

Structured Finance Deals: A Review of the Rating Process and Recent Evidence Thereof¹

Seoyoung Kim²

October 2012

Abstract

The pooling and tranching of assets into prioritized cash-flow claims has become a substantial source of revenue for issuers as well as rating agencies in the last decade. With the recent demise of vehicles used to operationalize these structured deals, a natural question arises as to the quality of standards applied in structuring, managing, and ultimately rating these products. The purpose of this paper is to review rating practices in the area of structured finance, and to summarize the research and empirical evidence pertaining to these questions.

JEL Classification: G2, G24

Keywords: structured finance, credit rating agencies, rating standards

¹ I thank John McConnell for helpful discussions.

² Leavey School of Business, Santa Clara University, 500 El Camino Real, Santa Clara, CA 95053.
Email: skim@scu.edu.

Structured finance ratings have been a matter of urgent concern because of the debacle of several special purpose vehicles (SPVs) known as structured investment vehicles (SIVs) in recent years. SIVs held an estimated \$400 billion in assets, most of which required liquidation of assets.³ Of the 29 SIVs in existence as of July 2007, seven defaulted, five were restructured, four de-leveraged, and thirteen were bailed out with liquidity support from underwriting banks. Liquidations often come at steep discounts. For instance, in the case of Cheyne Finance, a recent innovative SIV, initial liquidation of assets resulted in a 44% recovery of par value,⁴ and in the case of Sigma Finance, liquidation yielded a 15% recovery of par value.⁵ In general, the equity tranches of SIVs (also denoted as capital notes) were almost entirely wiped out, and senior notes averaged 50% in losses.⁶

These failures raise several questions as to the structuring and risk management of SIVs, and the ratings issued both at inception and throughout the life of SIVs and structured finance deals in general. First, did the rating agencies follow prudent standards in their assessments of both the underlying assets and the tranches of debt and capital issued? Or were the models used to evaluate, rate, and oversee the deals too lax in their controls and parameterization? In this paper, I review rating practices in the area of structured finance, and I summarize the research and empirical evidence related to these questions.

Possible conflicts of interest arise from the nature and structure of the credit rating industry. Rating agencies earn their fees directly from the issuers they rate, which can exert pressure on the agencies to issue more favorable ratings, particularly in the case of structured finance deals, whose size and complexity command substantially larger fees than the rating of standard corporate debt issues. The increased business from the proliferation of structured finance products

³<http://www.telegraph.co.uk/finance/newsbysector/banksandfinance/5769361/400bn-SIV-market-sold-off-in-two-years.html>

⁴ <http://www.risk.net/risk-magazine/news/1504163/cheyne-assets-disappoint-in-rescue-auction>

⁵<http://www.telegraph.co.uk/finance/newsbysector/banksandfinance/5769361/400bn-SIV-market-sold-off-in-two-years.html>

⁶ <http://www.risk.net/risk-magazine/news/1517514/almost-siv-assets-sold-fitch>

has had a material impact on the rating agencies' bottom line. Moody's earnings increased from \$288 million in 2002 to \$701 million in 2007 (Risk Management Institute, 2011), by which time almost half of Moody's revenues came from the rating of structured deals, exceeding its revenues earned from the rating of corporate bond issues (Coval, Jurek, and Stafford, 2009). Nonetheless, other factors may serve to temper the competitive environment for rating services, and ultimately, whether the quality of ratings is compromised is an empirical matter.

Overall, the evidence presented below points to breaches of rating standards and biased modeling assumptions in the rating of specific structured deals, as well as to systematic breaches across the board. Biases occur not only at the underlying asset level, but also at the deal level, where modeling complexity and opacity allow for opportunism in the input assumptions and estimation methods. In particular, the evidence suggests that sufficient stressing of the risks in these models was not undertaken, input quality was poor, and correlations were not appropriately elevated, either through the choice of correlation parameters or the mathematical structure (i.e., copulas) used to model the simulations.

The evidence also suggests that rating agencies did not properly account for the systemic risk in the markets for the collateral assets. Were such risks adequately accounted for, many SIVs would have been found unviable, and the deals would not have proceeded. In sum, the broader empirical evidence points to a widespread practice of ratings inflation, indicating that market competition and pressure from underwriters drove the rating agencies to support deals that an impartial view might not have found sensible.

This review is organized as follows. In Sections 1 and 2, I begin with an overview of credit ratings and what these ratings are intended to capture, and in Section 3, I highlight the rating standards outlined in policy documents of the two largest Nationally Recognized Statistical Ratings Organizations (NRSROs): Moody's

Investors Service, Inc., and Standard & Poor's Rating Services.⁷ In Section 4, I expound on the rating process of structured finance deals, and in Section 5, I outline potential sources of conflict in the application of rating standards. In Section 6, I then provide an overview of systematic breaches in rating standards implied by recent empirical evidence, and in Section 7, I briefly outline specific breaches to these standards in the rating of recent structured deals. Finally, in Section 8, I discuss and conclude.

1. Overview of Credit Ratings

Both S&P and Moody's stress that they neither audit nor guarantee the accuracy or timeliness of the information reflected by their issued credit ratings,⁸ emphasizing credit ratings as *opinions*. In an excerpt from their ratings definitions, Standard & Poor's states:

"The ratings and other credit related opinions of Standard & Poor's and its affiliates are statements of opinion as of the date they are expressed and not statements of fact or recommendations to purchase, hold, or sell any securities or make any investment decisions. Standard & Poor's assumes no obligation to update any information following publication. Users of ratings and credit related opinions should not rely on them in making any investment decision. Standard & Poor's opinions and analyses do not address the suitability of any security. While Standard & Poor's has obtained information from sources it believes to be reliable, Standard & Poor's does not perform an audit and undertakes no duty of due diligence or independent verification of any information it received." (S&P Form NRSRO, p. 97)

⁷ As of May 2011, there were ten registered NRSROs (<http://www.sec.gov/answers/nrsro.htm>).

⁸ S&P states that "it does not perform an audit and undertakes no duty of due diligence or independent verification of any information it receives" (S&P Form NRSRO, p. 220), and similarly, Moody's states that it "in assigning a Credit Rating, MIS is in no way providing a guarantee with regard to the accuracy, timeliness, or completeness of factual information reflected, or contained, in the Credit Rating or any related MIS publication" (Moody's Form NRSRO, p. 383).

Still, “even statements of opinion are actionable if they are made in bad faith or are not supported by the available evidence” (Scheindlin, 2012; Case 1:09-cv-08387-SAS, p. 8), particularly in cases where an agency issues ratings knowing that these ‘opinions’ form the basis for how a specific group assesses and ultimately invests in the rated security.^{9 10}

A number of players in the securities markets rely on credit ratings, which substantially impact the allocation of and access to capital.¹¹ Borrowers rely on credit ratings to enhance the visibility, credibility, liquidity, and ultimate pricing of their debt issues. Institutional investors rely on credit ratings to enhance their understanding of the risks involved and to ensure compliance with internally and externally imposed restrictions on their investments and capital requirements, which are often tied explicitly to credit ratings. Counterparties in private transactions also rely on credit ratings, tying contractual events/triggers to pre-specified ratings. Thus, it is important that credit rating agencies make correct and proper interpretation of the accessed information to adhere to their stated principles outlining the quality and integrity of their rating processes,¹² and so that ratings accurately reflect the creditworthiness of the assets conditional on this information.

Notable firm-specific as well as systemic failures have caused concern over the role and regulatory treatment of credit ratings and the agencies that issue them (U.S. Senate Committee on Governmental Affairs, 2002),¹³ and governmental

⁹See <http://www.reuters.com/article/2012/05/07/ratingagencies-rulings-idUSL1E8G7PKB20120507>

¹⁰ See also http://newsandinsight.thomsonreuters.com/Legal/News/2012/06_-_June/Rating_agencies_don_t_have_to_lie_to_be_liable/

¹¹ For more details on the regulatory use of credit ratings, see the U.S. Securities and Exchange Commission Report on the Role and Function of Credit Ratings Agencies in the Operation of the Securities Markets (January 2003).

¹² “The mission of Standard & Poor’s is to provide high-quality, objective, independent, and rigorous analytical information to the marketplace. In pursuit of this mission, among other things, Standard & Poor’s engages in Credit Rating Activities and issues Credit Ratings.” (S&P Form NRSRO, p. 276).

¹³ “... Ratings have taken on great significance in the market, with investors trusting that a good credit rating reflects the results of a careful, unbiased, and accurate assessment by the credit rating agencies of the rated company... [but] It was not until just 4 days before Enron declared

agencies have stressed the importance of and widespread value placed on ratings, stating that “an investment grade credit rating has become an absolute necessity for any company that wants to tap the resources of the capital markets. The credit raters really do hold the key to capital and liquidity...” (Lieberman, 2002 Congressional Hearing).¹⁴

Given the value of and widespread reliance on credit ratings, it is crucial to have an understanding of the credit rating process and what credit ratings mean. I now proceed to an overview of the rating standards and specific criteria employed by Moody's and S&P. Although I review the process of rating debt issues in general, more focus will be given to the rating of structured finance products in particular.

2. What Are Credit Ratings Intended to Capture?

Standard & Poor's defines its issue credit rating as “a forward-looking opinion about the creditworthiness of an obligor with respect to a specific financial obligation... The opinion reflects Standard & Poor's view of the obligor's capacity and willingness to meet its financial commitments as they come due, and may assess terms, such as collateral security and subordination, which could affect ultimate payment in the event of default” (Standard & Poor's Ratings Definitions, p. 3).¹⁵ Long-term issue credit ratings range from ‘AAA’, denoting that the “obligor's capacity to meet its financial commitment on the obligation is extremely strong”, to ‘D’, denoting that the obligation is in payment default.

bankruptcy that the three major credit rating agencies lowered their ratings of the company to below the mark of a safe investment, the investment grade rating.” (p. 76, Report of the Staff of the Committee on Governmental Affairs: “Financial Oversight of Enron: The SEC and Private-Sector Watchdogs”, October 7, 2002)

¹⁴ Excerpt from statement by Chairman Joseph I. Lieberman, p. 2, Rating the Raters, Hearing before the Committee on Governmental Affairs United States Senate, 107th Congress, March 20, 2002

¹⁵http://www.standardandpoors.com/spf/general/RatingsDirect_Commentary_979212_06_22_2012_12_42_54.pdf

Moody's defines its credit ratings as "forward-looking opinions that seek to measure relative credit loss. That is to say, they forecast the likelihood of default on a bond and the estimated severity of loss in the event of that bond's default" (Moody's Code of Professional Conduct, p. 2).¹⁶ Long-term issue credit ratings range from 'Aaa', denoting obligations that are "judged to be of the highest quality, subject to the lowest level of credit risk", to 'C', denoting obligations that "are the lowest rated and are typically in default, with little prospect for recovery of principal or interest". Numerical modifiers 1, 2, and 3 are appended to Moody's ratings ranging from 'Aa' to 'Caa' to further rank obligations within each classification, with 1 denoting the highest within-class ranking.

Thus, the two agencies intend their ratings to reflect the creditworthiness of an obligation/obligor, and both agencies emphasize that their ratings are relative, rather than absolute, measures. However, they differ not only in the quantitative models used, but also in the qualitative description of what their ratings intend to capture: the issue credit ratings of Moody's are based on expected credit losses under default, while those of S&P are based more on the probability of default. Though, S&P does also consider the seniority of an issue and/or its expected recovery under default, particularly when rating obligations of speculative grade issuers (i.e., issuers rated 'BB' or below, which denotes that "while such obligors will likely have some quality and protective characteristics, these may be outweighed by large uncertainties or major exposures to adverse conditions").

With regard to rating performance, both agencies stress that ratings should be "accurate" (i.e., how well does the issue's credit rating correlate with its probability of default) and "stable" (i.e., how frequently and to what extent do credit ratings change). To this end, both S&P and Moody's provide default statistics on the percentage of defaults, calculating the cumulative average default rates within each rating classification over time. Both agencies also provide transition

¹⁶http://www.moody.com/uploadpage/Mco%20Documents/Documents_professional_conduct.pdf

matrices demonstrating, for each rating classification, the percentage of issues that moved up, down, or remained unchanged within a specific time frame.

3. The Rating Process

A typical rating process is as follows.¹⁷ The issuer begins the process by soliciting a rating request prior to a debt issue, at which point the credit rating agency (CRA) assigns an analytical team to conduct research and to review both inside and public sources of information. The team employs both quantitative and qualitative methods; interviews and meetings with management facilitate their understanding of operating and financial strategies, which supplement their assessment of credit risk based on quantitative models.

To reach a rating decision, a rating committee is then formed specifically to suit the nature, complexity, and potential independence concerns at hand. A committee chairperson is designated to ensure that the rating committee is properly formed, reviews all applicable information, and complies with the CRA's ratings criteria and codes of conduct.

Ultimately, the CRA issues a credit rating only when "it possesses information that is of satisfactory quality, meaning a sufficient quantity of information, received on a timely basis, and considered reliable" (S&P Form NRSRO, p. 242). The CRA "will not issue a Credit Rating - and for an existing Credit Rating will immediately disclose - if the Credit rating is potentially affected by certain conflicts of interest." (S&P Form NRSRO, p. 240).

Once the rating committee has voted and a rating decision has been reached, the issuer is notified of the decision and the key factors underlying that decision. Prior to public release, the CRA may provide an advance copy of its

¹⁷ Though specific quotes may be obtained from a single CRA's policy statements, Moody's and S&P follow a similar timeline with regard to their general rating process.

report to the issuer, and may consider changes based on the issuer's proposals regarding factual errors, the removal of confidential information, or word choice. In addition, "changes that reflect concerns or misunderstandings by the Issuer will be discussed with the Issuer, but such changes are generally discouraged" (S&P Form NRSRO, p. 248). On a case-by-case basis, the CRA may grant ratings appeals by an issuer prior to issuing its final rating decision.

After a credit rating is released, the CRA maintains ongoing surveillance of the issue to uphold "timely" and "credible" ratings. A team separate from the original analytical group (that was tasked with the initial credit-rating assessment) may be assigned to perform the monitoring, as appropriate. The issue credit rating is monitored/reassessed at least annually based on the availability of new information or material changes, and entails updating models and parameters as the financial situation changes, presupposing sufficient data of good quality

4. Rating Structured Finance Deals

Structured finance deals are operationalized via SPVs (i.e., special purpose vehicles) that issue prioritized claims, referred to as tranches, against their asset pools. Until their recent collapse, one common form was the SIV (i.e., structured investment vehicle), the purpose of which was to generate an excess return by issuing cheaper, short-term, and highly rated commercial paper and medium-term notes to finance the acquisition of medium- and long-term fixed-income assets. The spread between the revenue generated from the SIV's asset portfolio and the cost of funding the liabilities provides an excess return to subordinated note holders and pays investment management fees, absent being pushed into either "restricted" or "enforcement" mode. Failures of various tests (usually capital, leverage, or liquidity tests) can force the issuer to follow an investment defeasance plan to liquidate the investment portfolio, often at steep discounts, and to repay the senior obligations, followed by other creditors and capital notes investors.

The management of a SIV depends on the regular monitoring of a number of features, with liquidity being one of the most important to the SIV's operation. Proper cash and asset management ensures that the SIV can meet its short-term debt obligations even during periods of high net cumulative outflow caused by large amounts of maturing debt. To maintain liquidity, SIVs must be able to roll over existing commercial paper and medium-term notes and to borrow from liquidity facilities in case the amount of maturing liabilities exceeds the amount of debt that can be refinanced. Besides liquidity, the credit and price risk of the asset portfolio must be actively managed, for example, by hedging interest rate and currency exposures. The SIV must also pass regular operating tests to avoid entering a restricted operation mode, whereby the SIV may be prohibited from issuing new short-term paper or from increasing the overall risk profile of the asset portfolio.

All of these features must be assessed and monitored by rating agencies, which rate the issued liabilities as well as the underlying assets of the SIV/SPV. To this end, S&P and Moody's provide very similar outlines in terms of the qualitative descriptions of their structured-finance rating process, which is designed to reflect "whether the senior debt of the vehicle will remain 'AAA/A-1+' rated until the last senior obligation has been honored in the event that the SIV needs to be wound down for whatever reason".¹⁸ Thus, the focus is on stressing left-tail outcomes to assess whether capital adequacy levels are sufficient to support senior liabilities in the event of defeasance.

The analysis begins with an assessment of the credit quality of the underlying collateral assets. For underlying securities that have not been rated by the CRA in question, the team may, on a "limited basis", use the ratings issued by other NRSROs (S&P Form NRSRO, p. 252). The team may choose to accept the issued ratings as-is, or the team may choose to discount the ratings (a common and controversial

¹⁸ Standard & Poor's: "Structured Investment Vehicle Criteria: New Developments" (Published: September 4, 2003).

practice known as “notching”).¹⁹ The team then estimates the expected losses under *adverse conditions* to determine the level of subordination (i.e., the capital requirement) necessary to justify a ‘AAA’-level credit rating on senior debt in the capital structure. Simulation models, such as the Gaussian copula model, are widely used in this stage of the analysis to arrive at a probability of default or an expected loss rate, after which a lookup table maps these into ratings. There is wide flexibility in choosing the specific simulation model, allowing room for subjective judgment in the issued rating.

Overall, the analysis includes assessments of:

- 1) the subordination level, which refers to the size of the subordinated tranches in the deal, and is intended to ensure that there is sufficient capital to service the senior liabilities,
- 2) the asset-class composition, which is intended to ensure sufficient diversification and to limit exposure to a single obligor, and includes guidelines on portfolio composition by asset class, sector, region, maturity, credit rating, and obligor concentration limits,
- 3) the legal and regulatory risks, which entails assessing whether the deal is adequately isolated (i.e., through the creation of a special purpose entity) from the bankruptcy risk of the issuer and its other entities,
- 4) the payment structure and cash flow mechanics, which entails assessing whether the entity has the proper cash and asset management to meet its short-term debt obligations and ongoing liabilities,

¹⁹ “Notching” refers to a credit rating agency’s practice of “lowering their ratings on, or refusing to rate, securities issued by certain asset pools (e.g., collateralized debt obligations), unless a substantial portion of the assets within those pools were also rated by them” (U.S. Securities and Exchange Commission Report on the Role and Function of Credit Ratings Agencies in the Operation of the Securities Markets, January 2003).

- 5) the operational and administrative risks, which entails assessing management's ability and willingness to perform the duties inherent in a structured finance deal,
- 6) the counterparty risks, which entails assessing the exposure to and creditworthiness of engaged third-parties in deals, such as interest-rate and currency swaps, that enhance the payment structure and cash-flow mechanics of the structured finance issue in question.

For a given deal, the size of the senior tranche is deemed too large (or the subordination level is too low) if there exist scenarios in which the expected default rate of the collateral pool exceeds the maximum loss rate that the pool can sustain such that all liabilities in the senior tranche can still be honored. Thus, the tranche sizes must be determined such that all liabilities in the senior tranche can be fulfilled in the event of defeasance/enforcement, and the asset-class limitation serves as a buffer to ensure that all senior liabilities can be honored with AAA-level of certainty. Since the accuracy of scenario default rates as well as asset class limitations depend on the rating accuracy of collateral assets, errors compound if ratings are misspecified at the underlying asset level and then again at the deal level.

5. Sources of Conflict in the Rating Process

The debacle of SIVs, and structured finance deals in general, during the recent financial crisis may be attributed to a failure to adhere to these standards and criteria. That these standards were possibly reduced and violated across several SIVs exacerbates matters when simultaneous liquidation of the SIVs resulted in greater systemic losses.

Possible conflicts of interest in the rating process arise from the nature and structure of the credit rating industry, and credit ratings may not ultimately reflect unbiased opinions of the creditworthiness of a debt issue. CRAs earn their fees

directly from the issuers they rate, rather than the investors who ultimately use the credit ratings. This issuer-pay model may pose greater problems in the rating of structured deals than in the rating of single corporate debt issues for several reasons.

For one, unlike with corporate debt issues, there is no fixed fee schedule in the rating of structured finance products (Langohr and Langohr, 2009, p. 185). Given the size and complexity of structured deals, the potential revenues earned (or lost) are far greater, exerting more pressure on CRAs to be less conservative in their assessment of the risks involved. In fact, the earnings profiles of major CRAs show a substantial increase in their net incomes marked by the proliferation of structured finance deals. By 2006, 44% of Moody's revenues came from rating structured deals (Coval, Jurek, and Stafford, 2009). Overall, its reported earnings increased from \$288 million in 2002 to \$701 million in 2007 (Risk Management Institute, 2011), suggesting a substantial gain driven by the increased business from the rating of structured finance products.

Furthermore, unlike corporate debt issues/issuers, issuers of structured deals gravitate toward different combinations of CRAs. That is, in the case of corporate debt issues, the standard practice is to solicit ratings from both S&P and Moody's; of the non-convertible public debt offerings from 1976 through 2006, 99.0% were rated by Moody's, 98.3% were rated by S&P, and 28.9% were rated by Fitch (Langohr and Langohr, 2009). For structured finance issues, however, there is no standard combination of solicited CRAs. For instance, of the CMBS deals originating in 2007, 30% were rated by both Moody's and S&P, 16% were rated by both Moody's and Fitch, 30% were rated by both S&P and Fitch, and 25% were rated by all three (Cohen, 2011). This lack of standard facilitates rating shopping since it allows underwriters freedom in selecting which CRAs to solicit.

Conflicts of interest may also arise from a CRA's ancillary businesses, which provide consulting and advisory services. Although the CRAs have policies in place prohibiting rating analysts from being involved in structuring transactions (e.g., see

“Policy Against Structuring Transactions”, S&P Form NRSRO, p. 253) as well as firewall policies to alleviate analyst independence concerns (e.g., see “Confidentiality, Conflicts, and Firewall” policy, S&P Form NRSRO, p. 271), conflicts are likely to remain.

Nonetheless, other factors may serve to temper the competitive environment for rating solicitations and relieve pressure from CRAs to relax rating standards. For instance, the aforementioned practice of notching, whereby collateral assets not rated by the CRA in question are discounted, may deter issuers from soliciting ratings from other CRAs. Moreover, reputational concerns may also temper the incentive to inflate ratings. Thus, whether these potential conflicts of interest ultimately result in biased ratings is an empirical matter. In a review of the evidence presented below, I cover these issues of whether subordination levels were sufficient in meaningfully supporting the standards of ‘AAA-level certainty’. I also explore the empirical evidence on ratings inflation as it relates to cross-temporal and cross-sectional variation in incentives.

6. Empirical Evidence on the Standards Applied in the Rating of Structured Deals

An important aspect of evaluating the risks arising from asset correlation lies in the structure of correlation itself. Two joint asset distributions may have the same overall correlation, but very different conditional correlations. That is, one joint distribution may be characterized by equal asset correlation throughout both good times and bad; the other may exhibit very little asset correlation in good times, but high correlation in times of crisis. The latter structure carries far more risk, since diversification is lost just when it is needed most.

With regard to the mathematical structure used in simulation models, the rating agencies' choice of the Gaussian copula has been widely criticized.²⁰ Intuitively, when there is financial stress, portfolios suffer as the correlations of assets within portfolios tighten considerably (Ang and Bekaert, 2002; Das and Uppal, 2004; Das, Duffie, Kapadia, and Saita, 2007). Thus, use of the Gaussian copula results in an understatement of risk, lower capital requirements, and an overstatement of ratings, and the use of a t-copula has been recommended as a more realistic modeling assumption (Demarta and McNeil, 2004).

Coval, Jurek, and Stafford (2009a) show that, ultimately, most senior tranches of CDOs should have been trading at a higher risk premium and that securities with comparable risk/payoff profiles offered substantially greater compensation than these AAA-rated tranches. They link this discrepancy to the fact that despite having a low likelihood of default, these highly-rated senior tranches fail to deliver in poor or catastrophic economic states, when cash-flow certainty is most valued.

Coval, Jurek, and Stafford (2009b) further argue that highly rated structured securities are far riskier than what their AAA designation suggests, since the pooling process replaces diversifiable risk with non-diversifiable risk, creating securities that are much less likely to survive an economic downturn. In addition, they show that in assessing prioritized cash-flow claims, even modest changes to model input parameters can lead to vastly different assessments of default risk, giving rise to AAA-rated tranches with non-negligible likelihoods of default. Thus, the success of the CRAs' models crucially depends on the quality of the inputs into these models, and "most securities could only have received high credit ratings if the rating agencies were extraordinarily confident about their ability to estimate the underlying securities' default risks, and how likely defaults were to be correlated".

Duffie, Eckner, Horel, and Saita (2009) also argue the sensitivity of default-loss estimates in portfolios to the quality of model input parameters, since the joint

²⁰ See, for instance, Salmon, Felix (February, 2009). "Recipe for Disaster: The Formula That Killed Wall Street," *Wired Magazine* 17(3), 23.

exposure to, combined with the uncertainty surrounding the actual level of a (low-quality) input factor causes substantial downward bias in portfolio-default loss estimates. The inclusion of key factors, such as whether proper documentation was obtained during loan origination, substantially increases the estimated conditional probability of catastrophic outcomes, demonstrating the need to account for the quality of the input factors when modeling portfolio default losses.

In addition to the correlation structure of the underlying collateral assets and the quality of the model inputs, other important aspects to consider are the *level* of asset correlation as well as the quality of collateral. Along this regard, researchers have suggested that rating agencies were also optimistic in these modeling inputs when forming their rating opinions. For instance, in comparing initial rating reports with subsequent surveillance reports, Griffin and Tang (2011) find that surveillance reports present correlation estimates that are on average 14.9% greater than those presented in the initial rating reports, and CDO collateral quality estimates that are on average one-third of a notch below those presented in initial rating reports.

Griffin and Tang (2012) then use the differences between the CRA's initial-rating and surveillance reports to intimate biases in the initial ratings issued, finding a substantial difference in the share of the senior tranche determined by the reports (with an average 12.1% difference). On one hand, these results point to the various aggressive practices undertaken by CRAs to issue favorable ratings. However, that initial rating reports are more optimistic than ensuing surveillance reports may also be explained by differences in timing. Standard surveillance policy is to monitor an issue at least annually, with more frequent surveillance performed based on the arrival of new information or material changes. Thus, differences between the reports may, at least in part, reflect environmental changes rather than opportunism.

Furthermore, given the inherent complexities in modeling the risk of structured finance products, it is difficult to know with certainty whether the rating agencies were deliberately aggressive or biased in their modeling assumptions. But

irrespective of modeling complexity, issued ratings should not be correlated with incentives to inflate if ratings reflect unbiased opinions of a security's creditworthiness. Thus, in addition to studies concerning specific features in the rating of structured finance products, studies have also exploited cross-sectional and time-series differences in a security's capital requirement to highlight how incentives can skew ratings accuracy.

Capital requirements are an important consideration to investors, and in turn, are an important consideration to issuers. Acharya and Richardson (2009) argue that "especially from 2003 to 2007, the main purpose of securitization was not to share risks with investors, but to make an end run around capital-adequacy regulations". Thus, when "the regulatory advantage of highly rated securities is sufficiently large, delegated information acquisition is unsustainable, since the rating agency prefers to facilitate regulatory arbitrage by inflating ratings" (Opp, Opp, and Harris, 2012). Stanton and Wallace (2011) provide empirical support for this notion of regulatory arbitrage, finding a high incidence of ratings upgrades for Alt-A CMBS coinciding with the 2002 regulatory changes on risk-based capital requirements for CMBS deals, supporting the case for ratings inflation. This incidence of ratings upgrades in the CMBS market was substantially higher than that in the RMBS market, which did not suffer the same capital-requirement changes during this time.

In a further linking of ratings issued to incentives to inflate, studies have provided evidence that credit ratings are affected by the competition for rating business and the potential revenues earned from solicited ratings. For instance, He, Qian, and Strahan (2011) find that private (i.e., non-GSE) MBS deals originated by larger issuers have lower subordination levels (i.e., the fraction of the deal receiving AAA ratings is higher), than those originated by smaller issuers. The prices of these "inflated" AAA tranches fell more in the market downturn, suggesting that rating agencies granted more favorable ratings to large issuers in the boom period leading up to the financial crisis. Cohen (2011) provides evidence that increased

competition in the credit rating industry contributes to a lower quality of ratings issued, finding that subordination levels of CMBS deals are lower when competition among CRAs is greater, and Becker and Milbourn (2010) provide support for this notion in corporate bond ratings, finding that “rating levels went up, the correlation between ratings and market-implied yields fell, and the ability of ratings to predict default deteriorated” with increased competition among CRAs.

Studies have also argued the predictability of the decline in the subprime mortgage market, pointing to deteriorating loan quality, increasing delinquency rates, and widening spreads (Demyanyk and Hemert, 2008), which further suggests that deals predicated on securities related to the housing sector were overrated. Ashcraft, Goldsmith-Pinkham, and Vickery (2009) provide additional evidence of ratings inflation, finding more generous initial ratings for MBS deals originated between early 2005 to mid 2007. For instance, they find that risk-adjusted subordination levels decline by 13% for AAA-rated subprime MBS deals, and that ex-ante identifiable “risky” deals perform predictably worse than what their initial ratings would suggest if ratings were unbiased.

In sum, the empirical evidence suggests that the models used to assess and rate the deals were lax in their structural choices and input parameters, pointing to a systematic practice of ratings inflation. In addition, these more optimistic ratings coincide with instances of pronounced incentives to inflate, pointing to an intentional upward bias in ratings.

7. Specific Failures to Adhere to Rating Standards

Given the empirical evidence suggesting systematic shortcomings in evaluating and monitoring structured finance products, I now turn to highlight some of the specific failures in applying the rating standards/criteria to recent large SIVs.

Asset quality. SIVs typically pool securities from broad asset classes such as: RMBS, CMBS, Credit Cards, Auto Loans, Student Loans, CDOs, and HELs. As noted earlier, a crucial requirement of SIVs is that their asset pools earn a rate of return that covers management fees and payments to the various note holders, yet be of sufficiently high quality and sufficiently diversified to avoid defeasance. However, the asset pools underlying recent SIVs contained risky securities with a high concentration in the mortgage markets. In the case of one specific deal, the Cheyne SIV, which was the first to include home-equity loans (HELs) in its asset pool, the portfolio allocation reached 35-40% in this risky asset class.

Asset-rating correlation and correlation structure. The asset portfolio of a SIV is stressed by evaluating left-tail scenarios, and an important aspect of this simulation lies in incorporating an appropriate rating correlation of assets in the SIV. However, the CRAs did not sufficiently stress rating correlations in assessing SIVs, and an analysis of the actual rating correlations during the years 2006 and 2007 revealed much higher transitions to default and correlations of ratings than were applied in the simulation models used to assess the SIVs. These simulation models also failed to account for a properly stressed correlation structure by using the Gaussian copula model, which understates correlation in times of crisis, instead of the t-copula, which enhances correlation with joint fatter-tailed outcomes when assets experience extreme movements.

Asset-spread standard deviation and correlation. When asset credit risk increases, not only do the asset spreads change and become more volatile, they also move in a correlated manner. In assessing these SIVs, *standard deviations* of spreads were stressed per the CRAs' simulation models, but *spread correlations* were often not, an oversight which also contributed to inflated ratings.

Quality of inputs. The initial data used in analyzing these structured securities was thin, and unsubstantiated extrapolations and interpolations were often made in an attempt to fill in the missing data. The poor quality of inputs not only compromises the assessment of asset quality, but also severely biases downward

the asset correlation estimates and generally compromises the success of the CRAs' models (Duffie, Eckner, Horel, and Saita, 2009; Coval, Jurek, and Stafford, 2009b).

Liquidity and credit risk. As mentioned previously, the ability to meet short-term obligations and to roll over existing notes is crucial to a SIV's viability. Thus, sufficient stressing of initial asset spreads is needed to incorporate the possibility of higher liquidity and credit risks. However, even stresses of about half of the historical stressed levels would have resulted in poorer ratings for these SIVs than the actual ratings that were issued.

Liquidation risk. The trigger of a restricted or enforcement mode may require liquidation of the SIV's asset portfolio, which can result in such steep discounts that senior notes lose their buffer and experience losses. Even small expected losses (usually less than 0.10%) are sufficient to lose a AAA rating on senior notes, and capital requirements were too low to adequately account for the effect of liquidation discounts in the likelihood of defeasance.

Economic viability. The asset pool and capital structure must be such that the SIV is able to meet all payment obligations at market rates of return commensurate with the risks of each note. Thus, it is tempting for the SIV to take on riskier assets to generate a greater spread (return above Libor) to pay off the junior and mezzanine notes, and still leave sufficient return for the AAA-rated senior notes and management. It is the task of rating agencies to properly assess these risks and to ensure that they do not jeopardize the long-term viability of the SIV. Ostensibly, the margins (i.e., asset spreads) on which SIVs operated were too thin, and crucially relied on holding a large proportion of risky assets; thus, a small adverse shock to the asset portfolios of these SIVs would have made them economically unviable.

Collectively, these points suggest that the tests and standards applied were not sufficiently conservative, thereby allowing inadequate levels of subordinated notes and making unsuitable deals appear economically viable.

8. Concluding Remark

Overall, the empirical evidence suggests a widespread practice of upward bias in the rating of structured finance deals, where modeling complexity and opacity allow for opportunism in the input assumptions and estimation methods. Arguably, the inherent complexities in modeling the risk of structured finance products make it difficult to know whether rating agencies were knowingly lax in their modeling assumptions. Yet, these very ambiguities make it incumbent upon CRAs to be even more conservative and careful in certifying instruments as low risk. Furthermore, the findings that: 1) the positive biases coincide with greater incentives to inflate ratings, and 2) these ex-ante identifiable “risky” deals perform predictably worse, cannot be explained by modeling complexity, and provide a compelling case for an intentional upward bias in the rating of many structured finance deals that underwent subsequent downgrades.

References

- Acharya, Viral V., and Matthew Richardson (2009). "Causes of the Financial Crisis". forthcoming *Critical Review*.
- Ang, Andrew, and Geert Bekaert (2002). "International Asset Allocation with Regime Shifts". *Review of Financial Studies*, 15(4), 1137-1187.
- Ashcraft, Adam B., Paul Goldsmith-Pinkham, and James Vickery, (2009). "MBS ratings and the mortgage credit boom". Working paper, Federal Reserve Bank of New York.
- Becker, Bo, and Todd Milbourn (2010). "How did increased competition affect credit ratings?". Working paper.
- Cohen, Andrew (2011). "Rating Shopping in the CMBS Market". Working paper.
- Coval, Joshua D., Jakub W. Jurek, and Erik Stafford (2009a). "Economic Catastrophe Bonds". *American Economic Review* 99, 628-666.
- Coval, Joshua D., Jakub W. Jurek, and Erik Stafford, (2009b). "The Economics of Structured Finance". *Journal of Economic Perspectives* 23, 3-25.
- Das, Sanjiv, Darrell Duffie, Nikunj Kapadia, and Leandro Saita (2007). "Common Failings: How Corporate Defaults are Correlated". *Journal of Finance*, 62, 93-117.
- Das, Sanjiv, and Raman Uppal (2004). "International Portfolio Choice with Systemic Risk". *Journal of Finance* 59(6), 2809-2834.
- Demarta, Stefano, and Alexander McNeil (2004). "The t copula and related copulas". Working paper, Federal Institute of Technology, Zurich.
- Demyanyk, Yuliya, and Otto Van Hemert (2008). "Understanding the Subprime Mortgage Crisis". Working paper.
- Duffie, Darrell, Andreas Eckner, Guillaume Horel, and Leandro Saita (2009). "Frailty Correlated Default". *Journal of Finance* 64(5), 2089-2123.
- Risk Management Institute of the National University of Singapore (2011). *Global Credit Review: Volume 1*.

- Griffin, John, and Dragon Tang (2011). "Did Credit Rating Agencies Use Biased Assumptions?" *American Economic Review* 101(3), 125-130.
- Griffin, John, and Dragon Tang (2012). "Did Subjectivity Play a Role in CDO Credit Ratings?" *Journal of Finance* 67(4), 1293-1328.
- He, Jie, Jun Qian, and Philip E. Strahan (2011). "Credit ratings and the evolution of the mortgage-backed securities market". *American Economic Review* 101, 131-135.
- Langohr, Herwig M., and Patricia T. Langohr (2009). "The Rating Agencies and Their Credit Ratings". Wiley Finance Series.
- Moody's Investors Service, Inc., Form NRSRO: Application for Registration as a Nationally Recognized Statistical Rating Organization (NRSRO), submitted June 26, 2007
- Moody's Investors Service (June 2011). Code of Professional Conduct
- Opp, Christian, Marcus Opp, and Milton Harris (2012). "Rating Agencies in the Face of Regulation". Working paper, Wharton School, University of Pennsylvania.
- Reuters (May 7, 2012). "UPDATE 1-NY judge won't dismiss lawsuits vs Moody's, S&P". <http://www.reuters.com/article/2012/05/07/ratingagencies-rulings-idUSL1E8G7PKB20120507>
- Risk Management (July 18, 2008). "Cheyne assets disappoint in rescue action". <http://www.risk.net/risk-magazine/news/1504163/cheyne-assets-disappoint-in-rescue-auction>
- Risk Management (July 7, 2009). "Almost all SIV assets now sold off, Fitch says". <http://www.risk.net/risk-magazine/news/1517514/almost-siv-assets-sold-fitch>
- Salmon, Felix (February, 2009). "Recipe for Disaster: The Formula That Killed Wall Street". *Wired Magazine* 17(3), 23.
- Scheindlin, Shira A. (2012). Opinion and order: Case 1:09-cv-08387-SAS.

Standard & Poor's Ratings Services (September 4, 2003). "Structured Investment Vehicle Criteria: New Developments", *RatingsDirect*

Standard & Poor's Ratings Services, Form NRSRO: Application for Registration as a Nationally Recognized Statistical Rating Organization (NRSRO), submitted May 15, 2012.

Standard & Poor's Ratings Services (June 2012). Standard & Poor's Ratings Definitions, *RatingsDirect*

Stanton, Richard, and Nancy Wallace (2011). "CMBS Subordination, Ratings Inflation, and Regulatory-Capital Arbitrage". Working paper, Haas School of Business, UC Berkeley.

The Telegraph (July 7, 2009). "\$400bn SIV market sold off in two years". <http://www.telegraph.co.uk/finance/newsbysector/banksandfinance/5769361/400bn-SIV-market-sold-off-in-two-years.html>

Thomson Reuters, News & Insight (June 11, 2012). "Rating agencies don't have to lie to be liable". http://newsandinsight.thomsonreuters.com/Legal/News/2012/06_-_June/Rating_agencies_don_t_have_to_lie_to_be_liable/

U.S. Senate (March 20, 2002). Rating the Raters, Hearing before the Committee on Governmental Affairs United States Senate, 107th Congress.

U.S. Senate (October 7, 2002). Report of the Staff of the Committee on Governmental Affairs: "Financial Oversight of Enron: The SEC and Private-Sector Watchdogs".

U.S. Securities and Exchange Commission (January 2003). Report on the Role and Function of Credit Ratings Agencies in the Operation of the Securities Markets.

U.S. Securities and Exchange Commission (May 2011). "Credit Rating Agencies—NRSROs". <http://www.sec.gov/answers/nrsro.htm>