

Systemic Risk: Is it Black Swans or Market Innovations?

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Whatever you think you know about the distribution changes the distribution."

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In this week's issue of The IRA, our friend and colleague Richard Alford, a former Fed of New York economist, and IRA founders Dennis Santiago and Chris Whalen, ask us whether we really see Black Swans in market crisis or our own expectations. Of note, we will release our preliminary Q2 Banking Stress Index ratings on Monday, August 24, 2009. As with Q1, these figures represent about 90% of all FDIC insured depositories, but exclude the largest money center banks (aka the "Stress Test Nineteen"), thus providing a look at the state of the regional and community banks as of the quarter ended June 30, 2009. [Click here](#) to register for The Institutional Risk Analyst.

Many popular explanations of recent financial crises cite "Black Swan" events; extreme, unexpected, "surprise" price movements, as the causes of the calamity. However, in looking at our crisis wracked markets, we might consider that the Black Swan hypothesis doesn't fit the facts as well an alternative explanation: namely that the speculative outburst of financial innovation and the artificially low, short-run interest rate environment pursued by the Federal Open Market Committee, combined to change the underlying distribution of potential price changes. This shift in the composition of the distribution made likely outcomes that previously seemed impossible or remote. This shift in possible outcomes, in turn, generated surprise in the markets and arguably led to the emergence of "systemic risk" as a metaphor to explain these apparent "anomalies."

But were the failures of Bear Stearns, Lehman Brothers, Washington Mutual or the other "rare" events really anomalous? Or are we just making excuses for our collective failure to identify and manage risk?

The choice of which hypothesis to ultimately accept in developing the narrative description of the causation of the financial crisis has strategic implications for understanding as well as reducing the likelihood of future crisis, including the effect on the safety and soundness of financial institutions. To us, the hard work is not trying to specifically limit the range of possibilities with artificial assumptions, but to model risk when you must assume as a hard rule, like the rules which govern the physical sciences, that the event distribution is in constant flux.

If we as financial and risk professional are serious in claims to model risk proactively, then change, not static assumptions, must be the rule in terms of the possible outcomes. Or "paranoid and nimble" in practical terms. After all, these modeling exercises ultimately inform and support risk assumptions for decisions that are used in value-at-risk (VaR) assessments for investors and for capital adequacy benchmarking for financial institutions.

Even before the arrival of Benoit Mandelbrot in the 1960s, researchers had observed that distributions of price changes in various markets were not normally distributed. The observed distributions of price changes had fatter tails than the normal distribution. Nassim Nicolas Taleb, author of *The Black Swan* and *Fooled by Randomness*, and others have dubbed significantly larger extreme price moves than those predicted by a normal distribution as "Black Swans." Indeed, Taleb and others have linked Black Swan price change events to the recent financial crisis, suggesting in effect that we all collectively misunderstood on which side of the distribution of possible risk outcomes we stood.

The argument is as follows: Current risk management and derivative pricing regimes are based upon normal distributions. Price movements in the recent financial crises were unpredictable/low probability events that were also greater than predicted by normal distribution models. Hence our collective failure to anticipate Black Swan events is "responsible" for the recent crises as mis-specified risk management models failed due to fatter than normal tails.

The alternative explanation, however, links the extreme price movements not to aberrations with respect to a stable, observable mean, but instead to the activation of alternate table means as a result of jumping discontinuously through tipping points -- much in the same way particles jump quantum levels in energy states when subjected to cumulative effects of energy being added to or removed from their environments. These tipping points are as predictable as the annual migrations of ducks. Swans, alas, rarely migrate, preferring to stay in their summer feeding grounds until the water freezes, then move only far enough to find open water. Sound familiar?

Force feed a system with enough creative energy via permissive public policies and the resulting herd behaviors, and the system will change to align around these new norms, thereby erasing the advantages of the innovators and creating unforeseen hazards. "Advances" such as OTC derivatives and complex structured assets, and very accommodating Fed interest rate policy, resulted in unprecedented leverage and maturity mismatches by institutions and in markets that are the perfect quantum fuel to brew such change.

While the exact timing of each tipping point and magnitude of the crises remains somewhat inexact, the waves of change and the ultimate crisis borne shift are broadly predictable. The probabilities attached to extreme price moves are calculable as the cost of deleveraging an accumulation of innovation risk that must be shed as the system realigns. The "Black Swan" approach assumes a stable distribution of price changes with fatter than "normal" tails. The alternative posits that the distribution of possible price changes was altered by innovation and the low cost of leverage. It also posits that the new distributions allowed, indeed require, more extreme price movements. Two examples will illustrate the alternative hypothesis.

Once upon a time, the convertible bond market was relatively quiet. The buy side was dominated by real money (unleveraged) players who sought the safety of bonds, but were willing to give up some return for some upside risk (the embedded equity call option).

More recently the market has been dominated by leveraged hedge funds doing convertible bond arbitrage. They bought the bonds, hedging away the various risks. In response to the advent of the arbitrageurs, the

spread between otherwise similar conventional and convertible bonds moved to more accurately reflect the value of the embedded option and became less volatile.

When the financial crises hit, however, arbitrageurs were forced to liquidate their positions as losses mounted and it became difficult to fund the leveraged positions. Prices for convertible bonds declined and for a period were below prices for similar conventional bonds -- something that had been both unheard of and considered impossible as the value of an option cannot be negative.

Was this a Black Swan type event, or had the market for convertible bonds and the underlying distribution of price changes, been altered? The mean spread between otherwise similar conventional and convertible bonds had changed. The volatility of the spread had changed. Forced sales and the public perception of possible future forced sales generated unprecedented behavior of the heretofore stable spread. The emergence and then dominance of leveraged arbitrage positions altered the market in fundamental ways. What had not been possible had become possible.

Now consider bank exposures to commercial real estate. Numerous financial institutions, hedge funds (e.g. at Bear Stearns), sellers of CDS protection (e.g. AIG) and banks (many of them foreign as reflected in the Fed swap lines with foreign central banks) suffered grievous losses when the real estate bubble popped. Much of these losses remain as yet unrealized.

As investors and regulators demanded asset-write downs and loss realization, many of these institution expressed dismay. They had stressed tested their portfolios, the large banks complained, often with the support of regulators. The large banks thought their geographically diversified portfolios of MBSs immunize them from falls in real estate prices as the US had experienced regional, but never (except for the 1930s) nationwide declines in housing prices. These sophisticated banks incorporated that assumption into their stress test even as they and the securitization process were nationalizing - that is, changing -- the previously regional and local mortgage markets.

Was the nationwide decline in housing prices an unpredictable Black Swan event or the foreseeable result of lower lending standards, a supportive interest rate environment, and financial innovation the led to the temporary nationalization of the mortgage market? Risk management regimes failed and banks have been left with unrealized losses that still threaten the solvency of the entire system in Q3 2009.

However, useful or necessary "normal" statistical measures such as VaR might be, it will not be sufficient to insulate institutions or the system from risk arising from rapidly evolving market structures and practices. Furthermore, insofar as models such as VaR, which are now enshrined in the bank regulatory matrix via Basel II, were the binding constraint on risk taking, it acted perversely, allowing ever greater leverage as leveraged trading acted to reduce measured volatility! Remember, the convertible bond market at first looked placid as a lake as leverage grew - but then imploded in a way few thought possible. Is this a Black Swan event or a failure of the stated objectives of risk management and prudential oversight?

We all know that risk management systems based solely on analysis of past price moves will at some point fall if financial markets continue to change. The problem with current risk management systems cannot be fixed by fiddling with VaR or other statical models. Risk management regimes must

incorporate judgments about the evolution of the underlying markets, distribution of possible price changes and other dynamic sources of risk.

Indeed, as we discussed last week ("[Are You Ready for the Next Bank Stress Tests](#)"), this is precisely why IRA employs quarterly surveys of bank stress tests to benchmark the US banking industry. Think of the banking industry as a school of fish, moving in generally the same direction, but not uniformly or even consistently. There is enormous variation in the past of each member of the school, even though from a distance the group seems to move in unison.

Stepping back from the narrow confines of finance for a moment, consider that the most dramatic changes in the world are arguably attributable to asymmetric confluences of energy changing the direction of human history. It's happened over and over again. The danger has and always will be the immutable law of unintended consequences, which always comes back to bite the arrogant few who believe they can control the future outcome. And it is always the many of us who pay the price for these reckless leaps of faith.

If the recent financial crises were truly highly infrequent random events, then any set of policies that can continuously prevent their reoccurrence seemingly will be very expensive in terms of idle capital and presumably less efficient markets required to avoid them. If, on the other hand, the crisis was the result of financial innovation and the ability to get leveraged cheaply, then society need not continuously bare all the costs associated with preventing market events like the bursting of asset bubbles.

Policymaker would like everyone to believe that the recent crises were random unpredictable Black Swan events. How can they be blamed for failing to anticipate a low probability, random, and unpredictable event? If on the other hand, the crises had observable antecedents, e.g. increased use of leverage, maturity mismatches, near zero default rates, and spikes in housing price to rental rates and housing price to income ratios, then one must ask: why policymakers did not connect the dots, attach significant higher than normal probabilities to the occurrence of severe financial disturbances, and fashion policies accordingly? Ultimately, that is a question that Ben Bernanke and the rest of the federal financial regulatory community still have yet to answer.

Questions? Comments? <mailto:info@institutionalriskanalytics.com>

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