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Book Review: *An Introduction to Econophysics, Correlations, and Complexity in Finance*

An Introduction to Econophysics, Correlations, and Complexity in Finance. N. Rosario, H. Mantegna, and H. E. Stanley, Cambridge University Press, Cambridge, 2000.

Technology, developed in the mid-eighties which enabled one to generate high frequency data on stock and other prices, can be considered to be a major step forward in understanding the dynamics of financial markets. Before such technology became available the only data on which a study could be based consisted of daily or weekly closing prices. This, at most, represented a maximum of 250 samples per year. Data bases compiled on such sparse information can only provide vague and unreliable characterizations of price movements. On the other hand, "tic by tic" data provides huge amounts of data for analysis. For example, data on the exchange rate between U.S. dollars and German marks can routinely consist of more than 18,000 changes in a single day. Such data, when filtered and analyzed, is the basis of useful financial information.

Because there is so much data available there is ample scope for analysis using tools developed in statistical mechanics and other fields of physics. Such analysis has been directed towards the study of price movements, and at a minimum allows one to characterize their statistical properties. The present book presents a useful summary of some of the methods used to bridge the fields of physics and finance. It is concise and not exhaustive. A prime virtue to the physicist is that the book is written from the physicist's point of view. The authors explain, in a clear and understandable form, concepts from the field of economics. These are exemplified by the efficient market hypothesis, arbitrage, ARCH and GARCH processes, portfolios, options, hedging, the Black-Scholes theory, as well as a miscellany of others. Typical concepts used in the analysis of finance based on physical applications are self-similarity, Lévy distributions, scaling, renormalization among others. In consequence, the book will be of value to physicists with interests in financial dynamics, and to economists

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who want to learn, in a practical, and not unduly abstract way, the great potential and the advantages of methods developed in the context of physical analysis for the study of time-series data derived from finance.

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