

Classical Economics: An Emperor With No Clothes

Benoit Mandelbrot's discovery of the discontinuity and fractal property of financial market prices robbed classical economics of its empirical foundation. So why has the world refused to take note?

By **Richard Olsen**, The Olsen Group

The founders of classical economics, Adam Smith and David Ricardo, had to develop their theories without benefit of access to hard statistical facts about the behavior of market prices. They wrote descriptively, without the support of mathematical tools. And only gradually did successive economists apply mathematical rigor to support the founders' hypotheses.

In 1900 Louis Bachelier made an important contribution to the formalism of classical economics by explaining that an efficient market depends on the Brownian motion of market prices. Classical economic theory claims that if markets are efficient, then economic resources will be automatically allocated in an optimal way – in line with the long-term interests of society.

Policy makers around the world have used this argument to legitimize political and economic policy decisions that have shaped the developed world and fueled its characteristic realities: a superabundance of consumer goods, oversupply of agricultural produce, unemployment, poverty, environmental stress and political strife.

But as early as 1963, using data from cotton prices, Benoit Mandelbrot analyzed the statistical properties of market pricing and discovered that the assumption of Brownian motion does not hold. From his findings – since confirmed by a generation of research – Mandelbrot concluded that price changes in financial markets are discontinuous and follow a scaling law.

Today it is beyond any doubt that the theoretical model of classical economics cannot be validated by actual market data.

This conclusion is of more than passing interest. And it cannot be

dismissed or explained away as an insignificant deviation between the theoretical model and empirical data. It is a truth, comparable in its revolutionary implications to Rutherford's discovery of the nucleus in 1911.

And so why, we are obliged to ask, has one of the most important discoveries in the history of economics failed to inspire a concerted effort to develop a better theory? Perhaps it has to do with Mandelbrot himself and his position vis à vis the kingmakers of economics who reserve the right to bestow acknowledgment. Why has Mandelbrot not been recognized, say, with a Nobel¹ Prize in economics? Because he is considered an "outsider"—trained as a mathematician and active in research that ranges well beyond economics alone? Or has he failed to play by establishment rules and violated some unwritten code of economist conduct?

Why, indeed, should Mandelbrot receive a Nobel prize in economics? The Nobel is the *ne plus ultra* of global recognition; it carries considerable political weight; it does not go unnoticed; the very fact of the award can stir things up. In Mandelbrot's case, everyone would be made aware that classical economics – quite literally the emperor of our global economy – is without clothes. Younger economists and students around the world would be motivated to search for a better explanation of how economies work and why, and to propose alternative theories validated by actual data and subject to empirical scrutiny. Putting all of us, as real science always does, in the temporarily uncomfortable position of not knowing in order that we may know.

Since the demise of communism and the sweeping victory of capitalism, we have failed to question policy recommendations based on classical economics as a means to achieve an optimal allocation of

resources. Are these recommendations really in the best long-term interest of humanity? Mandelbrot's discovery raises serious doubts about such assumptions.

But as with every great thinker or artist on the threshold of a new epoch, Mandelbrot's work is open to interpretation. Each person finds unique meaning. We take what we need.

For me the value of his work extends beyond the earth-shaking deconstruction of classical economics, suggesting new epistemological disciplines by which we may redefine the way we work.

1. We cannot develop complex theories unsupported by repeated empirical validation.

In today's digital economy, the inference is simple: we should collect and record all of the data we communicate electronically and accept the cost of keeping such a record. Without complaining. (Outsiders may find it hard to believe, but today we fail miserably at this.)

Today even the most simple digital data, such as tick-by-tick market prices, are not systematically collected. Our fellow researchers and – even more important – future generations of economists will at some point be infinitely grateful for the record we leave behind. For the simple reason that without it they will be unable to discover their limitations and validate their theories.

Even with today's data storage capability the costs will not be insignificant, but they pale in comparison to other investments in the future we make (a Hubble telescope, for example, or the exploration of deep space). And that is the context in which this expense should be considered. Collect the data – this is central in Mandelbrot's message to us – regardless of our ability to make immediate practical use of it.

2. Mandelbrot's discovery of the scaling law of market prices highlights the need to analyze economic phenomena at many time scales.

Biological research cultivates the cheap and abundant fruit fly in order to exploit its two-week life cycle. In economics we do not have this luxury. We cannot afford to wait several human generations to evaluate the impact of economic theory on practical policy.

Mandelbrot teaches us that it is possible to research short-term time scales to make inferences about longer-term behavior. Our mandate is to research tick-by-tick changes in market prices in order to discover the evolution of prices over very long periods, enabling us to more reliably infer market behavior over tens or even hundreds of years.

Mandelbrot's discovery of the scaling law of absolute price changes carries another message: it is an invitation to systematically screen statistical properties for the existence of any scaling laws.

Economists have failed to leverage the interplay between scaling and non-scaling properties. A case in point is the relationship between absolute price change and the non-stable distribution of prices, where price extremes (fat tails) become bigger the shorter the time horizon of observation.

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3. Mandelbrot replaces physical time with the concept of transaction time.

I encourage researchers to question our use of physical time to analyze economic phenomena. Unlike physical objects described by classical physics, which is firmly embedded in our slow-moving everyday world, economic phenomena are fleeting and lack a fixed point of reference.

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A call to action

I encourage readers of this article to write a letter in support of Benoit Mandelbrot to the selection committee of the Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel in economics

(e-mail: ekon@nobel.kva.se,

or postal address:

Royal Swedish Academy of Sciences,

P.O.Box 50005,

SE-104 05 Stockholm,

Sweden).

First as a gesture of fair recognition for his many important contributions in so many areas of science. But equally important as a call to action to economists the world over to come up with a better theory that will withstand the scrutiny of statistical validation.

As long as the theory of economics is used to legitimize policy decisions that affect billions of people, we scientists must hold ourselves accountable: we must take responsibility for aligning the soundness of theory with the reasonableness of expected outcomes. The emperor has no clothes; how long shall we sit silently by?

■ Edited by Thomas Grizzard

FOOTNOTE

1 In 1968, the Bank of Sweden (Sveriges Riksbank) instituted the "Bank of Sweden Prize in Economic Sciences in Memory of Alfred Nobel", and it has since been awarded by the Royal Swedish Academy of Sciences, Stockholm.