Forward Premium Anomaly and Risk Premiums in the Currency Markets : A Literature Review

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Abstract

The uncovered interest rate parity (UIP) is one of the most important theories explaining the relationship between the currency spot and futures rate. UIP states that under the assumption of rational expectations, the futures rate should be an unbiased predictor of the future spot rate. However, there is a vast literature that suggests that the UIP is empirically violated, and this condition is called forward premium anomaly. The forward premium anomaly is a condition when the forward rate is not an unbiased predictor of the future spot rate. One of the main reasons for the forward premium anomaly has been attributed to the presence of time-varying risk premiums. Prior studies have not been successful in addressing the issue of forward premium anomaly in the currency markets. In this paper, we presented an overview of the existing literature which explains the forward premium anomaly and the risk premium.

Keywords: **currency futures markets, forward premium, risk premiums, unbiasedness**

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For quite a long time, we have been seeing an increase in the number of studies that have tried to examine the various aspects of the foreign exchange markets. The large number of studies in this area are not surprising given the fact that large amount of currencies that are traded worldwide are quite far in excess than what is actually required in goods and services trade. The foreign exchange market is the most liquid market because of its volume. Given the same reason, all the participants in the market are expected to have uniform access to information and in turn they form their expectations about the future events in a rational manner. However, the belief of rational expectations is losing more ground due to the arrival of anomalies in the foreign exchange literature. One of the central issues in the literature of international financial markets has been the relationship between the currency forward rate and the realized spot rates. The uncovered interest rate parity (UIP) and the forward rate unbiasedness hypothesis (FRUH) are the most commonly used theories to establish the relationship between current forward rates and future spot rates.

UIP theory suggests that the expected future change in the spot rate is determined by the interest rate differential (or forward premium under the assumption of no arbitrage) between two countries or to be more precise, high yield currencies are expected to depreciate. The UIP theory under the assumption of no-arbitrage leads to the FRUH which states that the forward exchange rate (forward premium) should be an unbiased predictor of the

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future spot (future change in the spot exchange rate) rate at maturity of the contract. Hereby, unbiasedness means that the currency futures price should not be significantly different from the corresponding future spot prices. In other words, a regression of the spot rate at maturity on the current forward rate should yield a slope coefficient of one under the assumption of risk neutrality and rational expectations. Alternatively, a slope coefficient of one should also be obtained in the regression of percentage change in spot rates between now and maturity on the current futures-spot basis (forward premium) divided by the current spot rate.

However, the unbiasedness of the forward rate has been overwhelmingly rejected in a number of studies and the slope coefficient has been found to be significantly different from one, often even negative in a number of cases. The puzzle of the biasedness of the forward rate has been coined as the *forward premium puzzle* by Fama (1984) who states that the reason for the failure of UIP is a time-varying risk premium. Baillie and Bollerslev (2000) suggest the forward premium anomaly as a widespread empirical result in the literature and find that returns on most of the nominal exchange spot rates are negatively correlated to the forward premium. This finding implies that the forward rate is not an unbiased predictor of future spot rates. Tai (2003) states that the speculative return from holding a forward contract results from a risk premium that has to be paid to risk averse speculators who takes the risk of future changes in the exchange rates.

In this study, we provide an overview of the work in the foreign exchange literature that has been receiving significant attention over the last few years. The conclusions of our literature review can be described as: First, the empirical tests in majority of the studies routinely reject the FRUH. Second, the risk premium models have not been successful in explaining the magnitude of this biasedness.

Why do we Need to Care About Forward Premium Anomaly ?

The biasedness of the forward premium as a predictor for future change in spot exchange rate movements due the existence of a risk premium has been pointed out by a number of authors, see e.g. Fama (1984), Hodrick and Srivastava (1986), Wolff (1987), Kaminsky and Peruga (1990), Liu and Maddala (1992), Jabbour (1994), Baillie and Kilic (2006), Nikolaou and Sarno (2006), Chakraborty and Haynes (2008), Pippenger (2011), and so forth.

If the market for currency futures is efficient (i.e. the investors are risk neutral and rational) or the unbiasedness hypothesis holds, then the forward rate should be an unbiased predictor of the future spot rate conditional on all the information set (I_t) available at time t. The current futures rate F_t, for delivery at time $t+1$ should be an unbiased predictor of the future spot rate S_{t+1} at time $t+1$, that is,

$$E(S_{t+1} | I_t) = F_t \qquad (1)$$

This equation is supposed to be valid when the expectations theory holds in which case there will be no expected gain or loss from a position in the futures market i.e. the current futures price at time t will be equal to the market expectations of the future spot price at the delivery date (Jabbour, 1994 ; Jiang & Chiang, 2000). For estimation purposes, it would be more convenient to write equation (1) in logarithmic form as:

$$E(s_{t+1} | I_t) = f_t \qquad (2)$$

If we subtract current spot rate, from both sides of equation (2) we get,
where, $= f_t = \log F_t$, $= \log S_{t+1}$.

If we subtract current spot rate, S_t from both sides of equation (2) we get,

$$E(s_{t+1} | I_t) - s_t = f_t - s_t \qquad (3)$$

The term on the left side in (3) is the expected future change in the log of the spot exchange rate (expected forecast error) and $(f_t - s_t)$ is the forward premium or the basis. If we write (3) in the regression form assuming that rational expectations hold, we get the typical UIP equation suggested by Fama (1984) as:

$$S_{t+1} - S_t = \alpha + \beta (f_t - s_t) + \varepsilon_{t+1} \quad (4)$$

According to equation (4) if the coefficient β is found not to be significantly different from one, and the coefficient α is found to be zero, then the FRUH prevails and the forward rate would be an unbiased predictor of the future spot rate. We refer to equation (4) as the *Forward Premium Regression Equation*. However, the coefficient β is found to be different from one in the vast literature like Verschoor and Wolff (2001a, 2001b), Baillie and Killic, (2006), Nickolaou and Sarno (2006), Chakraborty and Haynes (2008), Wang and Wang (2009), Kumar and Hetamsaria, (2010), Frankel and Poonawala (2010), and the FRUH has been overwhelmingly rejected. Fama (1984) suggested that the reason for the coefficient β not to be one may be attributed to the presence of the time varying risk premium. However, other studies like Liu and Maddala (1992), Cavaglia et al. (1994), and Jongen et al. (2008) have suggested that FRUH has been rejected due to both the existence of risk premium and the lack of rational expectations.

Since the risk premium plays an important role, equation (3) takes the following form in presence of risk premium:

$$E(s_{t+1} | I_t)\, s_t = f_t - s_t + \pi_t \quad (5)$$

where, π_t is the risk premium on the futures contract. Risk premium may be defined as the difference between future spot rate at maturity and currency futures rate now; $(s_{t+1} - f_t)$, assuming that the rational expectations hypothesis holds. This definition of risk premium has been used in a number of studies like Hodrick and Srivastava (1984), Baillie and Bollerslev (1990), Kaminsky and Peruga (1990), Canova and Ito (1991), Peresetsky and de Roon (1997), Breuer (2000), Jiang and Chiang (2000), Chiang and Yang (2007), Chakraborty and Haynes (2008), Frankel and Poonawala (2010), and so forth [1].

Now, to understand the significance of risk premium and rational expectations, consider the difference between the expected and realized spot rate at *t+1*. Based on the rational expectations hypothesis, there should be no systematic pattern in the forecast error e_{t+1} which is the difference between the spot rate at maturity s_{t+1} and the expected spot rate forecast $E(s_{t+1} | I_t)$based upon the information set I_t, that is,

$$s_{t+1} = E(s_{t+1} | I_t)\, s_t = e_{t+1} \quad (6)$$

Combining equation (5) and (6), we get,

$$\Delta s_{t+1} = (f_t - s_t) + \pi_t + e_{t+1} \quad (7)$$

Equation (7) represents that the basis is a combination of realized change in spot exchange rate (realized forecast error) and the risk premium. Fama (1984) stated that the risk premium and realized change in spot exchange rate must sum to the basis, $(f_t - s_t)$. We will discuss this relationship further in next subsection.

From equation (4), the OLS estimate β for :

$$\beta = \frac{Cov\,(\Delta s_{t+1}, f_t - s_t)}{Var\,(f_t - s_t)} \quad (8)$$

Now, based on equation (6), the estimator for β in (8) can also be rewritten as:

$$\hat{\beta} = \frac{Cov\,(f_t - s_t, \pi_t)}{Var\,(f_t - s_t)} \quad \frac{Cov\,(f_t - s_t, e_{t+1})}{Var\,(f_t - s_t)} \quad (9)$$

[1] However, there are studies that have defined $(f_t - s_{t+1})$ as the risk premium. For example, Fama (1984), Cavaglia et al. (1994), Backus et al. (1995), Baum and Barkoulas (1996), Engel (1996), Wolff (2000), Landon and Smith (2003), Bams et al. (2004), Kiani (2009), Rezessy (2010), among others.

Hence, equation (9) provides statistical evidence that the risk premium and non-rationality play an important and significant role in moving the coefficient $\hat{\beta}$ away from unity. If we assume that there is no risk premium, i.e. the participants are risk neutral, then the second term on the right side of Equation (9) would become zero. Further, if the rational expectations hypothesis holds, the third term also becomes zero and the coefficient estimate $\hat{\beta}$ would statistically converge to one. Overall, as pointed out by Cavaglia et al. (1994), Landon and Smith (2003) and Jongen et al. (2008) both time-varying risk premiums and irrational expectations could be the reasons for observing the forward bias anomaly in many currency futures markets.

Literature Review

As we have mentioned before, the unbiasedness of currency forward rates and the relationship between currency forward rates and realized spot rates has been one of the central issues in the literature of international finance. One of the most influential studies is provided by Fama (1984), who attributed the behaviour of forward and spot exchange rates to a time-varying risk premium. In his analysis, Fama tests a model for joint measurement of variation in the premium and expected future spot rate components of the forward rates and tries to find an explanation for the forward premium anomaly. He has used the data for spot exchange rates and thirty-day forward rates for nine major currencies (Belgium, Canada, France, Italy, Japan, Netherlands, Switzerland, United Kingdom, and West Germany) taken from Harris Bank Data Base supported by the Centre for Studies in International Finance of the University of Chicago. He shows that the implied risk premium on a currency is negatively correlated with its expected rate of depreciation and that the premium must have greater variance. Although this paper is highly cited in the literature, it does not take into account the behaviour of forward rates and risk premiums with time, that is, it is not shown what pattern the forward premium anomaly follows and how the risk premium is related to the maturity of the contract.

Hodrick and Srivastava (1984) examined the risk premium in foreign exchange markets using a statistical model based on theoretical models of asset pricing. They find evidence of heteroskedasticity in the premium and suggest that the conditional expectation of the risk premium is a non-linear function of the forward premium. Kaminsky and Peruga (1990) investigated the presence of time-varying risk premiums in currency futures markets using the inter-temporal asset pricing model. They state that the risk premium arises due to the consumption risk which they measure as the covariance between the returns and the marginal utility of money. Modelling the conditional covariance using Engle's ARCH model, they conclude that although the time-varying risk premium is an important determinant of the expected returns, still more flexible specifications are required for the model.

Baillie and Bollerslev (1990) found little support for the hypothesis that the risk premium is a linear function of conditional variance and covariance. Conversely, they stated that lagged changes in the forward rate appear to be significant in explaining the risk premium. Yoo and Maddala (1991) conducted large sample tests for commodity and currency futures market to show that a representative large hedger, on average consistently loses money in the futures market which leads to state that they pay some risk-premium. On the contrary, they suggested that a representative large speculator consistently makes profit. They demonstrated that these large speculators are rewarded for the risk that they accept and also for the superior information that they possess and that this reward makes them stay in the futures market. They also found that if futures rates are more volatile, hedgers will be paying higher risk premium. The size and the variability of risk premium are of crucial importance in the foreign exchange markets. Canova and Ito (1991) proposed the VAR (Vector Auto-Regression) constructed measure of risk premium and stated that it is highly correlated with the expected change in the spot exchange rate. Bessembinder and Chan (1992) stated that non-random price movements in the equilibrium theories of security pricing may be an evidence of either time-varying risk premia or market inefficiency. Further, their results supported the presence of time-varying risk premia.

McCurdy and Morgan (1992) analyzed weekly data for currency futures prices to investigate the nature of risk premiums. They measured the covariance risk and stated that no significant risk premium is found when the

parameters of the prices of the covariance risk are kept constant. However, they observed considerable premiums when the prices were allowed to vary along with the variances and conditional expected returns of the benchmark portfolio. Bessembinder (1993) tested the presence of risk premiums in a cross section of 22 markets, including financial, currency, metal and agricultural futures contracts. The author rejected the hypothesis of mean returns being equal to zero in only three out of a total 22 considered markets.

Liu and Maddala (1992) tested the market efficiency hypothesis (MEH) in foreign exchange markets using co-integration. They studied four exchange rates, the British pound, the Deutsche mark, the Swiss franc, and the Japanese yen against the US dollar. Using survey data on expectations for one-week and one-month forward exchange rates, they investigated whether the violation of MEH is due to risk premia or expectational errors. They concluded that for the weekly data it is the risk premia and for the monthly data, it is both risk premia and expectational errors that lead to the violation of the MEH. Also, the tests of volatility of the currency futures market stated that for the one month horizon, the forecasts failed the tests of rationality, while for a short-term horizon like one week; the forecasts did not fail such tests. However, the major drawback of this study is that the sample size was small and they only considered the 1 month forward forecast for the long-term analysis of MEH. They could have extended the time horizon to 2-3 months and so on to really see the effect of the risk premium and the expectational errors on the MEH.

Bailey and Chan (1993) confirmed the presence of risk premium in the commodity futures market. The risk premium represents the difference in the futures price and the future spot price. The rationale behind introducing the futures market has been the hedging or minimizing the risk in a way by creating a channel through which risk can be transferred from those who are highly risk averse to those who are willing to take it. This is in accordance with the hedging theory originally put forward by Keynes (1930) which states that the holders and producers of commodities sell futures contract at a price which is below the expected future spot price in order to minimize the risk associated with their long positions in the underlying commodities.

Dutton (1993) demonstrated that output shocks could cause risk premium in the forward exchange rate. He confirmed the effect of stochastic shocks on the risk premium using the Monte-Carlo approach and rules out the effect of monetary variance on the risk premium. Similarly, Cavaglia, et al. (1994) also demonstrated that the bias in the forward discount could be attributed to the failure of rational expectations and the presence of large and time-varying risk premium. Baum and Barkoulas (1996) also confirmed the presence of significant risk premiums in the currency future basis which in turn may be explained by variables stemming from stock and bond markets. The suggested stock market variable is the dividend yield, while bond market variables are the default spread and term spread. The default spread is measured by net returns from investing in long-term corporate bonds in comparison to government bonds, while the term spread is the premium demanded by investors for holding long term government bonds rather than short-term US treasury bills. The authors find that the futures basis varies positively with the riskiness in the stock market (dividend yield) and negatively with the riskiness in the bond market (default and term spread).

Peresetsky and de Roon (1997) used the current spot price, the current forward rate, and the basis as a proxy for the risk premium. They tried to explain the risk premium (which they define as the difference between the future spot rate and current futures rate) through three different independent variables – current spot rate, spread (difference between current futures rate and spot rate) and current futures rate – in three separate regression equations. Similar to many other studies in the literature, they also rejected the hypothesis that the futures price is an unbiased predictor of the future spot rate. Further, they found that the spot rate and the basis are found to have predictive powers for the risk premium; however, the current futures rate is not significant in explaining the risk premium. Hence, they stated that the risk premia in the ruble/dollar futures market are both statistically and economically different from zero. Further, the risk premium appears to be time varying also, that is, the risk premium increases with the maturity of the contract. This is clear from the fact that when they used spot rate and spread as regressors, the risk premium is found to be larger for the longer maturity contracts compared to the shorter maturity contracts. They stated that the reason for the maturity effect could be the fact that bank credits are easily available for shorter maturity contracts while not so for the longer maturity contracts which imply that

interest rate risk is significant for the longer maturity contracts. However, one of the major limitations of this study is shorter time of only about three years. Secondly, they ran simple regressions in which they used one independent variable at a time and saw their individual effect while they should have incorporated all the independent variables at once in the regression. It is widely known in the literature that the effect of the independent variable on the dependent variable may change in the presence of another independent variable(s).

Lauterbach and Smoller (1996) conducted tests for the presence of risk premium in the Eurodollar futures and also examined the effects of the factors that could affect the risk premium. Presence of positive premium on an average has been confirmed during their sample period. Also, in contrast to other previous studies, they found that the premium was independent of many factors like interest rate volatility, hedging imbalances and time to maturity of the contract. Similarly, Roon et al. (1998) found that the difference in expected one period returns on futures contracts with different maturities could be attributed to the risk premiums present in the spread between futures and spot rates. Further, Wolff (2000) studied the nature of the risk premium for 15 currencies relative to the US dollar. For almost all currencies, the presence of a time-varying risk premium was confirmed in the analysis.

Jiang and Chiang (2000) also confirmed the presence of risk premium in foreign exchange market by using GARCH models. They attempted to examine the relationship between the risk premiums in the foreign exchange returns and risk factors which are from currency as well as the stock market. Their study was based on the argument that due to risk-averse behaviour of investors, the expected excess returns on assets move closely with the expected risk premiums which in turn are assumed to co-vary with the conditional volatility. For measuring the excess returns in the exchange markets, they took the end of the month spot rates and forward rates from the *Weekly Review* of the Harris Bank. They used daily exchange rates and the daily observations on the stock returns for US, UK, Canada, Japan, and West Germany from Data Stream to produce monthly variances of exchange rates and the stock market indices. They found that the forward excess returns (risk premiums) can be suitably explained by the risk measures from stock market and the exchange market.

Using the monthly conditional volatility calculated from the high frequency data, they found the volatility from the stock market to be a more important factor than the volatility from the currency market. However, they attained different results when they relaxed the assumption that conditional forecasts are generated from a stable time series and used the GARCH (1,1)- M model. They found that the volatility from the currency market also affects the currency risk premium. Further, they noticed that positive and negative shocks play an important role in forming market's expectations about the future volatility. For example, for the Canadian dollar, and Japanese yen, they found the volatility (standard deviation) to move downward when shocks in the conditional mean equation are positive. However, for the British pound, the German mark, and the Japanese yen (variance as a risk proxy), the results were found to be contradictory. Although, they used a longer time period of data, they focused upon only one measure of risk in the currency and stock market. As suggested by Inci and Lu (2007) and Lee (2010), the application of a standard mean-variance framework is problematic for currency market, as currency market returns exhibit significant skewness and excess kurtosis. Hence, along with the volatility, they should have incorporated other measures of risk like skewness and kurtosis of the spot exchange rate as the explanatory variables for the risk premium in the currency futures market.

Ehsani and Shahrokhi (2003) explained the forward premium anomaly and found the main reasons for a negative relationship between the future currency spot rate and the forward rate can be attributed to surrogate variables (variables that can be easily measured and used in place of one that cannot be measured or is difficult to measure) used in place of expectations conditional on all the available information. Since it is harsh to assume a zero risk premium in the existing applied finance literature, the argument of the time-varying risk premium has led to an intensive search for a proper specification of the risk premium in the currency futures market (Tai, 2003). He defined risk premium as the speculative return from holding a forward contract that has to be paid to risk seeker speculators who takes the risk of future changes in the exchange rates. Staikouras (2004) provided the evidence of time-varying risk premium in the interest rate future and state that both the premium and expected spot changes volatility are statistically significant with the later being slightly higher than the former. Landon and Smith (2003) studied the hypothesis of the unbiasedness of forward exchange rate for yen-dollar exchange rate and found that

the forward rate is not an unbiased predictor of the future spot rate due to the presence of time-varying risk premium and the absence of rational expectations. Panigirtzoglou (2004) estimated the exchange rate risk premium and the market prices of risk using the information in the foreign exchange implied volatilities from option prices. He stated that the risk premium disappears when the market prices of the risk vectors are perfectly aligned or investors are risk neutral.

The risk premium starts playing an increasingly important role for the longer maturity currency futures contracts or the UIP does not hold true for the long maturity contracts (Inci & Lu, 2007). As we go further in the future, the uncertainty increases which in turn increases the associated risk premium. This can be explained using two arguments: the first explanation is based on the relationship between hedging and speculation activities. The hedging activities become more prevalent on contracts with longer maturities as the uncertainty in the exchange rate increases with maturity of contract. Therefore, the pricing of longer maturity contracts will be more affected by risk premiums. Hedgers in currency markets typically hold positions in the cash market and use futures contracts to hedge against undesirable long-term exchange rate movements in the cash market. On the other hand speculators do usually not hold positions in the cash market but only operate in the futures market. As a consequence, in case there are a lot of hedging activities relative to speculating activities, we expect to observe more significant risk premiums in currency futures markets. A second explanation, provided by Inci and Lu (2007) can be related to covered interest parity (CIP) that states that the futures-spot basis is equivalent to the interest rate differential between two countries' currencies. Generally, short-term interest rates are set by central banks and are not affected by market risk premiums. However, as the maturity increases, the risk premium starts playing a more important role in the determination of interest rates, as these rates are set by market forces.

Lustig and Verdelhan (2007) studied currencies of countries where interest rates are either higher or lower than in the U.S. market. Using aggregate consumption growth risk, they explained that low interest rate currencies do not appreciate as much as suggested by interest rate differentials, while high interest rate currencies do not depreciate as much as suggested by UIP and observed interest rate differentials. Thus, domestic investors would earn negative excess returns on currency portfolios with low interest rates and positive excess returns on currency portfolios having high interest rates. Phengpis and Nguyen (2009) studied co-integration, policy coordination, and the risk premium in the British pound, the Danish krone, the Swedish krona, and the euro foreign exchange market. Their results indicate that only the krone and the pound have a co-integrated relationship with the euro. They further stated that co-integration of spot exchange rates can be considered as one of the factors representing time-varying risk premiums because to maintain the relationship over the long-run, deviations would require dynamic adjustments of the concerned currencies, resulting co-movements emerge and the participants in the foreign exchange markets will have smaller benefits bearing higher risk due to exposure in the co-integrated currencies.

Poghosyan et al. (2008) modelled the foreign exchange risk premium in Armenia using stochastic discount factor methodology. Using the weekly data on foreign and domestic deposits, they confirmed the systematic presence of time-varying risk premium which increases with maturity. Jongen et al. (2008) attempted to determine the relative importance of presence of irrational expectations and the time-varying risk premium to explain the forward bias puzzle in the exchange rate markets. Using survey based measures of expectations, they stated that the decomposition of the forward premium can be done in part to irrationality in the market participants and in part to the presence of time-varying risk premiums. Hence, they concluded that the forward premium unbiasedness hypothesis is rejected both due to the irrational expectations and the time-varying risk premium. They confirmed that the time-varying risk premium increases for the contracts having more than one month maturity. Gupta (2008) put forward that foreign exchange markets are the largest markets in the world and always remain volatile in nature. In such a market where cross currency buying and selling occurs and funds move from one option to another, one can face risk every time when one enters and trades in the market. However risk has been an inherent part of forex markets across globe and Indian forex market has been no exception. The exchange rate has experienced several fluctuations and has been a major characteristic of Indian forex market in recent times. Usually exchange rates are determined through the flow of capital between countries, rate of inflation, interest rates and confidence in the economy of respective country.

Kiani (2009) investigated the presence of time-varying risk premium in the monthly Singapore forward exchange rates for a period of November 1983 to June 2004. Using univariate signal plus noise model, he provided the evidence of statistically significant time-varying risk premium in the Singapore forward exchange rates against the US dollar. Rezessy (2010) examined the currency risk premium for Czech Republic, Hungary, Poland, and Slovakia by applying three different approaches: A constant risk premium approach based upon rational expectations, a survey based approach and finally an approach based on Kalman Filter. The co-movement of the premium series obtained with Kalman Filter and the survey data for the forint shows that the expectations based on survey are highly in line with both risk-premium-extended UIP and the rational expectations hypothesis.

Frankel and Poonawala (2010) studied a sample of 14 emerging market currencies and state that the bias in the forward rate for emerging market currencies is lower than that of advanced market currencies. The forward premium anomaly remains a paradox in international financial markets (Baillie, 2011) which is important and worthwhile to be better understood. Chang (2011) tried to solve the forward premium puzzle using covered interest parity. Due to the complex nature of the forward premium puzzle, Müller (2011) stated that we should stop trying to work out this anomaly and should start looking for fundamentally better models for the determination of exchange rates.

Snaith et al. (2013) provided a comprehensive study of horizon effect for testing the FRUH. They estimated Fama (1984) regressions on the exchange rates from 1-month to 10-year horizon for the five most traded currencies against the US dollar. In contrary to Inci and Lu (2007), they reported that the slope coefficient approaches unity as the forward contract maturity is extended. The forward premium anomaly disappears at 3-year horizon and beyond for all the currencies.

Conclusion

Extensive review of the literature suggests that forward premium puzzle and the risk premiums can be investigated further to find out what pattern they follow over the sample period for different maturities. Though there have been a number of studies that have found the presence of forward premium anomaly and attributed different reasons for its existence, however no study have been able to resolve this issue. Hence, it can be an exciting idea to address the issue of forward premium anomaly through analyzing the term structure of realized risk premiums.

The importance of understanding the relationship between the forward rate and the future spot rate can be examined from survey-based measures of expected future spot rates which are only at its preliminary phase. To realize the true modeling of risk premiums, the use of survey based expectations of future spot rates will be likely to give rise to successful and interesting methodologies. If survey based expectations of future spot rates are considered, it would allow a direct measure of biases in the expectations and risk premiums. Moreover, it would allow the decomposition of forward premium anomaly into a part attributable to irrationality of the markets' expectations and a part attributable to the presence of risk premiums. Specifically, it leads to the conclusion that survey based expected future spot rates are biased estimates of the actual level of the future spot rate. If that is the case, there are some important questions to be answered (Engel, 1996):

First, if the expectations are not rational, what actually are they? Maybe there is no another model available as to how market participants actually forecast the future. Second, why do the market participants act irrationally? Third, although, bias in some of the agents' expectations imparts a bias to the forward rate as well, why are there no rational agents who may bet large amount of money against the biased agents? We have ruled out so many things; however a true story or a solution to the forward premium anomaly has not been settled yet.

Research Implications

The important implications of this literature review on the importance of relationship between spot rate and futures rate can be highlighted as follows :

(1) The relationship between the current futures rate and the future spot rate to identify the existence of forward premium anomaly and risk premiums for different maturity contracts in various currency markets can be studied.

(2) To explore the major determinants of the risk premiums in the currency markets.

(3) The term structure of the risk premiums can be explored to identify the major factors and study the economic significance of these factors.

(4) It would be interesting to examine whether the forward premium anomaly can be addressed by analyzing the term structure of the risk premiums.

Limitations of the Study and Scope for Future Research

One of the major limitations of our study is that we did not use empirical data to build our arguments. This study is only a collection of the literature in the area of the foreign exchange markets. It will be a great idea to validate the theories of uncovered interest rate parity and forward rate unbiasedness hypothesis using the data for different maturities and multiple currencies.

The scope for future research can be summarized as follows:

(1) Use econometric models for factor time series in order to forecast entire term structure of the risk premiums or changes in the entire term structure.

(2) Examine how inclusion of macroeconomic and financial variables in forecasting procedure improve results.

(3) Develop 'currency spread trading' strategy to exploit changes in term structure of potentially time-varying risk premiums which could be based on (a) delivery date for the same currency (similar to calendar spreads in commodity markets) or, (b) cross-currency spreads.

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