Has There Ever Been a Normal?

Critical information is often unknown at the time or unknowable, concealed, misrepresented, and/or misunderstood.

"To all the complexity of the physical world of weather, crops, ores, and factories, you add the psychological complexity of men acting on their fleeting expectation of what may or may not happen," **Benoît Mandelbrot.**

Utilising fractal mathematics, Mandelbrot created market simulations that matched the characteristics of the financial markets—from volatility to patterns of advance and decline, cyclical movement, and other mathematical relationships.

Unlike most complex physical systems, the agents of an economy, and perhaps to some extent the economy itself, have an extra ingredient, an extra degree of complexity. This ingredient is (mis)behaviour, which is at the heart of all risk management optimal performance strategies.

Power Law (the functional relationship between two quantities) distribution has a dramatic impact on what may be seen as normal: it renders the term normal, nonsensical. For example, imagine a room full of people. We measure their heights. From their heights we can determine an average. Imagine to this room of people we introduce the world's tallest person. The average height will increase only marginally. Now, imagine to the same room of people we have measured the average income. To this room we introduce the world's wealthiest person. The average will now change by such a vast amount – perhaps billions – it renders the average nonsensical.

As we increase the number of samples the values will not converge to a normal but diverge. This makes asking for an average a bit like asking how long is the average piece of string?

Consequently, what we develop is an exponential relationship between:

1. The size of the event
2. Frequency of it occurring

And, for example, in the natural world, more and more do we witness extreme events: in 2021 alone, the heat dome over Northwest US and Canada, the floods in Germany and Belgium, China and India. We see this effect globally in increasing hurricanes, droughts, floods, fires - pandemics etc. Normal is no longer applicable.

Normal distribution is vaguely derived from the fact of taking random samples from components that have no correlation between them. For example, if you were to flip a coin, the coin will follow a pattern of normal distribution of heads and tails. But this does not mean that winning on one table in a casino you will, as a result, win on another.

Extreme events are much more likely. We see this effect in increasing hurricanes, droughts, floods, fires, pandemics etc.

In contrast, we do not live in a linear world. It is the misbehaviour of man that has created linear two-dimensional processes and forced them upon a spherical, three-dimensional, looped, feedback world. On this basis, the siloed thinking of 'green', 'low-carbon', ‘circular economy’, ‘net-zero’ and so on, will at best deliver sub-optimal performance.

“Sometimes it’s not about things but the relationship between things.”

Natural Complex Systems

Fractals have symmetry with respect to scale and are both mathematical constants that derive from iterative functions and real-world phenomena. As with non-linear systems, the idea behind fractals is feedback and iteration. Behind Sustainable Viability is feedback and iteration.

The Earth's surface and all living things upon it are incredibly diverse. The Earth presents a vast template of geology, physical oceanography and limnology and a climate that varies on a scale from the largest oceans, continents, lakes, and rivers to the tiniest microsites. Billions of individual organisms belonging to millions of species are distributed over the Earth. These and many more act upon one another interdependently.

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It follows, natural complex systems offer many orders of magnitude and provide a means for extrapolating between scales: between the large scale of the globe, region, ecosystem, or habitat where ecological relationships appear to be complex. The study of scaling is a way of simplifying ecological complexity and of understanding the human, physical and biological principles that regulate the biosphere.

Vivid biological patterns emerge from even subtle interactions. Similar phenomena are seen in the emergence of order in economic, social and political systems.

Dr Jim Haseloff, from the Department of Plant Sciences at the University of Cambridge

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Understanding Economic Risk

Mixed with the complexity of nature's systems, is man's intentional impact upon those systems and the economies [of scale], that along with the resources of the planet, help provide for the well-being and growth of communities intermingled with the creation of self-sustaining systems.

And, using tools of probability, investors can evaluate the odds for or against some outcome. Yet such tools rely upon the normal bell curve and standard deviations. And, while forecasting markets may be perilous, fractal mathematics can estimate the odds of future volatility from a wider, more complex spectrum of systemic risk.

In contrast, one of the simplest models for price and market variation is based on the sum of independent random numbers where the random numbers are considered to conform to normal distribution. For example, a financial trader needs to obtain information that can provide some confidence in the immediate future of a stock. This is often based upon repeating patterns from the past - patterns based on the interplay between greed and fear. This based on a backdrop of increasing extreme events. It follows, the normal dynamics of market (mis)behaviour will attract extreme events, such as Black Monday, when in October 1987, the markets fell twenty two percent: which under normal distribution has a 10^{50} chance of happening!

The fractal model describes a process that leads to long-tail distributions. Consequently, the markets, portfolios and individual businesses become inclusive and spherical with feedback loops in nature as they become self-aware of the greater dynamic systems that will affect value in the future: that value in the future will have little to do with the 'normal' distribution patterns of the past.

Consequently, Sustainable Viability explores outcomes of non-linear feedback loops, verified across the whole as a Sphere Economy. The process of SV is outcome focussed to produce structures that have a scale and variant property to produce de-risked value optimised eco-innovative organisations.

Christopher Gleadle, Sustainable Viability