ELSEVIER

Economics Letters 50 (1996) 127–134

economics letters

# Exchange rate returns, 'news', and risk premia

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Received 30 January 1995; revised version received 15 March 1995; accepted 24 May 1995

**Abstract**

Using a new survey data set of *matched* exchange rate and interest rate expectations for eight currencies relative to the German mark, we examine empirically the relationship between exchange rate returns, 'news', and risk premia. 'News' on interest differentials enters significantly in equations for the difference between the spot rate and the lagged forward rate for the British pound, Japanese yen, Spanish peseta and the US dollar. An unexpected rise in the interest rate differential tends to strengthen the domestic exchange rate. For each of these currencies, 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 is widely suggested in the literature, but probably reflect a peso problem, learning about a policy change, a market inefficiency, or a combination of these factors.

*Keywords:* Exchange rates; Risk premia; Survey data

*JEL classification:* F31

## 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

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0165-1765/96/$12.00 
*SSDI* 0165-1765(95)00724-5

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 of 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. Up to now, the empirical literature has considered three methods to generate values of the determining variables: univariate time series models, vector autoregressions (VARs) and survey data.[1]

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, although there is some ambiguity attached to the sign of the estimated 'news' coefficient.[2] Edwards (1982) and MacDonald (1983) provided 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 investigate empirically the relationship between exchange rate returns, 'news', and risk premia using survey data of *matched* exchange rate and interest rate expectations. Employing a new survey data set on exchange rates and interest rates we test for the effect of news concerning interest rates and risk premia on exchange rates, so at least partially avoiding the problem of artificially generated expectations when using econometric techniques.

The paper is organized as follows. In Section 2, we describe the survey data set. In Section 3, the methodology and 'news' framework are described. The empirical results are presented and discussed in Section 4, while conclusions are in Section 5.

## 2. The survey data

Since 1985, Business International Corporation has been conducting a monthly survey of exchange rate expectations covering eight currencies relative to the German mark, which are published in its *Cross Rates Bulletin*. For publication purposes, survey participants are asked a few days prior to the end of the month to fax three-, six- and 12-month-ahead expectations of a number of currencies with projections being made from the beginning of the following month. Thus, for instance, the three-, six- and 12-month-ahead expected U.S. dollar/deutschmark rates recorded on 27 December 1990 reflect a slightly longer forecast horizon as they represent the expected spot rate on 1 April 1991, 1 July 1991 and 2 January 1992,

[1] See Baillie and MacMahon (1989) and MacDonald and Taylor (1992) for an overview.
[2] See Wolff (1986).

respectively.[3] The dates when the surveys are conducted have been recorded as well as the spot, three-, six-, and 12-month-ahead forward rates recorded on that particular day.

Since 1988, survey respondents have also been asked to provide their three-, six- and 12-month-ahead expectations regarding domestic interest rates with a three-month maturity. Thus, in the above example, on 27 December 1990, respondents were asked to provide their expectations of three-month domestic interest rates starting 1 April 1991, 1 July 1991, 2 January 1992 and maturing 1 July 1991, 1 October 1991, and 1 April 1992 respectively. Foreign currency deposits denominated in pounds sterling, Canadian dollars, French francs, German marks, Italian lire, Japanese yen, Spanish pesetas, Swiss francs, and U.S. dollars are those 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 12-month-ahead exchange rate and domestic interest rate expectations, using the most actively traded exchange rates relative to the deutschmark. In the following section we introduce the 'news' framework.

## 3. Interest rate 'news' and exchange rate surprises

In order to obtain a relationship between interest rate 'news' and exchange rate surprises, it is useful to decompose the forecast error resulting from the use of the forward exchange rate as a predictor of the subsequent spot rate (at the maturity date of the forward contract) as follows:

$$S_{t+k} - {}_tF_{t+k} = (S_{t+k} - \mathrm{E}_tS_{t+k}) + (\mathrm{E}_tS_{t+k} - {}_tF_{t+k}) \,, \tag{1}$$

where $S_{t+k}$ is defined as the natural logarithm of the spot exchange rate at time $t+k$ (the spot rate is stated in terms of domestic currency units per unit of the foreign currency), $\mathrm{E}_tS_{t+k}$ is defined as the natural logarithm of the expected future spot exchange rate at time $t+k$ formed at time $t$ and where ${}_tF_{t+k}$ is defined as the natural logarithm of the forward exchange rate at time $t$ for delivery at time $t+k$. The forecast error $S_{t+k} - F_{t+k}$ is often referred to as the 'return to forward speculation' or the 'exchange rate return'. The above identity shows that the forecast error consists of two components: the surprise in the spot rate and the risk premium for the currency in question.

In this paper we focus our attention on a number of different regression relationships that are closely linked to Eq. (1) and that can be estimated on the basis of our new survey database that contains matched exchange rate and interest rate expectations. Following Frenkel (1981), we focus on surprises in interest rate differentials as the most important source of unexpected exchange rate movements. We investigate the sources of relationship (1) by means of the following three regression equations:

$$S_{t+k} - {}_tF_{t+k} = \alpha + \beta_1(d_{t+k} - \mathrm{E}_td_{t+k}) + \beta_2({}_tF_{t+k} - \mathrm{E}_tS_{t+k}) + \varepsilon_{t+k} \,, \tag{2}$$

[3] Although the notation used in Sections 3 and 4 will be presented as if the survey was constructed on 31 December (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.

$$S_{t+k} - {}_tF_{t+k} = \alpha + \beta_1(d_{t+k} - \mathrm{E}_t d_{t+k}) + \beta_2(d_t) + \varepsilon_{t+k} , \tag{3}$$

$$S_{t+k} - \mathrm{E}_t S_{t+k} = \alpha + \beta_1(d_{t+k} - \mathrm{E}_t d_{t+k}) + \beta_2(d_t) + \varepsilon_{t+k} , \tag{4}$$

where $d_{t+k}$ 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 $\mathrm{E}_t d_{t+k}$ is the expected three-month domestic interest differential at time $t+k$ formed at time $t$. Eq. (2) relates the forecast error resulting from the forward rate to 'news' about the interest differential and the level of the risk premium, which is also directly observable from our survey data. In Eq. (3) we replace the ex ante measure of the risk premium by the lagged interest differential as a proxy for the risk premium, following Bekaert and Hodrick (1992). In Eq. (4), finally, we relate the innovation in the spot exchange rate to 'news' about the interest differential and the level of the lagged interest differential. The combination of Eqs. (3) and (4) allows for a direct test of the important hypothesis in the foreign exchange market literature that the short-term interest differentials across countries have played a dominant role as at least approximate determinants of risk premia.

## 4. Empirical results

In this section we report the empirical results obtained when estimating Eqs. (2)–(4). The equations were fitted for each currency and for each forecast horizon ($k=3$, $k=6$, and $k=12$). Realized spot exchange rates were obtained from Datastream.[4] Hansen and Hodrick (1980) demonstrate that, when the forecast horizon is longer than the observational frequency, the forecast error $\varepsilon_{t+k}$ will be serially correlated. While ordinary least-squares (OLS) point estimates of $\beta_1$ and $\beta_2$ remain consistent, despite 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 of the endogenous variables appearing on the right-hand side of the equations and they will not in general be independent of the disturbance term, since they are partly determined by the dependent variable in that equation.[5] It therefore seems 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 implement the instrumental variables estimation technique outlined in Hansen (1982), assuming a moving average process of order $k$ for the monthly $k$-month-ahead forecast errors.[6] Instruments used were a constant term and lagged explanatory variables.

[4] 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.

[5] This is usually referred to as 'simultaneous equation bias'.

[6] Note that the $k$-month-ahead forecast is in reality a $k$-month-*plus*-a-few-days-ahead forecast.

Table 1
$S_{t+k} - {}_tF_{t+k} = \alpha + \beta_1(d_{t+k} - E_t d_{t+k}) + \beta_2({}_tF_{t+k} - E_t S_{t+k}) + \varepsilon_{t+k}$

| | $k=3$ | | $k=6$ | | $k=12$ | |
|---|---|---|---|---|---|---|
| | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ |
| BP/DM | −2.922* | −0.479 | −3.188*** | −2.807*** | −1.997*** | −3.050*** |
| | (1.571) | (1.042) | (0.672) | (0.841) | (0.520) | (0.635) |
| CD/DM | −5.935 | 0.617* | −2.792 | 0.388 | −0.823 | −0.279 |
| | (5.183) | (0.337) | (2.900) | (0.361) | (1.715) | (0.744) |
| FF/DM | −0.861 | −0.239 | 1.133** | 0.135 | 0.756*** | −0.151 |
| | (2.377) | (0.949) | (0.526) | (0.298) | (0.255) | (0.566) |
| IL/DM | 4.354 | 0.697 | −0.452 | −0.239 | −0.037 | −0.685 |
| | (4.776) | (0.458) | (1.270) | (0.283) | (0.706) | (0.664) |
| JY/DM | −19.008** | 3.972 | −3.227 | −2.091* | 1.603 | −4.856*** |
| | (7.606) | (3.305) | (3.161) | (1.097) | (1.589) | (0.943) |
| SF/DM | −11.675 | 4.501 | 1.646 | −0.849 | −0.612 | 0.347 |
| | (14.687) | (4.405) | (3.012) | (0.829) | (0.629) | (0.579) |
| SP/DM | −10.212** | −2.826** | −5.204*** | −2.956** | −2.789* | −2.091* |
| | (4.698) | (1.426) | (2.107) | (1.276) | (1.664) | (1.281) |
| US/DM | −11.517* | −0.056 | −3.407 | −0.859 | −2.503** | −1.163** |
| | (6.667) | (0.985) | (3.038) | (1.325) | (1.069) | (0.555) |

*Note*: The heteroskedasticity consistent standard errors are given in parentheses. *(**) [***] denotes significance at the 10% (5%) [1%] level for the hypotheses $\beta_1 = 0$ and $\beta_2 = 0$, respectively.

Some interesting results emerge from the tables. In Table 1 we find that 'news' about the interest rate differential enters significantly in the equations for the British pound, Japanese yen, Spanish peseta, French franc and U.S. dollar. Moreover, in most cases, the significant coefficients are negative, reflecting that an unexpected rise in the interest rate differential tends to strengthen the domestic exchange rate, i.e. to reduce $S_{t+k}$. The results indicate that a 1% unanticipated increase in the interest differential for the British pound will lead to an approximately 3% (unantipicated) appreciation of the British pound. Noteworthy is the significantly positive coefficient for the French franc/German mark 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. For each of the four currencies exhibiting the Dornbusch effect, we also find significant effects of the ex ante measure of the risk premium. It is interesting to note that the significance of the risk premium increases as the length of the forecast horizon rises from three 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 movements in the 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 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 equations for the excess return in the foreign exchange market is confirmed in Table 2. For the six- and 12-month forecast horizons, the lagged interest differential has a statistically significant effect

Table 2
$S_{t+k} - {}_tF_{t+k} = \alpha + \beta_1(d_{t+k} - E_t d_{t+k}) + \beta_2(d_t) + \varepsilon_{t+k}$

| | $k=3$ | | $k=6$ | | $k=12$ | |
|---|---|---|---|---|---|---|
| | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ |
| BP/DM | −3.867*** | −0.421 | −1.175*** | −0.391 | 0.182 | 2.035* |
| | (1.604) | (0.856) | (0.414) | (0.773) | (0.494) | (1.211) |
| CD/DM | −5.460 | −1.507 | 1.039 | −3.004* | −0.798 | 2.343 |
| | (5.332) | (1.330) | (2.724) | (1.729) | (1.720) | (2.260) |
| FF/DM | −1.231 | −0.781* | 0.336 | −0.526*** | −0.044 | −0.886*** |
| | (1.092) | (0.408) | (0.422) | (0.169) | (0.143) | (0.155) |
| IL/DM | 2.698 | −0.907* | −0.103 | −0.780* | −1.238*** | −1.148*** |
| | (2.329) | (0.550) | (1.386) | (0.8) | (0.153) | (0.131) |
| JY/DM | −15.462*** | −19.370*** | −8.005*** | −15.770*** | −28.637*** | −55.418*** |
| | (4.170) | (5.522) | (2.599) | (3.798) | (4.642) | (10.059) |
| SF/DM | −12.263** | −13.988*** | −2.327 | −3.241** | −1.917*** | −4.508*** |
| | (5.746) | (3.672) | (3.359) | (1.492) | (0.795) | (1.370) |
| SP/DM | −6.146*** | −0.522 | −3.537*** | −1.684*** | −2.807** | −2.733*** |
| | (2.187) | (1.430) | (0.771) | (0.702) | (0.322) | (0.222) |
| US/DM | −7.595 | −1.563 | −4.970*** | −1.994 | −2.857*** | 0.607 |
| | (6.260) | (1.937) | (1.932) | (1.532) | (0.926) | (0.885) |

*Note*: The heteroskedasticity consistent standard errors are given in parentheses. *(**) [***] denotes significance at the 10% (5%) [1%] level for the hypotheses $\beta_1 = 0$ and $\beta_2 = 0$, respectively.

for six of the eight currencies. Noteworthy is that the U.S. dollar is the only currency where we fail to find significant evidence of the lagged interest rate differential. The effect of the 'news' about the interest differentials is very similar to the results reported in Table 1: the effect seems to dominate for the British pound, Japanese yen, Spanish peseta and U.S. dollar. To sort out whether the significant effects of the interest differential in Table 2 possibly reflect time-varying risk premia, we ran 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, then we would expect it to be insignificant in the equations for the difference between the actual exchange rate and the expected future spot exchange rate in Table 3. As is apparent from Table 3, the lagged interest differential is highly significant in most of the equations for 'news' on the exchange rate, which tends to suggest that the interest differential does not reflect risk premia.

## 5. Conclusion

In this paper, we focus on 'news' and risk in foreign exchange markets. Our survey forecast contains both three-, six- and 12-month-ahead exchange rate and interest rate forecast. We focused on these three horizons. We find that 'news' about the interest rate differential enters significantly in the equations for the British pound, Japanese yen, Spanish peseta, French franc and U.S. dollar. For each of these currencies, we also find significant effects of our ex ante measure of the risk premium, especially at the twelve-month horizon. In addition, we

Table 3
$S_{t+k} - {}_tF_{t+k} = \alpha + \beta_1(d_{t+k} - E_t d_{t+k}) + \beta_2(d_t) + \varepsilon_{t+k}$

| | $k=3$ | | $k=6$ | | $k=12$ | |
|---|---|---|---|---|---|---|
| | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ | $\beta_1$ | $\beta_2$ |
| BP/DM | −3.884*** | −0.418 | −1.834*** | 0.099 | 0.591* | 1.751** |
| | (1.570) | (0.927) | (0.390) | (0.531) | (0.370) | (0.880) |
| CD/DM | −7.195 | −3.628** | 1.116 | −4.331*** | −0.644 | 1.440 |
| | (6.519) | (1.712) | (3.126) | (1.376) | (1.932) | (1.923) |
| FF/DM | 0.391 | −1.019** | 0.326 | −1.320*** | 0.273 | −0.883*** |
| | (1.129) | (0.465) | (0.548) | (0.273) | (0.125) | (0.107) |
| IL/DM | 0.052 | −1.606*** | −1.548*** | −2.138* | −1.176*** | −1.514*** |
| | (1.993) | (0.646) | (0.768) | (0.354) | (0.241) | (0.154) |
| JY/DM | −14.885*** | −21.888*** | −5.880*** | −15.637*** | −25.426*** | −50.147*** |
| | (4.551) | (5.835) | (2.491) | (3.624) | (3.990) | (8.172) |
| SF/DM | −10.984** | −14.269*** | −4.091 | −4.689*** | −2.175*** | −5.228*** |
| | (5.085) | (3.770) | (3.081) | (1.486) | (0.682) | (1.128) |
| SP/DM | −6.668*** | −0.407 | −4.016*** | −2.117*** | −3.056*** | −2.396*** |
| | (2.797) | (1.426) | (0.719) | (0.530) | (0.772) | (0.623) |
| US/DM | −9.313 | −2.667 | −4.266*** | −2.925 | −2.507*** | −0.313 |
| | (6.745) | (2.172) | (1.807) | (1.518) | (0.718) | (0.852) |

*Note*: The heteroskedasticity consistent standard errors are given in parentheses. *(**) [***] denotes significance at the 10% (5%) [1%] level for the hypotheses $\beta_1 = 0$ and $\beta_2 = 0$, respectively.

tested for the effect of the lagged interest differential in equations for the difference between the realized spot rate and the lagged forward exchange rate, since it is widely held in the literature that the lagged interest differential might capture time-varying risk premia in the foreign exchange market. Our evidence suggests that the interest differentials do not capture time-varying risk premia but likely reflect a peso problem, learning about a policy regime, a market inefficiency or a combination of these factors.

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