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MODELS OF EXCHANGE RATES
A Comparison of Forecasting Results

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Abstract: In this note we compare the results of several published papers on exchange rate forecasting. With regard to univariate time series models, we confirm the result that such models, on average, do not outperform the simple random walk forecasting rule. This conclusion corrects results reported in this *Journal* by Alexander and Thomas (1987).

Keywords: Exchange rates, Kalman filter, Random walk, Forecasting results, Comparison.

1. Introduction

Meese and Rogoff (1983a) studied the forecasting performance of several important monetary models of exchange rate determination. Although in-sample studies of these models usually show quite satisfactory fits, Meese and Rogoff's out-of-sample results were not very encouraging: the structural models failed to improve upon the simple random walk forecasting rule, even though the model's forecasts were based on actual, realized values of future explanatory variables. Wolff (1987) applied varying parameter estimation techniques, based on recursive application of the Kalman filter, and found that the introduction of parameter variation marginally enhances the various models' forecasting performance.

In a recent article in this *Journal*, Alexander and Thomas (1987) update the Meese and Rogoff (1983a) results and evaluate the use of time varying parameters to improve the models' forecasting performance. Their empirical results for time series models differ dramatically from previous studies due to a computational error.

2. Comparing various studies

Alexander and Thomas (1987) present out-of-sample forecasting results for two different time series models. The first is an AR(1) model for first differences in the (log of the) spot exchange rate

$$S_t - S_{t-1} = a + b(S_{t-1} - S_{t-2}) + e_t, \tag{3}$$

and the second is an AR(2) model

$$S_t - S_{t-1} = a + b(S_{t-1} - S_{t-2}) + c(S_{t-2} - S_{t-3}) + e_t. \tag{4}$$

Alexander and Thomas reported both U-statistics and RMSEs on the models' ability to predict future spot exchange rates.

When comparing Alexander and Thomas' results with those reported by Meese and Rogoff (1983a), two striking conclusions emerge. First, the RMSEs for the longer horizons are not greater than those for the shorter horizons. Second, all *U*-statistics are in the range 0.63–0.80, indicating that for all forecasting horizons and all currencies the estimated time series models perform better than the simple random walk forecasting rule by a substantial margin. These results, if true, would strongly contradict the Meese and Rogoff (1983a) conclusion.

It appears however, that Alexander and Thomas' results were incorrect. We have repeated the exact forecasting experiment performed by Alexander and Thomas for the two time series models. Our exchange rate data are taken from the *International Financial Statistics (IFS)*. The correct results are presented in table 1.

The results in table 1 roughly confirm Meese and Rogoff's conclusion: on average the time series models do not improve upon the random walk forecasting rule. Note, however, that the time series models do outperform the random walk for the dollar/sterling exchange rate. Note also that the RMSEs in table 1 exhibit the usual increasing pattern as the forecasting horizon is extended.

Table 1
Out-of-Sample forecasting results [a] of time series models based on IFS data.

Model	Horizon (months)					
	1	3	6	12	24	36
(A) Root mean square forecast errors						
Dollar/Mark						
AR(1)	3.57	6.72	10.32	16.34	27.00	39.41
AR(2)	3.58	6.69	10.27	16.36	27.06	39.56
Dollar/Yen						
AR(1)	3.44	6.07	8.46	10.54	13.80	16.64
AR(2)	3.47	6.10	8.47	10.53	13.78	16.64
Dollar/Pound						
AR(1)	3.60	6.58	10.57	14.43	23.86	36.54
AR(2)	3.58	6.55	10.58	14.47	23.84	36.59
(B) U-statistics						
Dollar/Mark						
AR(1)	1.04	1.07	1.11	1.20	1.32	1.42
AR(2)	1.04	1.06	1.10	1.20	1.32	1.42
Dollar/Yen						
AR(1)	1.01	1.01	1.03	1.12	1.41	1.71
AR(2)	1.01	1.02	1.04	1.12	1.40	1.71
Dollar/Pound						
AR(1)	1.00	0.99	0.98	0.91	0.88	0.91
AR(2)	1.00	0.98	0.98	0.91	0.88	0.91

[a] Period: January 1980–October 1985.

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Biography: Christian WOLFF is Professor of Finance at the University of Limburg, Maastricht, The Netherlands, and Research Fellow in International Finance at the London Business School. He obtained a Ph.D. from the Graduate School of Business at the University of Chicago in 1985. His main research interest is in international financial markets. Previous publications include articles in the *Journal of Finance*, the *Journal of Business and Economic Statistics*, the *Journal of International Money and Finance* and *Economics Letters*.