security prices reflect all available information and adjust instantly to any new information. It therefore means that the market is efficient when forward rates accurately forecasts future spot rates. Salavatore (1993) argues that markets are efficient when prices correctly reflect the scarcity of the various resources resulting in allocation efficiency. Efficiency therefore, will also mean that economic agents will not be able to earn unusual profits by exploiting the available information.

The history of efficient market hypothesis could be traced back at least to the 1920s. In modern times Fama (1970) is credited as presenting a scholarly abstraction of efficient market hypothesis (EMH). According to his definition, there are three types of efficient market, depending upon the extent of the information reflected in the market:

Weak form: a market is said to be weak-form efficient if there is no relationship between the past price changes and the future price changes, in short the prices are independent. No trading rules can be developed to make abnormal returns based on the past history of an asset's prices or returns.

Semi-strong form: semi-strong form EMH states that no abnormal profits or returns can be made by developing a trading rule based on publically available information. The semi-strong form encompasses the weak form because past history is publically available. Public information also includes non-market information, e.g. economic news, company accounts and stock splits.

Strong form: In a strong efficient market not only public but also private information is available which can tell about future spot rates. Therefore no group of investors will be able to consistently derive any above-average profits. So the strong form states that the market should be perfect in which all the information is available to everyone at the same time.

Efficient market hypothesis

The efficient market hypothesis (EMH) has played an important role in understanding foreign exchange market efficiency especially in the past few decades. It states that if economic agents are risk-neutral; all available information is used rationally; the market is competitive; there are no taxes, transaction costs, or other frictions; then the foreign exchange market will be efficient in the sense that the expected rate of return to speculation in the forward exchange market will be zero (Geweke and Feige, 1979 and Hansan and Hodrick, 1980). The EMH also implies that since forward rates fully reflect available information concerning investor's expectations of future spot rates, the forward rates should be unbiased forecasts of the future spot rates. Technically, an efficient market is one in which observed exchange rate deviations from their long run value can be explained within information and transaction costs. So, in the absence of any new and relevant information, exchange rates will reflect their fundamental values and there will be no opportunities for deriving above-average profits. Thus excess profit or return from business can be defined as:

$$Z_{j, t+1} = r_{j, t+1} - E(r_{j, t+1} | I_t) \quad (1)$$

Where $r_{j, t+1}$ is the actual one period rate of return for holding currency j in the period ending at time $t+1$ and $E(r_{j, t+1} | I_t)$ is the expected value of that return conditional on the information set available at t . according to equation the foreign exchange market is efficient if, on average, expectation errors are zero. [$E(z_{j, t+1} | I_t) = 0$] and these errors follow no pattern that might be exploited to produce profits ($z_{j, t}$ is uncorrelated with $z_{j, k+1}$ for any value of k).

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Implications of EMH in exchange rates

In the case of exchange rates, a serious complication exists in the application of the EMH. At one time, it was assumed that the forward exchange rate represented the market's expectation of the actual future value of the exchange rate. However, it is now realized that this need not be the case if risk aversion is a significant factor limiting international capital flows. Alternative theories about the causes of the bias in the forward rate are surveyed by Froot and Thaler (1990). A necessary arithmetic relation exists between the forward rate and the interest differential. For example, if the Canadian interest rate is 1 percentage point higher than its U.S. counterpart, then the one year forward rate for the Canadian dollar must represent a 1 percent depreciation of

the Canadian dollar vis-a-vis the U.S. dollar. This is called covered interest arbitrage, and if it did not hold then an opportunity would be available to make a riskless excess profit by lending in one country or the other. The forward rate is the mirror image of the interest rate differential that prevails between Canada and the United States, and in principle either one of the could be the cause of the other. If the forward rate were the market's actual expectation of the future value of the spot exchange rate, it would imply that interest rate differentials are determined by the expected change in the exchange rate embodied in the forward rate. In that case, Canada could have a higher interest rate than the United States only because the market expected the Canadian dollar to decline correspondingly in the coming year. To sum up, two alternatives are possible as to what the actual market expectation of the dollar's future value is. Suppose the spot rate is 80 cents, the one-year forward rate is 77 cents, and the Canadian one-year interest rate is 3 percentage points higher than its U.S. counterpart. This could mean either:

The market expects that the Canadian dollar will decline 3 percent over the coming year, and this is why money does not continue to flood into Canada until it eliminates the interest differential. (This would imply that the forward rate is the EMH predictor of the one-year-ahead exchange rate, because it always shows a 3 percent depreciation when the Canadian interest rate is 3 percentage points higher).

Alternatively, the market expects the exchange rate to stay about where it is now. In that case, why doesn't an infinite amount of money flood into Canada to eliminate that wide interest differential? Because, while the central expectation is that the Canadian dollar will remain unchanged, there is a perceived risk that it might depreciate as much as, perhaps, 10 percent, and it may also appreciate 10 percent. But if investors are risk averse, they will put greater weight on the risk of depreciation, and limit their investments in Canada at such a point that the Canadian interest rate remains well above the U.S. interest rates. Either one of these alternatives is possible. Therefore, EMH does not make any clear prediction about what the future value of the dollar will be.

Forward exchange rates are unbiased predictors of future spot rates

Forward rate is the currently determined rate of exchange for a transaction to be carried out in the future. For example, the 90-day forward rate is the exchange rate to be applied to a transaction which is agreed to be completed at the end of 90 days from the date of agreement. The spot exchange rate prevailing in the market at the end of the 90-day period may be referred as the future spot rate. To find whether forward rate can be used to predict the future spot rate or not, there is a hypothesis, which postulates that the forward exchange rates are unbiased predictors of future spot rates in the exchange market. Technically speaking, an unbiased predictor is one that is just likely to overestimate as to underestimate a value, but these errors in the opposite directions are likely to offset each other in the long run. As discussed above this hypothesis is

based on the assumption that for the major free floating currencies, the foreign exchange markets are reasonably efficient. Let us discuss this in light of an example:

The 30-day forward rate of British Pounds is \$1.40 and the general expectation of speculation is that the future rate of pound will be \$1.45 in 30 days. Since speculators expect the future spot rate to be \$1.45 and then sell them when received (in 30 days) at the spot rate existing then. If their forecast is correct, they will earn \$.05 per pound, i.e. \$1.45 - \$1.40. If a large number of speculators implement this strategy, the substantial forward purchases of pounds will cause the forward rate to increase until the speculative demand stops. Perhaps this demand will terminate when the forward rate reaches \$1.45, since at this rate no profit will be expected by implementing the strategy. Thus the forward rate moves toward the market's general expectation of the future spot rate. In this sense the forward rate serves as the market based forecast or predictor of the future spot rate, as it reflects the market's expectation of the spot rate at the end of the forward horizon (30 days in this case).

It can also be implied, If today's expectation of future exchange rate is unbiased, and if the forward and future prices equal that expectation, we would find that today's forward, on an average and in the long run equal the subsequently observed spot exchange rate. Thus there are two things to be considered: first, does the forward price equal the market's expectation of the future exchange rate? Second, is today's expectation of the future spot exchange rate unbiased? That is, does today's expectation of the future spot exchange rate equal the actual observed rate? Unfortunately, there is no truly accurate way to observe today's market expectation of future exchange rates. Therefore, most tests assume that the market expectation is an unbiased estimate of future spot exchange rate. Under this assumption scholars have tested the relationship between the forward and observed spot rate. They test the following equivalence:

$$F_{0,t} = S_t \dots\dots\dots (1)$$

Where, $F_{0,t}$ = the forward price at $t=0$ for contract expiring at time t and

S_t = the spot exchange rate observed at time t .

Testing the equivalence in above equation determines whether the forward price is a good estimate of the future spot rate of exchange. Even if there are large deviations between the two prices in equation, it is still possible that the forward price would provide a prediction of the future spot rate. An unbiased predictor is a predictor whose expected value equals the variable being predicted. In other words, if the quantity $F_{0,t} - S_t$ equals zero, on average, the forward prices would provide an unbiased estimate of the future spot rate of exchange.

Although the forward rates are predictors of future spot rates, but only in the condition of risk-neutrality. If risk – neutral speculators are available in sufficient quantity, their profit-seeking activity will drive the future prices toward equality with the expected future

spot price. And there are many factors which affect the future spot exchange rates like interest rates, inflation rates and price levels. So, the linkages among interest rates, price levels, expected inflation and exchange rates emphasizes the fundamental relationship that exists between the forward and future foreign exchange prices, on the one hand, and the expected future value of the currencies, on the other. To investigate this relationship let us consider the table shown in appendix.

It can be seen that in the left panel, a set of consistent exchange rates, interest rates, expected inflation rates and tortilla prices are presented for March 20, 2009. The right panel presents the expected spot exchange rate for March 20, 2010, along with expected tortilla prices, consistent with the expected levels of inflation in Mexico and United States. Assuming, all of these values hold and that the expected spot exchange rate in one year is MP 11 per dollar. With the Mar, 2010 future prices of 10.45 MP/\$, a speculative opportunity exists as follows. A speculator might buy futures contract for the delivery of dollars in one year for MP 10.45/\$. If the expectation that the dollar will be worth MP 11 in one year, will be correct, the speculator will earn a profit that results from acquiring a dollar via the futures market for MP10.45 and selling it for the price of MP 11. If we assume that risk-neutral speculators are present in the foreign exchange market, the discrepancy between the future prices of 10.45 MP/\$ and an expected spot exchange rate of 11 MP/\$ (at the time the future contract matures) cannot exist. In fact, given a profusion of risk-neutral speculators, the only expected spot exchange rate to prevail on March 20, 2010, which would eliminate the incentive to speculate, would be 10.45 MP/\$. Of course, different market participants have different expectations regarding inflation rates and expected future spot exchange rates, and this difference in expectations is the necessary requirement for speculation.

No predictor is perfect; therefore, it is possible that the forward or future prices may seem to be error-ridden. While earlier studies generally found that forward exchange prices were predictors of future spot rates, later studies clearly find bias and large errors in the future forecasts of subsequent spot prices. In summary, the errors in forecasts of future exchange rates appear to be large and biases do seem to exist in these forecasts, although the biases appear to be too small to allow profitable exploitation of efficient markets.

Conclusion:

Fama's 1965 insight- Efficient Market Hypothesis (EMH) irreversibly changed the way we look at financial markets. The impact of the theory of efficient markets has proven to be durable and seems likely to continue to be so, despite its inevitable and painfully obvious limitations. And there have been a number of studies of the forecasting accuracy of future and forward exchange rates. Most of these studies find significant errors or biases in the future based forecasts. However, compared with most professional forecasting services, the forward exchange rates still provides a superior forecast of future spot rates. Only if the investors are risk-neutral, then the forward rates may be a guide for predicting and determining the future spot rate. But normally, the

investors are risk- averse and they need some amount of premium over and above the forward rate and because of this premium the forward rate alone cannot shape the future spot rate.

References:

Aggarwal, R., Mohanty, K.S. & Lin, T.W. (2008). Are forward exchange rates rational forecast of future spot rates? An improved econometric analysis for the major currencies. 'Multinational finance journal'. 20 (2), pp-22-25.

Ball, R. (2009). The global financial crises and the efficient market hypothesis: what have we learned? 'Journal of applied corporate finance, forthcoming'. November, 5.

Buser, A.S., Karolyi, A.G. & Sanders, B.A. (1996). Adjusted forward rates as predictors of future spot rates. April, 1996.

Fama, E. (1970). 'Efficient capital markets: A review of theory and empirical work'. Journal of finance, 25, pp- 383-417.

Froot, Kenneth A & Thaler, Richard H, 1990. "Foreign Exchange," Journal of Economic Perspectives, American Economic Association, vol. 4(3), pages 179-92

Geweke, J. & Feige, E. (1979). " some joint test of efficiency of markets for forward foreign exchange", review of economics and statistics, 61, 334-41

Hansen, L.P. & Hodricks, R.J. (1980). "Forward exchange rates as optimal predictors of future spot rates: An economic analysis", Journal of political economy, 88, 829-53.

Kolb, W.R. & Overdahl, A.J. (2007). Futures, options and swaps (5th Eds). Oxford: Blackwell publishing.

Kumar, V.R. (2007). Testing forward rate unbiasedness in India: an econometric analysis of Indo-US forex market. 'International research journal of finance and economics', 12(4), pp 56-66.

Levich, R.M. (1983). Exchange rate forecasting techniques, in George, A.M and Giddy, I.H. (Eds). International finance handbook. New York: Wiley.

Nguyen, J. (2004). The efficient market hypothesis: Is it applicable to the foreign exchange market? Economics working paper series. University of Wollongong.

Salvatore, D. (1993). International economics. New York: Mac Millan Publishing.

Sarno, L. & Taylor, P.M. (2002). The economics of exchange rates. Cambridge: Cambridge university press.

Sharan, V. (2009). International financial management (5th Eds). New Delhi: PHI.

Stanley, M. (2009). Market efficiency and risk management. 'The journal of applied corporate finance', 21(4), pp- 98-99.