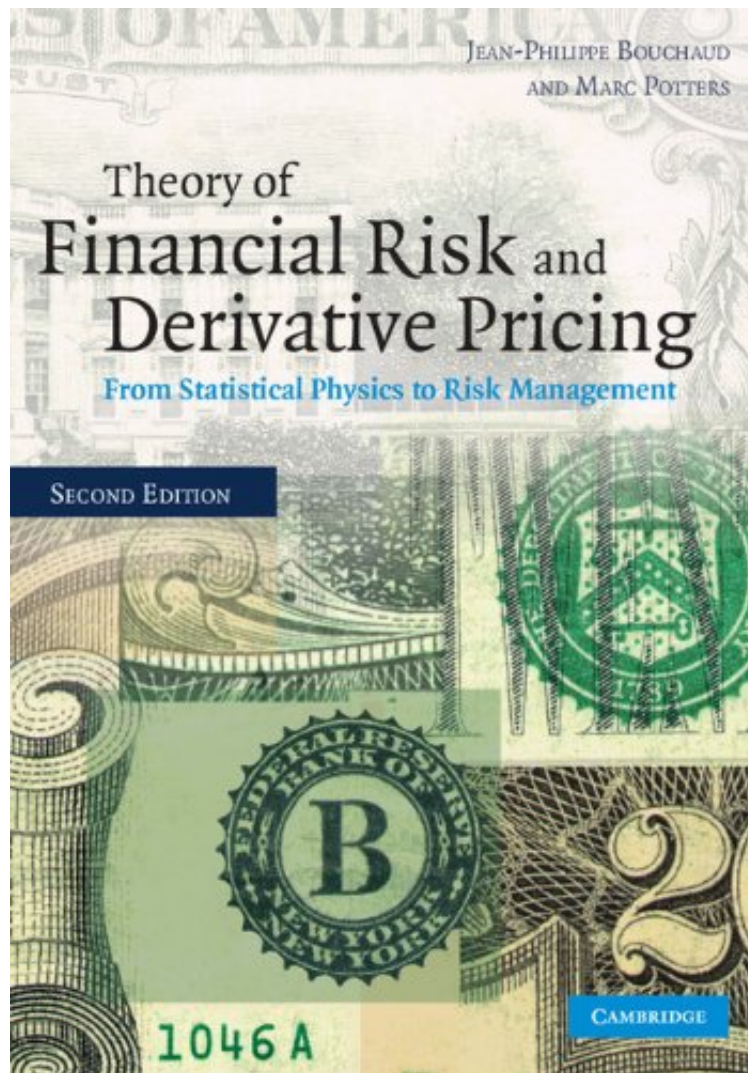


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Theory of Financial Risk and Derivative Pricing: From Statistical Physics to Risk Management

Jean-Philippe Bouchaud, Marc Potters
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Jean-Philippe Bouchaud, Marc Potters : Theory of Financial Risk and Derivative Pricing: From Statistical Physics to Risk Management before purchasing it in order to gauge whether or not it would be worth my time, and all praised Theory of Financial Risk and Derivative Pricing: From Statistical Physics to Risk Management:

3 of 3 people found the following review helpful. Excellent reference for Quantitative Finance, but difficult notation
By Mauricio Labadie
This is one of my favourite books in Quantitative Finance. I agree with Paul Wilmott's back cover comment that this book has a plethora of ideas. I have one on my desk and another at home, and I check them frequently for new ideas. The Econophysics flavour is definded with elegance. It can be summarised as an

approach based on empirical data, where there are not a priori assumptions on the distributions. In fact, this approach is more "scientific" than some dogmatic, axiom-based approaches in Economics like Efficient Market Theory or normality of returns. Moreover, checking directly the moments of the distribution is to my eyes more sincere than assuming $X \sim Y$ distribution and fit its parameters. Of course, Statistical Physics may have a bias towards Leacute;vy (i.e. power-law) distributions for the tails, but the authors prove that it is quite common to see this in real returns. The most important thoughts in the book are: * Returns are not normal, rather power-law on the tails * Not only mean and variance are important: third and fourth moments (skewness and kurtosis) are crucial for risk management * Using Taylor expansions on the empirical distributions we can estimate the first four moments or cumulants * Returns exhibit auto-correlation at high frequencies (around seconds), which decays as a power law and eventually (after 30 mins) disappears * Correlograms (i.e. lagged auto-correlation) can help to understand the market impact of trades * Random matrices can be used to assess cross-correlation in a very robust way * Pricing formulas like Black-Scholes can be corrected with skewness and kurtosis, e.g. the smile and the delta There is however a small negative point: its very difficult notation. I think the book tries to target people outside Statistical Physics, but unfortunately the notation has shunned some people away from the book. I know the notation (just as Einstein's) is compact and elegant once you get it, but if on the first two chapters there were a "translation" of formulas in terms of sum operators and quotients, that would help people to climb up the learning curve much faster. I understand the book is a reference manual for seasoned professionals in Quantitative Finance, not a textbook. However, some extra pages to allow more explanations and examples would be nice for the next edition. Those additions could help non-physicist readers to understand those "stylised facts" of markets, especially when the ideas are very intuitive and should help question the mainstream approach in Finance and Economics. I think the notation issue is important, but it can be overcome with patience. This in my opinion puts the rating of the book closer to 5 stars than to 4.27 of 33 people found the following review helpful.

Fat tails and more
By Professor Joseph L. McCauley
This text has a nice discussion of Levy distributions and (important!) discusses why the central limit theorem does not apply to the tails of a distribution in the limit of many independent random events. An exponential distribution is given as an example how the CLT fails. I was first happy to see a chapter devoted to portfolio selection, but the chapter (like most of the book) is very difficult to follow (I gave up on that chapter, unhappily, because it looked interesting). The notation could have been better (to be quite honest, the notation is horrible), and the arguments (many of which are original) could have been made sharper and clearer. For my taste, too many arguments in the text rely on uncontrolled approximations, with Gaussian results as special limiting cases. The chapters on options are original, introducing their idea of history-dependent strategies (however, to get a strategy other than the delta-hedge does not not require history-dependence, CAPM is an example), but the predictions too often go in the direction of showing how Gaussian returns can be retrieved in some limit (I find this the opposite of convincing!). For an introduction to options, the 1973 Black-Scholes paper is still the best (aside from the wrong claim that CAPM and the delta-hedge yield the same results). The argument in the introduction in favor of 'randomness' as the origin of macroscopic law left me as cold as a cucumber. On page 4 a density is called 'invariant' under change of variable whereas 'scalar' is the correct word (a common error in many texts on relativity). The explanation of Ito calculus is inventive but inadequate (see instead Baxter and Rennie for a correct and readable treatment, one the forms the basis for new research on local volatility). Also, utility is once mentioned but never criticized. Had the book been more pedagogically written then one could well have used it as an introductory text, given the nice choice of topics discussed.

13 of 15 people found the following review helpful.

An Unconventional and Engaging Treatment of Risk
By Raymond J. Hawkins
In 'More Heat Than Light', Philip Mirowski observed that the expertise brought to economics by the "... influx of engineers, physicists manqueacute;s, and mathematicians during the Great Depression and after ... did not get parlayed into novel physical/economic metaphors." In the literature of the new field of "econophysics" there are promising indications that the recent influx into finance following the end of the cold war will not repeat this. An exciting addition to this literature is the recent publication of this augmented and English version of Theacute;orie des Risques Financiers. In this monograph Drs. Bouchaud and Potters present much of their research together with related contemporary and previous work including that of Bachelier. Their "physicists viewpoint" of comparing theory to observed data appears early in the first chapter where time-series data illustrating 3 market crashes motivates their review of the basic notions of probability with an emphasis on non-Gaussian probability densities. This is followed by an interesting data-intensive comparison of these notions to the statistics of real prices including, as examples, the SP 500 index, the DEM/USD exchange rate, and the Bund futures contract. The results of this comparison between theory and observation are then applied in the chapters that follow in which portfolio optimization, risk management, and the valuation of derivative securities are discussed. The authors' approach in general, and to derivative securities in particular, is both unconventional and refreshing. It will appeal to those who have wondered if stochastic calculus is really required to price options. They demonstrate how a number of well-known results can be recovered in the appropriate (usually Gaussian) limits and provide an even-handed discussion of the risk associated with failing to include non-Gaussian effects. This book is readily accessible to readers who have/can read either McQuarrie's 'Statistical Mechanics' or Ingersoll's 'Theory of Financial Decision Making'. I enjoyed this book because of the authors' unconventional approach, stat-mech style, interesting comparisons of theory and data, and

the important implications of their approach for risk measurement and management

Risk control and derivative pricing have become of major concern to financial institutions, and there is a real need for adequate statistical tools to measure and anticipate the amplitude of the potential moves of the financial markets. Summarising theoretical developments in the field, this 2003 second edition has been substantially expanded. Additional chapters now cover stochastic processes, Monte-Carlo methods, Black-Scholes theory, the theory of the yield curve, and Minority Game. There are discussions on aspects of data analysis, financial products, non-linear correlations, and herding, feedback and agent based models. This book has become a classic reference for graduate students and researchers working in econophysics and mathematical finance, and for quantitative analysts working on risk management, derivative pricing and quantitative trading strategies.

"...thought-provoking...The feeling one is left with after putting the book down is one of time well spent." Risk "...the authors offer fresh and valuable insights into financial markets." -Mathematical s"The book is well written and self-contained...recommended to anyone interested in a new and fresh approach to the dynamics of financial markets." Journal of Statistical Physics"The book is interesting not only for physicists working in finance, but also practitioners and scholars with a mathematical or statistical background." Journal of the American Statistical Association

About the Author Jean-Philippe Bouchaud co-founded the company Science Finance, which merged with Capital Fund Management (CFM) in 2000, where he now supervises the research team with Marc Potters. He teaches statistical mechanics and finance in various Grandes Eacute;coles, and has worked at CRNS and CEA-Saclay. He was awarded the CRNS Silver Medal in 1996. Marc Potters has been Head of Research at CFM since 1998, where he supervises thirty physics PhD's. He has published numerous articles in the new field of statistical finance, in particular on Random Matrix Theory applied to portfolio management. He works on various concrete applications of financial forecasting, option pricing and risk control.