From the Editor

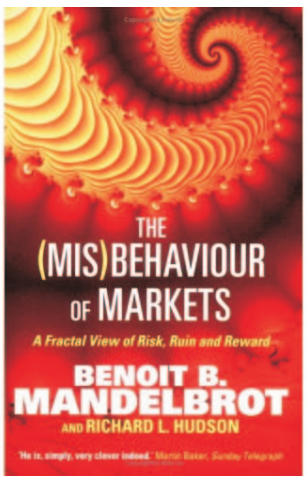
The (mis)Behaviour of Markets

> My life's work has been to develop a new mathematical tool to add to man's small survival kit. I call it fractal and multifractal geometry. It is the study of roughness, of the irregular and jagged. I coined its name in 1975.... Fractal geometry has come to be viewed as 'natural.' It is used today for an improbably diverse set of tasks: compressing digital images over the Internet, measuring metal fractures, analyzing brain waves in an EEG machine, designing ultra-small radio antennae, making better optical cables, and studying the anatomy of lung bronchia.

So wrote Benoit Mandelbrot, with his economist co-author Richard Hudson, in their fascinating and important book *The (mis)Behaviour of Markets* (pp. 116–117). Mandelbrot goes on to apply his fractal geometry to the study of financial markets and the rise and fall of stocks, shares, and currencies. You do not need to be a budding economist to find this fascinating. This book is written for a nonmathematical reader, so there is not a formula in sight in the main text; a few appear in the notes at the end. It is a very good read. The original hardback version appeared in 2004 and was the Financial Times' best business book of the year.

A prelude by Richard Hudson is a fascinating portrait of Mandelbrot, one of the most original mathematical minds of our age. Part I is a devastating critique of the mathematical models hitherto used in finance. To quote from later in the book (p. 247):

> The classic Random Walk model makes three essential claims. First is the so-called martingale condition: that your best guess of tomorrow's price is today's price, Second is a declaration of independence: that tomorrow's price is independent of past prices. Third is a statement of normality: that all the price changes taken together, from small to large, vary in accordance with the mild, bell-curve distribution. In my view, that is two claims too many.



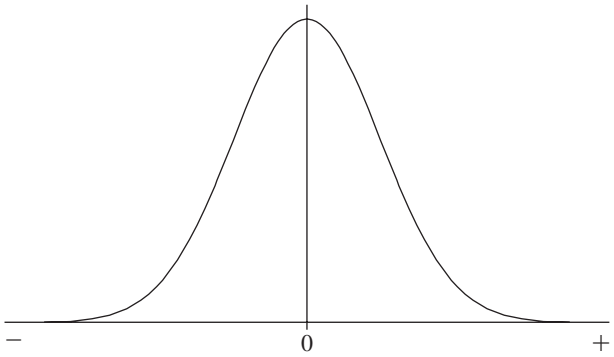


Figure 1

All students of Statistics are familiar with the bell-shaped normal distribution curve (see figure 1). In the standard model, price changes of a stock, share, or currency conform to a normal distribution. To quote (p. 276):

> I believe the conventional models and their more recent 'fixes' ... are not merely wrong; they are dangerously wrong.

Financial markets are much more volatile than this model predicts.

Mandelbrot goes on to apply the ideas of fractal geometry to finance (p. 118):

> A fractal ... is a pattern or shape whose parts echo the whole.

Thus, the frond of a fern is a smaller version of the whole, each floret of a cauliflower is itself a cauliflower, and branches of a tree are complete smaller trees (p. 125). Examples are legion. So, says Mandelbrot (p. 239):

> The genius of fractal analysis is that the same risk factors, the same formulae apply to a day as to a year, an hour as to a month. Only the magnitude differs, not the proportions.

I am not an economist, but I found this plea for a new, more realistic mathematical model for financial markets both fascinating and convincing. I urge you to read this book. It may encourage the more adventurous student of mathematics, 'the bungee jumpers', into working in finance or to play the markets. Those, like me, who prefer to keep their feet firmly on the ground, will be tempted to keep their money under the mattress!

Reference

1 B. B. Mandelbrot and R. L. Hudson, *The (mis)Behaviour of Markets* (Profile Books, London, 2005).