Asian interest expectations and exchange rate dynamics

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Abstract

Using a new survey data set of matched exchange rate and interest rate expectations for a set of Asian currencies, we empirically implement the "news" version of the Dornbusch-Frankel overshooting model. "News" on interest differentials enters significantly in equations that utilize the difference between the spot rate and the lagged forward rate for Asian exchange rates relative to the US dollar and the Deutsch mark. An unexpected rise in the interest rate differential tends to strengthen the domestic exchange rate. We also find significant effects of our ex-ante measure of the risk premium. In addition, we investigate the effect of lagged interest rate differentials as a proxy for the risk premium and find that they do not capture time-varying risk premia as has been widely suggested in the literature, but probably capture a lag effect due to the time it takes to learn about a policy change, a market-inefficiency or a combination of these factors.

Keywords: Asian exchange rates; Survey data; Risk premia

JEL classification: F41; G14; G15

1. Introduction

Since the abandonment of the Bretton Woods fixed exchange rate arrangement in the early 1970s, the debate regarding the determination of floating exchange rates continues to be an issue of central concern in the financial economics literature. In the past two decades, the asset market approach has become the principal tool for analyzing movements in exchange rates. According to this approach, exchange rates are priced in highly efficient markets where asset prices can be adjusted on an instantaneous basis to whatever the market regards as the currently appropriate price. Thus, exchange rates fluctuate in response to the
market's perception of future fundamental determinants that affect the supply and demand for foreign exchange. The asset market approach typically places considerable emphasis on the importance of expectations and changes therein and is generally taken to imply that empirical research on the determinants of exchange rates should relate innovations in exchange rates to innovations in expectations about relevant future fundamentals. In the empirical literature, this approach is often referred to as the "news" approach of exchange rate determination. Since expectations are inherently unobservable, any empirical study on the "news" approach involves choosing a specific model of the process of exchange rate determination and an appropriate method of generating expected values of its driving values. Until recently, empirical literature has considered three methods to generate expected values of the determining variables: univariate time series, vector autoregression (VAR), and survey data.

The empirical evidence of the "news" approach using different methods for the driving values is mixed. Frenkel (1981) relates the difference between the current spot rate and the lagged forward rate to news on the interest differentials, using time series methods to generate news on the interest rate differentials. His findings indicate weak explanatory power for surprises in interest rate differentials, though there is some ambiguity attached to the sign of the estimated "news" coefficient. Edwards (1982) and MacDonald (1983) provide mixed support with many coefficients being insignificant for the flexible-price "news" approach, using a seemingly unrelated regression (SUR) estimating technique.

In this paper, we empirically implement the "news" version of the Dornbusch-Frankel overshooting model, as derived in Isard (1983) using survey data of matched exchange rate and interest rate expectations. Using a new survey data set that covers a range of Asian currencies over the February 1988-May 1992 period, we test for the effect of news on interest rates and of risk premia on exchange rates. Thereby, at least partially, avoiding the problem of artificially generated expectations when using econometric techniques.

The presentation of the paper is as follows. In Section 1, we start with a description of our survey data set and provide summary statistics. In Section 2, the methodology and "news" framework are described. The empirical results are presented and discussed in Section 3. Section 4 offers some concluding comments.

2. The survey data

Since 1985, Business International Corporation has been conducting a monthly survey of exchange rate expectations covering the Australian and Hong Kong

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1 See Baillie and MacMahon (1989), and MacDonald and Taylor (1992) for an overview.
2 See Wolff (1986).
dollars relative to the US dollar and the Japanese yen relative to the US dollar and the Deutsch mark. These surveys are published in Business International’s Cross Rates Bulletin. For publication purposes, survey participants are asked a few days prior to month’s end to fax three-, six- and twelve-month future expectations on various currency movements with projections being made from the start of the next month. For instance, the three-, six- and twelve-month expected Japanese yen/US dollar rates recorded on December 27th, 1990 reflect a slightly longer forecast horizon as they represent the expected spot rate on April 1st, 1991, July 1st, 1991 and January 2nd, 1992, respectively. The dates when the surveys are conducted have been recorded as well as the spot, three-, six-, and twelve-month ahead forward rates.

Since 1988, survey respondents have also been asked to provide their three-, six- and twelve-month expectations regarding domestic interest rates with a three month maturity. Thus, in the above example, on December 27th, 1990, respondents were asked to provide their expectations of three-month domestic interest rates that start on April 1st, 1991, July 1st, 1991, January 2nd, 1992 and mature on July 1st, 1991, October 1st, 1991, and April 1st, 1992, respectively. Foreign currency deposits denominated in Australian dollars, Hong Kong dollars, German marks, Japanese yen, and US dollars are the ones considered by the monthly survey. Since our study is concerned with matched interest rate and exchange rate expectations, survey data availability led us to focus our analysis on the three-, six- and twelve-month exchange rate predictions and domestic interest rate expectations, using the most actively traded Asian exchange rates.

The thirty-odd participants of the survey are treasurers of multinationals and private banks residing in four of the world’s continents. Although not all participants will provide their views regarding a particular currency, the response rate is no less than 60 percent. The Cross Rates Bulletin reports the geometric mean forecast of the responses received, thus minimizing the effect of extreme forecasts. Unfortunately, disaggregated survey respondent data are not available, although the standard deviation of the respondents’ expectations is reported.

Tables 1a and 1b provide summary statistics for the survey and forward exchange rate annualized forecast errors across forecast horizon and across currencies. The summary statistics for the unanticipated three-month domestic interest differential, and interest differential across horizon and across currencies are reported in Tables 1c and 1d. Table 1e provides summary statistics for the annualized exchange rate risk premium across horizons and across currencies. In the tables, as in the rest of the paper, $S_i$ is defined as the natural logarithm of the

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3 Although the notation used in Sections 2 and 3 will be presented as if the survey was constructed on December 31 (in the example at hand), care has been exercised throughout the empirical analysis to ensure that conditional expectations are computed on the proper information set.

4 Denoting $k$ to be the forecast horizon in months, annualized returns are obtained by multiplying the log differences by $1200/k$. 
<table>
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<th>Table 1A</th>
<th>Survey Forecast Error: $S_{t+k} - E_t S_{t+k}$ (percent per annum)</th>
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<tr>
<td>HK/US</td>
<td>Mean 3 Months: 0.16 St. Dev. 2.10, 6 Months: 0.31 St. Dev. 1.59, 12 Months: 0.35 St. Dev. 1.04</td>
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<tr>
<td>JY/US</td>
<td>Mean 3 Months: 1.67 St. Dev. 27.99, 6 Months: 0.08 St. Dev. 18.21, 12 Months: -1.90 St. Dev. 12.60</td>
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<tr>
<td>JY/DM</td>
<td>Mean 3 Months: 2.69 St. Dev. 23.95, 6 Months: 2.55 St. Dev. 17.28, 12 Months: 1.83 St. Dev. 12.92</td>
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<td>HK/US</td>
<td>Mean 3 Months: 0.27 St. Dev. 2.20, 6 Months: 0.17 St. Dev. 1.54, 12 Months: 0.22 St. Dev. 1.09</td>
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<td>JY/US</td>
<td>Mean 3 Months: 0.17 St. Dev. 26.23, 6 Months: -0.40 St. Dev. 17.80, 12 Months: -0.25 St. Dev. 12.15</td>
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<tr>
<td>JY/DM</td>
<td>Mean 3 Months: 2.36 St. Dev. 22.53, 6 Months: 1.55 St. Dev. 17.95, 12 Months: 0.50 St. Dev. 14.11</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1C</th>
<th>Unanticipated Interest Differential: $d_{t+k} - E_t d_{t+k}$ (percent per annum)</th>
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<tr>
<td>AD/US</td>
<td>Mean 3 Months: 0.19 St. Dev. 1.16, 6 Months: 0.43 St. Dev. 1.62, 12 Months: 1.50 St. Dev. 2.35</td>
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<td>HK/US</td>
<td>Mean 3 Months: 0.32 St. Dev. 0.80, 6 Months: 0.67 St. Dev. 1.06, 12 Months: 1.23 St. Dev. 0.89</td>
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<td>JY/US</td>
<td>Mean 3 Months: 0.11 St. Dev. 0.85, 6 Months: 0.28 St. Dev. 1.22, 12 Months: 1.06 St. Dev. 1.87</td>
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<td>JY/DM</td>
<td>Mean 3 Months: -0.16 St. Dev. 0.86, 6 Months: -0.45 St. Dev. 1.19, 12 Months: -0.67 St. Dev. 1.57</td>
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<tr>
<th>Table 1D</th>
<th>Interest Differential: $d_t$ (percent per annum)</th>
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<td>AD/US</td>
<td>Mean 3 Months: 6.84 St. Dev. 1.77, 6 Months: 6.96 St. Dev. 1.77, 12 Months: 7.15 St. Dev. 1.82</td>
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<td>Mean 3 Months: -0.10 St. Dev. 1.10, 6 Months: -0.20 St. Dev. 1.07, 12 Months: -0.39 St. Dev. 1.00</td>
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<td>JY/DM</td>
<td>Mean 3 Months: -3.40 St. Dev. 0.89, 6 Months: -3.32 St. Dev. 0.86, 12 Months: -3.32 St. Dev. 0.88</td>
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<th>Table 1E</th>
<th>Exchange Rate Risk Premium: $F_{t+k} - E_t S_{t+k}$ (percent per annum)</th>
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<td>AD/US</td>
<td>Mean 3 Months: -0.36 St. Dev. 10.51, 6 Months: -1.66 St. Dev. 5.50, 12 Months: -0.91 St. Dev. 3.12</td>
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<td>HK/US</td>
<td>Mean 3 Months: -0.11 St. Dev. 1.31, 6 Months: 0.14 St. Dev. 1.00, 12 Months: 0.13 St. Dev. 0.73</td>
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<tr>
<td>JY/US</td>
<td>Mean 3 Months: 1.50 St. Dev. 7.01, 6 Months: 0.48 St. Dev. 3.51, 12 Months: -1.65 St. Dev. 2.48</td>
</tr>
<tr>
<td>JY/DM</td>
<td>Mean 3 Months: 0.33 St. Dev. 5.84, 6 Months: 1.00 St. Dev. 3.74, 12 Months: 1.33 St. Dev. 2.67</td>
</tr>
</tbody>
</table>

AD = Australian Dollar; DM = Deutsch Mark; HK = Hong Kong Dollar; JY = Japanese Yen; US = US Dollar.

spot exchange rate at time $t$ (the spot rate is stated in terms of domestic currency units per unit of the foreign currency – the US dollar), $E_t S_{t+k}$ is defined as the natural logarithm of the expected spot exchange rate at time $t + k$ formed at time $t$, $F_{t+k}$ is defined as the natural logarithm of the forward exchange rate at time $t$ for delivery at time $t+k$, $d_{t+k}$ is defined as the three-month domestic interest rate differential, $i_{t+k} - i_{t+k}^*$, for deposits starting at time $t+k$ and maturing at time $t+k+3$, and $E_t d_{t+k}$ as the expected three-month domestic interest differential at time $t+k$ formed at time $t$. The use of survey data allows the direct measurement of a risk premium from the decomposition of the forward exchange rate into its two components – the expected future spot rate and a risk premium:

$$F_{t+k} = E_t S_{t+k} + RP_t$$ (1)


From Table 1a, we note that the standard deviations of the survey forecast errors fall as the length of the forecast horizon rises from 3 to 12 months. Frankel and Froot (1987a) report similar results; however, their empirical observation is reversed in Frankel and Froot (1987b) when four data points are added to the sample. It is also interesting to note that both the absolute value and the standard deviation of the mean forecast error are significantly smaller for the Hong Kong/US dollar exchange rate than for the Australian dollar and Japanese yen exchange rates.

Table 1c provides surprises in interest rate differentials. Overall, we note that innovations in interest differentials are small relative to innovations in exchange rates. This is consistent with the results of Frenkel (1981) and Edwards (1982). It is also interesting to note that both the absolute values and the standard deviations of surprises in interest rate differentials rise markedly with the forecast horizon.

Table 1e suggests the presence of time-varying risk premia, indicating that domestic and foreign assets are regarded as imperfect substitutes. The mean numbers differ from summary statistics reported by Frankel and Froot (1987a, 1987b), which demonstrate surprisingly large exchange risk premia for the four most actively traded currencies (Deutsch mark, Swiss franc, Japanese yen, British pound) relative to the US dollar.

3. Interest rates and exchange rates: methodology

In this section, we use a "news" version of the Dornbusch–Frankel overshooting model, as derived in Isard (1983). In this framework, changes in the current real exchange rate are connected to either corresponding changes in the long-run equilibrium value of the real exchange rate, or to changing perceptions of the speed at which the current real exchange rate approaches its long-run equilibrium. Here, $SR_\infty$ denotes the long-run equilibrium. We assume that agents hold homogeneous views on long-run real exchange rate ("the anchor") and on the speed at which the current real exchange rate will move towards its long-run value ("the rope") – illuminating metaphors taken from Isard (1983) and Edwards (1983). We postulate that the difference between the logarithm of the exchange rate and the logarithm of its expected long-run value is a linear function of the differential between the two current ex-ante real interest rates on the one hand, and the current assessment of the risk premium on the other. The equation is as follows:

$$S_t - P + P - A(r^*-r) + B(RP_t) = E_t(SR_\infty),$$

(2)

where $P$ ($P^*$) is defined as the domestic (foreign) price level, $r$ ($r^*$) is defined as the domestic (foreign) real interest rate, $RP_t$ is defined as the risk premium, and

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5 Dominguez (1986) found that one- and two-week ahead forecast error variances were smaller than one- and three-month ahead forecast error variances.
A and B are coefficients. A simple example can illustrate the implied dynamics of the "news" version of Eq. (2). For ease of exposition, we assume that $RP_t = 0$ and that $E_t(SR_t)$ is a constant. Suppose the money supply in the US drops unexpectedly. Actual prices are sticky, causing a decline in relative money in real terms. This causes the real interest differential in the U.S. to rise temporarily above its long-run equilibrium level. The rise in the US interest rate induces an appreciation of the US dollar relative to the Japanese yen, for instance, due to interest arbitrage. The real exchange rate has to rise enough to achieve an expected depreciation of the US dollar relative to the Japanese yen that offsets the change in the interest differential. Subsequently, prices fall to their equilibrium levels and the interest differential and the real exchange rate converge towards their long run equilibrium levels.

The length of the time for the real exchange rate to converge towards its long-run value depends on the length of the horizon during which the interest differentials are expected to persist. If, due to the drop in US money, real interest rates in the US increase by $n$ percent, and if it is expected to take $z$ years for the interest differential to converge towards its long-run value, then the current real exchange rate has to appreciate by approximately $n * z$ percent in order to depreciate towards its long-run equilibrium. Implicit in this discussion has been the concept of long-run equilibrium. In the empirical analysis, it is important to specify the long-run time frame, given that the variability of the exchange rate depends directly on the length of time over which the real interest rates are expected to converge towards equilibrium. A source from which we can make inferences regarding the long run is Frankel and Meese (1987). If real exchange rates converge toward their long-run equilibrium value, we expect real exchange rates to exhibit some mean reversion and the time series representation of real exchange rates to be significantly different from a random walk. Frankel and Meese (1987) report evidence of mean reversion in real exchange rates using 116 years of data on the US dollar/British pound exchange rate. They also report an adjustment speed of 20 percent a year, suggesting that it would take approximately five years for the real exchange rate to converge towards its long-run equilibrium level.

The formulation in Eq. (2) is appropriate if agents expect both the real interest differential and the risk premium to converge towards zero over time. We do not impose, however, the restriction that the real interest rate differential and the risk premium disappear with the same speed. Relationship (2) must also hold in terms of expectations as held by economic agents during $k$-periods preceding period $t$. Rewriting Eq. (2) to reflect there modifications we obtain:

$$S_t - E_{t-k}S_t = (P)^{ue} - (P^*)^{ue} - A(r^* - r)^{ue} - B(RP_t)^{ue} + (SR_t)^{ue},$$

(3)

where $(P)^{ue}$ and $(P^*)^{ue}$ represent the unexpected change in the domestic and foreign (US) price levels, respectively. Similarly, $(r^* - r)^{ue}$ represents the unex-
pected change in the real interest rate differential. The remaining two terms in Eq. (3) refer to revisions in expectations of the risk premium and the long-run real exchange rate, respectively.

Next, we combine Eq. (3) with the general notion that spot exchange rates differ from lagged forward exchange rates due to a combination of "news" and "risk":

\[ S_{t+k} - F_{t+k} = (S_{t+k} - E_tS_{t+k}) + (E_tS_{t+k} - F_{t+k}) \]

(4)

If we shift Eq. (4) k-periods backwards in time and add it to Eq. (3), we obtain the following expression:

\[ S_t - F_t = (P)^{ue} - (P^*)^{ue} - A(r^* - r)^{ue} - B(RP_t)^{ue} + RP_{t-k} \]

\[ + (SR_{ue})^{ue} \]

(5)

where \( RP_{t-k} \) is the lagged level of the risk premium.

Eq. (5) contains the observable difference between the logarithm of the current spot exchange rate and the logarithm of the lagged forward exchange rate at time \( t - k \) for delivery at time \( t \) on the left-hand side, and a combination of "news" and "risk" on the right-hand side. Note that changes in the risk premium contain one element of "news" in the current period. Since \( B \) is a positive constant, the unexpected change in the assessment of the risk premium and \( t - k \) period’s risk premium have different signs in the expression for the dependent variable. In our view, this provides one fundamental reason why it is so difficult to empirically test hypotheses regarding risk premia in the foreign exchange market. A situation where both the level and the "news" of an unobservable variable are important, but affect the dependent variable in different directions, is similar to the determination of share prices if we assume that shareholders get returns in the form of capital gains. If the required real rate of return is high, share prices may be expected to increase rapidly. If, however, the required real rate of return increases unexpectedly without a corresponding change in the expected stream of future earnings, current share prices will have to fall. French et al. (1987) provide empirical evidence that this line of reasoning has important implications for the stock market.

Next, we link the dynamics of the price level of both countries to movements in their respective inflation rates. We adopt the following ARIMA specification:

\[ \Delta E_t P^* = \phi^*(p^* - E_{t-1}p^*) = \gamma^*(P^* - E_{t-1}P^*) \]

(6)

and

\[ \Delta E_t p = \phi(p - E_{t-1}p) = \gamma(P - E_{t-1}P) \]

(7)

where \( p \) and \( p^* \) represent the domestic and foreign inflation rates, respectively. Similarly, \( P \) and \( P^* \) denote the price level of both countries. We define:

\[ \omega^* = \frac{1}{\gamma^*}, \quad \omega = \frac{1}{\gamma} \]

(8)
Then, as is the case with the univariate Box–Jenkins models, changes in the expected rate of inflation are seen to be directly proportional to unexpected movements in the price level. In formula:

\[
(P^*)^e = \omega^* \Delta E_t p^*
\]

\[
(P)^e = \omega \Delta E_t p
\]

With respect to the determinants of the long-run equilibrium real exchange rate and the dynamics thereof, very little is known. Huizinga (1987) applies co-integration tests to real exchange rates and several macroeconomic fundamentals and finds very little evidence for co-integration between the real exchange rate and these variables. Since the long-run equilibrium value of the real exchange rate is an unobservable variable, any assumption regarding its stochastic behavior has to be tested jointly with other assumptions embedded in the exchange rate model. We hypothesize that the real exchange rate equilibrium in the future is a function of long-run differences in inflation rates between the two countries. If rates of inflation converge in the long run, then the long-run value of the real exchange rate should correspond to PPP. However, if the long-run characteristics of the countries differ in important respects, there may be persistent capital flows. In such a case, the real exchange rate settles at a level which would induce a long-run capital flow and a corresponding non-zero value for the current account. There is, however, no direct empirical evidence on these assumptions regarding the potential determinants of the long-run real exchange rate. We therefore opt for the following flexible specification:

\[
\Delta SR_x = C(\Delta E_t p^* - \Delta E_t p) + u_t,
\]

where \(C\) is a coefficient. As is apparent from Eq. (11), all movements in the equilibrium value of the real exchange rate are unexpected. Substitution of Eqs. (9), (10), (6), and (7) and some rearrangement gives:

\[
S_{t-1}F_t = A(i^* - i)^e + (-A + C - \omega^*) \Delta E_t p^* + (A - C + \omega) \Delta E_t p
\]

\[
+ RP_{t-1} - B(RP)^e + u_t,
\]

where \((i^* - i)^e\) denotes the unexpected movement in the nominal interest rate differential. Eq. (12) also introduces risk terms. We will deal with risk terms in two distinct ways. First, we will rely on exchange rate expectations from the Business International survey data to compute the ex-ante risk premium in the foreign exchange market. Second, we will use the actual interest differential as a proxy for the risk premium.

In the empirical literature concerning risk premia on foreign exchanges, short term interest differentials across countries have played a dominant role in recent years as proximate determinants of these risk premia. Hansen and Hodrick (1983) show that excess returns on five major currencies relative to the US dollar systematically depend on lagged excess returns and the forward premium. Their
sample covers the period 1976–1980 and includes the German mark, the Japanese yen, the British pound, the Swiss and French franc. Hodrick and Srivastava (1984) extend the analysis to the period 1976–1982 and provide a theoretical foundation for the inclusion of the forward premium using the dynamic asset pricing model of Lucas (1982). Giovannini and Jorion (1987) further extend the analysis by using data from Italy and the Netherlands in addition to the other currencies mentioned above. Their sample covers the period 1973–1984. Allowing the two components of the forward premium, that is the US interest rate and the interest rate of the country under investigation, to have independent effects, their results indicate a negative and often significant coefficient on the US interest rate and a positive and somewhat less significant coefficient on the foreign interest rate. This suggests that a high US interest rate coincides with the perception of a risky domestic currency and a high premium on the US dollar.

In estimating our model, we tried to incorporate innovations in inflation rates generated from the so-called Multi-State Kalman Filter (MSKF). The empirical results indicate that the constructed innovation series of inflation rates consistently yield insignificant coefficients. We have therefore decided to restrict our attention to variables that are directly observable from our survey database. The survey-based approach allows us to measure market forecasts of both the exchange rate and interest rate directly. Given the availability of survey data of exchange rate and interest rate expectations, we empirically implement an amended version of Eq. (12). We direct our attention to the following three alternative representations:

\[ S_{t+k} - F_{t+k} = \alpha + \beta_1(d_{t+k} - E_r d_{t+k}) + \beta_2(F_{t+k} - E_s S_{t+k}) + \varepsilon_{t+k} \]  

\[ S_{t+k} - F_{t+k} = \alpha + \beta_1(f_{t+k} - E_r d_{t+k}) + \beta_2(d_r) + \varepsilon_{t+k} \]  

\[ S_{t+k} - E_s S_{t+k} = \alpha + \beta_1(d_{t+k} - E_r d_{t+k}) + \beta_2(d_r) + \varepsilon_{t+k} \]

The use of survey data allows for the direct measurement of the ex-ante risk premium and generates expected values of the interest rate differentials. This means that both exchange risk premia, \((F_{t+k} - E_s S_{t+k})\), and innovations in nominal interest rate differentials, \((d_{t+k} - E_r d_{t+k})\), are observable.

4. Empirical results

The empirical results are provided in Tables 2, 3, and 4. In Table 2, we relate the difference between the realized spot rate and the three-, six-, and twelve-month lagged forward rate to “news” regarding the interest differential and the level of ex-ante exchange risk premium which is computed from the difference between the forward rate and the expected future spot exchange rate. In Table 3, we replace

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5 For a description of the Multi-State Kalman Filter, refer to Kool (1989).
Table 2

\[ S_{t+k} - F_{t+k} = \alpha + \beta_1 (d_{t+k} - E_t d_{t+k}) + \beta_2 (t_{t+k} - E_t S_{t+k}) + e_{t+k} \]

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The heteroskedasticity consistent standard errors are given in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level for the hypotheses $\beta_1 = 0$ and $\beta_2 = 0$, respectively.

Table 3

\[ S_{t+k} - tF_{t+k} = \alpha + \beta_1 (d_{t+k} - E_t d_{t+k}) + \beta_2 (t_t) + e_{t+k} \]

<table>
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<td>(0.376)</td>
<td>(0.162)</td>
</tr>
<tr>
<td></td>
<td>(3.953)</td>
<td>(1.498)</td>
<td>(1.184)</td>
</tr>
<tr>
<td></td>
<td>(7.606)</td>
<td>(5.252)</td>
<td>(1.707)</td>
</tr>
</tbody>
</table>

For notes see Table 2.

Table 4

\[ S_{t+k} - E_t S_{t+k} = \alpha + \beta_1 (d_{t+k} - E_t d_{t+k}) + \beta_2 (t_t) + e_{t+k} \]

<table>
<thead>
<tr>
<th></th>
<th>$k = 3$</th>
<th>$k = 6$</th>
<th>$k = 12$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta_1$</td>
<td>$\beta_2$</td>
<td>$\beta_1$</td>
</tr>
<tr>
<td>AD/US</td>
<td>1.557</td>
<td>0.973</td>
<td>2.667 *</td>
</tr>
<tr>
<td></td>
<td>(5.343)</td>
<td>(1.892)</td>
<td>(1.472)</td>
</tr>
<tr>
<td>HK/US</td>
<td>1.551 **</td>
<td>-1.177 ***</td>
<td>-0.673 ***</td>
</tr>
<tr>
<td></td>
<td>(0.667)</td>
<td>(0.569)</td>
<td>(0.243)</td>
</tr>
<tr>
<td></td>
<td>(4.586)</td>
<td>(1.684)</td>
<td>(1.001)</td>
</tr>
<tr>
<td></td>
<td>(4.551)</td>
<td>(5.835)</td>
<td>(2.491)</td>
</tr>
</tbody>
</table>

For notes see Table 2.
the ex-ante measure of the risk premium by the lagged interest differential to use
as a proxy for risk premium. Finally, in Table 4, we relate the difference between
the realized spot rate and the expected future spot exchange rate to "news" on the
interest differential and the level of the lagged interest differential. The equations
are fitted for each currency and for each forecast horizon \((k = 3, k = 6, \text{ and } k = 12)\). Realized spot exchange rates are obtained from Datastream. Hansen and
Hodrick (1980) demonstrate that when the forecast horizon is longer than the
observational frequency, the forecast error \(e_{t+k}\) will be serially correlated. While
OLS point estimates of \(\beta_1\) and \(\beta_2\) remain consistent in spite of the serially
correlated residuals, the OLS standard errors for the regression coefficients are
biased. This can be corrected via the Newey–West (1987) estimation procedure.
More importantly, if the disturbance at time \(t+k\) is correlated with some of the
explanatory variables at time \(t+k\), OLS will not, in general, be consistent. In this
section, the difficulty with applying the standard OLS procedure arises because the
endogenous variables appearing on the right-hand side of the equations. These
variables will not, in general, be independent of the disturbance term, since they
are partly determined by the dependent variable in the equation. It seems,
therefore, quite unsatisfactory to impose the exogeneity assumption. A general
approach to estimation problems of this kind is provided by the method of
instrumental variables. In this section, we utilize the instrumental variables
estimation technique outlined in Hansen (1982), assuming a moving average
process of order \(k\) for the monthly \(k\)-month forecast errors. Instruments used
include a constant term and lagged explanatory variables.

Some interesting results emerge from the Tables. In Tables 2 through 4, we
find that "news" regarding the interest rate differential enter significantly in the
equations for the Asian exchange rates relative to the US dollar and the Deutsch
mark, respectively. Moreover, significant coefficients are negative in most cases,
reflecting that an unexpected rise in the interest rate differential tends to strengthen
the domestic exchange rate, i.e. reducing \(S_{t+k}\), thereby exhibiting the
Dornbusch–Frankel overshooting effect. The results indicate that a 1 per cent
unanticipated increase in the interest differential for the Japanese yen will approxi-
mately lead to a 19 per cent (unanticipated) appreciation of the Japanese yen. Also
noteworthy is the significant positive coefficient for the AD/US dollar exchange
rate. As suggested by Frankel (1979), this is consistent with a monetary model of
exchange rate determination in which a rise in domestic interest rates may be
primarily due to inflationary expectations. The effect of the "news" on the

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7 The spot exchange rates at time \(t+k\), \(S_{t+k}\), used to compute the change in the spot rate are
obtained from Datastream on days corresponding to the survey forecast dates. If the forecast date falls
on a holiday or weekend, the previous business day is chosen. The spot rate series chosen are London
Bourse closing prices.

8 This is usually referred to as "simultaneous equation bias".

9 Note that the \(k\)-month ahead forecast is in reality a \(k\)-month plus a few days ahead forecast.
interest differential seems to dominantly explain for the difference between the realized spot rate and the expected future spot exchange rate (see Table 4). From Table 2, we also find significant effects of ex-ante measure of the risk premium. It is interesting to note that risk premium becomes more significant as the length of the forecast horizon lengthens from 3 months to 12 months.

As noted in the previous section, it is widely reported in the literature – see, for instance Bekaert and Hodrick (1992) – that the lagged interest differential tends to predict excess returns in the foreign exchange market, which are by definition equal to the difference between the spot rate and the lagged forward exchange rate. As a consequence, it is argued in the literature that the interest rate differential can serve as a proxy for the risk premium in the foreign exchange market. The significant effect of lagged interest differentials in our equations for excess returns in the foreign exchange market is confirmed in Table 3. Note that the AD/US dollar exchange rate is the only currency where we fail to find significant evidence of a lagged interest rate differential for the three- and six month forecast horizons. In order to determine whether the significant effects of the interest differential in Table 3 really reflect time-varying risk premia, we run the same regressions, but this time with the difference between the realized spot rate and the expected future spot exchange rate as the dependent variable. If the interest differential truly reflects risk premia, we would expect it to be insignificant in our equations reported in Table 4. As is apparent from Table 4, the lagged interest differential is highly significant in all but one (the AD/US dollar exchange rate) of the equations for "news" on the exchange rate, which tends to suggest that the interest differential does not reflect risk premia. Whether the effect of the interest differential reflects the time it takes to adapt to policy changes or reflects market inefficiencies remains an open question.

In general, the empirical evidence indicates that "news" concerning changes in interest rate differentials contributes significantly to explaining a non-negligible proportion of exchange rate fluctuations left undiscounted by the lagged forward exchange rate. Furthermore, the inclusion of the expected future spot rate as an alternative to the lagged forward rate frequently improves the significant contribution of "news" on interest differential to explaining unexpected exchange rate movements.

5. Conclusions

In this paper we empirically implemented the "news" version of the Dornbusch–Frankel overshooting model, as derived in Isard (1983) using survey data of matched exchange rate and interest rate expectations for a set of Asian currencies. Since the survey data contains both three-, six- and twelve-month exchange rate and interest rate forecasts, we investigate the Isard (1983) model for these three horizons.
In our empirical results, we find that "news" on the interest rate differential enters significantly in equations for Asian exchange rates relative to the US dollar and the Deutsch mark, respectively. For most of these currencies, we find that "news" on the interest rate differential enters the equations with a negative coefficient suggesting that an unexpected rise in the interest differential tends to strengthen the domestic currency, which is often referred to in the literature as the Dornbusch–Frankel overshooting effect. We also find significant effects of our ex-ante measure of the risk premium, especially at the 12 month forecast horizon. In addition, we test for the effect of the lagged interest differential in the equation that reflects the difference between the realized spot rate and the lagged forward exchange rate. Literature widely holds the view that the lagged interest differential might capture time-varying risk premia in the foreign exchange market. We find the effect of the lagged interest differential to be highly significant in the difference between the realized spot rate and the lagged forward exchange rate, and in the difference between the realized spot rate and the expected future spot exchange rate. This evidence suggests that the lagged interest differential in our equations that reflects the difference between the realized spot rate and the lagged forward rate does not capture time-varying risk premia but more likely reflects an adjustment period due to new policy regimes, a market inefficiency, or a combination of these factors.

References


