

File- Monetary Policy Issues-Exchange Rate
Intervention – Part B

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D. Analogies with Other Markets.

Let me now try to summarise what I claim to have established for the forex market. First, it exhibits some signs of persistence, under-reaction, in high frequency data: second, it often remains misaligned for long periods, in the sense that the forces driving it back to a long term equilibrium are notably weak: third, there is virtually no information contained in the pattern of forward rates.

What interests and excites me is the similarity between these findings and those that have been recently obtained for the fixed interest, money and debt markets. Ever since Tom Sargent's 1972 Journal of Money, Credit and Banking, article 'Rational Expectations and the Term Structure of Interest Rates', we knew that, given the historical auto-regressive structure of short rates, longer term rates under-reacted to (administered) changes in short rates. This finding, of under-reaction, has more recently been reconfirmed in a number of further tests, eg by Shiller, Campbell and Schoenholtz, 'Forward Rates and Future Policy: Interpreting the Term Structure of Interest Rates', Brookings Papers (1983), and Mankiw and Summers, 'Do Long-Term Interest Rates Over-React to Short-Term Interest Rates', Brookings Papers (1984).

Again, work by Shiller, for example in his 1985 NBER working paper, 'Conventional Valuation and the Term Structure of Interest Rates', and in the Mankiw/Summers paper raises the question whether the previously academically dominant expectations theory had any role to play in the determination of the term structure. There is hardly any more information about future movements of short-term interest rates to be derived from observing the yield curve than there is information on future spot rates to be obtained from looking at forward exchange rates.

Misalignment is, perhaps, less easy to spot in the fixed interest market, since we have less theory about the appropriate equilibrium values for real rates of interest, long and short, than we have for the real

exchange rate. Even so, the experience of the last two decades, with real interest rates generally appearing remarkably and persistently low in the 1970s and high in the 1980s perhaps suggests that equilibrating forces are no stronger in the debt market than in the forex market. Indeed economists such as Shiller and Summers argue that much of the longer term behaviour of financial markets, such as the Stock Exchange as well as the debt market, has to be seen as subject to long-term, only slowly-unwinding, 'fads and fashions'.

All this sounds to me as if there is accumulating evidence of a general pattern for the behaviour of financial markets, notably including the forex market. This pattern is not, however, consistent with many economists' current view of the world, in which a combination of rational expectations, long term confident expectations of future equilibria and certain sticky current prices forces the remaining free variables, e g exchange rates and interest rates into discrete jumps, followed by steady adjustments to some longer term equilibrium. Marshall said that 'natura non facit saltum'; nature does not exhibit jumps. I believe that he was right. Even more worrying, perhaps, the adjustment back to long term equilibrium seems uncertain and halting.

E. Any Explanations?

So far, I have been engaging in the simpler task of contrasting the empirical regularities that I have observed with some current theories. It is going to be much harder to suggest why these theories are flawed, and what causes the results that I have put before you.

One instinctive reaction, of those who believe that markets ought to work as they model them in theory, is that any discrepancy must be due in some large part to official intervention. There is one aspect of these puzzling features that may be exacerbated by such intervention: that is the short term tendency towards persistence and under-reaction may well have been intensified by the authorities' penchant for 'leaning into the wind' in the markets in which they operate. How much of such high frequency positive auto-correlation is due to their efforts at stabilisation, I do not have the data to test, but I am pretty confident that the authorities' responsibility for this anomaly is slight. As for the other two puzzles, I cannot see why the authorities -- who have not engaged in any large volume of outright forward operations in recent years -- should have any responsibility for the negligible forecasting record of forward rates; nor, why, except in so far as their general policy stances are part of the overall background against which agents form their decisions, the authorities should be held responsible for misalignments.

The standard current response to such anomalies is to ascribe them to time varying risk premia. But that is not so much an explanation as almost a tautological, and certainly a jargon, way of restating the problem. I cannot really do better than quote from Mankiw and Summers, who dealing with exactly the same problem, *mutatis mutandis*, for the term structure, note that, "once it is extended to include a time-varying liquidity premium, the expectations theory becomes almost vacuous. The liquidity premium is a *deus ex machina*. Without an explicit theory of why there is such a premium and why it varies, it has no function but tautologically to save the theory. If fluctuations in the liquidity premium are needed to

account for a large fraction of the variance in the slope of the yield curve, then the expectations theory fails to provide a strong basis for understanding these fluctuations." Exactly the same can be said about risk premia and the inability of forward rates to predict future spot rates in the forex market. Moreover, the recent studies by Frankel and Froot of the inter-relationship between market surveys of expectations of future exchange rates, which should presumably be clean of risk premia, and forward and spot rates give no support to the suggestion that fluctuations in the forward discount can readily be explained by such time varying risk premia; rather the reverse.

Surely it is the case that people's attitudes towards the risk of taking speculative market positions must be responsible for much of what we observe. I have not, however, seen any good explanations i.e. ones that convince me, about what particular facets of risk may be responsible for such risk premia as seem inherent in the data. My own hunch, supported by much direct practitioner opinion, is that the risks are so great that the extent of longer-term speculation, i.e. that is not intended to be closed within hours, is both less in volume and, as I shall argue, much less clear in direction, (since expectations of future spot rates may reasonably differ between agents at any time, being based on differing information sets), than would be required for the standard theory to hold.

This latter view, that the risks and costs of speculation simply cause there to be a shortage of speculators has remained a rather muted theme in the literature, though repeated from time to time by some economists and practitioners with close market links. Thus Ronald McKinnon in his 1976 paper on 'Floating Foreign Exchange Rates, 1973-74' stated, page 83, that.

"The questions of who was to be a stabilizing speculator, and what would be the source of private capital for such speculations were never directly addressed. Rather, this particular issue was superseded by a rough-and-tumble debate over whether private speculation would be stabilizing or destabilizing. An implicit consensus has been reached that there would be no restraints on the availability of private speculative capital on the huge scale needed.

The contrary hypothesis, advanced here, is that the supply of private capital for taking net positions in either the forward or spot markets is currently inadequate.... Once a rate starts to move because of some temporary perturbation, no prospective speculator is willing to hold an open position for a significant time interval to bet on a reversal."

Again, in an excellent, though rarely quoted, paper, on 'Uncertainty and Exchange Rate Stability', from International Finance and Global Banking, David King of Citibank, New York, stated in his conclusion, (pages 88-89_, that

"In practice, in a floating exchange rate system, actual and potential exchange market participants are overly uncertain about the medium-to-long term path of the exchange rate.... Private sector exchange market participants are highly risk adverse to uncovered FX positions, especially longer-term. As a result ..., long-term positions that would have moderated extreme departures of exchange rates from their longer-term paths have not been adopted, leaving exchange rate determination to the shorter-term position takers, whose expectations are (i) to a significant extent extrapolative, and (ii) affected temporarily by a wide variety of non-fundamental events: since it is known that the fundamentals have a long time to work themselves out, they need impose little threat of loss on a short-maturity position adopted because of events of a temporary or even psychological nature. Therefore, exchange rates have tended to move in broad swings around their central paths under the floating exchange rate system."

So, there is some support in the literature, and evidence, consistent with a dearth of speculators prepared to use their own money to bring rates into line either with what should be the rational expectation in the approximate random walk world we have experienced, or with the longer term fundamentals.

Anyhow at this stage I sought not only to do some calculations on whether risk averse persons would find the risk/reward distributions available on speculation in the forex market attractive, but also to carry out a personal qualitative survey among a number of London forex specialists of the existence of open speculative positions among their large corporate customers or any established by banks themselves. These exercises have also been relegated to an Appendix. Broadly the results are as follows. Individual wealth holders of normal risk aversion would have to be extremely wealthy, with net assets of probably well over £½ million, to make them willing to seek the relatively small expected returns, net of transactions costs, from an extremely risky speculation.

In turn, companies and banks, for various reasons, very rarely, virtually never in the case of banks, take an open forward position. They will, however, take strictly limited open spot positions. Even so, in aggregate the volume of such open spot positions could be large. If large, which I doubt, but cannot prove, the operation of multi-nationals and banks undertaking 'synthetic' forward deals, by taking open positions in spot markets, would actually achieve the same result, as if there were speculators driving forward rates into equality with expected future spot rates. Even if there were no (speculative) transactions at all in forward markets, any institution taking a view on expected future spot rates should, having taken proper account of interest differentials, drive present spot rates to a level where the implicit, and entirely slack and passive, forward rate was equal to the expected future spot rate. The likelihood that the forward rate actually does largely adjust passively in response to changes in interest rates and spot rates, therefore, does not

explain the phenomena, for example, of inefficient prediction described earlier.*

The claim that speculators will drive forward rates into equality with expected future spot rates is, therefore, on the basis of direct market evidence, a misnomer. There is not enough speculation in the forward market to do that. But it may be the case that speculation, through the adoption of open spot positions, will drive current spot exchange rates into equality with expected future spot prices, after taking existing interest differentials into account. Although there is no doubt that speculation is limited by risk aversion and uncertainty, I cannot disprove the hypothesis that it remains sufficiently large to do that.

But on what information base will such speculation be undertaken? A crucial feature now seems to me that we possess two, firmly held, and it would seem broadly equally valid items of information which do not rest easily together. First, we are aware, and can demonstrate, that these market processes approximate to random walks in the short run. Second, we believe that the process actually is stationary in some long term context, because there are fundamental conditions in the real world, for example PPP, (or that real interest rates cannot diverge too far from some equilibrium values), that will ultimately bring about a return to equilibrium.

Thus the market, and people observing the market, are inherently schizophrenic. Part of the time they will argue that no one can predict the future, that prices are as likely to go up as down (i.e. random walk behaviour), and that, therefore, one should place assets in the currency

* There is one possible qualification that might suggest why the concentration of speculative activity in the spot market could lead to forward rates being inefficient predictors. The variance in foreign exchange markets is greatly in excess of the variance in national interest rates. The key, therefore, to successful speculation is getting the future exchange rate 'right'. In such cases the speculator may disregard the current interest differential, and seek to drive the spot rate, not the forward rate, into equality with the subjectively expected future spot rate. Some qualitative comments by market participants suggest that such behaviour could be quite common.

with the highest yield, and buy long-dated assets when the yield curve is upwards sloping. Part of the time, people will argue that a currency, or current short rates, are out of line with the fundamentals, and thereby act to prevent forward rates adjusting into line with the random walk expectation. Economists, like me, are equally schizophrenic. Part of the time we tell ourselves, and our students, that it is a mug's game to pretend that we can forecast exchange rates or interest rates, because they approximately follow a random walk. Part of the time we are out there estimating misalignments, reference ranges and long-run equilibria with all the enthusiasm of, say, John Williamson.

There are, therefore, I believe two, usually opposing, groups of speculators operating at any time in markets, both though possessing limited funds, highly risk averse and conscious of their own forecasting limitations. The first group contains those who take positions on the basis of random walk views; the second seek to rely on fundamentals. The market value of the forward exchange rate (or implicit forward interest rate) simply records the balance of power in their struggle.

A fairly new, and I believe promising, line of research in this field has been to utilize direct evidence on future exchange rate expectations, for example from surveys undertaken by such institutions as the Economist, MMS and Amex. A recent study, by Froot and Frankel, using such survey data, came up with the conclusion that the expectations of those sampled tended to diverge from the actual historical experience, (which is, you will remember, that the spot rate approximately followed a random walk), by even more than did the forward rate*. In their data set there appeared to be evidence of a sizeable systematic divergence from rational expectations combined with a smaller, and roughly constant, risk premium of exactly opposite sign to that hypothesized in the work using Fama's approach.

* Thus, page 9 "expectational errors are more than 100 percent responsible for the unconditional bias in the forward rate errors".

Similarly, a recent study of exchange rate forecasts by Blake, Beenstock and Brasse, (Economic Journal, 1986), came to the conclusion that, (page 998), "A priori, we should expect these forecasts to be pure forecasts of future movements in the spot exchange rate, yet our tests have shown them to be not only biased in that they systematically fail to predict the magnitude of change, but more often than not the correct direction of change too. Moreover, this bias is in the same direction as, and usually bigger than, that observed in the forward rate which may reasonably expect to contain some element of market premium".

At an earlier stage in this whole exercise, I had been unable to provide any plausible interpretation for the finding that market surveys and forecasts generally gave results that were further divorced from the historical random walk process than is the forward exchange rate. I now think that this provides the capstone to the hypothesis here that the forward rate is driven from the current spot rate by those betting on 'fundamentals'. There is little incentive for those paid to forecast the future to confess that it cannot be done, so they are unlikely to put much weight on the random walk view. Moreover those who actually place money on such a random walk basis will usually see themselves as unable to take, or simply not taking, any view of the future, rather than consciously reckoning that the best forecast of the future rate will be the same as the present. Thus any sample of market expectations, or collection of forecasts, will find that a disproportionate number of random walk operators will be in the 'Don't Know' or 'Nil Return' category.

So, such a survey sample will include an excessively large number of those prepared to forecast, (and perchance to bet), on the basis of 'fundamentals'. Thus it is actually an implication of this hypothesis that such surveys, forecasts, etc. should differ from current rate levels by more than the forward rate. This is necessary in order to achieve market balance between the two groups, each operating on a different, but equally valid and rational, information base.

F. Conclusions

In my view speculation is not only strictly limited in total, but is also likely to have an often unpredictable and wayward effect, since it is based on differing data sets, notably random walk expectations, fundamental analysis and even technical market analysis, such as Chartism. And who are we to deny the validity of at least the first two, if not all three of these?

Let me conclude by reminding you of the four main puzzling phenomena that appear to exist in the forex market.

(1) Whereas the spot exchange rate follows an approximate random-walk path over short periods, one week to three months, the forward exchange rate diverges systematically from this (historically predicted) path, and contains no predictive power whatsoever.

(2) Surveys of market opinion, and forecasts, regularly tend to diverge even more from the historical random walk path.

(3) In the medium term there appear to be major misalignments, from some fundamental PPP.

(4) In the short run, however, my assessment of the empirical evidence indicates that the reaction of exchange rates to 'news', notably of interest rate changes, is an under-reaction, rather than an over-reaction.

I would like to think that I have provided at least a promising, partial hypothesis for items 1 and 2, as resulting from the interaction of those speculating on the basis of differing information sets, notably fundamentalists and random walkers.

It may be that this same approach can also go some way to explain some of the major misalignments of recent years. At least I believe that it is consonant with market anecdotes about what actually happened. In my Appendix on actual market behaviour, I stressed that bankers, and other with open spot positions, being naturally uncertain of their own, and of

their economic advisers', judgments would insist on closing out loss-making positions quickly. Assume then an initial balance in the market, with the weight of commercial orders, random-walk operators and 'fundamentalists' establishing the current value of spot and forward exchange rates. If, then, the currency of the country with the higher interest rate should appreciate, contrary to the fundamentalists' open position, the latter will want to close out their losing position, being uncertain both of the timing and even basic validity of their forecast. But in so doing, the 'tired bears' will exacerbate the initial upwards move. Moreover, if some sequence of chance events, e.g. changes in oil prices, flights of capital from Latin America, has the effect of causing a series of losses to 'fundamentalists', confidence, always fragile, in the validity of their short-term forecasting ability will be weakened, so that the flow of speculative funds advanced on such grounds may well decline. During the period 1981-85, company and bank treasurers may well have given increasing weight to random walk views and less to fundamentalist' forecasts since the latter proved so often fallible. Per contra, once the fundamentals really did take hold, at long last, in the UK in 1976 and after 1981, in the USA from early 1985, there would be losses made from taking a random walk view. The forward rate would become more dominated by the successful 'fundamentalists'.

All this suggests that we may be able to make more use of survey data - which you will recall, I believe to be dominated by fundamentalists -- to examine behaviour and to set up and run testable hypotheses in this field. Mark Taylor and I hope to start some further work on this, once we can assemble a satisfactory data set. I must also note that, after I had independently arrived at this view, my attention was drawn to the paper 'Explaining the Demand for Dollars: International Rates of Return and the Expectations of Chartists and Fundamentalists', by Frankel and Froot, University of California, Berkeley, Working Paper No. 8603, now published in The Marcus Wallenberg Papers on International Finance, vol. no 1, (1986) which sets out virtually an identical model, in considerably greater detail and richness. I strongly recommend that paper.

I have left until last my claim, based purely on empirical observations of varying quality, that markets tend to under, rather than over, react to news. My division between fundamentalists and random walkers will not help, since the fundamentalists should, as in the theory, over-react in the short run. I fear that I too will have to fall back on the view that there are many, outside of the immediate market, who take time to assimilate and act on news, and that these, together with some smoothing interventions by the authorities, may serve to inject some slight persistence into short-term market prices. In view of existing complaints about the extent of short-run market volatility, a system which actually involved jump over-reactions would be even more uncomfortable. It may well be that the economic system has devised a number of buffering devices, besides government intervention, that dampen such jump responses. I have elsewhere emphasized the role of money as a buffer-stock. All this remains rather a thin explanation, but I have none better, especially at the end of what has been already an excessively long lecture.

Table 1

Election days, % Δ spot rate from t-1 to t+1

3rd May 1979	+ 0.43%
9th June 1983	+ 0.17%

Budget days, A % Δ spot rate from t-1 to t
 B % Δ spot rate from t-1 to t+1

	A	B
12 June 1979	+1.09	+1.69
26 March 1980	+0.23	-0.71
10 March 1981	+0.65	+0.18
9 March 1982	-1.24	-0.77
15 March 1983	+0.30	-0.13
13 March 1984	+1.13	+1.00
19 March 1985	+2.68	+3.99
18 March 1986	+0.85	+1.02

£/\$ SPOT RATE, CLOSING RATE, MARCH 1985

DATE	RATE	% CHANGE	ABSOLUTE % CHANGE
1	1.0725		
4	1.0685	-0.3737	0.3737
5	1.0555	-1.2241	1.2241
6	1.0725	1.5977	1.5977
7	1.0665	-0.5610	0.5610
8	1.0665	0.0000	0.0000
11	1.0890	2.0877	2.0877
12	1.0890	0.0000	0.0000
13	1.0860	-0.2759	0.2759
14	1.0805	-0.5077	0.5077
15	1.0840	0.3234	0.3234
18	1.1065	2.0543	2.0543
19	1.1365	2.6750	2.6750
20	1.1515	1.3112	1.3112
21	1.1880	3.1203	3.1203
22	1.1735	-1.2280	1.2280
25	1.1715	-0.1706	0.1706
26	1.1825	0.9346	0.9346
27	1.2390	4.6665	4.6665
28	1.2280	-0.8918	0.8918
29	1.2375	0.7706	0.7706

TOTAL	24.7741
AVERAGE	1.2387

Table 2

Data Sets

Source	Exchange Rate	Tenor of Interest Rate	Frequency of Observation	Sample Period	Number of Observations
A Bank of England	£/\$	3 month	Weekly	1977:14-1985:47	450
B Bank of England	£/\$	1 month	Weekly	1977:14-1985:47	450
C OECD	DM/\$	3 month	Monthly	1974:1-1986:6	150
D OECD	SwFr/\$	3 month	Monthly	1974:1-1986:6	150
E Harris Bank	DM/\$	1 month	Weekly	1974:1-1980:52	364
F Harris Bank	SwFr/\$	1 month	Weekly	1974:1-1980:52	364
G Baring Bros *	SwFr/\$	1 month	Daily	1981:1:6-1986:9:14	1443
H Baring Bros *	Y/\$	1 month	Daily	1981:1:6-1986:9:14	1443
I Baring Bros *	DM/\$	1 month	Daily	1981:1:6-1986:9:23	1450

* In this data set, observations of the spot rate and the two euro-deposit rates were collected near the market opening at the same moment each day, and estimates of the forward rate on that day were then constructed using the covered interest parity arbitrage condition.

Table 3

Comparison of Spot and Forward Rates as
Predictors of Future Spot Rate

Equation 1: Spot $t+1$ = a + b Spot t (all in log form)

Equation 2: Spot $t+1$ = a + b Forward t (all in log form)

Data Set	a			b			R ²	DW
	Coefficient	SE	t	Coefficient	SE	t		
A1	.01	.04	0.21	0.973	.07	13.5	.91	0.11
2	-.02	.05	-0.32	0.966	.08	12.3	.90	0.10
B1	.002	.01	0.19	0.993	.02	50.7	.978	0.43
2	.004	.01	0.32	0.991	.02	48.4	.976	0.41
C1	-.07	.05	-1.37	0.920	.055	16.6	.851	0.62
2	-.08	.05	-1.77	0.908	.056	16.1	.847	0.60
D1	-.07	.04	-1.93	0.898	.043	21.1	.865	0.58
2	-.10	.03	-2.93	0.874	.042	21.0	.864	0.56
E1	-.02	.02	-1.13	0.972	.020	49.5	.9683	0.41
2	-.03	.02	-1.79	0.962	.020	48.3	.9680	0.40
F1	-.01	.01	-0.97	0.973	.016	59.2	.9792	0.41
2	-.03	.01	-1.89	0.962	.017	58.1	.9789	0.39
G1	-.12	.08	-1.47	0.837	.113	7.4	.678	1.20
2	-.13	.08	-1.59	0.832	.113	7.4	.675	1.18
H1	-1.70	1.32	-1.29	0.685	.243	2.82	.426	1.54
2	-1.71	1.33	-1.29	0.685	.244	2.81	.424	1.53
I1	-0.13	.04	-3.08	0.861	.049	17.7	.795	0.79
2	-0.14	.04	-3.26	0.856	.049	17.6	.794	0.79

In all the data sets there is a higher frequency of observation than of the maturity of the instruments, i.e., there are overlapping observations. The econometric problems that this entails can be met by an appropriate adjustment to the OLS covariance matrix, following the technique developed by Hansen (1982), and this has been done in all cases.

Table 4

Equation: $\text{Spot } \epsilon + n - \text{Spot } \epsilon = a + b (\text{Forward } \epsilon - \text{Spot } \epsilon)$ (all in log form)

Hypothesis $a = 0$ $b = 1$

Data Set	a			b			R ²	DW
	Coefficient	SE	t	Coefficient	SE	t		
A	-.001	0.27	-.004	7.90	42.2	0.19	-.002	3.86
B	-.00002	0.0003	-.04	-0.05	0.29	-0.17	-.002	3.47
C	.0092	0.005	1.92	-0.98	0.51	-1.94	-.003	3.41
D	.002	0.007	.25	-0.09	0.32	-0.22	-.1007	3.37
E	-.0002	0.003	-.07	0.04	0.71	0.06	-.003	3.56
F	.005	0.003	1.54	-0.93	0.55	-1.71	-.001	3.58
G	-1291.1	1337.2	-0.97	255192	271514	0.94	-.001	3.91
H	1211.0	1157.0	1.05	-1322596	300608	-1.07	-.001	3.91
I	-879.6	961.9	-0.91	254359	285831	0.88	-.001	3.91

Table 5

Equation Log Spot $e_{t-1} = a + b_1$ Log Forward $e_t + b_2$ Interest Differential
 (Interest Differential = $\frac{\text{Interest rate, domestic} - \text{Interest rate, foreign}}{1.0 + \text{interest rate domestic}}$)

Hypothesis $b_1 > b$ Log Spot, equation 1, Table 3
 $b_2 > 0$

	a	b_1	(b)	b_2	t	R^2	Table 3 Equation 1	DW
	Coefficient	Coefficient	Table 3 Equation 1	Coefficient				
Data Set A	-0.0006	0.982+	(0.973)	4.90	3.75	0.93	(0.91)	0.15
B	-0.003	0.999+	(0.993)	4.51	4.30	0.980	(0.978)	0.49
C	-0.04	0.939 ^o	(0.920)	2.31	1.55	0.851	(0.851)	0.66
D	0.05	0.958+	(0.898)	2.83	1.47	0.868	(0.865)	0.64
E	-0.007	0.980 ^o	(0.972)	2.70	1.72	0.969	(0.968)	0.42
F	0.01	0.994+	(0.973)	3.14	2.23	0.9794	(0.9792)	0.42
G	-0.08	0.857 ^o	(0.837)	5.65	2.00	0.685	(0.678)	1.25
H	-1.72	0.680 ^{*o}	(0.685)*	4.37	1.32	0.430	(0.426)	1.55
I	-0.11	0.874 ^x	(0.861)	4.18	1.34	0.797	(0.795)	0.81

- + less than one standard deviation from 1.00
- o less than two standard deviation from 1.00
- x more than two standard deviation from 1.00
- * rejects hypothesis

