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3.1 Introduction

The theory of risk premium in foreign exchange market still remains a highly controversial area of international macroeconomics and finance. A major building block of the theoretical works focusing on the functioning of international financial markets is the assumption of capital mobility. This necessitates relating domestic rate of interest to foreign rate of interest through some form of interest parity condition. There are three versions of interest parity condition, frequently used in the models of open macroeconomics; the covered interest parity (CIP) condition, the uncovered interest parity (UIP) condition and the real interest parity (RIP) condition.

3.2 Definitions of interest parity conditions

Foreign exchange transactions often involve buying or selling of currencies at a future date. This gives rise to the possibility of a loss on such transactions due to uncertain movements of exchange rates. The forward market provides a mechanism for hedging such risks by fixing a rate at which the currency can be delivered at a future date. The CIP provides an explanation for forward premium (the proportionate difference between the levels of the forward rate
and the spot rate or the simple difference between the logarithms of the forward and spot rates) that the investors have to pay at time $t$ to hedge or 'cover' the exchange risk associated with a forward contract to receive or deliver foreign currency at time $t+1$. In the absence of transaction costs, the CIP can be expressed as

$$i_t - i^*_t = f_t - s_t$$

where $i_t$ and $i^*_t$ denote the domestic and world rates of interest. $f_t$ is the logarithm of forward rate at time $t$ and $s_t$ is logarithm of spot exchange rate. Here exchange rate is taken as the 'home country' price of a unit of foreign currency.

The UIP hypothesis is expressed in terms of expected change in exchange rate. The UIP condition postulates that the interest differentials on similar investments should equal the expected depreciation of the exchange rate such that

$$i_t - i^*_t = E_t s_{t+1} - s_t$$

where $E_t$ is the expectational operator conditional on available information at time $t$.

The uncovered interest rate parity presumes risk neutrality.

"This is most easily seen by recalling the uncovered interest parity condition: under risk neutrality and rational expectations, the expected rate of depreciation of one currency against another will be just equal to the interest rate differential between the currencies of appropriate maturity, so that the expected profit from arbitraging between them is zero."  

Risk-neutrality means that an investor would be indifferent to holding one currency or the other. The assumption of risk neutrality is a theoretical necessity to ensure that an investor would treat all investments equally and

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1 The CIP and UIP conditions have been derived in chapter one.
2 The UIP condition is sometimes also called the Fisher hypothesis.
3 Macdonald and Taylor (1992), p. 28
would invest in any one of them only if there is a possibility of making a profit. However, in the world there are risk-averse individuals as well. Risk-aversion does not necessarily mean that an investor would always hold a particular currency but if there is a hierarchy among currencies it might push an investor to holding only one currency. In other words, if there is no hierarchy among different currencies, then risk-neutrality ensures that an investor will not prefer a particular currency except for making a gain.

There are two interpretations of UIP. One is, given the foreign or ‘world’ rate of interest; the domestic rate of interest is determined by the expectations regarding the future change in exchange rates. In the other, the current spot exchange rate is determined from the given world and home interest rates and the expected future spot exchange rate\(^4\).

The RIP condition implies that the real interest rates should be equalized across countries, that is \(r_{1t}=r_{2t}\). \(r\) is the real rate of interest defined as the nominal interest rate adjusted for expected inflation in each country. 1 and 2 denote the two countries. Therefore, the real interest rate is essentially ex ante real interest rate.

The assumption underlying the CIP and hence also UIP is the premise that investments denominated in domestic currency and investments denominated in foreign currency must earn same rate of return in a world of capital mobility. The CIP and UIP will coincide if \(E_{t}\Delta s_{t+1}=0\) and if either there is no risk associated with the former or the wealth holders are risk-neutral. According to Kaldor (1939), if expectations are quite certain, then the difference between the

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\(^4\) See McCallum (1996). McCallum (1994) specifies the UIP relationship as \(i_1-i^*=(\xi_t+\eta_t)\). \(\xi_t\) is the exogenous disturbance term which reflects time varying aggregation or other effects and even risk premium. Of course this notion of risk premium underlying McCallum’s argument differs from what is discussed by us since \(E(\xi_t)\neq 0\). He posits that it is very important to include a random disturbance term like this in any economic behavioural relationship. The relationships which hold in theoretical models are not adequate representations of reality and to account for various other influences we need to include such a term. The discrepancy gets magnified when we consider all the agents in the market because of the heterogeneity of the agents. Moreover in empirical works, there is some kind of measurement error that creeps in.
expected price and current price would equal the sum of interest cost and carrying cost. In other words, there would not be any risk premium.

But in practice, UIP will be different from CIP as the former involves risk arising from the fact that there would be a probability distribution around the \( E_t S_{t+1} \) with a certain standard deviation, which is a quantitative measure of risk and also the fact that wealth holders are risk-averse.

In absence of a direct measure of expectations, the UIP condition is jointly assessed with the assumption that expectations are formed rationally. This means that the expected future spot rate is taken to be an unbiased predictor of the actual future spot rate. That is, \( s_{t+1} = E_t S_{t+1} + u_{t+1} \). The assumption of rational expectations posits a world where rational and utility maximizing economic agents passively forecast events determined by an ergodic and stochastic process. This characterization gives rise to two distinct features, namely 'unbiasedness, and 'informational efficiency'. The former results because agents are rational and therefore do not make any systematic error. Informational efficiency requires that agents would use all relevant information available to them. In the context of a foreign exchange market, the two conditions can be represented as follows:

\[
s_{t+1} = \alpha + \beta E_t S_{t+1} + u_{t+1}
\]

Here \( s_{t+1} \) is the actual spot rate in period \( t+1 \), \( E_t S_{t+1} \) is the forecast of \( s_{t+1} \) and \( u_{t+1} \) is the forecast error.

Unbiasedness requires that \( \alpha = 0 \) and \( \beta = 1 \) and the error term \( u_{t+1} \) is serially uncorrelated, with mean zero.

According to the assumption of informational efficiency,

\[
u_{t+1} = \gamma + \delta I_t + \epsilon_{t+1}
\]

where \( I_t \) is the information set available in period \( t \) and \( \epsilon_{t+1} \) is the error term.

\(^5\)This definition is given by Harvey (1998-99)
For informational efficiency the required condition is $\gamma=\delta=0$.

If the errors from a particular forecast series are correlated with the information set, that is errors are not random; this leads to prediction bias.

In the existing literature, it is usually the practice to substitute the CIP condition to incorporate risk less arbitrage. Given CIP, this means that the forward premium is equal to the expected depreciation of the currency only if the wealth holders are risk neutral. Therefore, an indirect test for UIP is to see whether the forward premium is an unbiased predictor of the expected change in exchange rate. This is essentially an argument for the "Efficient market hypothesis". The 'efficient market' hypothesis presumes risk neutrality.

"In turn, the efficient market hypothesis has sometimes been viewed as an implication of the hypothesis that market participants are risk neutral and form their expectations rationally, given whatever relevant information is available."$^6$

"The rejection of the efficient market hypothesis is usually explained in one of two ways. As noted above, it is a joint null hypothesis of rational expectations and an assumption concerning the attitude of agents towards risk. It has often been tested under the assumption of risk neutrality."$^7$

According to Fisher, the UIP condition ensures that expected returns in one country should be equalized through speculation to the returns in another country once converted in the same currency. That is, the ex ante expected home currency returns on foreign currency deposits in excess of returns on domestic deposits should be zero. The excess returns in foreign exchange market can be written as –

$$e_{r_{t+1}} = i^*_t + s_{t+1} - s_t - i_t \ldots \ldots \ldots \ldots \ldots \ldots (1)$$

Predicted excess returns or $p_r$ is

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$^6$ Isard (1995), pp. 82.

$^7$ Macdonald and Taylor (1992), pp. 32
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\[ \text{per}_{t+1} = \mathbb{E}_t (\text{er}_{t+1}) = \mathbb{E}_t \Delta s_{t+1} - (i_t^* - i_t) \quad \cdots \quad (2) \]

where \( \mathbb{E}_t \) is the statistical expectation operator conditional on time \( t \) information.

Therefore, the ex post excess returns equal the true expected returns plus a forecast error.

That is, \( \text{er}_{t+1} = \text{per}_{t+1} + \text{er}_{t+1} \), \( \text{er}_{t+1} = \Delta s_{t+1} - \mathbb{E}_t \Delta s_{t+1} \)

where \( \text{er}_{t+1} \) is the ex post excess return, \( \text{per}_{t+1} \) is the predicted excess return and the last term on the right hand side is the forecast error.

If the UIP condition is satisfied and expectations are assumed to be rational, then the predicted excess returns would be zero. Substituting the UIP condition in equation (2), we get the above result.

If economic agents are risk averse then the forward rate would deviate from the future spot exchange rate by a positive risk premium.

Kaldor (1939) first gave a theoretical definition of risk premium. According to him, if expectations are uncertain, then the difference between the expected price and the current price must include a risk premium. He has given the following definition of risk premium:

\[ \text{EP} - \text{CP} = i + c - q + r \]

Here, \( i \) is the marginal interest cost, \( q \) the marginal yield, \( c \) the marginal carrying cost and \( r \) the marginal risk premium. \( \text{EP} \) and \( \text{CP} \) are expected price and current price respectively.

Risk premium is defined in the mainstream literature as the deviation from UIP, as postulated in the portfolio balance approach.

\[ \pi = (r^* - r) + \varphi \]
Here $\pi$ is the expected appreciation of the domestic currency and $\varphi$ is the exchange risk premium that must be expected, over and above the interest differential or forward premium, for asset holders to be indifferent at the margin between uncovered holdings of domestic bonds and foreign bonds. In a risk-neutral world, $\varphi$ would be identically zero\(^8\).

Since investors are assumed to be risk-averse, domestic and foreign bonds are not perfect substitutes. As a result, the rate of return on domestic asset deviates from the rate of return on foreign asset by the amount of risk premium.

Risk premium is also defined as\(^9\)

$$\lambda_t = -E_t\Delta s_{t+1} - f_t$$

Or, $\lambda_t = (E_tS_{t+1} - S_t) - (f_t - S_t)$

The predictable excess return can be written as $per_t = \lambda_t + \epsilon_{t+1}$ where $\epsilon_{t+1} = E_t\Delta s_{t+1}$

If the expectations are assumed to be rational, then the excess return would arise due to risk premium in foreign exchange market.

Real interest parity postulates that the ex ante real interest rates in the two countries should be equal. That is, $E_t r_1 = E_t r_2$. The real interest differentials can be written as $E_t r_1 - E_t r_2 = [(i_{1t} - i_{2t}) - E_t\Delta p_{t+1}] - [E_t\Delta p_{t+1}(E_t\Delta p_{2t} + E_t\Delta s_{t+1})]$ Here $i$ refers to the nominal interest rates and $E_t r$ refers to the ex ante real interest rates. $E_t\Delta s_{t+1}$ is the expected change in exchange rates and $E_t\Delta p_t$ is the expected inflation between period $t+1$ and $t$. 1 and 2 denote the two countries.

The right hand side gives the decompositions into uncovered interest parity condition and the ex ante purchasing power parity (EPPP) or equivalently deviations from PPP. Real interest parity will hold under two conditions namely the uncovered interest rate parity and ex ante PPP. The empirical work

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\(^8\) Dooley and Isard (1983)

\(^9\) Lewis (1995)
involving asset pricing models in foreign exchange market by and large assumes PPP such that real interest rate differentials reflect the risk premium as mentioned in chapter one.

3.3 Risk Premium: Theoretical Models and Empirical Evidence

There are two kinds of models to explain the existence of risk premium. One set of models is an extension of the static version of 'Capital asset pricing model' (CAPM) which is basically a partial equilibrium approach. The other set of models uses the general equilibrium pricing conditions.

In a simplified asset pricing model, there is a domestic investor and a foreign investor. Each investor holds a domestic asset and a foreign asset. The investor maximizes an objective function which is increasing in mean but decreasing in the variance of the end of period wealth. The first order condition gives the excess returns in terms of the risk aversion coefficient and the covariance terms

\[ \text{per}_{t+1} = \rho \text{Cov} \left( \text{er}_{t+1}, \text{i}_{p, t+1} \right) - \rho \text{Cov} \left( \text{er}_{t+1}, \pi_{t+1} \right) \]

Here \( \rho \) is the risk aversion coefficient, \( i \) is the nominal return on home portfolio and \( \pi \) is the domestic rate of inflation.

Therefore, the greater the degree of risk aversion, higher is the value of \( \rho \). The expected excess returns increases with the covariance between the excess returns and the nominal return on the portfolio of the domestic wealth holder. With a rise in inflation, the value of wealth falls. A high covariance of excess returns with inflation rates raises the hedging properties of the foreign asset and hence lowers the required excess returns. Empirical findings on the foreign exchange risk premium based on CAPM models show that the estimate of the parameter of risk aversion is large but insignificantly different from zero. The restrictions on the model have also been rejected. This set of models has failed

\[ ^{10} \text{Lewis (1995)} \]
to explain the excess variability and also the changes in sign of predictable excess returns\textsuperscript{11}.

The second set of models has been developed to rectify the shortcomings of the CAPM models and to incorporate the intertemporal general equilibrium approach. This approach draws heavily on Lucas’s (1975, 1982), two-country asset pricing model. There are representative economic agents with identical preferences in the domestic and foreign countries. They seek to maximize the expected infinite life-time utility function $E_0 \{ \Sigma \beta^t U(C_i, C^*_i) \}$ for residents of $i$th country. $C_i$ and $C^*_i$ are the domestic and foreign goods respectively for the $i$th country consumer at time $t$.

In each period, the domestic consumer receives the output of the home good and endowments of domestic money and the foreign consumer receives the foreign output and the endowment of foreign money. Endowments are known in the beginning of any period. Domestic good has to be purchased at the domestic nominal price and the foreign good at the foreign money price. These two conditions together imply a cash-in-advance constraint as used by Lucas. Thus, money demand and exchange rates are determined solely by the current demand for goods. This effectively uses the Quantity theory of money and the Law of one price. Exchange rates do not depend on the expectations of future events. With the perfect markets, forward foreign exchange contracts are redundant. In order to incorporate the forward rate, the assumption of covered interest parity has to be used.

In the Lucas model, the risk premium in foreign exchange market arises due to consumption-risk. The risk premium is the difference between the ratio of expected marginal rates of substitution in consumption and the expectation of this ratio. If consumers are risk averse and prefer a flat consumption profile, then they would prefer assets that would help them to smooth consumption over time. In these circumstances, if the expected gain from contracting in the

\textsuperscript{11} For an extensive \textit{CAPM} model and its critique, see Lewis (1995).
forward market co-varies positively with consumption, the risk premium must be positive. Over time, the conditional covariance is generally changing and also may change signs; as a result the risk premium will be changing and it can fluctuate from positive to negative\textsuperscript{12}. Sibert (1989) and Hakkio and Sibert (1995) have used an overlapping generations model, where money yields transaction services in every period. That is, agents in a particular country would require its own currency. To capture this, it is assumed that consumers save only in their own currency. Markets are incomplete and agents hold foreign exchange to share risk. Risk premium is found to depend on the parameters of the model and on the variances of output and money growth. They have considered both the nominal risk premium (most commonly used in empirical studies) and real risk premium.

In recent years, there have been attempts by Obstfeld and Rogoff (1995b, 1998), Engel (1992, 1999) and Devereux and Engel (1998), to explain risk premium in foreign exchange market in two-country inter-temporal optimizing general equilibrium models with sticky nominal prices. Obstfeld and Rogoff (1998, 1999 and 2000) have used the traditional definition of risk premium, whereas Engel defines the risk premium as a difference between the forward rate and what it would be if investors were assumed to be risk neutral.

In the Obstfeld and Rogoff model, producers set prices in their own currency. With changes in exchange rates, price paid by foreigners for home good and the price paid by domestic residents for foreign good also fluctuate. In Devereux-Engel (1998) producers set prices in the home currency for domestic residents and in the foreign currency for foreign residents. This is the Pricing to market (PTM) model. Here exchange rate fluctuations do not have any impact on price faced by consumers. The size of the risk premium depends on how prices are set (in producers’ currencies or in consumers’ currencies) and on the form of money demand function (whether cash-in-advance constraints are used

\textsuperscript{12} Domowitz and Hakkio (1985), Mark (1985) and Sibert (1989) focus on theoretical models explaining risk premium in foreign exchange market.
or money demand function is derived by incorporating real balances in the utility function).

The empirical studies which test for UIP condition mostly focus on forward market efficiency by incorporating the CIP condition rather than looking at the uncovered interest parity condition directly. One reason is that interest rate differential can explain only a small percent of the change in exchange rate. It is now recognized that exchange rate is driven by ‘news’ about the future policies regarding the economy. The tests on forward foreign exchange market efficiency involve some form of regression based analysis on forward and spot rates. Therefore, most empirical studies analyse the unbiased ness of the forward rate as an optimal predictor of future exchange rate in two ways. If expectations are rational then \( s_{t+1} = E_t S_{t+1} + u_{t+1} \). This can be written as

\[
S_{t+1} - S_t = E_t S_{t+1} - S_t + u_{t+1}
\]

Using the uncovered interest rate parity condition we have

\[
S_{t+1} - S_t = i_t - i^{*}_t + u_{t+1}
\]

With CIP\(^\text{13}\), the above equation can be written as

\[
S_{t+1} = f_t + u_{t+1}
\]

Then the regression equation can be written as \( s_{t+1} = \alpha + \beta f_t + u_{t+1} \) …………… (3)

Under the assumptions of rational expectations and risk neutrality, it means that \( \alpha \) and \( \beta \) should be insignificantly different from zero and one respectively and the disturbances should be serially uncorrelated.

\(^\text{13}\) The CIP is usually supported by the empirical investigations, which consist of interviews with market makers and the studies on recorded data on exchange rate and interest rates. However, it is generally accepted that the data should correspond to claims, which are identical in all respects (such as default and political risk) except their currency of denominations and the interest rates and the recorded data should be taken at same points of time. For empirical literature on CIP see Frankel and Levich(1975,1977), Taylor(1987,1989) and Dooley and Isard (1980).
Since the forward and spot exchange rates are usually found to be non-stationary, it is the usual practice to use a slightly modified version of the above. This is done by differencing the current spot rate to make the series stationary. Econometric tests involve regressing the actual change in the exchange rate on the forward premium, that is,

\[ s_{t+1} - s_t = \alpha + \beta (f_t - s_t) + u_{t+1} \]  \hspace{1cm} (4)

Here \( f_t - s_t \) is the forward premium. Both the equations (3) and (4) are same under the null hypothesis \( \alpha = 0 \) and \( \beta = 1 \) respectively.

An alternative way to test for the optimality of the forward rate as a predictor of change in exchange rate is to use orthogonality tests of forecast errors. The equation such as \( s_{t+k} - f_t = \Gamma X_t + \omega_t \) is used for estimation, where \( X_t \) is the vector of variables known at time \( t \), \( \Gamma \) is a vector of parameters and \( \omega_{t+k} \) is an error term. The null hypothesis of rational expectations and risk neutrality is equivalent to the hypothesis that \( \Gamma \) should equal the null vector. This effectively means that the error in forecasting the exchange rate using the current forward rate cannot be forecast using the current information.

There exists a large body of empirical literature to investigate whether forward rate is an unbiased predictor of future spot exchange rate\(^\text{14}\). There is very little consensus that forward rates have any powers of predicting future spot exchange rates. According to Froot and Thaler (1990), the average coefficient across some 75 published studies is -0.88. None of the findings could come up with the value of \( \beta \) greater than or equal to 1.

There are more complicated models to explain the efficiency hypothesis. For example, Fama's paper (1984) stimulated further research on the risk premium in forward foreign exchange market. He defined the forward rate observed at time \( t \) for an exchange at \( t+1 \) as the market determined certainty equivalent of

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the future spot exchange rate. Forward rate according to him can be decomposed into expected future spot exchange rate and premium

\[ F_t = E_t (S_{t+1}) + P_t \]

Where \( S_{t+1} = \log S_{t+1} \), \( E_t (S_{t+1}) \) is the rational or efficient forecast conditional on all information available at \( t \).

Fama has used an equation of the form

\[ \Delta s_{t+1} = \alpha + \beta (f_{t-1} s_t) + u_{t+1}. \]

This paper tests a model for joint measurement of variation in the premium and expected future spot rate components of forward rates. Based on the assumption of efficient or rational forward market and using the data on dollar exchange rates against the Deutschmark, British pound and Japanese Yen over the period from 1975 to 1989, he found that the estimates of \( \beta \) are all significantly less than one and in some cases even negative. Most of the variation in forward rates is due to variation in premiums and both the components of forward rates are negatively correlated\(^{15}\).

Boyer and Adams (1988) have taken risk premium as an exogenous variable. They have used Canadian data from 1973 to 1986. They have used the regression equation \( FP = a + b RP + u \).

\( FP \) is the forward premium and \( RP \) is the risk premium. They have used the difference between the forward rate in that period and the spot rate which prevails in the next period as proxy for \( RP \). Their conclusion is that the estimates are biased.

Cumby (1988) has used ex ante returns to holding forward contract to test for unbiasedness of forward rate as a predictor of future spot exchange rate. It is an accepted view that if forward rate is an unbiased predictor of future spot exchange rate then there will be zero predictable returns to forward speculation.

\(^{15}\) However, Froot and Frankel (1989) have strongly rejected the null hypothesis that variance of the true risk premium is greater than or equal to the variance of the true expected depreciation. They have taken surveys on expectations instead of realized ex post change in exchange rates used in studies on exchange rates.
He has taken the excess returns both the nominal and real terms\textsuperscript{16} and the
evidence strongly rejects the hypothesis that UIP condition holds and also the
hypothesis that expected returns in nominal as well as real terms are constant.

Bilson (1981) has used a number of econometric techniques to test the
efficiency hypothesis. He has taken nine developed countries and the time
period is 1974 to 1980. He has used a slightly different version\textsuperscript{17} of the usual
regression equation that is generally used to test the efficiency hypothesis. All
the estimates of the coefficient $\beta_1$ in the regression equation are negative and
all $\beta_0$ are greater than one. Out of nine countries, $\beta$ is significantly different
from zero for France, Italy and Netherlands and $\alpha$ is not significantly different
from zero for any country except Netherlands. With pooled data, the slope
coefficient is found to be negative. He has also used other techniques to
improve the efficiency of the estimation. But the overall finding from all these
results firmly rejects the efficient market hypothesis.

Hansen and Hodrick (1980) have conducted tests of the efficiency of the
foreign exchange market for the period 1920s and 1970s using data for Canada,
Germany, France, UK, Switzerland, Japan and Italy. The empirical findings
also reject the efficiency hypothesis during both the time periods.

In a typical example of portfolio balance model\textsuperscript{18} Dooley and Isard (1983) have
found that the risk premium associated with this particular representation of

\textsuperscript{16}Engel (1984), Frankel and Engel (1984) and Frenkel and Razin (1980) pointed out that there can be
nonzero expected nominal returns to speculation even if investors are risk neutral because of Jensen's
inequality arising due to covariance between the nominal returns and the future purchasing power
of money. The implication is that the rejection of UIP does not provide evidence of risk premium in the
forward foreign exchange market and therefore it is necessary to test whether the real excess returns to
holding forward contract are zero. The hypothesis of constant ex ante real returns is rejected in
Cumby's empirical analysis. Dutton (1993) has found Jensen's inequality effects to have substantial
effects on risk premia.

\textsuperscript{17}The regression equation is $\Delta s_{t+1} = x_{t+1} = \beta_0 + (\beta_1 - 1)x_{t+1} + \epsilon$. The null hypothesis is $\beta_0 = 0$ and $\beta_1 = 0$.

\textsuperscript{18}The home country private wealth consisting of domestic money, domestic bonds and foreign bonds,
depends on the own rate of interest on domestic bonds, the expected domestic currency yield on foreign
bond and a vector of all other variables. Because of the constraint that portfolio shares for each country
investors must equal unity, effectively there are three equations to solve four variables, spot exchange
rate, own rate of interest on domestic bonds, own rate of interest on foreign bonds and the expected
rate of appreciation of foreign currency.
the portfolio balance model can explain only a small part of the discrepancies between observed percentage change in exchange rates and forward premiums.

According to Domowitz and Hakkio (1985), risk premium depends upon the conditional variances of the forecast errors of the domestic and foreign money supplies. They find evidence of non-zero constant risk premia for some but not all currencies.

Mark (1985b) uses a parameter of constant relative risk aversion. The restrictions on the correlation among various time series variables imposed by the model have been rejected. He estimates the parameter of risk aversion to be quite large, generally in the range of 12 to 50 for most sets of instrumental variables.

Kaminsky and Peruga (1990) find that under the assumption of a constant variance-covariance matrix, the Lucas model is incapable of explaining the excess returns in the forward market. However, they point out that their measure of risk premium may not in fact be an adequate approximation of the risk involved in foreign exchange transactions. Once they model the time varying conditional covariances, the model provides stronger support for the hypothesis of a time varying risk premium.

Dutton (1993) develops a model on the lines of Lucas and Domowitz and Hakkio. In this model, the coefficient of relative risk aversion, which is considered to be a very important determinant of risk premium, does not remain so important in certain cases. However, risk premium varies significantly depending on the value of the intra temporal elasticity of substitution in consumption. Moreover, the source for stochastic shocks to the system is crucial in determining the existence of a risk premium.

The broad conclusion emerging from the empirical literature on foreign exchange market efficiency is the rejection of the null hypothesis that the forward rate is an efficient and unbiased predictor of the future spot exchange
rate. The biased ness of forward rate has been explained in terms of the attitude of wealth holders towards risk and the formations of expectations regarding change in exchange rates. The explanations for the failure of forward rate as an efficient and unbiased predictor of the future exchange rate assume one of the components of the joint hypothesis as always valid. Some studies Fama (1984), Hodrick and Srivastava (1984), Bilson (1985) attribute the rejection of efficient market hypothesis to time varying risk premium under the assumption that economic agents are rational19. Others like Bilson (1981) and Longworth (1981) try to explain the biased ness of the forward premium in terms of irrationality of market participants and they assume that market participants are risk neutral. Marston (1997) has shown that the ex post deviations from UIP cannot be attributed either to risk premium or systematic forecast errors alone. He has used a joint test of three parity conditions namely the UIP, the RIP and the ex ante PPP. He has used data for UK, France, Germany, Japan and the US. He has used information variables namely, the interest differential, share yields in two countries and the inflation differential between these two countries in a bilateral comparison between any country and the US. He has found that in most cases the deviations from all three parity conditions are systematically related to variables in the current information set.

McCallum (1994) has emphasized on the importance of the UIP condition in the theoretical and empirical models of international macroeconomics and finance. According to him, the overwhelming rejection of the hypothesis that forward rate is an unbiasedness predictor of future spot exchange rate over the floating exchange years cannot be interpreted as the failure of the UIP hypothesis20. He has provided an alternative explanation for the negative value of β which is consistent with the UIP condition. He has put forward the view that the monetary authorities use short term interest rates to avoid excessive fluctuations in exchange rates and also use interest rate ‘smoothing’ in the

19 Bilson takes the extreme view that expected depreciation is zero and the variability of forward premium is entirely due to risk premium.

20 He has found negative values of β in the regression $r_t - r_{t+1} = \beta(r_{t+1} - r_t) + \epsilon_t$. 

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sense that they try to keep the current rate not very different from the past rates. Therefore, UIP should be jointly determined with an additional equation like

$$x_t = \lambda (s_t - s_{t-1}) + \sigma x_{t-1} + \xi_t$$

where $x_t$ denotes the interest differential and $\xi_t$ represents random policy influences. $\lambda > 0$, $0 < \sigma \leq 1$ describes interest rate 'smoothing'.

A new trend in research, using survey data on expectations on forward foreign exchange market has emerged to discern whether unbiasedness is due to risk aversion or irrationality of expectations. Frankel and Froot (1987) and Froot and Frankel (1989) have used the exchange rate forecasts from surveys made by financial firms American Express Banking Corporation (AMEX), Economist Financial Report and Money Market Services Inc. (MMS) whereas Macdonald and Torrance (1988, 1990) have used survey on expectations made by MMS Inc. They all have taken median forecast across traders at each period $t$ as a measure of the market's expected future spot rate $E_t s_{t+1}$. They have decomposed the forward premium $(s_c - f_t)$ into the expected change in exchange rate $E_t \Delta s_{t+1}$ and risk premium $r_p$. Therefore, the regression coefficient $\beta$ is considered to be made up of two components; $\beta_{rp}$ arising due to risk premium and $\beta_{re}$ arising due to the forecast error such that $\beta = 1 - \beta_{rp} - \beta_{re}$. The finding of $\beta$ not equal to 1 means that either risk premium is time varying under the assumption of rational expectations or expectational errors or a combination of the two. For a negative estimate of $\beta$, as a conclusion in most of the empirical works, it is required that either $\beta_{rp} > 1$ or $\beta_{re} > 1$. Froot and Frankel (1989) have shown that the most important component of the variability of excess returns is

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21 However, economists by and large have been skeptical of using survey s on foreign exchange forecasts. It is argued that respondents not always come out with the actual answers. As a result the expected exchange rates reported in surveys tend to under predict consistently the extent of actual movements. See Tagaki (1991)

22 Frankel and Froot (1987) have used exchange rate forecasts from surveys conducted by financial firms to show how the survey expectations can be described by the usual models of expectations used in open economy models. They have rejected the static or random walk expectations and extrapolative or "bandwagon" expectations. They have found expectations to be stabilizing.

23 The sample periods and procedures are different for different surveys.
forecast errors. That is, $\beta_{fc}>1$. This violates the basic assumption of rational expectations hypothesis that forecast errors are not correlated with past information. The forecast errors are found to be significantly correlated with the lagged forward premium. Froot and Frankel (1987) find that the expectations regarding future exchange rates differ significantly from the ex post realized exchange rates. Moreover, exchange rate expectations take the form of a distributed lag of past exchange rates and expectations are stabilizing. Macdonald and Torrance (1988, 1990) have found evidence of the forward premium as a biased predictor of change in exchange rates and the biasedness is due to risk premium as well as the characteristics of expectations formations by market participants.

There are two kinds of interpretations to explain the fact that forecast errors are correlated with the lagged value of forward premium. One is the existence of some irrational traders in the market. The ex post realized values of exchange rates differ from the expected values so that expectations appear to be irrational. One of the implications of this type of irrational behaviour is the existence of heterogeneous traders in the market in contrast to the 'single representative agent' underlying the rational expectations hypothesis.

The other is related to difficulties in measuring the market's forecasts under rational expectations during the finite sample period. This is more of a statistical nature when disturbances are not normally distributed and the forecast errors may be serially correlated over time. Investors tend to anticipate during the sample period changes in the underlying processes which generate returns that are yet to occur and which occur only after the sample period is over. This is known as the 'Peso' problem. In this case, it is not that "rationality" of expectation is being violated rather it gets realized after the sample period is over and hence is not captured in the data obtained. As Lewis puts it "A peso problem arises when market participants anticipate a

\[24\] However they could not reject the hypothesis that all of the bias is due to the systematic expectation errors and none to a time varying risk premium.
future discrete shift in policy that is not materialized within the sample period examined\textsuperscript{25}.

Lewis (1995) has provided an explanation for such serial correlation in terms of 'rational learning'. Economic agents will update their expectations when there is a policy shift that affects the economy so that forecast errors will not be random.

Another way of looking at the risk premium in foreign exchange market in empirical works is to use the deviations from Real Interest Parity. The real interest rate differentials can be decomposed into uncovered interest rate differentials and deviation from purchasing power parity.

\[ E_t r_{1t} - E_t r_{2t} = \left[ i_{1t} - i_{2t} - E_t \Delta s_{1t} \right] - \left[ E_t \Delta p_{1t} - \left( E_t \Delta p_{2t} + E_t \Delta s_{1t} \right) \right] \]

Here \( r_t \) refers to the real interest rates, \( E_t \Delta s_{1t} \) is the expected depreciation of the country 1’s exchange rate and \( E_t \Delta p_t \) is the expected rate of inflation.

Many asset pricing models, which try to analyse predictable components in excess returns to holding foreign exchange assume that purchasing parity holds. This necessarily means that real interest differentials equal risk premium.

Korajczyk (1985) has used real interest rate differentials to explain the ex post deviations from UIP\textsuperscript{26}. When deviations from real exchange rates are of mean zero, then real interest rate differentials reflect risk premium.

Mishkin (1984) has used a latent variable model to test for equality of real interest rates. He rejects the equality hypothesis for six industrialized countries vis-à-vis USA. Huang (1990) has used a regression technique similar to Fama to show that deviations from real interest parity alone cannot explain the predictable component of excess returns in foreign exchange market.

\textsuperscript{25} Lewis (1995)
\textsuperscript{26} Korajczyk could not reject the hypothesis that real interst rates completely account for risk premium in foreign exchange markets.
Mark (1985a) rejected the real interest parity using short term interest rates for US, Canada, Germany, Italy, Netherlands and UK. Cumby and Cumby and Mishkin (1986) have investigated the link between real interest rates in eight industrialized countries, US, Canada and six European countries. They find a strong positive but not one to one relationship between the short term real interest rates between US and other countries.

Merrick and Saunders (1986) strongly reject expected real interest parity across countries. They have used the cross-sectional mean of ex post real interest rates as a measure of international expected real interest rates. However they do not explain the failure of real interest rate parity in terms of deviations from UIP. They have considered ex ante real interest rates as nominal interest rates adjusted for expected inflation.

However recent studies by Levine (1989) and Gokey (1994) have shown that deviations from PPP primarily account for predictable excess returns in holding foreign exchange and real interest rate differentials play a minor role.

The empirical evidence for a relationship between the real interest rates and real exchange rates is ambiguous. The link between real exchange rate and real interest rate presupposes three conditions; namely the uncovered parity condition, the ex ante PPP and a specific stochastic process generating the real exchange rate.

Baxter (1994) uses the following representation:

\[ E_{t}(S_{t+k} - S_{t}) = (R_{t} - R_{t}^{*}) \]  \hspace{1cm} (1)

27 He has also looked at the real interest rates net of taxes. As economic agents pay taxes on interest incomes and treat interest payments as deductible expenses, the real rates of interest net of taxes can be treated as better indicators of true cost of borrowing or lending. He has recognized that investment decisions of individuals are not influenced by taxes as taxes are not imposed in Euro Currency markets at source. Rather multinational firms can borrow will try to maximize their profits by charging interest on highly taxed profits and investing the surplus funds at low cost locations. However, the hypothesis that after tax real interest rates are equal across countries is by and large rejected.

28 Levine (1991) found that deviations from EPPP explain about eighty to ninety percent of time variations in risk premium. Gokey has used a direct method of decomposition of ex ante excess returns over the period 1974-1989 to show that deviations from ex ante real interest rates account for only six percent and the deviations from ex ante PPP account for over eighty percent of ex ante excess returns.
Chapter III

Review of Literature

$kR_t$ and $kR^*$ refer to the nominal rate of return on $k$-period domestic and foreign bonds respectively. $E_t(s_{t+k}-s_t)$ is the expected change in exchange rate between periods $t$ and $t+1$.

$$E_t(s_{t+k} + p_{t+k} p^*_{t+k}) = s_t + p_t p^*_t,$$ \hspace{1cm} (2)

This is the ex ante purchasing power parity.

The log of real exchange rate is denoted by $q_t$ and $\bar{q}_t$ is the log of the real exchange rate under the assumption that prices are fully flexible. Then from equation (2)

$$E_t(q_{t+k} - q_t)$$

The real exchange rate is assumed to be determined by adaptive expectations as followed in sticky price version of monetary models.

$$E_t(q_{t+k} - q_t) = \theta^k (q_t - \bar{q}_t), \quad 0<\theta<1,$$ \hspace{1cm} (3)

From (1), (2) and (3) one gets

$$q_t = \bar{q}_t + \alpha (r_t - R^*_t), \quad \alpha = 1 / (1 - \theta^k) > 1 \quad \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdots \cdOTS

$r_t$ is the ex ante real return on domestic bonds * denotes the foreign country.

Edison and Pauls (1993) have used a slightly different version because they have assumed the risk premium in uncovered interest rate parity. They have used the following equation to study the relationship between real exchange rate and real interest rate differential,

$$q_t = E(r_t, \tau) - E(r^*_t, \tau) + f(q_t) - \rho_t, \quad \text{where } \rho_t \text{ is the risk premium.}$$

29 Baxter (1994) uses this particular representation of uncovered interest rate parity which signifies a positive relationship between real exchange rate and real interest rate differential.

30 Baxter (1994) and Meese and Rogoff (1988) have used this equation to look for a relationship between real exchange rate and real interest rate differential.
Meese and Rogoff (1988) have estimated equation (4) directly. They have found that the estimate of $a$ is positive for dollar/deutschmark rate, dollar/yen rate and dollar/pound rate. However none of the estimates of $a$ is greater than 1 as predicted in theory. Edison and Pauls (1993) do not find support for such a relationship for US dollar against Japanese Yen, German Deutschmark, British pound sterling and the Canadian dollar. They even tested for co integration to see whether there exists any long run relationship between real exchange rates and real interest rates. However their conclusion is that there is no significant relationship between the real exchange rates and real interest rates either in the short run or in the long run. Baxter (1994) has found a positive relationship between the real exchange rates and real interest rates although it is very weak and the explanatory power of real exchange rates is very low which has come out in low $r^2$ (the correlation coefficient). Baxter argues that the link between real interest rates and real exchange rates is the strongest at trend and business cycle frequencies.

The post Keynesian understanding on interest parity theorems is an extension of the hypothesis to open economy setup that monetary authorities can set domestic interest rates given the policy objectives regarding the key macro variables. This view primarily focuses on the RIP condition. According to ‘Cambist’ approach to forward markets, the forward exchange rate relative to the spot rate is essentially an example of ‘cost determined price’. In contrast to the Neo Classical view, the forward exchange rate is considered to be endogenous in the sense that banks fix the spread between the forward and spot exchange rates on the basis of interest differentials on the euro currency.

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31 Their view is also supported by Campbell and Clarida (1987)
32 Baxter applies band-pass filters to the data on real exchange rates and real interest rates to examine the correlation between these variables by three frequency bands to represent trend, business cycles and irregular movements in the data. She argues that first difference filters used by Meese and Rogoff (1988) to remove the non stationary components also removes most of the low frequencies in which the relationship between real exchange rates and real interest rates appears to be strongest.
33 For an exposition on the post-Keynesian view on interest parity conditions see Lavoie (2000, 2002) and Smithin (2002-3)
market\textsuperscript{35}. Therefore, this definition of CIP does not require the assumption of free capital mobility. Regarding UIP, the post Keynesians hold the view that the deviations from UIP occur due to risk premium which is related to the net debtor position of the domestic country. If domestic interest rate is higher than the foreign rate, this would increase the domestic country indebtedness to the rest of the world and raise the risk premium because of the growing indebtedness. The lower rate of interest in the home country would likewise lower the risk premium or the domestic country would benefit from a risk discount\textsuperscript{36}. The post Keynesians consider ex ante PPP as more of an assumption since it provides no information about the determinants of real exchange rates\textsuperscript{37}. Even Lavoie (2000) and Smithin (2002-3) do not accept ex post PPP as a valid theoretical postulate. In their view, the ex ante PPP does not say anything about the equilibrium value of real exchange rate; what it proposes is that the real exchange rate is not supposed to change from its current value.

"This is the misleadingly named " ex ante PPP" which simply says that real exchange rates are not expected to change from current values, but makes no statement about the "equilibrium" value of the real exchange rate"\textsuperscript{38}.

Therefore, they consider the equilibrium real exchange rate as an endogenous variable determined by monetary factors as well.

The theoretical models and empirical literature investigating the existence of risk premium in foreign exchange market still cannot provide an adequate explanation for the existence of such a premium. As far as empirical studies are concerned, the hypothesis of forward rate as an unbiased predictor of

\textsuperscript{35} What the post Keynesian economists argue that the CIP condition specifies the forward premium or discount rather than the forward rate itself. For this interpretation, see Smithin (2002-3)

\textsuperscript{36} Moosa (2004) argues that the deviations from UIP occurs not because of any risk associated with the expected depreciation of domestic currency but due to the contemporaneous relationship between the forward rate and spot exchange rate as postulated by CIP. He has given different econometric tests to prove that forward rate is a poor predictor of the future spot exchange rate; rather the forward rate and the current spot rate are correlated.

\textsuperscript{37} Smithin(2002-3) has used the concept put forward by Paraskevopoulos et al.(1996)

\textsuperscript{38} As one cannot infer anything about the equilibrium value from the equation $q(t+1)=q(t)$ where $q$ is the real exchange rate. This is the ex ante PPP condition. Smithin (2002-3).
expected future exchange rate has been strongly rejected. But this fact has usually been attributed to the prediction errors arising within a particular sample within a particular period (which makes rational expectations untenable), as mentioned above, rather than the existence of a systematic risk premium. The deviation from UIP still remains a puzzle in international macroeconomics and finance.

3.4 A critique of the theories of risk premium in foreign exchange market

In recent years the focus of theoretical and empirical studies in explaining deviations from UIP has shifted to intertemporal optimizing models based on Lucas. Flood and Rose (2002) and Tanner (2002) are the exceptions who have made an attempt to analyse the UIP condition directly in terms of interest rate differentials. Surprisingly Tanner has not found any evidence of risk for the developing countries. He has taken the same set of countries as our present study. The sample mean of the measure of risk premium in all the countries are statistically not different from zero. As a measure of risk premium he has used \( \omega_t = S_t - S_{t-x} + i_{t-x} - i^*_{t-x} \) However, the ‘ex post’ deviations from UIP or risk premium is defined as \( \omega_t = i_t - i^*_t (S_t - S_0) \). He has used interest rate of USA as the foreign rate of interest. He concludes that there is no ex post deviations from UIP, that is “UIP ‘works’, in the sense that ex-post deviations from UIP are mean zero and stationary”\(^{39}\). In other words, no risk premium is evident from interest differentials. His approach to the analysis of risk is however totally wrong.

Flood and Rose have taken ten developing countries which have faced currency crisis and thirteen other developed countries. The sample period taken is 1990s. Of the twenty one estimates of \( \beta \), twelve are negative (of which all but one is significant); seven are positive (of which Argentina, Brazil and Russia are significant) and two are essentially zero. The intercept terms are insignificantly different from zero except for Canada and Japan. With pooled data across

countries and time horizons, the estimate of $\beta$ (the coefficient of the interest differential in the regression equation $s_{t+1} - s_t = \alpha + \beta (f_t - s_t) + u_{t+1}$) is found to be significantly different from zero with a value of 0.19 with monthly time horizon. For other time horizons, $\beta$ has a positive higher value but insignificantly different from zero. What is interesting about this study is the heterogeneity in the UIP relationships across countries and the positive estimates of $\beta$ for some countries.

All these studies involve data on exchange rates for major industrial countries. The main focus of these studies is to test for 'forward foreign exchange market efficiency'. The use of interest parity conditions and the exchange rate and interest rate data on developed countries implicitly assumes away any risk other than the risk due to unexpected exchange rate change.

Aliber\textsuperscript{40} gives a reinterpretation of the deviations from interest parity in terms of 'political risk'. Political risk is said to arise because of the prospect of capital controls that would be imposed on capital flows. Deviations from covered interest parity reflect political risk when assets are denominated in the same currencies but issued under different legal jurisdictions.

Dooley and Isard (1980) have done a study of Germany from January 1970 to December 1974 when Germany placed a series of capital controls. They have used interest rate on Euromark deposits in Zurich and the interest rate on interbank mark denominated loans in Frankfurt for three month maturities. They have shown in terms of a theoretical portfolio balance model that interest rate differential due to political risk depends on the gross supplies of debt outstanding against different governments and the distribution of world wealth among residents of different political jurisdictions. They have made a distinction between the interest differential arising due to political risk because

\textsuperscript{40} Aliber(1973) has argued that there can be deviations from interest parity condition because of political risk. Political risk arises due to the fact that there is an expectation that there would be capital controls in the future. This means the violation of the assumption of free capital mobility leading to an interest differential not compensated by the forward premium as captured in CIP condition.
of the probability of capital controls and the tax imposed on the investors because of the existing capital controls. The interest differential is shown to be consisting of two components; one arising due to political risk and the other due to the effective tax imposed due to already existing capital controls. On the basis of the empirical analysis based on OLS, their conclusion is that most of the interest differential (71 percent and 77 percent respectively) could be explained by the effective tax due to existing capital controls.

Therefore, risk in foreign exchange market is said to occur for two reasons; one is the threat of perceived or existing capital controls and the other is the expected depreciation of exchange rate. For developing countries, there is an added source of risk in holding currencies of these countries which arises due to the nature of the habitat itself. This kind of risk is specific to third world countries.

3.5 Concluding remarks

Researchers have used different estimation techniques and a variety of currencies for industrialized countries (such as Dollar, Deutschmark, Swiss franc, British pound etc) and different time periods for the floating exchange rate era. Even the alternative tests rejected the efficiency hypothesis. Researchers are still not unanimous in their interpretations of ex post deviations from uncovered interest rate parity. One of the explanations is the existence of a systematic risk premium in foreign exchange market. This risk is considered as currency or exchange rate risk to compensate an investor for the risk of holding that currency. However, this kind of risk is symmetric in nature because investor in any country would require such compensation to hold any currency irrespective of the identity of the country. But the identity of the country matters to investors as far as investments in developing countries are concerned because the elements of risk and uncertainty are much greater in developing countries which arise for different reasons and which may not be quantifiable at all. Therefore, to define risk only in terms of perceived or
existing capital controls or the expected depreciation of exchange rate does not capture the nature of risk associated with investments in developing countries. The basic asymmetry between the developing countries and industrialized nations is not recognized in mainstream literature although investors acknowledge it in terms of higher expected returns on investments in developing countries.

A critique of methodology is given in chapter four which deals with empirical works related to risk premium in foreign exchange market for developing countries.