

Chart analysis and the foreign exchange market

Standard economic analysis of floating exchange rates, as it has developed over the past fifteen years, is apparently subject to severe limitations: standard analysis cannot, it seems, give an adequate explanation of the past, nor predict the future reliably. Largely as a result of these failings, recent research has begun to analyse influences on financial markets other than those relating to pure economic fundamentals.

This article⁽¹⁾ summarises some empirical research undertaken in the Bank's Economics Division on the nature and perceived importance of a major form of non-economic, or non-fundamentalist, analysis—chartism—in the London foreign exchange market.

Four main findings emerge:

- *the use of chart analysis as an input into trading decisions appears to be widespread among dealers in the London market;*
- *chartists' forecasts display a marked degree of heterogeneity;*
- *it appears that chartist advice is unlikely to have a destabilising effect on the market;*
- *some chartists perform extremely well when compared against a range of alternative forecast procedures, although this finding should be interpreted with caution.*

Introduction

The idea that asset prices will always reflect fundamental economic values alone has long been at odds with the practitioners' view of financial markets. Moreover, the extreme position that all current and potential economic influences are instantly discounted into asset prices—the efficient markets hypothesis—continues to be brought into question by numerous empirical anomalies which are at variance with it.⁽²⁾ Recent research in financial economics has begun to look for other fundamental forces driving exchange rates,⁽³⁾ and even to look beyond the fundamentals to the role of other, 'non-fundamentalist', influences on financial markets.⁽⁴⁾

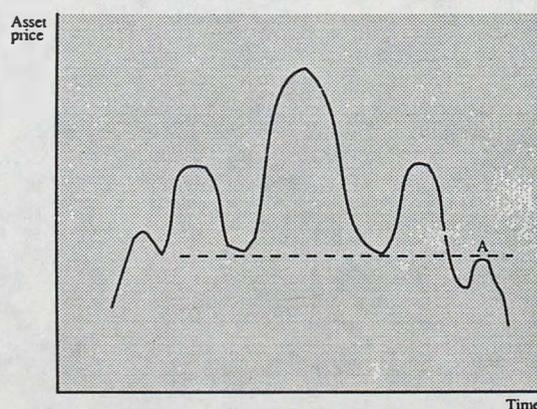
Chart analysis in practice

Chart analysis has developed from systems of interpreting time charts of asset prices, the basic methods of which have been in use for over a hundred years. These techniques have now become many and varied and some, such as those which rest on the calculation of the momentum of price changes, are not necessarily chart-based in themselves. Analysts differ considerably as to which techniques they favour, and so the following

description should be thought of as only a very brief introduction to charting methods.

Basic chart analysis involves identifying patterns in time series price data and attempting to infer from these what may happen next. For example, certain configurations,

Chart 1
The head and shoulders reversal pattern^(a)



(a) A reversal of the incumbent uptrend is confirmed by the failure to penetrate the neckline at point A.

(1) Written by Mrs Helen Allen and Professor Mark P Taylor, summarising Bank of England Discussion paper No 40: 'Charts and fundamentals in the foreign exchange market'.

(2) See eg R MacDonald and M P Taylor, 'Economic analysis of foreign exchange markets: an expository survey', in R MacDonald and M P Taylor (eds) *Exchange rates and open economy macroeconomics*, 1989, Oxford: Basil Blackwell; R Dornbusch, 'Exchange rate economics 1986', *Economic Journal*, 1987, volume 84, pages 1-18.

(3) See eg M P Dooley and P Isard, 'Fiscal Policy, Locational Decisions and Exchange Rates', International Monetary Fund, Working Paper 89/49, June 1989.

(4) See eg J A De Long, A Shleifer, L Summers and R Waldman, 'The economic consequences of noise traders', National Bureau of Economic Research Working Paper No. 2395, October 1987; J A Frankel and K A Froot, 'Understanding the US dollar in the eighties: the expectations of chartists and fundamentalists', *Economic Record*, 1986, special issue, volume 62, pages 24-38; C A E Goodhart, 'The foreign exchange market: a random walk with a dragging anchor', *Economica*, 1988, volume 55, pages 437-60.

known as reversal patterns, are taken to indicate the imminent reversal of a trend, perhaps the most famous of which is the 'head and shoulders' formation (Chart 1).⁽¹⁾ Other configurations may be judged to be 'continuation patterns'—ie patterns that occur *within* established trends. Often, chartists will identify broad ranges within which exchange rates or asset prices are expected to trade, and the upper and lower limits of such ranges are termed 'resistance' and 'support' levels respectively, terms which now seem to have entered common financial parlance.

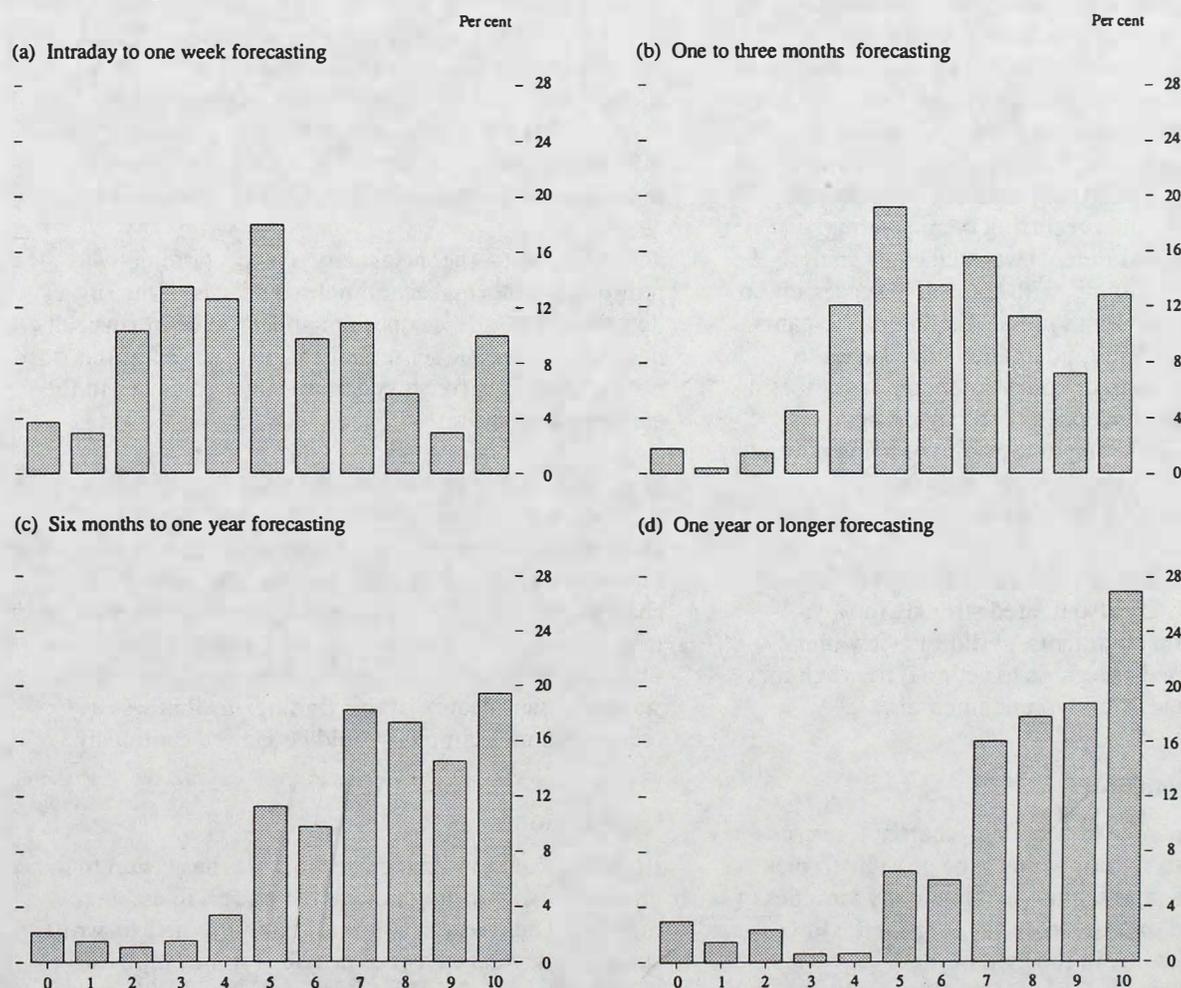
Chart analysts may also employ one or more 'mechanical indicators' when forming a general view. These might be trend-following (eg 'buy when a shorter moving average cuts a longer moving average from below') or non-trend following (eg 'oscillators' which calculate the rate of change of prices, with the assumption that there is a tendency for markets to 'correct' when an asset has been 'overbought' or 'oversold').⁽²⁾ Other, non-price-based indicators might also be considered by chart analysts. For example, attitudinal indicators may be studied for signs of

the market being at extreme values—market sentiment measures such as surveys of market opinion are widely used in this context. Other indicators which also do not fall strictly into the category of analysing the individual market price itself might be the study of, say, interest rate charts alongside exchange rates, or using indices of the whole market as an additional input to the study of a single price within that market.

Market perceptions of chart analysis

Clearly, chart analysis has a large subjective element, and there are probably as many methods of combining and interpreting the various techniques as there are chartists themselves. In an attempt to ascertain the influence of chartism on foreign exchange market practitioners, a questionnaire survey of chief foreign exchange dealers in the London market was conducted. The survey had a wide coverage of dealing institutions and over 200 responses (over 60% of those sent out) were received and analysed. The aim of the survey was to assess the manner in which

Chart 2
Perceived importance of chartism and fundamentals in foreign exchange forecasts^(a)



On the horizontal scale, 0 = pure chartism and 10 = pure fundamentals.

(a) Percentage of chartists advocating particular chart/fundamental weighting in forecasting the path of exchange rates at each time horizon.

(1) See eg R D Edwards and J Magee: *Technical analysis of stock trends*, 5th edition, 1966, Boston: John Magee.

(2) See eg J J Murphy: *Technical analysis of the futures markets*, 1986, New York: New York Institute of Finance.

chartism is used in the foreign exchange market—the methods used in practice, the input of chartists into trading decisions and the importance which the actual market participants attach to chartism. Respondents were also invited to add general comments concerning the relevance and use of chartism in the foreign exchange market.

A clear result of the survey was that chartism appears to be most used for forecasting over short time horizons, relative to the frequency of economic data. At the shortest horizons, intraday to one week (Chart 2a), approximately 90% of respondents use some chartist input in forming their exchange rate expectations, with 60% judging charts to be at least as important as fundamentals. At longer forecast horizons, of one to three months or six months to one year, the weight given to fundamentals increases (Charts 2b, 2c). At the longest forecast horizons, one year or longer (Chart 2d), the skew towards fundamentals is most pronounced, with nearly 30% of respondents relying on pure fundamentals and 85% judging fundamentals to be more important than charts.

Several comments made by survey participants and interviewees indicated a belief that charts essentially measure swings in market psychology, which may be of most importance in the shorter term but may be harder to forecast over the longer horizons, over which fundamental economic factors tend to become more dominant. A slightly different view expressed was that chartism may actually obscure the underlying fundamentals over the shorter horizons. Another recurring theme among respondents' general comments was that chart analysis may be largely self-fulfilling, with some 40% suggesting so explicitly. The survey also inquired whether participants regarded the chartist and fundamental approaches to exchange rate analysis to be complementary or competing. Only 8% of respondents replied that they thought approaches to be competing to the point of being mutually exclusive; the rest held the approaches to be complementary to a greater or lesser degree.

The view that chartist and fundamental analysis may be largely complementary also figured strongly in respondents' general comments, as did the view that charts should be used as a guide to action only when they confirm the message from the fundamentals.

Chartists' expectations

Clearly, it is not possible to 'simulate' chartist forecasts for the purpose of analysis, nor would it be possible to pick one practitioner as representative of the many varieties of chartist advice and to proceed on the basis of the forecasts of that individual alone. In the light of these considerations, it was decided that the best way forward would be to survey the exchange rate expectations of a number of chartists, allowing each contributor to employ

whichever methods were felt to be the most appropriate to the particular market situation.

Over the period June 1988–March 1989, a panel of chart analysts was telephoned every week and their expectations with respect to the sterling-dollar, dollar-mark and dollar-yen exchange rates for one and four weeks ahead were recorded. The panel was selected to include chartists who were highly regarded in the City both by fellow chartists and by foreign exchange dealers, this having been ascertained through preliminary interviews with a number of chartists and dealers as well as from the questionnaire survey sent out to chief dealers.⁽¹⁾

Chart 3 shows the sample median, high and low chartist forecast for each currency and time horizon, together with the actual rate that materialised. The forecasts are shifted forward so that points vertically in line on the charts compare predictions with actual outcomes.

There are at least three points which can be made from inspection of these figures. First, as would be expected, prediction errors are noticeably greater at the four-week horizon. Second, there appears to be a slight tendency for the forecasts to miss turning points and for forecast errors to narrow when the exchange rate is trending. Third, the extent to which there is a tendency to underpredict in a rising market and to overpredict in a falling market suggests that the average elasticity of expectations is less than unity, ie a rise in the rate since the last period does not induce expectations of a bigger rise next period.

This last point—the inelasticity of expectations—was reinforced by formal econometric analysis of the survey data: chartists' advice does not appear to be intrinsically destabilising, in the sense that chartists' expectations do not appear to overreact systematically to changes in the current exchange rate.

Statistical tests of individual chartists' forecasts revealed a significant difference between individual forecasters' accuracy—chartists do not all appear to react in a uniform manner to chart formations. Indeed, one particular chartist consistently outperformed all other chartists and a range of alternative economic and statistical forecasting methods, in terms of forecasting accuracy, although the statistical significance of this finding, in what was a relatively small sample, should be viewed cautiously.

Conclusion

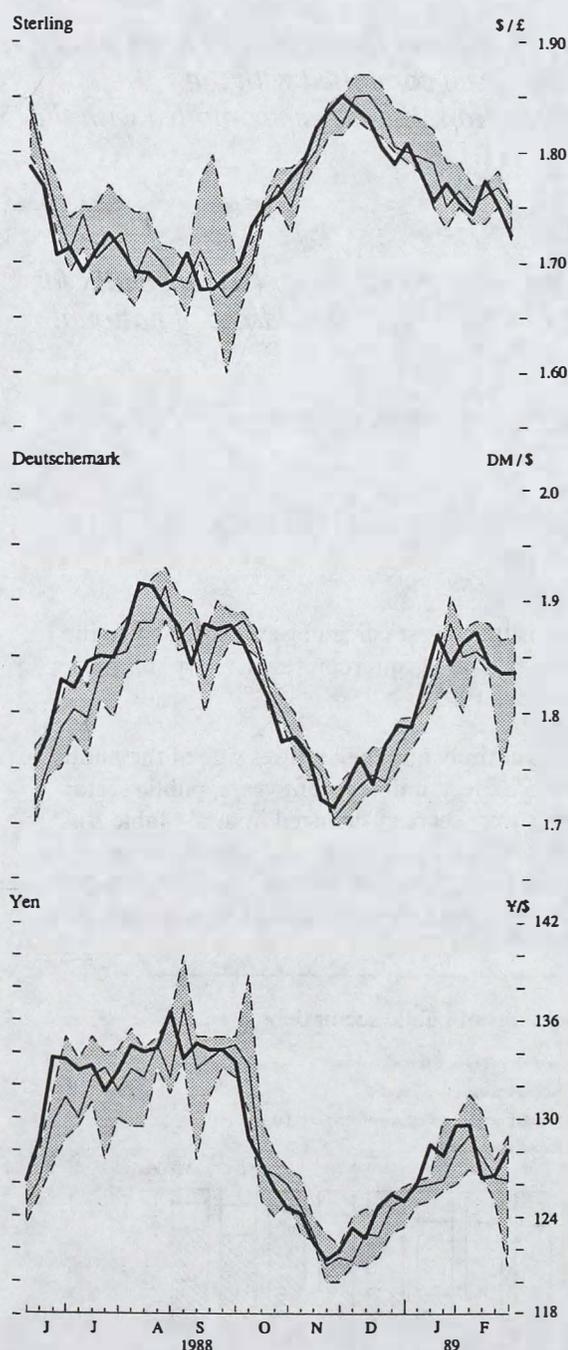
Recent research in financial economics has begun to focus on the role of non-fundamentalist traders in asset markets. The research summarised in this article, while subject to several caveats,⁽²⁾ provides some empirical evidence concerning the nature and perceived importance of one particular kind of non-fundamentalist analysis—chartism—in the London foreign exchange

(1) Details of the composition of the panel are confidential.
(2) See Bank of England *Discussion paper* No 40, page 19.

Chart 3
Chartist forecasts: one week and four weeks ahead

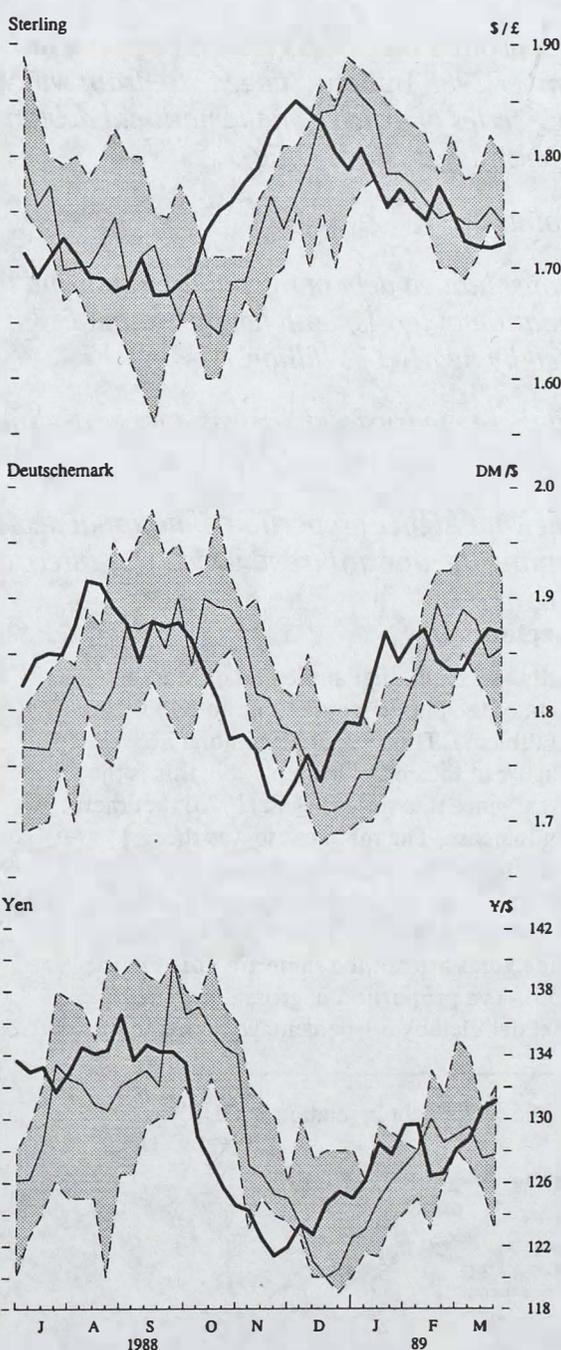
— Actual rate
— Median chartist forecast
□ Range of forecast (high to low)

One week ahead (a)



(a) Actual rate plotted at time t , forecasts plotted at time $t + 1$.

Four weeks ahead (b)



(b) Actual rate plotted at time t , forecasts plotted at time $t + 4$.

market. It emerges that, especially at the shorter horizons, some chartist input into exchange rate forecasts appears to be widespread among London foreign exchange dealers. Three further findings of the research can also be stressed. First, it appears that not all chartists predict the same market movements at the same point in time. Indeed, the broad range and heterogeneity of chartists' forecasts probably imply an insufficient consensus among chartists to influence the overall market strongly in any particular

direction. Second, the research suggests that chartism is unlikely to have a destabilising effect on the market. Third, however, financial market researchers should not dismiss technical analysis: some chartists' forecasts were remarkably good and could not be improved upon by a range of alternative forecasting procedures. Further empirical and theoretical work on foreign exchange markets should not preclude the consideration of non-fundamentals.