

*NASSIM TALEB's 2007 best-seller on improbable events looks prescient to a Wall Street battered by subprime. Now even NASA wants to pick the former trader's brain for tips on randomness.*

# Flight of the Black Swan



By STEPHANIE BAKER-SAID

Photograph by BRAD TRENT



On a freezing day in March 2007, Nassim Taleb walked into a conference room at Morgan Stanley's Manhattan offices on 47th Street and Broadway to address a group of the firm's risk managers. His message: Your models don't work.

Using a whiteboard to scribble out his calculations, Taleb, now 48, began one of his rants, this time against stress tests—Wall Street lingo for examining how a market rout will play out. Stress tests are inherently

risky because they ignore rare but potentially devastating events, Taleb said.

"Past shortfall doesn't predict future shortfall," the options trader turned best-selling author recalls telling the assembled group of about 40. The risk managers, part of a tribe of mathematical model makers known in the finance world as quants, stared back at him blankly, and a debate ensued, according to people who were there.

Only six months later, Morgan Stanley experienced its own rout. The world's second-biggest mergers adviser announced in December that it had written down its subprime-related holdings by \$9.4 billion after the firm's traders misjudged how fast and far prices of the debt would fall. Their risk management had failed.

The Lebanese-born Taleb, a balding man who labels himself a philosopher of randomness, has an eerie knack for timing things right. His most recent book, *The Black Swan: The Impact of the Highly Improbable* (Random House), came out in May 2007, just months before the subprime fiasco rocked global markets and led banks to announce at least

\$188 billion worth of writedowns. The book's message offered something of a preview of the crisis: that we're all blind to rare events and routinely fool ourselves into believing we can predict risks and rewards.

Taleb argues that history is littered with high-impact rare events, known in quantspeak as *fat tails*, for their shape when plotted on a bell curve. He cites the Latin American debt crisis of 1982, the collapse of hedge fund firm Long-Term Capital Management LP in 1998 and the crash of the U.S. stock market in October 1987, to name a few.

As the founder and manager of New York-based Empirica LLC, a hedge fund firm he ran for six years until he closed it in 2004, Taleb built an investment strategy based on options trading. It was designed to bulletproof investors against blowups while profiting from rare events. His 20-year trading career has been marked by jackpots (like when he lucked out in trading options during the stock market crash of 1987) followed by long dry spells. "If you lose money on a steady basis and then make money in a lumpy way, people think you're crazy," he says.

While Taleb has stepped back from everyday trading, he remains an adviser to Santa Monica, California-based hedge fund firm Universa Investments LP. It opened its doors last year under the direction of Mark Spitznagel, 36, Taleb's former trading partner at Empirica. Universa has a so-called Black Swan Protection Protocol managed by Pallop Angsupun, a former Taleb student who's hedging

Taleb's literary success yielded a multimillion-dollar advance on the book he's now writing.



roughly \$1 billion of client investments against certain events that can cause market declines. The firm has another \$300 million pot betting on large positive jumps in individual stocks and is readying a similar, third fund several times that size, a person familiar with the funds says.

“Nassim and I share this genetic flaw,” says Spitznagel, a one-time Chicago pit trader who was a student of Taleb’s at New York University. “We’re not interested in the small frequent payouts. We want the infrequent huge payouts.”

**T**ALEB HAS GONE from being a leading Wall Street heretic—he rails against economists and quantitative model makers—to a mini institution whose appeal reaches well beyond the realm of finance. More than 370,000 copies of *The Black Swan* are in print in the U.S. and the U.K. It spent 17 weeks on the *New York Times* best-seller list and is being translated into 27 languages. It even outranks Alan Greenspan’s memoirs, *The Age of Turbulence: Adventures in a New World* (Penguin, 2007), among 2007 best-sellers on Amazon.com. The success of *The Black Swan* has led to a \$4 million advance for the English-language rights to a follow-up book, according to a person familiar with the deal. It’s tentatively titled *Tinkering* and will examine how to live in a world we don’t understand.

Taleb now charges more than \$60,000 for some of his lectures, according to the London Speaker Bureau, a firm that places business, political and motivational speakers. He warns audiences against believing worst-case scenarios and making so-called naked, or unhedged, bets on the future that could lead to disastrous losses.

The message of *The Black Swan*—whose title describes a bird once thought not to exist, until it was found in Australia in the 17th century—has penetrated Wall Street trading rooms, says Aaron Brown, a risk manager at Greenwich, Connecticut-based AQR Capital Management LLC, which manages about \$8.6 billion in hedge fund assets. “You can’t

## FAULTY PREMISES

The following are among the risk-management fallacies Taleb says can lead to errors.

### FALLACY OF ...



#### NARRATIVITY

People hedge for what “makes sense” even though things that happened in the past rarely made sense at the time.

#### SINGLE-EVENT PROBABILITY

It’s a severe error to look at a single probability of a single event, like asking “What is the probability of war?”



#### LOW VOLATILITY

People mistake low volatility for low risk. Banking is less volatile but vastly more dangerous than venture capital.

#### THE BLINDFOLDED

Most people take risks because they don’t know about them. It’s like crossing the street blindfolded.



#### STRESS TESTING

Stress testing is dangerous, as events not covered by the test will be ignored.

Source: Nassim Taleb

say you haven’t read it or you read it but you’re not going to do anything in response in a trading or risk management role,” says Brown, a former Morgan Stanley risk manager who calls Taleb a friend while disagreeing with him that banks’ risk models are useless.

Now everybody wants to talk about “black swans,” those highly improbable events that can cause havoc. The National Aeronautics and Space Administration’s Langley Research Center in Hampton, Virginia, has invited Taleb to talk about how to identify technology black swans as it prepares to send humans back to the moon and beyond. The U.S. Fire Administration, part of the Department of Homeland Security, wants him to address 200 executive fire officers to talk about the probability distribution of forest fires. He’s given talks about risk models for the U.S. Department of Defense, where he’s a member of the Highlands Forum, a Pentagon-sponsored study group on risk.

Taleb is no security expert nor does he claim any special knowledge of space technology. Instead, these groups want to hear him talk about how to apply his ideas on chance and decision making to their specific fields.

One day last December, Taleb stood before 30 top executives from Société Générale SA, France's second-biggest bank. The executives, including Chairman Daniel Bouton, had gathered at Prague's five-star Hotel Aria, where each room is dedicated to a famous musician, for a conference organized by Paris-based business school ESCP-EAP.

The proliferation of bank mergers has resulted in fewer banks and a greater concentration of risks, Taleb warned, according to a person who attended. The probability of a devastating banking loss has increased rather than decreased, he said. The response was muted, and attendees walked out with copies of *The Black Swan*, the person said.

About six weeks later, SocGen revealed the biggest trading loss in banking history, announcing that it had lost 4.9 billion euros (\$7.2 billion) and blaming 31-year-old trader Jerome Kerviel.



Taleb dismisses the bell curve averages of mathematics pioneer **Carl Friedrich Gauss**.

Taleb's fan club has grown far beyond the investment and research community. When Tampa, Florida-based Odyssey Marine Exploration Inc. discovered a colonial-era shipwreck in the Atlantic Ocean last May with 17 tons of gold and silver coins valued at some \$500 million, Greg Stemm, the company's co-founder, happened to be reading Taleb's book. Stemm decided to name the site "The Black Swan." Soon after, the two met for champagne in Los Angeles and bonded over the role of randomness in life.

Taleb has made enemies, too. In August, *The American Statistician*, the quarterly journal of the American Statistical Association, came out with a special *Black Swan* issue

that published a series of critical reviews alongside an article by Taleb. "He characterizes statisticians as people who blindly assume things, and nothing could be further from the truth," says Peter Westfall, the journal's editor and a professor of information systems and quantitative sciences at Texas Tech University in Lubbock.

Even his one-time colleagues disagree with him. Robert Engle, a Nobel laureate in economics who teaches at New York University's Stern School of Business in Manhattan, says Taleb's book ignores a mass of literature on rare events called extreme value theory, which is often used to assess risks in insurance as well as finance. "He's reflecting an opinion that financial markets are sort of out of control," Engle says. "I think a lot of mistakes are made, but I don't think he helps us understand the mistakes."

Taleb's book blends highbrow philosophical musings with quasi-self-help advice that appeals to our fascination with success and chance occurrences. While Stephen Covey's *The 7 Habits of Highly Effective People* (Simon & Schuster, 1990) purports to give everyone a road map on how to become the next Bill Gates, Taleb reminds us that skills and hard work aren't always enough. "Hard work plus luck is what gets you a jet instead of just a BMW," he says over duck at a dim sum restaurant in

London, where he's conducting research with a colleague.

It's much the same message he delivers in more-formal settings. One day last June, Taleb gets up in front of about 40 people at Miller's Academy, a West London lecture society, to talk about black swans. Surrounded by antiques and a fish tank stuffed with dead owls, he begins his trademark attack on Gaussian statistics, named after 19th-century German mathematician Carl Friedrich Gauss, who charted probabilities on a bell-shaped curve. In a bell curve, high-frequency events are represented at the top, or middle, and infrequent episodes are charted on the edge, or tail, of the curve. The tail is usually thin, reflecting rare, low-impact events.

Gaussian statistics might work in casinos, but it can't accurately help calculate stock market valuations, Taleb argues. "With stocks, we don't know if we're overpaying," he tells the audience.

"No self-respecting statistician in finance is using Gaussian statistics," interjects Lord John Eatwell, an economist and president of Queens' College at Cambridge University, who's sitting in the back. "All models are Bayesian," he says, referring to the theory derived from 18th-century British mathematician Thomas Bayes that allows for data to be constantly added to calculate probabilities.

**T**ALEB SHOOTS back: "Bayesian is necessary but not sufficient."

Taleb, who sports a salt-and-pepper goatee and mustache and a €60 black Swatch watch, is often quick to take offense. At a conference in Italy, a group of students told him he looked like Umberto Eco, the somewhat paunchy Italian philosopher and author of the novel *The Name of the Rose*. Taleb says he promptly went on a diet.

For more than a decade, Taleb has been trying to transform himself from trader to philosopher. "By the age of 30, I was emotionally outside the world of finance," he says.

Surrounded by a collection of ancient



Hedge fund manager **Mark Spitznagel** says he and Taleb aim for 'infrequent huge payouts.'

sculpted Roman heads, Orthodox Christian icons and thousands of volumes spread throughout his suburban home north of Manhattan, Taleb has churned out a series of technical papers and books. His first mainstream book, *Fooled by Randomness: The Hidden Role of Chance in Life and in the Markets* (W.W. Norton, 2001), which has 160,000 paperbacks in print in the U.S., was translated into 20 languages and turned him into a guru in some finance circles.

Taleb has learned about uncertainty firsthand. Born into a prominent Greek Orthodox Christian family, he says he witnessed Lebanon's transformation from heaven to hell when civil war erupted in 1975. At the time, he was a 15-year-old student at Beirut's Grand Lycée Franco-Libanais, an elite French-speaking school that was damaged during the war. He listened to adults tell him that the conflict would soon end, only to watch it drag on for almost 17 years. His family's home in Amioun, in northern Lebanon, was destroyed in 1982, when his grandfather, former Deputy Prime Minister Fouad Ghosn, was a member of parliament.

Taleb left Lebanon to attend the University of Paris and then got his Master of Business Administration in 1983 from the Wharton School at

options trader. On Sept. 22, 1985, France, Germany, Japan, the U.K. and the U.S. signed the Plaza Accord, an agreement to push down the value of the dollar to shore up the U.S. current account deficit. Taleb was sitting on currency options—which give investors the right to buy or sell a currency at a specified exchange rate—that had cost him pennies. The options exploded in value that day. "I had no clue what had happened to me," he recalls. "We were lucky. We made a lot of money but by accident."

A French colleague, Jean-Manuel Rozan, later wrote about the episode in a memoir disguised as a novel called *Le Fric*, or *Cash* (Michel Lafon, 1999), in which he named Taleb and called him the Bobby Fischer of options, referring to the legendary chess player.

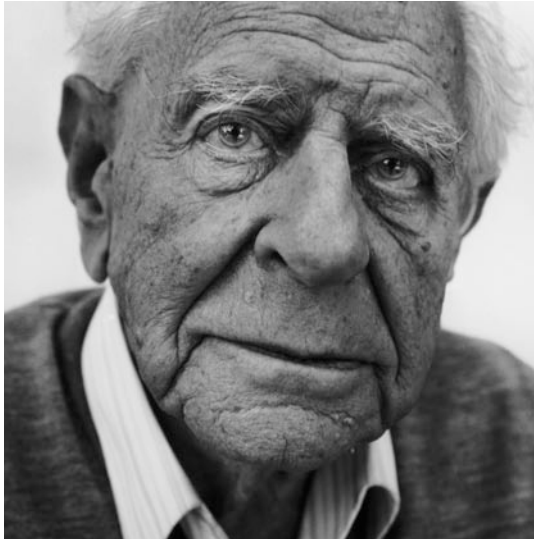
After this fluke, Taleb says he became obsessed with buying out-of-the-money options—puts and calls whose strike price is either lower or higher than the market price of the underlying security. An agreement to sell is a put option; an agreement to buy is a call option.

A typical trade might work like this: Microsoft Corp. is trading at \$35. Taleb would buy a put option, agreeing to sell another investor the stock at a strike price of, say, \$25 in the next three months. He's betting the stock will fall much more than it has done historically, making the option cheap to buy. If the stock fell further, to

**'I had no clue what had happened to me,'**  
Taleb says of **his big score in**  
**currency options** arising from  
the 1985 Plaza Accord. **'We were lucky.'**

the University of Pennsylvania, where he says he fell in love with options. An options contract allows but doesn't oblige an investor to buy or sell a security or index at an agreed price at some future date.

Two years later, he got his first lesson in financial uncertainty. After a brief stint as a trainee at Bankers Trust Corp., Taleb joined French bank Indosuez, now part of Crédit Agricole SA, as a currency



Philosopher **Karl Popper**, a Taleb hero, said trying to prove a theory false is the best test.

\$20, he would exercise the option and force the investor to buy at \$25, pocketing the difference. If the stock doesn't fall, the option expires and Taleb has lost only the pennies he paid for it.

In 1986, Taleb moved to First Boston Inc. (now part of Credit Suisse Group), where fellow traders called him "Nassim the Dream," recalls Demetrios Diakolios, a former colleague. At First Boston, Taleb, then 28, built what he terms a "massive" position in out-of-the-money calls on Eurodollar futures.

On Oct. 19, 1987, he was sitting at a row of desks on First Boston's trading floor at Park Avenue Plaza in Manhattan when his dream came true. The Dow Jones Industrial Average plummeted 22.6 percent in the biggest one-day drop in U.S. stock market history. The crash caused Eurodollar futures to surge after the U.S. Federal Reserve pumped liquidity into the banking system, lowering interbank borrowing rates. Taleb's positions exploded once again. "We all knew that he did well, that he cleaned up on that and made \$35 million–\$40 million," Diakolios says of the sum the bank made on Taleb's positions. "The equities guys below us thought, 'Why did some guy upstairs make all this money on a day when everybody got killed?'"

The payday for Taleb was big. Without divulging the amount, he says 97 percent of the money he's ever made was on Black Monday in 1987. "There are concentrated pockets of luck," he says. After a few

**'Our aim was not to make money,' Taleb says, explaining his first hedge fund's effort to protect against plunges. 'I make no claims of being able to beat markets.'**

months of volatile trading, the market calmed down, and Taleb grew bored. In 1991, he moved to Union Bank of Switzerland, now UBS AG, as chief options trader. He lasted less than a year; he says endless meetings annoyed him.

In 1992, Taleb turned his back on Wall Street. He moved to Chicago to become a pit trader and market maker at the Chicago Mercantile Exchange. In the pit, he saw how options are priced in real markets rather than from mathematical models. At the time, he was working on his Ph.D. in option pricing at the University of Paris Dauphine (which he completed in 1998) and writing his first book, *Dynamic Hedging: Managing Vanilla and Exotic Options* (Wiley, 1997). After two years, Taleb moved back to New York, where he worked at CIBC-Wood Gundy, a unit of Toronto-based Canadian Imperial Bank of Commerce, as global head of financial option arbitrage and then at Paris-based BNP Paribas SA,

France's biggest bank, as an options trader.

In the mid-1990s, when he was still in his 30s, Taleb found out that the scratchy voice he'd attributed to too much shouting in the pit had a more ominous cause. He had throat cancer. The disease tends to strike smokers over 50. Taleb wasn't a smoker except for the odd Friday when he would light up a pipe after a good trading week. After two years of radiation treatment, the cancer disappeared. Yet the effects linger, and Taleb says he remains paranoid that this particular black swan will resurface.

**T**ALEB'S FOLLOWING GREW in 1999 when he began teaching an evening graduate course at New York University. His class on model failure in quantitative finance attracted like-minded students, including Spitznagel. After the course wrapped up in the evening, Taleb would go to the Odeon cafe in Manhattan's TriBeCa neighborhood for drinks with students and Wall Street quants to talk about everything from pricing options to the failures of value-at-risk models, which banks use daily to decide how much to wager in the markets. "It became an unofficial meeting place for people interested in quantitative finance and trading," recalls AQR's Brown, author of *The Poker Face of Wall Street* (Wiley, 2006).

Taleb quit BNP Paribas in 1999 and set up Empirica in Greenwich, Connecticut, bringing Spitznagel with him. Empirica wasn't like most hedge funds. The Russian financial crisis and the collapse of Long-Term Capital Management after \$4 billion in losses had spooked many investors. Taleb began offering hedge fund clients protection against a blowup like LTCM by offsetting some of their trades with options.

Empirica ended up acting like a super-broker or clearinghouse for buying out-of-the-money options. After spending millions on computer systems and giving their software programs code names like Igor, Taleb and Spitznagel would download 600,000 option prices every night

and produce bids on 30–40 big blocks, getting them cheap by buying in bulk, Taleb says. The goal was to protect investors against market crashes. Knowing how much they would pay for options, the two guaranteed investors they wouldn't lose more than 13 percent a year. "Our aim was not to make money," Taleb says. "I make no claims of being able to beat markets."

Empirica did outperform the market. In 2000, its returns rose by about 60 percent on the back of high volatility and the bursting of the dot-com bubble, Taleb says. The next year, after the Sept. 11 terrorist attacks, nervous investors came flocking. Then volatility dropped as the stock market slowly drifted down, removing the opportunities to profit from wide market swings. In 2002, Empirica posted its worst year as returns fell about 12 percent, Taleb says, while the Dow Jones Industrial Average dropped 17 percent.

"I knew he was likely to lose money most of the time because it was kind of an insurance," says Jean Karoubi, an Empirica investor and chief executive officer of LongChamp Group Inc., the New York-based hedge fund unit of

Silvercrest Asset Management Group LLC, which manages about \$10 billion.

Taleb and Spitznagel moved Empirica to midtown Manhattan in 2003 and changed tack for some clients. To profit from low volatility, they began selling at-the-money options—those close to the market price of the underlying security. In '03 and '04, Empirica posted small positive returns, Taleb says. Eager to focus on writing *The Black Swan* and still afraid, he says, that his cancer might return, Taleb shuttered Empirica in 2004 and returned about \$380 million to investors. "I was fed up," he says. "I just wanted to write, and I had writer's block."

*The Black Swan* was itself a black swan—an unexpected hit. The book swings from advice on how to distinguish between positive and negative black swans in everyday life to ruminations on Taleb's hero, Karl Popper, the Austrian-born 20th-century philosopher who argued that scientific theories should be tested not through attempts to verify them but through efforts to prove them false. "If you are in banking and lending, surprise outcomes are likely to be negative for you," Taleb writes. "Put yourself in situations where favorable consequences are much larger than unfavorable ones."

He adds little tips such as: "Go to parties! If you're a scientist, you will chance upon a remark that might spark new research."

Taleb has a foot in academia. He's now a visiting professor at the London Business School, where he's conducting experiments with Dan Goldstein, an assistant professor of marketing, on the psychology of risk and decision making. Taleb wants hard proof that people misjudge risks. In one pilot experiment, they posed the following question to participants: "You're on vacation in a foreign country and are considering flying the national airline to see a special island you have always wondered about. Safety statistics in this country show that if you flew this airline once a year, there would be one crash every 1,000 years on average. If you don't take the trip, it is extremely unlikely you'll revisit this part

Born in Lebanon, Taleb collects Orthodox Christian icons and sculpted Roman heads.



of the world again. Would you take the flight?" Everyone answered yes, assuming that one crash every 1,000 years was a minimal risk.

Another group was given the same problem except they were told that an average of 1 in 1,000 flights on this airline crashes. Although it's the same risk mathematically, 30 percent refused to fly when presented with this wording. "This one-in-every-X-years framing is something you hear

## Taleb offers tips to make randomness work in your favor: 'Go to parties! If you're a scientist, you will chance upon a remark that might spark new research.'

concerning market crashes in financial reports on TV," says Goldstein, 38, who holds a Ph.D. in psychology.

Extremes are more likely in finance than in the real world, Taleb says. At a conference for risk managers in London last June, he used the following illustration: "Say I sample from the world population and find two people cumulatively 14 feet tall. What's the most likely allocation for Gaussian? One and 13? No, it's seven and seven."

In wealth, it's the opposite. "If we sample from the world population and get two people whose net worth totals 14 million pounds, what's the most likely combination?" he asked. "Seven and seven? No, it's £5,000 and £14 million minus £5,000."

He gives these two domains different names. The first he calls

Mediocristan, where, if you have a large sample, the average of an independent, identical, random set of variables will converge in the middle. In Taleb's other domain, Extremistan, average outcomes have little meaning. If financial markets are governed by extreme movements and unexpected events, we shouldn't be fooled into believing worst-case scenarios, he says. "We need more chutzpah," he says. "If someone tried to do stress testing before the stock market crash in '87, they would not have tested for 20 percent down."

Taleb likens modern-day financial markets to medicine in the 1800s, when going to a hospital in London or Paris multiplied your risk of death by four times, he says. Similarly, quants increase risk by deploying flawed financial tools designed to reduce it, he argues.

For Taleb, the ills besetting financial markets are a vindication of his ideas. Like medicine, though, he isn't offering easy cures. **B**

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## Tracking a Put Option

At the end of 2007, you could have bought a put option on Apple Inc. stock with a strike price of \$120 for just 59 cents. Shares of the iPhone maker traded at \$198 on Dec. 31, and the prospects of a 40 percent drop—at least judging by historical performance—were remote. (Put options grant the right but not the obligation to sell the underlying stock at a set price on or before expiration.)

You can use the Historical Return Histogram (HRH)

function to chart the daily returns of Apple stock. For returns during the previous two years, type `AAPL US <Equity> HRH <Go>`, tab in to the RANGE fields, enter `01/03/06` and `12/31/07` and press `<Go>`. During that period, Apple stock never fell more than 7.4 percent in a day. To compare the distribution of returns early this year, tab in to the RANGE fields again, enter `01/03/08` and `03/07/08` and press `<Go>`.

Apple's drop of almost 11 percent on Jan. 23 falls outside the normal distribution, as shown at left.

You can use the Option Monitor (OMON) function to display price, volume and open interest data for Apple options. Type `OMON <Go>` and click on the Expiry button on the red tool bar to select an expiration month. To graph the \$120 puts that expire in April, type `QAA+PD US <Equity> GP <Go>`. As of March 7, they traded at \$6.60, an 11-fold gain.

**MARYANN BUSSO**

