Introduction

This paper explores empirical evidence of the rating inflation and tries to explain the possible motivations to do the same for Credit rating agencies as well as the issuers of the securities. I try to review and discuss the methodology and evidence presented three famous papers published on this subject(list given below). The first papers review the structure of the deals by largest issuers before the boom (2000 – 2003) and after the boom (2004-2006) and looks at the price drops for securities issued in these two business cycles ex post. The second and third paper explore the possibility that the market already knew about the biases and inflation and was already pricing this rating inflation bias by demanding higher yield.

- Rating agencies play an important part in the fixed income securities as they have access to privileged information about the security and issuers. Such information is not available in public domain and access to that information is prohibited by the regulation such as – Reg-FD(Fair Disclosure). Studies conducted by Jorion, Zhu and Shi(2005) show that the impact on rating changes become stronger after the Reg-FD. Thus, investors depend a lot on the ratings provided by the credit rating agencies.

- Securitization process as such is opaque and complicated which leads to the investors relying on the CRA's to assess the underlying assets. This makes the role of CRAs very important in case of the MBS.

- Regulations for Financial institutions as such depend on the accuracy of the credit ratings and when these ratings are inflated – it enables financial institutions to take more leverage then they are permitted and this then become a source of systemic risk.

I focus on the three particular papers listed below to discuss their empirical findings and possible explanations behind those findings explain the role of CRAs in the MBS crisis

- **Paper 1** - Credit Ratings and the Evolution of the Mortgage-Backed Securities Market by He, Jie, Jun Qian, and Philip E. Strahan. 2011

- **Paper 2** - The second paper from He, Jie, Jun Qian, and Philip E. Strahan. Published in 2012 titled "Are All Ratings Created Equal?"

- **Paper 3** - The third paper is by Lugo, Stefano. Published in 2014 titled "Discretionary ratings and the pricing of subprime mortgage backed securities Conflict of interest within the fee structureof CRA"

Motivations/ Conflict of interest resulting in ratings inflation

The main motivation/drive behind all the three studies is the **big conflict of interest** in the Fee and income structure of the Credit Rating Agencies. Instead of being compensated by the investors, CRA's are paid a fee by the issuer. Thus based on the size of institution and business it brings – Large issuers can influence CRA's to provide favorable ratings known as - ratings **inflation** (CRA inflate the ratings beyond their model's prediction as a result of catering) as compared to smaller issuers (Size based on market cap. In addition, the issuers who bring in big business have the influence to **shop** around for the ratings (the practice of issuers asking different agencies for rating and making public only the most favorable ones) and take business to the agencies which grant favorable ratings.

In addition, many institutional investors within the fixed income market (Buyers of these MBS) seeking high yield/return investment opportunities – AAA rated MBS offers an ideal investment. Also securitization can produce many more AAA- rated tranches than the fraction of AAA rated corporate bonds available to invest in the fixed income market(Only one percent of all corporate bonds are AAA rated)(From Paper 1)

Financial institutions exploit the ratings inflation for **regulatory arbitrage** as they use securitization to reduce the regulatory capital. They do so by repackaging the mortgages sitting in the banking book(Instruments in Banking Book have more Regulatory capital requirements) and transferring them to the trading book(Less Regulatory capital requirements) as highly rated MBS's by the process of tranching. (FRTB – the new regulation which is a part of BASEL IV proposals seeks to address this Arbitrage by Reviewing/Defining assets which can go to Banking book and the ones that can go to Trading book)

 The FASB rule Fin-46 allowed depositories to run "shadow banks" Off-balance sheet conduits holding long-term securitized assets with short-term asset backed commercial paper (ACBP). This happened after the regulators exempted the depository institutions from the FASB rule Fin-46. Following this decision ACBP market boomed from $600 billion to $1.2 trillion by the summer of 2007. These structures required zero regulatory capital, while leaving all the credit risk with the issuing banks, who provide these conduits.

The **only downside of the inflated ratings for CRA's** is the loss of reputation for the CRA. But when quantified in dollar terms, it is not considerable enough because there is no other source of information(about the quality of the MBS and its tranches) available to investors apart from the Ratings supplied by CRA's.

PAPER 1

In this paper, the author tries to study the effect of the size of issuer on the structure and performance of the mortgage backed securities. They find that the securities sold by the

large issuers have less subordination – a greater fraction of securities received AAA rating as compared to those sold by the small issuers. They then match a large sample of MBS tranches issued between 2000 – 2006 (from Moody's, S&P and Fitch) and find that around 60% of the tranches are rated AAA by the three agencies. Furthermore they compare the tranches sold by the large issuers vs the small issuers and differentiate the sample between the market boom years 2004 – 2006(Housing market boom) as compared to earlier years (2000-2003). The below photo is taken from Paper 1 and shows the top 5 issuers of the private MBS from 2000 – 2006. Interesting point to note is that MBS market is **highly concentrated with top 5 issuers accounting for 38% to 47% of the newly issued securities. And when examined ex post the crisis - all the top 5 issuers of the MBS in 2006 collapsed during the crisis!!**

Table 1 - Top 5 Issuers of Private Mortgage-Backed Securities (2000-2006)

Rank	2000	2001	2002	2003	2004	2005	2006
1	General Motors	General Motors	General Motors	General Motors	Countrywide	Countrywide	Countrywide
2	Countrywide	Credit Suisse	Countrywide	Countrywide	General Motors	General Motors	General Motors
3	Wells Fargo	Countrywide	WaMu	Lehman	Bear Stearns	Lehman	Bear Stearns
4	JP Morgan	Wells Fargo	Credit Suisse	Credit Suisse	Lehman	Bear Stearns	Lehman
5	Bank of America	Lehman	Lehman	Bear Stearns	Bank of America	Bank of America	IndyMac
Market Share	38%	47%	45%	42%	40%	41%	39%

Notes: This table shows the top 5 issuers of private mortgage-backed securities by the number of deals during 2000-2006 using information from SDC. The last row shows the total market share of the top 5 issuers of a given year based on the number of deals they issue.

Below picture shows the comparison of median of the fraction of total deal-level fraction of financing in AAA – Tranches for Mortgage backed securities.
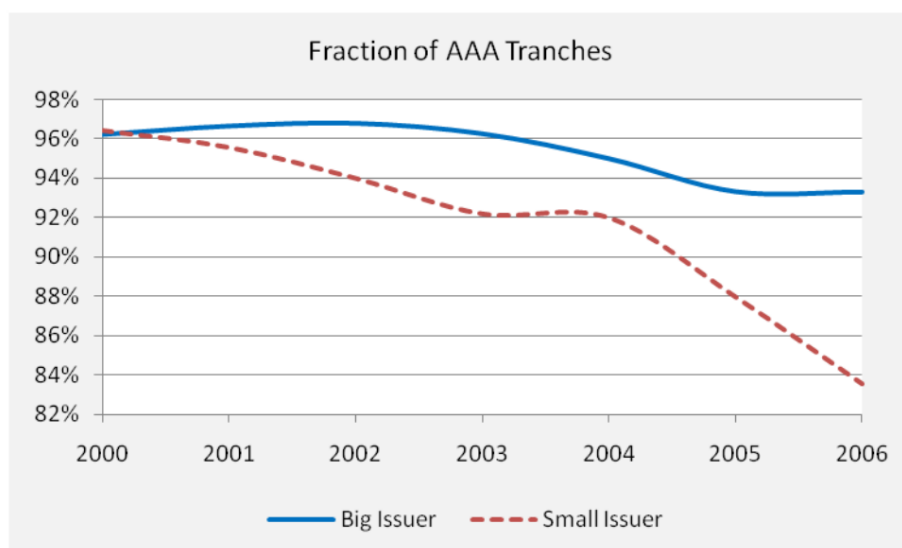
Figure 1: Fraction of Financing in AAA Tranches

As can be seen that the median fraction of financing in AAA tranches sold is similar in 2000 at 96% and then reduces for both big and small issuers. Also the gap for the degree of subordination increases from zero in 2000 to about 10 percentage point in 2006. This could mean aggressive behavior either on part of big or small issuers but as we have seen from the previous table all the top 5 big issuers failed in 2006 it strongly suggests that **the big issuers became more aggressive and received favorable ratings(Ratings inflation) from the rating agencies and took excessive leverage.**

Furthermore they checked ex-post the performance of the deals priced during market boom they checked empirically the prices drop for these Securities after the crisis. They observe that the Prices for the AAA and the non AAA rated tranches sold by **the large issuers fell more** when the market turned down than those by the small issuers.

The greatest difference is seen in the tranches sold during the 2004 – 2006 whereas the fall in prices on the tranches issues between 2000 – 2003 drop by the same amount and shown in the below two figures taken from the Paper 1. Figure 2 panel B suggests that the price dropped for AAA tranches by large issuers by around 53% as compared to the 37% price drop for the tranches issued by small issuers.
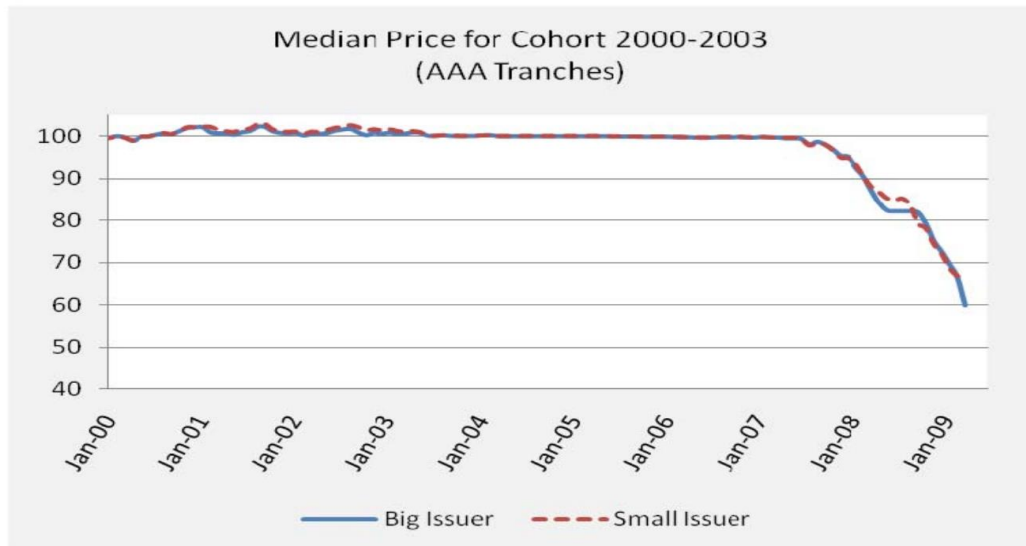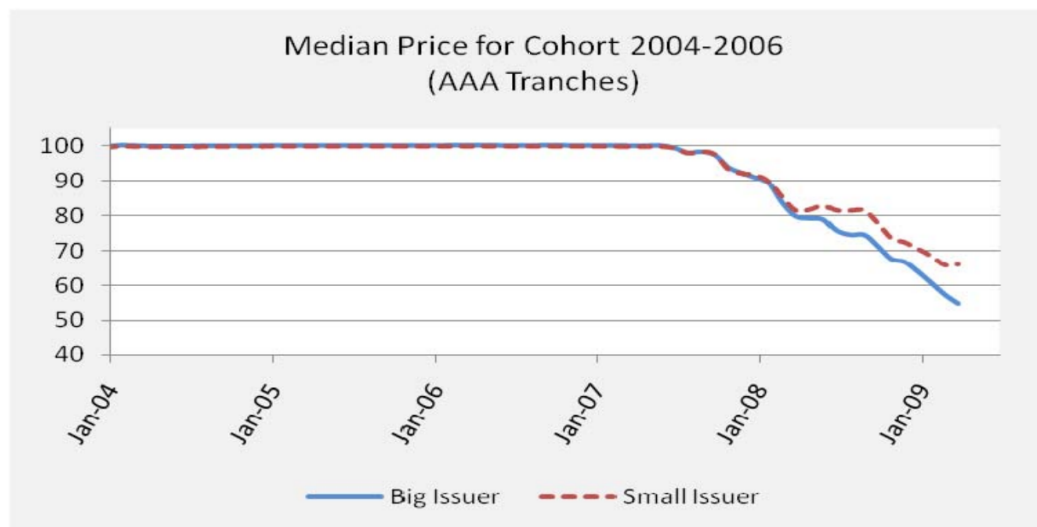
Figure 2, Panel A

Figure 2, Panel B

Figure 2: Monthly Prices of Private Mortgage-Backed Securities

PAPER 2-

In this paper the authors empirically try to prove that the MBS tranches sold by the large issuers have higher yields as compared to the tranches sold by the small issuers. This means that the investors were aware of the fact that the large issuers have influence and power to go for "shopping" for the ratings and also influence the issuance of favorable

ratings. Authors then further test empirically to check whether investors priced the risk that credit rating agencies favored large issuers over the small ones and whether the effect grew as the market boomed. The basic hypothesis behind these tests is that if the rating agencies treat different kinds of MBS issuers equally, yields on similarly rated securities would also be similar.

The authors conduct both ex ante price test and ex post price test to understand whether market and investors price these ratings inflation at issuance conditional on the credit rating by comparing the yields on MBS sold by small/Large issuers.

$$
\begin{aligned}
Log\ of\ Yield\ Spread_{i,j,t} = {} & \beta^1 Issuer\ Share_{k,t-1} + \gamma^1 Issuer\ Share_{k,t-1} \\
& \times\ Hot_t +\ Initial\ Rating,\ Fraction\ AAA \\
& (Level\ of\ Subordination), \\
& Collateral\ and\ Issuer\ controls + e^1_{i,j,t}
\end{aligned}
\tag{1}
$$

$$
\begin{aligned}
Price\ Change_{i,j,t} = {} & \beta^2 Issuer\ Share_{k,t-1} + \gamma^2 Issuer\ Share_{k,t-1} \times Hot_t \\
& +\ Initial\ Rating,\ Fraction\ AAA\ (Level\ of\ Subordination), \\
& Log\ of\ Yield\ Spread, Collateral\ and\ Issuer\ controls \\
& + e^2_{i,j,t}.
\end{aligned}
\tag{2}
$$

They use the equation 1 to regress the yield spread at the issuance with the characteristics of the deals and tranches, the issuer and the market where the lagged market share of the issuance (Issuer Share $k, t-1$) and its interaction with the fraction of total principal amount of all the tranches issues in a given year. They find that the tranches sold by the large issuers on an average have higher yields, which are as much as 13% higher in year 2006.

They also found that the yields on the AAA rated tranches included in the deals with greater number of tranches have higher yields as the investors are suspicious of the quality of more complicated deals and demanded greater price discounts as a compensation for holding the risky (complicated)deals.

They also found that for the tranches with underlying mortgages in troubled states(Arizona, California, Florida etc) investors demanded greater risk compensation by asking for more greater price discounts which result in a greater yields.

In addition, the tranches that have three ratings are associated with lower yields as compared to the tranches with two or one ratings. Again, for the tranches sold by the large issuers the yields on even the tranches that have three ratings is higher than those sold by the small issuers. This can be explained by the fact that the market understands the fact

that the big issuers have more bargaining power when dealing with rating agencies than the small issuers.

Equation 2 explains the ex post price changes of the tranches sold by the large issuers by almost 10% as compared to the small issuers. This result was also found in the Paper 1 published by the same authors. This suggests that the market prices incorporated the risk of the bad outcome during the years 2004- 2006.

Table III
Regression of MBS Yield Spread to Issuer Share

This table reports OLS regressions of the *Log of Yield Spread* of privately issued MBS tranches on issuer market share, tranche-level characteristics, other issuer characteristics, and market conditions. The sample includes all tranches for which we can observe initial coupons (or fixed spreads) on Bloomberg originated between 2000 and 2006 that received a rating from Moody's, S&P, or Fitch. Variables are defined in Section II.B of the text. *Initial Rating Category Dummies* in Panels C and D are a set of dummies to indicate each level of the average ratings a given tranche received at issuance, after we convert the ratings into a numerical value by setting AAA = 1, AA+ = 1.67, AA = 2, AA− = 2.33, and so on, and then take the arithmetic averages of the ratings the tranche receives. Each regression includes separate intercepts for coupon types (floating, fixed, or variable). Standard errors are clustered by both cohort-year and issuer (two-way clustering). *T*-statistics are in parentheses. Panels A and B present results for AAA tranches only; Panels C and D present results for non-AAA tranches only. Panels A and C do not have issuer fixed effects, and Panels B and D have issuer fixed effects. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			Panel A: AAA Tranches Only, No Issuer Fixed Effects					
Issuer Share	0.2891	−1.2301**	0.2247	−1.2073**	0.1904	−1.1930**	0.2060	−1.1207**
	(0.53)	(−2.35)	(0.43)	(−2.21)	(0.36)	(−2.24)	(0.40)	(−2.12)
HOT* Issuer Share	–	9.8987***	–	9.3310***	–	9.0203***	–	8.6405***
	–	(3.20)	–	(2.97)	–	(2.87)	–	(2.81)
Bank and Thrift	−0.0163	−0.0407	−0.0429	−0.0657	−0.0457	−0.0677	−0.0462	−0.0672
	(−0.35)	(−0.91)	(−1.09)	(−1.46)	(−1.18)	(−1.54)	(−1.17)	(−1.51)
Bank and Thrift⁺ Post July 04	0.0962**	0.1116***	0.1417***	0.1559***	0.1431***	0.1569***	0.1446***	0.1576***
	(2.20)	(2.61)	(3.27)	(3.50)	(3.25)	(3.42)	(3.16)	(3.37)
Level of Subordination	–	–	0.6736***	0.6718***	0.6645***	0.6629***	0.2417	0.2825
	–	–	(4.79)	(4.71)	(4.31)	(4.26)	(0.95)	(1.04)
HOT* Level of Subordination	–	–	–	–	–	–	2.3559	2.1199
	–	–	–	–	–	–	(1.47)	(1.31)
Log of Principal	−0.0208**	−0.0210**	−0.0041	−0.0044	−0.0028	−0.0032	−0.0022	−0.0026
	(−2.20)	(−2.48)	(−0.46)	(−0.49)	(−0.32)	(−0.35)	(−0.24)	(−0.28)
Log of Weighted Average Life	0.0082	0.0081	0.0106	0.0105	0.0108	0.0106	0.0110	0.0108
	(0.08)	(0.08)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)	(0.11)
Log of Number of Tranches	–	–	0.1499***	0.1491***	0.1515***	0.1505***	0.1523***	0.1513***
	–	–	(5.32)	(4.88)	(5.12)	(4.75)	(5.14)	(4.80)

The below picture is taken from paper 2 and compares the yield at issuance for large and small issuers for both AAA and non AAA securities. Clearly it can be seen that the yields for the tranches sold by the large issuers is higher when compared to the similar rated tranches sold by the small issuers and this Effect is more pronounced during the boom years where it can be seen that the yield spread is 10% higher for the tranches sold by the large issuers . This implies that the market was pricing and investors were aware of the risk of inflated and conflict of interest (as described above) and demanded price discount as a compensation for holding the tranches issued by the large issuers.

Yield Spread (Basis Points)
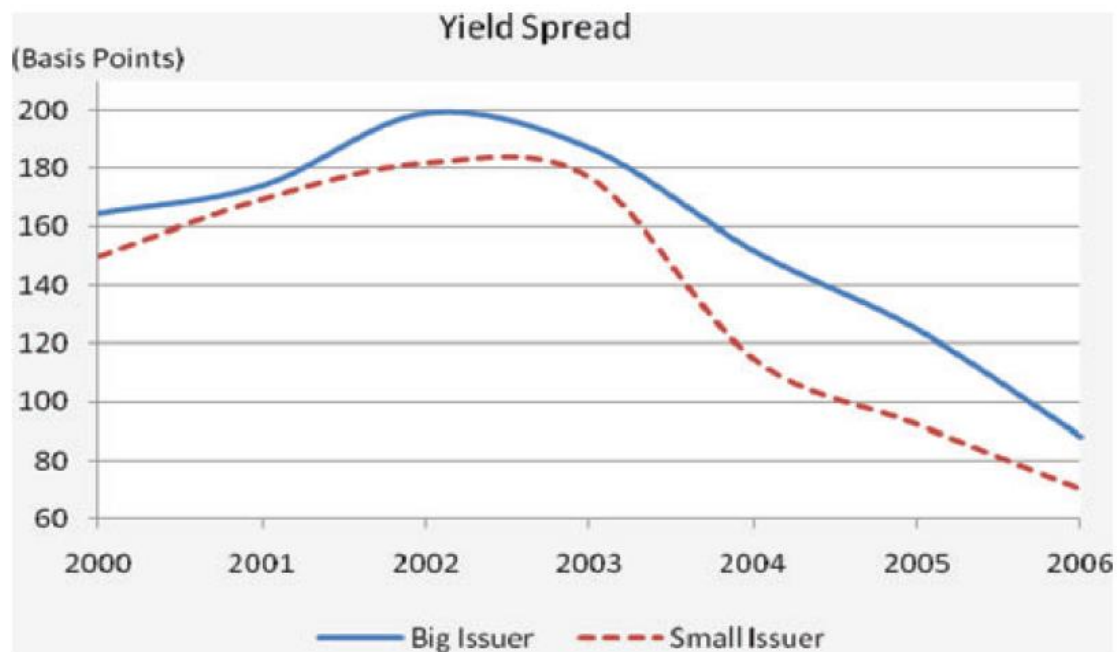
PAPER 3 –

In this paper the author studies the rating bias using the below equation

In this paper, the author estimates the rating inflation in relative terms by calculating the rating bias using a model that calculates the expected rating using all the market observable characteristics e.g. FICO Score, LTV etc. Rating bias is then calculated for each security by calculating the difference between the expected rating and the actual assigned rating as is given by the below equation. The author then empirically proves that the rating bias is consistent with both rating shopping and rating catering phenomenon as is consistent with the findings of paper 2.

Rating Bias = E[Rating] – Rating

It is seen that the market expects inflated ratings and the rating bias, but the marginal effect is not sufficient to explain the spread reduction due to the absolute inflated ratings assigned.

Moody's / S&P — Spread Reduction (bps) by rating tranche across Investment Grade and Speculative Grade.
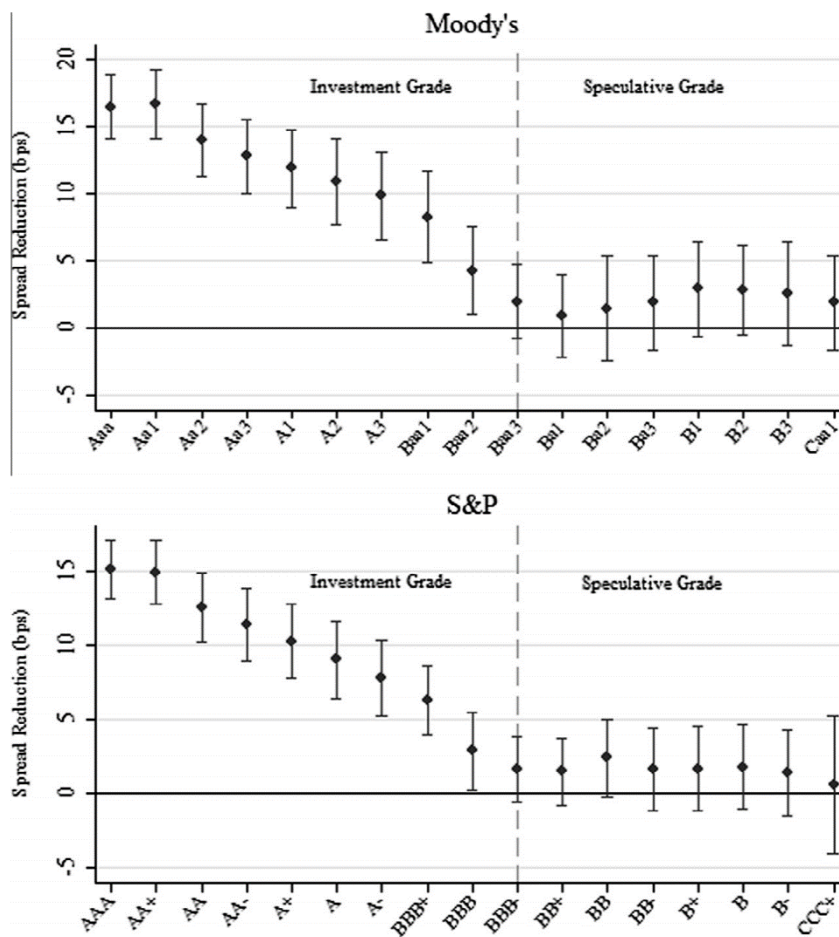
The above photo explains the effects of inflation and rating bias across all the tranches. Furthermore, it can be seen that there is a spread reduction across the Investment grade securities which is consistent with the demand of tranches among investors.

The ratings bias appears to be priced correctly for the Speculative Grade and incorrectly for the Investment grade. Two points can explain this finding – a significant amount of investors can be naïve and rely extensive on the Credit ratings and rating inflation favors buy side to relieve it from the heavy regulatory capital requirements for SG graded securities.