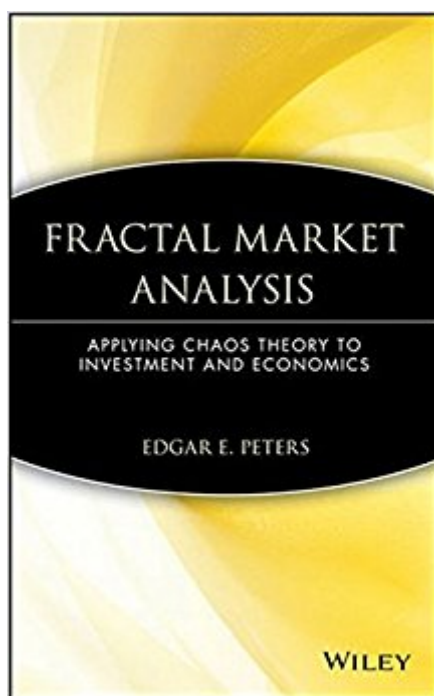


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Fractal Market Analysis: Applying Chaos Theory To Investment And Economics



Synopsis

A leading pioneer in the field offers practical applications of this innovative science. Peters describes complex concepts in an easy-to-follow manner for the non-mathematician. He uses fractals, rescaled range analysis and nonlinear dynamical models to explain behavior and understand price movements. These are specific tools employed by chaos scientists to map and measure physical and now, economic phenomena.

Book Information

Hardcover: 336 pages

Publisher: Wiley; 1 edition (January 12, 1994)

Language: English

ISBN-10: 0471585246

ISBN-13: 978-0471585244

Product Dimensions: 6.2 x 1.1 x 9.6 inches

Shipping Weight: 1.3 pounds (View shipping rates and policies)

Average Customer Review: 3.6 out of 5 stars 14 customer reviews

Best Sellers Rank: #1,043,799 in Books (See Top 100 in Books) #120 in Books > Science & Math > Mathematics > Pure Mathematics > Fractals #372 in Books > Business & Money > Economics > Public Finance #778 in Books > Textbooks > Business & Finance > Investments & Securities

Customer Reviews

The average investor is usually unaware of the theoretical bases and academic underpinnings of various investment strategies. Investment books and popular reference guides barely mention efficient market or random walk theory, and the mathematical aspect of portfolio management theory appears as little more than a footnote. Little actually new has been added to the field of investment and market theory for the last 30 years, but recently Peters introduced the landmark *Chaos and Order in the Capital Markets* (1991). Chaos theory is a branch of mathematics that, despite its name, attempts to make order out of seemingly random events and that has found application in the natural sciences. Market chaologists, as they have come to be known, have marshaled an array of formulas and computer models but have been criticized for not being able to explain their ideas in practical terms or to demonstrate how to apply these ideas. Fractals are the main mathematical tool of chaos theory, and Peters now shows how these can be applied to financial markets and trading. This book is unquestionably complex and relatively expensive, but all

libraries with investment collections should consider purchasing at least one copy. David Rouse

A leading pioneer in the field offers practical applications of this innovative science. Peters describes complex concepts in an easy-to-follow manner for the non-mathematician. He uses fractals, rescaled range analysis and nonlinear dynamical models to explain behavior and understand price movements. These are specific tools employed by chaos scientists to map and measure physical and now, economic phenomena.

Brief introduction to terminology, and is great for interested readers outside finance sector to learn about classical market models, albeit man-made, misleading, or only economic academic favored "models". This book tries to make market research more scientific, using re-scaled range analysis in hydrology of Richardson.

I call it my market bible. I love this book. It is an easy read with easy applications. I must say I am manic. This is one of the reasons I find math so beautiful. There is still a long ways to go for mathematics and I truly want to be a part of additions to dynamical systems.

This book includes a very detailed description of how to apply some chaos theory techniques - primarily R/S analysis - to time series data. With this technique, one can gauge whether a time series is completely random, completely predictive, or a mixture of these. This book glosses over some conceptual topics such as Efficient Market Theory and the Fractal Market Hypothesis in favor of details to perform a rigorous statistical analysis. These conceptual topics are better covered in Peters' earlier work "Chaos and Order in the Capital Markets". For the analytically oriented reader, there can be much frustration as equations are often initially presented in sloppy and unusable forms with undefined parameters (hence 4 of 5 stars). However, these are subsequently broken down and presented in a step-by-step manner that will allow most readers to implement his techniques. Overall, this is an excellent introductory book for the practitioner or economist, not so great for the non-technical reader.

A great book! Highly recommended. Reading this book opened my eyes to completely new territory. This will greatly benefit me professionally and intellectually.

3 stars for effort - trying to explain a technical analysis to a non-technical audience, but 1 star or less

for content. It really shows that the author is not trained in mathematics or economics since there are numerous mistakes in the presentation, explanation and scope of many of the more subtle points, enough to qualify this as not serious. The main subjects of this book has long been basic research and deeply debated in the academic community (and not just in math, finance, and economics) but only relatively recently been the subject of attention by traders, investment MBAs and the such. Its a sexy subject but perhaps the math is too daunting, but that doesnt mean you should get it from someone who is obviously pulling together some papers in the field without the background to understand fully what the qualifications are. Thats just silly. Just because chaos theory implies that the perbutations of a butterfly in Africa can result in storms in the midwest doesnt mean the reverse, and thats what you need to predict what might happen next.

Reviewed by Michael P. Corning
Edgar E. Peters wasn't satisfied with the Efficient Market Hypothesis (EMH). With the publication of his first book, *Chaos and Order in Capital Markets*, John Wiley & Sons, New York, 1991, he went public with his concerns about its underlying assumptions and with its empirical shortcomings. That book, a manifesto really, was followed last year by *Fractal Market Analysis: Applying Chaos Theory to Investment & Economics* (FMA). Where his first book broke ground, FMA has laid the foundation of a new conceptual infrastructure of capital markets.
Risk From The Past
Much of Peters argument is based on two things: one hundred three years of daily Dow Jones Industrial Average data, and Rescaled Range (R/S) analysis. He begins FMA by demonstrating that capital market returns in the United States are not a truly random walk. Instead, he contends they are a biased random walk and indicate a long memory process; they are persistent. Specifically, he characterizes their short term behavior (less than 1,200 days) as a stochastic nonlinear process and their long term behavior as a nonlinear dynamic, or chaotic, process. As a result, he enlarges the definition of risk to include a phenomenon he discovered about persistent processes: they are mirrored by antipersistent ones. If persistent processes are less random than random ones, antipersistent processes reverse themselves more often than random ones. An early insight due to this discovery is that risk is not merely the deviation from an expected value, viz., standard deviation, but the velocity of the second difference of price changes. Peters offers the Stable-Levy, or fractal, frequency distribution as a more faithful representation of capital markets. When two key variables are fixed at certain levels, the normal distribution becomes a special case of fractal distributions. To hear that the random walk is a special case should be no more surprising than to hear that visible light is a special case of the electromagnetic spectrum. It is not so much a matter of losing something; instead, vast amounts of knowledge remain invisible as

long as the old assumption remains intact and tools tuned to the different frequencies remain undeveloped. Instruments tuned to gamma, X-ray, infrared, and radio frequencies have shown astronomers far more about our universe than the special case of visible light ever could. Both these facts, that finance time series are not random and that the Gaussian assumption is a special case of fractal distributions, suggest that: 1. major rethinking about risk and diversification is necessary, 2. new statistical tools need to be created, and 3. very exciting discoveries are in store for us.

Risk in the Present While examining the same historic data at different time scales, Peters made another discovery. He found that the frequency distributions of investment horizons ranging from 1-day to 90-day intervals had the same shape. As a result, he concluded that capital markets do not have a characteristic time scale (an important attribute of fractal systems). Instead, he suggested that this phenomenon represented what he called "self-similar risk." In Peters' view, investors don't struggle against each other trying to attain an above average rate of return (at the expense of the seller) as much as they sustain each other and diversify each other's risk by keeping the market liquid. As long as long-term investors remain long-term investors, they are willing to step in and buy securities that are unwanted by traders on shorter investment horizons.

Risk of the Future In spite of the highest discipline, crashes happen. The EMH demurs. Crashes and stampedes are not efficient concepts. Copernicus had a similar problem. By placing the Sun at the center of the solar system, he was able to explain the wandering behavior of the planets-except for Mars. The EMH finds itself in a similar predicament. As long as it clings to its simplifying assumptions like a jealous lover, it will never be able to explain why crashes and stampedes happen. The FMH, on the other hand, not only explains why, it begins to construct a world view which explains how they happen, as well. In the long term, Peters conjectures, capital markets behave like nonlinear dynamic systems. Their time series have all the requisite attributes; among them, sensitivity to initial conditions, and a fractal dimension. In addition, through the use of R/S analysis, Peters can identify the nonperiodic cycles, known in chaos theory as attractors, so characteristic of chaotic systems. It may be this latter feature that will have the greatest impact on our understanding of risk and our techniques to minimize it. Though he does not explicitly suggest it in *Fractal Market Analysis*, he has speculated in earlier papers that sufficient understanding of the nonlinear dynamics of capital markets may provide a theoretic basis for market timing and tactical asset allocation.

Final Thoughts I conclude this review with a few of my own comments about risk. First, we risk making two types of errors when faced with a new and provocative world view. Type I: We too quickly appropriate a new idea or theory. Type II: We too quickly dismiss a new idea or theory. With Type I errors we agree without understanding; with Type II: we disagree without appreciating. The former is naive, the latter is insolent. With Type I

errors we are not fully utilizing our critical faculties; with Type II errors we are forgetting our intuitive. Ignorance is non-market risk. We have an obligation to our clients to diversify it away, and the best way to do that is with an open and critical mind. Finally, at the risk of overstating it, I would have to describe both of Peters' books as inspired. I say that because they not only informed me, they enlightened me. They changed the way I see the world, and they affected me at an emotional level. I have never before encountered a book at once so intellectually demanding and accessible. For me, the measure of a great book is taken in the number of times I return to it and the degree of new understanding each reading yields for me. In my library, Peters has few peers. Readers interested in a more in-depth discussion of Fractal Market Analysis can find it on the World Wide Web at [...]

Michael P. Corning is the Quality Assurance Officer at Chuck Jones & Associates, Inc., Portland, Oregon. The opinions expressed in this review are his alone and not necessarily those of Chuck Jones & Associates, Inc. This review was taken from a complete review first published in the Journal of Financial Planning, October, 1995

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