Investor Sentiment, Credit Default Swap and Crisis

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Abstract

The main purpose of this paper is whether the investor sentiment can predict credit default swap changes. We use several proxies for sentiment in our regressions in both firm level and portfolio level. The result is that most of sentiment proxies are economically significant to explain CDS spread changes and among the sentiment measurements, in general, the difference of Equity put/call ratio performs best in predicting CDS spread changes in both firm level and portfolio level regressions. We find some evidences that sentiment is a good factor to explain CDS spread in crisis. We also discover that sentiment explains differences in CDS spread best in the group whose leverage ratio and volatility is highest and vice versa and leverage ratio is more systematically related to CDS spread change than volatility. Besides, the difference of Equity put/call ratio explain CDS spread changes much better for non-investment grade CDS spread changes than investment grade ones.

Keywords: Investor Sentiment, Credit Default Swap, Volatility, Leverage Ratio, Crisis.
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1. Introduction

In the academic field, substantial amount of studies relating to CDS has been examined for credit risk as a credit instrument. The study of CDS dates back to the structure model of Merton (1974) which use the option pricing model of Black and Scholes (1973). Merton insists that the firm's default risk is one kind of call option of which underlying asset is the firm's equity and the strike price is firm's debt. In the model, the main determinants of which are financial leverage ratio, volatility, and the risk-free rate and does not consider systematic risk.

However, the theoretical model has shown the large gap from the historically observed credit risk. The pioneering empirical study of credit risk is Collin-Dufresne et al. (2001)'s. they reveal that the variables in theory model explain only limited portion of the variations in credit spreads of bonds and the residuals can be driven from single factor which is not explained by firm-specific variables, so a number of papers focus on discovering the determinants of credit spread. They use some plausible factors which are liquidity, macroeconomic, and other financial variables including individual firm's equity return, the change in leverage ratio, nonlinear effects, FF factors and leading effects of stocks on bonds in the additional robust test, but they cannot find the systematic factor.

Nowadays, a number of studies use CDS spread as a proxy of credit risk since several advantages of them. Ericsson, Jacobs and Oviedo-Helfenberger (2009) use structural model and carry out the liner regression on both CDS level and CDS changes to investigate whether the set of theoretical variables which are leverage ratio, volatility and riskless rate have explanatory power. While predicting approximately 60% of CDS level, the factors only have limited explanatory power, at about 23%.

Chen et al. (2009) expanded Huang and Huang (2003)'s model, found that historical default rates, recovery rates, and Sharpe ratios are important determinants, but even including these factors, theoretical model still falls far short of the historical spread. The results indicate that credit risk is hardly explained by theoretical variables.

Therefore, many studies investigating credit risk spread focus on finding the systematic determinants based on the suggested variables. The most popular factors that researchers are interested in are the macroeconomic factors. Alexander and Kaeck (2008) apply a two-stage Markov switching model as a business cycle to regime behavior of CDS spreads. They conclude that theoretical factors has an explanatory power on CDS spreads expect the slope of the yield curve, but they only can predict approximately 20% to 30% of the CDS spread changes. They also find that a systematic factor which are not considered in Merton(1974)'s model is on possible determinant to explain residuals.

Chen (2010) insists that the macroeconomic condition is an important factor since they influence the financial decision of corporation, which in turn affect the riskiness of the firms. Implementing business cycle to dynamic capital structure model, Chen (2010) insists that macro-economic factors are the potential candidate to resolve credit risk puzzle.

Kim et al. (2013) consider that macroeconomic condition is the significant clue to explain the credit spread puzzle. They incorporate expected market risk premium as the proxy of countercyclical risk into the structural model, and document that the model embedding macroeconomic factor enhances the explanatory power which are approximately 41% of the CDS spread variances and approximately 68% of the differences in CDS spreads in portfolio level regression.

Other noticeable papers consider the ones that are related to the other asset pricing model such as FF three factor model and Chen, Roll and Ross five factor model. Avramov et al. (2007) conduct a linear time-series regression of structural model on differences of corporate bond credit spread incorporating macroeconomic dummies and FF factors. Their result reports that although FF factors are significant in total sample, when the corporate bond is categorized by the three credit risk groups, the explanatory power of FF variables are not observed.

Galil et al. (2013) proposes a model for both CDS spread and CDS changes by analyzing Fama French(1993;FF) three Factors with Pastor and Stambaugh (2003;P&S) liquidity factor and Chen, Roll and Ross (1986; CRR) Factors. They report that the market variables are significant determinant for the CDS spread changes and firm-specific variables lose its power to forecast the CDS spread variances. Nevertheless, Galil et al. (2013) is not persuasive. While coefficients are all significant only in the FF factor model, the exception which has insignificant coefficient is observed in CRR and FF factor model including liquidity factor. Moreover, the intercepts are also highly economically significant which means the model does not fully capture the CDS premia changes and also implies the existence of other systematic factor. In addition, in the model which includes all variables, only with the exception of ΔMRI (change in median CDS spread in the rating class) factor, all other suggested factors are insignificant and only the firm specific variables are statistically valid.[1]

Likewise, these poor performances in empirical studies of preceding rational CDS spread determinants motivate us to need studies outside traditional structure determinants. Responding the demand, we suggest novel approach to credit risk. In this paper we implement investor sentiment as a determinant of CDS spread change.

According to Han (2008), "Investor sentiment is the aggregate error in investor beliefs." It is implemented to the numerous sorts of financial field theoretically and empirically. For stock asset pricing, sentiment is considered as the important variable. Lee et al. (2002) conduct GARCH-in-mean model employing the Investors' Intelligence sentiment index of New Rochelle as an independent variable. They conclude that sentiment is incorporated in the stock price. Excess returns and sentiment move is positively correlated without lags.

Yu and Yuan (2011) test how the investor sentiment is related to the market's risk and return. They conduct GARCH model using Baker and Wurgler (2007) to divide the sentiment into two parts: low-sentiment period and high sentiment period. They report that the expected excess return in stock market is high in low-sentiment periods while variance has weaker negative correlation with the expected risk premium in high-sentiment periods since the role of sentiment traders is larger during high-sentiment periods giving the logical explanation, sentiment traders can erode the risk-premium.

Investor sentiment shows outstanding results in option market, which is another part of derivatives market. Han(2008) documents that investor sentiment proxies in the stock market is related to index

[1] Verifying that macroeconomic factor can explain credit spread puzzle, we replace the expected market risk premium which is the proxy for the business cycle in Kim et al. (2013)'s research, to the factors suggested in the Cooper and Gubellini (2011) such as ΔCPI (changes in Consumer Price Index), ΔIPI (changes in Industrial production index) and ΔUNP (changes in unemployment), and we cannot find any evidence that these variables convince the Chen (2010)'s hypothesis.

option volatility smile and risk-neutral skewness in S&P 500 index option measured according to Bakshi, Kapadia, and Madan (2003) method and this result cannot be explained by the rational option pricing model. The researcher also finds that difference in the investor sentiment explains the slope of index option smile and risk-neutral skewness changes by time even better than the prevailing models. However, for the credit risk, investor sentiment is not significantly considered. Only few researches are related to the variable. Remolona et al. (2007) reports that log difference in sovereign CDS spread is determined by both national specific variables and investors' risk aversion.

Tang and Yan (2010) incorporate Conference Board Consumer Confidence Index as the proxy for changes of risk aversion which alters the market risk premium. They reveal that investor sentiment greatly predicts credit spread. However, their purpose of the study is more focusing on the influence of market risk on CDS changes through the structural model, so sentiment itself does not fully investigated. Besides, Tang and Yan (2010) only consider monthly Conference Board Consumer Confidence Index as the sentiment proxy among the various sentiment measurements. As Han (2008) pointed out, the general participants of the option markets are large investors who are usually institutions, so the small investors such as individuals do not take significant portion in the derivative market. Because of this reason, considering only individual sentiment such as Conference Board Consumer Confidence Index can have weak evidence for the result. Therefore, we consider not only for the individual's sentiment but for institutions' sentiment computed by various formulas used in different derivative markets.

Chen and Wang (2010) incorporate the investor sentiment in the model as the determinants of CDS spread from 2004 to 2007. They categorized diverse sentiment into two groups: market-wide derived from option market and firm-specific sentiment and report that the investor sentiment explains CDS spread in both direct way and indirect way by affecting stock market and option market. Compare to the research which purely conducts linear regression on the CDS spread and the sentiment variables, our study are more based on structural model which embed firm specific theoretical factors with controlling variables. Moreover, sample period of Chen and Wang (2010) exclude the global financial crisis which is extremely important term for CDS studies. Therefore we expand the research period from 2006 to 2009 which sufficiently include period of global financial crisis.

Along this line of research, this paper aims to examine that market sentiment can be the determinant for CDS spread changes in theoretical model. This paper is motivated by previously documented evidence of limits of explanatory power of theoretical model and its expanded models such as macroeconomic factor models. This study starts from the idea that the investor sentiment embeds common or systematic risk factor of variance in CDS spreads.

The main purpose of this paper is examining whether sentiment can be the determinants for CDS spread variance and if so, which market sentiment can predict CDS the best so that can be used as representative proxy of various sentiment measurements.

To fill the gap in the CDS spread studies, this paper has the following differentiations compared to the precedents. First, we use various measurements for sentiments. So far, only partial sentiment proxies have been examined. This is because researchers assume that the sentiment is only one of the proxies or conditioning variables for other factors which are the candidate to explain CDS premia. For example, Michigan Consumer Sentiment index and American Association Investment Index[2] are surveys of aggregate economic condition, so that often used as the proxy for macro economy. We assume that since many researches reveal that credit risk is related to the risk of other markets such as stock market and option market and plus recently macro economy, the sentiment of them can have explanatory power on CDS changes. Hence, to examine whether sentiment explain variation in CDS premia, we embed diverse sentiment proxies from different basis. Since stock market, especially S&P 500 return, is also related to CDS spread, we include another sentiment proxies calculated with stock market variables. Moreover, as Han (2008) indicates, the individual sentiment is relatively unrelated to the derivative market because individuals are not major participants in the market, in addition to the

[2] These sentiment proxies are generally called as individual sentiment since the responders of the survey are individuals.

individual sentiment proxies, we also incorporate sentiment from option market as Chen and Wang (2010) suggested. Finally, we calculate the sentiment from the futures market, too.

Second, we conduct regression based on structural model. Since Ericsson et al. (2009)'s model, derived from Black and Scholes (1973) and Merton (1974)'s model, is widely accepted for deciding CDS spread level, we also investigate relationship between CDS spread changes and investor sentiment with Kim et al. (2013)'s model which is an expanded model of Ericsson et al. (2009).

Third, we also carry out the regression in portfolio level to avoid idiosyncratic problems. Following Kim et al. (2013)'s study, we build the 5X5 portfolio by leverage ratio and volatility of individual corporations. Most of other researches about credit risk only conduct the regression in firm specific level which may remain idiosyncratic risk. We build the portfolio matrix by quintile based on leverage ratio and volatility to alleviate the problem.

For the last and the most important, to examine whether Stambaugh et al (2012)'s idea is convincing, we include global financial crisis which is the representative of turmoil term in the sample period. Based on the Miller (1997)'s idea[3], Stambaugh et al (2012) insist that when sentiment exists widely in the market, the limitation in shortsale contributes the major role to increase the degree of the existence of the mispriced asset. They continue that the higher sentiment period, in turn generally considered as the downturn, the more overpricing presences. According to the Stambaugh et al (2012)'s argument we hypotheses that sentiment explain the mispriced CDS spreads which cause so-called 'credit spread puzzle' better in turmoil period. Therefore, we divide the period into two period which are pre-crisis from January 2006 to August 2007 and during the crisis September 2007 to August 2009.

Some studies found that the sample period categorized by regimes has economically significant meaning to explain CDS spreads (Alexander and Kaeck (2008); Cesare and Guazzarotti (2010))

[3] Miller (1997) insist that constraints in short selling stops rational investors from fully using the opportunity of overpriced assets.

The main results of empirical tests are as follows. In general, most of sentiment proxies are economically significant factors to explain CDS spread changes. Among the sentiment measurements, ΔSentEPCR (differences of Equity put/call ratio) performs best in predicting CDS spread changes.

When we divide the sample period into two parts, pre-crisis and during crisis, sentiment models explain CDS spread changes much better in turmoil period than in stable period. These results are consistent with previous studies such as Alexander and Kaeck (2008); Cesare and Guazzarotti (2010) and support the Stambaugh et al (2012)'s hypothesis. To be specific, the constraints in short selling influence only when the stock prices decline because the market participants take advantage of overpriced assets by borrow-and-sell strategy. When they cannot freely use the strategy due to several impediments, for instance rule 105, more and more mispriced assets exist. We assume that sentiment captures the mispricing, so that the sentiment predicts better in turmoil period. This aligns with the widely observed phenomena that historically, in bearish market, the volatility rises, so that the explanatory power in the markets of which variance also increase. On the other hand, due to the absence of roles of short selling in bullish market, sentiment cannot explain well in the period. Therefore, our results can be interpreted by Stambaugh et al (2012)'s explanation.

CDS spread changes are better predicted in portfolio level analysis than in individual corporation level analysis. This shows that when idiosyncratic risk is removed, changes in CDS spread is predicted better. As with the findings from firm-level regression, the result from the portfolio level regressions shows that the models can predict better in turmoil time, and ΔSentEPCR (changes in Equity put/call ratio) shows outstanding explanatory power which is almost as triple high as that of structural model.

In the detail observation in result of each portfolio, we find that sentiment can explain CDS spread best in the group whose leverage ratio and volatility is highest and vice versa. Also, the gap of ability to forecast between the two polarized portfolios is dramatically large.

We also found that leverage ratio is more systematically related to CDS spread change than volatility. This is because CDS spread changes reflect default risk by the degree of the leverage ratio while volatility do not since it reflect not only the credit risk, but also other risk such as risk in other market and operational risk.

The rest of this paper is organized as follows. In Section 2, we describe the data which are used in empirical analysis and in section 3, we introduce the analytical models. Section 4 presents the result from the individual and portfolio regressions and section 5 concludes the empirical results and the remarks.

2. Data

2-1. Credit Default Swap

We use CDS data of senior unsecured USD-denominated debt with five years of maturity, 285 firms, monthly observed from January 2006 to August 2009 for 44 months. The CDS premia is based on first trading day of each month[4].

We will use changes in logarithm of CDS changes. So far, the researches approach credit risk with pure credit risk in level and changes. However, as many studies document, this method to measure credit risk has statistical problems. (Das et al. (2007); Duffie et al. (2007); Greatex (2008); Pan and Singleton (2008); Duffie et al. (2009); Kim and Park (2015)). To avoid bias in CDS data, we apply differences of natural logarithm of the CDS as the proxy for credit risk.

Greatex (2008) casts a doubt on the any findings with CDS spread levels, not difference ones. The researcher insist that the results from the unit root test show CDS spread levels are mostly non-stationary which means the data is statistically inappropriate to be used in time-regression analysis as a variable. Moreover, as following the Remolona et al (2007)'s methodology, we apply differences of natural logarithm of the CDS. The background is that several studies (Das et al. (2007); Duffie et al. (2007, 2009) reveal that corporate default rate has exponential relation with variables, so the variables has linear relation with differences of natural logarithm of the CDS rather than with the pure one

[4] We select monthly data to along with the previous researches (Collin-Dufresne et al. (2001); Ericsson et al. (2009); Kim et al. (2013))[4] and while fluctuation in daily CDS spread is too to observe, monthly CDS spread is large enough to observe significant changes. (Greatex (2008))

differences of CDS spread (Kim and park (2015)). In fact, in reduced form-model studies (e.g. Pan and Singleton (2008)), another approach to the credit risk, it is widely known that the model using logarithmic stochastic process can predict best. Considering these reasons, we use differences of natural logarithm of the CDS. To calculate CDS spread changes, first we convert CDS spread into logarithm of CDS spread and deduct CDS spread of previous month from that of latter month. Figure 1 depicts time series of average CDS spread and average of variance of CDS Spread January 2006 to August 2009.

[Figure 1 places here]

2-2. Investor Sentiment

A. Michigan Consumer Sentiment index[5] (SentMi)

It is a survey-based consumer confidence index, conducted monthly by Survey Research Center at the University of Michigan, based period of December 1966 at 100. Survey question primarily concerns three broad areas which are personal finances, business conditions, and buying conditions of consumer who are statistically designed to be representative of all American households.[6] According to Cooper and Gubellini (2011), it is usually the indicator of the future statement of the overall economy, so we assume SentMi as the sentiment for the business cycle.

B. American Association Investment Index (SentAA)

It is the survey-based investor sentiment index conducted on a weekly basis. Individuals selected by ranks of the AAII membership are questioned to answer whether it is bullish, bearish, and neutral on the stock market for the next six months and the percentage of each stock market statement is reported

[5] As Tang and Yan (2010) insist that the correlation between Michigan Consumer Sentiment index and Conference Board Consumer Confidence Index is high, we report only the result of Michigan Consumer Sentiment index as one of individual sentiment.

[6] Since it is monthly data and announced at the middle of the month as a prelim and the late of the month as a final index, we use one month lagged sentiment which is the closest result of the CDS data.

as the index. We use the bull-bear spread as the proxy for sentiment.[7] Since Qiu and Welch (2006) insist that survey-based sentiment performs better than other formulated sentiment in stock market, we use SentAA as the another individual's sentiment measurement as well as SentMi.

C. Baker and Wurgler (2007) (SentBW)

Following the equation in Baker and Wurgler (2007), the SentBW calculated by the weighted sum of closed-end fund discount detrended log turnover , the number of IPOs , the first-day return on IPOs , the dividend premium, and the equity share in new issues.[8] Since Baker and Wurgler (2007) announced that it measures sentiment in stock market, we use this proxy as the stock market sentiment

D. Equity put/call ratio (SentEPCR)

Investor sentiment proxy derived from option data, defined as the ratio of CBOE (Chicago Board Options Exchange) total equity put to call trading volume. To calculate it, the aggregate trading volume of put options is divided by the aggregate trading volume of call options. Among the several sort of put/call ratios, we used CBOE Equity Volume and Put/Call Ratios following in Chen and Wang (2010)'s study. As it is derived from option data, we consider this Sentiment proxy as the representative of sentiment in option market.

E. Long-short S&P 500 futures (SentLS)

Following Chen and Wang (2010) and Han (2008) studies which implement Long-Short S&P 500 futures, it is net position of large speculators in S&P 500 futures which is released weekly by CFTC (Commodity Futures Trading Commission). It is formed as deducting the number of short noncommercial transactions from the number of long noncommercial transactions. As it is derived from future trading data, we consider this Sentiment proxy as the representative of sentiment in future market.

Figure 2 illustrates the time series of changes of five sentiment measurements for entire period, from

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[7] As it is weekly data, the sentiment period which includes the date of observed CDS is applied.

[8] Since it is monthly data and announced not at the first trading date, we use one month lagged sentiment which is the closest result of the CDS data.

January 2006 to August 2009. It shows the relation between the movement of difference of CDS spreads and that of individual sentiment proxies. Among the five graphs, the option derived sentiment proxy shows the most identical movement with the CDS spread changes.

[Figure 2 places here]

2-3. Theoretical Factors

A. Leverage ratio (Lev)

We use the CRSP to gain market value of firm equity and Compustat to collect the quarterly book value of firm debt and preferred stock. The leverage ratio is calculated as follows.

$$lev = \frac{[book\ value(debt + preferred\ stock)]}{[book\ value(debt + preferred\ stock) + market\ value(equity)]}$$

B. Stock return volatility (Vol)

The data source of stock price time series for each firm is CRSP. Originally, firm value volatility should be implemented for measurement of volatility, but it is hard to obtain. Since a number of studies prove that there is a strong linkage between corporate bond spreads and stock return realized volatility or stock option implied volatility through empirical analysis, we implement stock return volatility as the substitute for firm value volatility whereas Collin-Dufresne et al. (2001) use S&P 500 index option implied volatility. We follow the Ericsson et al(2009)'s method to compute stock return volatility where exponentially weighted moving average model on the past three months daily stock price data for with a decay factor of 0.94.

C. Risk-free rate (Rf)

For the risk-free rate, it is used that the 10-year maturity Treasury bond yield which is collected from the FRED dataset. Because it is reported that the risk free rate increase the risk-neutral drift of the firm value process and decrease the probability of default and credit spread.

2-4. Controlling Variables

A. Smirk

Collin-Dufresne et al. (2001) insist that since negative jump in a corporation which can be detected by option implied volatility smiles can explain the probability of large negative jump, magnitude of a downward jump should result in changes credit spreads. In the empirical study, Zhang et al. (2009) find that the volatility and jump risks of individual corporations using high-frequency equity prices forecast large portion of CDS premia. Likewise, since several studies suggest that the volatility and jump risks have explanatory power to forecast the CDS premium, we include smirk as the controlling variable.

Smirk is calculated as follows. First, we select the options from standardized S&P 500 Index options of which a delta of puts and of calls are over -0.5 and 0.5 receptively and of which remaining maturities are longer than a month. With the selected data and implied volatility curves from OptionMetrics, we calculate the volatility of strike price by conducting the linear regression on implied volatility with strike price: vol(K) = a + bK, where K is the strike price. The slope of smirk is eventually generated by the following formula: vol(0.9S)-vol(1.1S), where S is the current stock price.

B. Term spreads (Term)

The term structure of the yield curve is basically computed by deducting the two-year maturity Treasury yield from 10-year maturity Treasury yield. Since Collin-Dufresne et al. (2001) discover that term structure has the negative relation with credit spread measured by bond, we also use the term structure as the controlling variable.

C. S&P 500 (SP)

S&P 500 returns obtained from the CRSP are used as the proxy of business climate. It is well known that in bull stock market represents a good business environment and increases the expected recovery rates of companies which lowers the CDS spreads.

Table 1 provides the variables and their descriptions, including the specific data used in their estimation. The last column shows the expected results of the regression on differences of natural logarithm of CDS differences.

[Table 1 places here]

For stationary check for the variables employed in the regression analysis, we do the unit root test before conducting the regression. For the test, we implement the average of CDS, Lev and Vol. Table 2 shows whether the data is stationary or non-stationary. The null hypothesis is that time series is non-stationary; H=0 means accept the default statement and H=1 means reject the statement. We also give the test statistic including corresponding p-values and t-statistics for further information. Panel A represents the Augmented Dickey Fuller Test for the raw time series data of all variables. Except two sentiment variables, AA and LS, most of the variables are non-stationary in levels. On the other hand, Panel B indicates that the factors are stationary in first differences. This statistic coincides the result of Greatex (2008). For this statistical reasons, we only use variables in change, not in level, for the analysis to avoid misleading result.

[Table 2 places here]

Table 3 shows the correlation of all independent variables. The maximum correlation is -0.4351 between risk-free rate and term spread which is still not significant large correlation. This result is intuitive because term spread itself is rendered from risk-free rate. The correlation coefficients among sentiment variables are relatively low, (The highest correlation coefficient is 0.28 between SentBW and SentMi) which means it is worthwhile to examining all sentiment measurement that we provide.

[Table 3 places here]

Table 4 summarizes descriptive statistics of the log difference of CDS spreads and the explanatory variables in first difference used in the multiple regressions. For the firm specific variables and CDS spread, cross-sectional averages are reported. First 4 columns are for the basic statistics and the last three columns, skewness, kurtosis and J-Q test are for the information for the distribution. With the exception of the risk-free rate, all variables are almost not skewed. However, several variables, especially three theoretical variables and SentLS, show fatter tails than normal distribution. There is no surprise that these variables reject the J-Q test of which null hypothesis is the data is normally distributed.

[Table 4 places here]

3. Analytical Framework

3-1. Structural Model (Merton model)

Since we replaced the proxy for the credit risk into logarithm of CDS spread differences, to investigate the validity of structural model, we test Ericsson et al. (2009) model as the base regression. Employed regression equations are as follows:

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{lev}\Delta\mathrm{lev}_i + \varepsilon_i \quad \text{……………………(1)}$$

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{vol}\Delta\mathrm{vol}_i + \varepsilon_i \quad \text{……………………(2)}$$

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{rf}\Delta\mathrm{Rf}_i + \varepsilon_i \quad \text{……………………(3)}$$

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{lev}\Delta\mathrm{lev}_i + \beta_{vol}\Delta\mathrm{vol}_i + \beta_{rf}\Delta\mathrm{Rf}_i + \varepsilon_i \quad \text{……………………(4)}$$

The regression equation (1),(2), and (3) are for verifying that each theoretical variables can explain the credit risk and the model (4) test the explanatory power of theoretical variables in total. We report the average of 285 coefficients and t-statistics follow Collin-Dufresne et al. (2001) method which is computed by dividing the mean of individual coefficients by the standard deviation of coefficient values scaling by squared root of number of firms.

3-2. Sentiment Model

A. Firm level

To be consistent with previous studies such as Collin-Dufresne et al. (2001), Ericsson et al. (2009) and Kim et al. (2013), we implement the following same regression equations with theirs.

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{sent}\Delta\mathrm{Sent}_i + \varepsilon_i \quad \text{……………………(8)}$$

$$\Delta\log(\mathrm{CDS}_i) = a_i + \beta_{lev}\Delta\mathrm{lev}_i + \beta_{vol}\Delta\mathrm{vol}_i + \beta_{rf}\Delta\mathrm{Rf}_i + \beta_{sent}\Delta\mathrm{Sent}_i + \varepsilon_i \quad \text{……………………(9)}$$

$$\Delta\log(\text{CDS}_i)=a_i+\ \beta_{lev}\Delta\text{lev}_i+\ \beta_{vol}\Delta\text{vol}_i+\ \beta_{rf}\Delta\text{Rf}_i+\ \beta_{sent}\Delta\text{Sent}\ +\ \beta_{term}\Delta\text{term}\ +\beta_{sp}\Delta\text{sp}\ +\ \beta_{smirk}\Delta\text{smirk}\ +\ \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots(10)$$

To examine whether each sentiment can predict spread variations, we use the univariate regressions for each sentiment which are regression equation number (8). Then we perform the regression of CDS spread on the three factors suggested by theory for each individual firm i, as represented in the equation (8), and average the 285 coefficients. For the t-statistics, we divide mean of each betas by standard deviation of 285 firms which is adopted by Collin-Dufresne et al. (2001).

B. Portfolio level

We also conduct portfolio level regression to examine whether each sentiment can predict spread variations after the idiosyncratic risk is controlled following Kim et al. (2013). We firstly employ the univariate regressions for each sentiment regression equation number (11). Then we perform the regression of CDS spread on the three factors suggested by theory for each 25 portfolios, as represented in the equation (13). For the T-statistics, we divide means of each betas by standard deviation of the number of the firms in each portfolio which are adopted by Collin-Dufresne et al. (2001).

$$\Delta\log(\text{CDS}_p)=a_i+\beta_{sent}\Delta\text{Sent}\ +\ \varepsilon_i\ldots\ldots\ldots\ldots\ldots\ldots(11)$$

$$\Delta\log(\text{CDS}_p) = a_i+\ \beta_{lev}\Delta\text{lev}_p+\ \beta_i\Delta\text{vol}_p+\ \beta_{rf}\Delta\text{Rf}_p+\beta_{sent}\Delta\text{Sent}\ +\varepsilon_i\ldots\ldots(12)$$

$$\Delta\log(\text{CDS}_p) = a_i+\ \beta_{lev}\Delta\text{lev}_p+\ \beta_i\Delta\text{vol}_p+\ \beta_{rf}\Delta\text{Rf}\ +\ \beta_{sent}\Delta\text{Sent}\ +\ \beta_{term}\Delta\text{term}\ +\beta_{sp}\Delta\text{sp}\ +\ \beta_{smirk}\Delta\text{smirk}\ +\ \varepsilon_i\ldots\ldots\ldots\ldots\ldots\ldots(13)$$

4. Empirical Results

4-1. Structural Factors

Table 5 presents the result of the regression between variance of CDS spread and traditional structural variables motivated by Merton (1974) and developed by Ericsson et al. (2009). The first three column reports the coefficient of univariate regressions. All three variables are statically significant, and leverage ratio, volatility and risk-free rate can predict CDS changes respectively 12%, 5% and 7%. The last column of the table is the result of multivariate regression incorporating all three factors. Based on the information from R^2, structural model predicts only about 20% of CDS difference. This result matches Ericsson et al. (2009) which reports that these three determinants explain approximately 23% of CDS difference. Compare to the Ericsson et al. (2009)'s research, our result of explanatory power of the variables are approximately 3% lower, and we conjecture that this gap is supposedly originated from the method of differencing CDS spreads, that is statistical difference between naïve difference in CDS premia and difference in logarithm of CDS premia and from the period of sample.

[Table 5 places here]

4-2. Investor Sentiments

A. Firm-level

Table 6 reports the result of basic regressions between each selected sentiment measurement and individual firm's CDS spread changes. Overall, sentiment proxies of diverse markets are significant. ΔSentMi, ΔSentAA and ΔSentBW are negatively significant while ΔSentEPCR and ΔSentLS are positively significant. Only ΔSentMi lose its significance showing altering sign from negative to positive when the controlling variables are added to the regression. Among the valid factors, ΔSentEPCR shows outstanding result. ΔSentEPCR has significantly positive effect on the CDS spreads variance which indicates that larger changes in ratio of trading volume of put to trading volume of call lead larger changes in CDS spreads variance. Its univariate regression even shows that it can predict better than the volatility, a firm-specific factor, of which adjusted R^2 is only 5.92% while ΔSentEPCR is 6.41%. Moreover, it enhances the explanatory power by 2% compared to that of the three-factor theoretical model.

[Table 6 places here]

We separate the sample period into two parts which are before global financial crisis term and during the global financial crisis term. Table 7 reports the result of various models that examine the relation between each selected sentiment measurement and individual firm's CDS spread changes during pre-crisis from January 2006 to August 2007 for 20 months. It shows very puzzling results. Except ΔSentLS, Sentiment measurements are generally positively related to CDS spread variance. This result is almost opposite to that of basic regression in table 6. ΔSentEPCR is the only sentiment which is consistent with the signs in basic regression. Explanatory power of all models is lower than those for total period. It is true that the models including sentiment proxy predict less than those in aggregate time, but the noticeable decline in R^2 is captured in theoretical factors, leverage ratio, volatility and risk free rate which explain approximately 20% of CDS spread changes for total period, but now predict only about 2% of CDS spread changes in normal stage model. This result is consistent with the Kim et al. (2013) which documents that structural factors lost its explanatory power and even volatility is not significant. While other variables lost its power to forecast CDS changes, ΔSentEPCR only survive in the tranquil period. It solely predicts about 6.4% of CDS changes in univariate regression and also explains approximately 5.2% in pre-crisis period which shows less than 1% difference by the period. Moreover, it shows the higher adjusted R^2 than the any other result from univariate regression. ΔSentBW, which was strongly significant in aggregate period, lost its significance during this period with theoretical variables and even signs are mixed. This result implies that ΔSentEPCR can be the best candidate for CDS determinant among various sentiment measurement derived from different markets.

[Table 7 places here]

Table 8 presents the result of regression models that study the relation between each selected sentiment proxies and individual firm's CDS spread changes during crisis period from September 2007 to August 2009 for 24 months. When overall explanatory power of variables is lower and the perplexing signs are observed in stable period, the result for the turmoil term convinces our hypothesis. Five sentiments are economically significant with consistent signs. Continuing with the previous results in aggregate period and stable period, ΔSentEPCR predicts best among the proxies for sentiment. It shows 6.41% adjusted-R^2 which is more approximately 4% higher than its theoretical model. ΔSentLS, once insignificant coefficients and opposite signs in pre-crisis period, shows strongly positively significant coefficient. Through this result divided by business stage, we find that models incorporating sentiment can predict CDS spreads for all period, especially in turmoil period. This result also follows the Cesare and Guazzarotti (2010) and Kim et al. (2013).

[Table 8 places here]

We examine whether sentiment affects CDS premia variance more precisely, and we sort the CDS categorized by ratings into two groups: investment grade CDS ranging from AAA to BBB and non-investment grade CDS ranging below BBB following precedent studies (Kim et al. (2013); Chen and Want (2010)). Table 9 presents the result of regression model that examines the explanatory power of sentiment on the investment grade CDSs for 44 months from January 2006 to August 2009. Except ΔSentMi, Sentiment proxies are generally significant and align with the expected signs. However, their magnitude of coefficient and t-statistics dramatically decrease compare to basic regression and most of adjusted-R^2 is either negative or nearly zero in univariate regression except ΔSentMi. Only coefficient resulting from ΔSentMi is statically significant and its adjusted-R^2 is as high as the theoretical factors, but its coefficient shows opposite signs in the model with controlling variables. Overall, sentiment barely explains high-graded CDS spread changes.

[Table 9 places here]

Table 10 presents the result of regression model that examines the explanatory power of sentiment on the non-investment grade CDSs for 44 months from January 2006 to August 2009. Comparing the result of two divided CDS ratings, unlike the results from other studies (Greatrex (2008); Kim et al. (2013); Chen and Wang (2010)), we cannot find the apparent evidence that theoretical variables can explain speculative CDS premia changes better than investment grade one. However, we find that one sentiment- model performs better to predict differences in speculative CDS by showing that R^2 for models are much higher in models on speculative CDSs than investment graded CDS. For the noninvestment graded CDS, the univariate regression of ΔSentEPCR reports outstanding result. It predicts about 8% of CDS premia differences and it is much better than other result from the univariate regression on theoretical variables which are volatility and risk free rate of which adjusted R^2 are both approximately only 5%.

[Table 10 places here]

To sum up, there are two main findings which are meaningful to report. First, the most noticeable finding is that when both stock return and option data are known as the effective factor to explain CDS spread, compared to the ΔSentBW derived from stock market performs poorly in predicting CDS, ΔSentEPCR explains best among the several sentiment candidates with only exception with forecasting non-investment grade CDS spread differences. This may indicate that the sentiment in option market predict CDS spread variance rather than sentiment in stock market because option market is also sensitive to the volatility of stock return just as CDS spread, but stock market is sensitive to the direction of assets. Moreover, it aligns with the result of other studies which reveal the price discovery role of derivative market in stock price. Since derivatives market has low initial cost and high leverage ratio, it responses to the information efficiently. Therefore, in terms of information efficiency, derivatives marker performs better than the stock market due to the feature.

Second, sentiment explains CDS spread changes better in turmoil session and better for the speculative CDS. We conjecture that this is because participants in the market are more sensitive to the credit risk. Market is bearish during the financial crisis term, and it is well-known fact that the return in stock market and volatility has negative relationship. In other words, during the global finance crisis, the volatility has dramatically increased, and this phenomenon comes from the fear of investors. This sensitive and anxious sentiment of investors deals with the information in the market in more effective way.

B. Portfolio level

We build 5x5 portfolio based on five leverage ratio and five stock return volatility following the method in Kim et al. (2013). Table 11 reports the cross-sectional mean of correlation coefficients of all variables employed in models for portfolio. We find that CDS spread associated by rankings of leverage ratio and volatility is highly correlated to the portfolio leverage ratio, about 80%.

[Table 11 places here]

Table 12 briefly shows the summary of statistics of CDS, leverage ratio and volatility respectively in panel A, panel B and panel C. Through the panel B, we can observe that all leverage ratios for each portfolio is not normally distributed.

[Table 12 places here]

Table 13 reports the linear regression results for 25 portfolio matrix by quintile based on leverage ratio and volatility, each with 44 monthly CDS spread quotes over the full sample period. Overall explanatory power is escalated than that in the firm level regression by approximately 13% from about 20% to about 33% in theoretical model. The coefficients of sentiment proxies in all sentiment models are statistically significant. Nevertheless, ΔSentMi is positively valid, which shows the opposite sign to the expected signs of which ground is derived from Tang and Yan (2010)'s study which reports that Conference Board Consumer Confidence Index, shows similar move with ΔSentMi, and it is negatively correlated to CDS. This discrepancy is resolved in result of the regressions which is divided by the period. Continuing the result of regressions, the magnitudes of coefficient is the biggest among five proxies and also economically and statistically significant in the model incorporating ΔSentEPCR. Moreover, the R^2 is increased by 3% than Merton(1974) model.

[Table 13 places here]

We separate the sample period into two parts which are before global financial crisis term and during the global financial crisis term. Table 14 reports the result of various models that examine the relation between each selected sentiment measurement and CDS spread changes grouped by five leverage ratio and five volatility during pre-crisis from January 2006 to August 2007 for 20 months. It shows similar result with firm level regressions in terms of lowering explanatory power compare to that of aggregate period regressions. This result is accorded to research or Kim et al. (2013). Structural model performs disappointingly reporting only 5.9% adjusted R^2 and other models embedding sentiment variables shows no more differentiation except regression on ΔSentEPCR. The SentEPCR model has explanatory power of approximately 15%, which is almost three times higher than that of theoretically structured model and presents highly significant and large magnitudes of coefficients which are also consistent with expected signs. This result indicates that ΔSentECPR can be the best candidate among various sentiment measurement derived from different markets. On the other hand, other sentiment factors performs poorly to predict CDS spread. ΔSentMi and ΔSentAA shows opposite coefficient signs to the expected signs and ΔSentBW has very low explanatory power at 1.2%, even much lower than structural model.

[Table 14 places here]

Table 15 presents the results of regression models that study the relation between each selected sentiment proxies and CDS spread changes grouped by five leverage ratio and five stock price volatility during crisis period from September 2007 to August 2009 for 24 months. When overall explanatory power of variables is lower and the perplexing signs are observed in stable period, the result for the turmoil term convinces our hypothesis. All five sentiments are economically significant with consistent signs. However, unlike previous results in aggregate period and stable period, 4 factor model with ΔSentAA predicts 48.77% of changes in CDS premia which is the best prediction among the models including proxies for sentiment and is about 7.5% higher than theoretical model. During crisis, even ΔSentBW, which is insignificant in another stage, shows strongly negative significant coefficient. Through this result divided by business stage, we conclude that sentiment models in portfolio level performs better than the one only include factors suggested by theories for all periods, and all models project CDS spread changes generally better in crisis rather than in stable. This result also is consistent with the Kim et al. (2013).

[Table 15 places here]

To observe result of the portfolio level regression, we also report the coefficient and t –statistics by individual portfolio. Table 16 through 21 presents the coefficient, t-statistic, R^2 and adjusted R^2 of individual portfolio. Overall, in the every result from the regression of sentiment model in portfolio level, the most stable portfolio in which CDS spread with the lowest leverage ratio and volatility are assigned has the lowest Adjusted R^2 and shows general ascending trend when the leverage ratio and volatility grows. In other words, most volatile portfolio which has the highest leverage ratio and volatility is most well explained by the models. The difference between the adjusted R^2 of most riskless portfolio and most risky is range from 41.33% in SentAA model to 47.20% in Ericsson et al. (2009)'s model.

[Table 16 places here]

[Table 17 places here]

[Table 18 places here]

[Table 19 places here]

[Table 20 places here]

[Table 21 places here]

We additionally provide the average adjusted R^2 by each 5 leverage ratio and 5 volatility of structural model and extended model including controlling variables in table 23. Similar to what we already found in average reporting, the explanatory power is increased when the firm's volatility and leverage ratio is ascending. More specifically examining the ability of models to predict CDS spread difference by criteria which are leverage ratio and volatility, we catch the steadily ascending pattern in explanatory power by portfolio order dividing by leverage ratio, especially in after controlling model only with exception of result from ΔSentBW and ΔSentLS regressions. In the sentiment models, we also observe that the gap between R^2 of two polarized portfolios by leverage ratio is bigger than this of two polarized portfolios by volatility.

[Table 22 places here]

To sum up, we have three main conclusions from portfolio level analyzing. First, when idiosyncratic risk is eliminated, the explanatory power is increased along with the result of Kim et al. (2013). Moreover, ΔSentEPCR shows extremely excellent forecasting power compared to the structural model.

Finally, 5X5 portfolio shows the large adjusted R^2gap between the most and least portfolio and the portfolio is better organized under the conditioning that leverage ratio is used as criterion than volatility. This is an intuitive result indicating that CDS spread changes reflect default risk by the degree of the leverage ratio not by the degree of the firm's volatility which embed not only credit risk , but also other risk factors such as market risks and operational risks. This is similar with Cesare and Guazzarotti (2010) of which finding reports that leverage ratio explains CDS variances better than volatility.

5. Conclusion

We investigated whether investor sentiment factors can be important determinants for CDS premia changes. We examine R-squared and significance and magnitude of coefficients to verify our hypothesis that investor sentiment can explain CDS spread changes and to find that which sentiment measurement can be the most effective determinant. In general, most of sentiment proxies are valid to explain CDS spread changes and ΔSentEPCR predicts best due to the characteristic of option market.

We divide the sample period into two stages, pre-crisis from January 2006 to August 2007 and during the crisis from September 2007 to August 2009, to test the explanatory power of sentiment by business cycle. Suggested models explain CDS spread changes much better in turmoil period than in stable period. This is also consistent with the other results. This result suggests that the concept of Stambaugh et al (2012) is supportive.

In portfolio level analysis, overall explanatory power is increased compared to individual level analysis. As the result from firm-level regression, models can predict better in turmoil time, and ΔSentEPCR shows outstanding explanatory power which is almost as triple high as that of structural model. When precisely observing result of each portfolio, we find that sentiment can explain differences in CDS spread best in the group whose leverage ratio and volatility is highest and vice versa. Also, the gap of ability to forecast between the two polarized portfolios is dramatically large, approximately the range from 41.33% to 47.20%.

We also found that leverage ratio is more systematically related to CDS spread change than volatility. This is because CDS spread changes reflect default risk by the degree of the leverage ratio while volatility do not since it reflects not only the credit risk, but also other risk such as market and operational risk.

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[Table 1] Expected Signs for the Variables
This table represents the description and expected signs from regressions of important variables which are employed in various models

Variables	Description	
Δlev	Change in leverage ratio	+
Δvol	Change in exponentially weighted moving average of squared stock returns	+
ΔRf	Change in yield on 10-year Treasury	-
ΔSentMi	Sentiment proxy, Changes in consumer's sentiment	-
ΔSentAA	Sentiment proxy, Changes in individual investment's sentiment	-
ΔSentBW	Sentiment proxy, Changes in Baker and Wurgler's sentiment measurement derived from stock market sentiment	-
ΔSentEPCR	Sentiment proxy, Changes in Equity put to call ratio	+
ΔSentLS	Sentiment proxy, Changes in net position of long-short S&P 500 futures	?
ΔTerm	Change in difference between 10-year and 2-year Treasury yield	?
ΔSP	Changes in return on S&P 500 index	-
ΔSmirk	Change in slope of one-month volatility curve across strike prices	+

[Table 2] Unit Root Test

The table presents the result of unit root test, T statistics and P-values. Significance tests conducted at the 5% level. Since stationarity is determined by the existence of unit root, Augmented Dickey Fuller Test is implemented. The lags are selected according to Schwarz Info Criterion. The null hypothesis is the variable has unit root. The critical values are as follows. Panel A indicates the unit root test before differencing the time series data while Panel B represents unit root test after differencing the time series data.

Panel A: Unit Root Test before Differencing the Time Series Data

	H	p-value	t-value
log(CDS)	0	0.6304	-0.0429
lev	0	0.9176	1.0288
Vol	0	0.4973	-0.4071
Rf	0	0.4174	-0.6259
SentMi	0	0.2666	-1.0389
sentAA	1	0.0010	-4.4105
SentBW	0	0.4702	-0.4818
SentEPCR	0	0.4158	-0.6305
SentLS	1	0.0184	-2.3808
Term	0	0.8916	0.8595
SP	0	0.3887	-0.7047
Smirk	0	0.3969	-0.6821

Panel B: Unit Root Test after Differencing the Time Series Data

	H	p-value	t-value
Δlog(CDS)	1	0.0010	-4.2832
Δlev	1	0.0010	-5.2250
ΔVol	1	0.0010	-4.8916
ΔRf	1	0.0010	-5.8083
ΔSentMi	1	0.0010	-7.1424
ΔSentAA	1	0.0010	-8.7327
ΔSentBW	1	0.0010	-7.6195
ΔSentEPCR	1	0.0010	-10.9810
ΔSentLS	1	0.0010	-5.7828
ΔTerm	1	0.0010	-5.7436
ΔSP	1	0.0010	-4.9821
ΔSmirk	1	0.0010	-10.6090

[Table 3] Correlation Coefficients of Variables

The table reports means of 285 the correlation coefficients between the time series changes in all the regression variables used in Sentiment models.

	Δlog(CDS)	Δlev	Δvol	ΔRf	ΔSentMi	ΔSentAA	ΔSentBW	ΔSentEPCR	ΔSentLS	ΔTerm	ΔSP	ΔSmirk
Δlog(CDS)	1.0000											
Δlev	0.3170	1.0000										
Δvol	0.2345	0.2683	1.0000									
ΔRf	-0.2768	-0.1531	-0.0945	1.0000								
ΔSentMi	-0.1299	-0.2453	-0.1822	0.1136	1.0000							
ΔSentAA	-0.1245	-0.0851	0.0800	0.1952	0.0783	1.0000						
ΔSentBW	-0.0285	-0.0406	0.0324	-0.1688	-0.1235	0.1825	1.0000					
ΔSentEPCR	0.2494	0.2899	0.1193	-0.1175	-0.1216	-0.2173	-0.0659	1.0000				
ΔSentLS	0.0857	-0.0495	0.2603	-0.2028	-0.0500	0.1984	0.0449	-0.1322	1.0000			
ΔTerm	0.1276	0.0770	0.2098	0.4351	0.0037	-0.0375	-0.1088	-0.0071	-0.0096	1.0000		
ΔSP	-0.4423	-0.6129	-0.4206	0.2390	0.3176	0.1729	0.1160	-0.4831	-0.0193	-0.2359	1.0000	
ΔSmirk	-0.0392	0.0644	0.0571	0.2235	-0.2399	-0.3785	-0.0913	0.1986	-0.0627	0.1306	-0.1046	1.0000

[Table 4] Summary Statistics

This table shows the summary of the statistics of differences of all variables. The first row is the statistics for log CDS premia in first difference and the next three rows are changes in theoretical factors which are the time series statistics of cross-sectional means of the data. The rest of the table shows the time series statistics of the other explanatory variables.

	Mean	Min	Max	Std	Skew	Kurtosis	J-Q
Δlog(CDS)	0.0172	-0.3248	0.3997	0.1526	0.3280	3.4947	0
Δlev	0.0026	-0.0361	0.0539	0.0178	0.5333	4.9140	1
Δvol	0.0052	-0.3065	0.3670	0.0970	0.5986	8.1295	1
ΔRf	-0.0002	-0.0124	0.0053	0.0029	-1.5186	8.5911	1
ΔSentMi	-0.5930	-12.7000	8.2000	4.6765	-0.1461	2.7502	0
ΔSentAA	0.0036	-0.4137	0.3707	0.1736	-0.2438	2.7114	0
ΔSentBW	0.0995	-1.4998	1.6997	0.7411	-0.0579	2.8573	0
ΔSentEPCR	0.0019	-0.2700	0.3500	0.1491	0.0549	2.2941	0
ΔSentLS	-0.0017	-0.0717	0.1025	0.0303	0.8677	5.8325	1
ΔTerm	0.0570	-0.6900	0.5600	0.2432	-0.1397	4.0061	0
ΔSP	-6.1900	-194.7600	115.5900	66.7387	-0.7291	3.4711	0
ΔSmirk	0.0000	-0.0675	0.0986	0.0332	0.3076	3.5460	0

[Table 5] Regression Results of Theoretical Variables

This table represents the result from univariate and multivariate regression of CDS differences and the structure variables suggested by Ericsson et al. (2009) from January 2006 to August 2009, for 44months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001).

constant	0.0097	0.0153	0.0135	0.0072
	(0.5840)	(0.8221)	(0.6987)	(0.4219)
Δlev	4.0606			3.5379
	(9.2348)			(3.8109)
Δvol		0.4537		0.3089
		(19.1668)		(13.4200)
ΔRf			-22.2381	-17.8554
			(-30.6138)	(-24.4826)
R^2	14.18%	8.16%	9.61%	25.73%
A-R^2	12.09%	5.92%	7.41%	20.02%

[Table 6] Regression Results of Sentiment Proxies

This table represents the result from liner regression of CDS differences and the other variables from January 2006 to August 2009, for 44months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0133	0.0071	-0.0033	0.0178	0.0078	-0.0027
	(0.6935)	(0.4169)	(-0.1578)	(0.9238)	(0.4565)	(-0.1330)
Δlev		3.5497	1.2624		3.3230	1.1859
		(3.8626)	(1.0129)		(3.8423)	(0.9781)
Δvol		0.3141	0.0709		0.3322	0.0981
		(13.4449)	(3.4775)		(13.9648)	(4.8556)
ΔRf		-17.7934	-19.9416		-16.7057	-18.6019
		(-24.4242)	(-27.0411)		(-23.4159)	(-25.3938)
ΔSentMi	-0.0066	-0.0001	0.0008			
	(-16.9886)	(-0.2825)	(2.2195)			
ΔSentAA				-0.1721	-0.1023	-0.0667
				(-16.7662)	(-10.1166)	(-5.7766)
ΔTerm			0.1509			0.1445
			(18.2004)			(17.4104)
ΔSP			-0.0010			-0.0010
			(-19.4697)			(-19.4095)
ΔSmirk			-0.2838			-0.4634
			(-6.5271)			(-8.3999)
R^2	3.32%	27.19%	39.05%	3.13%	27.69%	39.37%
A-R^2	0.97%	19.52%	26.86%	0.76%	20.08%	27.25%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0181	0.0093	-0.0026	0.0165	0.0077	-0.0039	0.0183	0.0073	-0.0034
	(0.9166)	(0.5315)	(-0.1214)	(0.8494)	(0.4491)	(-0.1875)	(0.9521)	(0.4333)	(-0.1682)
Δlev		3.3756	1.2874		2.9860	1.3094		3.4033	1.0920
		(3.7056)	(0.9601)		(3.1984)	(1.0603)		(4.0719)	(0.9438)
Δvol		0.3220	0.0788		0.2949	0.0814		0.3032	0.0521
		(13.7099)	(3.9278)		(13.3298)	(4.0884)		(12.5602)	(2.4788)
ΔRf		-18.7990	-20.4057		-17.0768	-20.2061		-17.6860	-19.6186
		(-24.9487)	(-27.0856)		(-23.7524)	(-27.1322)		(-23.6974)	(-26.3228)
ΔSentBW	-0.0086	-0.0212	-0.0098						
	(-3.9123)	(-9.4953)	(-4.3932)						
ΔSentEPCR				0.3984	0.2248	0.1422			
				(25.0340)	(15.6630)	(9.4887)			
ΔSentLS							0.6368	0.0630	0.1068
							(12.8721)	(1.1175)	(1.8971)
ΔTerm			0.1524			0.1672			0.1521
			(18.3087)			(19.4944)			(18.3661)
ΔSP			-0.0010			-0.0008			-0.0010
			(-18.7546)			(-15.8220)			(-19.6508)
ΔSmirk			-0.3190			-0.4070			-0.3051
			(-7.2486)			(-8.7053)			(-6.9069)
R^2	1.44%	27.51%	39.11%	8.64%	29.51%	40.13%	2.03%	27.10%	39.10%
A-R^2	-0.97%	19.87%	26.93%	6.41%	22.09%	28.15%	-0.36%	19.43%	26.92%

[Table 7] Pre-crisis Regression Results for Sentiment Proxies

This table reports the result from liner regression of CDS differences and the other variables during normal period, from January 2006 to August 2007, for 20months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0031	0.0023	0.0050	0.0023	0.0051	0.0042	0.0299	0.0044	0.0026	0.0274
	(0.1175)	(0.0921)	(0.1831)	(0.0845)	(0.1909)	(0.1523)	(0.7667)	(0.1613)	(0.0955)	(0.7315)
Δlev	3.9092			3.7617		3.9078	1.1187		3.7029	1.7399
	(5.2299)			(5.7706)		(5.5558)	(1.5190)		(5.9697)	(2.6909)
Δvol		0.2532		0.1796		0.1884	0.0216		0.2493	0.0585
		(5.0091)		(3.3579)		(3.5061)	(0.3605)		(4.3253)	(0.9635)
ΔRf			-11.7126	-9.1037		-10.9725	-2.9541		-10.6988	-1.3391
			(-11.5487)	(-8.0138)		(-9.5611)	(-2.4820)		(-9.2991)	(-1.1172)
ΔSentMi					0.0029	0.0044	0.0034			
					(5.2641)	(7.9662)	(5.5921)			
ΔSentAA								0.1385	0.1701	0.1667
								(10.8534)	(12.0434)	(7.6875)
ΔTerm							-0.1275			-0.1396
							(-4.9159)			(-5.1281)
ΔSP							-0.0021			-0.0020
							(-17.3777)			(-17.1809)
ΔSmirk							-0.2863			0.0534
							(-4.4386)			(0.6043)
R^2	8.80%	6.07%	4.02%	18.22%	4.83%	23.10%	42.23%	4.25%	23.28%	43.19%
A-R^2	3.73%	0.85%	-1.32%	2.89%	-0.46%	2.59%	8.53%	-1.07%	2.82%	10.04%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0037	0.0024	0.0024	0.0029	0.0011	0.0266	-0.0014	-0.0035	0.0249
	(0.1374)	(0.0876)	(0.0876)	(0.1062)	(0.0403)	(0.6476)	(-0.0469)	(-0.1222)	(0.6284)
Δlev		4.0186	1.7026		2.9849	1.0732		3.4553	1.4875
		(5.3219)	(2.5998)		(4.6714)	(1.5993)		(5.9645)	(2.6063)
Δvol		0.1932	0.0087		0.0444	-0.0496		0.1665	0.0004
		(3.5003)	(0.1450)		(0.7824)	(-0.7299)		(3.0076)	(0.0072)
ΔRf		-9.0652	-3.1498		-3.1677	-1.7962		-10.8410	-3.8989
		(-7.9214)	(-2.6042)		(-2.5000)	(-1.4296)		(-9.5879)	(-3.2330)
ΔSentBW	0.0076	-0.0025	-0.0187						
	(2.2865)	(-0.7010)	(-4.8523)						
ΔSentEPCR				0.2964	0.2485	0.0717			
				(18.4927)	(13.1340)	(3.2933)			
ΔSentLS							-0.9885	-1.0875	-0.8303
							(-10.0545)	(-9.9555)	(-7.6640)
ΔTerm			-0.1489			-0.1235			-0.1678
			(-5.5491)			(-4.7213)			(-6.2764)
ΔSP			-0.0021			-0.0018			-0.0020
			(-17.6029)			(-13.4589)			(-16.8612)
ΔSmirk			-0.4922			-0.4694			-0.4481
			(-7.9827)			(-8.0203)			(-7.6026)
R^2	2.67%	20.94%	41.68%	10.26%	26.47%	43.02%	4.95%	23.33%	42.83%
A-R^2	-2.74%	-0.15%	7.66%	5.27%	6.86%	9.78%	-0.33%	2.88%	9.49%

[Table 8] During-crisis Regression Results for Sentiment Proxies

This table represents the result from liner regression of CDS differences and the other variables during the financial crisis period, from September 2007 to August 2009, for 24months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0144	0.0274	0.0192	0.0101	0.0190	0.0082	-0.0271	0.0323	0.0157	-0.0185
	(0.4792)	(0.9055)	(0.6068)	(0.3387)	(0.6105)	(0.2718)	(-0.6329)	(1.0201)	(0.5384)	(-0.4744)
Δlev	4.1637			3.7405		3.5884	1.4618		3.0698	1.6440
	(7.5013)			(2.7713)		(2.6474)	(0.8978)		(2.1693)	(0.9692)
Δvol		0.5071		0.3527		0.3381	-0.0136		0.4526	0.1085
		(19.8398)		(14.1561)		(13.4082)	(-0.5786)		(16.5439)	(4.6270)
ΔRf			-24.5634	-20.1500		-19.9959	-37.0344		-16.5323	-31.6598
			(-27.7765)	(-22.0379)		(-22.0705)	(-28.1713)		(-18.7127)	(-24.2939)
ΔSentMi					-0.0129	-0.0038	-0.0056			
					(-22.6243)	(-7.3035)	(-10.4655)			
ΔSentAA								-0.3654	-0.3066	-0.1272
								(-22.6245)	(-18.4940)	(-8.4370)
ΔTerm							0.2858			0.2383
							(24.6853)			(21.6160)
ΔSP							-0.0007			-0.0007
							(-10.8468)			(-11.3481)
ΔSmirk							0.9957			0.6009
							(9.8809)			(5.9731)
R^2	19.09%	12.40%	14.17%	36.60%	8.55%	39.37%	58.49%	10.06%	43.67%	58.46%
A-R^2	15.24%	8.23%	10.08%	26.59%	4.20%	25.89%	39.12%	5.77%	31.15%	39.07%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0313	0.0149	0.0149	0.0286	0.0125	-0.0213	0.0273	0.0096	-0.0248
	(0.9602)	(0.4921)	(0.4921)	(0.8963)	(0.4228)	(-0.5240)	(0.8503)	(0.3123)	(-0.5724)
Δlev		3.3571	1.6940		2.7737	1.5346		3.9425	1.8615
		(2.6240)	(0.9705)		(1.9443)	(0.9534)		(2.6699)	(1.0234)
Δvol		0.3731	0.0495		0.3769	0.0801		0.3054	-0.0567
		(14.3686)	(2.0885)		(14.7498)	(3.3917)		(11.3859)	(-2.1191)
ΔRf		-21.5104	-36.0741		-20.8546	-36.3774		-19.2651	-33.4765
		(-22.7922)	(-26.9728)		(-22.5234)	(-27.4685)		(-20.8230)	(-25.8075)
ΔSentBW	-0.0155	-0.0285	-0.0110						
	(-5.8656)	(-10.5823)	(-3.7491)						
ΔSentEPCR				0.5194	0.3023	0.1777			
				(23.0404)	(13.3386)	(7.8614)			
ΔSentLS							1.0303	0.3709	0.4981
							(16.4331)	(4.9778)	(6.3160)
ΔTerm			0.2607			0.2736			0.2592
			(23.0994)			(23.5727)			(22.6154)
ΔSP			-0.0008			-0.0006			-0.0009
			(-10.7549)			(-9.0111)			(-12.6017)
ΔSmirk			0.8776			0.7790			0.8067
			(8.7115)			(7.8333)			(8.0212)
R^2	2.48%	39.57%	57.94%	10.66%	41.47%	58.57%	4.64%	39.21%	58.56%
A-R^2	-2.17%	26.15%	38.31%	6.41%	28.46%	39.23%	0.10%	25.70%	39.21%

[Table 9] Regression Results on Investment Graded CDS

This table represents the result from liner regression of investment-graded CDS differences and the other variables from January 2006 to August 2009, for 44months. CDS are divided into two credit rating categories: investment grade, from AAA to BBB and non-investment grade, below BBB. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0098	0.0157	0.0136	0.0070	0.0133	0.0068	-0.0044	0.0182	0.0077	-0.0032
	(0.5715)	(0.8350)	(0.6930)	(0.3978)	(0.6825)	(0.3844)	(-0.2056)	(0.9344)	(0.4404)	(-0.1532)
Δlev	4.7121			4.1245		4.1285	1.3499		3.8442	1.2478
	(8.0686)			(3.8340)		(3.3360)	(0.8019)		(3.3001)	(0.7621)
Δvol		0.5170		0.3592		0.3639	0.0749		0.3897	0.1130
		(17.6294)		(14.2148)		(12.2020)	(2.8165)		(12.9077)	(4.3170)
ΔRf			-23.6956	-20.1010		-20.0242	-22.3907		-18.7182	-20.5675
			(-27.2111)	(-27.4659)		(-23.4620)	(-27.0951)		(-22.4468)	(-25.0355)
ΔSentMi					-0.0072	-0.0003	0.0003			
					(-16.5106)	(-0.7435)	(0.6585)			
ΔSentAA								-0.1979	-0.1240	-0.0937
								(-16.4958)	(-10.2774)	(-6.8975)
ΔTerm							0.1713			0.1611
							(17.9359)			(16.9341)
ΔSP							-0.0011			-0.0011
							(-18.0166)			(-18.1622)
ΔSmirk							-0.3505			-0.5728
							(-7.2524)			(-9.1535)
R^2	12.77%	8.43%	10.37%	25.68%	3.46%	27.15%	39.09%	3.56%	27.86%	39.57%
A-R^2	10.64%	6.20%	8.19%	19.96%	5.83%	21.49%	27.99%	-1.00%	19.91%	27.05%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0185	0.0094	0.0094	0.0168	0.0077	-0.0047	0.0188	0.0074	-0.0040
	(0.9258)	(0.5162)	(0.5162)	(0.8564)	(0.4346)	(-0.2214)	(0.9762)	(0.4247)	(-0.1917)
Δlev		3.9147	1.3933		3.4811	1.4098		3.9630	1.1461
		(3.1906)	(0.7693)		(2.7664)	(0.8453)		(3.5226)	(0.7335)
Δvol		0.3766	0.0866		0.3463	0.0887		0.3468	0.0484
		(12.6193)	(3.3197)		(12.3200)	(3.4193)		(11.1781)	(1.7721)
ΔRf		-21.1361	-23.0136		-19.3239	-22.7391		-19.7139	-21.8824
		(-23.9984)	(-27.2585)		(-22.9730)	(-27.2520)		(-22.3835)	(-25.7912)
ΔSentBW	-0.0096	-0.0234	-0.0113						
	(-3.7290)	(-8.7249)	(-4.2170)						
ΔSentEPCR				0.3961	0.2206	0.1385			
				(22.0512)	(14.0097)	(8.0309)			
ΔSentLS							0.7570	0.1862	0.2088
							(13.5089)	(2.8610)	(3.1956)
ΔTerm			0.1721			0.1869			0.1711
			(17.9210)			(18.7048)			(17.9403)
ΔSP			-0.0011			-0.0009			-0.0011
			(-17.4317)			(-14.5390)			(-18.4510)
ΔSmirk			-0.3694			-0.4541			-0.3525
			(-7.4263)			(-8.6921)			(-7.0734)
R^2	1.40%	27.54%	39.21%	8.07%	28.97%	39.99%	2.24%	27.09%	39.24%
A-R^2	1.20%	20.26%	27.48%	1.11%	19.48%	26.91%	-0.15%	19.41%	27.08%

[Table 10] Regression Results on Non-Investment Graded CDS

This table represents the result from liner regression of non-investment-graded CDS differences and the other variables from January 2006 to August 2009, for 44months. CDS are divided into two credit rating categories: investment grade, from AAA to BBB and non-investment grade, below BBB. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0097	0.0143	0.0133	0.0078	0.0133	0.0080	0.0000	0.0166	0.0080	-0.0013
	(0.6209)	(0.7806)	(0.7118)	(0.5002)	(0.7230)	(0.5265)	(-0.0002)	(0.8893)	(0.5071)	(-0.0700
Δlev	2.2030			1.8656		1.8993	1.0130		1.8369	1.0091
	(11.6864)			(18.3027)		(9.3369)	(5.9173)		(9.6866)	(5.8666)
Δvol		0.2733		0.1654		0.1720	0.0596		0.1683	0.0558
		(10.0505)		(14.7838)		(7.6367)	(2.8760)		(7.4851)	(2.5762)
ΔRf			-18.0820	-11.4524		-11.4327	-12.9583		-10.9672	-12.9972
			(-15.4677)	(-19.8900)		(-10.3139)	(-10.1040)		(-9.5705)	(-9.3727)
ΔSentMi					-0.0051	0.0005	0.0024			
					(-6.1180)	(0.7400)	(3.3847)			
ΔSentAA								-0.0985	-0.0406	0.0101
								(-5.7086)	(-2.4756)	(0.5221)
ΔTerm							0.0926			0.0971
							(6.2645)			(6.1663)
ΔSP							-0.0009			-0.0009
							(-8.0730)			(-7.8317)
ΔSmirk							-0.0937			-0.1513
							(-1.0160)			(-1.4005)
R^2	18.21%	7.40%	7.45%	25.89%	2.93%	27.29%	38.95%	1.90%	27.21%	38.82%
A-R^2	16.22%	5.14%	5.19%	20.19%	0.56%	19.63%	26.74%	-0.49%	19.55%	26.58%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0169	0.0093	0.0093	0.0155	0.0079	-0.0015	0.0168	0.0072	-0.0017
	(0.8860)	(0.5807)	(0.5807)	(0.8247)	(0.4943)	(-0.0792)	(0.8802)	(0.4597)	(-0.0926)
Δlev		1.8385	0.9853		1.5742	1.0229		1.8073	0.9376
		(9.0208)	(5.8766)		(8.4908)	(5.7711)		(9.3337)	(5.3085)
Δvol		0.1662	0.0566		0.1483	0.0606		0.1791	0.0626
		(7.3609)	(2.6967)		(6.9602)	(2.9854)		(7.6133)	(2.8256)
ΔRf		-12.1351	-12.9697		-10.6692	-12.9835		-11.9037	-13.1638
		(-10.5507)	(-10.1449)		(-9.8162)	(-10.1570)		(-10.1904)	(-10.2558)
ΔSentBW	-0.0057	-0.0150	-0.0057						
	(-1.3576)	(-3.8592)	(-1.4233)						
ΔSentEPCR				0.4047	0.2369	0.1526			
				(11.9541)	(7.3086)	(5.0265)			
ΔSentLS							0.2941	-0.2882	-0.1839
							(3.1456)	(-2.7928)	(-1.7597)
Term			0.0961			0.1113			0.0981
			(6.4403)			(7.4002)			(6.4951)
SP			-0.0009			-0.0007			-0.0009
			(-7.6691)			(-6.6046)			(-7.8354)
Smirk			-0.1754			-0.2726			-0.1699
			(-1.9198)			(-2.7225)			(-1.8404)
R^2	1.53%	27.41%	38.82%	10.27%	31.04%	40.51%	1.43%	27.13%	38.71%
A-R^2	-0.87%	19.77%	26.58%	8.08%	23.79%	28.61%	-0.97%	19.46%	26.45%

[Table 11] Correlation Coefficients of Variables

The table reports means of 25 portfolio the correlation coefficients between the time series changes in all the regression variables.

	Δlog(CDS)	Δlev	Δvol	ΔRf	ΔSentMi	ΔSentAA	ΔSentBW	ΔSentEPCR	ΔSentLS	ΔTerm	ΔSP	ΔSmirk
Δlog(CDS)	1.0000											
Δlev	0.8020	1.0000										
Δvol	0.4601	0.4842	1.0000									
ΔRf	-0.3746	-0.2665	-0.2954	1.0000								
ΔSentMi	-0.2644	-0.3399	-0.1618	0.1136	1.0000							
ΔSentAA	-0.0875	-0.1663	0.1128	0.1952	0.0783	1.0000						
ΔSentBW	-0.0307	-0.0628	-0.0214	-0.1688	-0.1235	0.1825	1.0000					
ΔSentEPCR	0.4408	0.5055	0.1031	-0.1175	-0.1216	-0.2173	-0.0659	1.0000				
ΔSentLS	0.0565	-0.0030	0.4415	-0.2028	-0.0500	0.1984	0.0449	-0.1322	1.0000			
ΔTerm	0.1653	0.1168	0.1778	0.4351	0.0037	-0.0375	-0.1088	-0.0071	-0.0746	1.0000		
ΔSP	-0.7633	-0.8922	-0.5379	0.2390	0.3176	0.1729	0.1160	-0.4831	-0.1100	-0.2359	1.0000	
ΔSmirk	0.0058	0.1152	-0.0490	0.2235	-0.2399	-0.3785	-0.0913	0.1986	-0.0793	0.1306	-0.1046	1.0000

[Table 12] Summary Statistics of Individual portfolio

This table reports the summary of the statistics of CDS and firm specific data for individual portfolio divided by leverage ratio scale and volatility scale. The statistics are listed following the order of low leverage ratio and volatility (lev1vol1) to the high leverage ratio and volatility (lev5vol5). Panel A shows CDS spread, Panel B presents leverage ratio and Panel C is stock return volatility .

Panel A: CDS spread

	Min	Max	std	skew	kurtosis	J-Qtest
lev1vol1	-0.3425	0.3789	0.1494	0.2319	3.7513	0
lev1vol2	-0.4178	0.3451	0.1647	0.0141	3.2511	0
lev1vol3	-0.3749	0.4720	0.1625	0.3557	3.8274	0
lev1vol4	-0.3775	0.4005	0.1610	0.1378	3.1409	0
lev1vol5	-0.4106	0.4448	0.1973	0.2987	3.1002	0
lev2vol1	-0.4665	0.5125	0.2021	0.1672	3.5124	0
lev2vol2	-0.3910	0.4610	0.1688	0.2122	3.6857	0
lev2vol3	-0.2409	0.2707	0.1073	0.0623	3.2479	0
lev2vol4	-0.3209	0.4430	0.1449	0.5922	3.9430	0
lev2vol5	-0.2938	0.4941	0.1654	0.8674	3.8589	1
lev3vol1	-0.4139	0.3729	0.1676	0.2331	3.5686	0
lev3vol2	-0.3748	0.4201	0.1594	0.2145	3.7390	0
lev3vol3	-0.3641	0.4383	0.1743	0.2789	3.1982	0
lev3vol4	-0.3632	0.4111	0.1804	0.2427	2.8322	0
lev3vol5	-0.3208	0.4545	0.1423	0.6171	4.3420	1
lev4vol1	-0.3518	0.4192	0.1578	0.3673	3.3553	0
lev4vol2	-0.3815	0.3523	0.1567	-0.0193	3.4558	0
lev4vol3	-0.4264	0.4385	0.1891	0.0513	3.2842	0
lev4vol4	-0.3276	0.4576	0.1626	0.4423	3.5236	0
lev4vol5	-0.3165	0.5450	0.1686	0.5973	4.0103	0
lev5vol1	-0.4900	0.6585	0.2118	0.3169	3.9783	0
lev5vol2	-0.4166	0.8325	0.2187	1.1640	5.9435	1
lev5vol3	-0.3132	0.4485	0.1611	0.2878	3.3597	0
lev5vol4	-0.2725	0.5287	0.1485	0.9656	4.5748	1
lev5vol5	-0.3418	0.4181	0.1531	0.3616	3.3661	0

Panel B: leverage ratio

	Min	Max	std	skew	kurtosis	J-Qtest
lev1vol1	-0.0056	0.0231	0.0056	2.2448	8.3512	1
lev1vol2	-0.0103	0.0201	0.0051	1.4126	7.5684	1
lev1vol3	-0.0177	0.0202	0.0080	0.2463	4.2922	0
lev1vol4	-0.0148	0.0218	0.0076	0.7481	4.0891	1
lev1vol5	-0.0520	0.0474	0.0165	-0.6465	6.7413	1
lev2vol1	-0.0123	0.0206	0.0065	1.0442	4.8857	1
lev2vol2	-0.0305	0.0318	0.0129	0.1551	4.3991	0
lev2vol3	-0.0325	0.0383	0.0139	0.3996	4.7668	1
lev2vol4	-0.0471	0.0781	0.0218	1.1298	6.8453	1
lev2vol5	-0.0551	0.0598	0.0222	0.3614	4.5050	1
lev3vol1	-0.0257	0.0320	0.0103	0.5036	4.7655	1
lev3vol2	-0.0380	0.0396	0.0152	0.1664	4.1884	0
lev3vol3	-0.0473	0.0489	0.0189	0.2068	4.3323	0
lev3vol4	-0.0591	0.0894	0.0261	0.3367	5.5756	1
lev3vol5	-0.0957	0.1017	0.0398	0.2065	4.3965	0
lev4vol1	-0.0362	0.0442	0.0139	0.2253	4.8460	1
lev4vol2	-0.0527	0.0581	0.0209	0.3524	4.5159	1
lev4vol3	-0.0766	0.0811	0.0300	0.3108	4.9732	1
lev4vol4	-0.0578	0.0933	0.0290	0.7061	4.8210	1
lev4vol5	-0.1015	0.1365	0.0405	0.6038	6.6980	1
lev5vol1	-0.0352	0.0527	0.0172	0.7695	4.8749	1
lev5vol2	-0.0515	0.0872	0.0208	0.9675	7.5626	1
lev5vol3	-0.0429	0.0743	0.0228	0.9112	4.3655	1
lev5vol4	-0.0541	0.0716	0.0252	0.4232	4.0074	0
lev5vol5	-0.0661	0.0875	0.0283	0.3617	4.4300	0

Panel C: stock return volatility

	Min	Max	std	skew	kurtosis	J-Qtest
lev1vol1	-0.2174	0.3123	0.0680	1.5177	13.4193	1
lev1vol2	-0.2735	0.3709	0.0867	1.1039	10.9178	1
lev1vol3	-0.2706	0.3554	0.0927	0.6512	7.6238	1
lev1vol4	-0.3935	0.3968	0.1139	0.4171	8.5914	1
lev1vol5	-0.3992	0.4433	0.1604	0.6090	4.9583	1
lev2vol1	-0.1851	0.2774	0.0611	1.5271	12.5181	1
lev2vol2	-0.2795	0.3422	0.0846	0.7622	9.8699	1
lev2vol3	-0.2811	0.3684	0.1009	0.9504	7.1457	1
lev2vol4	-0.4502	0.5604	0.1340	0.9404	10.9785	1
lev2vol5	-0.4731	0.4777	0.1516	0.3989	6.6371	1
lev3vol1	-0.1812	0.3061	0.0656	1.7557	12.9689	1
lev3vol2	-0.2001	0.3118	0.0752	1.1644	8.8047	1
lev3vol3	-0.2424	0.3087	0.0856	0.5763	6.4392	1
lev3vol4	-0.3457	0.4009	0.1043	0.4828	8.7885	1
lev3vol5	-0.4163	0.5157	0.1457	0.6637	6.5877	1
lev4vol1	-0.2332	0.2916	0.0740	0.8932	9.3678	1
lev4vol2	-0.2533	0.3316	0.0871	0.6460	7.3390	1
lev4vol3	-0.2766	0.3139	0.0980	0.1684	5.6692	1
lev4vol4	-0.3553	0.3510	0.1082	0.2161	6.7360	1
lev4vol5	-0.3588	0.5271	0.1505	0.8709	6.4509	1
lev5vol1	-0.2141	0.3762	0.0855	2.1126	11.8905	1
lev5vol2	-0.2588	0.2715	0.0889	0.3204	5.1765	1
lev5vol3	-0.3125	0.2621	0.0925	-0.0337	6.3234	1
lev5vol4	-0.3189	0.3493	0.1124	0.4247	6.4433	1
lev5vol5	-0.4581	0.4635	0.1601	0.2036	5.0955	1

[Table 13] Regression Results for Mean of Basic Portfolio Regressions

This table represents the result from liner regression of CDS differences assigned in 5x5 portfolios and the other variables from January 2006 to August 2009, for 44months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results of structural variables and from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0040	0.0045	-0.0026	0.0049	-0.0017
	(0.4674)	(0.5288)	(-0.2654)	(0.5752)	(-0.1726)
Δlev	3.5814	3.7129	-1.7081	3.2943	-1.7137
	(31.2516)	(31.6402)	(-9.4019)	(33.6978)	(-9.6007)
Δvol	0.3383	0.3507	0.0462	0.3802	0.0902
	(22.1166)	(22.1434)	(4.1546)	(23.9432)	(7.6949)
ΔRf	-17.1568	-17.2908	-20.1748	-15.9332	-18.8487
	(-54.9812)	(-54.7973)	(-77.6872)	(-53.5786)	(-88.9529)
ΔSentMi		0.0015	0.0004		
		(8.7380)	(2.9999)		
ΔSentAA				-0.1121	-0.0596
				(-32.8161)	(-13.5769)
ΔTerm			0.1465		0.1386
			(47.1589)		(47.2362)
ΔSP			-0.0014		-0.0014
			(-43.8240)		(-43.8126)
ΔSmirk			-0.3176		-0.4759
			(-18.7747)		(-21.8631)
R^2	38.95%	39.46%	53.56%	40.43%	53.85%
A-R^2	34.26%	33.09%	44.28%	34.16%	44.62%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0062	-0.0020	0.0054	-0.0030	0.0043	-0.0023
	(0.7191)	(-0.1997)	(0.6045)	(-0.2915)	(0.5060)	(-0.2189)
Δlev	3.3959	-1.5447	2.7727	-1.4432	3.7085	-1.6412
	(32.9187)	(-9.0746)	(30.1987)	(-8.2301)	(30.8093)	(-8.5896)
Δvol	0.3558	0.0585	0.3515	0.0757	0.3007	0.0045
	(21.9087)	(5.3173)	(23.5119)	(7.0010)	(19.3081)	(0.3560)
ΔRf	-18.1854	-20.5949	-16.6923	-20.4272	-16.7114	-19.6054
	(-55.5008)	(-77.9139)	(-53.5033)	(-78.3856)	(-49.9336)	(-69.0418)
ΔSentBW	-0.0212	-0.0077				
	(-21.3369)	(-9.3447)				
ΔSentEPCR			0.2051	0.1419		
			(29.8804)	(19.8349)		
ΔSentLS					0.2119	0.2166
					(8.8284)	(7.4516)
ΔTermspread		0.1476		0.1622		0.1453
		(46.7305)		(46.5972)		(46.7490)
ΔSP		-0.0014		-0.0012		-0.0014
		(-44.0340)		(-39.5596)		(-43.7427)
ΔSmirk		-0.3403		-0.4330		-0.3315
		(-17.3545)		(-19.6438)		(-16.5900)
R^2	40.19%	53.64%	42.11%	54.78%	39.44%	53.91%
A-R^2	33.89%	44.37%	36.02%	45.74%	33.06%	44.69%

[Table 14] Regression Results for Mean of Pre-crisis Period Portfolio Regressions

This table represents the result from liner regression of CDS differences assigned in 5x5 portfolios and the other variables from January 2006 to August 2007, for 20 months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results of structural variables and from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Constant	0.0045	0.0079	0.0353	0.0041	0.0308
	(0.2567)	(0.4451)	(1.2648)	(0.2349)	(1.2968)
Δlev	10.0919	10.6443	3.8243	9.7992	3.7324
	(9.0533)	(9.4886)	(2.6452)	(8.9147)	(2.6723)
Δvol	-0.2085	-0.2458	-0.4928	-0.0471	-0.2553
	(-4.4282)	(-5.0616)	(-10.9749)	(-0.9799)	(-5.6408)
ΔRf	-3.8752	-5.8846	1.2583	-5.0587	2.3532
	(-6.5211)	(-8.9135)	(2.1014)	(-8.4408)	(4.1705)
ΔSentMi		0.0050	0.0051		
		(14.7576)	(11.8097)		
ΔSentAA				0.1329	0.1233
				(25.5512)	(22.0838)
ΔTerm			-0.1493		-0.1898
			(-11.6958)		(-15.1484)
ΔSP			-0.0021		-0.0021
			(-26.0227)		(-27.2584)
ΔSmirk			-0.0606		-0.0111
			(-1.9087)		(-0.3700)
R^2	20.76%	26.49%	47.20%	24.55%	44.28%
A-R^2	5.90%	6.88%	16.40%	4.43%	11.78%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0047	0.0347	0.0053	0.0286	-0.0001	0.0290
	(0.2680)	(1.4547)	(0.3130)	(1.2561)	(-0.0029)	(1.2839)
Δlev	10.4539	3.3787	8.7898	4.1113	10.2186	3.3873
	(9.3715)	(2.4500)	(8.0189)	(2.9037)	(9.4261)	(2.5035)
Δvol	-0.1831	-0.3651	-0.6426	-0.6769	-0.2683	-0.4272
	(-3.8226)	(-8.1768)	(-12.3438)	(-12.7354)	(-5.7896)	(-9.6671)
ΔRf	-3.9628	0.7093	1.4377	2.3276	-5.5303	-0.2228
	(-6.7385)	(1.2820)	(2.7977)	(4.1750)	(-8.7507)	(-0.3860)
ΔSentBW	-0.0105	-0.0182				
	(-6.7557)	(-14.6261)				
ΔSentEPCR			0.2865	0.1525		
			(26.3745)	(13.6375)		
ΔSentLS					0.0000	0.0000
					(-15.0493)	(-16.7851)
ΔTermspread		-0.1902		-0.1340		-0.2112
		(-15.1014)		(-12.4160)		(-16.8748)
ΔSP		-0.0022		-0.0017		-0.0021
		(-28.8122)		(-20.5158)		(-27.2994)
ΔSmirk		-0.4275		-0.4313		-0.3696
		(-15.9720)		(-15.7408)		(-13.5387)
R^2	22.06%	43.82%	32.04%	45.47%	24.28%	44.88%
A-R^2	1.27%	11.05%	13.92%	13.66%	4.09%	12.73%

[Table 15] Regression Results for Mean of During-crisis Period Portfolio Regressions

This table represents the result from liner regression of CDS differences assigned in 5x5 portfolios and the other variables from September 2007to August 2009, for 24 months. The coefficient estimates and the R-squared values are the average of the result of regressions of each CDS differences of individual firms and the t-statistics are calculated by dividing the mean of individual coefficients by the standard deviation coefficient values scaling by squared root of number of firms as in Collins-Dufresne et al. (2001). Panel A is the matrix of the results of structural variables and from regressions which include ΔSentMi and ΔSentAA respectively. Panel B is the matrix of the results from regressions which include ΔSentBW, ΔSentEPCR and ΔSentLS respectively.

Panel A: Results of ΔSentMi and ΔSentAA

Coefficients	0.0078	0.0068	-0.0291	0.0157	-0.0200
	(0.5332)	(0.4680)	(-1.5225)	(1.1403)	(-1.1525)
Δlev	3.0971	2.9596	-2.9593	1.9068	-1.5698
	(27.3501)	(26.6126)	(-12.6033)	(22.9001)	(-7.7993)
Δvol	0.4154	0.4096	-0.0714	0.6096	0.1108
	(24.6147)	(24.0396)	(-5.2278)	(30.5704)	(7.7408)
ΔRf	-19.7633	-19.8944	-38.9874	-16.2350	-33.5276
	(-47.4786)	(-48.9621)	(-58.7232)	(-38.8492)	(-53.6479)
ΔSentMi		-0.0020	-0.0077		
		(-10.8889)	(-33.7001)		
ΔSentAA				-0.3350	-0.1001
				(-53.3272)	(-17.2830)
ΔTerm			0.3035		0.2528
			(64.5034)		(72.3733)
ΔSP			-0.0012		-0.0010
			(-25.8759)		(-24.1442)
ΔSmirk			1.1128		0.7109
			(17.8024)		(12.6996)
R^2	49.27%	49.91%	74.62%	58.08%	72.70%
A-R^2	41.26%	38.78%	62.78%	48.77%	59.97%

Panel B: result of ΔSentBW, ΔSentEPCR and ΔSentLS

Constant	0.0125	-0.0237	0.0125	-0.0218	0.0067	-0.0285
	(0.8661)	(-1.2765)	(0.8725)	(-1.3020)	(0.4442)	(-1.4822)
Δlev	2.7805	-1.5529	1.6042	-1.7583	3.2633	-1.1760
	(27.9285)	(-8.0449)	(20.6083)	(-8.1958)	(25.5672)	(-5.4808)
Δvol	0.4384	0.0174	0.4902	0.0804	0.3506	-0.1498
	(24.2340)	(1.4073)	(26.5627)	(5.8507)	(20.6513)	(-10.1686)
ΔRf	-21.1920	-37.1703	-20.6408	-37.5910	-19.1360	-35.4182
	(-49.4095)	(-57.9247)	(-47.1145)	(-58.7363)	(-43.2510)	(-57.3173)
ΔSentBW	-0.0275	-0.0056				
	(-21.3805)	(-5.1993)				
ΔSentEPCR			0.2779	0.1735		
			(27.6060)	(16.8319)		
ΔSentLS					0.0000	0.0000
					(7.5719)	(16.9459)
ΔTerm		0.2738		0.2840		0.2863
		(66.6384)		(65.5206)		(61.9001)
ΔSP		-0.0011		-0.0009		-0.0011
		(-24.5314)		(-23.3591)		(-27.0614)
ΔSmirk		0.9460		0.8649		0.9589
		(16.5802)		(14.9264)		(16.7279)
R^2	51.46%	72.34%	52.52%	73.30%	50.03%	73.44%
A-R^2	40.67%	59.43%	41.97%	60.84%	38.92%	61.04%

[Table 16] Individual Result for Basic Portfolio Regression of Structural Variables

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables from January 2006 to August 2009, for 44months. Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, and Panel D is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

u	lev1	lev2	lev3	lev4	lev5
vol1	5.5706	6.0256	7.1082	2.5030	3.4076
	(1.5173)	(1.2223)	(2.8302)	(1.0444)	(2.2458)
vol2	7.5728	4.0279	3.1572	0.7519	0.5219
	(1.8819)	(2.2715)	(3.1272)	(0.9927)	(0.8501)
vol3	3.9863	4.1770	3.7429	2.4461	1.3753
	(1.9153)	(3.2020)	(3.5578)	(2.9864)	(3.1416)
vol4	0.6476	2.7181	3.1990	2.5982	2.3034
	(0.3891)	(2.3759)	(4.0265)	(3.7625)	(4.3175)
vol5	1.3526	1.0374	1.5308	2.2126	3.4528
	(1.0304)	(1.4639)	(1.4232)	(2.9668)	(6.9074)

Panel B: Δ vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.4699	0.3696	0.6063	0.2385	0.2399
	(1.2259)	(1.2548)	(2.4707)	(1.1782)	(1.4324)
vol2	0.8231	0.5024	0.1999	0.4120	0.2413
	(1.5908)	(1.4340)	(1.0151)	(2.0453)	(0.6479)
vol3	0.7178	0.5470	0.4652	0.3061	0.3167
	(1.4403)	(1.4112)	(1.6952)	(0.6584)	(2.4875)
vol4	0.9597	0.1103	0.1262	0.0589	0.1442
	(2.8529)	(0.2482)	(0.4212)	(0.0381)	(0.5308)
vol5	1.1415	0.7517	0.2356	0.3069	0.0946
	(2.5235)	(0.6475)	(0.4214)	(1.5719)	(0.5469)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-16.8557	-28.1666	-23.6322	-32.9353	-33.7799
	(-1.8549)	(-3.0144)	(-3.2153)	(-3.5793)	(-3.3563)
vol2	-26.5552	-21.2454	-14.5358	-17.2241	-13.0706
	(-2.3666)	(-2.3247)	(-2.6660)	(-2.0293)	(-1.2180)
vol3	-18.4611	-20.1737	-23.8526	-27.4323	-13.4937
	(-1.7435)	(-2.4571)	(-2.9771)	(-3.2086)	(-2.4129)
vol4	-19.1957	-22.3499	-16.8104	-15.8205	-8.2681
	(-2.0918)	(-2.9567)	(-2.0157)	(-2.0977)	(-1.2314)
vol5	-26.5766	-9.2842	-20.8990	-15.4454	-8.0171
	(-1.8113)	(-1.2140)	(-2.5547)	(-2.2633)	(-1.6811)

Panel D: R^2 coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	18.65%	33.90%	32.62%	37.16%	39.00%
vol2	27.96%	37.95%	49.02%	36.44%	14.13%
vol3	55.41%	50.06%	49.76%	44.90%	35.02%
vol4	35.85%	33.62%	56.95%	46.59%	46.00%
vol5	42.33%	10.69%	61.13%	60.76%	75.49%

[Table 17] Individual Regression Results for Basic Portfolio of SentMi Model

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables and SentMi from January 2006 to August 2009, for 44months. Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, Panel D is the matrix of coefficient of ΔSentMi, and Panel E is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	5.3296	5.9544	6.3259	2.6011	2.9942
	(1.4696)	(1.2333)	(2.6389)	(1.1431)	(2.3381)
vol2	7.9202	3.6747	2.7392	0.4578	0.3192
	(1.8524)	(2.1445)	(2.9425)	(0.9792)	(0.6623)
vol3	4.0466	4.0137	3.3697	2.3397	1.2727
	(1.9406)	(3.0762)	(3.3519)	(3.0276)	(3.0451)
vol4	0.5427	2.6746	3.0532	2.2916	2.0519
	(0.4640)	(2.4142)	(3.8906)	(3.5951)	(4.1455)
vol5	1.4646	2.1149	1.2074	1.9075	3.3225
	(1.0068)	(1.9151)	(1.5537)	(2.6997)	(6.5534)

Panel B: Δ vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.4527	0.3647	0.5827	0.2413	0.2204
	(1.1972)	(1.2649)	(2.4293)	(1.2092)	(1.4945)
vol2	0.8492	0.4690	0.2018	0.3991	0.2488
	(1.5929)	(1.3916)	(1.0005)	(2.0220)	(0.6991)
vol3	0.7348	0.5172	0.4255	0.2959	0.3165
	(1.5772)	(1.3505)	(1.6573)	(0.6857)	(2.4570)
vol4	0.9518	0.1080	0.1102	0.0366	0.1491
	(2.9053)	(0.2578)	(0.4295)	(0.0354)	(0.5040)
vol5	1.1617	0.7321	0.2586	0.3183	0.0935
	(2.4231)	(0.8640)	(0.3946)	(1.5647)	(0.5388)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-16.8462	-28.1303	-23.5964	-32.9250	-33.5713
	(-1.8323)	(-2.9876)	(-3.1720)	(-3.5795)	(-3.3731)
vol2	-26.5364	-21.1499	-14.6818	-17.4638	-13.3728
	(-2.3460)	(-2.2819)	(-2.6327)	(-2.0057)	(-1.2019)
vol3	-18.4530	-20.1434	-23.9499	-27.4935	-13.6924
	(-1.7773)	(-2.4165)	(-2.9313)	(-3.2076)	(-2.3837)
vol4	-19.3003	-22.3556	-17.0569	-16.0794	-9.1414
	(-2.1055)	(-2.9599)	(-1.9994)	(-2.0683)	(-1.1900)
vol5	-26.6332	-9.9822	-21.0460	-15.5817	-8.1784
	(-1.7775)	(-1.3629)	(-2.5747)	(-2.2264)	(-1.6629)

Panel D: Δ SentMi coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-0.0010	-0.0004	-0.0037	0.0006	-0.0069
	(0.0771)	(0.2516)	(0.0472)	(0.6415)	(0.7267)
vol2	0.0015	-0.0043	-0.0033	-0.0045	-0.0024
	(0.2649)	(-0.1789)	(0.0731)	(0.1238)	(-0.6920)
vol3	0.0007	-0.0024	-0.0055	-0.0020	-0.0028
	(0.6841)	(-0.1081)	(-0.1266)	(0.6424)	(0.1148)
vol4	-0.0009	-0.0005	-0.0029	-0.0063	-0.0045
	(0.6517)	(0.5920)	(0.2923)	(-0.0279)	(0.5404)
vol5	0.0020	0.0081	-0.0026	-0.0041	-0.0020
	(-0.0228)	(1.6491)	(0.6939)	(-0.2235)	(0.1354)

Panel E: R^2 coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	14.20%	30.30%	28.90%	33.73%	35.76%
vol2	23.96%	35.60%	46.54%	32.92%	11.37%
vol3	53.67%	48.75%	48.56%	42.24%	31.90%
vol4	32.31%	31.49%	54.75%	46.73%	44.34%
vol5	41.41%	6.29%	59.67%	59.66%	74.48%

[Table 18] Individual Regression Results for Basic Portfolio of SentAA Model

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables and SentAA from January 2006 to August 2009, for 44months. Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, Panel D is the matrix of coefficient of ΔSentAA, and Panel E is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-3.5387	-10.2067	-3.8193	-6.0761	-4.4403
	(-0.5886)	(-1.2643)	(-0.8058)	(-1.2625)	(-2.1486)
vol2	-3.6887	-3.5784	-0.5628	-1.5959	-0.5072
	(-0.4436)	(-1.0007)	(-0.2847)	(-0.8334)	(-0.1994)
vol3	1.2357	0.7223	-0.1673	0.6432	0.3497
	(0.3470)	(0.3010)	(-0.0655)	(0.3771)	(0.5268)
vol4	-6.4378	-2.1335	0.6649	-0.4133	1.3111
	(-2.4018)	(-0.9126)	(0.4032)	(-0.2579)	(1.3366)
vol5	1.1285	-2.7468	-0.7827	-1.5394	3.3377
	(0.4116)	(-1.1304)	(-0.4256)	(-0.9223)	(3.0005)

Panel B: Δ vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-0.0993	0.0549	0.3053	0.1011	-0.0490
	(-0.2575)	(0.1752)	(1.3708)	(0.4686)	(-0.3353)
vol2	0.2558	0.2132	0.0228	0.2932	0.0268
	(0.4843)	(0.7015)	(0.1504)	(1.4910)	(0.1139)
vol3	0.2517	0.2026	0.0236	0.0857	0.1551
	(0.5623)	(0.6321)	(0.0760)	(0.3111)	(1.3778)
vol4	0.3500	-0.0695	-0.2343	-0.2521	0.0276
	(1.0903)	(-0.2420)	(-0.8357)	(-1.0908)	(0.1723)
vol5	0.6598	-0.0141	-0.0503	0.0439	-0.0506
	(1.4419)	(-0.0335)	(-0.1500)	(0.2395)	(-0.4480)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-15.5058	-19.1443	-20.1600	-24.6989	-26.4039
	(-1.8205)	(-1.9469)	(-2.4605)	(-2.9976)	(-2.9571)
vol2	-23.2195	-18.9609	-13.0233	-15.5599	-14.2961
	(-2.0577)	(-2.1687)	(-2.4987)	(-1.9811)	(-1.2850)
vol3	-16.5789	-18.3979	-21.9592	-21.1744	-21.0046
	(-1.7610)	(-2.2397)	(-2.5066)	(-2.3052_	(-3.6179)
vol4	-20.6845	-16.6125	-21.7204	-17.7365	-14.4425
	(-2.6193)	(-1.8915)	(-2.2101)	(-2.0111)	(-1.6793)
vol5	-21.1193	-12.5793	-20.5751	-19.6134	-16.0470
	(-1.7229)	(-0.9890)	(-2.1253)	(-2.7764)	(-2.4334)

Panel D: Δ SentAA coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-0.0898	-0.1436	-0.0010	-0.1485	-0.0295
	(-0.6776)	(-1.0035)	(-0.0084)	(-1.1507)	(-0.2126)
vol2	-0.2092	-0.1702	-0.0225	-0.0546	-0.0019
	(-1.2208)	(-1.2535)	(-0.2785)	(-0.4413)	(-0.0110)
vol3	-0.1112	-0.0758	-0.0865	-0.1257	-0.0064
	(-0.7386)	(-0.5730)	(-0.6459)	(-0.9214)	(-0.0719)
vol4	-0.0008	-0.0714	0.0129	-0.0015	-0.0435
	(-0.0069)	(-0.5528)	(0.0868)	(-0.0115)	(-0.3601)
vol5	-0.1518	-0.0277	-0.0842	0.0557	0.0996
	(-0.8164)	(-0.1402)	(-0.5911)	(0.4950)	(1.0336)

Panel E: R^2 coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	33.60%	36.29%	35.91%	48.77%	29.89%
vol2	37.99%	45.57%	47.34%	40.99%	32.80%
vol3	54.24%	51.30%	51.24%	47.80%	30.56%
vol4	47.13%	40.57%	51.41%	46.16%	54.44%
vol5	58.26%	5.48%	67.21%	54.75%	65.79%

[Table 19] Individual Regression Results for Basic Portfolio of SentBW Model

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables and SentBW from January 2006 to August 2009, for 44months. Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, Panel D is the matrix of coefficient of ΔSentBW, and Panel E is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	3.9626	4.9125	6.7636	2.2208	3.2295
	(1.3044)	(1.0536)	(2.6701)	(1.0392)	(2.1063)
vol2	6.2508	3.7359	3.1172	0.4482	0.2358
	(1.6603)	(2.1237)	(3.0692)	(0.8230)	(0.7573)
vol3	3.2686	3.9057	3.5859	2.3824	1.4194
	(1.7576)	(2.9202)	(3.3726)	(2.9359)	(3.0688)
vol4	-0.2009	2.5529	3.1662	2.5764	2.3021
	(0.2340)	(2.2648)	(3.9383)	(3.6953)	(4.2446)
vol5	1.2389	1.2207	1.5989	2.1932	3.4258
	(1.0115)	(1.4734)	(1.5325)	(2.9105)	(6.7813)

Panel B: Δ vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.5915	0.4226	0.6432	0.2555	0.2348
	(1.4664)	(1.4041)	(2.5581)	(1.2917)	(1.4032)
vol2	0.9562	0.5333	0.1921	0.4589	0.2606
	(1.7609)	(1.4970)	(0.9887)	(2.2462)	(0.7067)
vol3	0.8214	0.5782	0.4709	0.3188	0.3127
	(1.5413)	(1.4596)	(1.7148)	(0.6871)	(2.4455)
vol4	1.0332	0.1225	0.1243	0.0605	0.1448
	(2.8832)	(0.2809)	(0.4157)	(0.0446)	(0.5378)
vol5	1.1440	0.6799	0.2015	0.3037	0.0940
	(2.4817)	(0.6610)	(0.2606)	(1.5388)	(0.5363)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-19.8147	-29.7918	-24.3682	-35.5255	-35.0042
	(-2.1177)	(-3.1571)	(-3.2704)	(-3.8503)	(-3.4302)
vol2	-28.9868	-22.5993	-15.2599	-19.5194	-15.6096
	(-2.5115)	(-2.4018)	(-2.7445)	(-2.2809)	(-1.3746)
vol3	-20.5729	-21.2327	-24.8670	-28.4058	-12.8861
	(-1.8348)	(-2.4795)	(-3.0114)	(-3.2578)	(-2.3158)
vol4	-21.9787	-23.6273	-17.4334	-16.2851	-8.1975
	(-2.1669)	(-2.9964)	(-1.9964)	(-2.0665)	(-1.1663)
vol5	-27.9133	-13.6881	-22.0964	-15.7339	-8.4013
	(-1.8221)	(-1.5065)	(-2.6636)	(-2.2307)	(-1.6517)

Panel D: Δ SentBW coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-0.0494	-0.0402	-0.0184	-0.0584	-0.0243
	(-1.3924)	(-1.0885)	(-0.7240)	(-1.5584)	(-0.7898)
vol2	-0.0444	-0.0261	-0.0164	-0.0422	-0.0423
	(-0.9566)	(-0.6991)	(-0.7640)	(-1.3735)	(-0.9438)
vol3	-0.0338	-0.0177	-0.0199	-0.0225	0.0103
	(-0.6888)	(-0.4847)	(-0.5936)	(-0.6930)	(0.0531)
vol4	-0.0344	-0.0265	-0.0123	-0.0104	0.0015
	(-0.6332)	(-0.6162)	(-0.2168)	(-0.1428)	(0.2146)
vol5	-0.0265	-0.0971	-0.0238	-0.0058	-0.0072
	(-0.3408)	(-1.6865)	(-0.8594)	(-0.1880)	(-0.1215)

Panel E: R^2 coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	20.73%	33.27%	31.27%	36.35%	36.61%
vol2	27.49%	35.94%	46.85%	34.78%	26.38%
vol3	53.66%	48.72%	47.73%	42.11%	33.17%
vol4	39.92%	35.10%	55.59%	43.94%	43.10%
vol5	40.08%	11.74%	59.29%	58.58%	74.30%

[Table 20] Individual Regression Result for Basic Portfolio of ΔSentEPCR Model

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables and ΔSentEPCR from January 2006 to August 2009, for 44months. Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, Panel D is the matrix of coefficient of ΔSentEPCR, and Panel E is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	2.3679	3.4818	4.1568	-0.5686	1.8331
	(1.2005)	(0.8654)	(2.1763)	(0.7760)	(1.4998)
vol2	2.0839	1.5606	2.7808	-0.0690	0.6062
	(1.1161)	(1.7456)	(2.5149)	(0.6127)	(0.6197)
vol3	1.1310	2.9630	2.5714	1.4080	1.2287
	(1.5146)	(2.6193)	(2.6946)	(2.3502)	(2.6456)
vol4	-0.3367	0.9034	2.3215	2.1998	1.9841
	(0.0076)	(1.4949)	(3.1083)	(2.7829)	(3.1604)
vol5	0.6997	-0.9814	0.4875	1.8516	3.4389
	(0.8061)	(0.6154)	(0.9326)	(2.5143)	(5.5526)

Panel B: Δ vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.5296	0.3964	0.7339	0.2841	0.2578
	(1.1226)	1.2017)	(2.5838)	(1.1422)	(1.3708)
vol2	1.0039	0.6467	0.2252	0.4675	0.2358
	(1.6862)	1.4850)	(1.1175)	(2.1392)	(0.5953)
vol3	0.8781	0.6303	0.5251	0.4113	0.3273
	(1.3721)	1.4446)	(1.6601)	(0.8043)	(2.5442)
vol4	1.0014	0.3037	0.2172	0.0919	0.1694
	(2.8905)	0.4308)	(0.5240)	(0.2642)	(0.8096)
vol5	1.1591	0.9925	0.3292	0.3427	0.0954
	(2.5269)	0.9661)	(0.4509)	(1.5799)	(0.6441)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-18.1289	-27.8949	-23.7614	-34.5364	-34.982
	(-1.7844)	(-2.8718)	(-3.1274)	(-3.5377)	(-3.3809)
vol2	-28.5279	-23.1133	-14.9354	-18.6318	-12.870
	(-2.3868)	(-2.292)	(-2.6600)	(-2.0190)	(-1.1884)
vol3	-21.0502	-21.3749	-24.8256	-28.2738	-14.014
	(-1.7156)	(-2.4269)	(-2.9855)	(-3.1574)	(-2.4255)
vol4	-20.6957	-23.5454	-18.1638	-16.1741	-9.3293
	(-2.1086)	(-2.9431)	(-2.0192)	(-2.0321)	(-1.3031)
vol5	-27.6707	-7.77734	-21.7708	-15.9372	-8.0347
	(-1.7705)	(-0.9616)	(-2.5180)	(-2.2268)	(-1.6568)

Panel D: Δ ΔSentEPCR coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.3118	0.2212	0.3279	0.3456	0.4138
	(1.1454)	(0.8832)	(1.0836)	(0.7195)	(1.7584)
vol2	0.5214	0.3849	0.0612	0.2610	-0.0256
	(1.5910)	(0.8952)	(0.8828)	(1.0990)	(1.0598)
vol3	0.4025	0.2558	0.3171	0.3628	0.0933
	(1.4136)	(0.9310)	(1.4023)	(1.2588)	(1.0562)
vol4	0.1491	0.4861	0.3707	0.1645	0.1636
	(1.3579)	(2.0785)	(1.7979)	(1.5168)	(1.7333)
vol5	0.2222	0.7221	0.2898	0.1206	0.0047
	(0.9208)	(3.0992)	(1.9726)	(0.7264)	(0.5941)

Panel E: R^2 coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	19.68%	38.00%	35.36%	34.57%	37.11%
vol2	26.00%	38.92%	48.64%	43.29%	29.40%
vol3	56.69%	47.57%	50.12%	45.69%	36.30%
vol4	37.15%	33.81%	59.24%	44.97%	43.74%
vol5	44.02%	5.77%	59.49%	59.59%	74.13%

[Table 21] Individual Regression Results for Basic Portfolio of SentLS Model

This table represents the result by each portfolio from liner regression of structural model which examines the relation between CDS differences assigned in 5x5 portfolios and the theoretical variables and SentLS from January 2006 to August 2009, for 44months.Panel A is the matrix of coefficient of Δlev, Panel B is the matrix of coefficient of Δvol, Panel C is the matrix of coefficient of ΔRf, Panel D is the matrix of coefficient of ΔSentLS, and Panel E is the matrix of coefficient of adjusted R^2.

Panel A: Δlev coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	6.9258	7.2287	7.1939	1.7052	3.7146
	(1.4520)	(1.1887)	(2.7094)	(0.6817)	(2.0958)
vol2	9.3163	5.1180	3.8610	0.2088	0.7462
	(1.8199)	(2.1722)	(3.2995)	(0.5397)	(0.9594)
vol3	5.1761	5.2410	4.1069	2.2102	1.4043
	(2.1288)	(3.5040)	(3.4300)	(2.5912)	(2.7646)
vol4	1.4758	3.2333	3.6587	3.1262	2.3985
	(0.5161)	(2.2473)	(3.9594)	(3.6068)	(4.1185)
vol5	1.7555	3.0287	1.9350	2.2729	3.5489
	(0.9804)	(1.7141)	(1.3962)	(2.7474)	(6.5189)

Panel B: Δ Vol coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	0.3381	0.2690	0.5946	0.2979	0.1844
	(1.1268)	(1.0715)	(2.2680)	(1.2566)	(1.2084)
vol2	0.5610	0.2870	0.0681	0.5095	0.2089
	(1.3569)	(1.0796)	(0.5307)	(1.8373)	(0.4076)
vol3	0.4815	0.2771	0.3645	0.3774	0.3067
	(0.9746)	(0.6131)	(1.3696)	(0.6471)	(2.2379)
vol4	0.7939	-0.0743	-0.0964	-0.1155	0.1074
	(2.3768)	(0.1664)	(0.0184)	(-0.2912)	(0.4379)
vol5	1.0441	0.1551	0.1096	0.2855	0.0651
	(2.3842)	(0.1560)	(0.3251)	(1.5453)	(0.4729)

Panel C: ΔRf coefficient

	lev1	lev2	lev3	lev4	lev5
vol1	-14.7646	-27.1409	-23.4904	-33.9754	-32.5192
	(-1.7619	(-2.8961)	(-3.1080)	(-3.5067)	(-3.1914)
vol2	-23.6073	-18.3021	-11.8349	-19.1987	-11.9788
	(-2.1981	(-2.1045)	(-2.2505	(-2.0070)	(-0.9572)
vol3	-15.1362	-16.6614	-22.5719	-28.1299	-13.2774
	(-1.4071	(-1.9838)	(-2.7634	(-3.1270)	(-2.3330)
vol4	-16.6656	-20.6728	-14.8212	-14.6525	-7.9396
	(-1.8383	(-2.8200)	(-1.8489	(-1.9520)	(-1.1912)
vol5	-24.3682	-7.7677	-20.2520	-15.0915	-7.7247
	(-1.7325)	(-1.0545)	(-2.4804)	(-2.2523)	(-1.6452)

Panel D: Δ SentLS coefficient

		lev1	lev2	lev3	lev4	lev5
vol1		0.0000	0.0000	0.0000	0.0000	0.0000
		(-0.3686)	(-0.2634)	(-0.1244)	(-0.9258)	(-0.2108)
vol2		0.0000	0.0000	0.0000	0.0000	0.0000
		(-0.1660)	(-0.0522)	(0.5133)	(-0.7101)	(0.1302)
vol3		0.0000	0.0000	0.0000	0.0000	0.0000
		(0.9202)	(1.0102)	(0.4382)	(-0.2680)	(-0.6848)
vol4		0.0000	0.0000	0.0000	0.0000	0.0000
		(0.3212)	(-0.0104)	(0.8884)	(0.4089)	(0.1364)
vol5		0.0000	0.0000	0.0000	0.0000	0.0000
		(-0.3494)	(0.7412)	(0.1420)	(-0.4591)	(-0.4583)

Panel E: R^2 coefficient

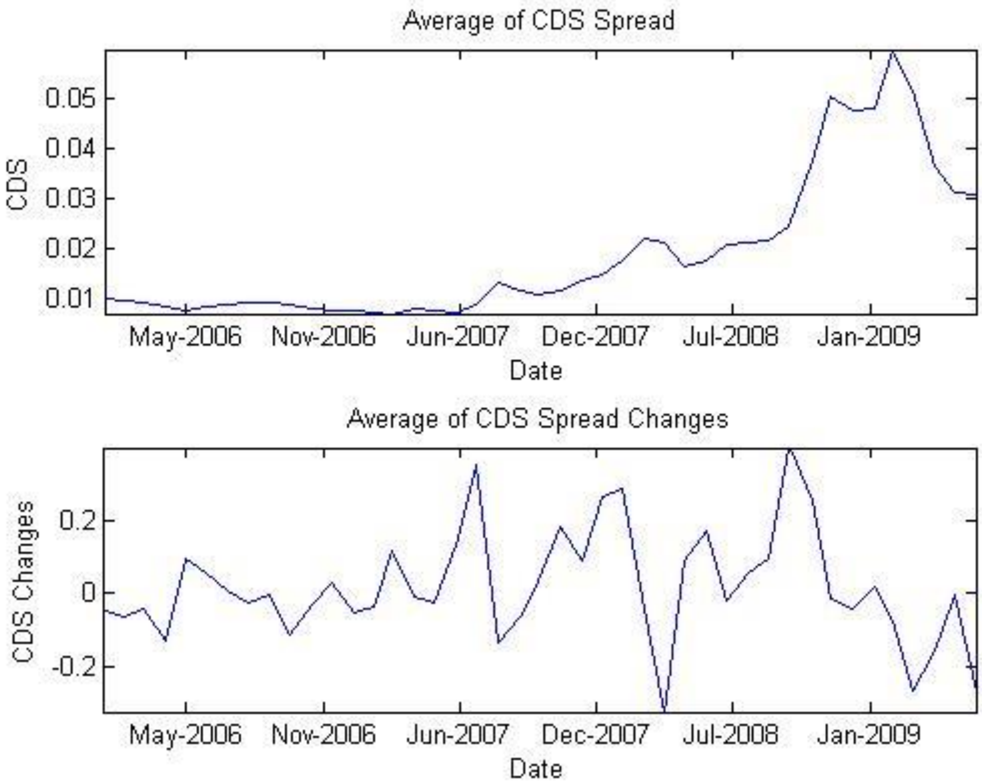
	lev1	lev2	lev3	lev4	lev5
vol1	15.49%	32.39%	32.16%	34.89%	36.11%
vol2	24.67%	36.47%	49.11%	34.32%	15.42%
vol3	52.95%	51.84%	47.72%	44.47%	32.35%
vol4	32.47%	30.49%	54.82%	45.64%	43.06%
vol5	39.56%	5.98%	58.99%	58.90%	74.39%

[Table 22] Average Adjusted R^2 Values for Portfolio

The table shows that the average R^2 by leverage ratio and volatility throughout the period resulting from structural regression and sentiment regression on the 5x5 portfolio. Before controlled section includes theoretical variables and designated sentiment proxy and controlling variables is additionally embedded in after period section.

		before controlled		after controlled	
		by lev	by vol	by lev	by vol
Structural model	low	30.18%	25.59%		
		27.79%	27.78%		
		42.63%	39.14%		
		37.01%	36.91%		
	high	33.68%	41.86%		
SentMi Model	low	24.01%	28.71%	36.00%	46.06%
		27.27%	26.17%	40.32%	34.88%
		37.77%	41.44%	47.04%	50.12%
		35.55%	35.75%	47.44%	47.71%
	high	40.84%	33.37%	50.58%	42.62%
SentAA Model	low	25.76%	30.73%	36.89%	46.24%
		28.53%	27.84%	40.94%	35.84%
		38.53%	42.46%	47.03%	50.62%
		36.59%	36.12%	47.94%	47.69%
	high	41.41%	33.66%	50.30%	42.70%
SentBW	low	30.86%	25.19%	45.88%	36.11%
		27.72%	28.02%	35.29%	40.56%
		41.62%	38.29%	50.12%	46.85%
		35.68%	36.94%	48.04%	47.76%
	high	33.57%	41.01%	42.53%	50.59%
SentEPCR Model	low	30.77%	26.88%	37.23%	45.77%
		28.33%	31.89%	43.60%	35.77%
		43.41%	41.11%	48.71%	51.39%
		39.95%	37.24%	47.91%	50.20%
	high	37.64%	42.99%	51.22%	45.55%
SentLS Model	low	24.12%	28.76%	36.59%	45.77%
		26.48%	26.18%	40.68%	35.34%
		37.94%	41.95%	47.46%	50.75%
		35.90%	35.71%	48.09%	48.37%
	high	40.52%	32.36%	50.16%	42.77%

[Figure 1] Trend of Average CDS Spread and Average of Variance of CDS Spread
The upper graph represents the time series of average of CDS spread and the lower graph shows time series of the average of variance of CDS spread for entire period, January 2006 to August 2009.



[Figure 2] Trend of Average Sentiment Proxies and Average CDS spreads

The five figures below represents the time series of difference in CDS spreads and of each five sentiment measurements which are ΔSentMi, ΔSentAA, ΔSentBW, ΔSentEPCR, and ΔSentLS for entire period, January 2006 to August 2009. The dashed line is the movement of CDS spread changes and the solid line is each sentiment proxy.