What determines CABS ratings and do the ratings matter on average?

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Abstract

In 2007, amidst falling home prices and rising delinquencies in the subprime mortgage market in the United States (U.S.), credit rating agencies (CRAs) such as Standard & Poor's, Moody's Investor Service and Fitch Ratings were accused of bearing a strong responsibility for the crisis. In this paper, we assess the importance of credit ratings of structured financial products, using a sample of asset backed securities and commercial asset backed securities over a period January 1998 through to February 2010. In particular, we assess the determinants of the credit ratings of asset backed securities as well as test whether ratings of asset backed securities do matter to the CABS index. We test the relationship between ratings changes of the asset backed securities and the CABS index using both univariate as well as a multivariate analyses and find that on their own, ratings of assets backed securities does matter to the returns, however as we add economic factors, it seems that on average the economic factors tend to overshadow the impact of the ratings changes in the market. We use panel ordered probit to assess the key determinants of ratings of asset backed securities. The key factors that play an important role in the determinants are the face value, the yield and the duration of the security.

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1. Introduction

The subprime crisis has demonstrated investors' limited understanding towards the complexities of asset backed securities and the underlying risks that the ratings of these instruments entail, leading to an undue reliance placed on the securities ratings for their investment decisions. The central theme of structured finance lies in the ability of financial institutions to securitize financial assets, and thereby, creating tradable instruments of varying degrees of subordination that have different risk-return profiles tailored to the specific risk appetites of investors. Structured finance products serve as an important avenue of credit risk transfer for financial institutions and also allow for greater capital efficiency. A conventional structured finance arrangement is an Asset-Backed Security (ABS), whereby a portfolio of income-producing assets such as loans are bundled and sold to investors in tranches with different tiers of priority in receiving cash flows as well as promised returns. The ratings of asset backed securities have been highly criticised and the ratings agencies are now under scrutiny for having given investment-grade ratings to asset backed securities based on risky subprime mortgage loans. These high ratings enabled these securities to be sold to investors, thereby financing the US housing boom.

Credit ratings agencies are not the only one culprit for the current financial market turmoil. Certainly, there are other financial market participants to whom blame is also attributable as regard the crisis. In spite of the critics, currently, the agencies still retain some weight in the financial markets, and have demonstrated that they are back to work given investors have been following their views carefully on sovereign debt in places like Greece, Japan and Italy. The literature on credit ratings does not seem to do much justice to the existence of the rating agencies. They seem to be always criticised. Boot, Milbourn and Schmeits (2006) highlight that there seems to be a fundamental disagreement on whether ratings play a meaningful role and relatedly whether the ratings have real informational value.

They provide support for the existence and role of the rating agencies in that they argue that credit ratings can serve as "focal points", that is they can serve to fix the desired equilibrium in the financial markets. Investors argue that the rating agencies are too slow in adjusting their ratings to changes. A possible explanation for this is the through-the –cycle methodology that rating agencies use. The through-the-cycle methodology that the rating agencies use is intended to measure default risk over long investments horizons and to respond to only changes in the permanent component of credit quality. There are a few studies which have shown that rating agencies do not generally exhibit excess sensitivity to the business cycles; see for example, Amato and Furfine (2004). Further Altman and Rijken (2005) show further support of the agencies by confirming that the exclusive focus of agencies is on the permanent component of credit quality. Stolper (2009) provide further support for the rating agencies. He empirically proves that the threat of a reputational loss presents a very strong incentive for the credit ratings agencies to assign a correct rating. During the past ten years, a number of researchers acknowledge the criticisms made on the rating agencies, but their conclusion nevertheless underline the continuous importance of the credit rating agencies. As such, one of the motivations of this paper is to test whether the criticisms of the rating agencies are justified, in particular over the crisis period and re-visit the role of the agencies in the markets.

In this paper, we use data on assets backed securities (ABS) ratings which is based on the Merill Lynch Asset backed Securities and Commercial Mortgage Backed securities Index (CABs), to assess whether the reliance placed by investors on credit ratings is justified. The key contribution of this paper is, firstly we add to the literature on both ratings and complex structured finance products. In particular we test whether ratings of assets backed securities does matter to the returns on the CABs in the market, that is by testing the information content of ratings. Second, we analyse the information content of the rating changes. We

undertake both univariate and multivariate analyses to assess whether other factors have more impact on the index as compared to the ratings. Third, we also undertake an assessment of the determinants of asset backed securities ratings for a period starting January 1998 through to February 2010. Hence as highlighted, the rationale for this study is mainly the criticisms on the rating agencies as well as the proposed reforms that are expected to be made to the rating industry and actions. In fact as per the Financial Crisis Inquiry Commission: "The three credit rating agencies were key enablers of the financial meltdown. The mortgage-related securities at the heart of the crisis could not have been marketed and sold without their seal of approval. Investors relied on them, often blindly. In some cases, they were obligated to use them, or regulatory capital standards were hinged on them. This crisis could not have happened without the rating agencies. Their ratings helped the market soar and their downgrades through 2007 and 2008 wreaked havoc across markets and firms". Rating agencies have played a very important role at various stages in the subprime crisis. They have been highly criticised for understating the risk involved with new, complex securities that fueled the US housing bubble. As such this study will shed light on the importance of these ratings and whether they are rightly classified as the major culprits of the global financial crisis and provide an understanding of the determinants of ABS ratings.

While there has been a rich vein of research in credit ratings covering a wide range of issues, including bond ratings, sovereign ratings, corporate ratings, the academic research is relatively silent with regards to ratings of structured finance products. However, the phenomenal growth of the structured finance sector has not escaped the attention of regulators and industry practitioners, who have published anecdotal studies and working papers in this area. For example, Carron, Dhrymes, & Beloreshki (2003) and the Committee on the Global Financial System (2005) presented comprehensive overviews of the role of ratings in structured finance and also reviewed the analytical methodologies and issuer

selectivity among the credit rating agencies. Ammer & Clinton (2004) also contributed to the literature with findings suggesting greater asymmetry in the value relevance of rating changes of ABS as compared to corporate and sovereign bonds.

Meanwhile, Hu & Cantor (2003) conducted an extensive study into credit rating transitions of structured finance products over a 20-year period from 1983 to 2002 with over 15,000 structured finance ratings and concluded that structured finance ratings were more stable but experience larger rating movements as compared to that of the firms, that is the magnitude of rating changes is larger. Violi (2005) built upon the large body of research on rating transitions of bond ratings and extended it into the area of structured finance, where empirical testing of over 3,000 Collateralised Loan Obligations yielded findings largely consistent with that of Hu & Cantor (2003). Following the phenomenal growth of the credit derivatives market, Hull, Predescu, & White (2004) extended the limited literature with their findings that downgrades and negative outlooks do not have significant effects on credit default swap (CDS) spreads and that the CDS market appears to be able to anticipate rating announcements.

Among the limited empirical studies on ratings in structured finance are Vink & Thibeault (2008), who found that common pricing factors such as market spread and expected recovery risk characteristics, do in fact impact on the pricing of asset backed securitties(ABSs), mortgage backed securities (MBSs) and collatersied debt obligations(CDOs) differently. Consequently, it was reported that these outcomes will be particularly insightful for industry practitioners in their design and pricing of such securities. Meanwhile, Skreta & Veldkamp (2009) and Fons (2008) acknowledged that the opacity of structured finance products presented the issuers with the opportunity to shop for the best rating and that increased competition within the rating industry would only serve to fuel this rating inflation. As such, the first segment of this study is to use data on ABS to test the

importance of credit ratings of structured finance products and assess whether the ratings impact significantly on the CABs index.

One of the criticisms in the global financial crisis, has been that the rating agencies have provided AAA ratings to the asset backed securities. Critics contend that if the top tranches of the structured products created by the investment bankers had not been rated by the rating agencies as AAA, there would not have been the demand for them. The models used by the rating agencies to rate the tranches of the structures products have been questioned by players of the financial market as well as regulators. Hence, the second segment of the study is to assess the determinants of these ABS ratings and assess whether the models used by rating agencies are in fact a failure. There exists a large body of literature analysing the determinants of bond ratings as well as sovereign ratings. For example, Blume, Lim, & Mackinlay (1998) incorporated market-based risk measures into the analysis, and concluded that both market and accounting-based measures yielded significant explanatory power for corporate bond ratings, with effects being more evident for larger companies. Gray, Mirkovic, & Ragunathan (2006) extended the literature to the Australian context and found that industry concentration measures were also important determinants of credit ratings. More recently, Tanthanongsakkun & Treepongkaruna (2008) offered further insights using the Merton Model and found that market-based variables had greater explanatory and predictive power than accounting-based measures in explaining the credit ratings of Australian firms. As far as sovereign ratings are concerned, the seminal work of Cantor & Packer (1996) examined the determinants of sovereign ratings and its impact on sovereign bond yields, identifying six macroeconomic factors including per capita income and default history to be significant in explaining the country's rating. However, it should be highlighted that the ratings of structured finance products is said to be different from the rating process of bonds and equities, (see, Spaudling, (2005)) and hence an assessment and

understanding of their determinants becomes significant given that the market is said to place undue reliance on these ratings.

The key findings of this paper can be summarised as follows. For the first part of the analysis, where we test the relationship between ratings changes of the asset backed securities and the CABs index, the results suggest that on average, ratings on their own have a significant impact on the CABs index. However, as we include control variables, including measures of economic activity in the multivariate analysis, the importance of ratings seem to drop significantly and the substantial reliance that the market places on these ratings does not seem to be justified. Our results highlight a very important aspect of the role of the rating agencies and indicates that some of the criticism made of the ratings agencies is in fact too harsh. Hence it becomes necessary for the market players and regulators to have a good understanding of the role of the rating agencies in the market. A rating is an independent forward looking assessment of the credit risk according to a globally comparable standard. While the role of the credit rating agencies have been described as the 'gatekeeper' of the markets, they should not be misinterpreted as rating talks of only one topic that is credit risk.

For the second part of the analysis that is the determinants of the ratings, the key quantitative factors that seem to be the most important to the rating process of asset backed securities include specific attributes of each of the securities, such as, the face value, the yield and the duration of the security. The remainder of the paper is organised as follows. Section 2 provides details of the data; section 3 explains the modelling framework employed in this study. Section 4 presents the results of the paper and section 5 provides some concluding remarks.

2. Data

The data that we use in this study of asset backed securities credit rating changes is based on Merrill Lynch's US asset Backed Securities and Commercial Mortgage backed

Securities Index (CABS), for the period back from January 1998 to February 2010. Specifically, the data is downloaded from Bloomberg which has a sequence of files containing various fields for each constituent member including, security identifiers, the CUSIP, the ticker, price, yield, duration, face value, the maturity, the effective yield, and modified duration. The data equally includes the general category of the underlying collateral assets. Table 1 contains a summary of the data that is used in the study.

The Merrill Lynch US Asset Backed Securities & Commercial Mortgage Backed Securities Index tracks the performance of US dollar denominated investment grade fixed and floating rate asset backed securities and fixed rate commercial mortgage backed securities publicly issued in the US domestic market. Qualifying securities must have an investment grade rating. Qualifying asset backed securities must have a fixed or floating rate coupon, an original deal size for the collateral group of at least $250 million, a current outstanding deal size for the collateral group greater than or equal to 10% of the original deal size and a minimum outstanding tranche size of $50 million for senior tranches and $10 million for mezzanine and subordinated tranches. Qualifying commercial mortgage backed securities must have a fixed coupon schedule, an original deal size for the collateral group of at least $250 million, a current outstanding deal size for the collateral group that is greater than or equal to 10% of the original deal size and at least $50 million current amount outstanding for senior tranches and $25 million current amount outstanding for mezzanine and subordinated tranches. Fixed-to-floating rate securities qualify provided they are callable within the fixed rate period and are at least one year from the last call prior to the date the bond transitions from a fixed to a floating rate security. Floating rate securities are excluded.

Each of the securities has a three part description that consist of a ticker, ISIN number (which equally provides the CUSIP number), the description which is the class

identifier specifies the particular tranche of the security and the ticker corresponds to the sponsor of the deal. The index covers a variety of types of asset backed securities and commercial asset backed securities, with a heavy emphasis on the collateral type. The underlying assets are located in the US and denominated in USD. The categories include home equity loan, utilities, credit cards, automobiles, manufactured housing loans, commercial mortgage and a miscellaneous category.

The credit ratings given in the dataset are a composite based on an average of Moody's, S&P and Fitch. Further, any rating below BBB3 is excluded from this sample, hence the sample includes investment grade ratings only. It should be highlighted that the price data is available on a daily basis, but the ratings are usually updated only at the end of the month. As such in our study to assess the importance of these rating on the index, we use a monthly data frequency.

The first segment of our study involves the assessment of the impact of the ratings changes on the CABs index. Credit rating agencies have been extensively criticised for their role in fuelling the unsustainable growth of the asset-backed structured finance debt market—a major catalyst for the global financial crisis. But many of the complaints about them are not new. Rating agencies have long been accused of being slow to react to market events. Examples include their failure to foresee severe financial problems of sovereign issuers (as in Latin American debt crisis and the 2001 collapse of Argentina) and established corporations (Enron, Worldcom). While ratings have been identified as one of the key catalysts to contribute to the Global financial crisis (GFC), it should be noted that the list of the culprits for the crisis is very long. In fact the US Senate issued the Levin-Coburn report which found "that the crisis was not a natural disaster, but the result of high risk, complex financial products; undisclosed conflicts of interest; and the failure of regulators, the credit rating agencies, and the market itself to rein in the

excesses of Wall Street." Hence in our study we consider a series of economic factors to test for how these factors together with the rating changes impact on the CABS return index. We compile a set of economic factors that we obtain from the US Federal Reserve database. Table 2 summarise the factors that have been included in this analysis. The factors that we consider are measures of macroeconomic activity and financial development. There is a wide literature that identifies the importance of macroeconomic factors in security process analysis. For instance, Chen, Ross and Roll (1986) test the validity of the Arbitrage Pricing theory in the US securities market. Their analysis used the US macroeconomic variables as proxies for the underlying risk factors driving stock returns. They found that industrial production, inflation, risk premia, and the slope of the yield curve are statistically significant. Abell and Krueger (1989) investigate a variable beta model that includes a set of ten macroeconomic variables in the US context. Erb et al.(1996a) and Bekeart et al. (1996) suggest a variety of factors that influence the country risk. Demirgüç-Kunt & Detragiache (2002) and Büyükkarabacak & Valev (2010) employed macroeconomic variables into their studies into the determinants of banking crises, providing further validation of the macroeconomic variables as well as the financial sector measures included in this study. We further include some factors to reflect the housing sector, given the data includes collateral such as home equity loans. These are similar to the factors used by Wheeler & Chowdhury (1993) and Kasparova & White (2001) to account for the possible effects on the quality of the underlying assets.

The next segment of our study is an assessment of the determinants of the ratings of the asset backed securities. The profitability of asset-backed securities is largely determined by having a high credit rating, since most of the investors consist of institutional investors who, because they are acting on behalf of others, demand or are legally obliged to invest in only investment grade securities. To achieve this high rating, the sponsors of asset-

backed securities consult with the credit rating agencies to find out what they need to achieve a high rating, then structure the business accordingly. This process is quite different to the rating of bonds. As per the rating agencies, the ratings of asset backed securities depends on four factors, (1) the parties to the deal, which includes the sponsors and the management of the issuer;(2) legal review of the business and documentation;(3) the credit quality of the underlying collateral; and (4) the structure of the security itself, including its cash flow and the use of credit enhancements, see Spaudling (2005)).

Hence we assess the determinants of the ratings so as to further shed light and justify the ratings that have been assigned to the asset backed securities. In our analysis we utilize the specific information relating to each of the securities to assess the determinants of the ratings. The specific factors that we consider include, price, face value, effective duration, yield to worst, effective yields and modified duration to worst. The variables we use fall in the category as the publicly available information in setting quality ratings (see Blume, Lim and Mackinlay (1998)). There is a wide literature on the determinants of ratings which dates back to the early 1960, including Horrigan (1966), Pogue and Soldofsky (1969) and West (1970) who assign numbers to the ratings and regress these numbers on accounting and other variables. Later studies include Pinches and Mingo (1973, 1975) and Altman and Katz(1976), who use discriminant analysis instead of regression analysis. Ederington (1985) compares and contrasts different modeling techniques for assessing the determinants of ratings. Some recent studies focus on other categories of ratings including sovereign ratings, (see Cantor and Packer (1995), Afonso (2003), banks ratings (see Bissoondoyal-Bheenick and Treepongkaruna (2011)), credit risk analysis (see Linden McNamara and Vaaler (1998), Cosset and Roy (1991) and Moon and Stotsky (1993) among others. There is limited or no other studies that undertake an analysis of the determinants of asset backed securities ratings. Hence, our study will make significant contribution to the determinants literature.

3. Modeling Framework

Although the agencies use different symbols, every Moody's rating symbol has its counterpart in the Standard and Poor's rating classification as well as in Fitch rating scale. The agencies make use of alphabetical grades and differentiate each category of rating by using identifiers, which is either a plus or minus or 1, 2 or 3. Similar to most studies undertaken in this area, the initial stage is to transpose the alphabetical grades to numbers. Hence we assign numerical grades to each of the ratings of the securities. It should be highlighted that in our study, the ratings of structured finance products includes only the investment grade ratings and hence we end up with the score of up to 10 rating categories. Table 3 provides a summary of the mapping of the rating to the numerical scores. Following this transition, a positive change will imply that the security has been downgraded and a negative change will imply that the security has been upgraded. The rating provided in the CABS index is a composite rating and as such is updated only at the end of the month and hence we conduct the analysis on a monthly basis. However, we provide details of the ratings changes over the years for the securities that have been upgraded or downgraded. Table 4 reports the summary of the rating changes with the number of notches by which the rating have been changed. As expected, the number of upgrades is higher in the years prior to the global financial crisis, that is 2005 and 2006 and the number of downgrades exceeds the number of upgrades in the years 2007, 2008 and 2009.

As highlighted the frequency of the rating changes are on a monthly basis. As such for the first part of our study we conduct the analysis on a monthly basis and calculate the monthly rating change for each security. i.e. if this month's rating is 3 whereas the rating for last month is 2, then the change in the rating would be 1 and a positive change is a downgrade. Once, this is calculated, we determine the average changes in each month. We use both equally weighted as well as market value weighted changes in all securities in each month.

Hence to assess the impact of the ratings changes on the CABS index, the analysis is restricted to 145 months that is January 1998 through to February 2010.

In order to test for the information content of the ratings, we run a simple regression using the ordinary least squares method. We obtain the monthly CABs index from Merrill Lynch and run both a univariate analysis and a multivariate analysis. It is very important to undertake both analyses as there are other events that affect the returns on the market and to test whether ratings carry the same significant information as compared to when there is no other event, (see Hill and Faff (2010))[2]. As such we run a regression where the return is modelled as a function of the individual macroeconomic variables identified that can potentially act as factors that will impact on the information content of the rating changes. We run the following model:

$$R_{it} = \alpha_i + \beta_i X_{it} + e_i \qquad (1)$$

Where, R_{it} is the monthly log returns on the CABS index, X_{it} are the macroeconomic variables described in the previous section and the ratings changes that have been calculated. X_{it} takes the values of each of the individual variables for the univariate analysis and e_i is the error term.

We then undertake the multivariate analysis using different combination of the variables, as well as including the rating change. The following equation is estimated:

$$R_{it} = \alpha_i + \beta_{1i} \text{Ratingchanges}_t + \beta_{2i} Y_{it} + \mu_i \qquad (2)$$

Where R_{it} is the monthly log returns on the CABS index. We calculate both the market value weighted average changes in the ratings (rating_mw) and the equally weighted average changes in the ratings (rating_ew). The variable Y_{it} includes different combination of the economic variables that could potentially impact on the returns index and μi is the error term. The use of a large number of economic variables in the model introduces the possibility

[2] The debate on univariate and multivariate analysis dates back to Beaver and Altman analysis in 1968

of multicollinearity that is independent variables that are closely related to each other. We calculate the correlation between the variables to assess the combination of variables that will be used for the multivariate analysis[3].

The literature on modelling techniques for the determinants of ratings is very wide, with some studies using OLS techniques (Cantor and Packer (1996)), discriminant analysis rather than regressions (Altman and Katz (1976)), (Kaplan and Urwitz (1979)) and ordered probit models. In this paper, in contrast to Kaplan and Urwitz (1979) who use a single cross section of firms, in this paper we utilize panel data covering the years 1998 to 2010. With panel data, we can examine whether the rating standards have changed over time conditional on the included variables. The empirical analysis is done by using a panel ordered probit model. The ordered probit model is said to be more appropriate to data of an ordinal nature such as ratings. This model relates the rating categories to observed explanatory variables through an unobserved continuous linking variable which can be written as follows:

$$y_i^* = x_i \beta + \varepsilon_i \qquad (3)$$

where y_i^* is an unobservable linking variable that measures the risk level, x_i is a vector of explanatory variables, β is a vector of unknown parameters and ε_i is a random disturbance term. If the distribution of ε_i is chosen to be normal, then ultimately this produces an ordered probit model. What we assume is that y_i^* is related to the observed variable y_i – in this case, the ratings that are provided to the individual asset backed securities in the following way.

$$y_i = \begin{cases} 0 \text{ if } y_i^* < \varepsilon_0 \\ 1 \text{ if } \varepsilon_0 < y_i^* \leq \varepsilon_1 \\ 2 \text{ if } \varepsilon_1 < y_i^* \leq \varepsilon_2 \\ 3 \text{ if } \varepsilon_2 < y_i^* \leq \varepsilon_3 \end{cases}$$

[3] We do not report the correlation matrix in the paper; however, this is available on request.

10 if $\varepsilon_9 < y_i^*$

where the εs ($\varepsilon_0 < \varepsilon_1 < \varepsilon_2 < \varepsilon_3 < \ldots\ldots < \varepsilon_9$) are unknown (threshold) parameters to be estimated. To estimate the model, the variables that constitute x_i must be selected, which in this case are the variables detailed in Section 2. Therefore the model to be estimated for the period 1998 to 2010 is as follows:

$y_i = \beta_1$ Price $+\beta_2$ face Value $+\beta_3$ effective Duration $+\beta_4$ Yield to worst $+\beta_5$ effective yield$+\beta_6$ Modified duration. (4)

Given the limitation of data variability on specifics of each of the securities, we focus our study on the publicly available information in setting quality ratings. Similar to the first segment of our analysis we estimate equation 4 as well as undertake univariate analysis for each of the variables listed in equation 4.

4. Results

The analysis in this paper is conducted over the period January 1998 to February 2010, using monthly data of 145 observations. Ratings agencies have been harshly criticised over the past years given investors have placed heavy reliance on the ratings of the asset backed securities. We run equation (1) and equation (2) to assess how rating changes impact on the CABs index. The rating changes have been calculated using both equally weighted as well as market value weighted changes in all securities in each month. The results of the univariate analysis of running each variable at a time are reported in table 5. The univariate analysis indicate that the variables that have a significant impact on the returns on CABS include the equally weighted average changes in the ratings(Rating_ew) , the equally weighted average ratings level in each month (level_vw), percentage changes in Nonfarm payrolls

(Nonfarm_Payrolls_change), percentage changes in CPI (CPI_percentage_change), percentage changes in the industrial production index (IPI_change), percentage changes in Commercial and Industrial Loans at All Commercial Banks (BUSLOANS_change), percentage changes in Total Commercial and Industrial Loans Including Foreign Related Institutions, (TOTCI_change), Percentage changes in Bank Credit of All Commercial Banks (TOTBKCR_change). Pelizzon, Enrico and Sottana,(2002) argue that the returns on assets backed securities including residential mortgage backed securities and commercial mortgage backed securities differ substantially from the returns on a traditional investment like bonds and in particular for the risk-return trade off. They equally argue that ABSs are collateralised by several assets (often thousands), so the subscriber should look for information about all these assets and then study how the cashflows are allocated throughout the subordinated tranches as compared to bonds. Hence by undertaking the univariate analysis, it provides us with an insight as to the possible factors that could significantly have an impact on the returns of the CABS.

We then undertake an estimation using the variables identified as being significant in the univariate analysis and conduct a multivariate analysis. The results are reported in table 6. We undertake the analysis using the market value weighted average changes in the ratings,(Rating_mw), the equally weighted average changes in the ratings,(Rating_ew), using the level of rating changes both equal weighted as well as market weighted (level_ew and level_vw).However, we report our results using the equally weighted average rating changes given we obtain similar results. We report six versions of the model to assess the impact of the rating changes on the returns on CABS. The key observation from these models is that rating changes do not have a significant impact on the CABs index. What does have an impact are the set of the variables that have been included in the model as control variables. If we consider model 5 for instance, it indicates that Nonfarm payrolls

(Nonfarm_Payrolls_change), percentage changes in CPI (CPI_percentage_change), percentage changes in the industrial production index (IPI_change), percentage changes in Total Commercial and Industrial Loans Including Foreign Related Institutions, (TOTCI_change), delinquency rate, unemployment rate, effective federal funds rate, percentage changes in total consumer credit Outstanding (TOTALNS_change), percentage changes in total loans and investments at all commercial Banks (LOANINV_change) and Percentage changes in Total Loans and Leases at Commercial Banks (LOANS_change) are statistically significant . A very interesting finding is that the rating changes in this model as indicated by the equal weighted rating changes (rating_ew) and level of rating changes (level_vw) are not statistically significant. Our results indicate as we add macroeconomic factors that capture economic conditions and the variables highlighting the level of loans by banks, the rating changes do not seem to have an impact on the market. Our results are in line with the results obtained by Demyanyk and Hemert (2011) who undertake a study to provide an understanding of the subprime mortgage crisis. They find that during the growth of the securitised mortgage market, the quality of the market deteriorated dramatically by using measures of loan quality as the performance of loans, adjusted for differences in borrower characteristics, and macroeconomic conditions. The result indicates that as we add the loan variables by banks, rating is no longer a factor that has a significant impact of the CABS index. This supports the view of Demyank and Hemert (2011) who argue that the continual deterioration of loan quality could have been detected long before the crisis by using loan variables. Model 5 equally highlights that delinquency rate is statistically significant. Once again Demyank and Hemert (2011) show that the adjusted delinquency rate rose monotically from 2001 onwards and hence this could have been used to show loan deterioration as early as 2005 and conclude that the subprime mortgage market problems were apparent before the actual crisis erupted. These results raise the issue that of the list of the culprits of the global

financial crisis, rating agencies may have been too harshly criticised. During the global financial crisis, rating agencies have come under stinging criticism as they provided a number of AAA ratings to problematic mortgage securities made up of subprime loans. While the rating agencies have agreed to some of the criticism and have been working with the regulators to provide better quality and more credible rating , our results indicate that the rating changes on the asset backed securities are overshadowed by other key factors that have contributed to the crisis. In fact our results are in line with the literature highlighting the validity of macroeconomic variables in security analysis, see for example Chen, Roll and Ross (1986), Abell and Krueger (1989), Gangemi, Brooks and Faff (2000).

The next section of our analysis focuses on the determinants of the asset backed securities ratings. As highlighted in the previous segment, we run a panel ordered probit to assess the determinants of the ABS ratings. Estimation of the parameters of the ordered probit model for the panel data covering 1998 to 2010 is based on standard maximum likelihood techniques. The panel ordered probit model as given by equation (3) assumes that the linking variable y_i^* is a linear function of the explanatory variables. We run the model and the results of the determinants are reported in table 7. We run the model using both a univariate (reported in Panel A of table 7) and a multivariate approach (reported in panel B of table 7). Panel A indicates that the specific attributes to the security are the key determinants of asset backed securities ratings including the price, face value, effective duration, yield to worst, the effective yield and modified duration to worst. The ratings agencies specify that the ratings of asset backed securities is based on the examination of the issuing entity's structure, its collateral and investment guidelines, and the key parties involved, including the vehicle's sponsor and the credit enhancement and liquidity support providers. However, it should be highlighted that the pool of information that they use include both qualitative and quantitative factors. Given the complexity of the asset backed securities, data on these factors

is hard to access as such in this analysis we focus on the attributes of each of the securities. We run equation (4) using a multivariate approach and the results are reported in panel B. Panel B highlights that price and effective duration are not statistically significant while the face value, yield to worst, effective yield, and modified duration to worst are significant determinants of the ratings.

5. Conclusion

This study is primarily motivated by the market's lack of understanding towards the complexities of asset backed securities and the associated criticism that the rating agencies have faced during the global financial crisis. At the core of the recent financial market crisis has been the discovery that these asset backed securities are actually far riskier than originally advertised and one of the key ways that investor's assessed the credibility of these products has been the ratings assigned to these products. As such, it becomes very essential to assess whether the importance and reliance that investors and financial market participants have placed on the ratings are justified. Hence in this paper, we contribute to the literature by assessing the impact of rating changes on the CABS returns as well as undertaking a quantitative assessment of the determinants of these ratings.

The key finding for the first segment of our study, testing the relationship between ratings changes and the returns index suggest that on average, ratings on their own have a significant impact on the returns index as illustrated by the univariate analysis. However, as we include control variables, including measures of economic activity in the multivariate analysis, the importance of ratings seem to drop significantly and the substantial reliance that the market places on these ratings does not seem to be justified. The key determinants of the ratings of the asset backed securities include face value, the yield and the duration of the security. The financial crisis has been classified as a liquidity crisis and the ratings are meant to be

providing an assessment of the credit worthiness of a particular product. Our results shows support that the rating agencies have to some extent been harshly criticised. However, with the lesson drawn from the global financial crisis, it is still important to improve transparency and as such regulators do have some strong justification as to the reforms that are going through.

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Table 1: Summary of data of Merrill Lynch CABS index

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of securities	275	574	950	1,155	3,629	6,328	10,511	13,535	17,862	19,542	16,949	11,142	6,581
Mean:													
Price	103.89	97.14	97.44	103.48	103.15	102.99	101.88	100.81	100.10	92.66	69.12	61.07	82.22
Duration	5.59	5.62	5.35	5.29	3.10	2.43	1.91	1.60	1.39	1.42	1.38	1.43	1.87
Yield	6.22	7.41	7.66	6.17	3.66	2.87	3.15	4.63	5.70	9.20	19.73	25.00	9.40
Coupon	6.88	6.92	7.10	7.02	5.30	4.52	4.19	4.83	5.71	5.74	4.28	3.41	3.88
Rating:													
AAA	217	361	490	557	1945	3930	5457	5945	7609	8209	7186	4406	2681
AA1	9	26	50	61	107	219	396	897	1514	1796	2133	1134	516
AA2	12	30	67	100	298	572	1098	1603	2093	2286	2468	1441	601
AA3	13	21	38	42	119	196	353	739	1303	1611	2124	1275	487
A1	3	17	35	40	95	195	422	795	1212	1493	1842	1177	385
A2	8	27	75	102	506	766	1304	1620	1874	2111	2309	1502	442
A3	3	16	41	58	104	198	476	809	1166	1575	2084	1374	359
BB1	1	1	0	0	0	0	0	0	0	0	0	0	0
BBB1	7	19	35	42	84	166	469	843	1138	1535	1752	1375	396
BBB2	6	45	87	107	264	394	826	1041	1101	1389	1840	1436	426
BBB3	6	21	49	63	129	210	449	573	584	914	1503	1380	402

Table 2: This table reports the list of economic factors that have been used in the analysis. All the variables are available on a monthly frequency.

Variables	All monthly frequency
Ret_month	Monthly log returns on the CABS index
Rating_mw	Market value weighted average changes in the ratings
Rating_ew	Equally weighted average changes in the ratings
level_ew	Market value weighted average ratings level in each month
level_vw	Equally weighted average ratings level in each month
Nonfarm_Payrolls_chang	percentage changes in Nonfarm payrolls obtained from FRED
Delinquency_rate	Quaterly Deinquency rates on all loans made by all US banks obtained from Fed Reserve bank of New York
CPI_percentage_change	percentage changes in CPI obtained from FRED
IPI_change	percentage changes in industrial production index obtained from FRED
Mortgage_Rate	Mortgage rates obtained from FRED
Bank_Prime_Loan_Rate	Bank Prime Loan Rate obtained from FRED
Civilian_Unemployment_I	Civilian Unemployment Rate obtained from FRED
ten_year_Maturity_rate	10-Year Treasury Constant Maturity Rate from FRED
Effective_Federal_Funds_	Effective Federal Funds Rate from FRED
BUSLOANS_change	Percentage changes in B55Commercial and Industrial Loans at All Commercial Banks, From FRED
CONSUMER_change	Percentage changes in Consumer (Individual) Loans at All Commercial Banks, from FRED
REALLN_change	Percentage changes in Real Estate Loans at All Commercial Banks, from FRED
TOTALNS_change	Percentage changes in Total Consumer Credit Outstanding, from FRED
LOANINV_change	Percentage changes in Total Loans and Investments at All Commercial Banks, From FRED
LOANS_change	Percentage changes in Total Loans and Leases at Commercial Banks, from FRED
TOTCI_change	Percentage changes in Total Commercial and Industrial Loans Including Foreign Related Institutions, from FRED
TOTBKCR_change	Percentage changes in Bank Credit of All Commercial Banks, from FRED

Table 3: Summary of Rating mapping to Numerical Scores

Ratings	Numerical Score
AAA	1
AA1	2
AA2	3
AA3	4
A1	5
A2	6
A3	7
BBB1	8
BBB2	9
BBB3	10

Table 4: This table reports the number of securities that have had a rating change over the years. The table details both upgrades and downgrades with the number of notches by which these changes were undertaken.

	Number of Securities												
Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Upgrades No of Notches													
1	90	230	5	20	14	128	441	860	1068	784	299	129	26
2	9	15	4	11	8	31	97	260	420	159	50	45	11
3	11	12	1	2	4	15	36	50	141	46	14	9	4
4	2	4	1	2	1	5	10	18	31	15	0	6	0
5	0	0	0	0	3	0	2	4	5	8	0	4	0
>5	6	0	0	0	0	1	4	11	15	8	2	2	0
Downgrades No of Notches													
1	130	80	8	9	56	180	135	171	51	1428	2473	1303	50
2	30	25	1	4	36	83	44	24	8	680	1834	1400	57
3	33	16	1	2	12	53	46	3	2	229	1609	1117	65
4	2	0	0	0	10	43	20	0	0	68	986	650	40
5	4	1	0	0	1	8	4	0	0	17	560	415	14
>5	7	0	0	0	2	20	23	0	0	11	614	445	4

Table 5: This table reports the results of the univariate analysis to test how rating changes impact on CABS return. The regression is undertaken using OLS techniques. Results are equally reported for the economic variables included in the study. The LHS of the equation is the return on the CABS index.

LHS : Returns on CABS						
RHS Variables	Intercept	t-stat	variable	t-stat	F-value	Adjusted R^2
Rating_mw	0.00341	(3.00)	-2.6476	-(1.16)	1.35	0.00
Rating_ew	0.00359	(3.20)	-0.0242	-(1.84)	3.39	0.02
lag_Rating_mw	0.00282	(2.45)	1.08556	(0.47)	0.22	-0.01
lag_Rating_ew	0.00299	(2.62)	-0.0005	-(0.03)	0.00	-0.01
level_vw	-0.0002	-(0.12)	0.07727	(2.17)	4.70	0.03
level_ew	0.00591	(0.92)	-0.0009	-(0.45)	0.21	-0.01
Nonfarm_Payrolls_change	0.00254	(2.37)	0.01639	(2.90)	8.43	0.05
Delinquency_rate	0.00026	(0.11)	0.00103	(1.37)	1.88	0.01
CPI_percentage_change	0.00064	(0.56)	0.0116	(4.62)	21.33	0.12
IPI_change	0.00273	(2.57)	0.00438	(2.96)	8.78	0.05
Mortgage_Rate	0.00396	(0.47)	-0.0001	-(0.11)	0.01	-0.01
Bank_Prime_Loan_Rate	0.00099	(0.28)	0.00032	(0.60)	0.36	0.00
Civilian_Unemployment_Rate	-0.0023	-(0.58)	0.00098	(1.37)	1.89	0.01
ten_year_Maturity_rate	-0.0035	-(0.58)	0.00142	(1.10)	1.20	0.00
Effective_Federal_Funds_Rate	0.00205	(0.99)	0.0003	(0.55)	0.31	0.00
BUSLOANS_change	0.00367	(3.35)	-0.0026	-(2.81)	7.92	0.05
CONSUMER_change	0.00333	(2.86)	-0.0008	-(0.88)	0.77	0.00
REALLN_change	0.00387	(2.61)	-0.0012	-(0.89)	0.79	0.00
TOTALNS_change	0.00218	(1.66)	0.00188	(1.10)	1.22	0.00
LOANINV_change	0.00291	(2.01)	0.00013	(0.07)	0.01	-0.01
LOANS_change	0.00414	(3.03)	-0.0021	-(1.42)	2.00	0.01
TOTCI_change	0.00413	(3.93)	-0.0041	-(4.69)	21.97	0.13
TOTBKCR_change	0.00596	(4.38)	-0.0053	-(3.47)	12.04	0.07

Table 6: This table reports the results of the multivariate analysis to test how rating changes impact on CABS return. The regression is undertaken using OLS techniques. We run the regression using different combinations of the variables as well as run the model using both equal weighted rating changes and value weighted rating changes. In this table we report the results using equally weighted average ratings changes given value weighted average rating changes are not statistically significant. The LHS of the equation is the return on the CABS index.

Multivariate Results												
RHS Variables	Model1	t-stat	Model2	t-stat	Model3	t-stat	Model4	t-stat	Model5	t-stat	Model6	t-stat
Intercept	0.0028	(2.39)	0.0033	(2.32)	0.0027	(2.04)	0.0005	(0.26)	-0.0389	-(1.39)	0.0030	(1.76)
Rating_ew	-0.0080	-(0.54)	-0.0144	-(1.13)					-0.0056	-(0.44)		
Nonfarm_Payrolls_change	0.0147	(2.28)	0.0196	(2.88)	0.0222	(3.44)	0.0139	(2.36)	0.0189	(2.31)		
CPI_percentage_change			0.0091	(3.91)	0.0091	(3.90)			0.0101	(4.56)		
IPI_change			0.0010	(0.64)	0.0011	(0.71)			-0.0004	-(0.28)		
BUSLOANS_change			-0.0016	-(1.33)	-0.0014	-(1.19)			-0.0019	-(1.17)	-0.0012	-(0.66)
TOTCI_change			-0.0035	-(2.63)	-0.0037	-(2.81)			-0.0029	-(2.07)	-0.0030	-(1.98)
TOTBKCR_change			-0.0019	-(1.15)	-0.0015	-(0.94)			-0.0017	-(1.04)	-0.0020	-(1.04)
Level_vw							0.0513	(1.40)	0.0091	(0.19)		
Delinquency_rate									-0.0055	-(1.79)		
Mortgage Rate									-0.0027	-(0.65)		
Bank_Prime_Loan_Rate									-0.0065	-(1.14)		
Civilian_Unemployment_Rate									0.0108	(2.60)		
ten_year_Maturity_rate									0.0033	(0.83)		
Effective_Federal_Funds_Rate									0.0115	(1.95)		
CONSUMER_change									0.0005	(0.57)	-0.0009	-(0.93)
REALLN_change									0.0014	(0.71)	-0.0024	-(1.10)
TOTALNS_change									0.0029	(1.95)	0.0026	(1.62)
LOANINV_change									0.0094	(2.74)	0.0097	(2.39)
LOANS_change									-0.0092	-(2.38)	-0.0038	-(0.85)
F-value	4.34		11.33		12.98		5.22		7.35		4.43	
Adjusted R^2	0.0443		0.3358		0.3345		0.0553		0.4577		0.1609	

Table 7: This table reports the results of the determinants of the ratings of the asset backed securities. The estimation is done using panel ordered probit. Panel A reports the results of the univariate analysis and panel B reports the results of the multivariate analysis.

Panel A:Univariate Probit Results

RHS Variable	variables	P-value	R square	No of Obs
PRICE	-0.0256	(0.00)	0.10	7722
FACE_VALUE	0.0035	(0.00)	0.04	7722
EFF_DURATION	0.0914	(0.00)	0.03	7696
YIELD_TO_WORST	0.0550	(0.00)	0.01	7722
EFF_YIELD	0.0502	(0.00)	0.01	7697
MOD_DURATION_TO_WORST	0.0971	(0.00)	0.03	7722

Panel B:Multivariate Probit Results

RHS Variables	variable	p-value
PRICE	-0.0015	(0.38)
FACE_VALUE	-0.0017	(0.00)
EFF_DURATION	0.0128	(0.62)
YIELD_TO_WORST	0.1218	(0.00)
EFF_YIELD	-0.0933	(0.00)
MOD_DURATION_TO_WORST	0.0604	(0.02)
No of Obs	7696	
R square	0.57	