The Debt Market Relevance of Management Earnings Forecasts: Evidence from Before and During the Credit Crisis*

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October 8, 2010

Abstract

We investigate the credit market's response via changes in credit default swap (CDS) spreads to management earnings forecasts, and evaluate the importance of these forecasts relative to earnings news during the periods before and after the onset of the recent credit crisis. We document that credit markets react significantly to management forecast news and that the reactions to forecast news are stronger than to actual earnings news. Consistent with the asymmetric payoffs to debt holders, the forecast news is mainly relevant for firms with poor credit rating or with bad news. We also show that the relevance of management forecasts to credit markets is particularly strong during periods of high uncertainty, as experienced during the recent credit crisis.

* We acknowledge helpful comments from three anonymous reviewers, Karthik Balakrishnan, Jeff Callen, Jim Ohlson, Mark Clatworthy, Doron Nissim (the editor), Scott Richardson and seminar participants at the 4th Manchester Business School / LSE Accounting Conference, Tel Aviv University and Turku School of Economics. We thank Viral Acharya for graciously sharing the CDS Markit data with us. Oktay Urcan and Florin Vasvari acknowledge the financial support from London Business School Research and Materials Development Fund.

1. Introduction

The recent credit crisis has emphasized the importance of a good understanding of the information based on which credit instruments are priced. A significant body of literature examines the role of macroeconomic, industry-specific and firm-specific factors on the credit market in a variety of settings.[1] However, surprisingly little empirical research has been done to evaluate the credit market's use of earnings-related information, even though prior research finds that earnings information can predict firm bankruptcies (e.g. Altman, 1968; Beaver, 1968; Ohlson, 1980).[2] In addition, there is no evidence on the use of earnings-related information when credit markets are under heightened uncertainty and information asymmetry. We extend the literature by investigating the credit market's response to management earnings forecasts during the periods before and after the onset of the credit crisis.

Management earnings forecasts are voluntary disclosures that have increasingly become an important source of information for capital market participants. An extensive literature in equity markets has found that management earnings forecasts decrease information asymmetry about the firm, and that the issuance of these forecasts is driven mainly by stock price considerations (e.g., Coller and Yohn, 1997; Ajinkya, Bhojraj and Sengupta, 2005; Graham, Harvey and Rajgopal, 2005). However, little is known about the usefulness of these forecasts to credit market participants, whose response to management forecasts can differ substantially from those of equity market participants.

[1] Several papers have investigated drivers of bond spread levels. More recently, the literature has turned its attention to examining the determinants of the credit default swap spreads (e.g., Jorion and Zhang, 2007; Ericsson, Jacobs and Oviedo, 2009; Zhang, Zhou and Zhu, 2009).

[2] Callen, Livnat and Segal (2009) is the first paper to investigate the impact of accounting earnings on CDS spread levels and changes. Easton, Monahan and Vasvari (2009) investigate the role of earnings with respect to bond pricing. We discuss these papers in greater detail later.

In contrast to equity markets, credit markets would ignore management forecasts if the forecasts are aimed primarily at shareholders and contain little credible information about a firm's downside risks, which are the main concerns of debt holders. The prior evidence on the relevance of earnings as well as of management forecasts for evaluating downside risks is, however, mixed. On the one hand, some studies (e.g., Hayn, 1995; Barth, Beaver and Landsman, 1998) show that earnings are less important for evaluating downside risks. In addition, Koch (2002) and Rogers and Stocken (2005) document that management earnings forecasts issued by firms in poorer financial health tend to be upwardly biased, lowering their credibility. But, on the other hand, some studies show that credit markets react to negative earnings surprises (e.g., Callen, Livnat and Segal, 2009; Easton, Monahan and Vasvari, 2009; Defond and Zhang, 2009) and that management forecasts are employed to release bad news in a timely manner (see, Kasznik and Lev, 1995; Hutton and Stocken, 2007). The evidence in these latter studies imply that credit markets should respond to management earnings forecasts. Also, there is anecdotal evidence to suggest that credit rating agencies and credit-market participants follow management's forecasts and use these to revise their outlook on firms' credit risks.[3]

We evaluate the credit market's use of management forecasts in two ways. First, we evaluate the credit market reactions to management forecasts by themselves. Second, we compare the importance of management forecasts to credit markets with that of mandated earnings announcements. Relative to earnings announcements, which face substantial auditing and regulatory requirements, management forecasts offer greater flexibility to communicate information in a more timely manner.

[3] As an example, a report issued by Standard and Poor's in June 2010 discusses the CDS market reaction and the rating agency's decision to change the outlook on the company as a result of Nokia's management forecast revisions (Standard and Poor's, 2010).

Consistent with this argument, management forecasts have been shown to be more important than earnings announcements in conveying information to stock markets (e.g., Ball and Shivakumar, 2008; Beyer, Cohen, Lys and Walther, 2009). However, unlike stocks, contractual features of debt securities, such as covenants and performance pricing agreements, are often written on reported earnings numbers rather than on forecasted earnings. The uncertainty relating to the impact of accounting numbers on debt contracts is fully resolved only at earnings announcements, making earnings releases potentially more informative for credit markets than for stock markets. Thus the issue of whether credit markets react more to management's earnings forecasts or to earnings announcements is an empirical one.

Apart from investigating the relevance of management forecasts to credit markets, another equally important objective of this study is to examine whether credit market reactions to management forecasts vary with the level of information uncertainty in an economy. Several theoretical studies argue that market reactions to information vary depending on the level of information uncertainty (e.g., Lang, 1991; Veronesi, 1999; Epstein and Schneider, 2008). Extrapolating these arguments to the credit market, we suggest that management forecasts are likely to be more informative to debt investors during periods of greater information uncertainty and that the typically observed asymmetric response to good and bad news in credit markets will vary with the level of uncertainty. This analysis, besides potentially helping us better understand the credit market's use of management forecasts, also provides insights into the tools that managers could employ during such crises to mitigate informational asymmetries in debt markets.

Our empirical analyses focus on the changes in credit default swap (CDS) spreads around management forecasts issued over the period 2001 to 2008. To study

the effect of the level of information uncertainty on credit market reactions, we exploit the exogenous shocks to the information uncertainty in the credit market that were triggered by the recent credit crisis and compare the CDS spread reactions to management forecasts in the pre-crisis period with those during the crisis.

We document that CDS spread changes over a five-day window centered at the announcement of management forecasts are significantly and negatively associated with management forecast news, defined as the proportional deviation of the management earnings forecasts from the most recent consensus analyst earnings forecasts. The economic effects of the forecasts on CDS spreads are also highly significant. An increase in management forecast news from its 10^{th} to 90^{th} percentile (i.e., from 17.9% below to 7.6% above the analyst consensus estimate) causes the market-adjusted CDS spread reactions to decrease from 0.63% to –0.27%. These reactions are robust to the inclusion of a variety of control variables, including lagged measures of volatility of daily stock returns and of CDS spreads and contemporaneously-measured changes in the volatility index, changes in risk free-rate, return on the S&P 500 index, announcements of credit-rating revisions and equity market returns orthogonalized to other control variables. The inferences are also robust to control for potential self-selection of the management forecast issuance.

Also, consistent with theoretical arguments that greater information uncertainty amplifies the sensitivity of prices to news, we find that the credit market reactions are significantly greater for the forecasts issued during the credit crisis period (July 2007 to December 2008) than for forecasts issued in the pre-crisis period. During the crisis, the magnitude of the CDS spread reaction increases by two to three times relative to the reaction during the pre-crisis period, depending on the model specification.

Additional exploratory analyses to uncover whether the credit-market reactions vary with types of news and with types of forecasts document interesting results. First, consistent with the rational expectations model of Veronesi (1999) which predicts that asymmetric reactions between good and bad news are amplified in periods of low information uncertainty, we find that the credit market reacts primarily to bad forecast news in the pre-crisis period, but not during the credit crisis.[4] Second, consistent with debtholders' asymmetric payoff function, where they bear losses when firms do badly but do not share the profits when firms do well, we find that credit markets are most responsive to management forecast news when the firms are rated below investment grade than when they are rated investment grade. Third, we find that the credit market reaction to management forecasts is a function of forecast attributes. Specifically, higher-quality forecasts, measured either as regular forecasts or as short-horizon forecasts, lead to stronger credit market reactions.

When we investigate the relative importance of management forecasts and earnings announcements to credit markets, we find that in the pre-crisis period, although changes in credit spreads are negatively correlated with both earnings news and management forecasts news, the coefficient on earnings news is significantly lower. However, during the crisis, the coefficient of accounting earnings news becomes insignificant while the coefficient of management forecasts news doubles in magnitude, suggesting that, during periods of higher uncertainty, information about future earnings, even if unverifiable at the time of its announcement, is more price relevant to credit markets than the backward-looking audited earnings numbers. These

[4] The intuition behind Veronesi's (1999) model is that, in a regime-switching economy, if investors have low uncertainty about which regime the economy is in, then good news in a bad state of the economy or bad news in a good state of the economy increases the uncertainty. Consequently, risk-averse investors demand greater compensation for bearing risk. This discount rate effect, combined with the good (bad) news, causes equilibrium prices to react more asymmetrically during periods of low uncertainty.

conclusions are robust to whether we focus on a sample of "bundled" management forecasts (i.e., forecasts issued during a five-day event window around the earnings-announcement window) or on a sample of "unbundled" forecasts (i.e., forecasts issued outside the earnings-announcement window).[5]

Our paper makes contribution to three distinct literatures. First, to the best of our knowledge we are the first to study the relevance of management earnings forecasts to credit markets and by doing so, contribute to the limited literature on the role of voluntary disclosures in debt markets (e.g., Sengupta 1998; Francis, Nanda and Olsson, 2008). Second, by documenting that the credit market's asymmetric response to good news and bad news is weaker during the recent credit crisis, we contribute to the literature pertaining to the effect of information ambiguity on asset prices. Lastly, we also contribute to the emerging literature on the interdependencies between mandated financial reporting and voluntary disclosure numbers by evaluating the relative importance of mandated earnings announcements and voluntary disclosures in debt markets. Our finding that credit markets react more to management forecasts than to earnings announcements also has implications for the evidence documented in extant literature on credit market reactions to earnings announcements. Our analyses reveal that the importance of earnings news to credit markets is overstated in the literature as prior studies do not control for contamination of earnings announcements by release of bundled management forecasts.

The rest of the paper is organized as follows. Section 2 discusses the institutional details of credit default swaps and develops our hypotheses. Section 3 presents the data and the sample selection process. Section 4 presents univariate descriptive statistics and discusses the main results, and Section 5 concludes the paper.

[5] Rogers and Van Buskirk (2009) observe that bundled forecasts have become more common recently, increasing from approximately 15% of forecasts in the late 1990s to 75% of forecasts in 2007.

2. Institutional Details, Literature Review and Hypotheses Development

2.1 Institutional details of credit default swap market

Credit Default Swaps (CDS) are in essence insurance contracts that provide a buyer protection against losses arising from borrower-defaults. In a typical CDS contract the buyer pays to the seller a periodic fee (i.e., the CDS spread) to insure against default of any debt security issued by a third party, called the reference entity.[6] The CDS contracts are written at the reference entity level, not the debt security level. If the reference entity defaults, the buyer delivers to the seller the debt owed by the reference entity in return for a lump sum equal to the face value of the debt. However, CDS contracts can be also settled in cash whereby the protection seller pays the buyer the difference between the face value of the debt and its current value.

The CDS contracts have turned out to clearly dominate other types of credit derivatives such as credit-linked notes or total return swaps in terms of market volume and standardization. The CDS market has grown dramatically over a short period of time. Although the market originally started as an inter-bank market to exchange credit risk without selling the underlying loans, it now involves financial institutions from insurance companies to hedge funds. The International Swaps and Derivatives Association (ISDA) estimates that the market has grown from $918 billion in notional amount in 2001 to $30 trillion by the end of 2009.

Although both CDS markets and bond markets are likely to have similar price responses to management forecasts news, we focus on credit default swaps rather than on secondary bond prices for several reasons. First, CDS spreads provide a relatively pure pricing of the default risk of the underlying entity as the CDS contracts are

[6] Most CDS contracts are standardized to increase the tradability of the contract. Typically, the contracts are triggered when a specified credit event (e.g., debt restructuring, default, bankruptcy) occurs for any of the debt of the reference entity. The most liquid contracts are 5-year contracts, although 1-, 3-, 7-, and 10-year contracts are also traded.

standardized and homogenous (e.g., Hull, Predescu, and White, 2004; Longstaff, Mithal, and Neis, 2005). In contrast, bond returns need to be adjusted for interest rates and taxes to compute default spreads. Also, idiosyncratic bond features, such as maturity, seniority, coupon rates, embedded options, and guarantees, can cause substantial heterogeneity in the bond-price reactions to management forecasts. Second, institutional features of the CDS market facilitate a continuous flow of trades compared with the bond market, where short positions are difficult to achieve. As a result CDS spreads reflect changes in credit risk more accurately and quickly than corporate bond yield spreads (see Longstaff, Mithal, and Neis, 2003; Blanco, Brennan and Marsh, 2005; Zhu, 2006).[7] Third, bond markets suffer from potential liquidity concerns, because many bonds are tied up in "buy and hold" portfolios of institutional investors (e.g., Warga, 2004).[8] These are less of an issue for CDS contracts, which tend to be highly liquid.[9]

2.2 Credit pricing and management earnings forecasts

Extensive research in equity markets has found that management forecasts decrease information asymmetry between a firm's managers and its investors. For

[7] Comparing the speed of price reaction in the stock market with the CDS market, Longstaff, Mithal, and Neis (2003) do not find a clear lead for either the stock market or the CDS market. However, Acharya and Johnston (2007) find evidence that the CDS market leads the stock market especially when firms experience adverse credit events. Also, Norden and Weber (2004) document that the CDS market reacts earlier than the equity market to rating agency announcements. These findings suggest that the CDS market is more efficient than the stock market, at least with respect to credit relevant information. This could be either due to a smaller fraction of noise traders in the CDS market or due to leakage of information garnered through private lending relationships by banks from private-lending relationships information about borrowers and are heavily trading in the CDS market.

[8] Longstaff, Mithal and Neis (2005), Chen, Lesmond and Wei (2007) and Bushman, Le and Vasvari (2010) find that a large proportion of bond spreads are determined by illiquidity factors, which do not reflect the default risk of the underlying bond. Bushman, Le and Vasvari (2010) further document that the effect of illiquidity factors on bond spreads has increased dramatically during the credit crisis.

[9] The greater liquidity in CDS markets is partly due to the lower capital required to buy CDS contracts, where only the credit risk premia are paid for at the time of the trade, as opposed to the full face value that needs to be paid at the time of purchase of a bond.

instance, studies show that management forecasts lower bid–ask spreads on equity prices (Coller and Yohn, 1997), increase analyst coverage (e.g., Ajinkya, Bhojraj and Sengupta, 2005; Graham, Harvey and Rajgopal, 2005), generate revisions in analysts' forecasts (e.g., Jennings, 1987; Clement, Frankel and Miller, 2003; Cotter, Tuna and Wysocki, 2006), attract more transient investors (Bushee and Noe, 2000), and, depending on their attributes, significantly influence stock prices (e.g., Penman, 1980; Hutton, Miller and Skinner, 2003; Ng, Tuna and Verdi, 2009).

The evidence from equity markets does not necessarily imply that management forecasts have information relevance to credit markets, or that credit markets will respond to news in management forecasts as there are significant differences in the information needs of these two markets. First, as holders of a call option on the firm value, equity holders are more interested in a firm's upside potential than in its downside risks. In contrast, credit markets are concerned primarily with a firm's downside risks.

Second, it is possible that management forecasts signal information about potential wealth transfers across debtholders and shareholders. For instance, good news in a management forecast might increase the likelihood of a firm increasing dividend payments or conducting share repurchases, which causes credit markets to react negatively, but leads to a positive response in the share market (see Dhillon and Johnson , 1994).

Third, managers have incentives to issue forecasts strategically to guide shareholders expectations or to avoid adversely affecting their own compensation, which is almost always based on share price movements rather than on default spread changes. As a result, they might voluntarily disclose more favorable news, while withholding disclosures of bad news (e.g., Roychowdhury and Sletten, 2009). Also, as

Kothari, Shu and Wysocki (2009) observe, managers' career concerns can motivate them to withhold bad news. Delayed or withheld disclosures of bad news could give managers time to take corrective actions, if possible, as well as allow for subsequently received good news to offset the bad news. Such strategic disclosures are likely to be uninformative to credit market participants.

Fourth, credit prices are sensitive to firm-specific information, particularly when firms are risky or are close to financial distress. However, for such firms, management forecasts of earnings might not be informative in the credit market, either because earnings themselves are not providing the necessary information or because the forecasts are biased. Hayn (1995) finds that accounting earnings do not reflect the liquidation option value, lowering the relevance of negative earnings for equity valuation. Similarly, Barth, Beaver and Landsman (1998) find that the accounting earnings becomes less important for equity valuation as the financial health of the firm deteriorates. Also, Waymire (1985) finds that risky firms are less likely to issue management forecasts. With respect to forecast credibility, Koch (2002) and Rogers and Stocken (2005) document that management earnings forecasts are more optimistically biased and less credible for firms in poorer financial health.

Notwithstanding the above, credit markets could still respond significantly to news in management forecasts if credit investors perceive these forecasts to be a relevant, credible and timely source of information on a firm's default risks.[10] Evidence in Callen, Segal and Livnat (2009) and Easton, Monahan and Vasvari (2009) that earnings news, especially negative ones, are priced in the debt market

[10] Recent research investigates the impact of the information provided by bond analysts in debt and equity markets (e.g., DeFranco, Vasvari, Wittenberg-Moerman, 2009; Johnston, Markov and Ramnath, 2009; Gurun, Johnston, and Markov, 2009) and finds that their reports provide relevant information with respect to debt pricing. In unreported sensitivity tests, we control for the presence of bond analysts reports around management forecast announcement dates and our results remain unchanged.

suggests that management forecasts of earnings could also be relevant for debtholders. In addition, Kasznik and Lev (1995) and Hutton and Stocken (2007), among others, report that firms with bad news are more likely to issue management forecasts than firms with good news.

Thus, the issue of whether management forecasts are relevant for credit pricing is ultimately an empirical one. As no evidence exists on this issue, this study aims to fill the void.

2.3 Management earnings forecasts versus earnings announcements

Prior research has documented that earnings announcements provide new information to debt markets. For instance, using a small sample that makes generalization of results difficult, Datta and Dhillon (1993) find that bond prices respond positively (negatively) to unexpected earnings increases (decreases) while Hotchkiss and Ronen (2002) find that intra-day bond prices quickly incorporate the information in earnings announcements. Easton, Monahan, and Vasvari (2009) and Defond and Zhang (2009) use larger bond samples and document bond market reactions to quarterly earnings announcements. In terms of CDS spreads, Callen, Livnat, and Segal (2009), Berndt and Ostrovnaya (2008) and Greatrex (2008) find that earnings news generate changes in the CDS spreads around the release date.

While the above studies make an important contribution, Beyer, Cohen, Lys and Walther (2009) observe that earnings announcements are only one part of a larger and interdependent information environment and that little attention has been paid to understanding the interdependency between earnings announcements and other sources of information, such as management forecasts. None of the prior studies examining credit market reactions to earnings news control for the relatively common

phenomenon, particularly in recent times, of management forecasts being released contemporaneously with earnings announcements (e.g., Rogers and Van Buskirk, 2009). Consequently, it is difficult to glean the relative importance of earnings and management forecasts as sources of new information for credit markets from these studies.

Although the observed credit-market reactions to earnings announcements document the relevance of earnings information to credit markets and lead one to expect a similar credit-market response to management's earnings forecasts, recent theoretical and empirical studies that investigate the interdependencies between management forecasts and earnings releases note that such an extrapolation is unjustified. These studies show that voluntary management forecasts and mandated earnings releases are complements, where credible voluntary disclosures provide new information to capital markets and mandated earnings announcements act as a disciplining mechanism to enhance credibility of voluntary disclosures (e.g., Ball, Jayaraman and Shivakumar, 2009; Gigler and Hemmer, 1998; Stocken, 2000; Lundholm, 2003). The arguments in these studies imply a negative relation between the informativeness of earnings announcements and that of voluntary disclosures. That is, more informative management forecasts lead to less information in earnings announcements and vice-versa. Thus, ex-ante, the significant credit-market reaction to earnings announcements documented in prior studies states little about the relevance of management forecasts to credit markets.

In the context of equity markets, the evidence on the relative informativeness of management forecasts compared to that of accounting earnings is mixed. For instance, Atiase, Li, Supattarakul and Tse (2005) find that current earnings are more strongly associated with announcement period returns than the concurrently disclosed

future earnings guidance presumably because of investors' preference for the reliability of earnings compared to management forecasts. On the other hand, Ball and Shivakumar (2008) and Beyer, Cohen, Lys and Walther (2009) document that management forecasts are more informative for stock markets than earnings announcements. Ball and Shivakumar (2008) attribute this higher relative importance of management forecasts to the discretion available to managers to issue forecasts only when they are perceived to be informative, and to the fact that mandated earnings have low frequency (quarterly), are not discretionary (announced every quarter regardless of arrival of new information), and are primarily backward-looking.[11] Moreover, mandated earnings numbers face greater regulatory scrutiny and auditing requirements, which make earnings announcements relatively rigid for use in communicating timely information to capital markets.

The arguments of Ball and Shivakumar (2008) suggest that, if any, management forecasts are likely to be more informative than earnings announcements even in credit markets. However, relative to stocks, debt securities rely more heavily on reported accounting numbers in their contracts, such as in debt covenants, performance-pricing features, etc. The settlement of these debt contracts occurs at earnings announcements, and not when management forecasts are released. Consequently, earnings announcements could be more informative for credit markets than for stock markets. Hence, even if management forecasts are informative by themselves, it is unclear whether they are more or less informative than earnings announcements for credit market participants.

[11] Prior literature starting with Ball and Brown (1968) documents that earnings surprises are anticipated in the stock market, where stocks are found to gradually impound both good and bad news during the days leading up to the earnings announcement. Management forecasts contribute to this anticipation by stock markets given their timeliness and their forward looking aspect.

2.4 Time variation in credit market response to management earnings forecasts

Several studies provide predictions with respect to the time variation in stock market responses to new information, depending on, among other things, the level of information uncertainty in the market. For instance, Lang (1991) argues and finds that the stock market reaction to earnings news is larger during periods characterized by greater information uncertainty.

Recent studies have focused on investigating the effect of information uncertainty separately on good news and bad news. Veronesi (1999) presents a theoretical model, in the context of a regime-switching economy, in which investors are uncertain about the overall state of the economy. In his model, differences in responses to good and bad news arise endogenously as the net effect of a change in uncertainty on discount rates and of a direct effect of the news on firm value. During periods of relatively low (high) uncertainty, where investors place a high probability on the economy being in a good (bad) state, bad (good) news increases uncertainty about the state of the economy, and leads to higher discount rates. This discount rate effect, combined with the direct effect of the news, causes an asymmetrically greater (lesser) market reaction to bad (good) news in good (bad) times. Thus, the model predicts asymmetric responses to bad and good news to be attenuated during periods of high uncertainty relative to periods of low uncertainty. Consistent with these predictions, Conrad, Cornell and Landsman (2002) find that differences in stock market reactions to good and bad earnings news decrease during periods of declining aggregate-market valuation and greater uncertainties. The arguments and findings of these studies, when extrapolated to the credit markets, suggest that credit spreads should be more (less) sensitive to good (bad) news during periods of greater

uncertainty and declining aggregate market value, as was the case during the recent credit crisis.[12]

In contrast to the above predictions, Epstein and Schneider (2008) develop a model based on the assumption that ambiguity-averse investors make investment decisions by processing news under a worst-case scenario. This assumption leads to investors under-weighing good news and overweighing bad news. To the extent that Epstein and Schneider (2008) model characterizes the behavior of investors during the recent credit crisis, we would expect the CDS spread reactions to management forecasts to be more (less) negative (positive) for bad (good) news during the financial crisis than in the pre-crisis period.

3. Sample Selection and Data Description

3.1 Sample selection

We obtain CDS data over the period 2001 to 2008 from the database provided by Markit Group. This database includes CDS that are sufficiently liquid to provide reliable daily closing prices. The composite CDS spread in the database are based on the daily closing bid and ask prices obtained from the official books and records of market-makers at the end of each trading day. Thus, these spreads are based on market data and, specifically, do not represent "matrix" spreads that are estimated algorithmically. Markit achieves high data quality by removing outliers, stale observations, and quotes provided by less than three dealer contributors. Besides the spreads, the database also contains information about debt seniority, restructuring clauses, credit ratings, and contract maturity.

[12] Johnson (1999) examines time variation in earnings persistence and earnings response coefficients (ERCs) on account of business cycles, and reports that both earnings persistence and ERCs are weaker during recessions relative to economic expansions. The credit crisis period in our sample includes both an economic expansion and an economic recession.

To maintain contract homogeneity, we focus only on five-year CDS contracts of senior unsecured debts with modified restructuring clauses written on U.S. non-financial reference entities. We chose the five-year contracts as they are the most liquid contracts in the US markets and have the best coverage in the database (Zhang et al., 2009). However, in unreported tests, we confirm the robustness of our results to using one-year CDS contracts. We match the CDS data manually with COMPUSTAT based on the name and the location of the reference entity. The matched CDS database consists of 710 firms (reference entities) and 846,261 daily observations of composite CDS spreads.

We collect management earnings forecasts, analysts' forecast and earnings announcement data from the First Call database. Our analyses include only forecasts of earnings per share (EPS) that are denominated in U.S. dollars. When EPS forecasts for multiple periods are issued simultaneously, we retain only the forecasts with the shortest forecast horizon. After requiring CDS data, forecast data and other data on control variables (discussed below), our sample consists of 3,320 non-bundled management forecasts (i.e., management forecasts that are not issued during an earnings announcement window) for 430 unique firms. Out of these, 2,634 and 686 forecasts are announced in the pre-crisis and crisis periods, respectively. To avoid contamination of management forecasts with earnings announcements, most of our analyses are based on this sample of non-bundled forecasts.

However, for robustness checks, and to evaluate the relative informativeness of earnings announcements and management forecasts, we additionally analyze a sample of 6,206 bundled management forecasts made by 449 unique firms. Of the bundled forecasts, 4,677 are issued in the pre-crisis period and 1,529 in the crisis period.

3.2 Variable definitions and research design

We investigate short-window CDS spread changes to the announcements of management earnings forecasts by estimating the following pooled regression:

$$\begin{aligned}\Delta\text{CDS Spread} = {} & \beta_0 + \beta_1\text{MF News} + \beta_2\sigma(\text{CDS Spread}) + \beta_3\sigma(\text{Stock Return}) \\ & + \beta_4\text{Residual Stock Return} + \beta_5\text{S \& P500 Return} + \beta_6\Delta\text{Treasury} \\ & + \beta_7\Delta\text{VIX} + \beta_8\text{Good Rating News} + \beta_9\text{Bad Rating News} \\ & + \text{Year fixed effects} + \varepsilon \qquad (1)\end{aligned}$$

The dependent variable (Δ*CDS Spread*) is the percentage change in CDS spreads over a five-day window centered on the management forecast announcement date in excess of the average spread change for a matched basket of CDS contracts calculated over the same five-day window. For each firm announcing a management forecast, we obtain a matched basket of CDS contracts by selecting the CDS contracts with the same credit rating category as the announcing firm. We focus on spread changes in excess of the ratings-matched basket's spread changes to isolate the effects of market-wide shifts in spreads, which are likely to be a function of the credit quality of the reference entities. The main independent variable of interest in the regression, the management earnings forecast news (*MF News*), is calculated as the management earnings forecast minus the most recent consensus analyst earnings forecast divided by the absolute value of the most recent consensus analyst earnings forecast.[13] We use only range and point estimates when calculating *MF News*.[14]

Following prior literature, the regression controls for a variety of variables that are potentially associated with daily changes in CDS spreads (see, for example, Zhang,

[13] We prefer to scale by absolute value of forecast errors rather than by stock price, since Cheong and Thomas (2010) find that forecast errors and seasonally differenced earnings per share do not vary with stock price. However, our results are robust to scaling by stock price, as well as to including the inverse of stock price as an additional explanatory variable in the regression.

[14] In the case of range estimates, we follow Anilowski, Feng, and Skinner (2007) and compute management earnings forecasts as the average of high and low estimates when First Call's CIGCODEQ equals 'B', the lower estimate when CIGCODEQ equals 'G' and the higher estimate when CIGCODEQ equals 'H'.

Zhou and Zhu, 2009). Firm-specific control variables include volatility of daily CDS spreads (σ(*CDS Spread*)) and the prior stock return volatility (σ(*Stock Return*)), which are computed as the standard deviation of daily CDS spreads and daily market-adjusted stock returns respectively over the event days [−137, −6] relative to the management forecast announcement date (day 0). By including the prior volatility of the daily CDS spreads, we control for intrinsic CDS volatility. Stock return volatility is included to capture the unobservable asset volatility, which is an important determinant of default probability in the CDS and bond pricing models (e.g., Campbell and Taksler 2003; Houweling and Vorst, 2005). We also control for other information simultaneously released with the management forecast by including contemporaneous market adjusted stock returns. To mitigate multi-collinearity concerns, the stock returns (*Residual Stock Return*) are orthogonalized against the other control variables.

Following Zhang, Zhou and Zhu (2009) and Ericsson, Jacobs and Oviedo (2009), the regression also includes a set of contemporaneously-measured macro variables: S&P 500 index return (*S&P500 Return*), change in 3-month treasury bill rate (Δ*Treasury*), and percentage change in the S&P 500 implied volatility index (Δ*VIX*). The t-bill rates are obtained from Federal Reserve Bank database, while the S&P 500 implied volatility data are from the Chicago Board Options Exchange Volatility Index.

Prior research documents that the CDS market responds to announcements by credit-rating agencies (Hull, Predescu and White, 2004; Norden and Weber, 2004; Galil and Soffer, 2008). To control for the confounding effects of these rating agency announcements, we include two dummy variables, *Good Rating News* and *Bad Rating News.* The *Good Rating News* (*Bad Rating News*) takes the value of one if the

forecasting firm's credit rating is upgraded (downgraded), or if the firm is put on the positive (negative) watch list, or if the firm receives a positive (negative) outlook by Standard & Poor's or Moody's during the five-day event window. Otherwise, it takes the value of zero.[15] We include separate dummy variables for positive and negative rating agency announcements to account for the asymmetric reaction to good rating news versus bad rating news in debt markets that is documented in prior research (e.g., Easton, Monahan and Vasvari, 2009).[16]

To study the relative market reaction to management forecast news and earnings news, we extend Equation (1) by including a measure of earnings news (*EA News*). Earnings news is calculated as the actual earnings minus the most recent consensus analyst earnings forecast divided by the absolute value of the most recent consensus analyst earnings forecast.

Since one of the objectives of this paper is to examine how the informativeness of management forecasts to credit markets changes during the recent credit crisis, we estimate Equation (1) for subsamples separated into whether the forecast was issued before or after 1 July 2007, apart from estimating the regression for the entire sample period. The period before (after) 1 July 2007 is referred to as the "pre-crisis" ("crisis") period. We choose July 1, 2007 as the onset of financial crisis because of the widespread credit downgrading initiated by the large rating agencies,

[15] Outlooks, watchlist additions and ratings are based on both public information about borrowers' operating and financial conditions and private information obtained through confidential discussions with borrowers (e.g., Jorion, Liu and Shi, 2005).

[16] We obtain qualitatively similar results when we drop management forecasts announced simultaneously with rating agency announcements. We lose a total of 114 observations for the unbundled sample and 119 observations for the bundled sample when we remove management forecasts simultaneously disclosed with rating agency announcements.

consistent with the analyses in Ryan (2008) and Duchin, Ozbas, and Sensoy (2009) among others.[17]

4. Results

4.1 Descriptive statistics and univariate evidence

Panels A and B of Table 1 present descriptive statistics for the samples of 3,320 unbundled management forecasts and 6,206 bundled management forecasts. For the unbundled (bundled) management forecasts sample, the average CDS spread change, measured over the five trading days around the management forecast announcement date, is 1.5% (0.2%), which is significant at the 1% (5%) level. This implies that, on average, the credit market reacts to management earnings forecasts by increasing the spread. This increase in spread suggests that management forecasts on average reveal bad news to the credit market – a conclusion also supported by the univariate statistics on management forecast news (*MF News*). The mean *MF News* is −2.3% for unbundled management forecasts and −3.2% for bundled forecasts.

In contrast to management forecasts, earnings announcements convey good news on average. The average earnings announcement news, *EA News*, is 4.7% compared with the most recent consensus analyst earnings forecast. This observation is consistent with the stylized fact that analysts' earnings estimates tend to be optimistic at the beginning of a fiscal period and tend to turn pessimistic as the earnings announcement date approaches (Matsumoto, 2002; Richardson, Teoh, and Wysocki, 2004). Finally, less than 3.1% (0.4%) of unbundled management earnings forecasts are accompanied by rating agency announcements that convey bad (good) news. The proportions for bundled forecasts are lower, suggesting that the

[17] In early July 2007, Moody's and Standard and Poor's downgraded 399 and 612 tranches of subprime mortgage backed securities respectively. Also, investment bank Bear Stearns informed investors on July 7th, 2007 that they will get little, if any, of the money invested in two of its hedge funds after rival banks refused to bail them out.

confounding effects of rating agency announcements are unlikely to be a major concern in our sample.

Panels A and B of Table 2 provide the correlations (Spearman rank order) among the variables for the unbundled and bundled forecasts samples, respectively. As observed in Panel A, which reports the correlations for the unbundled forecasts sample, the CDS spread changes are significantly negatively correlated with *MF News*, contemporaneous market-adjusted stock returns *(Stock Returns), S&P 500 Return, and Good Rating News,* while they are significantly positively correlated with *ΔVIX* and *Bad Rating News*. The results in Panel B reveal that the above correlations continue to be observed for the bundled forecast sample except for *ΔVIX*. Additionally, for this sample, the CDS spread changes are significantly negatively correlated with *EA News* and *σ(CDS Spread)*.

4.2 Main results

Table 3 presents the results of the regressions of the five-day market-adjusted CDS spread changes on the management forecast news in the unbundled management forecasts sample. In unreported analyses we find similar results when we use CDS spread changes over a three-day window centered at event-day 0 (i.e., the management earnings forecast date), over event-days 0 and +1 or on event-day 0. To mitigate the effect of extreme observations, all regressions are based on winsorizing continuous variables at the top and bottom one-percentile. Our qualitative results are, however, robust to winsorizing at other percentiles (2%, 3% and 5%). Throughout the paper, *t*-statistics for the regressions are computed using standard errors clustered at the firm level.

Table 3, Column (1), presents results from a pooled OLS regression using observations from the entire sample period.[18] The coefficient on *MF News* is −0.035 (*t*-stat = −3.27), suggesting that a more positive management-forecast news is associated with a significant decrease in the default premium for the firm, relative to the expected market CDS spread change. In terms of economic magnitude, a change in management forecast news from its 10th to 90th percentile (i.e., from 17.9% below the most recent consensus analyst estimate to 7.6% above it) causes the market-adjusted CDS spread to decrease from 0.63% to −0.27%. Thus news in management forecasts has both a statistically and an economically significant effect on CDS spreads.

In Columns (2) and (3) we estimate the regressions separately for the pre-crisis and crisis subsamples. While the coefficients on *MF News* continue to be significant and negative in both subsamples, the magnitude of the coefficient on *MF News* during the crisis period is more than three times that during the pre-crisis period. This difference in coefficients across the sub-periods is statistically significant at the 1% level. This suggests that the CDS market is more sensitive to firm-specific information provided through management forecasts during the crisis than in the pre-crisis period, which is consistent with the evidence reported in prior studies on the effect of uncertainty on stock market reactions to news (e.g., Lang, 1991).

With respect to control variables, the market-adjusted CDS spread changes are generally negatively associated with the *Residual Stock Return* and to *Good Rating News*, and positively associated with *Bad Rating News*. These findings are in line with prior studies (e.g., Galil and Soffer, 2008; Callen, Livnat and Segal, 2009).

[18] Although the Hausman test and the Breush and Pagan tests indicate that OLS regressions are the most appropriate regressions for our sample relative to either a fixed-effects or a random-effects model, our conclusions remain unaltered when these alternative estimation methods are employed.

Although managers provide earnings forecasts either qualitatively or as numerical estimates, our sample in the earlier analysis is restricted to quantitative forecasts only (i.e., point or range forecasts), because of the need for a forecast number to compute *MF News*. Nonetheless, as a robustness test, we check the sensitivity of our results to the use of qualitative forecasts, which provide directional guidance on future earnings. We implement this test by employing the methodology in Anilowski, Feng and Skinner (2007) to classify qualitative forecasts into good or bad news forecasts. We then replace *MF News* in Equation (1) with a dummy variable for bad news forecasts. In untabulated results we find that, during the pre-crisis period, the coefficient on the indicator for bad forecast news is 0.046 (*t-stat* = 2.43), implying that downward qualitative management forecasts increase the market-adjusted CDS spread changes. During the crisis, the coefficient on the bad forecast news dummy is 0.94 (*t-stat* = 2.10), indicating that the market reaction to downward management forecasts is much stronger during the crisis than before the crisis. Although these results are qualitatively similar to those reported in Table 3, we refrain from drawing strong conclusions from these regressions, as the sample of qualitative forecasts consists of only 407 observations. Of these, only 38 qualitative forecasts are issued during the crisis period.

Firms that choose to issue management forecasts may have certain (unobservable) features that are potentially correlated with the CDS reactions to management forecasts, which would introduce a self-selection bias in the analysis. To control for this, we employ the standard Heckman (1979) two-stage selection approach. We adapt the probit model in Chen, Chen and Cheng (2008) to estimate the probability of issuing a management earnings forecast in the first stage. The details of the first stage regression are presented in Appendix A.

Columns (4), (5) and (6) of Table 3 present regressions for the pooled sample as well as for the two subsamples (pre-crisis and crisis) after we include the inverse Mills ratio as an additional control variable. We do not find evidence of self-selection biases in the OLS regressions, as the coefficient on the inverse Mills ratio is insignificant at conventional levels in all regressions. Moreover, our inferences from the OLS regressions remain unchanged when self-selection is controlled for. The results from the Heckman model continue to reveal a significantly negative coefficient on *MF News* for the entire sample, as well as for each of the subsamples. Moreover, the coefficient is significantly greater in the crisis period than in the pre-crisis period. The coefficient on *MF News* is −0.104 (*t*-stat = −3.33) during the crisis, whereas that before the crisis is −0.049 (*t*-stat = −3.70). These coefficients are significantly different from each other at the 5% level.

4.3 Cross sectional results

We next investigate whether the CDS market reaction to management forecast news varies with the forecast properties, and with the credit riskiness of the forecasting firms. Apart from helping us understand when credit markets view management forecasts as being more informative, the cross-sectional analysis also provides corroborative evidence that the market reactions reported in Table 3 are driven by management earnings forecasts, rather than reflecting noise or research design choices.

Prior studies provide good reasons to expect that the credit-related information content of management forecasts is a function of a variety of firm characteristics and forecast attributes. First, consistent with arguments based on asymmetric payoffs facing debtholders, Easton, Monahan and Vasvari (2009) and Callen, Livnat and

Segal (2009) show that credit markets react primarily to bad earnings news rather than to good earnings news, and that the reactions are stronger for firms with below investment-grade ratings. These findings have a direct implication for the market response to management forecasts, and imply that market responses would be larger for bad forecast news and for riskier firms. Second, forecasts that are issued more sporadically by the management are likely to be viewed as less credible by market participants, as the costs of manipulating sporadic forecasts are lower than those of manipulating regularly-issued forecasts (Stocken, 2000). Lastly, Rogers and Stocken (2005), among others, observe that the forecast horizon is a good indicator of the quality of the information underlying the forecasts, because managers are likely to be better informed when making forecasts with shorter horizons, and also because these forecasts are more quickly verified at the subsequent earnings announcements. Hence we expect stronger credit market reactions to short-horizon forecasts, defined as forecasts issued after the fiscal period end but before the earnings announcements (i.e., earnings pre-announcements).

Table 4 presents the cross-sectional results where the dependent variable is the market-adjusted CDS spread change around the five-day announcement window. In this analysis we extend Equation (1) by interacting *MF News* with an indicator variable that captures either the forecast attribute or the characteristics of the forecasting firms. Based on the above arguments, our tests consider a variety of interactive variables, including the sign of the forecast news, whether the forecasts represent regular forecasts or not, the forecast horizon, and the credit riskiness of the forecasting firm. We estimate these regressions separately for the pre-crisis and crisis periods.

Column (1) of Table 4 presents the results when the indicator variable takes

the value one for bad news (*MF News* is less than or equal to zero) and zero otherwise. Since debtholders face an asymmetric payoff function and since bad forecasts news are often argued to be more credible than good forecast news (e.g., Hutton, Miller and Skinner, 2003; Rogers and Stocken, 2005), we expect credit market reactions to be stronger for bad forecast news than for good forecast news. Our sample includes 2,209 bad news forecasts, of which 462 are issued during the financial crisis.

Consistent with our expectations, market-adjusted CDS spreads react more negatively to bad news management forecasts in the pre-crisis period. The coefficient on *MF News* * *Indicator* for bad news is −0.073 with a *t*-statistic of −3.11 in the pre-crisis period. However, during the financial crisis, there is no significant difference in the credit market reactions to good and bad forecast news. The coefficient on *MF News* equals −0.053 (*t*-stat = −1.90) during the crisis period, and is also significantly different from the corresponding coefficient from the pre-crisis period at the 5% level. In contrast to the significantly larger market reaction to bad news in the pre-crisis period, the incremental coefficient on bad forecast news is insignificant during the crisis period, suggesting that market participants react similarly to good forecast news and bad forecast news during the crisis. This reduced asymmetry in market reaction to good news and bad news during the crisis is consistent with the predictions of Veronesi (1999), as discussed in section 2.3.

We next analyze whether credit markets react differently to forecasts issued as part of a regular forecasting strategy, relative to irregular forecasts, by adding an interactive dummy for *Habitual* forecasts, which we define as forecasts made by a firm that has issued at least four management earnings forecasts in the prior year. Since irregular or sporadic forecasts can be used manipulatively by managers, we expect credit market reactions to be stronger for *Habitual* forecasts. Of the entire

sample, 2,703 management forecasts are classified as *Habitual* forecasts. In the crisis subsample, 605 forecasts are categorized as *Habitual*.

The results in Column (2) show that credit-spread reactions are not different across sporadic and habitual forecasts in the pre-crisis period. The coefficient on *MF News * Indicator* for *Habitual* is statistically indistinguishable from zero. However, during the financial crisis, we find that the coefficient on *MF News* is statistically insignificant, while the incremental coefficient on *MF News * Indicator* is significant and equals to −0.258 (*t*-stat = −3.84). These findings indicate that during the credit crisis, when managers had potentially greater incentives to issue forecasts strategically and manipulatively, credit markets almost entirely ignored sporadic forecasts, and reacted significantly more strongly to *Habitual* forecasts than to similar forecasts issued in the pre-crisis period.

Column (3) of Table 4 reports results when the indicator variable captures the forecast horizon. Based on prior studies, such as Pownall, Wasley and Waymire (1993) and Rogers and Stocken (2005), we expect forecasts issued with a shorter horizon to be more informative. We test this prediction by including the interactive indicator variable *Preannouncement* in Equation (1). *Preannouncement* takes the value one if the firm releases management earnings forecast after fiscal period-end but before the earnings announcement date, and zero otherwise. Our sample includes 695 preannouncements, of which 117 are issued during the financial crisis. We find that, although credit markets react both to *preannouncements* and to longer-horizon forecasts, the credit market response is significantly stronger for *preannouncements* in the period before the financial crisis. The coefficient on *MF News* interacted with indicator for *preannouncement* is −0.049 (*t*-stat = −2.08) for the pre-crisis period. However, during the financial crisis, the credit market's response is similar to both

preannouncements and longer-horizon forecasts (the interaction coefficient for preannouncement forecasts is −0.044, *t*-stat = −0.80). During periods of high uncertainty, the market views forecasts issued close to earnings announcements and those that are not, as equally informative.

Finally, we investigate whether CDS market reactions to management forecast news are a function of the forecasting firm's credit-riskiness. We examine the impact of credit ratings on the relationship between management earnings forecasts and CDS spread changes by creating an indicator variable *Speculative credit rating*, which equals one if the firm's credit rating is below BBB+, and zero otherwise. The full sample includes 2,268 forecasts made by firms with speculative credit ratings. The corresponding figure for the crisis period is 484. Consistent with the evidence in prior studies of equity markets, we observe from Column (4) of Table 4 that, in both sub-periods, credit markets respond primarily to forecast news from firms with speculative credit ratings, rather than from firms with investment-level credit ratings. Again the reactions during the crisis are significantly larger.

Overall, these cross-sectional analyses provide evidence that the CDS spreads reactions to management forecast news vary not only over time but also across firms, depending on the forecast attributes and the forecasting firm's characteristics. The evidence from this analysis generally supports the view that management earnings forecasts with more informative attributes and issued by firms with lower credit ratings have a more prominent role in credit markets and that during the crisis period, the market relies equally on all credible information, irrespective of the type of news (i.e., bad or good news) and the forecast horizon (i.e. preannouncements or longer-horizon forecasts).

4.4 Management forecasts relative to earnings announcements

Management forecasts are often issued along with earnings announcements, and this phenomenon has become more popular recently. For instance, the proportion of bundled forecasts has increased from 46% in 2001 to about 75% in 2007 (Rogers and Van Buskirk, 2009). As discussed in Section 2, it is possible for credit markets to react more to earnings releases than to management forecast releases, as issues relating to settlement of a debt's contractual features are clarified only at earnings announcements. In contrast, the arguments in Ball and Shivakumar (2008) suggest that earnings announcements are unlikely to be a good source of new information, and that management forecasts are likely to provide more timely information to capital markets.

We test the relative importance of management forecasts and earnings announcements as sources of new information for credit markets by estimating Equation (1) for a sample of bundled forecasts, after including the contemporaneously released earnings news as an additional explanatory variable in the regression. The results from this analysis are reported in Table 5.

From Column (1) we find that, when we control for the actual earnings news, management forecast news continues to be significantly negatively associated with the market-adjusted CDS spread changes. The coefficient on *MF News* is −0.043 (*t*-stat = −5.49) and the coefficient on *EA News* is −0.019 (*t*-stat = −3.57). In terms of economic magnitude, a change in management forecast news from its 10^{th} to 90^{th} percentile (i.e., from 14.3% below analyst consensus estimate to 5.2% above it) decreases the market-adjusted CDS spread changes over the five-day announcement window by about 0.84%. However, the change in earnings news has a much smaller effect on the CDS spreads. A change in earnings news from the 10^{th} to 90^{th} percentile

of its distribution (i.e., from 7.0% below analyst consensus estimate to 20.0% above the consensus estimate) decreases the market-adjusted CDS firm spreads over the five-day announcement window by 0.51%. Moreover, as observed earlier in the unbundled forecasts sample, the sensitivity of CDS spreads to management forecasts news also increases significantly (p-value < 1%) in the crisis period for the bundled forecasts sample. In contrast, the coefficient on actual earnings news turns insignificant in the crisis period, indicating that credit markets ignore backward-looking earnings information during the crisis.

In order to check the robustness of the results obtained using bundled forecasts sample, we create a subsample of 1,001 forecasts from the entire sample of unbundled management forecasts by matching the latest management forecast for a fiscal period with the earnings announcement of that fiscal period. In this matching of unbundled forecasts with earnings announcements, we consider only earnings announcements that are not bundled with any management forecast.

The results from analyzing the matched unbundled forecasts sample are presented in Table 6. In the entire sample, as well as in each sub-period, we find that the market-adjusted CDS spread changes are significantly negatively associated with the management forecast news, but not with earnings news. For example, in the pre-crisis period, the coefficient on *MF News* is a significant −0.097 with a t-statistic of −3.28, whereas the coefficient on *EA News* is insignificant. These results suggest that management forecasts preempt earnings announcements in conveying price-relevant information to the CDS market, consistent with the findings in the equity market (Ball and Shivakumar, 2008).

Taken together, the results in Tables 5 and 6 suggest that management forecasts news provide more timely and price-relevant information to the CDS market

than earnings announcements. Moreover, during the financial crisis, CDS spreads react only to management forecast news, irrespective of whether management forecasts are issued simultaneously with earnings or not. The increased informativeness of management forecasts during the financial crisis and the associated decrease in market response to earnings announcements in this period is consistent with voluntary management forecasts and mandated earnings releases being complements with more credible voluntary disclosures lowering the information content of earnings announcements (e.g., Ball, Jayaraman and Shivakumar, 2009; Gigler and Hemmer, 1998; Stocken, 2000; Lundholm, 2003).

5. Conclusions

This paper examines the credit market reactions, via changes in credit default swap (CDS) spreads, to management forecasts, and compares the credit spread impact of management forecasts with that of mandated earnings for the periods before and during the credit crisis. We find that credit spreads react significantly and negatively to management forecast news, and that these reactions are stronger during the credit crisis. The market reacts more to bad forecast news than to good forecast news, reflecting the asymmetric payoff of debt securities. But, consistent with theoretical arguments of Veronesi (1999), the asymmetric reaction to bad and good news is significantly reduced during the high market uncertainty period of the financial crisis. The credit market reactions are also larger for forecasts issued by more risky companies.

We also compare the credit-market reaction to management forecasts with the credit-market reaction to earnings announcements and find that the market reactions to management forecasts are substantially greater. This finding is consistent with the

characterization of voluntary management forecasts and mandated earnings releases as complements by Ball, Jayaraman and Shivakumar, (2009), Gigler and Hemmer (1998) and Lundholm (2003) among others. During the crisis, the credit market does not react to earnings releases, possibly due to the more timely release of news by management in this period decreasing the information content of earnings announcements.

To the best of our knowledge, this is the first study to document the relevance of management earnings forecasts to credit markets as well as the first study to investigate the effect of information uncertainty on credit market reactions to news. Further, by investigating the relative importance of management forecasts and earnings announcements, this study compliments the existing evidence on the role of earnings-related information in credit markets (e.g., Callen, Livnat and Segal, 2009; Easton, Monahan and Vasvari, 2009), while also pointing out the importance of controlling for management forecasts in studies evaluating credit market responses to earnings news.

Appendix A

Heckman Procedure: Estimation of first stage Probit regressions

In order to implement the Heckman two-stage selection approach to control for firms self-selecting to issue a management forecast, we estimate the probability of issuing a management forecast in a first-stage Probit regression and then include the Inverse Mills Ratio computed using the Probit estimates in a second stage OLS regression. We estimate the first-stage Probit regression in each calendar year by closely following the approach of Chen, Chen and Cheng (2008). The dependent variable in the regression is an indicator variable that equals one if the firm issues at least one management forecast during the calendar year, and zero otherwise. The independent variables in the regression are listed below, with the measurement approach for each variable given in parenthesis:

(i) Institutional shareholdings (the percentage of shares held by institutional investors obtained from Thomson Reuters 13f Institutional Holdings.)

(ii) Analyst coverage (the number of analysts following a firm)

(iii) Analyst forecast dispersion (the standard deviation of analyst earnings)

(iv) Stock return volatility (the standard deviation of daily stock returns)

(v) Board independence (an indicator variable that equals one if more than 60% of directors are independent directors, and zero otherwise.)

(vi) Board size (the number of directors).

(vii) Litigation risk indicator (an indicator variable that equals one if the firm is in an industry with a high litigation risk, and zero otherwise. Industries with the f SIC codes: 2833–2836, 3570–3577, 7370–7374, 3600–3674, 5200–5961, and 8731–8734 are classified as high-litigation risk industries)

(viii) Firm size (the natural log of total assets).

(ix) Market-to-book ratio (the market value of equity divided by the book value of equity).

(x) Return on assets (net income divided by total assets)

(xi) Future equity financing (an indicator variable that equals one if the firm has seasonal equity offerings during the subsequent year, and zero otherwise)

(xii) Future debt financing (an indicator variable that equals one if the firm issues debt during the subsequent year, and zero otherwise).

Except for the equity and debt financing indicators, all variables are computed in the year prior to the management forecast issuance year. The data on board characteristics are from Risk Metrics, data on stock returns are from CRSP, data on analyst following and analyst forecasts are from IBES, data on financial statement variables are from COMPUSTAT and data on security and debt offerings are from Securities Data Corporation. The additional data requirements for this analysis, decreases the number of observations in regressions employing the Heckman controls to 2,985.

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Table 1

Descriptive Statistics

Δ*CDS Spread* is the percentage change in CDS spread around management forecast announcement date over a five-day window ([−2, 2]) minus average CDS spread of the market within the same credit rating group during the same five-day window. *MF News* is management forecast news calculated as management earnings forecast minus the most recent consensus analyst earnings forecast divided by absolute value of the most recent consensus analyst earnings forecast. *Crisis* is an indicator variable taking the value of 1 for observations starting with 1 July 2007 and 0 otherwise. *σ*(*CDS Spread*) is the standard deviation of firm's CDS spread during the period [−137, −6] with respect to management forecast announcement date (day 0). *σ*(*Stock Return*) is the standard deviation of firm's market adjusted equity market return during the period [−137, −6] with respect to management forecast announcement date (day 0). *Stock Return* is the cumulative market adjusted equity market return around management forecast announcement date over a five-day window ([−2, 2]). *S&P500 Return* is the cumulative S&P 500 index return during the window for which the dependent variable (Δ*CDS Spread*) is measured. Δ*Treasury* is the percentage change in three-month treasury rate during the window for which the dependent variable (Δ*CDS Spread*) is measured. Δ*VIX* is the percentage change in S&P 500 index implied volatility during the window for which the dependent variable (Δ*CDS Spread*) is measured. *Good Rating News* is an indicator variable taking the value of 1 if the firm's credit rating is upgraded, or if the firm is put in positive watchlist, or if the firm is put in positive outlook during the window for which the dependent variable (Δ*CDS Spread*) is measured, and 0 otherwise. *Bad Rating News* is an indicator variable taking the value of 1 if the firm's credit rating is downgraded, or if the firm is put in negative watchlist, or if the firm is put in negative outlook during the window for which the dependent variable (Δ*CDS Spread*) is measured, and 0 otherwise. *EA News* is earnings announcement news, calculated as reported earnings minus the most recent consensus analyst earnings forecast divided by the absolute value of the most recent consensus analyst earnings forecast.

When simultaneous management forecasts are announced, the forecasts with the shortest forecast periods are included. Bundled forecasts refer to the forecasts issued within a five-day window of earnings announcements. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles.

Panel A: Unbundled Forecasts

	N	Mean	Median	STD	P10	P90
Δ*CDS Spread*	3,320	0.015	0.000	0.101	-0.068	0.100
MF News	3,320	-0.023	-0.005	0.224	-0.179	0.076
σ(*CDS Spread*)	3,320	0.186	0.079	0.308	0.015	0.464
σ(*Stock Return*)	3,320	0.017	0.015	0.007	0.009	0.026
Stock Return	3,320	-0.003	0.001	0.062	-0.073	0.063
S&P500 Return	3,320	-0.001	0.001	0.022	-0.030	0.023
Δ*Treasury*	3,320	-0.063	0.000	0.228	-0.103	0.031
Δ*VIX*	3,320	0.005	-0.006	0.107	-0.118	0.137
Good Rating News	3,320	0.004	0.000	0.060	0.000	0.000
Bad Rating News	3,320	0.031	0.000	0.173	0.000	0.000

Panel B: Bundled Forecasts

	N	Mean	Median	STD	P10	P90
Δ*CDS Spread*	6,206	0.002	0.000	0.083	-0.074	0.078
MF News	6,206	-0.032	-0.005	0.152	-0.143	0.052
EA News	6,206	0.047	0.022	0.214	-0.070	0.200
σ(*CDS Spread*)	6,206	0.171	0.073	0.265	0.013	0.424
σ(*Stock Return*)	6,206	0.016	0.014	0.007	0.009	0.025
Stock Return	6,206	0.004	0.004	0.061	-0.066	0.076
S&P500 Return	6,206	0.001	0.003	0.024	-0.028	0.023
Δ*Treasury*	6,206	-0.029	0.000	0.172	-0.059	0.044
Δ*VIX*	6,206	0.010	-0.004	0.110	-0.110	0.141
Good Rating News	6,206	0.005	0.000	0.067	0.000	0.000
Bad Rating News	6,206	0.015	0.000	0.120	0.000	0.000

Table 2
Correlations

This table provides Spearman correlations among variables of interest in our sample. Correlations in bold are significant at the 10% level or better. All variables are defined in Table 1. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles.

Panel A: Unbundled Forecasts

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1)	Δ*CDS Spread*	1.000									
(2)	*MF News*	**-0.097**	1.000								
(3)	*σ*(*CDS Spread*)	0.019	-0.019	1.000							
(4)	*σ*(*Stock Return*)	0.012	-0.024	**0.500**	1.000						
(5)	*Stock Return*	**-0.166**	**0.394**	-0.006	-0.022	1.000					
(6)	*S&P500 Return*	**-0.069**	0.016	**-0.050**	**-0.045**	-0.012	1.000				
(7)	Δ*Treasury*	-0.028	-0.011	**-0.062**	**-0.090**	0.000	**0.107**	1.000			
(8)	Δ*VIX*	**0.036**	-0.013	**0.040**	0.003	-0.008	**-0.620**	**-0.111**	1.000		
(9)	*Good Rating News*	**-0.064**	0.000	-0.005	0.024	0.001	-0.016	-0.010	0.002	1.000	
(10)	*Bad Rating News*	**0.090**	**-0.060**	**0.069**	**0.092**	**-0.086**	-0.009	-0.024	-0.000	-0.011	1.000

Panel B: Bundled Forecasts

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1)	Δ*CDS Spread*	1.000										
(2)	*MF News*	**-0.096**	1.000									
(3)	*EA News*	**-0.085**	**0.306**	1.000								
(4)	*σ*(*CDS Spread*)	**-0.029**	**-0.056**	**0.034**	1.000							
(5)	*σ*(*Stock Return*)	0.007	**-0.050**	**0.064**	**0.505**	1.000						
(6)	*Stock Return*	**-0.153**	**0.321**	**0.314**	0.010	**0.033**	1.000					
(7)	*S&P500 Return*	**-0.027**	0.003	-0.003	-0.010	-0.007	**-0.038**	1.000				
(8)	Δ*Treasury*	-0.004	**0.035**	-0.005	**-0.039**	**-0.105**	0.008	**0.050**	1.000			
(9)	Δ*VIX*	0.020	-0.009	0.017	-0.015	**-0.061**	0.002	**-0.658**	**-0.107**	1.000		
(10)	*Good Rating News*	**-0.033**	0.008	0.002	-0.002	-0.004	-0.008	0.008	-0.005	-0.022	1.000	
(11)	*Bad Rating News*	**0.086**	**-0.068**	**-0.034**	**0.069**	**0.044**	**-0.052**	0.014	-0.007	-0.014	-0.008	1.000

Table 3
Association between management forecast news and CDS return (unbundled sample)

The dependent variable is change in CDS spread in the five-day window around management forecast announcement date minus average CDS spread of the market within the same credit rating group during the same five-day window. Inverse mills ratio is defined as $\phi(Z_i\beta)/\Phi(Z_i\beta)$, where ϕ and Φ are standard normal p.d.f. and c.d.f., respectively, Z is the row vector of explanatory variables in the management earnings forecast choice model, and β is the column vector of coefficients estimated from management earnings forecast choice model. *Residual Stock Return* is the stock return orthogonalized to all other control variables in the regression. All other variables are defined in Table 1. When simultaneous management forecasts are announced, the forecasts with the shortest forecast periods are included. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles. The *t*-values, reported in parentheses, are based on standard errors adjusted for clustering at firm level. $^{+++}$, $^{++}$ and $^{+}$ indicate that the coefficients between the pre-crisis and crisis periods are significantly different at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

	Dependent variable: Δ*CDS Spread*					
	(1)	(2)	(3)	(4)	(5)	(6)
	Pooled	*Pre-crisis*	*Crisis*	*Pooled*	*Pre-crisis*	*Crisis*
MF News	-0.035	-0.028	-0.092^{+++}	-0.056	-0.049	-0.104^{++}
	(-3.27)	(-2.51)	(-3.71)	(-4.48)	(-3.70)	(-3.33)
σ(*CDS Spread*)	-0.004	0.001	-0.019	-0.010	0.001	-0.052^{++}
	(-0.53)	(0.05)	(-1.21)	(-0.99)	(0.05)	(-2.18)
σ(*Stock Return*)	-0.222	-0.290	0.315	-0.247	-0.681	1.299^{++}
	(-0.59)	(-0.68)	(0.33)	(-0.63)	(-1.55)	(1.25)
Residual Stock Return	-0.305	-0.379	-0.093^{+++}	-0.290	-0.375	-0.004^{+++}
	(-6.82)	(-7.65)	(-1.02)	(-5.86)	(-6.80)	(-0.04)
S&P500 Return	-0.202	-0.101	-0.449	-0.140	-0.032	-0.470^{+}
	(-1.65)	(-0.71)	(-1.75)	(-1.10)	(-0.23)	(-1.63)
Δ*Treasury*	-0.017	-0.012	-0.028	-0.013	-0.009	-0.026
	(-1.62)	(-1.32)	(-1.22)	(-1.14)	(-0.92)	(-1.09)
Δ*VIX*	0.032	0.030	0.014	0.034	0.035	-0.008
	(1.41)	(1.26)	(0.31)	(1.37)	(1.38)	(-0.15)
Good Rating News	-0.087	-0.086	-0.104	-0.074	-0.054	-0.137
	(-3.81)	(-3.16)	(-3.61)	(-4.28)	(-3.22)	(-4.81)
Bad Rating News	0.092	0.084	0.141^{++}	0.093	0.091	0.095
	(5.39)	(4.70)	(2.66)	(5.12)	(4.63)	(2.50)
Inverse Mills ratio	–	–	–	-0.006	0.003	-0.059^{+}
				(-0.33)	(0.16)	(-1.48)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.083	0.093	0.080	0.084	0.099	0.084
N	3,320	2,634	686	2,985	2,375	610

Table 4
Association between management forecast news and CDS return (unbundled sample): Cross-sectional tests

The dependent variable is change in CDS spread in the five-day window around management forecast announcement date minus average CDS spread of the market within the same credit rating group during the same five-day window. *Bad* is an indicator variable taking the value of 1 if management forecast news is 0 or negative, and 0 otherwise. *Habitual* is an indicator variable taking the value of 1 if the firm releases at least four management earnings forecast over the last year, and 0 otherwise. *Preannouncement* is an indicator variable taking the value of 1 if the firm releases management earnings forecast after fiscal period end but before earnings announcement, and 0 otherwise. *Speculative credit rating* is an indicator variable taking the value of 1 if credit rating is below BBB+, and 0 otherwise. All other variables are defined in Table 1. When simultaneous management forecasts are announced, the forecasts with the shortest forecast periods are included. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles. The *t*-values, reported in parentheses, are based on standard errors adjusted for clustering at firm level. $^{+++}$, $^{++}$ and $^{+}$ indicate that the coefficients between the pre-crisis and crisis periods are significantly different at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

Table 4 (contd)

	Dependent variable: Δ*CDS Spread*							
	(1)		(2)		(3)		(4)	
	Indicator = Bad		Indicator = Habitual		Indicator = Preannouncement		Indicator = Speculative credit rating	
	Pre-crisis	*Crisis*	*Pre-crisis*	*Crisis*	*Pre-crisis*	*Crisis*	*Pre-crisis*	*Crisis*
Indicator	0.007	0.011	0.001	0.028	0.013	0.027	0.005	-0.005
	(1.58)	(1.22)	(0.20)	(1.82)	(2.99)	(2.34)	(1.18)	(-0.58)
MF News	0.014	-0.053^{++}	-0.031	0.047	-0.021	-0.063^{++}	0.006	0.003
	(0.81)	(-1.90)	(-1.61)	(1.12)	(-2.07)	(-2.50)	(1.39)	(0.47)
*MF News * Indicator*	-0.073	-0.031	-0.036	-0.258^{+++}	-0.049	-0.044	-0.049	-0.090^{++}
	(-3.11)	(-0.72)	(-1.07)	(-3.84)	(-2.08)	(-0.80)	(-3.00)	(-2.57)
σ(*CDS Spread*)	-0.002	-0.020	0.023	-0.037^{++}	0.002	-0.020	-0.002	-0.019
	(-0.23)	(-1.25)	(1.18)	(-1.59)	(0.20)	(-1.25)	(-0.23)	(-1.21)
σ(*Stock Return*)	-0.491	0.283	-0.845	1.236^{+}	-0.445	0.156	-0.347	0.368
	(-1.17)	(0.29)	(-1.09)	(0.82)	(-1.04)	(0.17)	(-0.81)	(0.38)
Residual Stock Return	-0.377	-0.105^{+++}	-0.502	0.007^{+++}	-0.370	-0.130^{+++}	-0.371	-0.114^{+++}
	(-7.54)	(-1.18)	(-5.83)	(0.06)	(-7.63)	(-1.54)	(-7.57)	(-1.33)
S&P500 Return	-0.117	-0.443	-0.497	-1.172^{++}	-0.117	-0.442	-0.112	-0.447
	(-0.83)	(-1.74)	(-2.26)	(-3.45)	(-0.83)	(-1.72)	(-0.79)	(-1.74)
Δ*Treasury*	-0.011	-0.028	-0.008	-0.027	-0.007	-0.029	-0.011	-0.026
	(-1.21)	(-1.23)	(-0.66)	(-1.02)	(-0.85)	(-1.25)	(-1.21)	(-1.16)
Δ*VIX*	0.026	0.015	0.029	0.032	0.028	0.007	0.027	0.014
	(1.08)	(0.33)	(0.98)	(0.54)	(1.15)	(0.15)	(1.13)	(0.30)
Good Rating News	-0.085	-0.106	-0.091	-0.122	-0.084	-0.100	-0.087	-0.102
	(-3.15)	(-3.54)	(-2.60)	(-3.74)	(-3.15)	(-3.56)	(-3.17)	(-3.71)
Bad Rating News	0.079	0.142^{++}	0.119	0.151	0.082	0.128	0.083	0.143^{++}
	(4.43)	(2.61)	(3.74)	(2.80)	(4.55)	(2.21)	(4.59)	(2.64)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.097	0.083	0.089	0.133	0.097	0.091	0.094	0.081
N	2,634	686	2,634	686	2,618	672	2,634	686

Table 5
Association between management forecast news and CDS return (bundled sample)

The dependent variable is change in CDS spread in the five-day window around management forecast announcement date minus average CDS spread of the market within the same credit rating group during the same five-day window. *EA News* is earnings announcement news calculated as reported earnings minus the most recent consensus analyst earnings forecast divided by absolute value of the most recent consensus analyst earnings forecast. All other variables are defined in Table 1. When simultaneous management forecasts are announced, the forecasts with the shortest forecast periods are included. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles. The *t*-values, reported in parentheses, are based on standard errors adjusted for clustering at the firm level. $^{+++}$, $^{++}$ and $^{+}$ indicate that the coefficients between the pre-crisis and crisis periods are significantly different at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

	Dependent variable: Δ*CDS Spread*		
	(1)	(2)	(3)
	Pooled	*Pre-crisis*	*Crisis*
MF News	-0.043	-0.036	-0.084^{+++}
	(-5.49)	(-4.20)	(-3.69)
EA News	-0.019	-0.016	-0.026
	(-3.57)	(-2.75)	(-1.48)
σ(*CDS Spread*)	-0.016	-0.017	-0.016
	(-2.67)	(-2.40)	(-1.50)
σ(*Stock Return*)	0.466	0.473	0.393
	(1.94)	(1.73)	(0.87)
Residual Stock Return	-0.218	-0.217	-0.223
	(-9.00)	(-7.82)	(-5.19)
S&P500 Return	-0.066	-0.081	0.006
	(-0.86)	(-0.93)	(0.05)
Δ*Treasury*	0.015	0.027	-0.007^{+++}
	(2.38)	(3.58)	(-0.55)
Δ*VIX*	0.019	0.016	0.018
	(1.23)	(0.88)	(0.63)
Good Rating News	-0.048	-0.046	-0.043
	(-2.67)	(-2.51)	(-0.74)
Bad Rating News	0.082	0.093	0.043^{++}
	(6.22)	(6.26)	(1.72)
Year fixed effects	Yes	Yes	Yes
p-value (*MF News* = *EA News*)	0.005	0.027	0.009
R^2	0.059	0.066	0.047
N	6,206	4,677	1,529

Table 6
Comparison of CDS market reaction to management forecast news versus earnings announcement news (unbundled sample)

The dependent variable is change in CDS spread in the five-day window around management forecast announcement date minus average CDS spread of the market within the same credit rating group during the same five-day window. *EA News* is earnings announcement news calculated as reported earnings minus the most recent consensus analyst earnings forecast divided by absolute value of the most recent consensus analyst earnings forecast. All other variables are defined in Table 1. When simultaneous management forecasts are announced, the forecasts with the shortest forecast periods are included. The sample period is between 2001 and 2008. All non-indicator variables are winsorized at the top and bottom one-percentiles. The *t*-values, reported in parentheses, are based on standard errors adjusted for clustering at the firm level. $^{+++}$, $^{++}$ and $^{+}$ indicate that the coefficients between the pre-crisis and crisis periods are significantly different at the 1%, 5% and 10% levels, respectively, in two-tailed tests.

	Dependent variable: Δ*CDS Spread*		
	(1)	(2)	(3)
	Pooled	*Pre-crisis*	*Crisis*
MF News	-0.097	-0.097	-0.106
	(-3.57)	(-3.28)	(-1.79)
EA News	-0.003	-0.005	0.085
	(-0.15)	(-0.20)	(0.91)
σ(*CDS Return*)	0.006	0.006	0.025
	(0.51)	(0.44)	(0.77)
σ(*Stock Return*)	-0.248	-0.293	-0.175
	(-0.32)	(-0.35)	(-0.12)
Residual Stock Return	-0.448	-0.456	-0.453
	(-4.43)	(-4.18)	(-1.65)
S&P500 Return	-0.447	-0.461	-0.084
	(-2.27)	(-2.16)	(-0.16)
Δ*Treasury*	0.013	0.017	-0.002
	(0.79)	(0.99)	(-0.02)
Δ*VIX*	0.056	0.024	0.260
	(0.99)	(0.38)	(2.25)
Year fixed effects	Yes	Yes	Yes
p-value (*MF News* = *EA News*)	0.013	0.020	0.156
R^2	0.089	0.086	0.217
N	1,001	918	83