

# FORECASTING VOLATILITY

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*This is a .pdf version of a monograph published in Financial Markets, Institutions, & Instruments 6 (1), 1997. The actual monograph in electronic form can be purchased through the Blackwell-Synergy website (<http://www.blackwell-synergy.com/>). This is the final pre-publication version, that is essentially identical to the published monograph.*

This monograph puts together results from several lines of research that I have pursued over a period of years, on the general topic of volatility forecasting for option pricing applications. It is not meant to be a complete survey of the extensive literature on the subject, nor is it a definitive set of prescriptions on how to get the best volatility forecast. While at the outset, I had hoped to find the Best Method to obtain a volatility input for use in pricing options, as the reader will quickly determine, it seems that I have been more successful in uncovering the flaws and difficulties in the methods that are widely used than I have been in determining a single optimal strategy myself.

Since I am not revealing the optimal approach to volatility forecasting, the major value of this work, if any, is more to share with the reader a variety of observations and thoughts about volatility prediction, that I have arrived at after investigating the problem from a number of different angles. Two major themes emerge, both having to do with the connection, or perhaps more correctly, the possibility of a disconnection between theory and practice in dealing with volatility prediction and its role in option valuation. Two general classes of theories are involved.

First, there is the statistical theory involved in modeling price behavior in financial markets. In Chapter I we bring out the distinction between a physical process and an economic process in terms of the stability of their internal structure and the prospects for making accurate predictions about them. We argue that simply applying the theoretical estimation methodology appropriate for physical processes to the economic process of price behavior in a financial market can lead one to build models that are too complex and hold inappropriately high expectations about the potential accuracy of volatility forecasts from those models.

The second area where conflict between theory and practice arises is in the use of implied volatility from option market prices. The conflict comes from the disparity between the trading strategies arbitrage-based derivatives valuation models assume investors follow and what actual market participants do. In theory, the implied volatility is the market's well-informed prediction of future volatility. In practice, however, the arbitrage trading that is supposed to force option prices into conformance with the market's volatility expectations may be very hard to execute. It

will also be less profitable and entail more risk than simple market making that maximizes order flow and earns profits from the bid-ask spread. The latter, however, does little to enforce theoretical pricing in the face of the forces of supply and demand in the market.

In both cases, I try to point out important implications for estimating volatility that tend to be overlooked by those following the more traditional lines of thought. I hope the reader will find some of these insights to be of value.