

Taking flight

In the second of a four-part series on the development of risk management, *David Rowe* considers the phenomenon of high-impact events, or *Black Swans*

In 2004, I wrote a column entitled *Op Risk and Black Swans* (*Risk* September 2004, page 114¹). I had stumbled on to Nassim Nicholas Taleb's musing about extreme events on the web fully two-and-a-half years before his book, *The Black Swan*, was published. It was immediately clear to me he had found a far better hook for driving home the importance of extreme events than we risk managers had done up to that point. By assembling colourful examples, some based on stressful personal experience, and weaving an interesting storyline, Taleb had brought the importance of focusing on extreme events home to a broad audience of business generalists.

In the late 1960s, it was actually considered an open question whether market fluctuations were normally distributed. Even then, however, evidence for fat tails in the distribution of price changes was steadily accumulating. Today, these departures from the classic bell curve are a widely recognised fact of life. It is worth asking, though, what makes social systems more prone to such behaviour than physical systems. The answer, it seems to me, is mutual self-awareness. As long as individual market decisions are statistically independent, based on idiosyncratic circumstances unique to each individual, then market fluctuations are approximately normal. When there is a common crystallising event, the basic assumptions required for statistical normality break down.

The role of mutual self-awareness

An example unrelated to finance can be instructive.

Say you equip the passengers of a single-deck cruise ship with a device that allows you to locate them exactly at any given moment.

Then proceed to calculate once every minute the centre of gravity of all these locations with reference to the two-dimensional framework of the ship and plot the resulting distribution. At most times, passengers will be in a variety of locations based on their personal preferences, energy levels, mood of the moment and the available alternatives. The resulting distribution of their centre of gravity over time will be a cloud of points bunched around the centre of the available passenger areas. We would expect it to exhibit

something very close to a bivariate normal distribution.

Now, however, assume there is an announcement over the ship's loudspeaker that there is a pod of whales breaching off the port bow. The consequences are fairly obvious. We would see a sudden outlier in the distribution as passengers rush to find a good viewing spot among the limited spaces available. In the immediate aftermath of the announcement, a typical passenger knows several things:

- There is an opportunity to see something quite unique.
- The time to see it is limited.
- There is an ideal location of limited size for viewing the phenomenon.
- Everyone knows everyone else knows all this as well.

It is this final point – this mutual self-awareness – that makes for the sudden mad rush to the port bow. Each passenger reacts to the knowledge that speed is of the essence if a good viewing place is to be secured. If the ship was nearly empty or if only a few people were aware of the opportunity or were likely to take advantage of it (if, say, most passengers were confined to their cabins with sea sickness), the sense of urgency would be greatly reduced.

Crystallising events

There is a relevant scene in the movie *Rogue Trader* about Nick Leeson and the Barings debacle. He is awakened by a call at home in the early hours of the morning from another member of the firm. The voice at the other end of the phone says urgently: "Turn on CNN." The television in the bedroom flickers to life showing scenes of the Kobe earthquake. The voice at the other end of the phone says: "This is just going to kill the market."

In effect, this is much like the announcement on the ship but on a global basis. Observers around the world were suddenly focused on a common crystallising event with obviously directional implications for the market. In addition, everyone knew everyone else knew. In such a situation, the millions of decisions that drive the market suddenly are no longer randomly independent. Rather, they are subject to a common shared perception. The core structural assumptions that underpin a normal distribution have temporarily broken down, explosively self-referential behaviour becomes dominant and we see a sudden extreme observation. From such mutually reinforcing mass reactions, driven by the ever-mercurial state of human emotions delicately balanced between greed and fear, do Black Swans take flight. ■

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¹ www.risk.net/1498572