Statement by Christopher Whalen
House Committee on Science & Technology
Subcommittee on Investigations and Oversight
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Chairman Miller, Congressman Broun, members of the Committee, my name is Christopher Whalen and I live in the State of New York. I work in the financial community as an analyst and a principal of a firm that rates the performance of commercial banks. [1] Thank you for inviting my comments today on this important subject.

The Committee has asked witnesses to comment on the topic of "The Risks of Financial Modeling: VaR and the Economic Meltdown." The comments below reflect my own views, as well as comments from my colleague and business partner Dennis Santiago, and others in the financial and risk management community.

By way of background, our firm provides ratings for assessing the financial condition of US banks and commercial companies. We build the analytical tools that we use to support these rating activities and produce reports for thousands of consumer and professional users.

We use mathematical tools such as models to explore the current financial behavior of a given subject. In the course of our work, we use these tools to make estimates, for example, as to the maximum probable loss in a bank's loan portfolio through an economic cycle or the required Economic Capital

[1] Mr. Whalen is a co-founder of Institutional Risk Analytics, a Los Angeles unit of Lord, Whalen LLC that publishes risk ratings and provides customized financial analysis and valuation tools.

for a financial institution. Models help us understand and illustrate how the financial condition of a bank or other obligor have changed and possibly will change in the future.

But in all that we at Institutional Risk Analytics do in the world of ratings and financial analysis, we do our best to separate objective measures based upon empirical observations, and subjective analyses that employ speculative assumptions and directives which are often inserted into the very ground rules for the analysis process itself. The difference between subjectivity and objectivity in finance has significant implications for national policy when it comes to financial markets and institutions.

I strongly suggest to the Committee that they bear the distinction between objective and subjective measures in mind when discussing the use of models in finance. Obtaining a better understanding of the role of inserting subjectivity into models is critical for distinguishing between useful deployments of modeling to manage risk and situations where models are the primary failure pathway towards creating systemic risk and thus affect economic stability and public policy.

Used as both a noun and a verb, the word “model” has become the symbol for the latest financial crisis because of the use, or more precisely, the misuse of such simulations to price unregistered, illiquid securities such as subprime mortgage backed securities and derivatives of such securities. The anecdotal cases where errant models have led to mischief are many and are not limited to the world of finance alone.

The Trouble with Models

The problem is not with models themselves. The trouble happens when they are (a) improperly constructed and then (b) deliberately misapplied by individuals working in the financial markets.

In the physical sciences, models can be very usefully employed to help analysts understand complex systems such as disease, buildings and aircraft. These models tend to use observable data as inputs, can be scientifically validated and are codified in a manner that is transparent to all involved in the process. Models used in the physical world share one thing in common that financial models do not: they are connected to and are confirmed or refuted by the physical world they describe.

Financial models, on the other hand, are all intellectual abstractions designed to manipulate arbitrarily chosen, human invented concepts. The chief reason for this digression from the objective use of models observed in the physical sciences is the injection of economics into the world of finance. Whereas financial models were once merely arithmetic expressions of expected cash flows, today in the world of financial economics, models have become vehicles for rampant speculation and outright fraud.[2]

In the world of finance, modeling has been an important part of the decision making toolkit of executives and analysts for centuries, helping them to understand the various components in a company or a market and thereby

[2] See "New Hope for Financial Economics: Interview with Bill Janeway," *The Institutional Risk Analyst*, November 17, 2008

adjust to take advantage of the circumstances. These decision analysis models seek to measure and report on key indicators of *actual performance* and confirm the position of the entity with respect to its' competitive environment. For instance, the arithmetic calculation of cash flows adheres to the scientific method of structures and dynamics, and is the foundation of modern finance as embodied by the great theorists such as Benjamin Graham and David Dodd.

At our firm, we employ a "measure and report" model called The IRA Bank Monitor to survey and stress test all FDIC insured banks each quarter. By benchmarking the performance of banks with a consistent set of tests, we are able to not only characterize the relative safety and soundness of each institution, but can drawn reasonable inferences about the bank's future performance.

But when the world of finance marries the world of outcome driven economics – the world of "what if" and "I want" – models cease to be mechanistic tools for validating current outcomes with hard data and assessing a reasonable range of possible future events. Instead models become enablers for speculation, for the use of skillful canards and legal subterfuge that ultimately cheat investors and cause hundreds of billions of dollars in losses to private investors and insured depository institutions.

Take the world of mortgage backed securities or MBS. For decades the investment community had been using relatively simple models to predict the cash flow of MBS in various interest rate scenarios. These predictions have been relatively simple and are validated against the monthly mortgage

servicer data available to the analyst community. The MBS securitization process was simple as well. A bank would sell conforming loans to GNMA and FNMA, and sell inferior collateral to a handful of investment banks on Wall Street to turn in the loans into private MBS issues.

At the beginning of the 1990's, however, Wall Street's private MBS secret sauce escaped. A firm named Drexel, Burnham, Lambert went bankrupt and the bankruptcy court sold copies of Drexel's structured finance software to anyone and everyone. It eventually wound up in the hands of the mortgage issuers themselves. These banks and non-banks naturally began to issue private MBS by themselves and discovered they could use the mathematics of modeling to grow their mortgage conduit businesses into massive cash flow machines. When brought to market, these private MBS were frequently under-collateralized and could therefore be described as a fraud.

Wall Street, in turn, created even more complex modeling systems to squeeze even more profits from the original MBS template. The expanding bubble of financial innovation caught the eye of policy makers in the Congress, who then created political models envisioning the possibility that "innovation" could be used to make housing accessible to more Americans.

Spurred on to chase the "policy outcome" of affordable housing, an entire range of deliberately opaque and highly leveraged financial instruments were born with the full support of Washington, the GSEs and the Congress. Their purpose now was to use the alchemy of financial modeling to create the appearance of mathematical safety out of dangerous toxic ingredients. Wall Street firms paid the major rating agencies to award "AAA" ratings to

derivative assets that were ultimately based on subprime mortgage debt. And the stage was set for a future economic disaster.

In the case of subprime toxic waste, the models became so complex that all transparency was lost. The dealers of unregulated, unregistered complex structured assets used proprietary models to price and sell deals, but since the "underlying" for these derivative securities was invisible, none of the investment or independent ratings community could model the security. There was no validation, no market discipline. Buy Side customers were dependent upon the dealer who sold them the toxic waste for valuation. The dealers that controlled the model often time would not even make a market in the security.

Clearly we have now many examples where a model or the pretense of a model was used as a vehicle for creating risk and hiding it. More important, however, is the role of financial models for creating opportunities for deliberate acts of securities fraud. These acts of fraud have caused hundreds of billions of dollars in losses to depository institutions and investors.

Whether you talk about toxic mortgage assets or credit default swaps, the one common element that the misuse of models seems to contain is a lack of a visible underlying market against which to judge or "mark" the model. Indeed, the use of models in a subjective context seems to include the simulation of a nonexistent market as the primary role for the financial model.

In single-name credit default swaps or "CDS" for example, there is often insufficient trading in the supposed underlying corporate debt security to provide true price discovery. In the case of CDS on complex structured assets, there is no underlying market to observe at all. The subjective model becomes the market in terms of pricing the security.

In the spring of 2007, however, the fantasy land consensus that allowed people to believe that a model is a market came undone. We have been dealing with the consequences of the decisions that originally built the house of cards since that time.

An Objective Basis for Finance and Regulation

The term "model" as it applies to finance can be a simulation of reality in terms of predicting future financial outcomes. The author Nassim Taleb, who is appearing at this hearing, says the term "VaR" or value at risk describes a statistical estimate of "the expected maximum loss (or worst loss) over a target horizon within a given confidence interval." [3]

VaR models and similar statistical methods pretend to estimate the largest possible loss that an investor might experience over a given period of time to a given degree of certainty. The use of VaR type models, including the version imbedded in the Basel II agreement, involves a number of assumptions about risk and outcomes that are speculative. More important, the widespread use of these statistical models for risk management suggest

[3] See Taleb, Nassim, "Against Value-at-Risk: Nassim Taleb Replies to Philippe Jorion," 1997.

that financial institutions are subject to occasional “Black Swans” in the form of risk events that cannot be anticipated.

We take a different view. We don’t actually believe there is such a thing a a “Black Swan.” Our observations tell us that a more likely explanation is that leaders in finance and politics simply made the mistake of, again, believing in what were in fact flawed models and blinded themselves to what should have been plainly calculable innovation risks destined to be unsustainable. Or worse, our leaders in Washington and on Wall Street decided to be short sighted and not care about the inevitable debacle.

We suggest that going forward our national interest needs to demand a higher standard of tangible proof from “outcome designers” of public policies. If financial markets and the models used to describe them are limited to those instruments that can be verified objectively, then we no longer need to fear from the ravages of Black Swans or systemic risk. The source of systemic risk in the financial markets is fear born from the complexity of opaque securities for which there is no underlying basis. The pretext for issuing these ersatz securities depends on subjectivity injected into a flawed model.

If we accept that the sudden change in market conditions or the “Black Swan” event that Taleb and other theorists have so elegantly described arises from a breakdown in prudential regulation and basic common sense, and not from some unknowable market mechanism, then we no longer need to fear surprises or systemic risk. We need to simply ensure that all of the financial instruments in our marketplace have an objective basis, including a visible,

cash basis market that is visible to all market participants. If investors cannot price a security without reference to subjective models, then the security should be banned from the US markets as a matter of law and regulation. To do otherwise is to adopt deception as the public policy goal of the US when it comes to financial markets regulation.

As Graham and Dodd wrote nearly a century ago, the more speculative the inputs the less the analysis matters. Models only have real value to society when their workings are disciplined by the real world. When investors, legislators and regulators all mistook models for markets, and even accepted such speculations as a basis for regulating banks and governing over-the-counter or OTC markets for all types of securities, we as a nation were gambling with our patrimony. If the Committee and the Congress want to bring an end to the financial crisis, we must demand higher standards from our citizens who work in and regulate our financial markets

As we discussed in a commentary last month, “Systemic Risk: Is it Black Swans or Market Innovations?,” published in *The Institutional Risk Analyst*, “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? A copy of our commentary follows this testimony. I look forward to your questions.

Systemic Risk: Is it Black Swans or Market Innovations?

August 18, 2009

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

Alex Pollock
American Enterprise Institute

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 crises 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 stable 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 the 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.

Policymakers 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? info@institutionalriskanalytics.com

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Christopher is cofounder of Institutional Risk Analytics, the Los Angeles based provider of risk management tools and consulting services for auditors, regulators and financial professionals. Christopher leads IRA's risk advisory practice and consults for global companies on a variety of financial and regulatory issues. He is a Fellow of the Networks Financial Institute at Indiana State University. Christopher volunteers as a regional director of Professional Risk Managers International Association (www.prmia.org) and is a board adviser to I-OnAsia Limited (www.ionasia.com.hk), a global business security and risk consultancy based in Hong Kong. Christopher currently edits *The Institutional Risk Analyst*, a weekly news report and commentary on significant developments in and around the global financial markets. Christopher has testified before the Congress and the SEC on a variety of issues and contributes articles and commentaries to publications such as *The International Economy*, *American Banker* and *The Big Picture*.

For further information about Christopher, go to www.rcwhalen.com, including a list of speeches, interviews and articles that may be found at www.rcwhalen.com/articles.asp