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Towards the fundamentals of technical analysis: analysing the information content of High, Low and Close prices ☆

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Abstract

Technical analysis assigns a special importance to the Open, High, Low and Close prices in forecasting the mean and volatility of exchange rates. In this paper we propose to investigate the time series properties and the informational content of these different prices, using range and cointegration methods. The application of these methods to a high frequency data set indicates the existence of stable structural relationships and asymmetric information flows, which is supportive of certain predictions of market microstructure models of the foreign exchange market. In sum, we argue that a technical analysis of High, Low and Close prices is a useful way of learning about latent Granger causality in high frequency exchange rates. © 2002 Elsevier Science B.V. All rights reserved.

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1. Introduction

Technical analysis (TA) assigns a special importance to the Open, High, Low and Close prices in forecasting the mean and volatility of exchange rates. Candlestick analysis is a popular form of TA that combines Open, High, Low and Close prices for the purpose of charting and forecasting and represents probably the most exhaustive attempt to classify price forecasts according to High–Low–Close constellations.[1] Within Candlestick analysis, as well as in other forms of TA, the difference between Open and Close prices serves as a measure of the direction and the extent of intradaily trends. The difference between High and Low prices marks the intradaily trading range and represents a measure of volatility. For many forms of TA, it is the interaction between trend and volatility that is assumed to be informative about future price developments.

While TA is often perceived as an example of trading on information unrelated to underlying fundamental rationalisation (Shleifer and Summers, 1990), we argue that this is not the full story: the underlying fundamental rationalisation, at least in part, is provided by the market microstructure of the foreign exchange market. Furthermore, there appears to be a direct link between TA and the favourable statistical properties of the extreme value estimators of Parkinson (1980), Garman and Klass (1980) and Kunitomo (1992).[2] Blume et al. (1994) have recently shown that TA is valuable when information is costly. In particular, they demonstrate how sequences of volume and prices can be informative and how TA of market data arises as natural components of an agent's learning process.

We argue that similar hypotheses can be formulated for the analysis of High and Low prices once we realise that: (1) High and Low prices reveal information about shifts in the demand and supply structure; and (2) changing order flows play an important part in determining market prices. The academic work on support and resistance levels (Curcio and Goodhart, 1992; DeGrauwe and Decupere, 1992) seems to support the first point. The recent empirical evidence for the latter point is provided by Menkhoff (1998) in a survey of the German foreign exchange market. Menkhoff's results strongly underline the role of order flow analysis in the expectation formation process of foreign exchange market participants. Given that the order flow is unobservable to the uninformed trader, a TA of directly observable High and Low prices allows traders to learn about the underlying market mechanism that drives these order flows.

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[1] Candlestick charts were introduced by Japanese rice traders in the 17th century as a graphical way of displaying the different constellations between High, Low, Open and Close prices, where each constellation implies a different forecast (see e.g. Feeny, 1989).

[2] Parkinson (1980) and Garman and Klass (1980) have recently demonstrated that the efficiency of traditional return-based volatility estimators can be greatly increased by additionally incorporating the extremes of a range — the High and Low prices — into the information set of a volatility forecasting function. Kunitomo (1992) has shown that the efficiency of extreme value estimators can be increased further once a drift term is accounted for.