The Black Swan: The Impact of the Highly Improbable

By Nassim Nicholas Taleb; Random House, 2010 (2nd ed.), 366 pages.

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If not one of the most influential books of the last few years, *The Black Swan* has definitely been one of the most controversial pieces of criticism and economic thought. Nassim Nicholas Taleb is currently a distinguished professor of risk engineering at New York University, but he has held academic positions as professor or research fellow at Oxford University, the London Business School, and the University of Massachusetts. With a background in mathematical finance, Taleb derives most of his expertise from extensive experience as a trader at institutions including BNP Paribas, UBS, CIBC, Credit Suisse, and several independent (sometimes self-founded) hedge funds.

If we really understand risk and are able to safely manage it with an extensive array of sophisticated techniques and financial assets that supposedly ensure against uncertain outcomes, then why are we so often "taken for suckers by the unexpected"? (page 38) And it is no minor loss in a sidewalk game of chance we are facing. When we mess up because we had been relying on the wrong notion of risk we are usually forced to assume enormous damage (look at the recent financial crisis). Taleb's main motivation in writing this book is to make people aware of how wrongly we *normally*

approach risk and uncertainty.[1] In particular, the book is a bitterly harsh critique of what he sees as the abusive and erroneous use of the so-called bell curve in the markets. Taleb throws all his anger at all the people who dare to forecast the unpredictable, not only because they do it with the wrong tools, but because they usually fancy themselves as *the* experts and teach everyone their methods as the only truth.

The most relevant notion in his argument is illustrated by the discovery of the *Cygnus atratus* (the black swan) in Australia (circa 1697); until then, Europeans regarded the idea that all swans are white as a scientific truth. However, I prefer another example in the book that, in my opinion, collects his ideas in a better, more insightful manner: A turkey is being fed for a thousand days until one Thanksgiving evening it is finally slaughtered. Taleb tries to imagine all the analysts and risk managers hired by the turkey telling it that, day after day, things are looking more promising. In fact, the turkey was getting fatter and being treated better each day. Not only could nothing go wrong, things could only get better, as confirmed by empirical evidence in hundreds of days in the dataset! This image reminds me of the way traders in the City of London went home on the night of August 3, 1914, seemingly unsuspicious that a world war lasting more than four years would break out the next day.[2]

Taleb provides three criteria to identify black swans. First, they are very rare and happen unexpectedly. Second, they have a huge impact. Third, despite the fact that they are unforeseeable, we try to rationalize them by constructing convincing explanations that make them appear somehow not so hard to have predicted, as if by doing so we find relief in the thought that next time we'll do better. Guess what: Next time we fail again.

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[1] The use of the word *normally* here is absolutely intentional, as Taleb precisely criticizes the fact that people overemploy (and misemploy) techniques based on normal distributions of shocks.

[2] Other examples of Black Swans are September 11, 2001; or stock market crashes. Taleb also argues that the current financial crisis is a Black Swan. But this will be discussed later.

One of the most interesting aspects of the book is a valuable accounting of the most common mistakes we tend to make when dealing with risk, uncertainty, and, in general, what we don't know. Since there are many reviews of *The Black Swan* out there (some dealing with more technical matters, some dealing with the conceptual aspects), in this review I will focus on what seems to me the most relevant issue for management and economics research.

Taleb frames our world in two kingdoms: Mediocristan and Extremistan. Mediocristan is the dominion of all those things that are located around some average. Even though some observations can be found relatively far from such an average, they are very few. We move here in a territory of the non-scalable (in Taleb's terms) where "no single instance will significantly change the aggregate or the total." (page 32) In Extremistan, on the other hand, "inequalities are such that one single observation can disproportionately impact the aggregate or the total." (page 33) We are in the domain of the scalable, where rare and unlikely events can actually happen and have a huge impact. Some examples could be the distribution of wealth, scientific research, the Internet, September 11th, financial crises, and so on.

The author regrets that, seemingly unworried about whether we are in Mediocristan or Extremistan, we tend to take our own knowledge too seriously. Once we think we have achieved the right conclusion about something, it is extremely hard to make us change our mind. And of course we think within the frame we have formed in our minds. Similarly, we always seek evidence that confirms our views. We learn from repetition, from searching for patterns, and tend to overlook or dismiss the rare events that have not happened before when we project the future. We often don't listen to the silent evidence.

Taleb argues that we are less prepared to understand the nature of risk and uncertainty as we try to rationalize the unpredictable after the fact. He maintains that we are just small parts of a highly interconnected world where we depend on many things and many people we do not even know. He uses this line of thinking to criticize (or rather try to dismantle) economic forecasters, researchers, and predictions in general in sentences such as "Economic forecasters tend to fall closer to one another than to the resulting outcome"(page 149) and "The econometrician Robert Engel … invented a very complicated statistical method called GARCH and got a Nobel prize for it. No one tested it to see if it has any validity in real life." (page 155) On page 173 he presents one of his arguments: "It is impossible to predict because to do so we need to incorporate elements from the future itself … but we do not know them."

The author suggests that the recent financial crisis was a black swan because no one saw it coming. I find this difficult to accept given that many people sounded alarms before it happened. For example, in July 2008, Mark Zandi, chief economist at Moody's Analytics, published his book *Financial Shock*, in which he explained in great detail what was going on in the markets for derivatives and asset-backed securities. Like him, many professors at leading institutions (Jesús Fernández-Villaverde[3] at the University of Pennsylvania and John Geanakoplos at Yale University, among others) were talking about this long before it happened. Furthermore, many people in the financial markets knew (or at least had serious suspicions about) what was coming. One just has to look at the yield curve around 2006 (even going all the way back to 2005) to see its abrupt decline about 2008, which means people back in 2005-2006 expected a recession to take place in two years time. That said, I tend to agree with Taleb's statements urging us to

[4] In a blog post called "Nada Es Gratis" ("Nothing Comes for Free") Fernández-Villaverde provides, in response to the critiques of the economic profession, a list of research papers that discussed a possible financial collapse like the one that actually happened. Many of those articles were written in 2002.

avoid unnecessary dependence on large-scale harmful predictions, which may be easier to see.

Taleb's most bitter critique is of modeling of risk and uncertainty using the Gaussian bell curve and similar methods (such as the Black-Merton-Scholes formula for asset pricing).[4] Taleb argues that "what can be mathematized [in financial markets and economics] is usually not Gaussian but Mandelbrotian," (page 128), after the great mathematician Benoit Mandelbrot, the father of fractal geometry. The author favors a Mandelbrotian treatment of risk and uncertainty and the use of empirical methods to observe data, based on the property that "the fractal has numerical or statistical measures that are (somewhat) preserved across scales, unlike the Gaussian" (page 260) Gaussian refers to all the inference methods based on statistical properties that can be modeled with a Gauss curve. Mandelbrotian relates to inference and risk measurement methods that use the mathematics of fractals. That is, mathematics that consider fat tails in the statistical distributions of many phenomena and other properties not related to the concentration of probability around a mean.—thus making it precisely the right tool to model scalability![5]

Another approach that meets with the author's approval is network theory. This research has many interesting aspects relating to the interconnectedness that subjects us to unexpected shocks coming from unexpected links or nodes. Authors such as Duncan Watts, Steven Strogatz, and Albert Barabasi have argued that there is concentration among a few nodes that serve as central connections.

[5] He considers this a mathematical tool well-suited for studying things in Mediocristan, but definitely not in Extremistan.

[6] In the 1960s Mandelbrot published a series of papers in economics and finance using fractal techniques. He showed that this approach fit the behaviors of prices better than the Gaussian. A representative article might be "The Variation of Certain Speculative Prices" (see reference list).

Perhaps the book's most interesting contribution is the idea of silent evidence, hidden risks, or (in my terms) endogenous scalability. I will illustrate it with an example. In 1987 three physicists named Per Bak, Chao Tang, and Kurt Weisenfeld at the Brookhaven National Laboratory in New York wrote a computer program that simulated the building of a huge sandpile by piling one sand grain atop another. When the pile gained considerable size, adding one more grain would start an avalanche, sometimes small, sometimes huge. Two features were particularly interesting: There was no typical average size of an avalanche, and at any time anything seemed to be possible. It seemed purely unpredictable—until they decided to make the software program color the pile according to its steepness and stability. Grains would range from green to red. They found that as the pile grew, there appeared ever more red grains clustered throughout the pile, until a grain falling on a red spot would, by domino effect, cause nearby red grains to slide down. If the red clusters were rather isolated the avalanche would be small, but if they were connected throughout the pile the whole mountain could collapse. It sounds a lot like the recent financial crisis to me!

Even though I agree with modeling the type of randomness that Taleb suggests, it must be said that, despite Taleb's critiques, the academic establishment has already addressed these issues. Some examples are the literature on sunspots and chaotic dynamics of economic systems, best known through the contributions of David Cass and Carl Shell. At least as important is the literature on incomplete financial markets, where issues such as avoiding Ponzi schemes with the use of collateral (Araujo, Páscoa, & Torres-Martínez, 2002) or how leverage may cause fat tails and clustered volatility (Geanakoplos, 2010) have been studied.[6] These are only a few references, part of a

[7] By the way, many of these use Arrow-Debreu type of models, which the author also undervalues.

larger and continuously developing literature that Taleb should have consulted before trying to rip apart the economics establishment (academic or non-academic).[7]

Even though *The Black Swan* can be considered a philosophical book about economics—and despite its being aimed at, and accessible to, a general audience—some knowledge on financial markets and statistics could help readers grasp its concepts in depth and extract the most from it. Possibly overcrowded with examples, anecdotes, and tangential stories that do not make it easy to separate the wheat from the chaff, *The Black Swan* is still full of interesting examples of the way our "rationality" works, with plenty of different ways to look at reality.

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[8] A different branch of the literature focuses on asset price bubbles and global games of regime change. Some representative contributions come from Markus Brunnermeier (Princeton), George-Marios Angeletos (MIT), and Christian Hellwig (UCLA).

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