The Sensitivity of the CDS Market to Financial Analysts' Forecast Revisions

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August 2016

An earlier version of this paper was presented at the 2015 American Accounting Association (AAA) Ohio Region meeting, 2015 AAA annual meeting, and at the Accounting and Finance Research Workshop, University of Toledo. We are also thankful for comments and suggestions received from Z. Kaplan and T. White. This research was partly funded by the Dean's Summer Research Fund, College of Business Administration, Kent State University.

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ABSTRACT

We examine the impact of analysts' earnings per share (EPS) and cash flow per share (CPS) forecast revisions on the market for credit default swaps. Earnings and cash flows directly affect the level of firm assets and equity, and prior theoretical and empirical work demonstrates they are important factors in the determination of credit spreads. Accordingly, if analysts' forecasts and forecast revisions represent new and unexpected information, credit default swap (CDS) spreads are likely to respond. We find that while the issuance of both EPS and CPS forecast revisions relate inversely with changes in CDS spreads, cash flow forecast revisions have a larger effect, on average. We also find that the relationship between CPS forecast revisions and CDS spreads tends to be stronger in cases of financial distress. Furthermore, we do not observe an immediate significant reaction in the CDS market to analysts' recommendation changes. Our study provides evidence that cash flow forecasts dominate earnings forecasts in some situations and that participants in the CDS market discriminate between forms of analyst output.

Keywords: Forecast revisions, Earnings per share, Cash flow per share, Credit default swap.

JEL Codes: M41, G13, G20, G24, G32

Data Availability: Data used in this study are available from public sources.

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1. Introduction

Accounting data are theoretically value-relevant for pricing credit default swap (CDS) spreads (Duffie and Lando, 2001). Firms' earnings and cash flow data are particularly important since they provide critical information relative to both firm value and bankruptcy risk. Callen *et al.* (2009) and Das *et al*. (2009) empirically show that accounting earnings affect CDS spreads. In addition to actual earnings, prior research demonstrates that the CDS market reacts to information regarding expectations of future earnings as well. For instance, Shivakumar *et al.* (2011) find that management earnings forecasts impact credit spreads, particularly when news is bad or firms have poor credit ratings. We extend this area of study by focusing on the effect of sell-side financial analysts' earnings and cash flow forecast revisions on credit default swap spreads.

Long a topic of equity market research (e.g., Lys and Sohn, 1990; Francis and Soffer, 1997; Gleason and Lee, 2003), the debt market implications of analyst forecast and recommendation revisions have received comparatively less attention in the literature. A small number of studies examine reactions in the bond market to financial analyst output (e.g., Khurana and Raman, 2003; Edmonds *et al.*, 2011). However the relative infrequency of bond trading often limits these studies to issuance events. The comparative high liquidity of the CDS market, and the speed with which it responds to new information (Longstaff *et al.*, 2005; Acharya and Johnson, 2007), makes it a desirable environment in which to examine credit-market impacts of analysts' forecasts.

Since future earnings and cash flows directly affect the level of firm assets and equity (through the clean surplus relation), they are important factors in the determination of credit spreads (Callen *et al.*, 2009; Das *et al*., 2009). Higher future income and cash flow increase expected firm value and reduce default probability. If analysts' forecasts and revisions of these

measures represent new and unexpected information about default risk and uncertainty, CDS spreads are likely to respond. Specifically, we expect earnings and cash flow forecast revisions to relate inversely with changes in CDS spreads. For example, an upward earnings forecast revision reflects an increased likelihood of higher future income and cash flow, increasing the probability of greater firm wealth and asset values, and correspondingly decreasing the probability of default. Thus, we expect a decline in CDS spreads around the release date of an upward revision of earnings. We further posit that cash flow forecast revisions may be more relevant than earnings forecast revisions to the CDS market because bond interest and principal at maturity must be paid in cash, and it is the failure to meet these payments which triggers a default event.[1]

Francis and Soffer (1997) show a greater impact of earnings forecast revisions on equity markets for "buy" or "strong buy" than non-buy recommendations. Francis and Soffer (1997) attribute this asymmetry to the former representing imprecise valuation measures, motivating market participants to rely more on other types of information when issued. We investigate whether a similar phenomenon exists in the CDS market, but refrain from making a directional prediction due to structural differences between debt and equity markets.[2] We also examine the impact of credit ratings and the financial crisis on the forecast revision-CDS spread relationship as these situations reflect heightened uncertainty. We predict that cash flow forecast revisions impact CDS spreads more than earnings forecast revisions for firms with non-investment grade credit ratings as well as during the recent financial crisis. We test our hypotheses using a model adapted from Shivakumar *et al*. (2011).

[1] Credit events may vary by contract but typically include bankruptcy, obligation default, failure to pay, and restructuring. See Blanco *et al*. (2005) for additional information.

[2] Debt instruments lack the call-option structure of equity claims (e.g., Jensen and Smith, 1984) and debt markets have a lower verification threshold for bad news than for good news (DeFond and Zhang, 2014).

The results largely support our hypotheses. We find a strong negative relation between CDS spread changes and the release of both analyst earnings and cash flow forecast revisions. Further, we find on average that the CDS market responds more strongly to cash flow forecast revisions than earnings forecast revisions. Earnings, though not cash flow, forecast revisions matter more when firms have a "buy" or "strong buy" rating from analysts. On the other hand, a relatively stronger negative relation exists between cash flow forecast revisions and CDS spreads for firms with non-investment grade credit ratings. We also find the CDS market reacts more to cash flow forecast revisions than earnings forecast revisions for all firms during the recent financial crisis. Overall, our pattern of results suggests that the CDS market increasingly values cash flow forecast revisions relative to earnings forecast revisions as firms experience poorer financial health.

Finally, we examine whether analyst recommendation (buy/hold/sell) changes impact CDS spreads upon announcement. Interestingly, we fail to find a statistically significant link. The CDS market thus appears selective in pricing information from analysts. However, this is in line with prior research questioning the usefulness of analysts' recommendations (e.g., Barniv *et al.*, 2009; Simon and Curtis, 2011; Ertimur *et al.*, 2011), especially for sophisticated investors (Malmendier and Shanthikumar, 2014).

We contribute to prior literature by identifying the impact of financial analysts on an increasingly-important CDS market. We demonstrate that analysts' forecast revisions generate predictable movements in CDS spreads. By filling this gap, we paint a more-complete picture of financial analysts' impact on credit markets. While previous work in equity markets generally finds that cash flow forecasts tend to be less important than earnings forecasts (Givoly *et al.*, 2009; Call *et al.*, 2013), our research suggests that cash flow forecast revisions can be more informative

than earnings forecast revisions. Furthermore, we show the importance of cash flow forecasts increases during periods of financial distress. Together these results provide further evidence of the sophistication and relevance of cash flow forecasts (e.g., Call *et al.*, 2013). We also demonstrate that the CDS market does not value all forms of analyst output equally: we do not observe an association between recommendation revisions and immediate significant changes in CDS spreads. Our findings broadly align with the conclusions of Malmendier and Shanthikumar (2014) that earnings forecasts and revisions are directed more at large, sophisticated investors (the primary players in the CDS market), while recommendations are targeted at retail investors.

Our paper continues as follows. Relevant literature is reviewed and hypotheses are developed in section 2. We present our models and data in section 3 and regression results and additional analyses in section 4. Section 5 summarizes our findings and concludes.

2. Literature Review and Hypotheses Development

2.1. Credit Default Swaps Background

Credit default swaps operate as insurance on the bonds of an issuing company.[3] In a CDS contract, a protection buyer (the holder of the bond, or possibly another market participant betting against a company's ability to repay its bond obligations) makes quarterly payments to a seller offering protection against default. The cost of the insurance premium is referred to as the 'spread' and is typically described in terms of basis points. For example, a protection buyer for a reference entity with a CDS spread of 100 basis points would make quarterly payments of $25,000 (0.0100/4 x $10,000,000; ten million dollars being a typical bond issuance amount) to a protection seller. If

[3] Current gross notional value of the CDS market is approximately $12 trillion (http://www.swapsinfo.org/charts/swaps/notional-outstanding, accessed July 21st 2016). The CDS market peaked with a gross notional value of $58 trillion in 2007 (Griffin, 2014). Dias (2015) argues the surge in the CDS market was a consequence of managerial self-interest and risk taking in the early 2000s. She attributes the marked decline in the size of the market to the failure of financial institutions to act as market makers and a retreat from risk-taking in general.

a credit event occurs upon which the parties have previously contracted (e.g., failure to pay, bankruptcy, unfavorable debt restructuring), the protection seller pays the protection buyer the face value of the bonds and the buyer delivers the bonds to the protection seller. If the buyer has a naked CDS position (i.e., the buyer does not hold the underlying bonds), a credit event results in a payout of the difference between the current and face value of the bond.[4]

2.2. Related Literature on Analysts' Forecasts of Earnings and Cash Flows

Analysts make forecasts of firms' earnings and cash flows and revise their forecasts based on new information obtained from public and private sources. Financial analysts' earnings forecast revisions have long been shown to have information value for equity markets (e.g., Givoly and Lakonishok, 1979, 1980; Imhoff and Lobo, 1984). Recent research regarding the impact of analysts on the equity market provides evidence that both analyst leaders and followers play important roles in the price discovery process (Cooper *et al.*, 2001; Shroff *et al.*, 2014; Keskek *et al.*, 2014).

Analyst cash flow forecasts are a relatively recent innovation.[5] DeFond and Hung (2003) find that analysts tend to provide cash flow forecasts in response to investor demand and when earnings are of lower quality. While Givoly *et al*. (2009) argue that analysts' cash flow forecasts are mere naïve extensions of their earnings forecasts, most other research concludes that cash flow forecasts are at least moderately sophisticated (DeFond and Hung, 2003; Call *et al.*, 2009; McInnis and Collins, 2011; Pae and Yoon, 2012; Brown *et al.*, 2013; Call *et al.*, 2013). Givoly *et al*. (2009) find only a weak association between cash flow forecasts and stock returns, but Call *et al*. (2013)

[4] See Griffin (2014) for a thorough literature review of studies concerned with the relation between the CDS market and the disclosure and transparency of accounting information, as well as a detailed example of the calculation of credit spreads from assumed inputs.

[5] The first year for which I/B/E/S provides cash flow forecasts is 1993.

provide more robust evidence that cash flow forecast revisions are significant in explaining abnormal equity returns, even after controlling for earnings forecast revisions.[6]

Research also demonstrates financial analysts impact bond markets. Their activity is linked with lower bond yield spreads, especially when firm idiosyncratic risk is high (Mansi *et al.*, 2011), and Khurana and Raman (2003) find a negative association between earnings forecast revisions and yields for new bond issues. Financial analysts' cash flow forecasts serve as important benchmarks in the bond market; meeting or beating these forecasts tends to improve bond ratings and decrease initial bond yields (Edmonds *et al.*, 2011). However, the bond market poses challenges to researchers. First, bonds trade relatively infrequently and prices and yields typically react slowly to new information (Longstaff *et al.*, 2005; Acharya and Johnson, 2007).[7] Second, determining the credit spread from a given bond yield requires assumptions about the underlying risk-free rate (Hull *et al*., 2004); and third, bond yields are also a function of idiosyncratic bond features such as covenants and warrants.

Using the market for credit default swaps to examine the impact of analysts on credit markets offers a way around these difficulties. The relation between financial analysts' output and the CDS market is relatively unexplored in the accounting literature. Although Batta *et al*. (2016) find the initiation of CDS trading increases analyst forecast accuracy and decreases dispersion, to the best of our knowledge there is no existing study that directly examines the impact of analyst forecast revisions *on* the CDS market.

2.3. Hypotheses Development

[6] In a replication of Call *et al.* (2013), we also find that both earnings and cash flow forecast revisions are significant in explaining short-window (5-day) residual equity market returns. Similar to Call *et al.* (2013), we observe a larger coefficient on the earnings forecast revision term.

[7] Blanco *et al*. (2005) demonstrate enhanced liquidity in the CDS market: new information is priced faster in CDS spreads than corporate bond prices.

Duffie and Lando (2001) model credit spreads as a hybrid structural model combining imperfect accounting information. They find accounting information is important in modelling term structures of credit spreads. While the Duffie and Lando (2001) model is general in that it does not employ a specific type of accounting data, earnings and cash flow are appealing to operationalize empirically because of their relation to firm wealth and asset dynamics through the clean surplus relation (Callen *et al*., 2009). Further, the generality of the Duffie and Lando (2001) model suggests that credible expectations regarding accounting information may be as important as *ex post* realized numbers.[8] Provided forecasted earnings inform market participants by causing those participants to revise their priors, new information regarding estimated future earnings and cash flows should be incorporated in CDS spreads. Specifically, we expect an inverse relation between CDS spread changes and analysts' earnings and cash flow forecast revisions. For instance, an upward revision reflects higher future income and cash flow, which increases probable future firm wealth, asset values, and ability to service debt. In turn, this reduces the likelihood of default; we would therefore expect a decline in CDS spreads around the release date of an upward forecast revision.

Multiple empirical studies demonstrate the responsiveness of the CDS market to realized earnings and cash flow information (Callen *et al*., 2009; Das *et al*., 2009; Batta, 2011). There is also evidence that *expectations* regarding earnings are priced in the CDS market. Kraft *et al*. (2011) show CDS spreads capture the intra-industry earnings announcement effect of firms disclosing earnings news on firms which have not yet announced their earnings under certain conditions. Additionally, in a similar study to our own, Shivakumar *et al*. (2011) report that CDS spreads

[8] Research from equity markets provides evidence that analyst forecast revisions (i.e., expectations about earnings) may be more informative than actual earnings. Elton *et al.* (1981) finds larger abnormal returns can be achieved with a perfect foreknowledge of analyst revision behavior than with a foreknowledge of actual earnings.

respond to management earnings forecasts and that the reaction in the financial crisis period is stronger than in the pre-financial crisis period.[9]

We also predict that, on average, cash flow forecast revisions may have a higher information value to the CDS market relative to earnings forecast revisions. Though prior research suggests the association between cash flow forecast revisions and equity market reactions is weaker than that between earnings forecast revisions and equity markets (Givoly *et al*., 2009; Call *et al*., 2013), we expect a stronger inverse CDS market reaction to cash flow forecast revisions. This is due to the importance of the cash component of earnings for meeting bond interest and principal obligations. To take a straightforward example, accrued earnings resulting from revenue-recognizing transactions involving promises to pay the reference entity would not aid that reference entity in making principal and interest payments immediately; it is not until accrued earnings are received in cash that they are useful for meeting these obligations. As a result, earnings as a whole may be less informative than cash flow in determining credit risk spreads, and the CDS market is likely to be more sensitive to cash flow forecast revisions than earnings forecast revisions.[10] Formally, we hypothesize in alternate form:

H1a: *Forecasted earnings per share revisions are inversely associated with CDS spread changes.*

H1b: *Forecasted cash flow per share revisions are inversely associated with CDS spread changes.*

H1c: *There is a stronger inverse association between cash flow per share forecast revisions and CDS spread changes than earnings per share forecast revisions and CDS spread changes.*

Additionally, we predict that the informativeness of forecast revisions may depend on the prevailing analyst recommendation. As found by Francis and Soffer (1997), forecast revisions may

[9] In a discussion of Shivakumar *et al*. (2011), Lok and Richardson (2011) build a framework to link asset pricing research from debt and equity markets.

[10] We do not necessarily expect cash flow forecast revisions to entirely subsume the effects of earnings forecast revisions. Earnings forecast revisions, comprised of both cash flows and accruals, are likely to still be significant due to the predictive power of earnings and accruals in forecasting future cash flows (Dechow, 1994).

matter more for "buy" and "strong buy" recommendations as they represent an imprecise valuation measure. Distributional analyses indicate that "buy" recommendations outnumber "hold" and "sell" recommendations. This is typically held to be a function of the tendency of analysts to cover more successful firms and workplace pressure to issue favorable news about clients (McNichols and O'Brien, 1997; Michaely and Womack, 1999; Ertimur *et al*., 2011). As a result, a buy rating may be less informative regarding future firm prospects than hold or sell ratings. Accordingly, in the presence of a buy rating, market participants could tend to seek out other kinds of information such as analyst forecasts. However, debt markets have been shown to be conservative in that the value of debt holders' claims are more sensitive to bad news than good news – debt instruments lack the call-option structure of equity claims (e.g., Jensen and Smith, 1984). As such debt markets do not generally require as high a verification threshold for bad news as for good news (DeFond and Zhang, 2014) and so may not be more sensitive to news regarding the earnings of firms with better recommendations. Therefore, we do not predict a direction for the interaction of the analyst forecast revision and prevailing recommendation and state our second hypothesis in null form:

H2a: *There is no difference in the association between forecasted earnings per share revisions and CDS spread changes when the current recommendation is "buy" or "strong buy" relative to other recommendations.*

H2b: *There is no difference in the association between forecasted cash flow per share revisions and CDS spread changes when the current recommendation is "buy" or "strong buy" relative to other recommendations.*

We also predict that firms with non-investment grade credit ratings will be more sensitive to cash flow forecast revisions than earnings forecast revisions. As Lok and Richardson (2011) note, the reaction of CDS spreads to cash flow forecast revisions should be larger for firms that are nearer to default (as measured by the value of assets relative to debt outstanding). This situation is also similar to what occurred during the financial crisis, when the expected default frequency

jumped six-fold between 2007 and 2008 (Lok and Richardson, 2011). Furthermore, as this default point approaches, the importance of cash, relative to earnings as a whole, is likely to increase. Eisdorfer (2007) finds the importance of cash flow news grows in determining stock returns as the possibility of financial distress increases. As a result, we also hypothesize a stronger relationship between CDS spread changes and cash flow forecast revisions relative to earnings forecast revisions for firms with lower credit ratings and for all firms during the financial crisis. Our third set of hypotheses in alternate form is stated below:

H3a: *The inverse association between cash flow forecast revisions and CDS spread changes is stronger than that between earnings forecast revisions and CDS spread changes for firms with non-investment grade ratings.*

H3b: *The inverse association between cash flow forecast revisions and CDS spread changes is stronger than that between earnings forecast revisions and CDS spread changes for firms during the financial crisis.*

3. Models and Sample Description

3.1. Models

We utilize models adapted from Shivakumar *et al*. (2011) to test H1a and H1b:

$$\Delta CDS_{j,t} = \beta_0 + \beta_1 Y_{j,t} + \beta_2 \sigma(CDS)_{j,t} + \beta_3 \sigma(RET)_{j,t} + \beta_4 RESIDRET_{j,t} + \beta_5 SP500RET_t + \beta_6 \Delta TREAS_t + \beta_7 \Delta VIX_t + \beta_8 GOODNEWS_{j,t} + \beta_9 BADNEWS_{j,t} + \beta_{10\text{-}21}(YEAR\_DUM)_t + \varepsilon_{j,t} \quad (1a\text{-}1b)$$

where *Y* represents *EFR* in model (1a) and *CFR* in (1b). To test H1c we include both *EFR* and *CFR* simultaneously:

$$\Delta CDS_{j,t} = \beta_0 + \beta_1 EFR_{j,t} + \beta_2 CFR_{j,t} + \beta_3 \sigma(CDS)_{j,t} + \beta_4 \sigma(RET)_{j,t} + \beta_5 RESIDRET_{j,t} + \beta_6 SP500RET_t + \beta_7 \Delta TREAS_t + \beta_8 \Delta VIX_t + \beta_9 GOODNEWS_{j,t} + \beta_{10} BADNEWS_{j,t} + \beta_{11\text{-}22}(YEAR\_DUM)_t + \varepsilon_{j,t} \quad (1c)$$

The dependent variable is the percentage change in five-year maturity CDS spreads for firm *j* at time *t* over a five-day window around the forecast revision announcement date from Institutional Brokers' Estimate System (I/B/E/S), adjusted for the average percentage change for all CDS spreads with the same implied rating as firm *j*. This operation helps to ensure that the change observed in the CDS spread of interest is due to firm-specific events and not a result of market-wide changes. CDS spreads and implied rating data come from Markit.

Our independent variables of interest for models (1a-1c) are the average daily analyst forecasted annual earnings per share (EPS) revision (*EFR*) and the average daily analyst forecasted annual cash flow per share (CPS) revision (*CFR*), with the revisions expressed as percentages, for firm *j* at time *t*. In the construction of these variables we average all analyst revisions of forecasted annual EPS and CPS made on the same day for the same firm to obtain calculated daily changes. We source analyst information from I/B/E/S. Next, we match revision days (day 0) with the daily CDS data and build five-day CDS spread change windows around this date ([-2, 2]).[11]

Following Zhang *et al*. (2009) and Shivakumar *et al*. (2011) we include a number of control variables shown to be associated with short-term changes in CDS spreads. The standard deviation of CDS spreads ($\sigma(CDS)$) and standard deviation of market-adjusted stock returns ($\sigma(RET)$) control for CDS and equity volatility and are calculated over the period of day -137 through day -6 relative to the revision date. We control for the level of the market-adjusted return (*RESIDRET*) over the five-day period surrounding the revision date. Returns data come from the Center for Research in Security Prices (CRSP).

[11] Specifically, we first manually match Markit CDS data to Compustat based on an analysis of firm name. In the event of ambiguity we conservatively omit the entity from our sample. We then merge with I/B/E/S data using the GVKEY-I/B/E/S ticker linking tables provided through Wharton Research Data Services.

We also include key macroeconomic variables which influence the CDS spread over our five-day window of interest: *SP500RET* is the cumulative return in the S&P 500 index, also obtained from CRSP; *ΔTREAS* is the percentage change in the three-month Treasury bill rate; data are obtained from the Federal Reserve Economic Data website.[12] *ΔVIX* is the change in the S&P 500 implied volatility index and is available on the website of the Chicago Board Options Exchange.[13]

We control for ratings announcements by Standard and Poor's, Fitch, and Moody's. *GOODNEWS* (*BADNEWS*) is an indicator variable that takes a value of one (zero otherwise) if an observation experiences an actual credit rating upgrade (downgrade), is placed on a positive (negative) ratings watch, or receives a positive (negative) outlook on the forecast revision date. Credit ratings data are obtained from Factiva and year controls are added to all regressions.

We estimate the following model to test our second and third hypotheses:

$$\begin{aligned}\Delta CDS_{j,t} = {} & \beta_0 + \beta_1 Y_{j,t} + \beta_2 Y_{j,t} * Z_{j,t} + \beta_3 Z_{j,t} + \beta_4 \sigma(CDS\_SPREAD)_{j,t} + \beta_5 \sigma(RET\_SPREAD)_{j,t} + \\ & \beta_6 RESIDRET_{j,t} + \beta_7 SP500RET_t + \beta_8 \Delta TREAS_t + \beta_9 \Delta VIX_t + \beta_{10} GOODNEWS_{j,t} + \\ & \beta_{11} BADNEWS_{j,t} + \beta_{12\text{-}23}(YEAR\_DUM)_t + \varepsilon_{j,t} \qquad (2\text{-}4)\end{aligned}$$

where *Y* represents *EFR* in (2a), (3a), and (4a) and *CFR* in (2b), (3b), and (4b). Models (3c) and (4c) include both *EFR* and *CFR* and their interaction terms. *Z* represents the dichotomous variable *BUY* in (2a) and (2b); *JUNK* in (3a), (3b), and (3c); and *CRISIS* in (4a), (4b), and (4c).[14]

[12] Data available at http://research.stlouisfed.org/fred2/
[13] Data available at http://www.cboe.com/micro/VIX/historical.aspx
[14] Specifically, we estimate the following models (controls and subscripts omitted for conciseness):

$\Delta CDS = \beta_0 + \beta_1 EFR + \beta_2 EFR * BUY + \beta_3 BUY + Controls + \varepsilon$ (2a)
$\Delta CDS = \beta_0 + \beta_1 CFR + \beta_2 CFR * BUY + \beta_3 BUY + Controls + \varepsilon$ (2b)
$\Delta CDS = \beta_0 + \beta_1 EFR + \beta_2 EFR * JUNK + \beta_3 JUNK + Controls + \varepsilon$ (3a)
$\Delta CDS = \beta_0 + \beta_1 CFR + \beta_2 CFR * JUNK + \beta_3 JUNK + Controls + \varepsilon$ (3b)
$\Delta CDS = \beta_0 + \beta_1 EFR + \beta_2 EFR * JUNK + \beta_3 CFR + \beta_4 CFR * JUNK + \beta_5 JUNK + Controls + \varepsilon$ (3c)
$\Delta CDS = \beta_0 + \beta_1 EFR + \beta_2 EFR * CRISIS + \beta_3 CRISIS + Controls + \varepsilon$ (4a)
$\Delta CDS = \beta_0 + \beta_1 CFR + \beta_2 CFR * CRISIS + \beta_3 CRISIS + Controls + \varepsilon$ (4b)
$\Delta CDS = \beta_0 + \beta_1 EFR + \beta_2 EFR * CRISIS + \beta_3 CFR_{j,t} + \beta_4 CFR_{j,t} * CRISIS + \beta_5 CRISIS + Controls + \varepsilon$ (4c)

BUY is a binary variable that takes a value of one if the firm currently has an average rating of "buy" or better from all analysts following the firm and zero otherwise. *JUNK* is a binary variable that takes a value of one (zero otherwise) if an observation has an implied non-investment grade credit rating. *CRISIS* is a binary variable that takes a value of one (zero otherwise) for observations between the fourth quarter of 2007 and the third quarter of 2009.

3.2. Sample Selection and Description

Our sample period covers the years 2001 through 2012. We first obtain analyst forecast data from I/B/E/S for firms with available CDS data. This results in 546,470 EPS forecasts and 115,355 CPS forecasts. We next calculate revisions in the two metrics made for a given firm by a given analyst for both EPS and CPS forecasts, providing an initial sample of 391,024 earnings and 85,048 cash flow firm-analyst-day forecast revisions. Finally, we average the forecast revisions by day if more than one analyst following a given firm revises their forecast on the same day. We obtain 237,377 average daily earnings forecast revisions and 62,412 average daily cash flow forecast revisions.[15]

We utilize CDS data provided by Markit, which provides composite CDS spreads that are based on daily closing bid and ask prices obtained from market makers, for US non-financial reference entities. In our primary analyses, and similar to Zhang *et al*. (2009) and Shivakumar *et al*. (2011), we use CDS data for contracts with a five-year maturity because of their enhanced liquidity. Our sample consists of CDS contracts on senior debt issues with modified restructuring clauses. After matching with available daily CDS data and control variables, our final sample

[15] The majority of our daily forecast revision observations are the result of a single analyst revising his or her forecast. Single-analyst-firm earnings (cash flow) forecast revision days comprise 67 per cent (52 per cent) of our total firm-day observations.

consists of 126,365 daily earnings forecast revisions (for 628 unique firms) and 31,932 daily cash flow forecast revisions (for 523 unique firms).[16]

Table 1 presents sample descriptive statistics. The median values of change in CDS spread and EPS and CPS forecast revisions (*EFR*, *CFR*) each approximately equal zero. We recode average consensus recommendation (*MeanRec*) so that 5 represents a "strong buy" and 1 represents a "strong sell." The *MeanRec* is 3.632, consistent with prior research indicating a propensity for analysts to issue buy recommendations (e.g., Ertimur *et al*. 2011). The mean change in T-bill rates and VIX, as well as stock and S&P500 returns, calculated over the five-day window of interest are also approximately zero.

(Insert Table 1 here)

Table 2 indicates a negative correlation between changes in CDS spreads and EPS forecast revisions, CPS forecast revisions, and recommendation changes, although the Pearson correlation between CDS spread changes and EPS forecast revisions is not significant at conventional levels. Correlation coefficients between control variables are low, indicating an absence of multicollinearity. Observed correlations are broadly intuitive. For example, the correlation between change in CDS spreads and good ratings news is negative while that between change in CDS spreads and bad ratings news is positive.[17]

(Insert Table 2 here)

[16] To enhance the comparability of the results for testing our hypotheses, our cash flow forecast revision sample initially consists of observations with accompanying earnings forecast revisions. In section *4.2. Sensitivity Analyses* we re-test H1b on a sample of observations with cash flow forecast revisions only.

[17] To verify analysts are not making forecast revisions in response to changes in CDS spreads we examine whether there is a significant correlation between changes in CDS spreads from days (-2,-1) and (-2,0) and subsequent *EFR*s and *CFR*s. We fail to find evidence that analysts issue forecast revisions in response to short-window CDS spread movements and conclude reverse causality does not hinder the interpretation of our results in section 4.

4. Multivariate Results and Additional Analyses

4.1. Regression Results

Prior to formally testing our hypotheses, we winsorize all continuous variables at the first and ninety-ninth percentiles to reduce the impact of outliers. All regression results reflect firm-clustered standard errors and include controls for year fixed-effects.[18] Regression results in Column A of Table 3 indicate support for Hypothesis 1a. EPS forecast revisions are negatively associated with changes in CDS spreads at the one per cent significance level (coefficient estimate = -0.486, *t*-statistic = -3.20). Upward (downward) analyst earnings revisions are associated with significantly lower (higher) CDS spreads over the five-day window of interest. Results for control variables are in line with predictions, with increased volatility in CDS spreads (σ(*CDS*)) and the market (*ΔVIX*) associated with larger spreads, and higher firm residual (*RESIDRET*) and market (*SP500RET*) returns associated with lower spreads. Good ratings news (*GOODNEWS*) is negatively associated with a change in CDS spreads while bad ratings news (*BADNEWS*) is positively associated with a change in CDS spreads, again as expected.[19]

Support for hypothesis H1b is found in Column B of Table 3. The coefficient on *CFR* is negative (coefficient estimate = -1.224) and significant at the one per cent level (*t*-statistic = -3.35), indicating that revisions in forecast cash flow per share are also negatively associated with changes in CDS spreads over our five-day window.[20] Results for control variables are nearly identical to

[18] In untabulated analyses, we also control for industry fixed effects using binary indicators for the 48 industries identified by Fama and French (1997). The inclusion of industry controls does not affect our reported results. Furthermore, results are robust to clustering by industry (untabulated).

[19] Our results are unchanged if we instead limit our sample to the 94,433 observations with an earnings forecast revision but no cash flow forecast revision or the 31,932 observations with an accompanying cash flow forecast revision. Inferences drawn from Column A of Tables 4-6 remain unchanged if we limit our sample to these 31,932 observations as well.

[20] We further explore whether upward or downward revisions are differentially priced and partition earnings and cash flow forecast revisions based on the sign of the revision. Re-estimating models (1a) and (1b), untabulated results indicate that the presence of both positive and negative earnings and cash flow forecast revisions are inversely related

those obtained in the estimation of model (1a).[21] These results appear to be economically significant as well. A one-standard deviation increase in an earnings forecast revision will result in a CDS spread that falls by over half a per cent (1.276 * -0.486 = -0.620), which represents 1.2 CDS basis points at the mean; if the average analyst cash flow per share forecast increases by one standard deviation, the CDS spread for the firm falls by over two percentage points (1.964 * -1.224 = -2.404), which represents 4.7 basis points at the mean. The larger magnitude of the coefficient on *CFR* relative to that on *EFR* suggests support for hypothesis H1c, and we formally test this in the last column of Table 3.[22]

As shown in Column C, when *EFR* and *CFR* are included in the model at the same time the coefficient estimate on *CFR* (-1.088) is nearly twice the magnitude of that on *EFR* (coefficient estimate of -0.521). Both continue to be significant as well (*t*-statistics of -1.90 and -2.86, respectively).[23] A partial *F*-test provides support for H1c: the magnitude of the estimated coefficient on *CFR* is statistically greater than *EFR* at the 10 per cent level, one-sided (*F*-statistic = 1.90, *p*-value = 0.08). Thus, on average, cash flow forecast revisions have a greater impact on the CDS market than do earnings forecast revisions. Interestingly, these findings differ from those

to CDS spreads at the one per cent level, with slightly larger coefficients observed on downward earnings and cash flow forecast revisions consistent with the greater downside risk borne by credit instrument holders.

[21] As suggested by an anonymous reviewer, in untabulated results we further control for lagged changes in CDS prices and residual stock returns calculated over the period [-5, -3] relative to the forecast announcement date. We also control for investment-grade CDS index prices (CDX) obtained from *Bloomberg*. Including *CDX* as a control modestly reduces sample sizes as it began trading in 2004. None of our reported results are affected by the inclusion of these controls. Additionally, we control for institutional ownership and interact institutional ownership with *EFR* and *CFR*. Results are robust to controlling for institutional ownership, while the absence of a significant coefficient on the interaction terms suggest the sensitivity of the CDS market to analyst forecasts is not affected by institutional ownership.

[22] Lok and Richardson (2011) note that using raw changes in spreads, as opposed to percentage changes, may be preferable at times. We re-run our analyses using raw changes in credit spreads and find very similar results. For example, the coefficient on *CFR* is negative (-0.030) and significant at the one per cent level (t = -2.81) when the raw change in credit spread is used as the dependent variable in Model 1a (untabuluated). Lok and Richardson's (2011) comments also suggest that there may be instances where using the log of raw change may also be appropriate. We re-run our analyses using the natural log of raw change and again find robust evidence for our conclusions (untabulated).

[23] Including both *EFR* and *CFR* at the same time does not induce multicollinearity as evidenced by VIF values of approximately 1 for both variables (untabulated).

which examine the association between cash flow forecast revisions and equity prices, which find only a mild reaction to cash flow forecast revisions (Givoly *et al*., 2009) or an economically-weaker association for cash flow forecast revisions than that which exists between earnings forecast revisions and abnormal equity returns (Call *et al*., 2013).

(Insert Table 3 here)

Table 4 presents the results of testing our second hypothesis regarding the impact of forecast revisions on CDS spreads for firms with "buy" or "strong buy" recommendations. The results in Column A of Table 4 show that the main effect of *EFR* is not significant when the interaction term between EPS revision and a buy/strong buy rating is included in the model (*EFR* coefficient estimate = -0.206, *t*-statistic = -1.17). However, the coefficient on the interaction term itself is negative and significant at the one per cent level (coefficient estimate = -1.451, *t*-statistic = -3.06). We reject our null hypothesis H2a and conclude that earnings forecast revisions matter primarily for firms with buy/strong buy ratings.[24] Column B (test of H2b) examines the effect of "buy" ratings on the CDS market reaction to cash flow forecast revisions. Relative to Column A, inferences are reversed. A negative and significant coefficient on *CFR* (coefficient estimate = -1.274, *t*-statistic = -2.66) indicates CPS forecast revisions are inversely associated with CDS spreads for firms with non-buy ratings. However, the coefficient estimate on the interaction term (*CFR*BUY)* is not significant (*t*-statistic = 0.23). This implies that cash flow forecasts are not valued differently for firms which analysts have given a buy/strong buy recommendation; therefore, we fail to reject our null hypothesis H2b. Taken as a whole, results from testing our second hypothesis suggest that a buy/strong buy recommendation is likely not a signal of an imprecise valuation measure to the CDS market. If it were such a signal, we would expect both

[24] A partial *F*-test of the sum of the coefficients on *EFR* and *EFR*BUY* (untabulated) indicate that it is significantly different from zero at the one per cent level (*F*-statistic = 33.76, *p*-value <0.01).

earnings and cash flow data to behave similarly. Our pattern of results instead suggests that a buy/strong buy recommendation may instead be interpreted by the CDS market as a general reflection of underlying firm economic health. *EFR*s may matter more to the CDS market for firms in healthier financial conditions while *CFR*s may matter more for those in distressed conditions. We further explore this possible explanation through the testing of our third hypothesis.

(Insert Table 4 here)

Table 5 examines the impact of analyst forecast revisions on the CDS market for firms with a non-investment grade credit rating. Column A of Table 5 shows the estimated coefficient on *EFR* is negative (-1.279), while that on *EFR*JUNK* is positive (1.408) in the estimation of model (3a). Both are significant at the one per cent level. A partial *F*-test indicates that the sum of the two coefficients is not significantly different from zero (*F*-statistic = 0.75, *p*-value = 0.39). We conclude that while earnings forecast revisions are negatively related with CDS spreads for investment-grade firms, this relationship disappears for firms with non-investment grade credit ratings; there is no net effect of an earnings forecast revision on CDS spreads for firms without an investment grade rating. However, the results from the estimation of model (3b) in Column B indicate that the relationship between cash flow forecast revisions and CDS spread changes is *stronger* for firms with non-investment grade credit ratings (coefficient estimate on *CFR*JUNK* = -2.589, *t*-statistic = -2.97), in support of H3a. The coefficient on *CFR* is not significant (*t*-statistic = -0.66) in this model.

In Column C of Table 5 we simultaneously include *EFR* and *CFR*, along with the interaction of each with *JUNK*. We find that the coefficient on the *CFR*JUNK* term is negative and significant at the one per cent level (coefficient estimate = -2.812, *t*-statistic = -3.16) while

that on *EFR*JUNK* is not significant (*t*-statistic = 0.90).[25] The evidence again supports hypothesis H3a: cash flow forecast revisions have a stronger negative effect on CDS spreads than earnings forecast revisions for firms with non-investment grade ratings. This pattern of results suggests the CDS market primarily values earnings forecast revisions for investment grade firms and cash flow forecast revisions for non-investment grade firms. There is no statistically significant effect of an earnings forecast revision on firms' CDS spreads that have a non-investment grade rating, while the lack of a significant main effect on *CFR* demonstrates cash flow forecast revisions matter primarily for firms with a non-investment grade rating.

(Insert Table 5 here)

Finally, Table 6 presents the results of the impact of the financial crisis on the CDS market's response to analyst forecast revisions.[26] The results of estimating model (4a) in Column A of the table indicate that the coefficient on *EFR*CRISIS* is not statistically significant. However, results in Column B from estimating model (4b) provide evidence that the CDS market did become more sensitive to cash flows during the financial crisis: the coefficients on *CFR* and *CFR*CRISIS* are both negative and significant (coefficient estimates of -0.885 and -1.959, *t*-statistics of -2.23 and -2.08, respectively) in Column B of the table. These findings provide initial support for hypothesis H3b.[27] Examining the results in Column C of the estimation of model (4c), where EPS

[25] In Column C, though the coefficient on *EFR* is negative and significant (coefficient estimate = -0.779, *t*-statistic = -2.17) while that on *EFR*JUNK* is positive and not significant (coefficient estimate = 0.521, *t*-statistic = 0.90), a partial *F*-test indicates the sum of the coefficients is not significantly different from zero (*F*-statistic = 0.58, *p*-value = 0.45); thus inferences regarding the impact of EPS revisions for firms with non-investment grade credit ratings as established through the estimation of model (3a) in Column A are unchanged.

[26] As the inclusion of year controls and the *CRISIS* indicator variable may induce multicollinearity, for all regressions in Table 6 we exclude year indicator variables for the crisis period while retaining other year indicator variables. Inferences are unchanged if we include crisis-period year controls, or exclude all year controls (untabulated).

[27] Alternatively, we model the effect of *CRISIS* by creating Pre-crisis, Crisis, and Post-Crisis sub-samples. Results are consistent with our interaction modelling. Namely, the coefficient on *EFR* is consistently negative and significant across all three periods with similar coefficients. The coefficient on *CFR* is also consistently negative and significant, but jumps in magnitude during the crisis periods; Pre-crisis and Post-Crisis coefficients are similar in size.

and CPS revisions are included at the same time along with the interaction of each with *CRISIS*, we find that the coefficient on the *CFR*CRISIS* term is negative and significantly different from zero at the five per cent level (coefficient estimate = -1.923, *t*-statistic = -2.03) while that on *EFR*CRISIS* is positive but not significant (*t*-statistic = 0.16).[28] Hypothesis H3b is thus again supported. During the financial crisis the CDS market was more responsive to the cash flow forecast revisions of analysts than earnings forecast revisions.

(Insert Table 6 here)

Taking the results of testing H2 and H3 together, we observe cash flow forecast revisions matter more than earnings forecast revisions when firms tend to be in weaker economic health. Per Tables 5 and 6, the CDS market appears to react more to earnings forecast revisions when firms have an investment grade rating and during non-crisis periods. For firms with non-investment grade ratings and during the financial crisis, the impact of EPS forecast revisions is much reduced. In Table 5, in fact, the coefficients on *EFR* and *EFR*JUNK* are of opposite signs and a test of the sum of the coefficients reveals it is not statistically different than zero. In Table 6 the story is very similar, whereby *EFR* and *EFR*CRISIS* have coefficients of opposite signs (although a partial *F*-test reveals the sum is still negative and statistically different than zero, the significance level drops to marginal). Tables 5 and 6 also reveal that cash flow forecast revisions are more important to the CDS market for non-investment grade firms and for all companies during the financial crisis as evidenced by the negative and significant coefficients on *CFR*JUNK* and *CFR*CRISIS*. Typically the impact of earnings information is found to be *more* important for firms with a shorter distance to default (Lok and Richardson, 2011). A possible explanation to this unexpected result may be that the usual CDS-earnings relationship in shorter distance-to-default situations can break down

[28] We note that the main effect of *CRISIS* is not significant in Columns B and C due to the reduced sample size relative to Column A.

in the presence of more-precise cash flow information. Overall, in contrast to the findings from the equity market, results of our tests lead us to conclude that the CDS market values cash flow forecast revisions *more* than earnings forecast revisions on average as evidenced by larger coefficient estimates on *CFR* relative to *EFR* in Table 3, and that this relationship strengthens as firms' financial condition worsens or when the business cycle is in a trough phase (Tables 4 – 6).

4.2. Sensitivity Analyses

In additional analyses, we test the sensitivity of our primary results to alternative CDS contract maturities. We re-estimate models (1a-1c) to test the relationship between forecast revisions and changes in CDS spreads for contracts of one, three, seven, and ten years. Results are tabulated in Table 7. The results in Columns A and B indicate that EPS forecast revisions and CPS forecast revisions remain significant at the one per cent level for all alternative maturities. Column C re-estimates model (1c), which includes simultaneous earnings and cash flow forecast revisions. When we include both terms in the regression equation, *CFR* is significant in all four alternative contract lengths, while *EFR* is significant in three of the four. Similar to our findings in Table 3 for five-year maturity contracts, the coefficient estimates for *CFR* are approximately two times larger (and more strongly significant) than *EFR* across the alternative maturities as well, indicating the continued economic importance of cash flow forecast revisions.

(Insert Table 7 here)

We also explore the impact of CDS liquidity on our results. We re-perform our analyses on high-depth and low-depth contracts, split at the median depth of 5. We find that our primary results continue to hold in both subsamples, albeit with slightly smaller coefficients and at weaker significance levels for the low-depth subsample. This is intuitive as a lack of trading limits the ability of spreads to reflect new information. In the low-depth sample, we observe a coefficient

estimate of -0.394 (t = -2.04, significant at the five per cent level) on *EFR* and an estimate of -0.980 (t = -1.98, significant at the five per cent level) on *CFR* (untabulated), each smaller in magnitude than the corresponding coefficient reported in Table 3. For our high-depth subsample, coefficient estimates on *EFR* and *CFR* are larger than reported in the original estimation of models 1a and 1b (-0.646 and -1.472, respectively), each significant at the one per cent level (untabulated). That this finding is what one would expect to observe if the CDS market were responding to analyst forecast revisions lends further support to our main hypotheses.

Relatedly, if our theory is correct in that the CDS market responds to analyst forecast revisions, then the timing of forecast revisions may be expected to generate differing observed CDS market reactions. Specifically, we investigate whether forecast revisions made on consecutive days but in different directions (i.e., an upward [downward] revision on the first day and a downward [upward] on the second) tend to offset each other. Since the five-day market-reaction window partially covers both forecast revisions, intuition suggests the market response to both forecast revisions should be muted for these observations. To test whether this effect occurs, we analyze our sample and remove all observations consisting of revisions made on consecutive days with opposite signs. We find this phenomenon to be fairly rare; our sample falls by 7 per cent to 117,181 in the earnings forecast revision sample and by 15 per cent to 27,095 in the cash flow forecast revision sample. *Ex ante*, we predict coefficients on *EFR* and *CFR* that are larger in magnitude for these reduced samples in the estimation of Models (1a) and (1b). Our results are consistent with this prediction: we observe coefficient estimates of -0.501 on *EFR* and -1.658 on *CFR*, each significant at the one per cent level (untabulated). We interpret the results of this test

as additional evidence in favor of our hypothesis that the CDS market responds to analyst forecast revisions.[29]

While we carefully construct our models to control for correlated omitted variables, it is possible that other confounding events may drive our observed results. One type of event which may be expected to move markets is the release of actual earnings information. To ensure our results are not driven by earnings announcements, we re-perform our primary analyses using a sample which excludes forecast revisions made during a five-day window around actual earnings announcement dates. This exclusion criteria affects a relatively small number of observations, with 1,452 revision-days (1.1 per cent) falling within announcement windows for the earnings forecast revision sample and 226 observations (0.7 per cent) for the cash flow forecast revision sample. Results (untabulated) are unaffected and continue to hold at the same significance levels when these observations are removed from the sample (*EFR* coefficient estimate = -0.501, *t*-statistic = -3.27; *CFR* coefficient estimate = -1.215, *t*-statistic = -3.29). These tests further suggest that the observed results are not a spurious reflection of confounding events.

Finally, to test the specific effects of cash flow forecast revisions and strengthen our findings regarding their relative importance, we re-estimate model (1b) on a sample of 7,119 observations that consist exclusively of cash flow forecast revisions; that is, these observations do not contain a corresponding earnings forecast revision. Untabulated results indicate that the effect of cash flow forecast revisions in this sample are also negatively associated with changes in CDS spreads (coefficient estimate = -0.752) and statistically significant at the ten per cent level (*t*-statistic = -1.72). Even in a much-reduced sample, we find cash flow forecast revisions are inversely related to changes in the CDS market, independent of changes in EPS forecast revisions.

[29] In untabulated analyses we do not observe that forecast revision horizon (the time between the release of a forecast revision and fiscal year end) impacts the CDS market's reaction to forecast issuance.

4.3. Effect of Analyst Recommendation Changes

The literature on the importance of the issuance and revision of analyst recommendations is mixed. Some studies find that the issuance of analysts' recommendations and recommendation changes have equity market impacts (e.g., Womack, 1996; Francis and Soffer, 1997; Cornett *et al*., 2007; Jegadeesh and Kim, 2009), while others question their usefulness (e.g., Simon and Curtis, 2011; Ertimur et al. 2011, Brown and Huang, 2013). We examine the impact of analyst recommendation changes on the CDS market. Results (untabulated) indicate recommendation changes are not significantly associated with movements in CDS spreads. While significantly responding to analysts' forecast revisions, the CDS market does not appear to immediately react to recommendation changes. This suggests that the CDS market discriminates between various types of analyst output and that the price discovery process in the CDS market absorbs information from various types of analyst output to differing degrees. This is consistent with the notion that that earnings forecasts and revisions are more directed at large, sophisticated investors while recommendations are targeted at retail investors (Malmendier and Shanthikumar, 2014).

5. Summary and Conclusion

In this study, we document the impact of financial analysts' output revisions on CDS spreads. Prior literature shows that analysts impact both equity and bond markets through their ability to provide new information regarding future earnings and cash flows. Though existing equity market research on cash flow forecast revisions tends to show they are less important than earnings forecast revisions, we predict that the opposite relation may hold in the CDS market. Our findings support this conjecture and indicate that while both earnings and cash flow forecast revisions are informative to the CDS market, on average cash flow forecasts are significantly more so. Existing literature demonstrates that news regarding earnings forecast revisions matters more

in equity markets for firms with "buy" recommendations. We find the CDS spreads of buy/strong buy recommendation-firms react more to earnings forecast revisions, but not to cash flow forecast revisions. Examining the differential impact of cash flow forecast revisions and earnings forecast revisions for firms with non-investment grade credit ratings, and for all firms during the recent financial crisis, we find cash flow forecast revisions are more important than those for earnings in both situations. In addition, we find analysts' recommendation revisions are not (at least immediately) informative to the CDS market.

This paper contributes to the literature by providing further evidence of the importance of financial analysts' cash flow and earnings forecasts outside the traditional domain of equity prices. We demonstrate that individual security market analysts provide new and useful information to the CDS market and a *continuing* effect of analysts on credit spreads, aside from the impact of analysts and their forecasts on initial bond yields documented in prior studies (e.g., Khurana and Raman, 2003; Edmonds *et al*., 2011). Our results also shed light on the varying importance of revisions in earnings and cash flow forecasts to the CDS market. In general, our findings show earnings forecast revisions are more important for firms in better financial positions while cash flow revisions tend to dominate as firms' financial health weakens. In contrast to the findings of prior literature examining equity markets, we also provide evidence that analysts' cash flow forecasts can be more important than earnings forecasts in credit markets. Finally, we show that all types of analyst output are not treated equally by the CDS market: unlike forecast revisions, recommendation changes do not elicit an immediate price reaction.

Future research may wish to examine how CDS spreads are impacted by other types of analyst activity, such as the issuance of long term growth forecasts and the initiation and cessation of coverage. It may also be fruitful to more closely examine the effects of specific analyst and

brokerage attributes in the CDS market, as well as “innovative” or “bold” forecasts relative to forecasts which represent herding behavior. Finally, the specific conditions under which the market responds differentially to cash flow and earnings forecasts warrants additional attention. For example, while in untabulated analyses we do not find that accrual quality impacts the CDS market’s reaction to forecast revisions, this question may be more fully examined in deeper equity markets. Exploring topics such as these will assist market participants and academics in developing a fuller understanding of the relationship between analysts and markets.

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Table 1
Descriptive Statistics: Sample Period 2001 – 2012

Variable	N	Mean	Std. Dev.	Min	Q1	Med.	Q3	Max
CDS	126,365	196.297	387.691	2.494	44.590	86.728	198.828	17,532.557
ΔCDS	126,365	0.005	0.120	-1.380	-0.003	-0.001	0.316	10.790
EFR	126,365	-0.004	1.276	-151.000	-0.033	0.000	0.029	169.000
CFR	31,932	0.033	1.964	-74.000	-0.024	0.001	0.026	167.647
RECREV	27,061	-0.035	1.484	-4.000	-1.000	-1.000	1.000	4.000
MeanRec	126,365	3.632	0.413	1.200	3.370	3.680	3.930	5.000
σ(CDS)	126,365	8.544	15.805	0.106	4.435	6.356	9.655	1,048.31
σ(RET)	126,365	0.019	0.011	0.005	0.012	0.016	0.022	0.308
RESIDRET	126,365	0.001	0.063	-1.654	-0.012	0.001	0.027	3.252
SP500RET	126,365	0.001	0.029	-0.197	-0.012	0.003	0.016	0.179
ΔTREAS	126,365	0.036	0.609	-1.000	-0.032	0.000	0.034	26.000
ΔVIX	126,365	0.009	0.125	-0.348	-0.068	-0.006	0.068	1.028
GOODNEWS	126,365	0.000	0.021	0.000	0.000	0.000	0.000	1.000
BADNEWS	126,365	0.001	0.036	0.000	0.000	0.000	0.000	1.000

CDS is the raw spread in basis points. *ΔCDS* is the percentage change in CDS spreads for firm *j* at time *t* over a five-day window around the revision date adjusted for the average percentage change in spread for all CDS sample observations with the same implied rating our sample. *EFR* is the average daily analyst forecasted earnings per share revision expressed as a percentage and *CFR* is the average daily analyst forecasted cash flow per share revision for firm *j* at time *t* expressed as a percentage. *RECREV* is average analyst recommendation revision for firm *j* at time *t*. *MeanRec* is the consensus recommendation from I/B/E/S recoded so that "5" represents strong buy and "1" represents strong sell. *σ(CDS)* is the standard deviation of the firm's CDS Spread and *σ(RET)* is the standard deviation of the market-adjusted stock returns calculated over the event period [-137, -6] relative to the revision date. *RESIDRET* is the market-adjusted return as well over the five day period surrounding the revision date. *SP500RET* is the cumulative return in the S&P 500 index, *ΔTREAS* is the percentage change in the three-month Treasury bill rate, *ΔVIX* is the change in the S&P 500 implied volatility index over the five-day window. *GOODNEWS (BADNEWS)* is an indicator variable that takes a value of 1 if the firm of interest experiences an actual credit rating upgrade (downgrade), is placed on ratings watch positive (negative), or receives a positive (negative) outlook on the event day.

Table 2
Correlation Matrix of Selected Variables: Pearson (Above Diagonal) and Spearman (Below Diagonal)

	ΔCDS	*EFR*	*CFR*	*RECREV*	*σ(CDS)*	*σ(RET)*	*RESIDRET*	*SP500RET*	*ΔTREAS*	*ΔVIX*	*GOODNEWS*	*BADNEWS*
ΔCDS		-0.004	-0.014	-0.050	0.042	0.010	-0.1196	-0.033	-0.006	0.029	-0.005	0.042
		(0.1959)	(0.0128)	(<.0001)	(<.0001)	(0.0003)	(<.0001)	(<.0001)	(0.0315)	(<.0001)	(0.0636)	(<.001)
EFR	-0.056		0.003	0.020	-0.005	-0.002	0.018	0.002	-0.001	0.002	-0.000	-0.003
	(<.0001)		(0.5591)	(<.0001)	(0.0763)	(0.5279)	(<.0001)	(0.5235)	(0.6909)	(0.3888)	(0.9516)	(0.2845)
CFR	-0.048	0.545		0.016	-0.003	0.018	0.025	0.018	0.001	-0.001	-0.000	-0.009
	(<.0001)	(<.0001)		(0.0023)	(0.6400)	(0.0016)	(<.0001)	(0.0011)	(0.9233)	(0.7998)	(0.9775)	(0.0960)
RECREV	-0.042	0.239	0.170		-0.006	-0.023	0.231	-0.005	0.034	-0.027	0.007	-0.021
	(<.0001)	(<.0001)	(<.0001)		(0.3601)	(0.0002)	(<.0001)	(0.4084)	(<.0001)	(<.0001)	(0.2336)	(0.0005)
σ(CDS)	-0.009	-0.049	-0.009	-0.021		0.143	0.010	0.000	-0.005	-0.009	-0.001	0.020
	(0.0008)	(<.0001)	(0.1062)	(0.0006)		(<.0001)	(0.0004)	(0.9174)	(0.0636)	(0.0025)	(0.6467)	(<.0001)
σ(RET)	-0.001	-0.083	-0.064	-0.025	0.294		0.021	0.010	0.010	-0.033	0.000	0.016
	(0.7557)	(<.0001)	(<.0001)	(<.0001)	(<.0001)		(<.0001)	(0.0005)	(0.0002)	(<.0001)	(0.8898)	(<.0001)
RESIDRET	-0.116	0.163	0.135	0.299	0.000	-0.005		0.113	0.009	-0.066	0.003	-0.034
	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(0.9762)	(0.0563)		(<.0001)	(0.0016)	(<.0001)	(0.2924)	(<.0001)
SP500RET	-0.018	-0.004	-0.010	-0.011	-0.007	0.007	-0.071		0.025	-0.627	0.001	-0.005
	(<.0001)	(0.1835)	(0.0728)	(0.0816)	(0.0083)	(0.0134)	(<.0001)		(<.0001)	(<.0001)	(0.6243)	(0.0812)
ΔTREAS	-0.006	0.015	0.011	0.005	-0.036	-0.059	-0.002	0.040		-0.032	-0.001	-.000
	(0.0435)	(<.0001)	(0.0404)	(0.4182)	(<.0001)	(<.0001)	(0.4956)	(<.0001)		(<.0001)	(0.7103)	(0.9416)
ΔVIX	0.016	0.019	0.018	-0.025	-0.011	-0.031	-0.050	-0.624	-0.032		0.003	0.002
	(<.0001)	(<.0001)	(0.0010)	(<.0001)	(<.0001)	(<.0001)	(<.0001)	(<.0001	(<.0001)		(0.3668)	(0.5294)
GOODNEWS	-0.005	0.007	0.006	0.006	-0.005	0.000	0.003	0.002	-0.001	0.002		-0.001
	(0.0746)	(0.0090)	(0.2946)	(0.3300)	(0.0764)	(0.9333)	(0.2604)	(0.4255)	(0.6595)	(0.4200)		(0.7917)
BADNEWS	0.026	-0.020	-0.014	-0.021	0.022	0.011	-0.016	-0.005	-0.000	0.005	-0.001	
	(<.0001)	(<.0001)	(0.0120)	(0.0006)	(<.0001)	(0.0002)	(<.0001)	(0.0898)	(0.9794)	(0.0800)	(0.7917)	

p-values in parentheses. See Table 1 for variable definitions.

Table 3
Regression Results: Effect of Earnings and Cash Flow Forecast Revisions
Test of Hypothesis 1

Dependent Variable: *ΔCDS*

Column		**A**		**B**		**C**	
	Predicted Sign	Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)	
Intercept		1.107	***	2.204	**	2.203	**
		(3.90)		(2.43)		(2.43)	
EFR	-	-0.486	***			-0.521	*
		(-3.20)				(-1.90)	
CFR	-			-1.224	***	-1.088	***
				(-3.35)		(-2.86)	
σ(CDS)	+	0.013	*	0.015		0.015	
		(1.91)		(1.19)		(1.18)	
σ(RET)	+	-4.116		2.884		2.529	
		(-1.09)		(0.42)		(0.37)	
RESIDRET	-	-20.609	***	-18.880	***	-18.756	***
		(-18.14)		(-12.19)		(-12.02)	
SP500RET	-	-4.412	*	-8.523	**	-8.612	***
		(-1.91)		(-2.58)		(-2.60)	
ΔTREAS	-	-0.097		-0.067		-0.068	
		(-1.06)		(-0.44)		(-0.44)	
ΔVIX	+	1.051	***	1.156	*	1.151	*
		(3.06)		(1.89)		(1.88)	
GOODNEWS	-	-2.267	**	-4.337	**	-4.360	**
		(-2.46)		(-2.24)		(-2.24)	
BADNEWS	+	7.500	***	8.229	***	8.174	***
		(6.58)		(3.76)		(3.73)	
						(*F*-statistic)	
Partial *F*-test ($\beta_1 = \beta_2$)						(1.90)	†
Year Controls?		Included		Included		Included	
N		126,365		31,932		31,932	
Adj. R^2		0.024		0.027		0.028	

All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors reflect clustering at the firm level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively (two-sided). † indicates significance at the 10% level (one-sided). *ΔCDS* is the percentage change in CDS spreads for firm *j* at time *t* over a five-day window around the revision date adjusted for the average percentage change in spread for all CDS sample observations with the same implied rating our sample. *EFR* is the average daily analyst forecasted earnings per share revision and *CFR* is the average daily analyst forecasted cash flow per share revision for firm *j* at time *t* expressed as a percentage, expressed as percentages. *σ(CDS)* is the standard deviation of the firm's CDS Spread and *σ(RET)* is the standard deviation of the market-adjusted stock returns calculated over the event period [-137, -6] relative to the revision date. *RESIDRET* is the market-adjusted return as well over the five day period surrounding the revision date. *SP500RET* is the cumulative return in the S&P 500 index, *ΔTREAS* is the percentage change in the three-month Treasury bill rate, *ΔVIX* is the change in the S&P 500 implied volatility index over the five-day window. *GOODNEWS (BADNEWS)* is an indicator variable that takes a value of 1 if the firm of interest experiences an actual credit rating upgrade (downgrade), is placed on ratings watch positive (negative), or receives a positive (negative) outlook on the event day. Coefficient estimates multiplied by 100 for ease of exposition.

Table 4
Regression Results: Test of Buy Recommendations
Test of Hypothesis 2

Dependent Variable: *ΔCDS*

Column		**A**		**B**	
	Predicted Sign	Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)	
Intercept		1.244	***	2.324	**
		(4.32)		(2.54)	
EFR	-	-0.206			
		(-1.17)			
*EFR*BUY*	-	-1.451	***		
		(-3.06)			
CFR	-			-1.274	***
				(-2.66)	
*CFR*BUY*	-			0.204	
				(0.23)	
BUY	-	-0.185	***	-0.129	
		(-3.56)		(-1.51)	
σ(CDS)	+	0.012	*	0.015	
		(1.88)		(1.20)	
σ(RET)	+	-5.346		2.683	
		(-1.39)		(0.39)	
RESIDRET	-	-20.468	***	-18.858	***
		(-18.02)		(-12.16)	
SP500RET	-	-4.422	*	-8.503	**
		(-1.92)		(-2.57)	
ΔTREAS	-	-0.097		-0.065	
		(-1.06)		(-0.43)	
ΔVIX	+	1.052	***	1.156	*
		(3.06)		(1.90)	
GOODNEWS	-	-2.219	**	-4.330	**
		(-2.40)		(-2.23)	
BADNEWS	+	7.468	***	8.188	***
		(6.55)		(3.74)	
Year Controls?		Included		Included	
N		126,365		31,932	
Adj. R^2		0.025		0.027	

All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors reflect clustering at the firm level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively. *ΔCDS* is the percentage change in CDS spreads for firm *j* at time *t* over a five-day window around the revision date adjusted for the average percentage change in spread for all CDS sample observations with the same implied rating our sample. *EFR* is the average daily analyst forecasted earnings per share revision and *CFR* is the average daily analyst forecasted cash flow per share revision for firm *j* at time *t* expressed as percentages. *BUY* is a dummy variable that takes a value of 1 if an observation has a Buy/Strong Buy analyst rating. *σ(CDS)* is the standard deviation of the firm's CDS Spread and *σ(RET)* is the standard deviation of the market-adjusted stock returns calculated over the event period [-137, -6] relative to the revision date. *RESIDRET* is the market-adjusted return as well over the five day period surrounding the revision date. *SP500RET* is the cumulative return in the S&P 500 index, *ΔTREAS* is the percentage change in the three-month Treasury bill rate, *ΔVIX* is the change in the S&P 500 implied volatility index over the five-day window. *GOODNEWS (BADNEWS)* is an indicator variable that takes a value of 1 if the firm of interest experiences an actual credit rating upgrade (downgrade), is placed on ratings watch positive (negative), or receives a positive (negative) outlook on event day. Coefficient estimates multiplied by 100 for ease of exposition.

Table 5
Regression Results: Test of Non-investment Grade Ratings
Test of Hypothesis 3a

Dependent Variable: *ΔCDS*

Column		**A**		**B**		**C**	
	Predicted Sign	Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)	
Intercept		1.105	***	2.348	**	2.347	**
		(3.88)		(2.55)		(2.55)	
EFR	-	-1.279	***			-0.779	**
		(-5.30)				(-2.17)	
*EFR*JUNK*	-	1.408	***			0.521	
		(3.85)				(0.90)	
CFR	-			-0.261		-0.026	
				(-0.66)		(-0.07)	
*CFR*JUNK*	-			-2.589	***	-2.812	***
				(-2.97)		(-3.16)	
JUNK	+	0.052		0.135		0.130	
		(0.75)		(1.36)		(1.32)	
σ(CDS)	+	0.012	*	0.013		0.013	
		(1.86)		(1.05)		(1.04)	
σ(RET)	+	-5.377		-1.416		-1.757	
		(-1.29)		(-0.19)		(-0.24)	
RESIDRET	-	-20.550	***	-18.780	***	-18.644	***
		(-18.12)		(-12.16)		(-11.99)	
SP500RET	-	-4.429	*	-8.645	***	-8.734	**
		(-1.92)		(-2.62)		(-2.64)	
ΔTREAS	-	-0.098		-0.062		-0.063	
		(-1.07)		(-0.41)		(-0.41)	
ΔVIX	+	1.052	***	1.118	*	1.117	*
		(3.06)		(1.83)		(1.83)	
GOODNEWS	-	-2.276	**	-4.326	**	-4.346	**
		(-2.48)		(-2.25)		(-2.26)	
BADNEWS	+	7.507	***	8.236	***	8.180	***
		(6.59)		(3.79)		(3.76)	
Year Controls?		Included		Included		Included	
N		126,365		31,932		31,932	
Adj. R^2		0.025		0.027		0.027	

All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors reflect clustering at the firm level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively. *ΔCDS* is the percentage change in CDS spreads for firm *j* at time *t* over a five-day window around the revision date adjusted for the average percentage change in spread for all CDS sample observations with the same implied rating our sample. *EFR* is the average daily analyst forecasted earnings per share revision and *CFR* is the average daily analyst forecasted cash flow per share revision for firm *j* at time *t* expressed as percentages. *JUNK* is a dummy variable that takes a value of 1 if an observation has a non-investment grade credit rating. *σ(CDS)* is the standard deviation of the firm's CDS Spread and *σ(RET)* is the standard deviation of the market-adjusted stock returns calculated over the event period [-137, -6] relative to the revision date. *RESIDRET* is the market-adjusted return as well over the five day period surrounding the revision date. *SP500RET* is the cumulative return in the S&P 500 index, *ΔTREAS* is the percentage change in the three-month Treasury bill rate, *ΔVIX* is the change in the S&P 500 implied volatility index over the five-day window. *GOODNEWS (BADNEWS)* is an indicator variable that takes a value of 1 if the firm of interest experiences an actual credit rating upgrade (downgrade), is placed on ratings watch positive (negative), or receives a positive (negative) outlook on event day. Coefficient estimates multiplied by 100 for ease of exposition.

Table 6
Regression Results: Test of Crisis Period
Test of Hypothesis 3b

Dependent Variable: *ΔCDS*

Column		**A**		**B**		**C**	
	Predicted Sign	Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)	
Intercept		1.106	***	2.218	**	2.216	**
		(3.88)		(2.44)		(2.44)	
EFR	-	-0.515	***			-0.514	*
		(-3.28)				(-1.92)	
*EFR*CRISIS*	-	0.145				0.146	
		(0.33)				(0.16)	
CFR	-			-0.885	**	-0.768	*
				(-2.23)		(-1.91)	
*CFR*CRISIS*	-			-1.959	**	-1.923	**
				(-2.08)		(-2.03)	
CRISIS	+	0.425	***	0.029		0.029	
		(2.65)		(0.08)		(0.08)	
σ(CDS)	+	0.013	*	0.015		0.015	
		(1.90)		(1.18)		(1.17)	
σ(RET)	+	-4.499		2.723		2.374	
		(-1.20)		(0.40)		(0.35)	
RESIDRET	-	-20.611	***	-18.847	***	-18.733	***
		(-18.14)		(-12.13)		(-11.96)	
SP500RET	-	-4.142	*	-8.869	**	-8.653	***
		(-1.80)		(-2.58)		(-2.60)	
ΔTREAS	-	-0.106		-0.067		-0.069	
		(-1.15)		(-0.44)		(-0.45)	
ΔVIX	+	1.070	***	1.137	*	1.132	*
		(3.11)		(1.85)		(1.85)	
GOODNEWS	-	-2.271	**	-4.341	**	-4.363	**
		(-2.46)		(-2.24)		(-2.24)	
BADNEWS	+	7.506	***	8.209	***	8.158	***
		(6.59)		(3.73)		(3.70)	
Year Controls?		Included		Included		Included	
N		126,365		31,932		31,932	
Adj. R^2		0.025		0.027		0.027	

All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors reflect clustering at the firm level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively. *ΔCDS* is the percentage change in CDS spreads for firm *j* at time *t* over a five-day window around the revision date adjusted for the average percentage change in spread for all CDS sample observations with the same implied rating our sample. *EFR* is the average daily analyst forecasted earnings per share revision and *CFR* is the average daily analyst forecasted cash flow per share revision for firm *j* at time *t* expressed as percentages. *CRISIS* is a dummy variable that takes a value of 1 if an observation occurs between Q4 2007 and Q3 2009. *σ(CDS)* is the standard deviation of the firm's CDS Spread and *σ(RET)* is the standard deviation of the market-adjusted stock returns calculated over the event period [-137, -6] relative to the revision date. *RESIDRET* is the market-adjusted return as well over the five day period surrounding the revision date. *SP500RET* is the cumulative return in the S&P 500 index, *ΔTREAS* is the percentage change in the three-month Treasury bill rate, *ΔVIX* is the change in the S&P 500 implied volatility index over the five-day window. *GOODNEWS (BADNEWS)* is an indicator variable that takes a value of 1 if the firm of interest experiences an actual credit rating upgrade (downgrade), is placed on ratings watch positive (negative), or receives a positive (negative) outlook on event day. Coefficient estimates multiplied by 100 for ease of exposition.

Table 7
Regression Results: Test of Alternative Maturities

Dependent Variable: ΔCDS									
Column		**A**		**B**		**C**			
Variable		*EFR*		*CFR*		*EFR*		*CFR*	
	Predicted Sign	Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)		Coeff. Est. (*t*-statistic)	
1-Year CDS	-	-0.862	***	-2.095	***	-1.025	*	-1.843	**
		(-3.09)		(-3.00)		(-1.83)		(-2.55)	
3-Year CDS	-	-0.702	***	-1.566	***	-0.623	**	-1.405	***
		(-3.98)		(-3.65)		(-2.04)		(-3.13)	
7-Year CDS	-	-0.526	***	-0.973	***	-0.450		-0.858	**
		(-3.92)		(-3.05)		(-1.58)		(-2.49)	
10-Year CDS	-	-0.561	***	-1.051	***	-0.542	*	-0.913	**
		(-3.92)		(-2.95)		(-1.75)		(-2.39)	

The table above reflects the running of models 1a, 1b, and 1c across various maturities. All controls from (1a-c) are included but omitted for conciseness. All continuous variables are winsorized at the 1st and 99th percentiles. Standard errors reflect clustering at the firm level. ***, **, * indicate significance at the 1%, 5%, and 10% levels respectively. Coefficient estimates multiplied by 100 for ease of exposition.