THE EFFECTS OF CREDITS DEFAULT SWAPS ON ANALYST FORECASTING

A Dissertation
Presented To
The Faculty of the C.T. Bauer College of Business
UNIVERSITY OF HOUSTON

In Partial Fulfillment
Of the Requirements for the Degree
Doctor Of Philosophy

By
Emrah Ekici
August 2017

ACKNOWLEDGEMENTS

There are several people whom I would like to thank for their support, mentorship, and contributions to my academic development. I would not have been able to complete this degree without the support of my adviser, professors, colleagues, friends, and family.

First and foremost, I thank my adviser Dr. Gerald Lobo, a most wonderful academic and professional adviser. This dissertation could not have been completed without his belief in my capabilities and his support. The time he has dedicated to my work and to my success in the field has been invaluable. He was not just my adviser but also he has represented a great model of an adviser, a researcher, and a teacher that I hope to become.

I am deeply thankful to Dr. Steve Crawford, whom I truly enjoyed working with and who has been a great mentor for my research and my professional development. I also would like to express my deepest gratitude to my committee member Dr. Emre Kilic, Dr. Michael Neel, and Dr. Nisan Langberg, for providing valuable and thoughtful feedback on this dissertation and helping my progress in the department. The courses they taught and their academic advice certainly contributed on my technical skills and research abilities.

Finally, I would like to thank my wife Dr. Derya Eryilmaz and my family for their endless support and encouragement. Words cannot express how grateful I am for their patience, caring and support in the past six years.

ABSTRACT

This research studies the effect of development of the CDS market; one of the most important financial innovations in recent times, on financial analysts' forecast characteristics. I examine whether and how the revelation of private information in the CDS market, which often leads public information disclosure and price discovery in other markets, affects analysts' forecast characteristics. This research shows that analysts have more accurate and less dispersed cash flow forecasts for firms with CDS contracts. These findings are consistent with the predictions that financial analysts include the information revealed from the CDS market in their cash flow forecasts. Next, I investigate the relation between CDS prices, CDS price changes and analysts' forecast properties and find that CDS price and CDS price changes are negatively (positively) associated with analysts' cash flow forecast accuracy (dispersion). The results show that CDS prices and price changes result in more disagreements among financial analysts.

TABLE OF CONTENTS

LIST OF TABLES

1. Introduction

Credit default swaps (CDS) are one of the major financial innovations in the financial markets in recent decades. A CDS contract is a credit derivative where the CDS buyer makes periodic payments in exchange for protection against default or other credit events of the underlying reference entity. The pros and cons of CDS had received considerable attention during the 2008 financial crisis. Opponents of CDS argue that it allows insider trading and speculation, so it made the crisis worse.[1] The major criticism of the CDS market is that large financial institutions, the main counterparties[2] in the CDS market, use their inside information about the reference entities in their trading activities (Acharya and Johnson, 2007, The Financial Times, 2006). On the other hand, proponents of the CDS market argue that CDS improve market efficiency and increases market competition. Additionally, CDS can serve as an important information sources to regulators and investors regarding the financial condition of the underlying reference entity. I examine whether and how the revelation of private information in the CDS market, which often leads public information disclosure and price discovery in other markets, affects analyst forecast properties. Previous studies

---

[1] For example, see George Soros (March 24, 2009), "Opinion: One Way to Stop Bear Raids," Wall Street Journal and Stevenson Jacobs, (March 10, 2010), "Greek Debt Crisis Is At The Center Of The Credit Default Swap Debate," Huffington Post.

2 It is explained in Section 2.

demonstrate that financial analysts are one of the most important information intermediaries in the capital markets. They receive and process financial information for investors. Their outputs are determined to a large extent by investor demand for information in the presence of uncertainty (Brown et al. 2014).

A higher degree of information uncertainty is associated with a greater degree of analyst forecast revisions.[3] Generally, financial analysts are negatively affected by a higher degree of asymmetric information, so they seek new information sources to mitigate the information uncertainty and to provide more accurate forecasts. Financial analysts use several information sources in their forecast process. Analyst coverage decisions are influenced by investors' demand for information, opportunities to signal talent, and economic incentives (Ramnath et al., 2008; Brown et al, 2015). The CDS market reveals incremental information about a reference entity based on the expectations of the CDS contract traders. Trading by informed traders results in the revelation of a new information or non-public information through CDS pricing (Glantz, 2003, Acharya and Johnson, 2007, Whitehead, 2012). Therefore, analysts may use additional information to provide more accurate cash flow forecasts.

[3]Zhang (2006) shows that greater information uncertainty predicts more positive forecast errors and subsequent forecast revisions following good news, and more negative forecast errors and subsequent forecast revisions following bad news

The dominant players in the CDS market, major banks, asset managers, and financial institutions use their non-public information in CDS trading. They have access to non-public information about reference entities[4] through their lending activities. Banks and financial institutions often receive material non-public and price-sensitive information provided by reference entities in advance of public release (Acharya and Johnson, 2007; Standard and Poor's, 2007). This non-public information includes timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions, and this information is provided to lenders before it becomes publicly available (Standard and Poor's, 2007). The trading desks of large banks and financial institutions provide CDS price quotes for firms to which they have loan exposure (Acharya and Johnson, 2007). Non-public information provided by reference entities to financial institutions could also be shared with analysts at the same bank/brokerage. According to Massa and Rehman (2008), Chinese walls prevent investment bankers from influencing analyst research reports and also separate the investment banking from the brokerage divisions. However, due to the absence of a Chinese wall in the CDS market, financial institutions trade on non-public information, and this information could also be shared with brokerage, research and other departments

[4] A CDS contract is written on a specific firm, also known as reference entity; the firm is not a party to the contract.

of the same firm. (The Economist, 2003, Financial Times, 2005, and Standard and Poor's, 2007).

Therefore, I examine how/whether information in the CDS market affects analyst forecast properties. I focus on cash flow forecasts and characteristics of those forecasts due to the fundamental relationship that exists between CDS prices and firm cash flows. Expected default risk, the major determinant of CDS risk premium, is a function of future cash flow volatility (risk), level, and timing. Therefore, it seems plausible that financial analysts would use private information transmitted by informed investor trading in the CDS market to update their estimates of future cash flows of the reference entity. Following Batta et al (2016) and Subrahmanyam et al. (2014), I examine the relation between analysts forecasting characteristics and the CDS initiation by using a matched sample. Subrahmanyam et al. (2014) indicate that the CDS initiation is positively related to a firm's investment grade, profit margin, leverage, and return volatility. By using a full sample and a matched sample, I expect to find that analysts' accuracy is positively related to the CDS initiation. To analyze, the effect of CDS contracts on cash flow forecast properties empirically, I obtain the CDS contract information from Markit and collect analysts' forecast information from the I/B/E/S database. Additionally, I collect firm specific information from COMPUSTAT and CRSP over the period 2001-2016. I focus on the firms with

cash flows forecasts in I/B/E/S. I conjecture that having a CDS contract improves the analysts' information environment, and so analysts can improve their forecasts by using this information and they can issue more precise cash flows forecasts. I also conjecture that with this additional information, analyst can have less disagreement.

Additionally, I examine the information flow from CDS prices and CDS price changes to financial analysts' forecast characteristics (i.e., accuracy and dispersion) because CDS price changes reflect public and non-public information about the reference entity. Increases in CDS prices indicate that financial institutions have more negative news about the reference entity (Acharya and Johnson, 2007). Prior literature has examined whether insiders use their superior future cash flow information in their trading strategies. Piotroski et al. (2005) show that insider trades reflect superior information about future cash flow realizations. Also, participants in the CDS market trade according to superior future cash flow information. Acharya and Johnson (2007) indicate that information flow from the CDS market to the stock market is greatest when credit deterioration is high and CDS levels are high. Due to the hedging activities in the CDS market, the information revelation from the CDS market to analysts would be greater when there is more negative news about the reference entity. Thus, analysts can improve forecast accuracy by using changes in CDS prices.

However, several analysts may use new information differently so that disagreements between analysts may also be affected by CDS prices. Changes in CDS pricing typically provide more timely feedback on a firm's performance than the pricing of its public debt or equity securities because CDS prices reflect a substantial amount of private information transmitted by informed investor trading (Glantz, 2003, and Whitehead, 2012).

Previous literature suggests that the CDS market is superior to other financial markets, with regards to the timely pricing of new information (e.g., Glantz, 2003; Standard and Poor's, 2007; Whitehead, 2012; Blanco et al., 2005). This is particularly important for the analyst because timely information is vital for forecast accuracy. The CDS market leads the bond market in price discovery (Blanco et al., 2005) and, prior to adverse information events, the equity option market as well (Berndt and Ostrovnaya, 2007). Anecdotal evidence also show that CDS prices reflect information about upcoming deals ahead of public announcements and price movements in the equity and bond markets (The Wall Street Journal, 2006 and 2007; Bloomberg, 2006; The New York Times, 2007).

Consistent with my expectation, I find evidence that analysts make more accurate cash flow forecasts for a reference entity when there is a CDS contract in the market. I also examine and find that analyst forecast dispersion decreases with the CDS initiation. The results show that CDS initiation increases cash flow

information of reference entity and financial analysts can benefit from this information and provide more accurate forecasts; furthermore, disagreement among analysts decreases. Thus, my results confirm that CDS contracts improve the information environment. To address any systematic differences between CDS-firms and non-CDS firms, I use a matched sample to examine the relation between CDS initiation and forecast accuracy and forecast dispersion. The regression results are similar to the full sample and also consistent with the predictions. Overall, my results confirm that the CDS market provides useful information about the reference entity, and analysts use this information in their cash flow forecasting processes.

Next, I examine the effect of CDS prices and CDS price changes on analyst forecast properties. It is important because some CDS firms have more constant and lower CDS prices than the other CDS firms. Therefore, the information revealed by the CDS market might be different among CDS firms. I use cross sectional analysis to test whether CDS price levels and CDS price change levels directly affect analyst forecast accuracy and dispersion. The results show that forecast accuracy (dispersion) is negatively (positively) related to CDS prices. I use several variables (i.e. CDS price, return volatility, etc.) to split the sample into two groups to determine if CDS prices are related to accuracy and dispersion the same way for all CDS firms. However, the results for forecast dispersion varies among the subsamples based on the proxies. CDS prices are

more informative for large firms and high CDS prices are also more informative. Moreover, following the CDS prices, I examine the CDS price changes and I find that only high CDS price changes are informative and low price changes do not have an impact on forecast dispersion.

This paper contributes to the literature in at least two ways. First, this paper shows that the information provided by the CDS market informs financial analysts' forecasts. So far, studies have demonstrated that analysts use information from the CDS market to inform their earnings forecasts. However, expected default risk, the major determinant of CDS prices, is a function of future *cash flow* volatility (risk), level, and timing. Therefore, it seems plausible that financial analysts would use private information transmitted by informed investor trading in the CDS market to update their *cash flow* forecasts. This paper shows that the accuracy (dispersion) of analyst cash flow forecasts increase (decrease) when there is a CDS contract on a reference entity. In addition to explaining the link between the existence of a CDS contract and the properties of analysts' forecasts, this paper shows that CDS prices and a change in CDS price also affects cash flow forecast accuracy and dispersion. This is particularly important because the information on CDS prices varies by firm. Thus, it is important to capture this variation as well as the impact of CDS on forecast accuracy and dispersion. I believe that this is one of the first studies that show this relationship in the literature.

The remainder of the paper proceeds as follows: Section 2 provides the background information on the CDS market and Section 3 develops testable hypotheses. Section 4 describes the data. Section 5 describes the empirical design, and Section 6 discusses the main results. Finally, Section 7 concludes.

2. Research Background

This section presents a brief overview of the CDS market. It also discusses CDS prices and financial analysts.

2.1 The Credit Default Swap

A CDS is a contractual agreement that transfers the default risk of one or more reference entities from one party to the other. Firms use CDS contracts mostly for hedging purposes. In a single-name CDS contract, one party buys a protection on a reference obligation (loan obligation) from a protection seller. The protection buyer agrees to make periodic payments to the seller until reference entity a reference entity[5] experiences a credit event due to its debt or the CDS contract matures. The credit event includes bankruptcy, failure to make a payment on a debt obligation, restructuring, obligation acceleration, and moratorium. The CDS contract includes some or all of these credit events as determined by the parties to the CDS contract, which result in a payment by the protection seller (Bomfim 2005). The following is a brief description of each event;

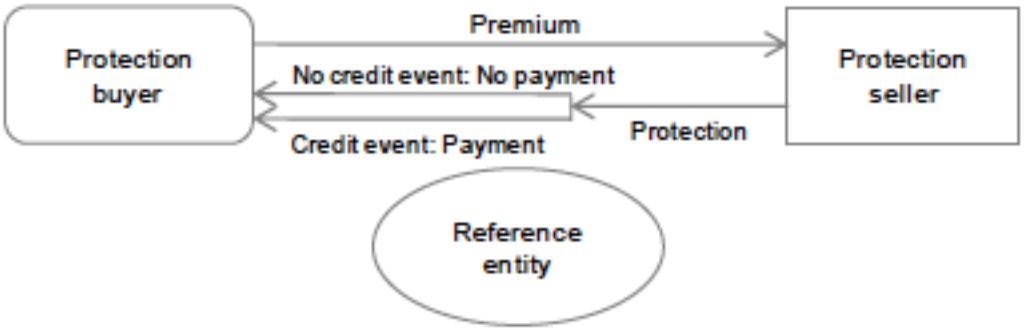
[5] A CDS contract is written on a specific firm, also known as the reference entity. The firm is not a party to the contract.

- ***Bankruptcy***: The reference entity becomes insolvent or unable to repay its debt. This inability to repay debt must be approved by a regulatory proceeding.
- ***Failure to Pay***: The reference entity is unable to make its due payments, such as principal or interest payments.
- ***Restructuring***: Restructuring refers to a change in the terms of a debt obligation such as lowering the coupon.
- ***Obligation Acceleration***: Accelaration occurs when a debt obligation becomes due before its maturity.
- ***Moratorium***: A moratorium occurs when a reference entity refuses or challenges the validity of its debt obligation.

The protection seller (CDS seller) agrees to compensate the protection buyer's loss if the reference entity experiences a credit event. The reference entity has no involvement in the CDS contract. These agreements are based on expectations of both buyer and seller; however, firm actions also have an impact on CDS pricing. As an example, counterparty Firm A buys credit protection on Firm X from counterparty Firm B by making periodic payments to Firm A based on the price of the CDS. If Firm X experiences a credit event during this period, counterparty Firm B pays the par amount to counterparty Firm A. However, if the default does not occur in this period, Firm B does not make any payments to Firm A. Thus, CDS contracts provide insurance to counterparty Firm A against default

risk of the reference entity. For example, a price of 100 basis points on a notional amount of $10 million equates to an annual payment of $100,000 until the credit event occurs or the CDS contract matures. Because of the standardizations of the CDS market, premiums are paid quarterly.

The CDS contract transaction is depicted in the following:[6]



In general, CDS contracts are traded over the counter, which means CDS contracts are negotiated directly between two parties. While the buyer and seller negotiate and customize the contract terms, CDS contracts in recent years have become more standardized by the International Swap and Derivative Association (ISDA). ISDA provides a set of guidelines, which documents extensive definitions of CDS contracts such as the reference entity, reference, obligation, effective date, termination date, and especially the definition of a credit event.[7]

[6] The diagram is based on Deutsche Bank Research (2009)
[7] ISDA definitions are available at www.isda.org

When there is a conflict over what constitutes a credit event between counterparties, the ISDA's Credit Derivatives Determinations Committee makes the decision and their decisions are binding.

The CDS market has been growing significantly in recent decades. The notional amount-based size of the market grew from $600 billion in 1999 to $17 trillion in 2006. The CDS market reached its peak of $57 trillion by the end of 2007. However, after the financial crisis, the market size decreased to $19 trillion by June 2014. Figure 1 shows the notional amount[8] of outstanding CDS. The notional amount of credit default swaps has dropped significantly after the financial crisis, but still, the notional amount has a noticeably high proportion in the amount of total credit derivatives.[9]

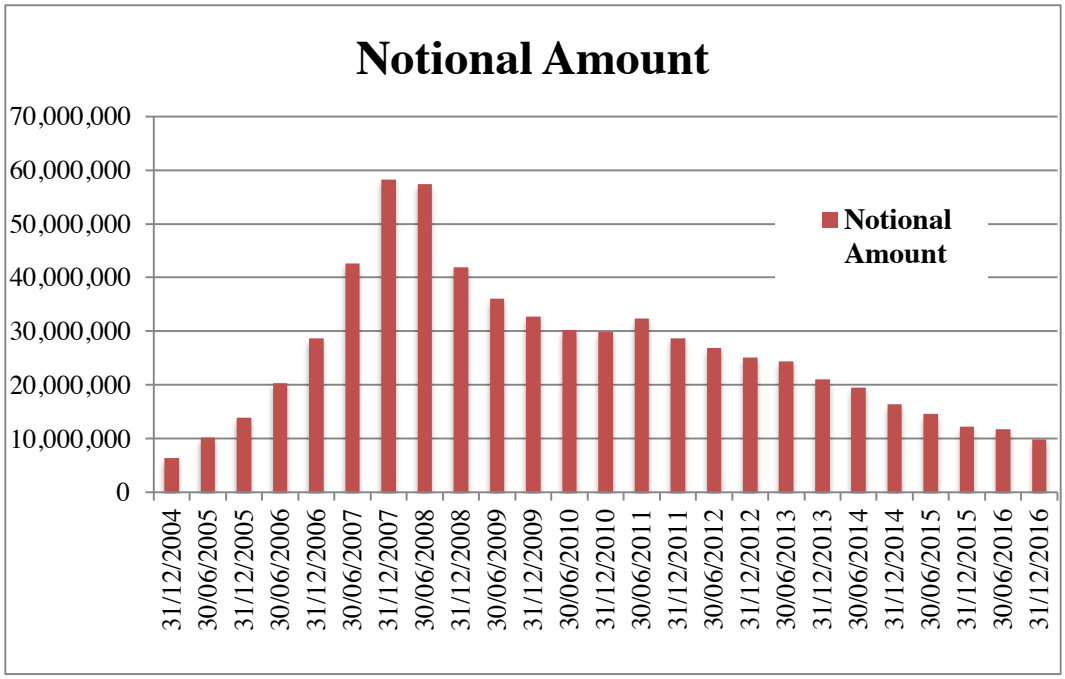
CDS contracts arguably complete the financial markets by facilitating hedging and trading of credit risks and by providing more timely and accurate signals (Griffin 2014, Deutsche Bank Research 2009, Deutsche Bank 2004). Alan Greenspan (2004) stated that the initiation of the CDS market provides for a more flexible, efficient, and resilient financial system. Also, the CDS market is argued to improve transparency in the credit markets (The Wall Street Journal, 2015). Thus, the development of this market potentially improves the financial system and the economy. The effects of this market are widely studied in both the finance

[8] The sum of all CDS contracts bought for a single reference entity.

[9] The share of CDS contracts in the notional amount of credit derivatives outstanding from 4% in 2008 to 16% in 2015. (BIS statistical release, November 2015).

and accounting literatures. The essential contribution of this market is to provide additional information about the reference entity.

Figure 1. Notional Amount Outstanding of CDS[10]



There are several reasons why financial institutions prefer the CDS market instead of the stock market to hedge their exposures. First, CDS contracts are traded in an over-the-counter market and not in organized exchanges, so these transactions are subject to minimal regulations (Gao et al., 2016). The U.S. Securities and Exchange Commission (SEC) and the Commodities and Futures Trading Commission (CFTC) exempt CDS transactions from information

[10] Source: BIS (www.bis.org)

dissemination (SEC Rule 10b-5)[11] because of the absence of the Chinese wall that allows non-public information to get traded in the CDS market (The Economist, 2003; Financial Times, 2005; Standard and Poor's, 2007). Second, CDS contracts are designed to provide a hedge on exposures to the reference entity. Financial institutions hedge their risk by buying protection through the CDS market. However, buying protection through the stock market requires dynamic rebalancing[12], which leads higher transaction costs.

2.2 Credit Default Swap Prices (Spreads) and Credit Default Swap Price Changes

The CDS spread is a premium paid by a protection buyer to a protection seller, based on the contractual agreement in a credit default swap contract. *"It measures the compensation to an investor for taking on the risk of losing par minus the expected recovery rate[13] of a bond if a credit event occurs before the maturity of the CDS contract."* (Lehman Brothers, Quantitative Credit Research Quarterly). The CDS spread determines the stream of cash flows paid for the premium for the duration of the CDS contract.

---

[11] SEC Rule 10b-5 prohibits the insider trading, where insiders use non-public information to trade profitably.

[12] Dynamic rebalancing requires rebalancing portfolios periodically instead of using the buy-and-hold strategy. Basically, this strategy is used in buying assets that perform poorly compared to other assets and in reducing asset classes that perform relatively well. (August et al.)

[13] Estimate of percentage of par value CDS seller will receive after a credit event.

The premium of a credit default swap, also called spread, is a price of the default insurance, expressed in basis points (bp=0.05%), usually paid quarterly or semi-annually. Usually, the price misleads the investors because it is not a "price" over anything, not like the bond price difference between bids and asks. It is the price or rate of insurance. It corresponds to realizable cash flows, which compensate a protection buyer for a loss of par minus recovery rate of a reference entity's credit event. For example, if a firm buys a protection on $10mm par to a 5-year CDS contract, and the CDS spread is 200bp, the protection buyer makes $100,000 semi-annual payments to a protection seller until the credit event occurs or the CDS contract matures. When there is a credit event, which is defined by the ISDA, the value of protection delivered by the seller to the buyer is the difference between the par amount and recovery rate. Assuming a recovery rate is 40%, the protection seller would lose $6mm.

CDS price (spread) is an indicator of firm risk, including liquidity risk, counterparty risk, default risk, and transparency risk. Liquidity is defined as the degree that an asset can be traded quickly in the market without affecting its market prices. CDS prices are affected by the liquidity risk due to transaction cost, asymmetric information, and funding costs (Augustin et al., 2014). Counterparty risk means the default risk of each counterparties of the CDS contract. Transparency risk occurs due to the quality of the information that the protection buyer might use to assess the probability default of the reference entity.

All else equal, an increase in any of these risks leads to higher CDS prices. Longstaff et al. (2005) show that the CDS price is a direct measure of a firm's default risk. Also, Das et al. (2009) compare accounting-based and market-based variables in pricing a firm's default risk by using CDS prices. Cornett et al. (2014) provide empirical results that CDS prices respond to default relevant information. Additionally, Yu (2005) examines the association between AIMR and CDS prices and finds a negative association between AIMR ranking and CDS prices. Bajlum and Larsen (2007) examine how accounting transparency affects CDS prices and find that accounting transparency and CDS prices are negatively related. Some studies focus on the counterparty risk and liquidity risk component of CDS prices. Tang and Yan (2006) examine the liquidity risk in the CDS market. They find that liquidity is an important driver of CDS prices. CDS prices are positively related to the liquidity risk.

However, CDS prices are not just risk measures. The extent literature and anecdotal evidence show that they are used more than risk measures; they contain public and non-public information about the reference entities. The dominant players in the CDS market, major banks, asset managers, and financial institutions use their non-public information in CDS trading. They can access non-public information about reference entities through their lending activities. Reference entities often provide material non-public and price-sensitive information about their financial health to banks before public release (Acharya and Johson, 2007;

Standard and Poor's, 2007; Kim et al., 2015). This non-public information includes timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions, and it is provided to lenders before this information becomes publicly available (Standard and Poor's, 2007). The trading desk of large banks and financial institutions provide CDS price quotes for firms to which they have a loan exposure (Acharya and Johnson, 2007). Additionally, hedge funds are other dominant players in the CDS market, and they can access the private information about the reference entity through participation in syndicated loans (Bushman et al., 2010; Ivashina and Sun, 2011) and connections with financial institutions (The New York Times, 2007; Financial Times, 2009).

CDS prices (spreads) provide information about the distribution of reference entity's future cash flow because the main concern for the CDS market participant is whether the reference entity is sufficiently meets the underlying debt obligations. CDS prices often reflect non-public information transmitted from the reference entity to CDS traders, so information embedded in changes in CDS prices are more timely manner the prices of the firm's public debt and equity securities (Glantz, 2003; Whitehead, 2012). CDS prices provide both mean and variance information of the future cash flows. An increase (decrease) in CDS prices results in a decrease (increase) in the mean of the reference entity's expected future cash flow distribution because when informed traders use their

public and/or non-public information in the CDS trading, CDS prices on reference entity either widen or narrow depending on the information about the reference entity. Moreover, an increase in CDS prices also results in an increase of the variance of the reference entity's expected future cash flow distribution due to higher uncertainty. Therefore, an increase (decrease) in CDS prices would mean both low (high) means of future cash flow of the reference entity and higher (lower) uncertainty of the future cash flows. If there is bad news about the reference entity, either public or non-public information, CDS prices will react to this news and widen. Financial analysts can assess the information about the distribution of the future cash flows via CDS prices and CDS price changes.

2.3 Sell-side Analysts and The CDS Market

Investors seek information to inform their trading strategies. Sell-side analysts are one of the most important information sources for investors. Sell-side analysts interpret and disseminate the financial information and provide outputs, such as earnings and cash flow forecasts, recommendations, and long-term growth forecasts (Brown et al., 2014). Analysts use their expertise to obtain and analyze information from various sources, including SEC filings, industry and macroeconomic conditions, conference calls, and other management

communications (Ramnath et al., 2008). Shipper (1991) and Brown (1993)[14] are review papers that call for more research papers to better understand the decision process of analysts' forecasts and the other types of information that they use in formulating their outputs. For instance, they suggest that investigating macroeconomic and industry factors and other information that is used by analysts is important to understand analysts' decision process and the role of analysts in capital markets.

Their outputs are influenced by several factors, such as firm characteristics and market factors. There are several studies that investigate the association between analysts' forecast accuracy, forecast dispersion, and firm-specific information and market information. Hope (2002) investigates the relation between annual report disclosures and forecasting accuracy. Additionally, Lang et al. (1996) examine the relation between disclosure practices of firms, the number of analysts following each firm and analysts' earnings forecast properties.

When investors have more information sources and, therefore, more information, markets become more complete, and signals become more precise (Griffin, 2014). Financial derivatives are one of the information sources for investors, and they improve capital allocation efficiency and price discovery (Stulz, 2010). Certainly, CDS contracts are among the important innovations in

[14] Shipper (1991) points out two important ways to improve the analyst forecasting literature. She suggests that the research should consider the full forecasting decision and economic incentives, which impacts forecasting properties.

financial markets. The CDS market arguably improves the informational efficiency in the capital markets and provides additional information that is useful for financial analysts. The prior literature shows the importance of the initiation of CDS prices for a firm. Kim et al. (2015) investigate the association between CDS prices and managers' voluntary disclosure. They provide evidence that managers have more incentive to provide managerial earnings forecasts when an entity has an actively traded CDS contract. Moreover, Chava et al. (2012) show that the CDS market is a viable alternative to credit ratings. They document that the CDS market incorporates new information more quickly than credit rating agencies. Recent studies examine the association between CDS trading and firms' innovative investments (Hong et al. 2016).

3. Hypothesis Development

3.1 Hypothesis H1: Initiation of CDS contracts affects the analysts' cash flow forecast properties

As discussed in the previous section, credit default swaps are one the most important innovations in financial markets. The dominant players in the CDS market are financial institution that can access public and non-public information about the reference entities. They access non-public information about reference entities through their lending activities[15]. Reference entities often provide material non-public and price-sensitive information in advance of public release to build a relationship with banks (Acharya and Johson, 2007; Standard and Poor's, 2007). This non-public information includes timely financial disclosures, covenant compliance information, amendment and waiver requests, financial projections, and plans for acquisitions or dispositions, and this information is provided to lenders before it becomes publicly available (Standard and Poor's, 2007). The trading desks of large banks and financial institutions provide CDS spread quotes for firms to which they have a loan exposure (Acharya and Johnson, 2007). Non-public information provided by reference entities to financial institutions would also be shared with analysts in the same bank/brokerage. According to Massa and Rehman (2008), Chinese walls prevent investment bankers from influencing

[15] A CDS contract is written on a specific firm, also known as reference entity that is not a part of the contract.

analyst research reports, and separate the investment banking from the brokerage. However, due to the absence of the Chinese wall in the CDS market, financial institutions trade on non-public information, and this information is also shared with brokerage, research, and other departments of the same firm. (The Economist, 2003; Financial Times, 2005; Standard and Poor's, 2007).

Therefore, I examine the impact of the initiation of CDS contracts on analysts' cash flow forecasts. I focus on cash flow forecasts and characteristics of those forecasts due to the fundamental relationship that exists between CDS spreads and firm cash flows. Expected default risk, the major determinant of CDS risk premium, is a function of future cash flow volatility (risk), levels, and timing. Therefore, it seems plausible that financial analysts would use private information transmitted by informed investor trading in the CDS market to update their estimates of future cash flows of the reference entity.

Documenting the relation between CDSs and cash flow forecasts also provides insight into analysts' decision process in forecasting cash flows. The CDS market incorporates new information and sometimes non-public information more quickly than the stock market and bond market; therefore, analysts can use the information embedded in CDS contracts to increase their forecasting accuracy. Also, additional information would decrease the disagreement between financial analysts, so financial analysts will have less dispersed cash flows forecasting. Hence, I state the following hypotheses:

H1a: Initiation of CDS contracts improves the accuracy of analysts' cash flow forecasts

H1b: Initiation of CDS contracts reduces the dispersion of analysts' cash flow forecasts

3.2 Hypothesis H2: CDS prices are negatively associated with accuracy of analysts' cash flow forecasts

Information uncertainty in the capital market is negatively correlated with analyst forecast accuracy (Zhang, 2006). Analysts utilize several information sources to mitigate information uncertainty. Studies show that CDS prices impound various type of information about the reference entities, which mitigates information uncertainty in the capital markets. For instance, Ericsson et al. (2009) show that market volatility, firm leverage, and a 10-year T-bill rate explain a significant amount of variation in CDS price. Batta (2011) examines the relevance of accounting information for CDS pricing (change in CDS prices) and finds that accounting information is priced in CDS valuation. Shivakumar et al. (2011) investigate the credit market reaction to manager forecasts by using CDS. They document that CDS prices react to managerial forecasts. Callen et al. (2009) examine the impact of earnings on CDS pricing. They also find that earnings (earnings changes) are correlated with CDS prices (CDS price changes). These

studies show that various type of information is associated with CDS prices. Thus, public and private information affect CDS prices, which are then used to inform analysts.

Information in CDS prices affects several markets, such as the bond market (Acharya and Johnson, 2007) and stock market (Norden and Weber, 2004). Financial institutions use both their private information and information processing advantages to price CDS contracts. Glantz (2003) and Whitehead (2012) argue that changes in CDS pricing provide more timely information about firms' financial performance than the pricing of firms' bonds or equity securities. Also, from the perspective of investors, changes in CDS prices indicate that CDS traders have used non-public information (Standard and Poor's, 2007).

Hull, Predescu, and White (2004) show that CDS prices anticipate credit rating downgrades. Moreover, Acharya and Johnson (2007) and Qiu and Yu (2012) show that CDS prices lead the equity market in price discovery. Acharya and Johnson (2007) show that there is information flow from the CDS market to the equity market; this flow is more significant when the reference entity has a higher number of bank relationships. Blanco et al. (2005) emphasize that price discovery is faster in the CDS market because it is the most convenient market for informed investors to trade credit risk. Thus, CDS prices and CDS price changes likely reflect such investors' expectations about the reference entity's financial condition.

I argue that CDS prices convey information about the distribution of the reference entity's future cash flow because the main concern for the CDS market participant is whether the reference entity sufficiently meets the underlying debt obligations. Specifically, CDS prices reflect the CDS market participants' assessment of the distribution of future cash flows of the reference entity. Thus, high CDS prices indicate either low future cash flows or high uncertainty of future cash flows of the reference entity. High CDS prices reflect that CDS contract participants expect low future cash flows, indicating the reference entity is more risky or may not be able to meet the underlying debt obligations. Also, a high CDS prices increase the expected variance of a firm's future cash flows. The magnitude of price may have different implications on information flows; on average, the CDS price influences forecast accuracy negatively and dispersion positively. I formalize these conjectures as follows:

H2a: CDS prices are negatively associated with accuracy of analysts' cash flow forecasts

H2b: CDS prices are positively associated with the dispersion of analysts' cash flow forecasts

3.3 Hypothesis H3: CDS prices changes are negatively associated with accuracy of analysts' cash flow forecasts

I also examine the information flow from CDS price changes to financial analysts' forecast characteristics (i.e., accuracy and dispersion) because CDS spreads change based on public and non-public information about the reference entity. For example, an increase in CDS prices shows that financial institutions have more negative news about the reference entity (Acharya and Johnson, 2007, Gao et al, 2016). Prior literature has examined whether insiders use their superior future cash flow information in their trading strategies. Piotroski et al. (2005) show that insider trades reflect superior information about future cash flow realization. Moreover, participants in the CDS market trade based on superior future cash flow information. Acharya and Johnson (2007) indicate that information flow from the CDS market to the stock market is greatest when credit deterioration is high or CDS levels are high. Banks and financial institutions use their non-public information, such as timely financial disclosures, covenant compliance information, and financial projections, in their CDS pricing. CDS price changes may reflect non-public information. CDS price changes do not affect future cash flows per se, but they convey information about both the CDS buyer's and the CDS seller's assessment of the distribution of future cash flows. Changes in CDS pricing typically provide more timely feedback on a firm's performance than the pricing of its public debt or equity securities because CDS spreads reflect a substantial amount of private information transmitted by informed investor trading (Glantz, 2003; Whitehead, 2012). A significant

movement in CDS prices without any corresponding news usually serves as an indication to market participants that informed traders have received information that is not yet public (Standard and Poor's, 2007).

I argue that change in price conveys additional information, and financial analysts use this information. CDS prices react to any type of the information, especially the private information. Thus, if there is any change in CDS prices, it means CDS contract counterparties price private information. The sign of price changes may have different implications on information flows; on average, the relation between CDS price change and forecast accuracy would be negative. For example, if CDS price increases, this indicates a higher uncertainty of a firm's future cash flow. Therefore, it means that future cash flows become uncertain and forecasts become harder to make. Also, CDS price change affects the analyst forecast dispersion positively; a higher CDS price means higher uncertainty, resulting in a higher variation among analysts due to the higher variation.

H3a: Changes in CDS prices are negatively associated with accuracy of analysts' cash flow forecast

H3b: Changes in CDS prices are positively associated with the dispersion of analysts' cash flow forecast

4. Sample Selection, Data, and Descriptive Statistics

4.1 Data Sources and Sample Selection

In this study, I investigate the impact of CDS initiation on analyst cash flow forecasting properties. I use forecasting accuracy and dispersion as a dependent variable and initiation of CDS prices as a key independent variable. Also, I add control variables consistent with the literature. Moreover, I examine the relationship between CDS prices and CDS price changes and analyst forecasting properties. In the second part, I use only firms with a traded CDS in order to investigate the information content of CDS prices and CDS price changes.

The data used in this study come from four main sources. First, I obtain CDS price data from Markit from 2001 to 2016. The Markit data provides CDS data from 2001, so I focus on the 2001-2016 period because of data availability. Markit database covers 921 North American CDS firms. Every CDS firm has a different CDS initiation date and a major empirical exercise involves the identification of the firm identifier for each CDS firm because Markit provides CDS data with Markit firm identifier, which doe not match with I/B/E/S, CRSP, or COMPUSTAT. Additionally, analyst forecast information is obtained from the I/B/E/S database. The I/B/E/S database provides monthly analysts cash flow forecasts and there are 7044 firms during the period from 2001 to 2016. The

percentage of U.S. firms with cash flow forecasts has increased from 4% in 1993 to 54% in 2005.[16] Data on firm characteristics is obtained from COMPUSTAT and CRSP.

In the finance and accounting literature, typically use 5-year CDS prices because they are the most liquid prices in the CDS market (for example, Batta et al., 2016, Hull et al, 2005). I also use 5-year CDS prices, but as a robustness test I also use CDS prices from 6-month to 30-year. CDS prices are denominated in basis points. I include all CDS quotes denominated in US dollars. I exclude the subordinated class of contracts in the sample. Additionally, I use CDS contracts with MR clauses[17], which are the most widely traded contracts, in the US market (Zhang et al. 2005). The Markit database provides CDS data with their original Red Code as a firm identifier. I match Markit Red Codes with CRSP Permnos to create a suitable firm identifier. Previous studies use daily changes in CDS prices (Ericsson et al. 2009), or weekly changes (Aunon-Nerin et al. 2002). However, I use quarterly CDS prices because quarterly frequency of financial statement variables.

---

[16] Call et al. 2009, provide more information about analyst cash flow forecasts

[17] Modified Restructuring (MR) is a Credit event clause, which was introduced in the 2001 by ISDA Credit Derivatives Definitions ("The Restructuring Supplement"). Under modified restructuring clause, any restructuring is still defined as a credit event. However, the only difference is deliverable obligations. They are limited to those within 30 months of maturity. (Augustin et al, 2014)

[Table 1]

Table 1 summarizes the sample selection process. For the first part of this study, I focus on the matched sample, which includes CDS firms and non-CDS firms. For the period between 2001 and 2016, I/B/E/S includes 7,044 firms with cash flow forecasts. The number of firms with earnings forecast is larger than the number of firms with cash flow forecasts. After merging I/B/E/S and CRSP, my sample drops to 4,319 firms. I use COMPUSTAT data for firm characteristics, which further restricts my sample to 3,568 firms. Furthermore of these firms, only 719 firms have a traded CDS contract during the period from 2001 to 2016.

In the second part of this study, I focus on firms with a traded CDS in order to examine the relation between CDS prices and analysts' forecasting properties. Using only CDS firms restricts my sample to 719 firms. In this sample, I have firms, which have cash flow forecast, and CDS prices.

4.2 Match Sample

As stated above, a CDS contract is a tool for CDS buyers to transfer their credit risk to CDS sellers. The CDS contract introduction is not assigned randomly; it depends on several firm characteristics, such as leverage, size, and

investment grade. Riskier (larger) firms typically have CDS contracts. Smaller firms with relatively with little debt are less likely to have CDS contracts in the market. To address the potential issue that CDS introduction is nonrandom, I follow the literature and use probit model to predict CDS initiation (Ashcraft and Santos, 2009; Saretto and Tookes, 2013;Subrahmanyam et al., 2014; Kim et al., 2015). I use the determinant variables from Subrahmanyam et al., 2014. The probit model is as follows:

$$Prob(CDS\_dummy=1) = \emptyset(\beta_0 + \beta_1 Investment\_Grade_{t-1} + \beta_2 ROA_{t-1} + \beta_3 Leverage_{t-1} + \beta_4 MB_{t-1} + \beta_5 Size_{t-1} + \beta_6 Return\_Vol_{t-1} + \beta_7 CAPEX_{t-1} + \beta_8 Working\_CAP_{t-1} + \beta_9 RE_{t-1} + \beta_{10} Profit\_Margin_{t-1} + \beta_{11} RD_{t-1} + \beta_{12} PPE_{t-1} + \beta_{13} Asset\_Turnover_{t-1}) + \varepsilon \quad (1)$$

Where CDS dummy is an indicator variable set to 1 for firms with a traded CDS, and zero otherwise; *Investment_Grade* is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; *ROA* is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; *Leverage* is the ratio of firm's total debt to total assets; *MB* is the ratio of the market value of equity to the book value of equity; *Size* is the logarithm of the firm's total assets; *Return_Vol* is the standard

deviation of daily stock returns measure over the quarter; *CAPEX* equals the ratio of the firm's capital expenditures to total assets; *Working_CAP* equals the ratio of the firm's working capital to total assets; *RE* is the ratio of retained earnings to total assets; *Profit_Margin* is net income scaled by total assets. These variables are chosen because they are likely associated with CDS initiation. Equation 1 is estimated using quarterly data for all Compustat firms from 2001-2016.

[Table 2]

Table 2 reports the results of estimating equation 1. The results show that CDS initiation is positively correlated with Investment_Grade, Leverage, Size, and Return_Vol. These results are consistent with the findings in prior literature (Subrahmanyam et al., 2014; Govindaraj et al. 2016). These results suggest that CDS sellers, especially large banks and insurance companies provide CDS contracts for safer firms (relatively higher investment grade and profit margin). Additionally, the regression coefficient on leverage is positive, which shows that CDS buyers' demand CDS contract for highly levered firms. Return volatility is also positively related with CDS initiation, which is also consistent with the literature. Finding positive relationship between CDS initiation and return volatility is due to the hedging demand for credit derivatives.

4.3 Descriptive Statistics

4.3.1 Full Sample

The first part of my analysis investigates the impact of CDS initiation on analysts forecast properties. I use analysts' cash flow forecast accuracy and dispersion as an output of their decision process. I begin with 7044 firms with cash flows forecasts and the sample is firm-quarter observations. Most of the firms do not have CDS contracts in this sample.

Table 3 provides the descriptive statistics for my variables of interest. Table 3, Panel A represents the full sample descriptive statistics. The average (median) firm quarter in the sample has cash flow forecast accuracy that is 4% (2%). The standard deviation of cash flow forecasts equal to 0.9%. The firm-quarter in this sample is followed by 3.5 analysts.

[Table 3]

Table 3, Panels B and C present the descriptive statistics for the CDS firm subsample and non-CDS firm subsample, respectively. The CDS sample is relatively smaller than the non-CDS sample. As shown in Panels B and C, CDS firms have lower forecast accuracy and standard deviation of the forecast. In Panel B, the mean of cash flow forecast accuracy is 2.9% for CDS firms, and in Panel C the mean of cash flow forecast accuracy is 55 for non-CDS firms. The

mean of cash flow forecast dispersion is 1.7% for CDS firms and 2% for non-CDS firms. The results indicate that analysts have more accurate cash flow forecasts for CDS firms than non-CDS firms. Additionally, the mean of dispersion is also smaller in the CDS subsample. These univariate results suggest that CDS contracts reveal additional useful information about the reference entity to the markets. However, CDS firms have higher size, leverage, and ROA. The size of CDS firms is 9.28, but the size of non-CDS firms is 7.60.

4.3.2 Univariate Correlation

Table 4 reports Pearson correlation among variables in Table 3. Consistent with the argument that the correlation between CDS initiation and forecast accuracy is positive correlated. As expected, CDS contracts are negatively correlated with the forecasting dispersion, which means the disagreement among analysts regard to expected cash flows for a given firm decreases with CDS contracts. Consistent with the analysts forecasting literature number of analyst and ROA are positively (negatively) correlated with forecasting error (dispersion).

[Table 4]

Other important control variables for analyst forecast literature are Cash flow surprise, which is negatively (positively) correlated with forecast accuracy

(dispersion). These results are also consistent with the literature. Also, number of analyst following is positively (negatively) correlated with forecast accuracy (dispersion).

5. Empirical Design and Control Variables

5.1. Measurement of analyst forecast accuracy and dispersion

Following Lang and Lundholm, 1996), I measure analyst forecast as follows;

$$Accuracy = (-1)\ x\ \frac{|Median\ Estimate - Actual|}{Price} x100$$

Median estimate is the median estimate of analysts that are providing cash flow forecasts for the firm. Actual is the actual amount of cash flow for each firm quarter. Price is the stock price at the end of each firm quarter. Following Lang and Lundholm (1996), I multiply the absolute forecast error by (-1), so higher values represent more accurate forecasts.

Additionally, following Hope (2002), I measure analyst forecast dispersion for each firm quarter by taking the standard deviation of analyst forecasts for each firm quarter:

$$Dispersion = \frac{Std\ (Analysts' forecasts)}{Price} x100$$

where Dispersion is the disagreements among financial analysts following each firm. Std_{it} (Analysts' forecast) and P_{it} are the standard deviation of cash flow forecasts and price per share for firm i at period t, respectively.

5.2. Research Design

I examine the impact of CDS initiation on properties of analyst cash flow forecasts after controlling for firm characteristics and market variables that are likely to be associated with analyst forecast properties. I employ a difference-in-difference design in a panel data setting with quarterly observations to examine the relation between CDS initiation and analyst forecast properties. The main variable of interest, CDS_dummy, captures the effect of CDS trading on analyst forecast properties. Additionally, I include firm control variables that have been shown to explain analyst behavior along with time and industry fixed effects. I also cluster standard errors at the firm level. The model is as follows:

$$Accuracy\ (Dispersion) = \beta_0 + \beta_1\ CDS\_dummy + \beta_2 \sum_{n=1}^{14} Control\ Variables\ + \beta_3 \sum_{i=1}^{K} Time\ FE + \sum_{j=1}^{K} Industry\ FE + \varepsilon \quad (2)$$

where Accuracy (Dispersion) are defined as explained above. Dispersion is the analysts forecast dispersion, which is the standard deviation of analysts' forecasts divided by lag prices. I test whether β_1 is significantly different from zero. Following Saretto and Tookes (2013), I include industry fixed effects to control for unobservable time-invariant differences between industries. Since CDS

initiation happens at different time for different firms, both non-CDS firms and the subset of CDS firms for which initiation has not occurred, can serve as the control group in the difference-in-difference method.

To address the potential omitted variable issue, I add several control variables that could affect forecast accuracy and dispersion through CDS initiation. The control variables include *Size, Leverage, Profit_Margin, RE, Cash, Inv_Grade, ROA, MB, CAPEX, Working_CAP, PPE*, *Asset_Turnover*, and RD. Moreover, I add *Return_Vol, Cash_Surprise*, and *No_Analayst*. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t. All these control variables are suggested by previous literature (Batta et al., 2016; Govindaraj et al., 2017; Kim et al., 2015).

Next, I conduct a cross sectional test to examine the association between the CDS price and CDS price changes and forecast properties. The main interested variable is CDS_price in model (3) and CDS_price_change in model (4). CDS_price is the average CDS price for a month before the cash flow information. CDS_price_change is the difference between monthly average CDS prices. I test whether β_1 is significantly different from zero. Additionally, I add all the control variables explained previously. I also add industry and time fixed

effects to control for unobservable time-invariant differences between industries. All standard errors are clustered at the firm level. The models are as follows:

$$Accuracy\ (Dispersion) = \beta_0 + \beta_1\ CDS\_price + \beta_2$$

$$\sum_{n=1}^{14} \text{Control Variables} + \sum_{i=1}^{K} Time\ FE + \sum_{j=1}^{K} Industry\ FE + \varepsilon \quad (3)$$

$$Accuracy\ (Dispersion) = \beta_0 + \beta_1\ CDS\_Price\_Change + \beta_2 +$$

$$\sum_{n=1}^{14} Control\ Variables + \beta_3 \sum_{i=1}^{K} Time\ FE + \sum_{j=1}^{K} Industry\ FE + \varepsilon \quad (4)$$

6. Results

6.1. Results for Hypothesis H1: Initiation of CDS contracts

Table 5, column 1 reports regression results on the change of analysts forecast accuracy around the CDS initiation, and column 2 reports regression results the change of analysts forecast dispersion around the CDS initiation for the full sample. As expected, the coefficient on CDS_dummy is statistically significant and positive in column 1. It is consistent with the Hypothesis 1a, which states that CDS initiation provides additional information that can be used by analysts to provide more accurate cash flow forecasts. As suggested by Hypothesis 1b, the coefficient on CDS_dummy in column 2 is statistically significant and negative. It is consistent with the argument that the standard deviation among analysts' cash flow forecasts should decrease with CDS initiation. Overall, these results support my Hypothesis 1. The results suggest that the CDS market provides additional information, and analysts can benefit by using this additional information in their cash flow forecasts.

For the other control variables, I find results consistent with previous literature (Hope, 2002 and Govindaraj et al., 2017). For instance, the number of analyst following a firm is positively (negatively) correlated with forecast accuracy (dispersion). Return volatility is negatively (positively) associated with forecast accuracy (dispersion) consistent with the argument that firms with higher

certainty have higher volatility, which makes forecasting harder and increases disagreement among financial analysts. As expected the association between cash surprise and forecast accuracy (dispersion) is negative (positive).

[Table 5]

6.1.1. Results for Hypothesis H1: Initiation of CDS contracts with match sample

Next, to address any systematic differences between CDS-firms and non-CDS firms, I use propensity score matching to identify the treatment and control group. Table 6 represents the regression results on the change of analyst forecast properties around the CDS initiation for the matched sample. Table 6, column 1 reports the regression result for forecast accuracy. As discussed in the hypothesis development section, the coefficient for CDS_dummy is positive. It is consistent with the argument that CDS initiation improves the firm's information environment and analysts can benefit from the CDS contracts and provide more accurate cash flow forecasts. Additionally, Table 6, column 2 reports the regression result for forecast dispersion. The coefficient of the interested variable (CDS_dummy) is negative and statistically significant. It is also consistent with the argument that CDS initiation improves and clarifies the firm's information environment and disagreement among analysts become smaller.

Additionally, for other control variables, I also find generally consistent results with previous literature. For instance, number of analyst following is positively (negatively) correlated with forecast accuracy (dispersion), which is consistent with Chang et al. (2015). The coefficient of return volatility is negative in column 1 implying that it is hard for analyst to provide accurate forecast in a high uncertain information environment. Consistent with Batta et al. (2015), investment grade is statistically and negatively related to forecast dispersion. It implies that analysts have less disagreement for firms with less uncertainty.

[Table 6]

6.2. Results for Hypothesis H2: CDS prices

In this section, I examine the effect of CDS prices on forecast accuracy and dispersion. I use cross sectional methodology to test whether the change of analyst forecast accuracy and dispersion varies with different CDS price levels. The interested variable is CDS_price and I expect to find negative (positive) relation between CDS_price and forecast accuracy (dispersion). To examine whether the information provided by CDS prices varies among the CDS firms, I split the whole sample into two subsamples within the CDS firms. I use the CDS_price to split the sample into two groups where CDS_price is equal to 1 if

the CDS price higher than median, zero otherwise. CDS prices provide information about the distribution of future cash flows, so I aim to test whether marginal impact of CDS price on forecast accuracy is different when the CDS price is higher than median. Additionally, following the literature, I use return volatility and size as proxies of information asymmetry to split sample into two groups (Zhang, 2006). The main idea of cross sectional test is to identify whether there is any different effect of CDS prices on forecast properties within the CDS firms.

Table 7; Panel A represents the regression results for forecast accuracy. As expected in the hypothesis 2a, CDS price is negatively related to forecast accuracy. The regression coefficient is -.358 for high CDS firms and -.340 for the low CDS firms. Additionally, I use return volatility and size as proxies to examine the whether the effect of CDS price on forecast accuracy varies among CDS firms. The regression coefficient for CDS price is -0.434 and -0.294 for high and low return volatility, respectively. I also check whether these coefficients are statistically different from each other. The Chi2 results show that the regression coefficients (β_1) in column 1 and 2 are not statistically different from each other. Also, the regression coefficients (β_1) in column 3 and 4, and 5 and 6 are similar to each other. These results show that CDS price levels provide information about the distribution of future cash flows, and this information suggests that cash flow forecasts will become harder, but among firms this information does not vary.

Next in Table 7, Panel B, I use forecast dispersion as a dependent variable to determine if variation in CDS prices affects analyst forecast properties. As expected from Hypothesis 2b, CDS prices are positively related to forecast dispersion. In Column 1 and 2, I use CDS prices to split the sample into two groups. Next, I use return volatility in Colum 3 and 4, and firm size in Colum 5 and 6 to divide the sample into two groups to examine how variation in the CDS prices affect forecast dispersion among CDS firms. I find that the effect of CDS prices on dispersion is higher when CDS prices are low, when low return volatility is low for and small firms. The Chi2 test results show that the CDS price coefficients are statistically different from each other. The results show that higher CDS price is more informative than low CDS price. When CDS price is high analyst dispersion increases.

[Table 7]

6.3. Results for Hypothesis H3: CDS price changes

Following Hypothesis 2, I also examine the effect of CDS price changes on cash flow forecast properties. I use cross sectional methodology to test whether the change of analyst forecast accuracy and dispersion varies with different CDS price change levels. The variable of interest is CDS_price_change and I expect to

find a negative (positive) relation between CDS_price_change and forecast accuracy (dispersion). Cross-sectional analysis splits the whole sample into two subsamples within CDS firms. I use CDS price change to split the sample into two groups where CDS price change is equal to 1 if CDS price change is higher than the median, zero otherwise. Additionally, I use stock return volatility and firm size to split the sample into two groups.

Table 8, Panel A shows the regression results for forecast accuracy. The regression coefficient of CDS_Price_Change (β_1) is negative as expected. The regression coefficient is -.409 for high CDS firms, but 0.0435 for the low CDS firms. The coefficient of CDS price Change in Column 2, for low price change, is not statistically significant. It means that higher change may provide better information about the future cash flows or financial analysts may pay attention to higher CDS price changes. Additionally, I use return volatility and size as proxies to examine whether the effect of CDS price on forecast accuracy varies among CDS firms. The regression coefficient for CDS price is -0.206 and -0.0589 for high and low return volatility, respectively. I also check whether these coefficients are statistically different from each other. The Chi2 results show that the regression coefficients (β_1) in column 1 and 2 are statistically different from each other. The regression results show that CDS price Change is statistically and negatively related to forecast accuracy. Also, the regression coefficients (β_1) in column 3 and 4, and 5 and 6 are similar to each other. These results show that

CDS price provide information about the distribution about the future cash flows and analysts assess information that providing cash flow forecast will become harder, but among firms this information does not vary.

Next in Table 8, Panel B, I use forecast dispersion as a dependent variable to examine variation in the effect of CDS prices on forecast properties. As expected in the Hypothesis 3b, CDS price change is positively related to forecast dispersion. In Columns 1 and 2, I use CDS prices to split the sample into two groups. Next, I use return volatility in Columns 3 and 4, and firm size in Columns 5 and 6 to divide the sample into two groups to examine the variation in the CDS price effect on forecast dispersion among CDS firms. I find that the effect of CDS price is higher with low CDS price, low return volatility, and small firms. The Chi2 test results show that the CDS price coefficients are statistically different from each other. The results show that higher CDS price change is more informative than low CDS price change. When CDS price is increasing the different opinions among analysts will increase.

[Table 8]

7. Additional Analysis

7.1. Using different CDS price maturities

This paper uses 5-year CDS prices in every analysis to be consistent with the prior literature. I use from 1-year CDS spread to 10-year CDS spread in order to examine the fluctuations in different spread maturities. Bhat et al. (2013,2014) also use different CDS price maturities to investigate whether their results change across the CDS price maturities. They find that their results do not change when they change the CDS maturity. However, accounting treatments are more likely to affect shorter CDS maturities, so the information revealed by CDS prices might be different between short maturity CDS and long maturity CDS.

I repeat the analysis from 1 through 4 by using different CDS maturities. The results do not vary across the different CDS maturities. I find that 1-year to 10-year CDS initiations are positively (negatively) related to cash flow forecast accuracy (dispersion). Additionally, I use 1-year to 10-year CDS prices and price changes to repeat the model 3 and model 4. The findings do not change and all CDS maturities provide information about the distribution of the future cash flows.

I do not regress the same models by using other CDS maturities because of several reasons. First, the observation availability for 6-month, 1-year, 2-year, and 4-year is limited. The data is not consistent and there are many missing data

points during the sample. Additionally, I do not use longer CDS maturities because of the information content of the longer maturity spreads.

8. Conclusion

The primary goal of this paper is to examine the information flow from the CDS market to the analyst forecast characteristics. Previous research has analyzed the implications of the initiation of CDS contracts for analysts' earnings forecast characteristics (Batta et al. 2016). Using cash flow forecasts during 2001- 2016, I first analyze the effect of initiation of CDS contracts on analyst cash flow characteristics. Using forecast accuracy and dispersion as a proxy for analyst forecast characteristics, I find that initiation of CDS contracts improves analyst cash flow forecast accuracy and mitigates the disagreements among analysts. These findings are consistent with the argument that the CDS market improves the information environment of the reference entity and analysts can benefit from this additional information.

Next, having confirmed that the CDS market conveys additional information, which is decision useful for financial analysts, I solely focus on firms with CDS contracts. I focus on the CDS prices and CDS price changes because some firms have more constant CDS prices, but some firms have more volatile CDS prices. Thus, I examine how CDS prices and CDS price changes affect analyst forecast characteristics. The results indicate that the information revealed by CDS prices and CDS price changes vary among CDS firms.

Additionally, I use several CDS contracts to confirm whether there is a

change among the different CDS maturities, such as 1-year, 3-year, 7-year, and 10-year. The results are consistent with the main results and using different CDS maturities does not change the main affect. I also examine the effect of CDS initiation and CDS prices and price changes on analysts' earnings forecast characteristics and the results are consistent with the prior literature.

References

Acharya, V.V., and T.C. Johnson, 2007. Insider trading in credit derivatives. Journal of Financial Economics 84(1), 110-141.

Acharya, V.V., and T.C. Johnson, 2010. More insiders, more insider trading: evidence from private equity buyouts. Journal of Financial Economics, 98(3), 500-523.

Augustin, P., Subrahmanyam, M., Tang, D., and Wang, S., 2014. Credit default swaps- A survey. Foundations and Trends in Finance, 1-188.

Ashcraft, A., and J. Santos, 2009. Has the CDS market lowered the cost of corporate debt? Journal of Monetary Economics, 56(4), 514-523.

Aunon-Nerin, D., Cossin, D., Hricko, T., and Huang, Z., 2002. Exploring for the Determinants of Credit Risk in Credit Default Swap Transaction Data: Is Fixed-Income Markets' Information Sufficient to Evaluate Credit Risk? FAME Research Paper, 65.

Barron, O., O.Kim, S.C. Lim, and D. E. Stevens, 1998. Using analysts' forecasts to measure properties of analysts' information environment. The Accounting Review, 73(4), 421-433.

Batta, G., 2011. The direct relevance of accounting information for credit default swap pricing. Journal of Business Finance and Accounting, 38(9&10), 1096-1122.

Batta, G, 2016. Credit derivatives and analyst behavior. The Accounting Review, 91(5), 1315-1343.

Bhat, G., Callen, J., Segal, D., 2015. Testing the transparency implications of mandatory IFRS adoption: The price/maturity relation of credit default swaps. Working paper.

Blanco, R., Brennan, S., and Marsh, I. W., 2005. An empirical analysis of the dynamic relation between investment-grade bonds and credit default swaps. The Journal of Finance, 60(5), 2255-2281.

Berndt, A., and Ostrovnaya, A., 2007. Information Flow Between Credit Default Swap, Options, and Equity Markets. Working Paper, Carnegie Mellon University.

Bomfim, Antulio N. Understanding credit derivatives and related instruments. San Diego: Elsevier Academic Press, 2005.

Brown, L., 1993. Earnings forecasting research: its implications for capital markets research. International Journal of Forecasting, 9(3), 295-320.

Call, C. Andrew, Chen, S., and Tong, Y., 2009. Are analysts' earnings forecasts more accurate when accompanied by cash flow forecasts? Review of Accounting Studies, 14(2&3), 358-391.

Callen, J. L., J. Livnat, and D. Segal, 2009. The impact of earnings on the pricing of credit default swaps. The Accounting Review, 84(5), 1363-1394.

Chava, S., and R. Jarrow, 2004. Bankruptcy prediction with industry effects. Review of Finance, 8(4), 537-569.

Chava, S., Ganduri, R., Ornthanalai, C., 2012. Are credit ratings still relevant? Working paper.

Chang, H., Donohoe, M., Sougiannis, T., 2016. Do analysts understand the economic and reporting complexities of derivatives? Journal of Accounting and Economics, 61(2&3), 584-604.

Cheong, F. S., and J.Thomas, 2011. Why do EPS forecast error and dispersion not vary with scale? Implications for analyst and managerial behavior. Journal of Accounting Research, 49(2), 359-40.

Clement, M. B. 1999. Analyst forecast accuracy: Do ability, resources, and portfolio complexity matter?. Journal of Accounting and Economics, 27(3), 285-303.

Das, S., P.Hanouna, and A. Sarin, 2009. Accounting-based versus market-based cross-sectional models of CDS prices. Journal of Banking and Finance, 33(4), 719-730.

Das, S., M.Kalimipalli, and S. Nayak, 2014. Does CDS trading improve the market for corporate bonds? Journal of Financial Economics, 111(2), 495-525.

DeFond, M., Hung, M., 2003. An empirical analysis of analysts' cash flow forecasts. Journal of Accounting and Economics, 35(1), 73-100.

Dhole, S., Mishra, S., Pal, A., 2014. Are Analysts' Cash Flow Forecasts Important? Another Examination. Working Paper

Ericsson, J., Jacobs, K., and Oviedo, R., 2009. The determinants of credit default swap premia. Journal of Financial and Quantitative Analysis, 44(1), 109-132.

Financial Times, 2005, Banks warned about insider trading in credit derivatives, April 25.

Flannery, M., et al. 2010. CDS prices as viable substitutes for credit ratings. University Pennsylvania Law Review, 158(7), 2085-2123.

Givoly, D., Hayn, C., Lehavy, R., 2009. The Quality of Analysts' Cash Flow Forecasts. The Accounting Review, 84(6), 1877-1911.

Glantz, Morton. Managing Bank Risk: An introduction to broad-base credit engineering. Vol. 1. Academic press, 2003.

Greatrex, C.A., 2009. The credit default swap market's reaction to earnings announcements. Journal of Applied Finance, 19(1&2), 193-216.

Griffin, P., 2014. The market for credit default swaps: new insights into investors'

use of accounting information. Accounting and Finance, 54, 847-883.

Govindaraj, S., Li, Y., Zhao, C., and Zhonh, Z., 2017. The Effects of Credit Default Swaps Trading on Analyst Forecasts. Working Paper.

Hong, H., Ryou, J., and Srivastava, A., 2016. You Blinked: The Role and Incentives of Managers in Increasing Corporate Risks Following the Inception of Credit Default Swap Trade. Tuck School of Business Working Paper.

Hope, O., 2002. Disclosure practices, enforcement of accounting standards, and analysts' forecast accuracy: an international study. Journal of Accounting Research, 41(2), 235-272.

Hull, J., Predescu, M., White, A., 2004. The relationship between credit default swap prices, bond yields, and credit rating announcements. Journal of Banking and Finance, 28(11), 2789-2811.

Ivashina, V., and D. S. Scharfstein, 2010. Bank lending during the financial crisis of 2008. Journal of Financial Economics, 97, 319-338.

Ivashina, V., and Sun, Z., 2011. Institutional stock trading on loan market information. Journal of Financial Economics, 100(2), 284-303.

Kaplan, R. 2011. Accounting scholarship that advances professional knowledge and practice. The Accounting Review, 86(2), 367-383.

Kim, J. B., P. Shroff, D.Vyas, and R.Wittenberg-Moerman, 2015. Active CDS trading and managers' voluntary disclosure, Working paper, University of Chicago.

Lang, H., Lundholm, R., 1996. Corporate disclosure policy and analyst behavior. The Accounting Review, 71(4), 467-492

Longstaff, F., S.Mithal, and E. Neis, 2005. Corporate yield prices: Default risk or liquidity? New evidence from the credit default swap market. Journal of Finance, 60, 2213-2253.

Massa, M., and Rehman, Z., 2008. Information flows within financial conglomerates: Evidence from the banks–mutual funds relation. Journal of Financial Economics, 89(2), 288-306.

Norden, L. and M. Weber, 2004. The Comovement of Credit Default Swap, Bond and
Stock Markets: An Empirical Analysis, Centre for Economic Policy Research.

Oehmke, M., and A. Zawadowski, 2013. The anatomy of the CDS market, Working paper, Columbia University.

Qiu, J., and F.Yu, 2012. Endogenous liquidity in credit derivatives. Journal of Financial Economics, 103, 611-631.

Piotroski, J., and Raulstone, D., 2005. Do insider trades reflect both contrarian beliefs and superior knowledge about future cash flow realizations? Journal of Accounting and Economics, 39(1), 55-81.

Saretto, A., and H. E.Tookes, 2013. Corporate leverage, debt maturity, and credit supply: The role of credit default swaps. Review of Financial Studies, 26, 1190-1247.

Shipper, K., 1991. Analysts' forecasts. Accounting Horizon, 5, 105-131.

Standard and Poor's, 2007. A Guide to the Loan Market, New York: Standard and Poor's.

Stulz, R. M., 2010. Credit Default Swaps and the Credit Crisis. The Journal of Economic Perspectives, 24(1), 73.

Subrahmanyam, M., D.Tang, and S.Wang, 2014. Does the tail wag the dog? The effect of credit default swaps on credit risk. The Review of Financial Studies, 27(10), 2927-2960.

Tang, D. Y. and H. Yan, 2007. Liquidity and Credit Default Swap Spreads,

Working
paper, Kennesaw State University and University of South Carolina.

The Economist, 2003, Pass the parcel – Credit derivatives, January 18.

Whitehead, C. K., 2012. Creditors and debt governance. Research Handbook On The Economics Of Corporate Law, Claire Hill and Brett McDonnell, eds., Edward Elgar Publishing, 011-04.

Zhang, B. Y., Zhou, H., and Zhu, H., 2009. Explaining credit default swap spreads with the equity volatility and jump risks of individual firms. Review of Financial Studies, 22(12), 5099-5131.

Zhang, X. F., 2006. Information Uncertainty and Analyst Forecast Behavior. Contemporary Accounting Research, 23(2), 565-590.

Table 1: Sample Selection

This table represents the sample selection process

	# of firms
(1) Observations with I/B/E/S from 2001 to 2016	14254
(2) Firms with CPS	7044
(3) After merging IBES-CDS-CRSP-COMP	3568
Firms with CDS contracts	719

Table 2: Logistic regression results on probability of CDS initiation

	Dependent Variable=Prob(CDS_dummy=1)	
Variable	Coeff. Est	p-value
Inv_Grade	1.796***	(0.152)
ROA	-6.307***	(1.948)
Leverage	1.179***	(0.391)
MB	-0.00940	(0.00967)
Size	0.557***	(0.0588)
Return_Vol	4.541***	(1.575)
CAPEX	-0.301	(0.429)
Working_CAP	-0.161	(0.407)
RE	0.215	(0.139)
Profit_Margin	0.627***	(0.182)
RD	4.848	(4.459)
PPE	0.683***	(0.159)
Asset_Turnover	1.533***	(0.359)
Constant	-12.01***	(1.174)
Time FE	Yes	Yes
Industry FE	Yes	Yes
Pseudo R-Square	0.3233	0.3233
Likelihood Ratio	-17351.09	-17351.09
Observations	48,197	48,197

This table reports coefficient estimates for a logistic model to predict the initiation of CDS trading. The sample period is from 2001 to 2016 and the regression is based on the data at firm-quarter level. The dependent variable, CDS_dummy, is equal to 1 if there is a traded CDS contract, and 0 otherwise. Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets. (*** significant at 1% level, ** significant at 1% level, and * significant at 10% level)

Table 3: Descriptive Statistics

Panel A: Full Sample

Variable	Count	Mean	Median	Std. dev	P25	P75
Accuracy	50,092	-0.04	-0.02	0.09	-0.04	-0.01
Dispersion	33,189	0.02	0.01	0.04	0.00	0.02
CDS_dummy	50,092	0.22	0.00	0.41	0.00	0.00
Size	50,092	7.96	7.94	1.64	6.81	9.07
ROA	50,092	0.01	0.01	0.04	0.00	0.02
Leverage	50,092	0.25	0.23	0.20	0.09	0.36
MB	50,092	3.28	2.36	4.23	1.46	3.87
RD	50,092	0.01	0.00	0.02	0.00	0.01
Cash	50,092	0.09	0.04	0.13	0.00	0.13
CAPEX	50,092	0.33	0.24	0.27	0.10	0.53
PPE	50,092	0.46	0.31	0.48	0.00	0.79
Working_Cap	50,092	0.20	0.16	0.21	0.04	0.31
Profit_Margin	50,092	-0.06	0.06	1.21	0.02	0.12
RE	50,092	0.08	0.21	0.83	0.02	0.40
Asset_Turnover	50,092	0.25	0.20	0.19	0.12	0.32
Rating	50,092	0.58	1.00	0.49	0.00	1.00
Inv_Grade	50,092	0.39	0.00	0.49	0.00	1.00
Cash_Surprise	37,387	0.05	0.02	0.08	0.01	0.05
Return_Vol	50,091	0.03	0.02	0.02	0.02	0.03
No_Analyst	50,092	3.46	2.00	3.99	1.00	4.00

This table reports sample mean and median for main variables for full sample. Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets.

Panel B: CDS Firms

Variable	Count	Mean	Median	Std. dev	P25	P75
Accuracy	10806	-0.029	-0.013	0.060	-0.030	-0.005
Dispersion	8566	0.017	0.010	0.025	0.005	0.020
Size	10806	9.283	9.192	1.054	8.521	10.000
ROA	10806	0.015	0.015	0.022	0.007	0.025
Leverage	10806	0.273	0.256	0.144	0.172	0.358
MB	10806	3.279	2.473	3.670	1.626	3.724
RD	10806	0.005	0.000	0.011	0.000	0.007
Cash	10806	0.054	0.028	0.069	0.000	0.083
CAPEX	10806	0.350	0.287	0.243	0.144	0.551
PPE	10806	0.548	0.510	0.442	0.139	0.888
Working_Cap	10806	0.130	0.115	0.144	0.019	0.224
Profit_Margin	10806	0.072	0.068	0.187	0.028	0.118
RE	10806	0.283	0.292	0.309	0.124	0.448
Asset_Turnover	10806	0.271	0.218	0.197	0.138	0.333
Rating	10806	0.981	1.000	0.135	1.000	1.000
Inv_Grade	10806	0.836	1.000	0.370	1.000	1.000
Cash_Surprise	9243	0.039	0.018	0.069	0.007	0.043
Return_Vol	10806	0.021	0.018	0.014	0.013	0.026
No_Analyst	10806	4.273	3.000	4.800	2.000	4.000

This table reports sample mean and median for main variables for CDS firms. Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets.

Panel C: Non-CDS Firms

Variable	Count	Mean	Median	Std. dev	P25	P75
Accuracy	39286	-0.05	-0.02	0.10	-0.04	-0.01
Dispersion	24623	0.02	0.01	0.04	0.00	0.02
Size	39286	7.60	7.54	1.59	6.54	8.51
ROA	39286	0.01	0.01	0.04	0.00	0.02
Leverage	39286	0.24	0.22	0.21	0.05	0.36
MB	39286	3.28	2.32	4.37	1.42	3.93
RD	39286	0.01	0.00	0.02	0.00	0.01
Cash	39286	0.10	0.05	0.14	0.00	0.15
CAPEX	39286	0.32	0.22	0.27	0.09	0.52
PPE	39286	0.43	0.26	0.48	0.00	0.74
Working_Cap	39286	0.21	0.18	0.22	0.04	0.35
Profit_Margin	39286	-0.10	0.06	1.36	0.01	0.13
RE	39286	0.03	0.18	0.92	-0.02	0.38
Asset_Turnover	39286	0.25	0.19	0.19	0.12	0.32
Rating	39286	0.47	0.00	0.50	0.00	1.00
Inv_Grade	39286	0.27	0.00	0.44	0.00	1.00
Cash_Surprise	28144	0.05	0.02	0.09	0.01	0.05
Return_Vol	39285	0.03	0.02	0.02	0.02	0.03
No_Analyst	39286	3.23	2.00	3.71	1.00	4.00

This table reports sample mean and median for main variables for non-CDS firms. Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets.

Table 4: Pearson Correlation

Accuracy	Dispersion	CDS_dummy	Rating	Inv_Grade	ROA	Leverage	MB	Size
1								
-0.5597*	1							
0.0756*	-0.0738*	1						
0.0309*	0	0.4247*	1					
0.1527*	-0.1568*	0.4810*	0.6763*	1				
0.2125*	-0.2601*	0.0654*	0.0486*	0.1353*	1			
-0.1600*	0.1871*	0.0692*	0.3714*	0.0609*	-0.1551*	1		
0.1261*	-0.1493*	0	-0.0588*	0.0137*	0.0963*	-0.0494*	1	
0.1017*	-0.0488*	0.4219*	0.6084*	0.6192*	0.1635*	0.1954*	-0.0591*	1
-0.0447*	0.0966*	0.0416*	0.1547*	0.0574*	-0.0140*	0.2839*	-0.1260*	0.1336*
0.0483*	-0.0851*	-0.1653*	-0.3782*	-0.2680*	0.0225*	-0.4220*	0.1059*	-0.4124*
-0.5066*	0.3658*	-0.0594*	-0.0254*	-0.1852*	-0.1671*	0.1684*	-0.1118*	-0.1104*
0.1120*	-0.1379*	0.1258*	0.1422*	0.2114*	0.4528*	-0.1463*	-0.0174*	0.2868*
0.0924*	-0.1149*	0.0579*	0.0939*	0.0948*	0.5489*	-0.0471*	-0.0395*	0.1724*
-0.3078*	0.3047*	-0.1579*	-0.1875*	-0.3161*	-0.2398*	0.0283*	-0.0700*	-0.3240*
0.0946*	-0.0469*	0.1073*	0.1865*	0.1835*	0.0325*	0.0279*	-0.0118*	0.2810*
-0.0244*	0.0733*	0.1023*	0.1853*	0.1141*	-0.0210*	0.2182*	-0.0929*	0.1418*
0.0172*	-0.0215*	-0.1550*	-0.2951*	-0.2151*	-0.0653*	-0.2370*	0.1387*	-0.2791*
0.0234*	-0.0472*	-0.0895*	-0.2516*	-0.1489*	-0.3077*	-0.1855*	0.1710*	-0.2562*
0	-0.0269*	0.0554*	-0.0394*	0	0.2186*	-0.1644*	0.0591*	-0.1002*

Table 4: (Continued)

Capex	WorkCap	Cash_Surprise	RE	Profit_Margin	Return_Vol	No_analyst	PPE	Cash	RD	Asset_Turnover
1										
-0.4900*	1									
0.1070*	-0.0296*	1								
0.0671*	-0.1040*	-0.1464*	1							
0.0415*	-0.1281*	-0.0780*	0.3553*	1						
0	0.0975*	0.2206*	-0.2054*	-0.1418*	1					
0.3771*	-0.1943*	-0.0308*	0.0748*	0.0437*	-0.0540*	1				
0.7161*	-0.3612*	0.0848*	0.0464*	0.0321*	-0.0283*	0.3282*	1			
-0.3022*	0.5059*	0.0224*	-0.2248*	-0.1542*	0.1004*	-0.0964*	-0.2263*	1		
-0.3192*	0.4057*	-0.0288*	-0.4628*	-0.3154*	0.1039*	-0.1172*	-0.2278*	0.3756*	1	
-0.1899*	0.1117*	0.0385*	0.1175*	0.1163*	0	-0.1900*	-0.1314*	0	-0.1324*	1

This table reports Pearson correlation among variables used in the empirical analysis. The sample period is 2001-2016. Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. The dependent variable in column 2 is Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total ass

Table 5: The relation between CDS initiation and Analyst forecast properties

	Accuracy		Dispersion	
Variable	Coeff. Est.	p-value	Coeff. Est.	p-value
CDS_dummy	0.00429***	(0.00161)	-0.00243***	-(0.000801)
Rating	0.00115	(0.00289)	0.000520	(0.00145)
Inv_Grade	0.00340	(0.00253)	-0.00577***	(0.00122)
ROA	0.307***	(0.0311)	-0.189***	(0.0163)
Leverage	-0.0370***	(0.00559)	0.0171***	(0.00308)
MB	0.00117***	(0.000164)	-0.000595***	(8.38e-05)
Size	0.000169	(0.000771)	0.00216***	(0.000376)
CAPEX	0.00693	(0.00756)	-0.00245	(0.00357)
Working_CAP	0.0141***	(0.00527)	-0.00562**	(0.00274)
PPE	0.000589	(0.00276)	0.00120	(0.00137)
Cash	0.0152**	(0.00688)	0.000949	(0.00309)
RD	0.187***	(0.0606)	-0.0925***	(0.0286)
Profit_Margin	-0.000145	(0.00119)	7.88e-05	(0.000451)
RE	-0.00185	(0.00158)	-0.000181	(0.000684)
Asset_Turnover	-0.00967*	(0.00542)	0.00933***	(0.00275)
Return_Vol	-1.225***	(0.0687)	0.527***	(0.0300)
Cash_Surprise	-0.358***	(0.0249)	0.111***	(0.0114)
No_Analyst	0.00202***	(0.000251)	-0.000399***	(0.000100)
Constant	-0.0508	(0.0665)	-0.0100**	(0.00444)
Time FE	Yes		Yes	
Industry FE	Yes		Yes	
Observations	50,077		33,178	
R-squared	0.259		0.244	

This table represents the multivariate result of CDS initiation on analyst forecast properties (accuracy, dispersion). The dependent variable in column 1 is Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. The dependent variable in column 2 is Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets. (*** significant at 1% level, ** significant at 1% level, and * significant at 10% level).

Table 6: Propensity Score Matching Analysis

Variable	Accuracy Coeff. Est.	p-value	Dispersion Coeff. Est.	p-value
CDS_dummy	0.00424***	(0.00144)	-0.00321***	(0.000812)
Rating	0.00692**	(0.00281)	-0.000766	(0.00154)
Inv_Grade	-0.00109	(0.00241)	-0.00431***	(0.00125)
ROA	0.239***	(0.0322)	-0.178***	(0.0176)
Leverage	-0.0311***	(0.00547)	0.0185***	(0.00323)
MB	0.000798***	(0.000183)	-0.000568***	(8.79e-05)
Size	-0.00142*	(0.000740)	0.00233***	(0.000397)
CAPEX	0.0126*	(0.00678)	-0.00294	(0.00369)
Working_CAP	0.0131***	(0.00492)	-0.00486*	(0.00292)
PPE	-0.000522	(0.00292)	0.00145	(0.00140)
Cash	0.0165**	(0.00698)	0.00163	(0.00331)
RD	0.114*	(0.0665)	-0.0732**	(0.0304)
Profit_Margin	-0.000279	(0.00149)	7.57e-05	(0.000520)
RE	-0.00398**	(0.00198)	0.000620	(0.000611)
Asset_Turnover	-0.00425	(0.00519)	0.00935***	(0.00291)
Return_Vol	-1.097***	(0.0795)	0.512***	(0.0323)
Cash_Surprise	-0.424***	(0.0258)	0.120***	(0.0121)
No_Analyst	0.00134***	(0.000235)	-0.000297***	(0.000104)
Constant	0.0407***	(0.00905)	-0.0132***	(0.00478)
Time FE	Yes		Yes	
Industry FE	Yes		Yes	
Observations	37,379	37,379	27,850	27,850
R-squared	0.347	0.347	0.270	0.270

This table represents the multivariate result of CDS initiation on analyst forecast properties (accuracy, dispersion) by using the propensity score matching. The dependent variable in column 1 is Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. The dependent variable in column 2 is Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets. (*** significant at 1% level, ** significant at 1% level, and * significant at 10% level).

Table 7: The relation between CDS prices and Analyst Forecast Properties

Panel A: CDS prices and Cash flow forecast accuracy

VARIABLES	(1) High CDS	(2) Low CDS	(3) High Volatility	(4) Low Volatility	(5) Large Firm	(6) Small Firm
CDS_Price	-0.358***	-0.340***	-0.434***	-0.294***	-0.466**	-0.492***
	(0.100)	(0.127)	(0.105)	(0.0960)	(0.187)	(0.0932)
Rating	-0.0390***	0.00579	-0.00994	0.00243	0.00544	0.00146
	(0.0133)	(0.00503)	(0.0106)	(0.00473)	(0.00659)	(0.00665)
Inv_Grade	-0.00392	-0.000449	-0.00274	0.000725	-0.00417	-0.00329
	(0.00424)	(0.00446)	(0.00440)	(0.00320)	(0.00669)	(0.00366)
ROA	0.583***	0.147***	0.543***	0.0637	0.255***	0.225***
	(0.152)	(0.0353)	(0.115)	(0.0473)	(0.0724)	(0.0856)
Leverage	-0.0387**	-0.00108	-0.0300**	-0.000479	-0.00311	-0.0178*
	(0.0164)	(0.00562)	(0.0143)	(0.00564)	(0.00915)	(0.00986)
MB	0.00188***	0.000416***	0.00162***	0.000388***	0.000605	0.000683***
	(0.000565)	(0.000136)	(0.000459)	(0.000142)	(0.000395)	(0.000250)
Size	0.00302	0.000407	0.00117	0.000632	2.98e-05	0.000233
	(0.00224)	(0.000500)	(0.00144)	(0.000604)	(0.00106)	(0.00222)
CAPEX	-0.000840	-0.00166	0.00548	0.00144	-0.00588	0.00294
	(0.0118)	(0.00395)	(0.0107)	(0.00465)	(0.00576)	(0.00885)
Working_CAP	0.0295	-0.00154	-0.00141	0.00629	-0.00309	0.00980
	(0.0218)	(0.00449)	(0.0120)	(0.00541)	(0.00677)	(0.00866)
PPE	-0.00242	0.000388	-0.00301	0.000117	0.00175	-0.00151
	(0.00436)	(0.00142)	(0.00330)	(0.00164)	(0.00189)	(0.00290)

Cash	-0.0298	0.0123*	0.00813	0.00481	0.0209**	0.00226
	(0.0274)	(0.00651)	(0.0174)	(0.00631)	(0.00811)	(0.0135)
RD	-0.314	0.00514	-0.217	-0.0544	-0.101	-0.0700
	(0.312)	(0.0440)	(0.186)	(0.0453)	(0.0720)	(0.122)
Profit_Margin	-0.0388**	0.00275	-0.0414***	0.0106	-0.000147	-0.0106
	(0.0197)	(0.00643)	(0.0153)	(0.00844)	(0.00874)	(0.0144)
RE	0.00909	-0.00119	0.00170	0.000665	0.000312	0.00105
	(0.00650)	(0.00154)	(0.00411)	(0.00167)	(0.00249)	(0.00312)
Asset_Turnover	-0.0174	-0.00955**	-0.0230***	-0.00565	-0.0131**	-0.00774
	(0.0133)	(0.00374)	(0.00865)	(0.00491)	(0.00511)	(0.00827)
Return_Vol	-0.699***	-0.150***	-0.613***	-0.212**	-0.201**	-0.588***
	(0.133)	(0.0401)	(0.128)	(0.0865)	(0.0856)	(0.118)
Cash_Surprise	-0.171***	-0.259***	-0.186***	-0.281***	-0.221***	-0.212***
	(0.0289)	(0.0278)	(0.0270)	(0.0244)	(0.0322)	(0.0264)
No_Analyst	0.00116**	0.000207	0.000311	0.000356**	0.000279	0.000573*
	(0.000469)	(0.000135)	(0.000281)	(0.000153)	(0.000183)	(0.000322)
Constant	0.0167	-0.0172**	0.0211	-0.0181**	-0.00736	0.00398
	(0.0293)	(0.00686)	(0.0185)	(0.00843)	(0.0123)	(0.0210)
Chi2	0.02		1.74		0.03	
Prob >chi2	0.8848		0.1875		0.8679	
Observations	2,357	6,895	3,043	6,209	4,673	4,579
R-squared	0.342	0.257	0.359	0.328	0.347	0.381

Panel B: CDS prices and Cash flow forecast dispersion

VARIABLES	(1) High CDS	(2) Low CDS	(3) High Volatility	(4) Low Volatility	(5) Large Firm	(6) Small Firm
CDS_price	0.186***	0.429***	0.206***	0.329***	0.133*	0.338***
	(0.0708)	(0.0979)	(0.0718)	(0.0591)	(0.0689)	(0.0693)
Rating	0.0222**	0.000613	0.00296	0.000290	0.00864	-0.000666
	(0.0102)	(0.00315)	(0.00408)	(0.00308)	(0.00573)	(0.00310)
Inv_Grade	-0.00317	-0.000835	-0.00314	-0.00144	-0.0139***	0.00284
	(0.00262)	(0.00275)	(0.00281)	(0.00210)	(0.00444)	(0.00218)
ROA	-0.298***	-0.0911***	-0.290***	-0.113***	-0.186***	-0.181***
	(0.0711)	(0.0275)	(0.0613)	(0.0300)	(0.0471)	(0.0452)
Leverage	0.00559	0.00816**	0.0124	0.00599	0.00804	0.00701
	(0.0103)	(0.00351)	(0.00840)	(0.00377)	(0.00730)	(0.00532)
MB	-0.000845**	-0.000307***	-0.00106***	-0.000336***	-0.000691***	-0.000350**
	(0.000355)	(8.93e-05)	(0.000285)	(9.81e-05)	(0.000236)	(0.000144)
Size	0.00305*	0.00127***	0.00104	0.00112**	0.00116	-0.000722
	(0.00157)	(0.000374)	(0.000933)	(0.000440)	(0.000734)	(0.00144)
CAPEX	0.00191	0.00344	-0.00167	0.00186	0.00481	0.000611
	(0.00979)	(0.00293)	(0.00835)	(0.00335)	(0.00517)	(0.00571)
Working_Cap	-0.0169	0.00195	-0.0144*	0.000361	-0.00180	-0.00857
	(0.0131)	(0.00281)	(0.00745)	(0.00309)	(0.00428)	(0.00543)
PPE	0.00148	0.000859	0.00296	0.000810	0.00150	-0.000210
	(0.00252)	(0.00102)	(0.00232)	(0.00102)	(0.00146)	(0.00186)
Cash	0.0186	0.00126	0.00697	0.00563	0.0135*	0.00150
	(0.0151)	(0.00435)	(0.00898)	(0.00470)	(0.00722)	(0.00720)

RD	0.384**	0.0367	0.211**	0.0713**	0.0614	0.159**
	(0.163)	(0.0349)	(0.0947)	(0.0341)	(0.0542)	(0.0673)
Profit_Margin	0.00649	-0.00442	0.0113	-0.00217	-0.00521	0.0118**
	(0.00924)	(0.00516)	(0.0112)	(0.00479)	(0.00761)	(0.00593)
RE	0.00303	-0.00232	0.00352	-0.00369***	-0.00269	-0.000493
	(0.00494)	(0.00149)	(0.00262)	(0.00132)	(0.00219)	(0.00194)
Asset_Turnover	0.0261***	0.00559**	0.0221***	0.00658**	0.00908**	0.0148***
	(0.00884)	(0.00277)	(0.00567)	(0.00286)	(0.00452)	(0.00478)
Return_Vol	0.254***	0.0561**	0.298***	0.114**	0.154***	0.209***
	(0.0574)	(0.0251)	(0.0501)	(0.0565)	(0.0405)	(0.0461)
Cash_Surprise	0.0409***	0.0407***	0.0629***	0.0400***	0.0526***	0.0541***
	(0.0135)	(0.0122)	(0.0150)	(0.0111)	(0.0168)	(0.0149)
No_Analyst	-0.000136	-0.0000452	0.0000199	0.000046	-0.000058	0.00006
	(0.000253)	(9.31e-05)	(0.000166)	(0.000103)	(0.000139)	(0.000155)
Constant	-0.0380**	-0.0119***	-0.0172*	-0.00869*	-0.00433	0.00298
	(0.0184)	(0.00441)	(0.00973)	(0.00489)	(0.00866)	(0.0125)
Chi2	10.17		3.63		8.57	
Prob >chi2	0.0014		0.0568		0.0034	
Observations	1,881	5,820	2,456	5,245	4,135	3,566
R-squared	0.335	0.171	0.373	0.226	0.323	0.379

Table 7: (continued)

This table compares the subsample relations between CDS prices and forecast properties by using CDS firms. The subsample is split based on the median of three control variables. Panel A and B represent the subsample analysis for based on CDS prices, Return_Vol, and Size. The dependent variable in Panel is Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. The dependent variable in Panel B is Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. CDS_price is the average CDS prices for a month for each firm before the cash flow information. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets. The sample period is from 2001 to 2016, based on firm-quarter observations. Year and Industry fixed effects are included, and standard errors are clustered at firm level. (*** significant at 1% level, ** significant at 1% level, and * significant at 10% level).

Table 8: The relation between CDS price changes and Analyst Forecast Properties

Panel A: CDS price changes and Cash flow forecast accuracy

VARIABLES	(1) High CDS Change	(2) Low CDS Change	(3) High Volatility	(4) Low Volatility	(5) Large Firm	(6) Small Firm
CDS_Price_Change	-0.409***	0.0435	-0.206***	-0.0589	-0.326**	-0.187***
	(0.120)	(0.0781)	(0.0657)	(0.0901)	(0.142)	(0.0676)
Rating	-0.00747	8.28e-05	-0.0145	-0.000797	-0.00605	-0.00159
	(0.0109)	(0.00759)	(0.0111)	(0.00516)	(0.00477)	(0.00715)
Inv_Grade	0.00149	0.00654**	0.00352	0.00532*	0.00753	0.00214
	(0.00473)	(0.00259)	(0.00411)	(0.00286)	(0.00467)	(0.00372)
ROA	0.280***	0.241***	0.570***	0.0891*	0.242***	0.308***
	(0.0863)	(0.0770)	(0.123)	(0.0479)	(0.0717)	(0.0883)
Leverage	-0.0180	-0.0211***	-0.0484***	-0.00643	-0.0102	-0.0335***
	(0.0118)	(0.00730)	(0.0158)	(0.00577)	(0.00871)	(0.0118)
MB	0.00107***	0.000724***	0.00209***	0.000467***	0.000924**	0.000960***
	(0.000376)	(0.000244)	(0.000504)	(0.000155)	(0.000380)	(0.000312)
Size	0.00129	0.000671	0.00139	0.000766	0.000567	0.000655
	(0.000997)	(0.000633)	(0.00151)	(0.000588)	(0.000992)	(0.00265)
CAPEX	-0.00396	0.00224	-0.00324	0.00165	-0.00305	-0.00368
	(0.00914)	(0.00672)	(0.0108)	(0.00471)	(0.00544)	(0.00954)
Working_CAP	0.00980	-0.00155	-0.000445	0.00449	-0.00372	0.0105
	(0.00855)	(0.00716)	(0.0129)	(0.00538)	(0.00662)	(0.01000)
PPE	-0.00183	-0.000428	-0.00207	0.000246	0.00125	-0.00140

	(0.00300)	(0.00200)	(0.00341)	(0.00166)	(0.00187)	(0.00323)
Cash	0.0134	-0.00289	0.00584	-0.00148	0.0111	-0.00361
	(0.0128)	(0.0104)	(0.0184)	(0.00617)	(0.00832)	(0.0144)
RD	-0.198	-0.0523	-0.309	-0.0427	-0.0933	-0.113
	(0.134)	(0.0811)	(0.225)	(0.0468)	(0.0748)	(0.158)
Profit_Margin	-0.00314	-0.0128	-0.0363**	0.00938	0.00621	-0.0124
	(0.0105)	(0.0138)	(0.0155)	(0.00871)	(0.00912)	(0.0149)
RE	0.00415	-0.000689	0.00638	0.000980	0.00162	0.00358
	(0.00325)	(0.00229)	(0.00461)	(0.00167)	(0.00255)	(0.00347)
Asset_Turnover	-0.00898	-0.0185***	-0.0236***	-0.00696	-0.00976*	-0.0127
	(0.00673)	(0.00672)	(0.00859)	(0.00495)	(0.00496)	(0.00812)
Return_Vol	-0.524***	-0.186	-0.762***	-0.293***	-0.256***	-0.758***
	(0.0968)	(0.115)	(0.135)	(0.0868)	(0.0863)	(0.124)
Cash_Surprise	-0.353***	-0.199***	-0.234***	-0.295***	-0.258***	-0.264***
	(0.0372)	(0.0199)	(0.0275)	(0.0244)	(0.0315)	(0.0280)
No_Analyst	0.000286	0.000277	0.000362	0.000297*	0.000268	0.000546*
	(0.000236)	(0.000197)	(0.000298)	(0.000153)	(0.000173)	(0.000327)
Constant	-0.00278	-0.0163	0.0255	-0.0195**	-0.0145	0.00582
	(0.0133)	(0.0110)	(0.0186)	(0.00850)	(0.0114)	(0.0241)
Chi2		14.58		2.52		1.60
Prob >chi2		0.0001		0.1125		0.2053
Observations	4,584	4,478	2,972	6,090	4,634	4,428
R-squared	0.406	0.347	0.353	0.326	0.347	0.368

Panel B: CDS price changes and Cash flow forecast dispersion

VARIABLES	(1) High CDS Change	(2) Low CDS Change	(3) High Volatility	(4) Low Volatility	(5) Large Firm	(6) Small Firm
CDS_Price_Change	0.239**	-0.0639	0.0634	0.0880**	0.0813**	0.0716
	(0.0976)	(0.0582)	(0.0556)	(0.0412)	(0.0359)	(0.0853)
Rating	0.00349	0.00361	0.00515	0.00599*	0.0108*	0.00366
	(0.00501)	(0.00275)	(0.00420)	(0.00353)	(0.00549)	(0.00368)
Inv_Grade	-0.00420*	-0.00628***	-0.00657***	-0.00708***	-0.0164***	-0.00133
	(0.00252)	(0.00209)	(0.00225)	(0.00230)	(0.00341)	(0.00171)
ROA	-0.209***	-0.165***	-0.299***	-0.140***	-0.175***	-0.225***
	(0.0470)	(0.0356)	(0.0605)	(0.0318)	(0.0449)	(0.0469)
Leverage	0.00984	0.0148***	0.0228**	0.0110***	0.0112	0.0156**
	(0.00621)	(0.00477)	(0.00891)	(0.00386)	(0.00705)	(0.00672)
MB	-0.000601***	-0.000680***	-0.00127***	-0.000442***	-0.000790***	-0.000539***
	(0.000188)	(0.000135)	(0.000291)	(0.000116)	(0.000245)	(0.000178)
Size	0.000331	0.000981*	0.000836	0.000826*	0.00103	-0.000924
	(0.000581)	(0.000568)	(0.000868)	(0.000453)	(0.000735)	(0.00156)
CAPEX	0.000414	0.000881	0.000547	0.00248	0.00290	0.00552
	(0.00522)	(0.00474)	(0.00769)	(0.00343)	(0.00484)	(0.00607)
Working_CAP	-0.00830*	-0.00504	-0.0184**	0.000676	-0.00181	-0.0137**
	(0.00451)	(0.00463)	(0.00743)	(0.00324)	(0.00430)	(0.00590)
PPE	0.00302**	0.00126	0.00294	0.000837	0.00178	-4.98e-05
	(0.00140)	(0.00150)	(0.00222)	(0.00107)	(0.00143)	(0.00190)
Cash	-0.000390	0.0168***	0.00766	0.0131***	0.0151**	0.00802

	(0.00629)	(0.00571)	(0.00879)	(0.00483)	(0.00650)	(0.00759)
RD	0.0885	0.164***	0.280***	0.0598	0.0641	0.179*
	(0.0623)	(0.0472)	(0.103)	(0.0368)	(0.0529)	(0.0941)
Profit_Margin	0.00275	0.00570	0.0120	-0.00114	-0.00409	0.00995
	(0.00678)	(0.00654)	(0.00965)	(0.00506)	(0.00679)	(0.00747)
RE	-0.00214	-0.00145	0.00337	-0.00420***	-0.00273	-0.000798
	(0.00185)	(0.00165)	(0.00265)	(0.00135)	(0.00210)	(0.00206)
Asset_Turnover	0.0119***	0.0137***	0.0228***	0.00765***	0.00860**	0.0163***
	(0.00418)	(0.00331)	(0.00519)	(0.00294)	(0.00428)	(0.00480)
Return_Vol	0.221***	0.112**	0.366***	0.183***	0.165***	0.317***
	(0.0408)	(0.0505)	(0.0588)	(0.0585)	(0.0349)	(0.0623)
Cash_Surprise	0.100***	0.0517***	0.0815***	0.0518***	0.0652***	0.0781***
	(0.0169)	(0.0104)	(0.0138)	(0.0111)	(0.0163)	(0.0126)
No_Analyst	-5.80e-05	0.000142	-2.05e-06	6.36e-05	-4.26e-05	-6.97e-07
	(0.000141)	(0.000118)	(0.000165)	(0.000117)	(0.000134)	(0.000148)
Constant	-0.000911	-0.00959	-0.0165*	-0.00621	-0.00248	0.00271
	(0.00781)	(0.00608)	(0.00964)	(0.00533)	(0.00902)	(0.0140)
Chi2	13.51		0.18		0.02	
Prob >chi2	0.0002		0.6677		0.8882	
Observations	3,762	3,798	2,401	5,159	4,104	3,456
R-squared	0.369	0.274	0.358	0.212	0.315	0.339

Table 8: (continued)

This table compares the subsample relations between CDS price changes and forecast properties by using CDS firms. The subsample is split based on the median of three control variables. Panel A and B represent the subsample analysis for based on CDS prices, Return_Vol, and Size. The dependent variable in Panel is Accuracy, analysts' cash flow forecast accuracy; defined as the absolute value of difference between forecast value and actual value, scaled by stock price. The dependent variable in Panel B is Dispersion, analysts' cash flow forecast dispersion; defined as the standard deviation of cash flow forecasts, scaled by stock price. CDS_price_chnages is the difference between monthly average CDS prices for each firm before the cash flow information. No_Analyst measures the number of analysts issuing cash flow forecasts within 90 days of the earnings announcements. Cash_Surprise is the absolute value of the difference between cash flows at quarter t and t-1, divided by stock price at the beginning of quarter t.Investment_Grade is an indicator variable equal to 1 if a firm's S&P rating is above BB+ and zero otherwise; ROA is the firm's return on assets, which is the ratio of net income before extraordinary items and discontinued operations to total assets; Leverage is the ratio of firm's total debt to total assets; MB is the ratio of the market value of equity to the book value of equity; Size is the logarithm of the firm's total assets; Return_Vol is the standard deviation of daily stock returns measure over the quarter; CAPEX equals the ratio of the firm's capital expenditures to total assets; Working_CAP equals the ratio of the firm's working capital to total assets; RE is the ratio of retained earnings to total assets; Profit_Margin is net income scaled by total assets. The sample period is from 2001 to 2016, based on firm-quarter observations. Year and Industry fixed effects are included, and standard errors are clustered at firm level. (*** significant at 1% level, ** significant at 1% level, and * significant at 10% level).