Black Swans and Absurdistan

For centuries people have been using the Gaussian Bell Curve to predict the performance of stable processes. Biologists and the businessmen alike have better understood their disciplines thanks to it, and have even come to call it the 'Natural Law' or the 'Normal Distribution.' Ask any engineer or biologist what he thinks of the following assertion, "what little mathematisation we can do in the real world does not assume the mild randomness of the Bell Curve," and you would be surprised by his or her laughter. It comes as a shock, then, to read a book, where a professor of "uncertainty" calls this brainchild of the German mathematician Gauss, the ***"Great Intellectual Fraud,"*** *(sic.) or GIF, for short. This author claims universal truth in his assertion that financial trading models are dangerous if they are based on the Gauss curve. His key idea is that only 'chaos' theory is truly adapted to a world that he states is "****dominated*** *by very rare events." He goes a step beyond saying that, "all models are wrong, but some are useful," simply by calling Gauss a* ***fraud****.*

Can this author, a Wharton MBA graduate and derivatives trader, called N. N. Taleb, who is an admirer of the father of fractal geometry, Benoît Mandelbrot, be justified in taking such a brash position? In his book, 'The Black Swan; The Impact of the Highly Improbable,' he attempts to placate his reader by claiming a high regard for "empiricism" and for "scepticism." I am at a loss to understand how he applies this philosophy or how he will win the support of 'classical' statisticians and Nobel Prize winners whose Gaussian theories he lambastes in his pages, but not how he masters sensationalist prose. Mandelbrot's own behaviour has been little different over the years, and no doubt, Mr. Taleb identifies with the master.

Mr. Taleb never reads newspapers because he claims that *"journalists are industrial producers of distortion,"* and waits for fortuitous events to happen because, *"focus makes you a sucker."* He says he has made money by *"tinkering"* with Black Swans, but I am not convinced that, in doing so, he has broken new ground: nor am I altogether happy with his sweeping statement that we live in *"Extremistan,"* a world dominated by very rare events, rather than in *"Mediocristan,"* where, according to him, stability, boredom and poverty reign. It is perhaps characteristic of his brashness that he should have coined these names in the way he has.

How has Mr. Taleb arrived at his conclusions? He claims his strategy is to trade derivatives on the basis of long-term discontinuities that provoke significant price moves, and he calls these discontinuities, "Black Swans." He criticises the *"reward systems based on the illusion of the regular,"* that appear to have won higher bonuses for his short-term trading colleagues, who act comfortably in what (everyone else perceives) is a Gaussian world. He even throws the Poisson distribution for discreet, low probability, events out of the window with the "Great Intellectual Fraud," and states that, in the real world, low probability behaviour is non parametric: this is to say that it is not possible to fit a mathematical curve to low probability data using simple parameters, such as an arithmetic data mean or a variance. Just for the record, Poisson's distribution was discovered by the French mathematician who found that it perfectly fitted the low probability of Prussian cavalry officers being killed by a horse kick; Poisson's work is used world wide in accident analysis and prevention, but Mr. Taleb says that it is unusable in financial markets: as with most of his other assertions, he doesn't explain why.

Even if we accept his non-parametric approach, using, it seems, Benoît Mandelbrot's work on cotton pricing to try to understand the impact of external events on security pricing processes, Mr. Taleb's claims that the Gaussian curve is the "Great Intellectual Fraud" is, at the very least, absurd! What he calls the GIF is possibly the most commonly used and best adapted tool for understanding the short term performance of *stable* processes.

As anyone knows who uses the Standard Normal Curve to understand process, we first distinguish whether we are approaching short-term or long-term data, and then we check whether we are working with non sequential, aggregate data, or not. Gaussian concepts need to be extended carefully to the analysis of time series, because this is where so much misunderstanding appears: the question is whether the time series is showing just movement of the mean with minimal change in variance, in which case we are probably in stable, Gaussian conditions, or whether the time series is exhibiting movement of the mean, change in the variance and variation in data frequency, leading it to be stochastic, in which case we use Gauss with circumspection.

<u>Signal and noise</u>

Process analysts, (financial securities pricing *is* a process,) generally use the Gaussian Bell Curve to identify and to separate random process noise, called 'common cause' variation in the jargon, from

the impact of events external to the process, called 'special cause' variation: to do so, they assume stability of both the mean and of the variance. If processes show stable oscillation around a mean, they exhibit a 'central tendency,' and the amplitude of oscillation, measured by the 'variance,' or by its square root, the 'standard deviation,' is the variation, (or 'volatility' in financial speak.) All process data oscillates, and its tendency to return to a central value, signifies that the distribution of data *is* parametric: this is because a mean can be identified, and, therefore an average distance of the data points from it, or standard deviation, also.

This approach is logically applied to classical economic supply and demand theory, which well describes the mechanics of equilibrium market-pricing. Security pricing *is* a clear candidate for parametric curves, and, if not for simple Gauss curves, nor for cleverly superimposed ones of different variance, then for their close parametric twin with unlimited variance, called the 'Cauchy' curve, which has 'fatter tails' than Gauss, and which is one tiny mathematical expression away. As Mr. Taleb is chucking out the GIF and Poisson with the bathwater, I assume he is chucking out parametric Monsieur Cauchy, too.

These distributions concern aggregate data, but what of Time-series graphs, which show the movement of data along a time axis? These are the charts we generally see used with financial securities, and they show movement of data means, as a 'signal,' with Gaussian variability of data points around the mean, as random 'noise.' Knowing this mean and variability, we are logically led to use parametric curves.

Short-term and long-term data

Evaluating process behaviour over a short period of time does not always account for long term 'shift and drift' of the data mean. Research shows not only that all processes have random noise, but also that they have a natural shift and drift of the process mean that short term metrics do not show up. Motorola quotes the work of three researchers, Bender (1975,) Evans (1975) and Gilson (1951,) who agree that the long term shift and drift of the mean in natural processes is ±1.5 standard deviations around the long term mean. Their research confirms the difficult nature of using the Gauss Curve in determining *long-term* process variation, but in no way invalidates it, and, for most practitioners, it still remains the principal, understandable, predictive model for working with 'stable,' natural processes.

All processes in nature oscillate: they are said to be 'noisy:' process noise is characterised by random oscillation about a mean, and movement of a mean signals progress through successive, instantaneous, equilibrium states. This is true *whether or not the process variance is stable*. The fact that processes oscillate (including financial securities pricing,) clearly illustrates their tendency *over the short term* to return to equilibrium states, *otherwise, they would shoot off to infinity all the time.*

As securities trading implies buying and selling by independent players, it's at least misguided, and probably irresponsible, to refute the idea of equilibrium pricing! All securities-pricing graphs show that prices oscillate: a discontinuity may impact the oscillation by moving the mean, by changing the process variance, or even by affecting the frequency, but financial securities pricing still shows a clear mechanism of demand and supply centring upon a point of balance. Even with a change in the frequency of oscillation, the concept of stable (or unstable) equilibrium at any time remains valid.

Instantaneous securities-pricing means are moved by Black Swans until they paddle off, but, as soon as they do, parametric movement around the time series mean returns. Empirical and sceptical Mr. Taleb doesn't concern himself with these ideas, because he shuts down when he hears a statistician use the *'beastly word, equilibrium!'* In fact, I wonder just how empirical he is when he says that, *"it is misleading to build a general rule from observed facts!"*

Special cause

Bollinger bands are trading limits traditionally calculated using Gaussian parameters: they are lines placed in time series at a distance of two or three standard deviations above and below the smoothed moving mean, and based on a backward look at existing data: they are extensively used by short-term traders to show up signals of heavy swings, and they assume that, compared with the backward look, the probability of sudden price movements outside these limits of variation is low. As indicators, they provide easily understood, valuable information, particularly because the backward look can be chosen to be long term or short term according to the trading horizon, but, more important than the parameters chosen to

calculate Bollinger bands is to understand *why* securities prices *surge* through them.

In 'process speak,' price surges occur either because an *external fortuitous* event has disturbed the *(beastly word)* equilibrium, or, as we shall see later, because there have been interaction effects between identified price-moving factors: neither of these invalidates Gaussian, nor any other parametric or non-parametric, behaviour of short term price oscillation around a mean. By fortuitous events, we mean those events that are external to a defined process? If our process is fattening a turkey by feeding it for 1000 days, the fortuitous event of chopping its head off to prepare Christmas lunch is *not part of the feeding process*. If the Titanic's process was to sail across the Atlantic, the fortuitous event of running into an iceberg is *not part of the sailing process*. We call such events external to the process, 'special cause:' I repeat, they are *not part of the process*: *these* are what Mr. Taleb calls Black Swans.

There is no point in trying to analyze special cause variation in the same expression as common cause variation: one is a part of a stable process*, the other is not*: analysing the unknown, "unknown" along with common cause, random variation is barking up the wrong tree. *Black swans do not invalidate in any way the parametric nature of process oscillation, because they have nothing to do with process oscillation.* Both Mr Mandelbrot and Mr Taleb believe that they must, otherwise they would not attempt to find a single expression to deal with both, fractal or not.

Mr. Taleb implicitly criticises trading using parametric mechanisms, claiming that they do not provide the same profit opportunity as long-term derivatives trading if you wait for the uncertain to happen. Is this universal declaration valid? Is it professional to play with o.p.m. (other people's money) by sitting on it and awaiting uncertain events? What has this got to do anyway with securities pricing?

Interactions

The science of interactions also appears to lie outside the compass of Mr. Taleb's thesis: it lies possibly in what he calls the *silent evidence* of the other half of "*Umberto Eco's library*," where he has not set foot.

If I, as a trader, identify factors that empirically modify a security price, in the way that the USD exchange rate and gold-mine output impact the USD gold price, then, providing I do read the press, which Mr. Taleb does not, I can trade forward positions based on information about these two factors. Supposing that, during the same session, there is a speculative run shorting the dollar and a contemporaneous announcement from Russia and Tanzania reducing output from their gold mines: what would happen to the gold price? Can anyone doubt that it would go through the roof! This is called an 'interaction effect' of two relevant, identified factors having a *mutually accelerating effect* on a security price, that, had they occurred individually, might have been less brutal. Are these uncertain events unique and external to the process of influencing the gold price, and so, Black Swans? Indeed, *they are not,* if the trader regularly and logically models his predictions on such factors. He may profit from such swings as he would from a Black Swan, but they don't result from factors outside the process, like a war or a terrorist outrage.

Mr. Taleb might reply that it doesn't matter whether a swing is caused by a special cause or by an interaction, because his empirical approach seeks not to understand why, but just to profit. I find his approach more in line with the strategy of another black bird, an Ostrich: stick your head in the sand and wait for something to happen! Personally, I believe in the importance of news and in an attempt to interpret it, especially if I am trading with o.p.m. If he wishes to trade special cause, fine, but the vast majority of traders doesn't, and most of them make money.

The book provides no new insights. The author uses a trading method which is 85% conservative and 15% exposed to long-term risk, and sounds much like the classical portfolio management theory he maligns. Is it the idea of potential gain under uncertainty that is new? Not really: Mr. Taleb personally favours the long end and chooses his securities for their long term conservative profile, that's all. Is it the use of Mandelbrot fractional noise to compute uncertainty? It might be easier to answer this if the author were less obscure about how he applies it to what he does. Just because a fractal curve repeats itself over different time scales, or looks as wonky as financial securities curves, his approach doesn't sound very helpful, and even Mandelbrot himself sounds unsure about how anyone is going to profit from his fractal sets.

So how do I feel about reading the Black Swan? I feel betrayed! As much as the book appeared to get off to a good start with its brash, promising

language, it massively discredits itself by proclaiming Gauss as the Great Intellectual Fraud; it slows into vendetta and into Mr. Taleb's existential issues with his mother, and ultimately attempts to attribute universal truth to questionable claims. The Black Swan fails to convince, as Mandelbrot has been failing to convince for decades. It's a pity for the reader, but I'm sure that it has been a money spinner for clever Mr. Taleb, who states that authorship is scalable, i.e. a money spinner – bully for him!

I wonder if he is not really talking also a bit about himself when, on page 138 in my paperback edition of his book, he claims that "*we are demonstrably arrogant about what we think we know.*" It is astonishing that this and all his other opinions are being published in 18 languages!

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