

Predicting Foreign Exchange Directional Moves: Can Simple Fundamentals Help?

MATTHEW R. MOREY AND MARC W. SIMPSON

MATTHEW R. MOREY is an associate professor of finance at the Lubin School of Business at Pace University in New York City.

MARC W. SIMPSON is an assistant professor of finance at Marshall University in Huntington, WV.

Many investors attempt to forecast exchange rates in the hopes of increasing returns, or in deciding when to hedge foreign currency exposure. Methods vary considerably from investor to investor. Some use fundamental economic information to form their forecasts; others use charting techniques, and yet others opt for a combination of the two methods.

One reason for the difference in forecasting philosophies is that few if any fundamental models of exchange rate determination have predicted well historically. Indeed, that basic models cannot predict exchange rates is extensively documented. For example, Meese and Rogoff [1983] use foreign exchange rate data from the late 1970s and early 1980s, and find that a simple random walk performs just as well as all standard models (e.g., purchasing power parity, the overshooting model, the simple forward rate) in terms of predicting changes in future exchange rates.

In another study, Froot and Thaler [1990] examine the equation $s_t = \beta f_{t-1} + \varepsilon_t$, where s_t is the current spot rate, f_{t-1} is the lagged one-period forward exchange rate, and ε_t is an error term. According to the efficient markets hypothesis, the null hypothesis is that β should be equal to 1. In their survey of many studies from the 1970s and the 1980s, Froot and Thaler find that the average empirical estimate of β is not 1, nor is it even positive. Instead, the average estimate of β is

actually -0.88, almost the exact opposite of the null hypothesis. In other words, if a firm had forecast exchange rates to be the *opposite* of what the forward rate indicated, it would have been closer to the truth than if it had used the actual forward rate.

The failure of economic fundamentals to predict how much the exchange rate is going to change means that investors have no simple guideline to follow in the face of exchange rate risk. In this article, we ask not whether one can predict future exchange rates, but whether there is any useful predictive information in exchange rate fundamentals whatsoever. Specifically, we ask a simple question: Can these fundamentals predict the *direction* of future exchange rate changes?

If we find that these fundamentals are of no help in predicting even the future direction of the exchange rate, our results simply add to the evidence that economic fundamentals are not very helpful in terms of helping investors predict exchange rates. If our findings indicate that fundamentals do help in predicting the future direction of the exchange rate, fundamentals may then provide investors with information that can help them make investment decisions. For example, if an investor can generally predict that an exchange rate will soon move downward toward the fundamental value, this prediction may signal to the investor that this is the correct time to pull money out of the market in question.

We look at a number of different simple

scenarios that are consistent with what investors might know. First, we investigate if either the forward exchange rate or purchasing power parity can predict the future direction of the exchange rate. Second, we examine whether large "deviations" in the forward rate or purchasing power parity can help to predict the future direction of the exchange rate. By "deviations" we mean in the case of the forward rate, historically large differences between the forward and spot exchange rates, and in the case of purchasing power parity, historically large deviations from the equilibrium exchange rate.

Our rationale for the second part of the study is that a great difference between the fundamentals and the present spot rate may indicate a greater disequilibrium in the foreign exchange market. As a result, the spot rate may readily move in the direction indicated by the fundamentals.

BASIC MODELS OF FOREIGN EXCHANGE DETERMINATION

Forward Exchange Rate

The basic premise for the current forward rate as a predictor of the future direction of spot rate changes rests on two parity conditions. The first is known as covered interest rate parity, which states that the forward rate premium incorporates the differences in interest rates between two countries. This condition must hold, or a clear arbitrage condition would exist.¹ The second parity condition is known as uncovered interest rate parity. It implies that differences in interest rates between two equally risky countries must be equalized by the future change in exchange rates. Hence, if the U.S. has an annual interest rate 2 percentage points higher than Germany (assuming the risk is the same in the U.S. and in Germany), we would expect the dollar to depreciate by 2 percentage points over the next year to equalize the expected rate of return.

Together, covered interest rate parity and uncovered interest rate parity imply that the forward exchange rate is the market's expectation of the future spot exchange rate. For example, suppose the one-year DM/\$ forward exchange rate is 2 percentage points lower than the current DM/\$ spot exchange rate; covered interest rate parity then implies that one-year interest rates are 2 percentage points higher in the U.S. On the other hand, interest rate parity implies that if U.S. interest rates are 2 percentage points higher (given the same risk), the dollar must be expected to depreciate by 2 percentage points

over the year to ensure that the expected rates of return between the two equally risky countries are equal. Hence, the 2 percentage points expected depreciation in the spot exchange rate is exactly what the forward rate predicts.

Relative Purchasing Power Parity and the Equilibrium Exchange Rate

Founded upon an intuitive arbitrage situation, the purchasing power parity (PPP) hypothesis is an appealing theory of exchange rate determination. In its strongest form, known as the law of one price, PPP postulates that in an environment free of trade barriers and tariffs the equilibrium exchange rate will equalize the price of similar goods in different countries. Unfortunately, empirical examination of the law of one price shows that the "law" does not seem to hold for many goods. This is largely because many goods are not traded internationally, and other assumptions of the model do not hold.

Rather than stop here, academicians have instead examined a weaker version of purchasing power parity called relative purchasing power parity, which states that the equilibrium exchange rate may be proportionate to the ratio of two countries' price levels. Relative purchasing power parity thus implies that the change in the exchange rate from one period to the next is equal to the difference in the inflation rates between the two countries. For example, if prices are rising in the U.S. at 3% per year and prices are rising in the U.K. at 2% per year, an increase in the \$/£ exchange rate of 1 percentage point would be necessary to eliminate the arbitrage opportunity created by the diverging prices (assuming no transaction costs).

By using this concept of relative PPP, Hakkio [1992] has developed a method for constructing an equilibrium exchange rate between two countries. His formula for finding the equilibrium exchange rate in time period $t + 1$, is:

$$e_{t+1} = e_t^* (1 + \Pi - \Pi^*), \quad (1)$$

where e_{t+1} and e_t are the equilibrium exchange rates at time $t+1$ and time t respectively and are quoted in terms of units of domestic currency per units of foreign currency, and Π and Π^* are the domestic and foreign inflation rates. The basic idea behind Equation (1) is that the PPP holds for a specific period. Since it holds for that period, an investor could then use that period's observed exchange rate as a base and map the equilibrium exchange rate for-

and backward from that observation using the difference in inflation in the two countries.

For example, assume that the base period of observation is January 1980. Also assume that the end-of-the-month dollar/pound exchange rate is 2.28. Moreover, the inflation rates in February 1980 are 1.37% in the U.S. and 1.45% in the U.K. Using Hakkio's idea, the end-of-the-month equilibrium dollar/pound exchange rate for February 1980 would be $2.28 * (1 + 0.0137 - 0.0145) = 2.27$. Hence, we would expect a slight depreciation in the pound over the next month according to relative PPP.

One could then use this February equilibrium exchange rate and the inflation rates for March to calculate the March end-of-the-month equilibrium exchange rate, and so on. The level of these equilibrium exchange rates, of course, would be biased by the choice of the base period. To mitigate this bias one could choose several base periods and take the average of the equilibrium exchange rates so generated. For our analysis we have created the PPP equilibrium exchange rate by using the 36 monthly observations in the base period of January 1980 to December 1982. This period was chosen as the base because Hakkio (1992) has argued that the exchange rate was in equilibrium during this period.²

The equilibrium PPP exchange rate indicates the direction of change in the actual exchange rate because a deviation from the equilibrium rate implies that arbitrage opportunities are increasing. As arbitrageurs take advantage of these opportunities, the exchange rate should move closer to the equilibrium rate. Therefore, if the actual exchange rate is above the equilibrium, relative PPP would indicate that the actual exchange rate should fall in the following periods. By the same token, if the actual exchange rate were below the equilibrium, relative PPP would indicate that the actual exchange rate should rise in subsequent periods.

DATA

There are three types of data used in the analysis: spot exchange rates, forward exchange rates, and (to measure purchasing power parity) consumer price indexes.

The spot and forward data correspond to the bid price of the last trading day of each month for the months between January 1974 and December 1998. The data from 1974-1992 come from the Harris Data Banks tapes, and the data subsequent to this come from Général du Banque, New York, and the Federal Reserve Bank of Chicago. The exchange rate data are in U.S. dol-

lar terms and are for nine countries: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Switzerland, and the United Kingdom. The forward rate data span four different terms: one month, three months, six months, and one year.

The Consumer Price Index data used to calculate the purchasing power parity measures are from the International Financial Statistics database. They are all calculated using a base year of 1990.

RESULTS

We present the results of the fundamental models to predict the direction of the future spot rates in four sections: The Forward Rate, The Purchasing Power Parity Equilibrium Exchange Rate, Large Forward Premium, and Large Purchasing Power Parity Deviations. For each section, we present the percentage success results of predicting the future direction of the exchange rates over four different time horizons: one month, three months, six months, and one year.

In Exhibits 1 and 2 we examine an overall period and two subperiods, 1974-1984 and 1985-1998, and the difference in results between the two subsamples. We use 1985 as a breakpoint for a number of reasons. First, 1985 was the year of the Plaza Accord, an agreement of the G-5 countries to drive down the value of the U.S. dollar. The agreement worked extremely well at achieving this end, as the dollar fell by over 50% against the Japanese yen in a year and half. Because of this massive and quick change in exchange rate values, a number of authors, including Krugman [1987], state that a structural break in exchange rates took place in 1985.

Also, most of the studies that examine the predictive ability of exchange rate models use data from before 1985. Hence, an examination of the data after 1985 allows a reevaluation of models using more up-to-date data.³

Forward Rate

The ability of the forward rate to predict the future direction of the spot exchange rate is shown in Exhibit 1.⁴ The results show rather abysmal predictive ability. Indeed, only four of 108 cases show a success rate above 60%, and not a single case has a success rate above 70%. For most cases, success rates are confined to the range from the high 30th to 50th percentiles.

Moreover, the predictive ability of the forward rate does not improve much after 1985. In fact, the average

EXHIBIT 1

Ability of Forward Rate to Predict Future Direction of Spot Exchange Rate

Success Rate in Predicting (%)				
1 Month in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	39.46	37.40	41.07	3.67
Canada	41.81	42.75	41.07	-1.68
France	44.82	48.09	42.26	-5.83
Germany	50.17	45.80	53.57	7.77
Italy	49.16	56.49	43.45	-13.04
Japan	41.14	34.35	46.43	12.08
Netherlands	46.15	39.69	51.19	11.50
Switzerland	50.17	51.15	49.40	-1.75
U.K.	49.50	48.09	50.60	2.51
Average:	45.82	44.87	46.56	1.69
3 Months in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	41.08	45.80	37.35	-8.45
Canada	40.07	47.33	34.34	-12.99
France	43.10	48.85	38.55	-10.3
Germany	51.85	47.33	55.42	8.09
Italy	61.95	64.89	59.64	-5.25
Japan	45.45	41.98	48.19	6.21
Netherlands	48.82	40.46	55.42	14.96
Switzerland	49.83	48.85	50.60	1.75
U.K.	43.10	38.93	46.39	7.46
Average:	47.25	47.16	47.32	0.16
6 Months in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	44.90	48.85	41.72	-7.13
Canada	44.56	48.09	41.72	-6.37
France	44.90	50.38	40.49	-9.89
Germany	54.76	52.67	56.44	3.77
Italy	51.36	68.70	37.42	-31.28
Japan	46.26	37.40	53.37	15.97
Netherlands	48.98	41.98	54.60	12.62
Switzerland	51.70	46.56	55.83	9.27
U.K.	38.78	37.40	39.88	2.48
Average:	47.35	48.00	46.83	-1.17
One Year in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	46.88	55.73	39.49	-16.24
Canada	48.96	58.02	41.40	-16.62
France	46.88	53.44	41.40	-12.04
Germany	50.00	46.56	52.87	6.31
Italy	57.29	69.47	47.13	-22.34
Japan	46.18	41.22	50.32	9.10
Netherlands	47.57	38.93	54.78	15.85
Switzerland	52.78	52.67	52.87	0.20
U.K.	42.01	40.46	43.31	2.85
Average:	47.35	50.72	47.06	-3.66
Overall Average:	47.29	47.69	46.94	-0.75

success rate in the 1974-1984 period is 47.69% compared to 46.94% in the 1985-1998 period. It is remarkable how steady the success of the forward rate is over different periods and different terms.

Purchasing Power Parity Equilibrium Exchange Rate

The success rates of purchasing power parity are shown in Exhibit 2. The results are not very encouraging in the 1974-1984 period. As with forward rates, only a small number of cases show a success rate of more than 60%. The results improve in the 1985-1998 period. In the majority of countries, the success rate of purchasing power parity improves substantially; the longer terms show the most improvement. Only in the cases of Canada and (less so) Japan is there a decrease in predictive ability in the 1985-1998 period.

The average success rate in the 1974-1984 period for all cases is 42.26%; it is 57.58% in the 1985-1998 period. Also note that the one-year term results are especially impressive, as the 1974-1984 period has only a 45.21% success rate while the 1985-1998 period has a 63.27% success rate.⁵

Large Forward Premiums

Exhibit 3 presents the ability of what we term "large" forward premiums to predict the future direction of the spot rate. To determine when a premium is "large," we use a moving average of the absolute value of the

EXHIBIT 2

Ability of Purchasing Power Parity Equilibrium Exchange Rate to Predict Future Direction of Spot Exchange Rate

Success Rate (%)				
1 Month in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	46.82	35.88	55.36	19.48
Canada	50.17	56.49	45.24	-11.25
France	51.84	46.56	55.95	9.39
Germany	46.82	39.69	52.38	12.69
Italy	48.16	45.04	50.60	5.56
Japan	50.17	51.15	49.40	-1.75
Netherlands	47.16	38.17	54.17	16.00
Switzerland	50.50	50.38	50.60	0.22
U.K.	53.85	45.80	60.12	14.32
Average:	49.50	45.46	52.65	7.18
3 Months in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	50.51	36.34	61.45	25.11
Canada	55.22	67.18	45.78	-21.4
France	53.54	41.22	63.25	22.03
Germany	51.85	38.17	62.65	24.48
Italy	49.49	46.56	51.81	5.25
Japan	50.17	48.85	51.20	2.35
Netherlands	53.54	41.22	63.25	22.03
Switzerland	52.86	53.44	52.41	-1.03
U.K.	55.22	45.04	63.25	18.21
Average:	52.49	46.45	57.23	10.78
6 Months in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	49.66	33.59	62.58	28.99
Canada	54.42	64.89	46.01	-18.88
France	55.44	42.75	65.64	22.89
Germany	47.96	29.77	62.58	32.81
Italy	44.56	40.46	47.85	7.39
Japan	48.98	53.44	45.40	-8.04
Netherlands	51.70	35.88	64.42	28.54
Switzerland	54.42	55.73	53.37	-2.36
U.K.	54.42	38.93	66.87	27.94
Average:	51.28	43.94	57.19	13.25
One Year in the Future				
Country	1974-1998	1974-1984	1985-1998	Difference Between 1985-1998 and 1974-1984
Belgium	53.82	31.30	72.61	41.31
Canada	56.25	69.47	45.22	-24.25
France	61.11	45.80	73.89	28.09
Germany	48.96	26.72	67.52	40.80
Italy	52.43	45.80	57.96	12.16
Japan	51.04	61.07	42.68	-18.39
Netherlands	54.17	29.01	75.16	46.15
Switzerland	55.56	53.44	57.32	3.88
U.K.	62.15	44.27	77.07	32.80
Average:	55.05	45.21	63.27	18.06
Overall Average:	52.08	42.26	57.58	12.32

premium.⁶ When the absolute value of the current premium is greater than the moving average, we define this premium as "large."

To construct the moving average we take the period 1974-1984 as a base.⁷ Then for each subsequent observation we add those data to the sample. For example, the moving average for July 1985 would be the average absolute value of the premium from January 1974 to July 1985. We choose this definition because it incorporates all the possible data. Hence, our success rate results are only for the 1985-1998 period.

Exhibit 3 shows the success rate, the percent of cases when the premium is "large," the success rates for the forward rate from 1985-1998 in which we have no filtering process to discern large premium from small (also shown in Exhibit 1), and the difference in success rates between when the forward premium is large and when we do not filter between large and small premium. The success of this measure is again quite poor.

In every country except Italy, the success rates are in the 30% to 40% range.⁸ Indeed, the filtering process of examining only large premiums actually produces slightly worse results than when no filter is used at all. The average rate of success using no filter at all for the 1985-1998 period is 46.94%. For the "large" premium, the average success rate is 46.20%.

EXHIBIT 3

Ability of Large Forward Premiums to Predict Future Direction of Spot Exchange Rate

Success Rate (%)				
<u>1 Month in the Future</u>				
Country	1985-1998 w/Large Premiums	1985-1998 with Non-Filtered Premiums	Difference Between When Premiums Are Large and When Not	% of Cases When Premiums Are Greater than Average
Belgium	50.00	41.07	8.93	45.51
Canada	38.46	41.07	-2.61	54.49
France	50.00	42.26	7.74	41.92
Germany	47.96	53.57	-5.61	58.68
Italy	48.15	43.45	4.70	16.17
Japan	48.84	46.43	2.41	51.50
Netherlands	48.28	51.19	-2.91	47.53
Switzerland	41.94	49.40	-7.46	37.13
U.K.	48.72	50.60	-1.88	46.71
Average:	46.93	46.56	0.37	44.40
<u>3 Months in the Future</u>				
Belgium	47.62	37.35	10.27	38.18
Canada	35.71	34.34	1.37	59.39
France	43.13	38.55	4.58	30.91
Germany	40.79	55.42	-14.63	46.06
Italy	78.13	59.64	18.49	19.39
Japan	38.20	48.19	-9.99	53.94
Netherlands	41.89	55.42	-13.53	44.85
Switzerland	40.00	50.60	-10.6	33.33
U.K.	49.28	46.39	2.89	41.82
Average:	46.08	47.32	-1.24	40.87
<u>6 Months in the Future</u>				
Belgium	42.86	41.72	1.14	43.21
Canada	37.14	41.72	-4.58	64.81
France	51.06	40.49	10.57	29.01
Germany	45.83	56.44	-10.61	44.44
Italy	87.50	37.42	50.08	4.94
Japan	41.56	53.37	-11.81	47.53
Netherlands	41.56	54.60	-13.04	47.53
Switzerland	35.56	55.83	-20.27	27.78
U.K.	38.33	39.88	-1.55	37.04
Average:	46.82	46.83	-0.01	38.48
<u>One Year in the Future</u>				
Belgium	41.10	39.49	1.61	46.79
Canada	38.32	41.40	-3.08	68.59
France	52.63	41.40	11.23	24.36
Germany	39.68	52.87	-13.19	40.38
Italy	100.00	47.13	52.87	5.13
Japan	16.33	50.32	-33.99	31.41
Netherlands	36.36	54.78	-18.42	49.36
Switzerland	31.37	52.87	-21.50	32.69
U.K.	49.02	43.31	5.71	32.69
Average:	44.98	47.06	-2.08	36.82
Overall Average:	46.20	46.94	-0.74	40.14

EXHIBIT 4

Ability of Large Deviations in Purchasing Power Parity to Predict Future Direction of Spot Exchange Rate

Success Rate (%)				
1 Month in the Future				
Country	1985-1998 w/Large Deviation	1985-1998 with Non-Filtered PPP	Difference Between When Deviation Is Large and When Not	% of Cases When PPP Deviation Is Greater Than Average
Belgium	71.88	55.36	16.52	19.05
Canada	45.92	45.24	0.68	58.93
France	65.71	55.95	9.76	20.83
Germany	55.07	52.38	2.69	41.07
Italy	51.35	50.60	0.75	44.05
Japan	50.97	49.40	1.57	92.86
Netherlands	62.79	54.17	8.62	22.60
Switzerland	52.07	50.60	1.47	72.62
U.K.	75.00	60.12	14.88	9.52
Average:	58.97	52.65	6.33	42.39
3 Months in the Future				
Belgium	87.50	61.45	26.05	19.05
Canada	46.88	45.78	1.10	58.93
France	80.00	63.25	16.75	20.83
Germany	73.91	62.65	11.26	41.07
Italy	56.76	51.81	4.95	44.05
Japan	52.29	51.20	1.09	92.86
Netherlands	83.72	63.25	20.47	22.60
Switzerland	56.67	52.41	4.26	72.62
U.K.	93.75	63.25	30.50	9.52
Average:	58.97	57.23	6.33	42.39
6 Months in the Future				
Belgium	96.88	62.58	34.30	19.05
Canada	45.16	46.01	-0.85	58.93
France	91.43	65.64	25.79	20.83
Germany	78.26	62.58	15.68	41.07
Italy	50.00	47.85	2.15	44.05
Japan	46.41	45.40	1.01	92.86
Netherlands	86.05	64.42	21.63	22.60
Switzerland	55.46	53.37	2.09	72.62
U.K.	100.00	66.87	33.13	9.52
Average:	72.18	57.19	14.99	42.39
One Year in the Future				
Belgium	100.00	72.61	27.39	19.05
Canada	43.68	45.22	-1.54	58.93
France	100.00	73.89	26.11	20.83
Germany	82.61	67.52	15.09	41.07
Italy	67.57	57.96	9.61	44.05
Japan	430.05	42.68	0.37	92.86
Netherlands	90.70	75.16	15.54	22.60
Switzerland	63.03	57.32	5.71	72.62
U.K.	93.75	77.07	16.68	9.52
Average:	76.04	63.27	12.77	42.39
Overall Average:	69.34	57.58	11.76	42.39

EXHIBIT 5 Success Rates of the Forward Rate

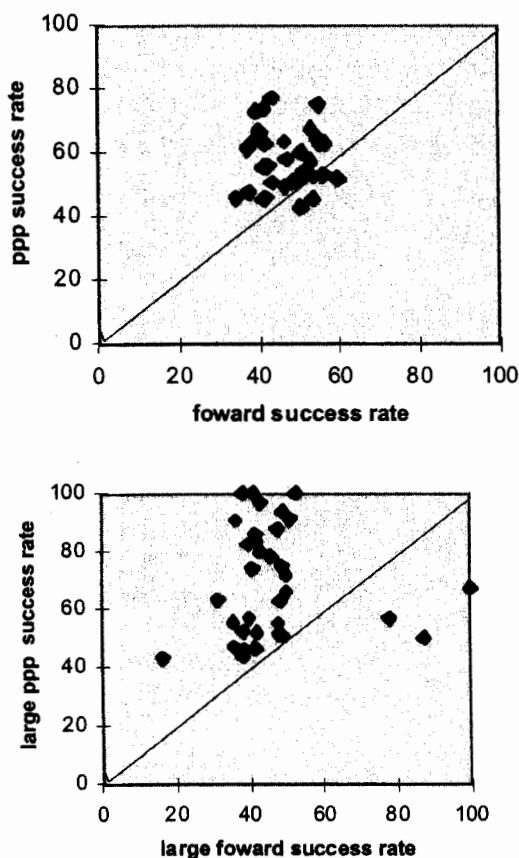


Exhibit 5: 1985-1998 success rates of forward rate and purchasing power parity at predicting future direction of spot exchange rate.

In first graph no filter is used. The second graph corresponds to the success rate of "large" premiums and "large" purchasing power parity deviations to predict the future direction of the spot exchange rate.

Large Purchasing Power Parity Deviations

In Exhibit 4 we examine the success rate of "large," purchasing power parity deviations to determine when a deviation is "large." We again use the same moving-average time period used to define large forward premiums. Hence, we can report results only for the 1985-1998 period.

The results show a clear improvement over the non-filtered purchasing power parity success rates. The average success rate in predicting the future direction of the spot rate is 69.34% when the large deviation filter is used, as compared to 57.58% when no filter is used.

Another trend in these results is that the success rates improve at the longer terms. The average success rate of the one-month term is 58.97%, while it is 76.04% for the one-year term.

Exhibit 5 depicts the success rates of the forward rate and of purchasing power parity. Observations above the diagonal line indicate purchasing power parity has a higher success rate than the forward rate. As can be clearly seen, purchasing power parity predicts the direction of the spot rate much better than the forward rate.

SUMMARY

Many investors want to know the direction of future exchange rates even if they cannot know the magnitude of a change. We investigate whether two simple fundamentals, the forward exchange rate and purchasing power parity, can predict the future direction of the spot exchange rate.

We find that the forward rate is a poor predictor of the future direction of the spot. The forward rate correctly predicts the future direction of the spot rate about 45% of the time across different terms, time periods, and currencies. We also find that purchasing power parity is a poor predictor during the 1974-1984 period. Its success rates in this period are generally below 50% for all currencies and terms.

The weak results of purchasing power parity and the forward rate during the 1974-1984 period are not surprising, given that others have found that these measures predict poorly (see Meese and Rogoff [1983]).

In the 1985-1998 period, purchasing power parity works considerably better at predicting the future direction of the spot rate. The average rate of success across all terms in this period is over 57% as compared to 42% in the 1974-1984 period. Moreover, when a filter is used to discern large purchasing power parity deviations from the spot rate, purchasing power parity works even better; the average success rate increases to 69%. It should also be noted that purchasing power parity works considerably better, the longer the term.

As to a reason why purchasing power parity works so much better in the 1985-1998 period, there is some recent evidence that the period of the early 1980s was an anomaly and hence the predictive ability of purchasing power parity improves when this period is excluded from the sample. Indeed, a number of recent articles including Lothian [1997, 1998] and Rogoff [1996] show the deviation of the spot rate from purchasing power parity was

extreme in the early- and mid-1980s. Furthermore, they argue that these deviations are not reflective of data before or after that time period.

In any event, investment practitioners who are looking for a rule of thumb as to future directional changes in the spot rate should give purchasing power parity more attention. This is especially so when the term is longer than three months and when there is considerable deviation between purchasing power parity and the spot rate.

ENDNOTES

¹Frenkel and Levich [1975] and Clinton [1988] show empirically that the forward exchange rate premium is equal to the interest rate differential.

²For this article, a number of other base time periods were examined both before and after the Hakkio base period used here. Note that the average success rates for purchasing power parity actually *increased* slightly using these other base time periods.

³For other breakpoint dates such as January 1986, January 1987, January 1988 the results are essentially the same.

⁴To calculate the results for the forward rate we use the k-month forward rate to predict the k-month ahead exchange rate direction. Hence, the one-month forward rate was used to predict the directional change in the one month in the future exchange rates, the three-month forward rates were used to predict the directional change in the three months in the future exchange rates.

⁵Note that we also examine cases when both the forward exchange rate and purchasing power parity agree on the future direction of the spot rate. We then examine the predictive success of these cases. The results show some improvement over the use of the forward rate, but little to no improvement over purchasing power parity. These results are available from the authors by request.

⁶Of course, assuming that an average implies that the premium is a stationary process. A number of authors including Ballie and Bollerslev [1994] have documented that forward exchange rate premiums are stationary processes. ♦

⁷When other averages are used to construct base averages, such as the past five years of data or the past three years of data, in every case the results are very similar to those presented here.

⁸Note that Italy has significantly fewer cases where the premiums are considered large.

REFERENCES

- Ballie, Robert, and Tim Bollerslev. "The Long Memory in the Forward Premium." *Journal of International Money and Finance*, 13 (1994), pp. 565-571.
- Clinton, Kevin. "Transactions Costs and Covered Interest Rate Parity." *Journal of Political Economy*, April 1988, pp. 27-47.
- Frenkel, Jacob, and Richard Levich. "Covered Interest Arbitrage: Unexploited Profits?" *Journal of Political Economy*, April 1975, pp. 325-338.
- Froot, Kenneth, and Richard Thaler. "Anomalies: Foreign Exchange." *Journal of Economic Perspectives*, 4 (Summer 1990), pp. 179-192.
- Hakkio, Craig. "Is Purchasing Power Parity a Useful Guide to the Dollar?" *Federal Reserve Bank of Kansas City Economics Review*, 3 (1992), pp. 37-51.
- Krugman, Paul. "Pricing to Market When the Exchange Rate Changes." In Sven W. Arndt and J. David Richardson, eds., *Real Financial Linkages Among Open Economies*. Cambridge: MIT Press, 1987, pp. 49-70.
- Lothian, James. "Multi-Country Evidence on the Behavior of Purchasing Power Parity Under the Current Float." *Journal of International Money and Finance*, Vol. 16, No. 1, (1997), pp. 19-35.
- Lothian, James. "Some New Stylized Facts of Floating Exchange Rates." *Journal of International Money and Finance*, 17 (1998), pp. 29-39.
- Meese, Richard, and Kenneth Rogoff. "Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?" *Journal of International Economics*, 14 (February 1983), pp. 3-24.
- Rogoff, Kenneth. "The Purchasing Power Parity Puzzle." *Journal of Economic Literature*, 34 (1996), pp. 647-668.