Modeling Fraud: Models Behaving Nefariously

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Agenda

• Definitions
• The Ideal Model
• Models and Financial Reporting
• Case Studies
• Best Practices To Prevent Model Fraud
A Fraud Definition

Securities and Exchange Act of 1934
Rule 13b2-1 -- Falsification of Accounting Records

No person shall directly or indirectly, falsify or cause to be falsified, any book, record or account subject to section 13(b)(2)(A) of the Securities Exchange Act.

Section 13(b)(2)(A):
Every issuer which has a class of securities registered pursuant to section 12 must:
• make and keep books, records, and accounts, which, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the issuer
“Models try to squeeze the blooming, buzzing, confusion into a Joseph Cornell box, and then, if it more or less fits, assume that the box is the world itself. In a nutshell, theories tell you what something is; models tell you merely what something is like.”

The Ideal Model

• Constructed with quality and well-maintained
• Assumptions are robust, verifiable, and up-to-date
• Outputs based on timely, consistent, and reliable inputs
Models and Financial Reporting

Financial instrument valuation is one of the most common uses of models in financial accounting and reporting.

Valuation models present a significant opportunity for manipulation and fraud given the subjectivity of many of the components. Additional controls are necessary when third-party services including pricing services are utilized.

“The balance sheets of an increasing number of companies are dominated by valuation estimates, rather than "solid numbers."”

Jay D. Hanson, PCAOB Board Member
27th Annual SEC Reporting and FASB Forum
New York, NY
Dec. 19, 2011
A Definition of Valuation or Model Risk

“Valuation or model risk is the risk associated with the imperfection and subjectivity of models and the related assumptions used to value derivatives.”

AICPA Audit and Accounting Guide for Depository and Lending Institutions, Chapter 18, 18.11, Derivative Instruments: Futures, Forwards, Options, Swaps, and Other Derivative Instruments
Modeling Counterparty Risk

• **Potential future exposure (PFE)** is the maximum amount of exposure expected to occur on a future date with a high degree of statistical confidence.

• PFE(t) is usually computed through simulation models.

• Typical PFE measurement systems include:
  - Databases (trades, agreements, legal entities, legal opinions, collateral holdings, risk limits)
  - Monte Carlo simulation engines
  - Trade pricing calculators
  - Exposure calculators
  - Reporting tools

• PFE estimation requires sophisticated models to simulate exposures in market scenarios on various future dates. The documentation of the PFE model, its assumptions, and ongoing validation of the assumptions are critical.
Fraud Vulnerability With Third-Party Services

• Do you have sufficient information about the values provided by pricing services to know that we're complying with GAAP?
• Have you adequately considered the judgments that have been made by third parties in order to be comfortable with your responsibility for the reasonableness of such judgments?
• Do you have a sufficient understanding of the sources of information and the processes used to develop third party data to identify risks to reliable financial reporting?
• Have you identified, documented, and tested controls to adequately address the risks to reliable financial reporting?

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Models and Financial Reporting

Valuation of financial instruments is not the only use of models that is vulnerable to fraud.

Some other examples:

• Business combinations and goodwill impairment
• Allowance for loan losses
• Inventory valuation – Models built on estimates of shrinkage, obsolescence, returns and allowances, and improper inventory capitalization to inflate value of inventory for use as collateral, to meet financial ratios or to use as cookie jar to meet profit targets.
• Deferred tax credit valuation allowances
• Counterparty risk
  o Potential future exposure (PFE)
  o Does the pricing source have a relationship with an entity that might impair its objectivity, such as an affiliate or a counterparty involved in selling or structuring the product?
• Executive compensation – Incentive compensation based on metrics derived from fraudulent balance sheet, income statement or other operational data.
The Case of Deutsche Bank AG

• ProPublica reported a mid-level Deutsche executive asked a junior analyst to alter a spreadsheets by changing certain payment schedules to win a higher rating.

• The spreadsheets are CDO models. They are intended to provide a model of how the CDO is likely to perform.

• Banks knew how to engineer the key elements of a CDO spreadsheet to show cash flow and other outcomes that would meet the ratings agencies' requirements for a AAA or AA rating, and the spreadsheets could be adjusted for these outcomes.
The Case of Deutsche Bank AG

- The junior analyst protested when asked to alter the numbers in a spreadsheet to make a Deutsche security look less risky to ratings agencies.
- One purpose of the spreadsheets was simple: to estimate how much cash the CDOs would generate at certain time points.
- The goal was to make it appear that the investment would produce more cash than the bank actually expected at certain time points.
- The spreadsheets were large and involved complex arrays of inputs and sophisticated calculations, such as default rates of the mortgages that backed the CDO and when borrowers would pay off their loans.
The Case of Citigroup

A “cookie jar” is the place manipulative managers build up generous reserves in good quarters so they can use them to offset losses that might be incurred in bad quarters.
The Case of Citigroup

• Deferred tax assets - Valuation is based on model of likelihood of making a profit sufficient to utilize the credits.

• Loan loss reserves - Amount based on modeling loan losses across portfolios using assumptions about interest rates, defaults...

• Credit valuation adjustment - Third quarter 2011 results of several banks including Citigroup impacted by this accounting entry which is highly dependent on models.
  - “About $1.9 billion of that reported net income came from “credit valuation adjustment”, a perverse accounting entry that adds book income when a bank’s credit spreads widen.”
The Case of Countrywide

“Countrywide was blindsided during the quarter by obligations on home-equity lines of credit that it had sold to investors in the form of securities...

Countrywide said the likelihood of such a situation was “deemed remote” until late 2007. It blamed a “sudden deterioration” in the housing market. As a result, it recorded a $704 million loss to cover the estimated costs of its obligations on the lines of credit...

A Countrywide computer model used to gauge risks on these securities didn’t take into account the possible effects of exceeding the loss levels that cut off reimbursements, according to a Dec. 28, 2006 internal report reviewed by The Wall Street Journal.”

The Case of New Century Financial

- New Century was once the second-biggest U.S. subprime-mortgage lender, according to the bankruptcy examiner report. The firm engaged in accounting fraud in 2005 and 2006 before filing for bankruptcy in April 2007.
- On February 7, 2007, New Century announced that it needed to restate its earnings for the first three quarters of 2006 due to its failure to account properly in accordance with GAAP for probable and estimable expenses and losses in its loan repurchase reserve.
The Case of New Century Financial

- New Century announced in May 2007, after filing for bankruptcy, that 2005 and 2006 financial statements:
  - Failed to properly account for and report the repurchase reserve in accordance with GAAP
  - Failed to properly account for and report the lower of cost or market (LOCOM) valuation adjustment for repurchased loans in accordance with GAAP
  - Failed to properly account for and report the valuation of residual interests in accordance with GAAP
  - Materially understated the repurchase reserve, materially overstated the value of repurchased loans, and materially overstated the value of residual interests
  - Materially overstated pre-tax earnings
The Case of New Century Financial

- Loan repurchase reserve model
  - Covers the establishment of a loan repurchase reserve for losses and expenses related to estimated repurchases, including backlog and future claims, inventory severity, and the lower of cost or market (LOCOM) valuation adjustment

- Allowance for loan losses model
  - Inadequate documentation of management’s calculations
  - Lack of confidence in data integrity underlying the calculations.
  - Models not updated
  - Actual losses were always less than modeled losses
  - Losses were over reserved leading to Audit Committee member to threatened to resign in 2005 over suspicions reserves would be used to manipulate earnings.
The Case of New Century Financial

- FAS 133, Accounting for Derivative Instruments and Hedging Activities
  - Failed to adopt a comprehensive set of hedging policies, procedures and practices until 2006 and did not document “contemporaneously”.
  - All derivatives within scope of FAS 133 must be accounted for at fair value and accounting for changes in fair value depends on intended use of hedge and designation in documentation.
  - Cash flow and fair value hedge accounting both make extensive use of modeling to determine what if any impact flows through the income statement that period.
  - Testing for hedging “effectiveness” uses regression analysis
  - New Century did not reflect the impact of interest rate lock commitments on subprime loans it originated at fair value in its balance sheet
Residual interest valuation process

Assumptions:
- Used the wrong discount rates
- Assumed that the likely value of remaining loans in a securitization at the time the trust was cleaned up or terminated would be at par value regardless of the pool’s delinquency status or estimated market conditions
- No documentation describing how the assumptions used in the models were established, revised or approved
- Assumed that the likely value of remaining loans in a securitization at the time the trust was cleaned up or terminated would be at par value regardless of the pool’s delinquency status or estimated market conditions.

• Construction and Maintenance:
  • No documentation describing how the residual interest valuation models worked
  • Failed to increase the discount rate used to value residual interests in 2005 and 2006 to reflect increased risk in the pools
  • Used stale information from the late 1990s to calculate prepayment rates. Failed to adjust its prepayment assumption to reflect changing market conditions.
  • Management decided in early 2006 to stop making changes to assumptions in pre-2003 securitization models

re: The Auditors
More Examples

Madoff Ponzi Scheme

• The “black box” trading model – a complex technique that relies on computing algorithms to select trades – was opaque and resisted benchmarking.

• “Executing a split-strike conversion strategy with over $17 billion of capital would have been prohibitively expensive using S&P100 options, which are much less widely used than S&P500 options. Given the daily trading volume, option prices would have experienced sharp moves in the wrong direction for Madoff. None of that happened.”

• Underlying data used to measure fund performance - trade tickets and statements - was faked. No one verified it.
Navistar

• Warranty reserves reflect estimated future warranty costs. The warranty accrual estimate process generated an estimated warranty cost per unit for each engine sold. This calculation incorporated certain “above-the-line” items, including well-established or known that were viewed, based on historical trends or data, to have effectively reduced warranty costs. The CPU was the primary basis for the warranty reserve amount; the higher the CPU, the higher the reserve.

• The warranty reserve-setting process is governed by accounting rules for contingent liabilities. SFAS No. 5, Accounting for Contingencies - Appendix A; With Respect to Obligations Related to Product Warranties and Product Defects, says warranty reserves must be established when it is probable that a liability has been incurred and the amount of the loss can be reasonably estimated.

• Certain anticipated fixes were incorporated into the CPU calculation before they had been implemented. These components consistently reduced the warranty reserve.

• The inclusion of these anticipated items was not in compliance with GAAP.
Best Practices To Prevent Model Fraud

• Maintain well-designed and sufficiently effective controls over model development and maintenance such as controls over data and the segregation of duties between those committing the entity to the underlying transactions and those responsible for undertaking the valuations. Ideally follow an SDLC methodology.

• Periodically evaluate the expertise and experience of those persons developing, maintaining, and feeding the models.

• Insure that any technology – in house or third-party – that is required follows IT general controls best practices.

• Periodically validate the integrity of change controls and security procedures for valuation models and relevant information systems, including approval processes.
Best Practices To Prevent Model Fraud

• Implement additional controls for non-routine, unusual, or summary level transactions. Fraud is more likely to occur when models are used for transactions that are non-routine or unusual than those that arise from the recording of routine and recurring transactions. If you rely on a service organization for pricing data or infrastructure you may need to obtain additional assurance of sufficient internal controls over processes that produce transactions that could have a material impact on the balance sheet.

• Engage or employ specialists wisely. Providing adequate training, supervision and quality review.

• Never assume assumptions will be correct at all times for all times. Validate management’s assumptions and the process used to develop and apply management assumptions at each reporting period.

• Produce and maintain sufficient documentation supporting all of management’s assumptions.

• Insure there is a robust and strict process used to monitor and document changes in management’s assumptions.

• Periodically validate the controls over the consistency, timeliness, and reliability of the data used in valuation models.
Why don’t you work for the SEC?

“Candidates should possess advanced quantitative and/or financial skills as demonstrated by a Ph.D. in finance, economics, accounting, statistics, or related area. Research associate candidates should have a Bachelor or Masters of Business Administration degree with a quantitative or finance concentration, or a Masters degree in Finance or Financial Engineering. We are also seeking professionals with specialized expertise gained either through extensive research in relevant topic areas, or through industry experience from positions held at banks, exchanges, asset management firms, broker-dealers, hedge funds, mutual funds, or related institutions. Positions are open to U.S. citizens and certain non-U.S. citizens.”
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