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by

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This paper examines the efficiency of the CDS market by conducting a comparative event study in which both the CDS and the stock markets' responses to earnings announcements are considered. I find that both markets have statistically significant reactions to earnings announcements and both markets anticipate these informational events up to 90 trading days prior to announcement. I further find that neither markets' reaction to earnings announcements is entirely efficient as there is evidence of both over- and under-reaction to earnings news. However, results are sensitive to both the categorization of earnings and the model used to generate abnormal performance.

Keywords: Credit default swap, market efficiency, earnings announcements, credit ratings.

JEL Classification: G14

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1. Introduction

The Credit Default Swap (CDS) market is a rapidly growing market in which participants such as banks and hedge funds actively trade credit risk. The most common credit derivative is the credit default swap (CDS). In a single-name credit default swap, one party buys credit protection on a reference obligation (a bond or loan) by a specified issuer from a protection seller. The party buying protection pays the seller a fixed premium each period until a credit event occurs or the swap contract matures. If the underlying firm experiences a credit event such as default, the protection seller is obligated to buy the defaulted bond or loan back from the buyer at its par value. The price of the credit default swap, also called the *spread*, is quoted in basis points as the percentage of the notional value that is to be paid annually. The premium or spread isolates credit risk and is, in itself, a measure of risk. Wider spreads indicate that the market perceives higher credit risk associated with the underlying reference entity (JP Morgan, 2006).

This paper examines the informational efficiency of the CDS market by exploring the reaction of the CDS market to earnings announcements. Two previous studies by Hull, Predescu, and White (2004) and Norden and Weber (2004) explore the CDS market's reaction to credit rating announcements and find the market to be informationally efficient. In contrast, the post-earnings-announcement drift is a longstanding anomaly in stock market research. Numerous authors, beginning with Ball and Brown (1968), have found that the stock market's response to earnings news is not immediate. In violation of the efficient market hypothesis (EMH), there is a post-earnings-announcement drift in which stock prices continue to adjust to earnings surprises up to one year following the announcement. Firm value and the volatility of that value are key inputs into the structural models that price credit risky instruments such

as the credit default swap. In as much as earnings announcements provide important information about the value of the firm, deviations from expected earnings should affect the price of a credit default swap. However, whether the CDS market's reaction is immediate and, therefore, efficient is an empirical question.

To answer this question, I employ event study methodology to examine the effect of earnings announcements on the CDS market. I do so in a comparative context by simultaneously analyzing the stock market's response to earnings news. I find that earnings announcements do have a statistically and economically significant effect on the CDS market, and this effect is inversely proportional to the percent deviation from analysts' estimates. Results are sensitive to credit quality: the lower the credit quality of the reference entity, the greater the reaction of the CDS market to earnings announcements. In general, negative events elicit more of a market reaction than positive ones. Furthermore, the CDS market anticipates the direction of the earnings surprise, especially negative ones, up to ninety days prior to the announcement. However, this study finds that the presence or absence of post-announcement abnormal performance – the criteria used in event studies to evaluate market efficiency – is sensitive to the categorization of earnings as well as the choice of the model used to generate abnormal performance.

2. Literature Review

The efficient market hypothesis states that asset prices should immediately and fully reflect all available information. But if markets are truly efficient and prices reflect all available information, the only impetus for price changes is the arrival of new information, i.e. news. As news is unpredictable, price changes, too, should be unpredictable. Thus in an efficient market, there must be no observable patterns in asset prices or returns. However, even before Fama (1970) popularized the notion of market

efficiency, researchers had been documenting "anomalies," that is, recurring observable patterns in stock prices that would contradict the EMH. Fama (1998) cites the post-earnings announcement drift – in which stock prices continue to adjust to earnings news for up to one year after the announcement – as one such anomaly that has endured a multitude of robustness checks and thus constitutes a legitimate attack on market efficiency. This post-announcement drift has been documented by Ball and Brown (1968), Joy, Litzenberger, and McEnally (1977), Brown (1978), Watts (1978), Latane and Jones (1979), Foster, Olsen, and Shevlin (1984), Rendelman, Jones, and Latane (1982), Bernard and Thomas (1990), Bernard, Thomas, and Abarbanell (1993), Chan, Jegadeesh, and Lakonishok (1996) among others.

In contrast, both Hull et al. (2004) and Norden and Weber (2004) analyze the reaction of the CDS market to rating events and find the market to be informationally efficient as no post-announcement drift is reported. Hull et al. test for changes in CDS spreads around credit rating announcements using a data set of CDS spread quotes from January 5, 1998 - May 24, 2002 for 1,599 reference entities. Their results show that the CDS market anticipates downgrades up to 90 days before the actual event with spreads increasing by 38 basis points while review for downgrades and negative outlooks are anticipated in the 30 days before the event with spreads widening by 24 and 29 bps respectively. However, in the ten days following the announcement day, they observe no statistically significant changes in spreads for any of the negative events. This observation indicates that the market efficiently incorporated the information into spreads.

Similarly, Norden and Weber (2004) test the reaction of both the CDS and the stock market to credit rating events from the three main rating agencies: Standard and Poor's, Moody's, and Fitch. Using 2000 - 2002 data, they find that both markets

anticipate downgrades and reviews for downgrades by S&P and Moody's. The magnitude of response is influenced, they observe, by both the level of the old credit rating and the number of previous rating events. For negative credit events in both markets, they observe significant abnormal performance both for the pre-event window and the event window, but they do not find a significant post-announcement day effect. In both markets, they note the magnitude of the reaction is larger to review for downgrades than it is for the downgrades themselves. The reaction to negative rating events is greater for lower credit quality firms than for their more highly rated peers. Furthermore, they find that the magnitude of the downgrade (i.e. downgraded two or more notches) influences the magnitude of cumulative abnormal returns and cumulative adjusted spread changes. In comparing the two markets, Norden and Weber find that the CDS market anticipates reviews for downgrades earlier than the stock market. They conclude that since a review intimates a downgrade, this finding suggests the CDS market is more efficient than the stock market. Overall, the reaction of both markets is consistent with market efficiency. However, the literature raises the question: Are the research findings on the CDS market's efficiency robust to alternative data sets, methodologies, and events?

3. Hypotheses of the Study

In light of the literature, I propose the following hypotheses:

H1: It is hypothesized that earnings announcements will have a statistically significant effect on CDS and stock prices.

Merton (1974) derives a formula for pricing risky claims that relies on the firm's value process. If earnings surprises affect the firm's value, they should affect not only the price of a credit default swap issued by the firm but also the price of the firm's stock. Furthemore, Kwan (1996) finds that both stock returns and bond yield changes are driven

by firm-specific information related to the mean of the underlying firm, suggesting both markets should experience abnormal performance around this firm-specific event. Likewise this paper's literature review cites numerous stock market studies supporting H1.

H2: CDS spreads will move in an inverse direction to the direction of the earnings surprise while stock returns will vary directly.

I expect good news will decrease abnormal CDS spread changes and increase abnormal stock returns while bad news will increase abnormal CDS spread changes and decrease abnormal stock returns. Norden and Weber (2007) state that if there are "unexpectedly high earnings, the stock price will go up because stockholders will benefit from improved earnings and the price (credit spread) of corporate debt will rise (fall) because default risk is reduced" (p. 3). Previous authors [e.g. Ashley (1962), Conrad, Cornell and Landsman (2002), Skinner and Sloan (2002)] have documented that good news increases stock returns while bad news decreases returns. This study expects to confirm those findings and extend them to the CDS market's reaction to earnings news.

H3: Negative news is more economically and statistically significant than positive news.

It is hypothesized that the market will react more strongly to negative earnings surprises than to positive surprises. An asymmetric reaction is in line with the notion that the market punishes those who do not meet estimates more than it rewards those who overachieve. Conrad, Cornell, and Landsman (2002) found an asymmetry in stock price responses to earnings announcements in a rising market environment. Skinner and Sloan (2002) find "that the average realized negative return to negative earnings surprises is significantly larger in magnitude than the average realized positive return to positive earnings surprises" (p. 289). Likewise, Hull et al. (2004) and Norden and Weber (2004)

observe that positive credit events have no statistically significant impact on CDS spreads, whereas negative announcements have a significant positive impact on spreads.

H4: The greater the earnings surprise, the greater the movement in spreads and returns.

In line with previous literature, I expect the magnitude of the earnings surprise to impact the magnitude of CDS spread changes and stock returns. Foster et al. (1984) report that 80% of the variation in cumulative abnormal stock returns can be explained by both the sign and the magnitude of the deviation from analysts' expectations. Similarly, Norden and Weber (2004) find that the size of both cumulative abnormal stock returns and cumulative abnormal CDS spread changes are sensitive to the magnitude of a credit rating downgrade. In particular, I expect small deviations from analysts' earnings estimates to have little effect on CDS spread changes whereas I expect large deviations from analysts' estimates to have a greater impact on spreads.

H5: Responses differ by credit quality.

The literature suggests that credit quality is an important factor in both the determinants of CDS spreads and the relationship between the credit and the equity markets. For example, Aunon-Nerin et al. (2002) and Abid and Naifar (2006) find credit rating to be the most important determinant of CDS spreads. Likewise, Avramov et al. (2007) and Ericsson et al. (2004) study the determinants of credit/CDS spreads and observe that results differ by credit quality. Furthermore, studies analyzing the lead-lag relationships among the stock, bond, and CDS markets find that lower-rated credits more closely resemble equities [e.g., Norden and Weber (2007)]. Most important to H5, Kwan (1996) finds that low-grade bonds are highly correlated with equities whereas AAA-rated bonds more closely resemble riskless bonds; he, thus, concludes that low-grade bonds are more sensitive to firm-specific information. Therefore, if earnings announcements provide

firm-specific information to the markets, firms with lower credit ratings should experience stronger reactions to earnings news.

H6: CDS spreads and stock returns will anticipate the direction of the earnings surprise prior to the announcement date.

Since markets often anticipate an event, prices may begin to move in the appropriate direction prior to the announcement date. This price movement may reflect information leakage, prior events acting as precursors to the event in question, or market expectations. Bloomberg has reported evidence that the CDS market anticipates leveraged buyouts prior to the LBO announcement suggesting insider, or at a least informed, trading (Harrington, 2006). Furthermore, Skinner and Sloan (2002) note "many firms preannounce earnings and preannouncements are particularly prevalent in the case of negative earnings surprises in large growth firms" (p. 291). Other firm-specific events, too, may be more timely indications of anticipated earnings. By definition, quarterly earnings announcements are only reported four times a year and, therefore, are inherently subject to lags. In both the stock and CDS markets, sophisticated investors are continually monitoring positions and undertaking fundamental analysis that may lead them to their own conclusions about the earnings power of the firm that is assimilated in the market prior to any formal announcements. Finally, the empirical literature documents stock market anticipation of earnings announcements. Therefore, I, too, expect to find that both markets will anticipate the direction of the earnings surprise.

H7: CDS prices will immediately adjust to informational events.

The earnings announcement literature strongly suggests that the stock market response to earnings news is too slow; i.e. there is a post-announcement drift. However, both CDS event studies conclude that the CDS market is efficient in its processing of rating actions.

Therefore, the null hypothesis is that the CDS market is efficient, and this study will test that hypothesis.

4. Data and Descriptive Statistics

To test these hypotheses, credit default swap pricing data was obtained for January 2, 2001 - April 4, 2006 from Markit, an aggregator of CDS data from several of the leading broker-dealers. For inclusion in this study, only senior debt, US dollar contracts on underlying US entities were selected. If a company was identified as having filed for bankruptcy, it was excluded from the data set from that point on or until it emerged from bankruptcy. While the data set included numerous subcompanies under a parent company in the energy sector, only the primary company was used to avoid redundancy and an overconcentration in the energy industry. The 5-year maturity contract price was used in the analysis because it is by far the most commonly traded maturity.

The CDS data was then merged with stock return data from CRSP. However, the CDS data set was missing observations for several firms for various days. If more than one week's worth of data was missing per firm, that firm's time series was constructed from the first date after the last missing date onward (the time series has fewer missing values as time progresses). These specifications resulted in a data series with 650 firms and 476,345 observations. Some firms experienced little variation in the CDS spread levels throughout the sample. Therefore, if more than half of a firm's daily changes in CDS spreads were zero, that firm was excluded from the analysis due to lack of variation in its spreads implying a lack of liquidity. This exclusion reduced the combined sample of firm-level CDS and stock return data to 476 firms and 413,844 observations and 1,320 trading days.

For earnings figures, analysts' forecasts are consensus mean estimates obtained from the Institutional Brokers' Estimate System (I/B/E/S). Actual earnings figures and the report date of quarterly earnings were also obtained from I/B/E/S. Daily holding period stock returns, number of shares outstanding, and price per share data were obtained from the Center for Research in Security Prices (CRSP). CRSP equally-weighted index returns were also obtained. Credit rating information was obtained from Standard and Poor's (S&P's).

The mean 5-year CDS spread for the data set is 127 basis points with a standard deviation of 217. The data set becomes increasingly robust over time with an average of 122 observations per day in 2001, 232 in 2002, 317 in 2003, 401 in 2004, 456 in 2005, and 455 observations per day in 2006. Default swap spreads vary over time with spreads at historically high levels in October 2002 and then reverting back to an average of 108 basis points for 1/1/2004 through 4/6/2006 (see figure 1 and table 1A). They also vary across reference entity with Exxon having the lowest average spread of 9.84 basis points throughout the time series while Level 3 Communications has the highest average spread of 1966.54 basis points. The average number of daily observations per firm is 869 with a minimum of 135 observations. 39 firms have the full 1,320 trading days of data.

Table 1B shows average spreads increase monotonically as credit worthiness, measured by Standard and Poor's credit rating, declines. The panel also reflects an increase in the standard deviation of spreads as credit quality declines. Figure 1B is a time-series graphs of mean daily spreads for the following credit rating categories: (1) AAA/AAs, (2) As, (3) BBBs, and (4) NIG. The AAA/AA category is comprised of all firms with an S&P rating of AAA, AA+, AA, or AA-. The A category includes all firms rated A+, A, or A-. The BBB category includes all firms with BBB+, BBB, or BBB-credit ratings, and the NIG (Non-Investment Grade) rating constitutes all firms with

below investment grade ratings. The graph clearly shows that as credit quality worsens, spreads increase. It also highlights a macroeconomic component to CDS pricing. As the overall environment deteriorates, as in 2002, all spreads increase, even those with the highest of credit ratings.

Descriptive statistics are also broken out by industry in Table 1C. Aside from the government sector, which consists only of the Federal Home Loan Mortgage Corporation, average spreads are lowest for financials (65 bps) and healthcare (68 bps), and highest for telecommunications (309 bps) and technology (221 bps). Financials and healthcare also have the lowest standard deviations (70 and 88 bps respectively), while telecom and technology have the highest (471 and 306 bps). Furthermore, this table illustrates that the data is not concentrated in any one industry.

This section provides an overview of the CDS data that is used in the subsequent analyses. The final data set has 476 firms with a total of 1,320 trading days over the time period 1/2/2001 through 4/4/2006 with an average of 869 daily observations per firm. The graphs and descriptive statistics outlined in this section highlight key aspects of credit defaults swaps. First, CDS prices vary through time; there is a macroeconomic component to CDS pricing. As the overall environment deteriorated in 2002, all spreads, including those for high credit quality reference entities, rose. Second, spreads vary by credit quality; higher spreads are associated with lower credit ratings. Furthermore, as credit rating deteriorates, the variation of spreads within a rating category increases.

5. Event Study Methodology

Event study methodology was used to ascertain the impact of earnings announcements and credit rating changes on the CDS and stock markets. The basic procedures for an event study are:

(1) Identify the event of interest and determine the precise date of the event.

(2) Define the event window.

(3) Measure abnormal performance around the event window.

(4) Draw appropriate inferences (Mackinlay, 1997).

The event date for an earnings announcement, obtained from I/B/E/S, is the day on which earnings figures were reported in newswires. Actual and mean consensus analysts' estimates have also been obtained from I/B/E/S. The event window includes the 90 trading days preceding the event, the event date itself, and the 90 days following the event for a total of 181 trading days and will be referred to as the [-90,+90] interval with day zero signifying the event date. The [-1,+1] trading day interval is considered the "announcement window".

To measure earnings surprise, Unexpected Earnings (UE) are measured as percent deviations from analysts' estimates:

$$UE_{it} = \frac{Q_{it} - E(Q)_{it}}{\left|E(Q)_{it}\right|} \qquad (1)$$

where Q_{it} is the quarterly earnings per share of the ith firm in period *t*. $E(Q)_{it}$ is the mean (consensus) analysts estimate of earnings for quarter *t* as of the last month of quarter *t* as reported by I/B/E/S. As in Cambell, Lo, and Mackinlay (1997, p.152), the earnings are categorized as good news if the percent deviation from analysts' expectations is greater than 2.5%, bad news if the percent deviation from analysts' expectations is less than -2.5%, and no news if the percent deviation from analysts' expectations is between -2.5% and +2.5%. Alternatively, to facilitate testing of H3 and H4, the percent deviation from analysts' estimates will also be stratified into deciles and abnormal performance will be compared across the various deciles.

Previous literature suggests, credit rating is a key determinant of CDS spreads [e.g. Aunon-Nerin et al. (2002) and Abid and Naifar (2006)]. Likewise this study's

descriptive statistics clearly show that spread levels vary by credit quality. Therefore, an index-adjustment procedure is used to calculate an abnormal CDS spread change (ASC_{it}):

$$ASC_{it} = \Delta CDS_{it} - \Delta INDX_t = (CDS_{it} - CDS_{it-1)}) - (INDX_t - INDX_{t-1}) \qquad (2)$$

where ΔCDS_{it} is the daily change in CDS spreads for firm *i* at date *t*, $\Delta INDX_t$ is the daily change in the rating-based index that corresponds to that firm's rating class. The rating categories are 1) AAA/AAs, 2) As, 3) BBBs, and 4) NIG as described in Section 4. This procedure is similar to that used by Norden and Weber (2004) with the exception that I follow Hull et al. by keeping a firm in the same rating class throughout the event time to avoid any discontinuities on the announcement date that would be associated with migrating rating classes. In addition, to ensure results are robust alternative methodologies, an index model

$$\Delta CDS_{it} = \alpha_i + \beta_i \Delta INDX_t + \varepsilon_{it} \qquad (3)$$

was estimated over the 250 trading days preceding the event window wherein ΔCDS_{it} is the daily change in CDS spreads for firm *i* at date *t*, $\Delta INDX_t$ is the daily change in the rating-based index that corresponds to that firm's rating class. ε_{it} is the zero mean disturbance term and α_i and β_i are the index model parameters. Abnormal spread changes are then computed over the event window as:

$$ASC_{it} = \Delta CDS_{it} - \hat{\alpha}_i - \hat{\beta}_i \Delta INDX_t . \qquad (4)$$

For the stock market portion of the event study, I use both the market-adjusted and the market model to calculate abnormal returns. The market-adjusted model is given by

$$AR_{it} = r_{it} - r_{mt} \qquad (5)$$

where AR_{it} is the abnormal stock return for firm *i* on day *t*, r_{it} is the day *t* log stock return on asset *i*, and r_{mt} is the corresponding day *t* equally-weighted return on the CRSP index. In addition, the market model is estimated over a 250-day estimation window as:

$$r_{it} = \alpha_i + \beta_i r_{mt} + \varepsilon_{it} . \tag{6}$$

Market-model abnormal returns are then given by:

$$AR_{it} = r_{it} - \hat{\alpha}_i - \hat{\beta}_i r_{mt} \tag{7}$$

where AR_{it} is the abnormal stock return for firm *i* on day *t*. Both individual stock data and the equally-weighted CRSP index were obtained from CRSP.

Mean abnormal spread changes (ASCs) and mean abnormal returns (ARs), are then aggregated cross-sectionally for day *t*

$$ASC_t = \frac{1}{N}\sum_{i=1}^{N} ASC_{it} \tag{8a}$$

and

$$AR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{it} . \tag{8b}$$

To test for anticipation, as in H6, and a post-announcement drift (H7), cumulative abnormal spread changes (CASCs) and cumulative abnormal returns (CARs) are then aggregated across the various multi-day periods as

$$CASC(t_1, t_2) = \sum_{t=t_1}^{t_2} ASC_t \tag{9a}$$

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_t . \tag{9b}$$

6. Event Study Findings

Table 2 reports index-adjusted cumulative abnormal spread changes over the [-90,-61], [-60,-31], [-30,-2], [-1,+1], [+2, +30], [+31,+60], and [+61,+90] event intervals. In

panel A, earnings surprises are broadly categorized as good or bad news with good news firms reporting unexpected earnings greater than 2.5% and bad news firms reporting earnings surprises less than -2.5%. In panel B, earnings surprises are more finely stratified into deciles based on percent deviation from analysts' estimates. As seen in panel A, announcement window CASCs increase a statistically significant 3.88 bps (t=3.11) for bad news firms while CASCs decrease -0.88 bps (t=-1.67) for good news firms thus confirming H1 – H3. Both a two-sample t-test and the Wilcoxon rank sum test confirm that the difference between good and bad news CASCs are statistically significant with p-values of < 0.01. These hypotheses are further confirmed in panel B in which announcement window CASCs range from a high of 6.10 bps for firms with the most negative earnings surprises (decile 1) to a low of -4.37 bps for firms with the most positive earnings surprises (decile 10). Both the t-test and the Wilcoxon test confirm the difference between CASCs for the most favorable and unfavorable earnings surprise deciles is statistically significant with p-values < 0.01.

Furthermore, panel A shows the response does, indeed, differ by credit quality. The magnitude of the CASCs increases as credit quality deteriorates with CASCs ranging from +0.45 bps for AAA/AA-rated firms reporting negative earnings to +8.83 bps for non-investment grade firms reporting negative earnings. Similarly, CASCs for AAA/AA-rated firms with positive earnings are -0.15 bps versus -3.72 bps for non-investment grade firms reporting positive earnings. Likewise in the thirty days prior to the announcement, CASCs increase by 18 bps for non-investment grade firms versus 16 bps for BBB-rated firms, 3 bps for A-rated firms and only 2 bps for AAA/AA-rated firms.

Thus the market anticipates the direction of the earnings surprise. CASCs begin to widen in the 90 trading days prior to the announcement with spreads increasing a

statistically significant 6.26 bps in the [-90,-61] window and 12.72 bps in the [-30,-2] interval. As of the day before the announcement, CASCs for bad news firms have increased a total of 20 bps. When results are stratified by deciles, CASCs for the most unfavorable decile have widened by 40 bps as of the day before the announcement. CASCs for good news firms have decreased by -6 bps prior to the announcement while CASCs for firms with earnings in the most favorable decile have decreased by -17 bps. Hence, H6 – which states the market will anticipate the direction of the earnings surpise – is confirmed.

Whether the CDS market's reaction is efficient is determined by the post-announcement day reaction. Panel A generally shows that the market efficiently incorporates earnings information into CDS prices. In the post-announcement windows, no statistically significant reaction to bad news is reported. Overall, the market's response to good news is efficient as well.[3] However, when CASCs are stratified by deciles of percent deviation from analysts' estimates, CASCs for decile 1 exhibit a statistically significant reversal of -17.76 bps in the 30 days following the announcement indicating a market overreaction to earnings news. In contrast, there is evidence of a post-announcement drift for deciles 9 and 10 as spreads decrease -4.06 bps in the [+31,+60] day interval for decile 9 and -7.64 bps in the [+2,+30] day interval for decile 10. Graphs of index-adjusted CASCs over the entire event window are presented in figures 2A-B.

When the index model is used as an alternative to generating CASCs, as in panels C and D of figure 2, the reversal for negative earnings becomes more pronounced and is statistically significant for both categorizations of earnings (bad news and decile 1).

[3] There is some evidence of a post-announcement reversal for the BBB-rated firms reporting good news as CASCs increase a statistically significant 3.49 and 3.55 bps in the [+2,+30] and [+61,+90] day windows respectively.

Index-model CASCs for bad news firms experience a statistically significant decrease of -10 bps in the thirty days following the earnings announcement. Strikingly, when stratified by deciles, after index-model CASCs for decile 1 reach a maximum of 27 bps by day 2, they then revert back to zero by the end of the event window (see panel D). Based on this analysis, the CDS market's reaction to earnings announcements is not entirely efficient as there is evidence of both over- and under-reaction to earnings news. However, results are sensitive to both the categorization of earnings and the model used to generate cumulative abnormal spread changes.

For comparison purposes, the same analysis was repeated for stock market returns using both the market model and the market-adjusted return model. Hypotheses 1 and 2 are confirmed in table 3, which presents market-model CARs over the various event intervals. Announcement window CARs are a statistically significant -1.71% (t=-7.72) for bad news firms and 1.44% (t=12.81) for good news firms. These results support the hypothesis that negative news is more economically and statistically significant than good news (H3). However, in panel B, CARs for the most favorable decile are actually larger in magnitude than CARs for the most negative decile (+2.19 versus -1.65).

The stock market's response, too, varies by credit quality with AAA/AA-rated firms experiencing announcement day CARs of -1.50% (+0.91%) whereas non-investment grade firms experience announcement day CARs of -2.52% (+1.81%) for bad (good) news. However, comparing these results to those reported in table 2, the CDS markets response to earnings varies more by credit quality than does the stock market's.

There is evidence of anticipation of both good and bad news by the stock market with CARs for bad news firms decreasing a statistically significant -0.88% and -2.10% in the [-90,-61] and [-30,-2] event windows, respectively. CARs for good news firms increase a statistically significant 0.59% and 1.06% in the [-60,-31] and [-30,-2] intervals,

respectively. As of the day before the announcement, market-model CARs have decreased by -3.04% (-4.10%) for firms with bad news (firms in the bottom decile) and increased 2.25% (4.94%) for firms with good news (firms in the top decile).

As in the CDS market's response to earnings announcements, the stock market appears to both overreact to negative news and underreact to positive news when CARs are generated using the market model as in table 3. In the [+2,+30] interval following the announcement of bad news, CARs increase 1.77%, negating the announcement window effect. Then in the [+60,+90] interval CARs further increase a statistically significant 1.28%. As with the announcement window effects, the reversal is coming primarily from the lower credit quality firms.

In contrast, good news firms experience a statistically significant post-announcement drift in the [+2,+30] and [+61,+90] intervals as seen in the market-model CAR plots presented in figures 3A-B. However, when CARs are generated using the market-adjusted model as in figures 3C-D, a model-induced negative drift appears to overwhelm the results. Thus consistent with the overwhelming amount of literature on the stock market's reaction to earnings, this study finds that the stock market's reaction to earnings announcements is not entirely efficient. However, again, the study also finds that the presence and extent of any market anomalies, such as a post-announcement drift or overreaction, can be quite sensitive to the choice of model.

The event study finds that both the stock market and the CDS market consider earnings announcements newsworthy. Likewise, both markets anticipate the direction of the news, and prices begin to move in the appropriate direction up to 90 days prior to the events. This anticipation is especially true for negative events. To compare the relative efficiency of both markets, a run-up analysis of negative news was undertaken and is presented in figure 4. The analysis is similar to that of Norden and Weber (2004), which

compares both markets reactions to ratings events by dividing the mean CAR/CASC on day t by the mean CAR/CASC on day zero in order to have a direct measure of comparison (p. 2830).

The graphs show that the speed of adjustment of both markets to both events is quite similar. At any one point in time leading up to the event window, the stock market has generally impounded somewhat more of the day zero price into the return process when market-adjusted CARs are compared to index-adjusted CASCs. However, when the speed of adjustment between the two markets is compared using index-model CASCs and market-model CARs, the CDS market has generally impounded more of the day zero price into CDS spreads than the stock market has into stock prices. As of the day before the event, the CDS market has incorporated:

- 88% of the day zero CASCs for bad news firms using the index-adjusted model.
- 87% of the day zero CASCs for bad news firms using the index model.
- 93% of the day zero CASCs for decile 1 firms using the index-adjusted model.
- 92% of the day zero CASCs for decile 1 firms using the index model.

Meanwhile, prior to the actual announcement, the stock market has incorporated:

- 88% of the day zero CARs for bad news firms using the market-adjusted model.
- 69% of the day zero CARs for bad news firms using the market model.
- 90% of the day zero CARs for decile 1 firms using the market-adjusted model.
- 74% of the day zero CARs for decile 1 firms using the market model.

The overall conclusion is that both markets incorporate a significant portion of the day zero price adjustment prior to the actual event in question and while the CDS market may exhibit signs of market inefficiency in its reaction to earnings releases, it appears to be no less efficient in its response to earnings news than the stock market.

7. Conclusion

This paper has examined the CDS market's response to earnings announcements in a comparative framework that simultaneously analyzed the stock market's response to earnings news. I find that earnings announcements contain valuable information with statistically significant announcement date effects. The CDS market anticipates the direction of the earnings surprise; prices begin to adjust up to 90 days prior to the actual announcement date. Furthermore, the market responds more strongly to negative news than to positive news, and the magnitude of that response is proportional to the magnitude of the event (i.e., larger deviations from analysts' earnings expectations result in larger abnormal CDS spread changes). The CDS market's reaction to earnings surprises also varies by credit quality with lower credit quality firms generally exhibiting more economically and statistically significant abnormal spread changes. The CDS market's reaction to earnings information is not entirely efficient as the market seems to overreact to negative earnings news and there is some evidence of a post-announcement drift associated with positive earnings. However, the size and significance of the reversal/drift is sensitive both to the categorization of earnings and the model used to generate abnormal performance.

In analyzing the stock market's reaction to earnings, I find post-announcement day performance is extremely sensitive to the choice of model. When abnormal performance is generated using the market model, the stock market's reaction to earnings surprises is similar to that of the CDS market's. That is, there is evidence of an overreaction to negative news and an underreaction to positive news. However, when the market-adjusted model is used to generate abnormal performance, a model-induced drift seems to overwhelm the results. While these conflicting results are somewhat disconcerting, my findings support Fama (1998), who states:

> Consistent with the market efficiency hypothesis that the anomalies are chance results, apparent overreaction to information is about as common as under-reaction, and post-event continuation of pre-event abnormal returns is about as frequent as post-event reversal. Most important, consistent with the market efficiency prediction that apparent anomalies can be due to methodology, most long-term return anomalies tend to disappear with reasonable changes in technique [Fama, (1998), p. 283)].

Finally, in comparing the speed of adjustment of the two markets, overall, I find the speed of adjustment of the two markets is quite similar indicating comparable levels of information processing. Thus although the CDS market may be somewhat inefficient in its processing of earnings information, it is no less efficient than one of the most efficient financial markets in the world, namely, the US stock market.

Table 1: Descriptive statistics

Panel A: Descriptive statistics by year

Year	Number of Observations	Avg No. of Obs. per Day	Mean 5-yr CDS Spread	Standard Deviation	Maximum	Minimum
2001	30,233	122	121.17	136.43	1,302	15
2002	58,547	232	188.91	324.56	5,909	10
2003	79,922	317	140.71	223.06	5,880	8
2004	101,159	401	107.33	175.57	2,897	5
2005	114,838	456	108.99	198.01	2,517	6
2006[4]	29,145	455	104.52	164.31	1,825	4

Panel B: Descriptive statistics by credit rating category

Rating Category	Number of observations	Mean	Standard Deviation	Maximum	Minimum
AAA/AAs	25,916	26.86	21.54	212	4
As	125,520	46.88	44.79	748	5
BBBs	179,870	99.70	134.36	5,900	10
NIG	76,550	352.86	374.34	5,909	31
NR/Missing	5,988	144.37	129.81	600	7

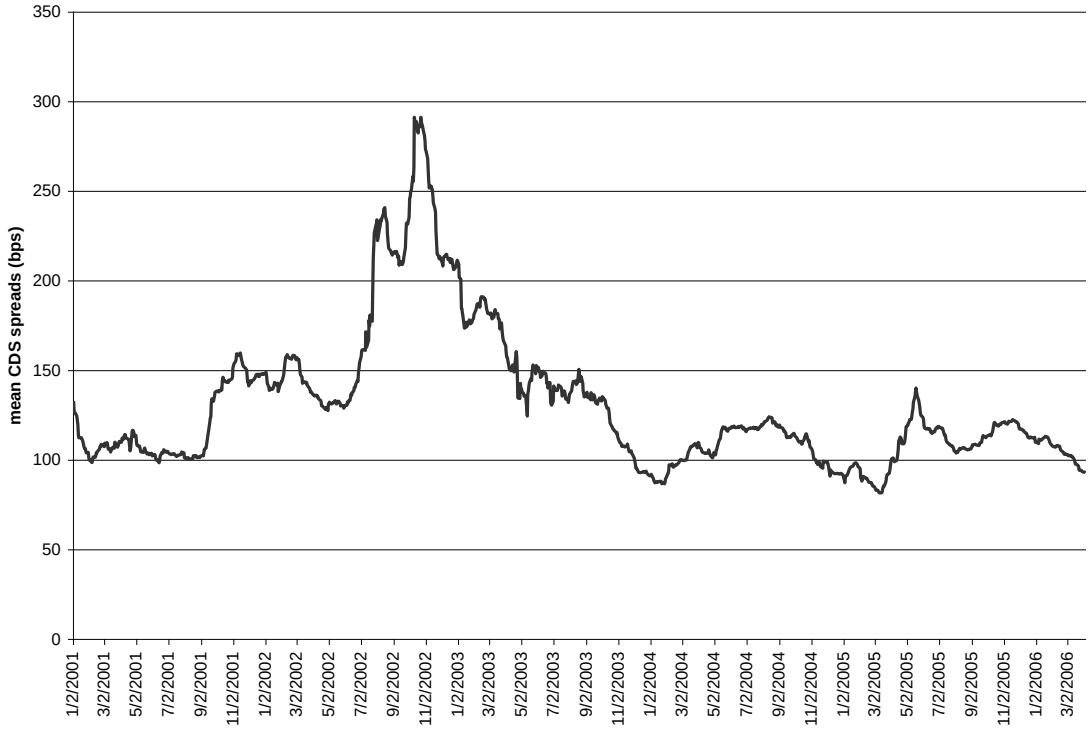
Panel C: Descriptive statistics by Industry

Sector	Number of observations	Mean	Standard Deviation	Maximum	Minimum
Government	1,042	19.54	6.46	35	7
Financials	60,062	64.47	69.71	1,052	10
Health Care	26,724	68.32	88.33	929	4
Consumer Goods	62,273	111.58	155.11	1,656	8
Oil & Gas	32,732	117.00	295.01	5,909	5
Industrials	62,838	121.58	144.85	1,198	5
Basic Materials	30,143	128.72	146.65	1,164	11
Utilities	33,794	132.72	192.85	4,121	20
Consumer Services	66,014	156.60	278.55	3,913	8
Technology	25,601	220.71	305.83	4,000	10
Telecommunications	12,621	308.95	470.86	4,688	19

[4] Data set is from January 2, 2001 through April 4, 2006.

Figure 1: Average credit default swap spread levels in basis points from January 2, 2001 through April 4, 2006.

Panel A: Mean Daily CDS Spreads



Panel B: Mean daily CDS spreads by credit rating category

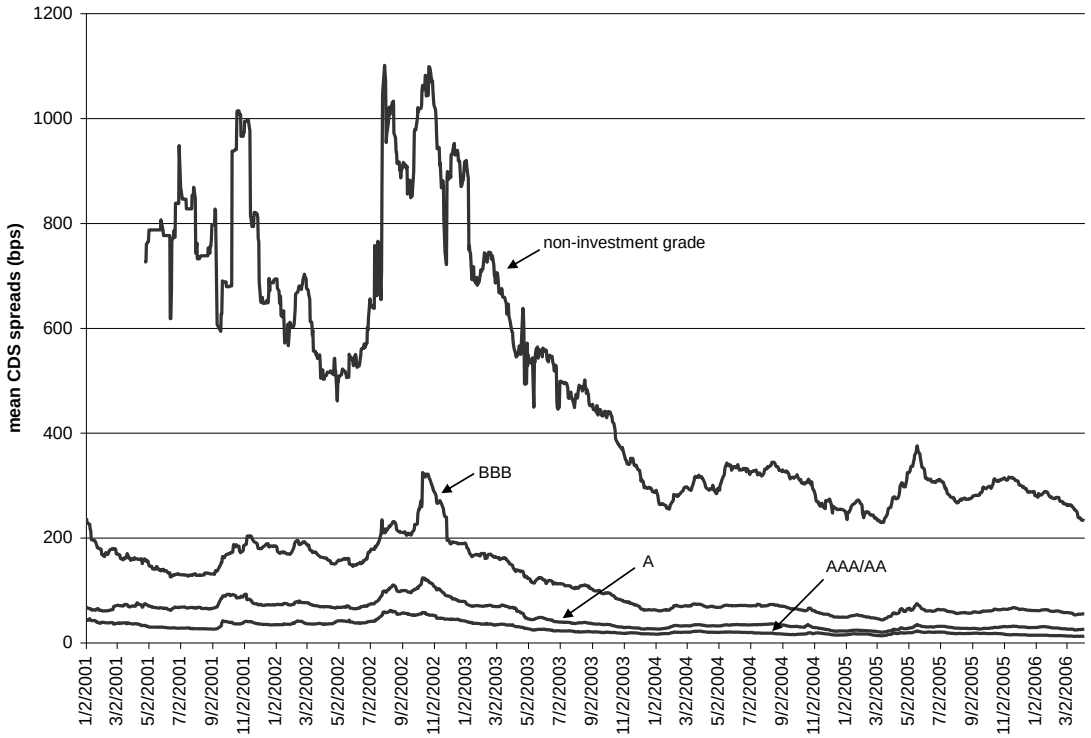


Table 2: The CDS market's reaction to earnings announcements

Panel A: CASCs by Credit Rating

	No. of	Event Time						
	events	[-90,-61]	[-60,-31]	[-30,-2]	[-1,+1]	[2,30]	[31,60]	[61,90]
Bad News								
All	1252	6.258	0.774	12.718	3.88	-5.789	2.465	0.371
		2.40	0.42	3.47	3.11	-1.75	1.36	0.18
AAA/AA	48	1.952	0.708	2.022	0.453	1.826	0.111	-1.441
		1.27	0.37	0.73	1.15	0.88	0.05	-0.68
A	338	2.427	0.886	3.253	2.411	1.548	1.202	1.206
		1.49	0.50	1.42	2.09	0.76	0.76	0.51
BBB	584	7.732	2.229	16.321	2.619	-7.16	4.069	0.475
		2.76	1.11	2.26	2.02	-1.39	1.39	0.17
NIG	282	8.535	-2.362	18.42	8.834	-13.04	1.057	-0.536
		0.86	-0.34	3.18	1.90	-1.33	0.22	-0.08
Good News								
All	2542	-0.57	-2.014	-3.325	-0.866	-0.052	-0.182	1.714
		-0.36	-1.56	-4.15	-1.67	-0.09	-0.19	1.70
AAA/AA	123	-0.376	1.48	-0.199	-0.145	0.243	-0.747	0.961
		-0.37	2.33	-0.25	-0.71	0.37	-0.77	1.37
A	809	1.061	-0.619	-0.316	0.075	-0.316	0.488	-0.529
		1.33	-1.07	-0.51	0.21	-0.55	0.59	-0.66
BBB	1177	-3.158	2.433	-3.923	-0.534	3.487	-1.498	3.552
		-2.58	2.18	-4.18	-1.62	2.82	-1.02	2.72
NIG	433	3.362	-17.661	-8.2	-3.722	-1.976	2.291	1.124
		0.40	-2.60	-2.18	-1.32	-0.39	0.61	0.25

Panel B: CASCs by deciles of percent deviation from analysts' estimates

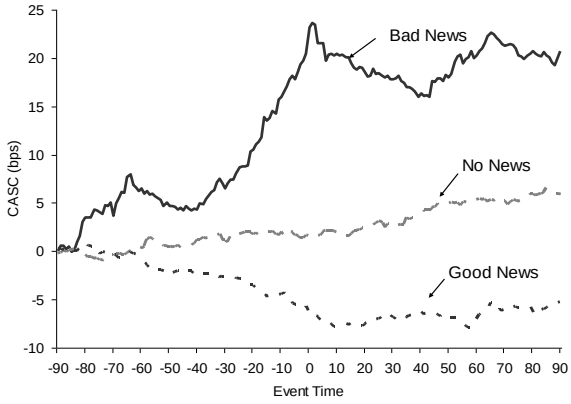
	No. of	Event Time						
Decile	events	[-90,-61]	[-60,-31]	[-30,-2]	[-1,+1]	[2,30]	[31,60]	[61,90]
1	501	10.632	1.704	25.732	6.098	-17.755	2.543	0.246
		2.18	0.51	2.95	2.51	-2.28	0.74	0.06
2	507	6.551	-0.823	4.949	3.281	2.274	3.458	-0.722
		1.55	-0.26	1.98	1.72	0.88	1.22	-0.22
3	410	-0.338	1.788	0.862	0.681	2.663	1.686	1.688
		-0.19	1.50	0.58	1.54	2.22	1.41	1.77
4	640	-0.457	0.000	-0.351	-0.087	0.875	2.880	1.416
		-0.27	0.00	-0.21	-0.22	0.65	1.56	1.14
5	453	0.380	2.160	1.532	0.389	1.283	1.750	-0.718
		0.28	2.25	0.92	0.83	0.67	1.27	-0.55
6	504	-2.354	2.444	-1.374	-0.362	3.402	-1.083	5.448
		-1.61	1.49	-1.44	-0.64	2.75	-0.86	3.63
7	500	0.684	-3.215	-0.513	0.599	2.734	0.518	1.188
		0.42	-1.39	-0.43	0.87	1.62	0.18	0.59
8	508	-0.074	-0.885	-4.221	0.189	-0.067	1.514	2.783
		-0.04	-0.48	-2.95	0.33	-0.06	0.77	1.28
9	499	0.728	0.238	-3.498	-0.765	1.400	-4.060	1.497
		0.29	0.12	-2.25	-1.04	0.61	-2.98	0.68
10	502	-2.109	-9.282	-7.025	-4.373	-7.635	1.339	-1.919
		-0.30	-1.79	-2.28	-1.94	-2.41	0.47	-0.60

Panel A reports index-adjusted cumulative abnormal spread changes (CASCs) by broken out by credit rating. Bad news earnings announcement are those for which the percent deviation from analysts' expectations are less than -2.5%. Good news earnings announcements are those for which the percent deviation from analysts' expectations are greater than +2.5%. Panel B further stratifies unexpected earning by deciles of percent deviation from analysts' estimates. Cross-sectional t-statistics reported below CASCs.

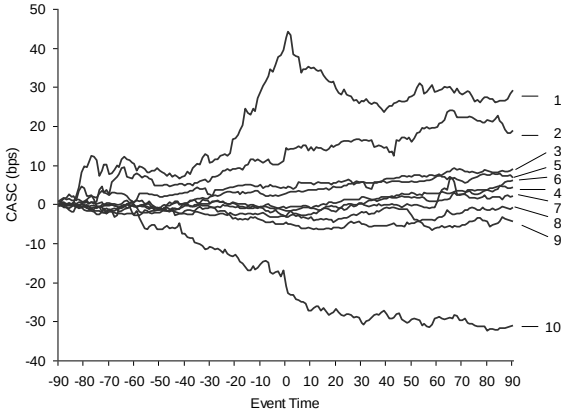
Figure 2: The CDS market's reaction to earnings announcements

Index-adjusted CASCs around earnings announcements

A: By good news, no news, and bad news

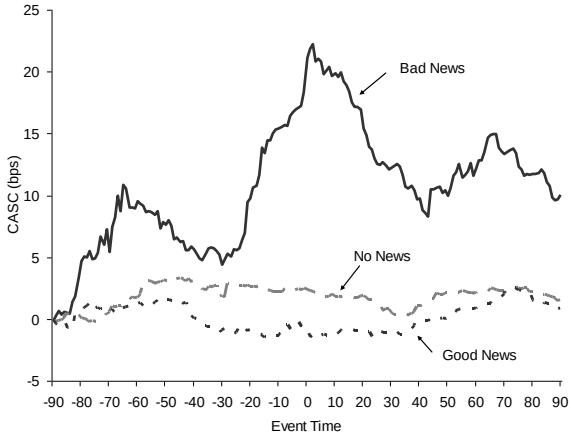


B: By deciles of percent deviation from analysts' estimates



Index-model CASCs around earnings announcements

C: By good news, no news, and bad news



D: By deciles of percent deviation from analysts' estimates

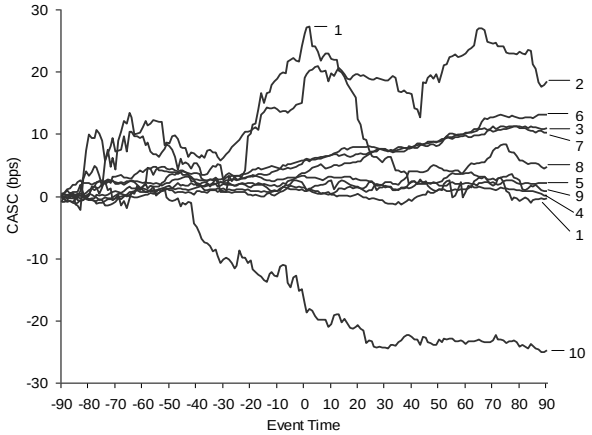


Table 3: The stock market's reaction to earnings announcements

Panel A: CARs by Credit Rating

	No. of	Event Time						
	events	[-90,-61]	[-60,-31]	[-30,-2]	[-1,+1]	[2,30]	[31,60]	[61,90]
Bad News								
All	762	-0.880	-0.099	-2.095	-1.710	1.768	-0.111	1.277
		-2.15	-0.26	-5.02	-7.72	5.11	-0.27	3.32
AAA/AA	26	3.139	0.390	-1.291	-1.502	-1.281	0.482	-2.967
		1.39	0.26	-0.53	-1.87	-0.89	0.38	-1.45
A	217	-1.560	-0.177	-1.647	-1.451	0.994	0.454	0.670
		-2.38	-0.27	-2.71	-3.82	1.97	0.74	1.08
BBB	375	-0.949	0.226	-2.553	-1.562	1.664	-0.281	1.795
		-1.72	0.42	-4.17	-5.69	3.50	-0.46	3.53
NIG	144	-0.402	-0.918	-1.719	-2.521	3.752	-0.628	1.608
		-0.33	-0.94	-1.50	-3.52	3.53	-0.52	1.38
Good News								
All	1771	0.449	0.590	1.059	1.439	0.689	0.063	0.807
		1.86	2.43	5.17	12.81	3.21	0.29	3.37
AAA/AA	102	-0.691	-0.271	1.116	0.908	0.246	0.126	-0.137
		-0.96	-0.31	1.66	2.57	0.29	0.17	-0.18
A	600	0.415	0.134	1.073	1.479	0.556	0.199	1.394
		1.26	0.41	3.52	9.24	1.73	0.60	3.94
BBB	828	0.323	0.980	0.720	1.367	1.210	-0.334	0.762
		0.91	2.69	2.39	7.70	3.76	-1.01	2.11
NIG	241	1.448	0.752	2.166	1.813	-0.580	1.060	-0.102
		1.52	0.83	2.94	5.07	-0.83	1.41	-0.13

Panel B: CARs by deciles of percent deviation from analysts' estimates

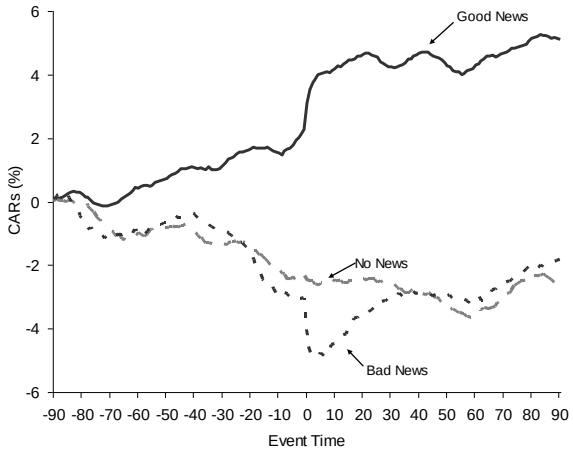
	No. of	Event Time						
	events	[-90,-61]	[-60,-31]	[-30,-2]	[-1,+1]	[2,30]	[31,60]	[61,90]
1	334	-1.000	-0.528	-2.678	-1.645	2.561	1.026	1.376
		-1.41	-0.83	-3.42	-4.56	4.68	1.66	2.17
2	336	-0.597	0.752	-1.368	-1.830	1.311	-0.868	2.100
		-1.08	1.44	-2.89	-5.96	2.58	-1.29	3.84
3	204	-1.818	-0.892	-2.379	-1.108	-0.336	-1.554	-0.675
		-2.86	-1.52	-4.55	-2.95	-0.61	-2.57	-1.21
4	462	-0.886	-0.284	-0.736	-0.130	0.512	-0.775	1.508
		-2.06	-0.69	-1.86	-0.63	1.25	-1.88	3.61
5	333	-0.674	0.021	-0.641	0.423	-0.521	-0.873	0.451
		-1.42	0.04	-1.62	1.95	-1.07	-2.04	0.95
6	335	0.368	-0.541	0.354	1.035	0.913	-0.484	0.494
		0.83	-1.16	0.87	4.24	2.11	-1.05	0.98
7	333	0.711	0.330	0.235	1.180	0.693	-0.292	0.723
		1.41	0.61	0.58	4.68	1.63	-0.59	1.47
8	337	0.327	0.569	0.863	1.515	0.550	0.239	1.127
		0.60	1.16	2.01	6.95	1.19	0.46	2.12
9	334	0.243	1.050	1.436	1.474	0.917	0.967	1.610
		0.45	2.01	3.10	5.49	1.65	1.85	2.74
10	333	0.700	1.419	2.652	2.189	0.528	-0.056	-0.057
		0.96	1.98	4.22	7.02	0.88	-0.10	-0.09

Panel A reports market-model cumulative abnormal returns (CARs) by broken out by credit rating. Bad news earnings announcement are those for which the percent deviation from analysts' expectations are less than -2.5%. Good news earnings announcements are those for which the percent deviation from analysts' expectations are greater than +2.5%. Panel B further stratifies unexpected earning by deciles of percent deviation from analysts' estimates. Cross-sectional t-statistics reported below CARs.

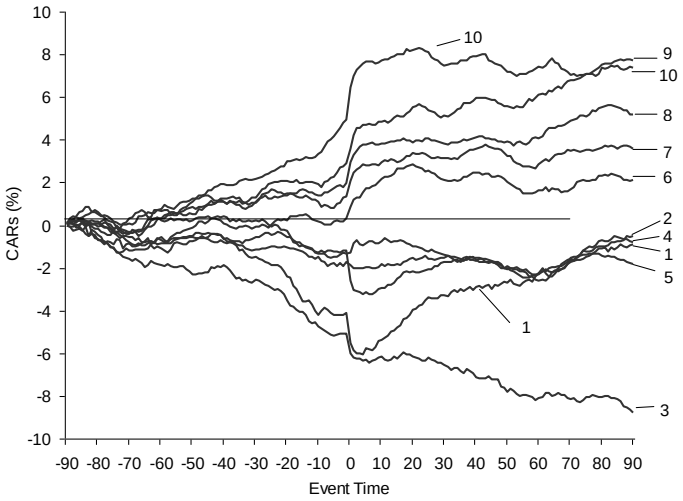
Figure 3: The stock market's reaction to earnings announcements

Market-model CARs around earnings announcements

A: By good news, no news, and bad news

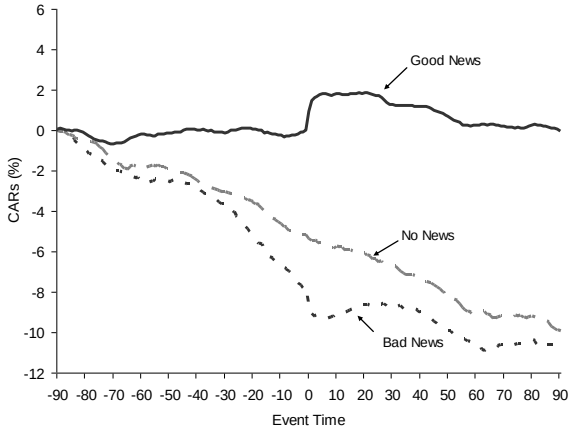


B: By deciles of percent deviation from analysts' estimates



Market-adjusted CARs around earnings announcements

C: By good news, no news, and bad news



D: By deciles of percent deviation from analysts' estimates

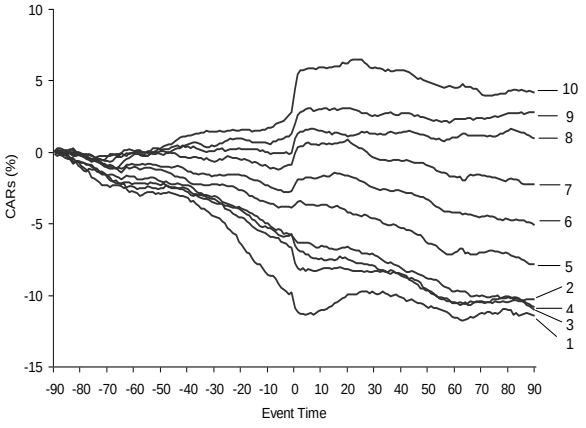
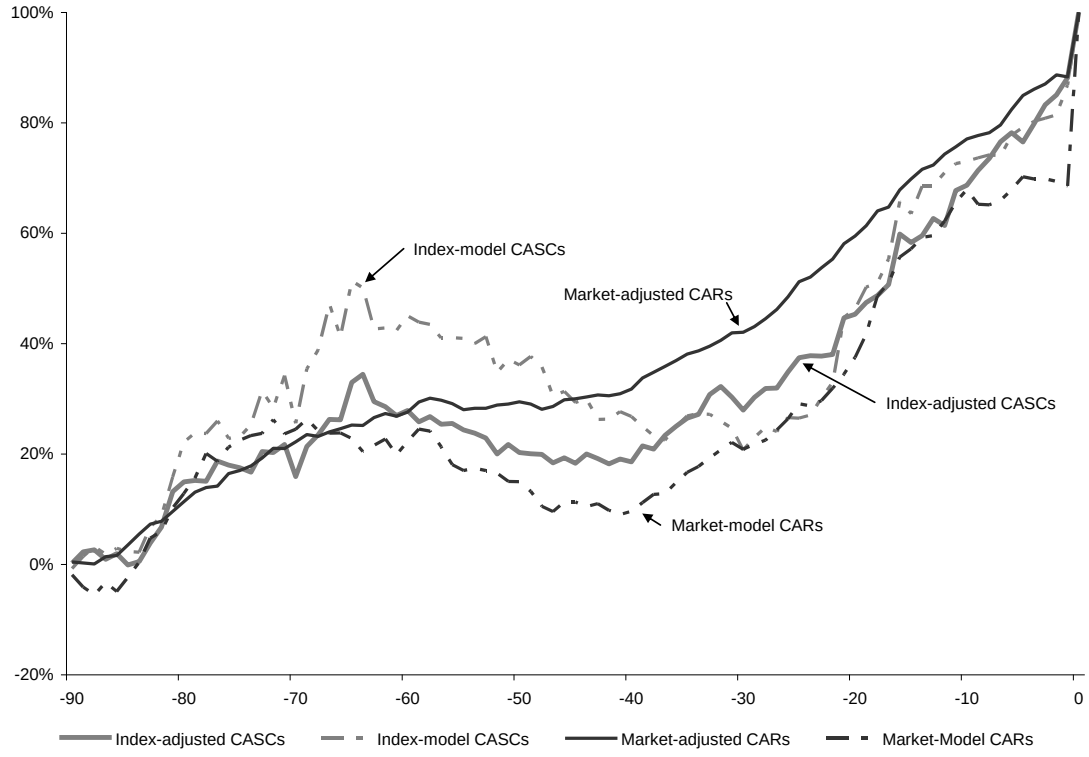
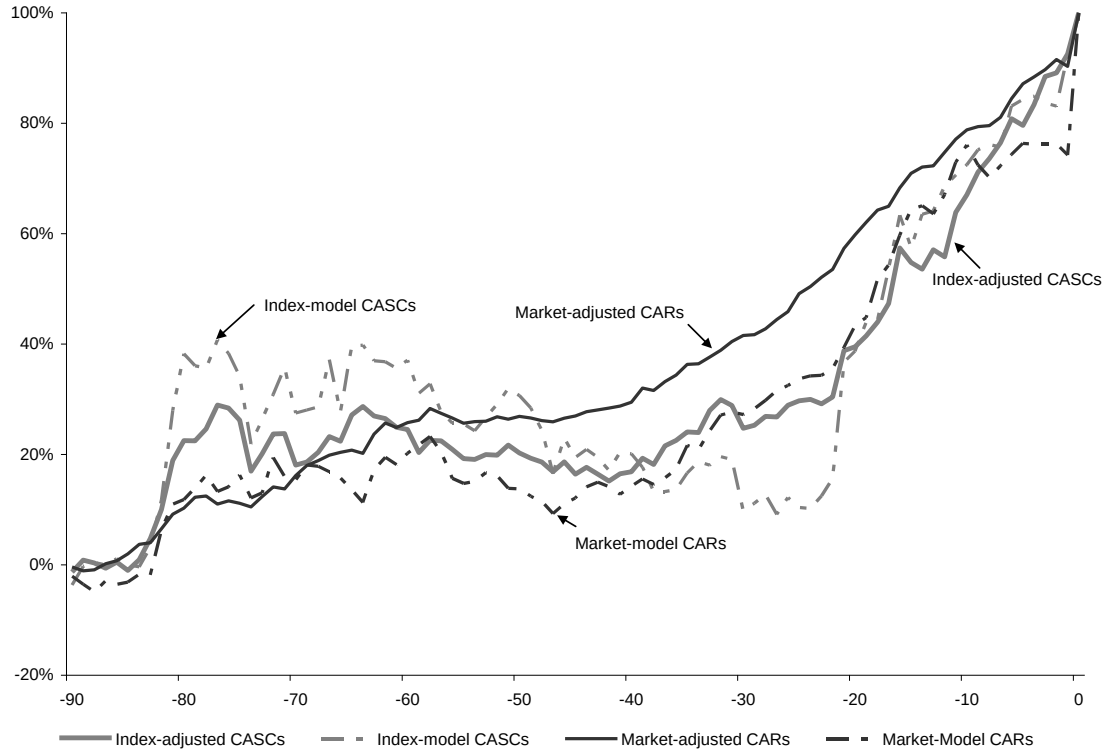


Figure 4: Run-Up Analysis

Panel A: Negative earnings surprises classified as deviations from analysts' estimates of < - 2.5%



Panel B: Negative earnings surprises classified as deviations from analysts' estimates in bottom decile



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