



Benoit B. Mandelbrot (1924–2010): a father of Quantitative Finance

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Benoit Mandelbrot was a father of Quantitative Finance in two senses.

The better known – and most important – sense is of course related to his fundamental insights into the real world behaviour of asset prices – discontinuities, power law tails, trading time, subordination, long memory, fractional Brownian motion, multi-fractal processes (see Mandelbrot 1997 for a detailed exposition of these ideas). In this he followed the long tradition of French positivism beginning in the early 19th century with Auguste Comte and applied to finance before him by Bachelier and Lévy.

The second lesser known sense relates to Professor Mandelbrot's unwavering support of this journal from his recruitment by Doyne Farmer in 2000 as a founding member of the Advisory Board, including his contribution of several long papers (Mandelbrot 2001, a–e) to its first volume and his help from time to time with some difficult editorial decisions. Subsequent plans to publish his widely cited working papers with his PhD students at Yale (Mandelbrot *et al.* 1997; Fisher *et al.* 1997) were unfortunately never brought to fruition.

It is however fitting that this Special Issue on Global Equity Markets begins with several contributions to the memory of Professor Mandelbrot by members of the Editorial Board and supporters of *Quantitative Finance*.

While Professor Mandelbrot might not approve of some of the modern portfolio theory inspired papers in this special issue, there is no doubt that he would heartily support the empiricism, global scope and geographically dispersed authorship that the papers represent.

I met Professor Mandelbrot for the first time only a decade ago at a conference at the Santa Fe Institute organized by Professor Farmer, the proceedings of which formed the first two issues of *Quantitative Finance*. For over ten years before this however I had been distributing to graduate students Mandelbrot's pioneering paper with Taylor, in which trading time and subordinated Brownian motion were introduced, as a cautionary antidote to the standard Gaussian processes used in continuous time mathematical finance and modern portfolio theory which formed the bulk of their courses. Regarding the 2000 Santa Fe conference I like to say that I have never been in a room with so many big egos (represented by Nobel Laureates, present and future, in various fields) as at its plenary sessions. I must also confess that I only understood in detail what Mandelbrot had said in his talk when his assertions were summarized prior to vigorous attacks by his several critics. However, this was in sharp contrast to the situation in which my wife, Elena, and I found ourselves when we met Aliette and Benoit Mandelbrot for breakfast each day, as we were staying in the same hotel. Here the conversation was urbane, witty and filled with fascinating fact and anecdote.

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The result of these fortuitous breakfast meetings was much subsequent correspondence by email which led eventually to my organizing Professor Mandelbrot's last visit to Cambridge in 2005. He was made an Honorary Visiting Fellow of my college, Hughes Hall, and stayed with his wife as a guest of the President in the college. During his visit Professor Mandelbrot gave three graphical lectures on the applications of fractals to science, finance, and art and music, at respectively the Isaac Newton Institute for Mathematical Sciences, the Judge Business School and Hughes Hall. He also gave me a copy of his then recently published popular, and ironically prescient book, with Hudson, *The (mis)Behaviour of Markets*, whose inscription I treasure to this day, 'To Michael Dempster, with warm thanks for arranging this lovely visit to Cambridge, showing new sides and asking all the right questions, Benoit Mandelbrot, June 2005'.

Although Professor Mandelbrot was sometimes seen as prickly, one evening after dinner during his visit to Cambridge he showed a different side in telling the following story on himself. After completing his DSc in Mathematics at the University of Paris in December 1952 with a thesis entitled *Games of Communication*, Mandelbrot was sponsored by John von Neumann at the Institute for Advanced Study in Princeton for the 1953–54 academic year. He told me that one long afternoon he and von Neumann were working together trying to prove a difficult theorem. As their conversation advanced, von Neumann asked Mandelbrot several times to take notes on their progress. Each time Mandelbrot grandly replied that he would remember everything and write it up the next day. But the next morning he woke up and could not remember any of the key steps in the proof they had been developing. He said that when he confessed this to von Neumann he had never before seen a man so

angry and he himself remembered the incident as the ultimate embarrassment of his professional career.

Benoit Mandelbrot was born in Warsaw on November 20th 1924 into a family of scholars and mathematicians and died in Cambridge, Massachusetts on October 14th 2010. His creation of fractal geometry is ranked among the greatest contributions to 20th Century mathematics, but its full applications to finance have yet to be developed. Some of these have already been published in *Quantitative Finance* and the Editors hope that this important line of inquiry will have a long and promising future on the pages of this journal.

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