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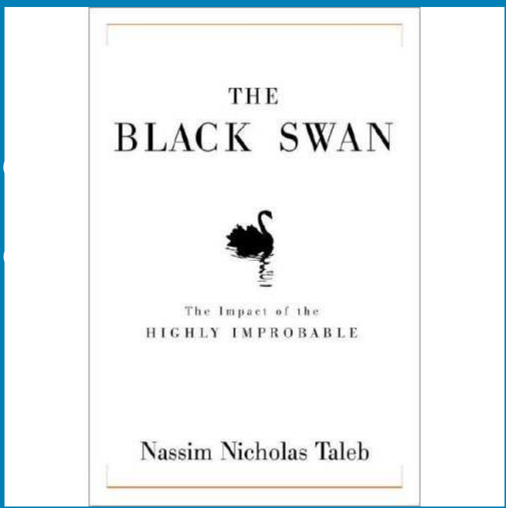

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Black Swans
And The Reinsurance Actuary

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Disclaimer

- Opinions expressed herein are, at best, presenters' opinions, and may not even be that
- Opinions expressed herein are **not** opinions of the CAS or the presenters' employers
- Use of Jargon:
  - Speak up
  - Ask for definition

Opening Remarks

- *" . . . We do know who society's winners will be: those who are prepared to face Black Swans, to be exposed to them, to recognize them when they show up and to rigorously exploit them."*

  Nassim Nicholas Taleb

- *"Look for what's missing . . . Few are able to see what isn't there."*

  Donald Rumsfeld

- *"It's tough to make predictions, especially about the future."*

  Yogi Berra

Thesis

- Black Swan events happen far more frequently than people predict. Under these circumstances, nice to have risk management is actually mission critical.

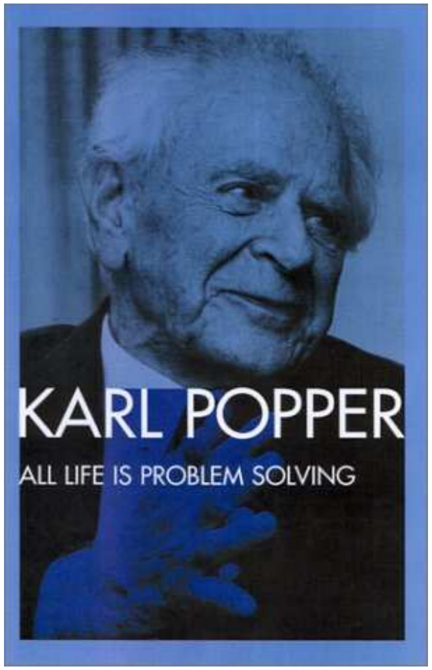
- "Every trader will tell you that every risk manager is a fraud. We never had any respect for the nerds."

  Nassim Taleb (NYT, March 10, 2009)

Black Swan Definition
via John Stuart Mill, Karl Popper

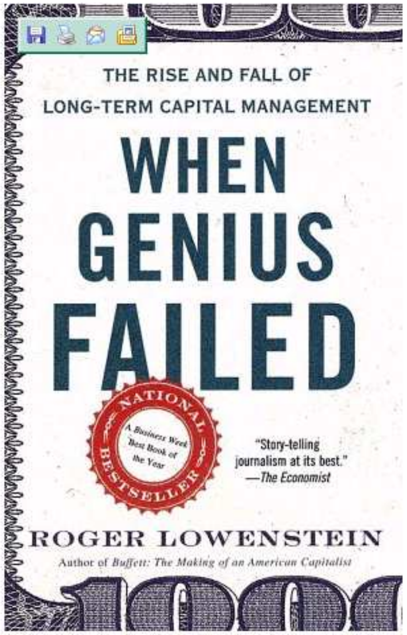
- Bird thought not to exist
  - Discovered, 1697, in Australia by Dutch explorer Willem de Vlamingh

- Black Swan via Karl Popper (1902-1994), philosopher
  - No amount of observations of white swans can allow the inference that all swans are white, but the observation of a single black swan is sufficient to refute that conclusion
  - Author, *All Life is Problem Solving*



Black Swan Definition
via Nassim Nicholas Taleb

- Black Swan via Nicholas Taleb (b.1960)
  - An event that is unexpected, has an extreme impact and is made to seem predictable by explanations concocted afterwards
    - 1987 – Oct stock market crash
    - 1992 – Latin American debt crisis
    - 1998 – LTCM collapse (Russian debt crisis)
    - 2000 – Tech bubble bursts
    - 2001 – Enron bankruptcy
    - 2007 – Subprime crisis
    - 2008 – Societe Generale trading loss
  - All handicapped, a priori, at over 1000:1



Black Swan Cliff Notes
Mediocristan vs Extremistan

- "Mediocristan"
  - For large samples, average converges to the middle
    - Bell-shaped curve/Gaussian
    - Average weights
  - Extreme event probability very low
  - Long-term observations provide information about probable outcomes
  - Impervious to the Black Swan
- "Extremistan"
  - Average outcomes have little meaning
    - Hurricanes: 1% chance of $100m loss, 99% chance of no loss
    - Power Law rules
    - Average wealth
  - Hard to predict from past observations
  - Financial markets like medicine in the 1800s
    - Hospital visit multiplies risk of death 4x
    - Flawed quant models exacerbate market swings
  - Vulnerable to the Black Swan

Black Swan Cliff Notes
Seduction of Mediocristan

- Seduction
  - Confirmation Bias
    - Tendency to reaffirm beliefs, not contradict them
  - Narrative Fallacy
    - Weakness for compelling stories
  - Silent Evidence
    - Failure to account for what we do not see
  - Ludic Fallacy
    - Willingness to oversimplify, take games/models too seriously
  - Epistemic Fallacy
    - Overestimate our knowledge, underestimate our ignorance
- Unfortunate Observations
  - "What is surprising is not the magnitude of our forecast errors, but our absence of awareness of it."
  - Unfortunate lesson: Better to be wrong than alone

Behavioral Economics
Black Swans - Failure

- "We were seeing things that were 25-standard deviation moves, several days in a row. There have been issues in some of the other quantitative spaces. But nothing like what we saw last week.
  - David Viniar, Goldman Sachs CFO, explaining 27% ytd drop in value of Goldman's flagship Global Alpha fund, quoted in Financial Times, August 13, 2007
  - Recipient, 2001 CFO Excellence Award for Risk Management

- ". . . someone ought to sneak into his office, sweep away the black feathers, and put a copy of Nassim Taleb's *Fooled by Randomness* on his desk chair. **If he and his Goldman quants don't recalibrate their understanding of black swans, the next few months are going to seem an awful lot like Hitchcock's *The Birds*.**
  - Seth Jayson, Motley Fool, August 15, 2007

- ". . . and remember, the next scream you hear may be your own!"

Behavioral Economics
Black Swans - Success

- Empirica Capital (Taleb hedge fund)
    - Never sells options, only buys them
    - Buys out of money options by the truckload
    - Lose small most days, wins huge occasionally
    - Inverted traditional psychology of investing
  - Result: Retired & best-selling author
  - Takeaway: Reinsurance is this put
    - The joyless prudence of the Sunday-school teacher

- J P Morgan
    - Criticized for earnings underperformance vs peers
    - Fort Knox balance sheet
  - Result: Fed support for $2/share Bear Stearns purchase, less than value of BSC midtown HQ building
  - Takeaway: Ready to prosper on transformational event

Behavioral Economics
KNOW YOUR BIAS

- Start with $300 and either:
  - a. Collect $100, or
  - b. Flip coin for $200 or $0 gain
  - – Most take (a)

- Start with $500 and either:
  - c. Give up $100, or
  - d. Flip coin for $200 or $0 loss.
  - – Most take (d)

- Notice (a) – (d) all have same expected value
- We are more willing to gamble when it comes to losses, but are risk averse when it comes to gains. That's why we like small daily winnings in the stock market, even if those entail the risk of losing everything in a crash.

Potential Sources of Surprises
In a Cat Portfolio

- Covered vs. modeled perils – how do you manage the gap?
  - Contracts with uncapped or very large limits: are there such places on this planet where is no cat aggregate potential?
  - Do you model terrorism exposure for property policies dominated by natural cat?
  - Which perils are covered in a worldwide all peril cover?
- Perils not covered by commercial cat models: Important to your firm?
  - US flood risk for commercial exposures
  - Flood and hail storms in Australia

Potential Sources of Surprises (cont.)
In a Cat Portfolio

- Wide confidence interval of risk measure
  - Model parameter uncertainty
  - Input data uncertainty
- The entire spectrum of risk: the portion not reflected in selected risk measures
  - If you use x-year PML or VaR, what is the implication of the extreme tail beyond x years, which can be magnified by model uncertainty?
  - If you use x-year TVaR, are the losses with return periods less than x unimportant? What about earnings volatility?

Potential Consequences of Surprises
In a Cat Portfolio

- Unexpectedly large aggregate (solvency risk)

- Surprisingly inadequate cat premium (pricing risk)

Q&A Lead-in

- *"Concentrate on consequences of Black Swans, which can be known, rather that the probability that they will occur, which can't."*

  Nassim Taleb, via The Economist book review

- *"I would not say that the future is necessarily less predictable than the past. I think the past was not predictable when it started."*

  Donald Rumsfeld

- *"Wise venturing is the most commendable part of human prudence."*

  Sir George Savile (1633-95), 1st Marquis of Halifax

Appendix A
Taleb's 10 Principles for a Black Swan-proof World

Taleb’s 10 Principles
Front Five

- What is fragile should break early while it is still small.
- No socialism of losses and privatization of gains.
- People who were driving a school bus blindfolded (and crashed it) should never be given a new bus.
- Do not let someone making “incentive” bonus manage a nuclear plant – or your financial risk.
- Counter-balance complexity with simplicity.

Source: Nassim Nicholas Taleb, Financial Times, April 8, 2009

Taleb's 10 Principles
Back Five

- Do not give children sticks of dynamite, even if they come with a warning.
- Only Ponzi schemes should depend on confidence. Governments should never need to "restore confidence."
- Do not give an addict more drugs if he has withdrawal pains.
- Citizens should not depend on financial assets or fallible "expert" advice for their retirement.
- Make an omelette with broken eggs [i.e., crisis cannot be fixed with makeshift repairs].

Source: Nassim Nicholas Taleb, Financial Times, April 8, 2009

Appendix B

Further Readings and References

Further Readings and References
(1 of 2)

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