Debt Covenant Violations, Credit Default Swap Pricing, and Borrowing Firms' Accounting Conservatism

Changling Chen*
clchen@uwaterloo.ca
University of Waterloo

Jeong-bon Kim
jeong.bon.kim@cityu.edu.hk
City University of Hong Kong

Chunmei Zhu
C39zhu@uwaterloo.ca
University of Waterloo

Abstract: We investigate the impact of debt covenant violations (DCVs) on credit default swap (CDS) pricing, and how DCVs and CDS, combined, affect the relation between DCVs and financial reporting conservatism of borrowing firms. While prior research suggests that lenders insured by CDS contracts reduce their demand of borrowers to report conservatively, we posit that other stakeholders such as large institutional shareholders and non-CDS protected creditors can intervene and demand borrowers to report more conservatively post DCVs, after they observe borrowers' increased credit risk from CDS market trading. We find evidence consistent with our proposition. We first show that DCVs induce significant increases in CDS spreads in the trading days subsequent to borrowers' SEC filing dates, which indicates that borrowing firms' credit risk increases upon DCVs. Next, we find that borrowing firms' financial reporting becomes more conservative post DCVs, especially when DCVs result in large increases in borrowing firms' CDS spreads. We also demonstrate that our results are more pronounced for borrowing firms with a large number of creditors or high institutional ownership.

Keywords: Debt Covenant Violation; Credit Default Swap; CDS Spreads; Accounting Conservatism

JEL: G12; G14; M41

*Corresponding Author: Changling Chen,
200 University Avenue West, Waterloo, ON. Canada N2L 3G1
Phone: (519) 888-4567 ext. 35731; Fax: (519) 888-7562; Email: clchen@uwaterloo.ca.

Debt Covenant Violations, Credit Default Swap Pricing, and Borrowing Firms' Accounting Conservatism

1. Introduction

Debt covenants provide early warning signs when companies are heading to financial distress (Demiroglu and James, 2010). In this paper we examine when a borrowing firm's outstanding debt is traded in the credit default swap (CDS) market, how debt covenant violations (DCVs) affect the borrowing firms' CDS pricing, and also how the DCVs, combined with the CDS pricing, affect the borrowing firm's financial reporting conservatism. We contend that while CDS-protected lenders lack of incentives to monitor borrowing firms, other stakeholders such as large institutional holders and lenders who are not protected by CDS contracts, could intervene and demand more conservative financial accounting post DCVs, in particular, when CDS pricing reveals increased credit risk to other stakeholders.

DCVs typically trigger the transfer of control rights from borrowers to lenders (Nini, Smith, and Sufi, 2012), which empowers lenders to exercise ex-post monitoring of borrowers' credit quality and help borrowers to recover from financial distresses. Prior research finds evidence that the control right transfer upon DCVs leads to a reduction in a borrowing firm's credit risk (Kim, Lin, Zhang, and Zhang, 2016), and also results in more conservative financial reporting by the borrowing firm (Tan 2013). On the other hand, when lenders purchase credit default swap (CDS) contracts to insure themselves from their borrowers' credit risks, they lack incentives to monitor borrowers (Morrison, 2005; Hu and Black, 2008a and 2008b; Bolton and Oehmke, 2011; Parlour and Winton, 2013), and also lessen their demand on borrowing firms' reporting conservatism (Martin and Roychowdhury, 2015). Therefore, CDS contracts could mitigate the effect of DCVs on a borrowing firm's credit risk and financial reporting conservatism because lenders do not exert efforts to monitor borrowers upon covenant violations. The above-mentioned two streams of literature suggest that the net effect of DCVs on CDS spreads and financial reporting conservatism is an empirical issue, depending on the trade-off between credit right transfer and empty creditor effects.

In this paper we introduce a third stream of literature on the flow of firm-specific credit risk information from the CDS market players to other non-CDS protected stakeholders of the borrowing firms. Substantial empirical evidence supports that information on price discovery of credit risk flows from the CDS market to the bond market (e.g., Blanco, Brennan and Marsh 2005; Forte and Peña 2009; Norden and Weber 2009; and Narayan, Sharma, and Thuraisamy 2014), as well as to the equity market (e.g., Norden and Weber 2004; Acharya and Johnson 2007; Lee, Naranjo, and Sirmans, 2014; Lee, Naranjo, and Velioglu 2017). Moreover, primary participants in the CDS market are institutional investors (J.P. Morgan, 2006), or elite information processors who directly collect private information and/or have the superior ability to transform public information into investment-relevant private information (Kim and Verrecchia 1994). Therefore, the CDS market likely reveals credit risk more efficiently than the bond and equity markets.

We argue that after DCVs, the changes in CDS spreads provide borrowing firms' credit risk information to other stakeholders, such as institutional shareholders and non-CDS protected lenders, who can influence borrowing firms' accounting conservatism.

Consequently, other stakeholders can demand borrowing firms to report more conservatively, especially when they observe large increases in CDS spreads and are concerned about borrowing firms' increased credit risk.

We examine DCVs using the CDS market setting for three reasons. First, banks are the primary CDS buyers according to J.P. Morgan's investigation on the profiles of CDS market participants in 2006.[1] In this sense, CDS spreads are likely to capture banks' perceived level of credit risk for borrowers referenced in the CDS contracts (i.e., reference entities). Second, we are interested in investigating how the empty creditor problem created by CDS trading affects the relation between DCVs and accounting conservatism. Extant research on the relation between DCVs and accounting conservatism (Tan 2013) does not consider the unique empty creditor problem for CDS-protected lenders. Finally, the CDS market reflects the credit risk of covenant violating borrowers more timely relative to the equity market. This setting enables us to examine whether other stakeholders intervene borrowing firms' financial reporting, after they receive the timely credit risk information from the CDS market, under the situation where CDS-insured creditors lack incentives to exert monitoring on borrowing firms.

Using a sample of bank loans with financial covenant data in the DealScan

[1] Even if banks do not purchase CDS contracts directly linked to their specific borrowers, banks may be perceived by the market as holders of specific CDS contracts because banks' disaggregated CDS data are not publicly available. CDS position is an off-balance-sheet item. Some international banks or financial holding companies provide loans to U.S. borrowers. For those international lenders, they do not need to disclose their CDS positions in the Federal Reserve System. For domestic lenders, they have been required to disclose aggregated CDS position in the form of FR Y-9C since January, 2006. However, participants in the CDS market cannot access disaggregated CDS data of lenders. Moreover, as standard CDS contracts are traded frequently in the OTC market, it is difficult to know who is the seller or the buyer in every transaction. Consequently, except that the total notional amount of CDSs on which the bank is the beneficiary equals zero, participants in the CDS market cannot ensure whether a bank buys CDS contracts related to its specific borrower or not.

database and CDS data in the Markit CDS Composites Pricing database, we first examine the relation between DCVs and CDS spreads by employing a regression discontinuity (RD) design to elicit a causal effect of DCVs on CDS spreads. We find that both graphical presentations and regression results of RD design show that DCVs lead to an increase in CDS spreads on both the first trading day and the first three trading days after borrowers' SEC filing dates.[2] Second, we find that the positive relation between DCVs and accounting conservatism documented by Tan (2013) varies with the level of CDS spreads—the relation is more positive when CDS spreads incur large increases. Finally, we examine the role of other stakeholders by conditioning our analyses by the level of institutional ownership and the number of loan lenders of borrowing firms. We find that when other stakeholders' influence is high (proxied by high institutional ownership or large number of loan lenders), the positive relation between DCVs and accounting conservatism is more pronounced for borrowing firms of large increases in CDS spreads upon DCVs.

In our additional analyses, we also provide evidence on whether the increase in CDS spreads is mainly attributable to lenders' (perceived) participation in the CDS market, by investigating the impact of DCVs on CDS spreads conditioning on several proxies for the probability of lenders' participation as protection buyers. Overall, the results of our conditioning analyses are in line with the view that banks are perceived to participate in the CDS market as protection buyers (that create an empty creditor

[2] Our findings are robust to alternative model specifications such as the inclusion of polynomial term in RD regression and the use of alternative bandwidths. We also find similar results when using alternative samples based on SEC filings and after controlling for endogeneity.

problem and thus less bank monitoring) rather than external monitors of credit quality; this CDS-induced reduction in external monitoring lead to an increase in CDS spreads after DCVs.

We contribute to the literature in several ways. First, this paper provides new insights into the economic consequences of control right transfer, particularly in the credit derivative market. Prior studies (e.g., Chava and Roberts, 2008; Roberts and Sufi, 2009a; Nini et al., 2012; Tan, 2013; Kim et al., 2016) find that the transfer of control rights triggered by DCVs plays a positive role in shaping borrowers' operating, financing, investment, as well as financial reporting choices. However, these studies are silent on the circumstance where lenders are protected by CDS contracts and the empty creditor problem may thus arise. We examine the effects of DCVs on CDS spreads, and the two elements combined, on borrowing firms' financial reporting conservatism. Second, to the best of our knowledge, this paper is the first to investigate the consequence of DCVs on CDS pricing. Following Roberts and Sufi (2009b) and Kim et al. (2016), we employ an RD design as the identification strategy to elicit a causal effect of DCVs on CDS spreads; we find that DCVs increase CDS spreads on both the first trading day and the first three trading days after borrowers' SEC filing dates. Finally, we demonstrate the role of other stakeholders in shaping borrowing firms' accounting conservatism upon borrowers violating debt covenants referenced by CDS contracts. Our research suggests that the relation between DCVs and accounting conservatism is not only determined by lenders directly involved in the violated debt covenants, but also other stakeholders after they learn about increased credit risk from the CDS market trading.

The paper proceeds as follows. Section 2 describes the background and reviews the literature. Section 3 develops hypotheses. Section 4 explains the data and research designs. Section 5 presents the primary results. Section 6 shows the results of additional analyses. The last section concludes and discusses the findings of this paper.

2. Background and Literature Review

2.1. The CDS Market and Related Literature Review

A CDS contract is an over-the-counter (OTC) agreement between protection buyers and protection sellers to transfer the credit risk of a bond issuer or a loan borrower. The buyer pays a periodic premium, called CDS spread, until the expiration of the contract or the occurrence of pre-specified credit events. According to the definitions of credit derivatives by the International Swaps and Derivative Association (2003: ISDA, p. 30), credit events refer to the events that trigger CDS contract settlement and include "bankruptcy, failure to pay, obligation acceleration, obligation default, repudiation/ moratorium or restructuring". Following a credit event, protection buyers holding the underlying bond or loan can give the defaulted bond or loan to protection sellers in exchange for its face value (physical settlement), or receive the cash difference between the recovery value and face value of the bond or loan (cash settlement). Alternatively, for protection buyers with pure derivative positions, they get a payment in the form of cash settlement. In practice, the uniform recovery value of a defaulted bond or loan is discovered through an auction mechanism (e.g., ISDA 2003 Credit Derivatives

Definitions; J.P. Morgan 2006; Callen, Livnat and Segal, 2009).

A growing literature related to CDS mainly focuses on determinants of CDS spreads. More specifically, structural models such as the classic Merton (1974) model, suggest that financial leverage, asset volatility, and risk-free interest rate are the main factors to predict the probability of default and further to affect CDS spreads. Duffie and Lando (2001) model shows that precision of accounting information also influences CDS spreads. Taken together, CDS spreads contain both default risk component and information risk component.

The advent of CDS trading since 1994 has exerted profound impacts on market participants such as lenders and reference entities. If lenders purchase CDS contracts to hedge credit risk exposure, they have limited incentives to implement costly monitoring or make costly efforts to help their borrowers (Morrison, 2005; Parlour and Winton, 2013; and Shan, Tang and Winton, 2014). In other words, the benefit of control right transfer diminishes or even not exists in this situation. Consequently, reference entities experience a high bankruptcy rate after CDS initiation (Bolton and Oehmke, 2011; Subrahmanyam, Tang, and Wang, 2014). Bolton and Oehmke (2011) argue that CDS contracts trigger too little renegotiation between lenders and borrowers and too much inefficient bankruptcy, especially when the borrower has more than one creditor. Similarly, Subrahmanyam, et al. (2014) find that the advent of CDS increases the credit risk of reference entities, as reflected in the high probability of credit rating downgrade and bankruptcy, and they attribute the increased credit risk to the absence of bank monitoring and banks' objection to restructuring loans.

Prior research also demonstrates the price discovery information embedded in CDS market trading is more timely relative to both equity and bond markets. For example, Qiu and Yu (2012) find evidence that informed financial institutions trading in the CDS market adds liquidity to the market, which results in a greater information flow from the CDS market to the stock market ahead of major credit events. Lee, et al. (2014) show evidence that CDS returns correctly anticipate future credit rating changes and help predict stock price momentums. Relatedly, Batta, Qiu, and Yu (2016) conduct a comprehensive analysis of the role of CDS in information production surrounding earnings announcements and provide evidence consistent with the CDS market being a preferred venue for informed trading. A recent paper, Lee et al. (2017), shows that CDS prices contain unique firm credit risk information that is not captured by the prices of other related securities such as stock and bonds of the same firm, suggesting that price discovery information spills over from the CDS market to the other security markets.

2.2. Debt Covenant Violations and Related Literature Review

Financial covenants are commonly used as trip wires to transfer control rights from borrowers to lenders (e.g., Aghion and Bolton, 1992; Demiroglu and James, 2010). A growing literature suggests that once DCVs occur, lenders have rights to intervene borrowers' operating, financing and investment activities, and corporate governance. In particular, borrowers' capital investment declines rapidly subsequent to DCVs (Chava and Roberts, 2008), implying that DCVs could alleviate investment distortions. In a related vein, DCVs induce a reduction in net debt issuance, leverage ratio, dividends, acquisition activities, voluntary disclosure, and an increase in CEO turnover and firm value (e.g., Roberts and Sufi, 2009b; Nini et al., 2012; Vashishtha, 2014; Zhang, 2015).

Prior research shows that DCVs lead to a decrease in borrowers' stock price crash risk (Kim et al. 2016), which is a downside risk in the equity market, or an increase in borrowers' accounting conservatism (Tan 2013). These researchers attribute their findings to the benefits associated with the transfer of control right from borrowers to banks upon DCVs. In contrast, our study examines the effect of DCVs on borrowers' credit risk (CDS spreads) and financial reporting conservatism under the situation where banks get protection from CDS contracts.[3]

The aforementioned CDS literature suggests that when lenders are protected by CDS contracts, the lenders lack of incentives to exert control right. Without lenders' intervention, borrowing firms' business operations and financial reporting choices may not change upon DCVs. Consequently, borrowers' credit risk may not reduce upon DCVs, as suggested by Kim et al. (2016). Similarly, borrowers' accounting conservatism may not increase post DCVs, as implied by Martin and Roychowdhury's (2015) finding that CDS-protected lenders reduce their demand of borrowing firms' accounting conservatism upon the initiation of CDS contracts.

[3] Our paper shares the spirit of Wang and Xia (2014), who find that banks securitizing their loans through collateralized loan obligations (CLOs) impose looser covenants on borrowers at origination and these banks exert less effort on ex post monitoring. Wang and Xia (2014) argue that with CLOs, banks limit their exposure to the risk of a given loan and their results suggest that banks' incentives to monitor borrowers are weakened due to securitization. However, our paper is distinguished from Wang and Xia (2014) because our paper focuses on how DCVs affect the pricing of CDS market, where debt covenants work as trip wires to transfer control rights from borrowers to lenders upon DCVs. In addition, our RD design allows us to identify a causal relation between DCVs and CDS pricing.

3. Hypothesis Development

3.1. DCVs and CDS Spreads

We discuss the impact of creditor control right transfer upon DCVs on CDS spreads based on the following two propositions. First, we contend that a technical default triggered by DCVs is not a credit event in CDS contracts,[4] which is consistent with Callen et al.'s (2009) argument that a technical default rarely leads to credit events. Second, we postulate that banks would negotiate debt covenants in the same manners, irrespective of whether there is a CDS arrangement, because efficient debt covenants are appealing for insurance companies and therefore the costs of CDS contracts linked to the loans would be lowered.

DCVs may reduce CDS spreads through control right transfer because close bank monitoring and scrutiny help borrowers recover from financial distress. Bank monitoring plays a significant role in disciplining borrowers' behavior, as shown by declined capital investment (Chava and Roberts, 2008), reduced new debt issuances (Roberts and Sufi, 2009b), and increased CEO turnovers (Nini et al., 2012). Those changes can improve the operating performance of borrowers (Nini et al., 2012), and thus reduce borrowers' default risk. In addition, Kim et al. (2016) find that DCVs reduce stock price crash risk as a result of close bank monitoring. This line of literature indicates that the benefits associated with control right transfer can lower CDS spreads after the occurrence of DCVs.

[4] We limit the sample to CDS contracts with *no restructuring* clauses when we collect CDS data from the Markit database. According to 2003 ISDA Credit Derivatives Definitions, there are four types of restructuring credit event: full restructuring, modified restructuring, modified restructuring, and no restructuring. However, the new standard on North American Corporate CDS published together with the 2009 ISDA Supplement, removes "restructuring" as a credit event of single-name CDS transactions.

On the other hand, one can argue that the positive side of control right transfer diminishes or even disappears when banks buy CDS linked to their borrowers—a situation where the empty creditor problem is at issue. As banks already minimize their credit risk exposure via purchasing CDS contracts, they have weak incentives to conduct costly ex-post monitoring and scrutiny (Shan et al. 2014). Without bank monitoring and scrutiny, borrowers' credit risk deteriorates and CDS spreads increase, given that DCVs are usually caused by bad operating performance, investment distortions, or inappropriate financing. In the absence of banks' effective intervention, managers of violating borrowers are more likely to continue their over-investments and poor corporate governance, which exacerbates their default risk. This is consistent with the finding of Freudenberg, Imbierowicz, Saunders, and Steffen (2012) that the default probability reaches around 30% on the following day after covenant violations. In addition, violating borrowers tend to reduce voluntary disclosure such as management forecasts (Vashishtha, 2014) and incur higher bid-ask spreads and return volatility (Gao, Khan, and Tan, 2017), which results in greater information asymmetry and uncertainty on the part of shareholders and other stakeholders. Chakraborty, Chava, and Ganduri (2015) examine the link between CDS and lender moral hazard, showing that after covenant violation, lenders charge higher spreads on renegotiated loans of borrowers with a traded CDS. Taken together, the literature suggests ineffective control right transfer upon DCVs (without creditors' incentives to monitor debtors) results in increased CDS spreads.

Anecdotally, banks may even force borrowers into pre-specified credit events in order to receive CDS payoffs. For example, General Motors (GM) Corporation once runs into this situation. Bolton and Oehmke (2011, p. 2621) state that:

> *"[A]according to Sender (2009c), hedge funds and other investors stand to make billions of dollars on credit insurance contracts if GM declares bankruptcy, a prospect that is complicating efforts to persuade creditors to agree to a restructuring plan for the automaker…Holders of swaps would be paid in the event of a default – but would lose money if they agreed to restructure GM's debt. For investors who own bonds and CDS, this could create an incentive to favor a bankruptcy filing."*

Banks that over-insure their loans are incentivized to favor bankruptcy filings (Bolton and Oehmke, 2011), which exacerbates borrowers' default risk and exposure to bankruptcy. Subrahmanyam et al. (2014) compare the bankruptcy rates for North American companies with and without CDS traded during the 1997−2009 period; they find that 6.7% CDS companies went bankruptcy—a number approximate to the four-year cumulative bankruptcy rate of all U.S. companies. Combined, control right transfer may not play a positive role in reducing CDS spreads when banks (are perceived to) get protection from CDS contracts.

In sum, the ultimate relation between DCVs and CDS spreads is a trade-off between the effect of the control right transfer triggered by DCVs and the effect of the empty creditor problem underlying the debts referenced by CDS contracts. To the extent that the empty creditor problem does not fully eliminate the effect of control right transfer triggered by DCVs, the direction of the impact of creditor right transfer upon DCVs on CDS spread is an empirical issue. Our first hypothesis on the relation between DCVs and CDS spreads is non-directional. We state H1 in null form as follows:

H1: Debt covenant violations have no impact on CDS spreads.

If we find a negative relation between DCVs and CDS spreads, it is consistent with the argument that control right transfer upon DCVs, on average, dominates the empty creditor problem and thus reduces credit risk. In contrast, the finding of a positive association between DCVs and CDS spreads indicates a dominant effect of empty creditor problem; in other words, the dark side of creditor right transfer upon DCVs, i.e., the ineffective or negative role of control right transfer aggravated by the empty creditor problem, dominates the benefit side associated with control right transfer.[5]

3.2. DCVs and Accounting Conservatism

Prior research, as mentioned in the above, provides evidence that DCVs may trigger control right transfer and lenders' intervention may mitigate borrowing firms' credit risk. The evidence of this line of literature is largely derived based on the analyses of all borrowing firms including both CDS and non-CDS firms, without separately considering the empty creditor problem for CDS firms. Similarly, Tan (2013) examines the impact of DCVs on accounting conservatism of all borrowing firms without distinguishing CDS from non-CDS firms. The author finds that subsequent to DCVs, lending banks' monitoring of borrowers is strengthened by various ways such as enhanced inspection right and increased frequency of compliance reports, which results in more conservative financial reporting prepared by borrowers.

We contend that the relation between DCVs and accounting conservatism for CDS firms is likely subject to the empty creditor problem. Martin and Roychowdhury (2015) find that CDS-protected lenders reduce their demand of borrowing firms' accounting

---

[5] It is possible that we observe insignificant impact of DCVs on CDS spreads in post-SEC filing period. This is because institutional investors and participants in the CDS market are professionals who collect private information and use their professional knowledge to estimate the probability of debt covenant violations *before* borrowers' SEC filing dates.

conservatism upon the initiation of CDS contracts. In our paper, we focus on the change in conservatism of reference entities upon DCVs. We contend that financial reporting of reference entities may become even more aggressive (less conservative) post DCVs because they have incentives to avoid violating debt covenants or the cost of higher spreads charged by lenders on renegotiated loans (Chakraborty et al., 2015). Therefore, the positive effect of DCVs on borrowing firms' accounting conservatism documented by Tan (2013) may not hold for CDS firms. The net effect of DCVs on accounting conservatism is an empirical issue, similar to the relation between DCVs and CDS spreads, reflecting the trade-off between the control right transfer and the empty creditor problem. Our second hypothesis on the relation between DCVs and accounting conservatism is non-directional as follows:

H2: Borrowing firms' financial reporting conservatism does not change post debt covenant violations.

A finding of no significant change or even decreased accounting conservatism post DCVs would suggest that the effect of empty creditor problem dominates the effect of control right transfer, corroborating Martin and Roychowdhury's (2015) finding that CDS-protected lenders reduce their demand of borrowers' accounting conservatism. A finding of increased accounting conservatism would be consistent with Tan's (2013) evidence on the effect of control right transfer.

3.3. CDS Spreads and the Relation between DCVs and Accounting Conservatism

We contend that besides CDS-protected lenders, a borrowing firm has other stakeholders who may also have incentives to demand more conservative financial reporting of the borrowing firm. For example, Ramalingegowda and Yu (2012) provide evidence that institutional shareholders demand for greater conservatism as the percentage ownership of these institutions increases, consistent with institutional shareholders' demand for early warning of possible financial distress and protection from manager opportunism.

Since CDS-protected lenders lack incentives to monitor borrowers upon the occurrence of DCVs, we argue that increased credit risk of the borrowing firms, if there is any, shall be captured by increased CDS spreads. When other stakeholders such as institutional shareholders and non-CDS protected creditors observe increased CDS spreads, they detect borrowers' increased credit risk and demand more conservatism in financial reporting. We use the change in CDS spreads as a proxy of a borrowing firm's credit risk change upon DCVs, and posit a conditioning hypothesis on the relation between DCVs and accounting conservatism as follows.

H3: Borrowing firms' financial reporting becomes more conservative post debt covenant violations when the CDS spreads on their outstanding debts incur large increases.

We expect that the H3 relation shall be more pronounced for borrowing firms of higher institutional ownership, or a greater number of creditors. As aforementioned, institutional ownership is a proxy of the influence of other stakeholders who likely intervene borrowers' financial reporting. In addition, we use the number of lenders in outstanding commercial loans covered by DealScan per borrower per fiscal year as another proxy for other stakeholders. The underlying rational is that when the number of loan lenders is large, it is more likely that some of these lenders are not protected by CDS contracts and have incentives to intervene borrowing firms' financial reporting after observing increased CDS spreads.

4. Data and Methodology

4.1. Sample and Data

We construct a sample based on three major databases, including the Markit CDS Composites Pricing database for CDS data, the Loan Pricing Corporation's (LPC) DealScan database for debt covenant data, and the quarterly Compustat database for financial statement data. Our sample period starts from January 2001 because the Markit database available to us begins to cover CDS data in the year of 2001, and ends by June 2012 because the DealScan-Compustat link file provided by Chava and Roberts (2008) is updated to around Mid-2012.

We begin with all borrowers with debt covenant data in the DealScan database, which compiles bank loan data by deals, where each deal has one facility or a package of several facilities. Our selected sample period requires that facilities in our sample have ending dates after the start of our sample period on January 1, 2001, and starting dates before the end of our sample period on June 30, 2012. We also delete facilities after the earlier time between the first facility amendment date and the first package amendment date to alleviate potential concerns on financial covenant amendments subsequent to loan initiations. Accordingly, we start from a sample of 78,846 facilities of 9,159 unique borrowers from the DealScan database. We next remove non-U.S.

borrowers and borrowers in the financial industry and have 64,013 facilities of 6,701 borrowers in the sample. After merging the loan covenant data with quarterly Compustat using the DealScan-Compustat link file, our sample has 206,387 facility-quarter observations, or 53,492 borrower-quarters, of 3,281 unique borrowers before merging with the CDS market data. Note that each borrower usually has multiple loan deals of multiple facilities. For each borrower-quarter, we keep only the facility with the smallest distance between debt covenant thresholds and actual financial ratios, which results in one smallest-distance facility for each borrower-quarter. In other words, our DealScan sample has 53,492 borrower-quarter observations to merge with the Markit CDS data.

We obtain the Markit CDS data with a restriction of five-year U.S. dollar denominated CDS contracts with reference to senior unsecured debt and with *No Restructuring* clauses in order to maintain the homogeneity of CDS data. We then combine daily CDS data with quarterly financial data by using a Markit-Compustat match table.[6] In addition, we extract the data of SEC filing dates from EDGAR company quarterly financial statement fillings, requiring that borrowers have CDS premium either in the first or the first three trading days after the SEC filing dates. After eliminating observations with missing data on credit ratings, monthly stock returns, and other financial variables such as ROA, leverage, and size, our final sample further reduces to 8,788 borrower-quarter observations of 517 unique borrowers.

To collect foreign exchange derivatives data, we manually match lender names in

[6] We appreciate Ke Wang for sharing this table.

the DealScan with bank holding companies in the Consolidated Financial Statements for Bank Holding Companies (FR Y-9C) and commercial banks in the Report of Condition and Income (Call Report). As lead arrangers in syndicate loans are mainly responsible for originating bank loans and monitoring borrowers while other participants are passive lenders, we focus on lead arrangers and assign lead arrangers to one if the variable "Lead Arranger Credit" is "Yes" in the DealScan, and zero otherwise. Note that most of lead arrangers in the DealScan are at subsidiary levels. In those cases, we find out their parent firms in their different historical periods by searching Bloomberg and Wikipedia.[7] In addition, as some syndicated loans include multiple lead arrangers, we choose the lead arranger with the smallest *FED*. We refer to that lead arranger as *the lender who is the most vulnerable to borrower's credit risk*. We also construct Tier One Ratio and Interest Margin variables based on FR Y-9C data. Lastly, we estimate the number of analyst following based on data in the I/B/E/S.[8] Table 1 summarizes the data filters.

[Insert Table 1 about here]

4.2. Measurement of Debt Covenant Violations

As different facilities have diverse covenant types, we measure DCVs in the facility level. The main types of debt covenants in our sample are maximum debt to EBITDA, minimum fixed charge coverage, minimum interest coverage, maximum capital

---

[7] There are bank merges and splits during the sample period. For instance, Bank of America purchased Fleet National Bank in June 2005, Merrill Lynch & Co. in September 2008 and LaSalle Bank NA in October 2008. Subsidiaries of Fleet National Bank are matched with Fleet National Bank before June 2005 and matched with Bank of America subsequent to this merge.

[8] We use an IBES-CRSP link table from WRDS dataset, WRDS Research Macros (2010) from the Wharton Research Data Services provided by The Wharton School at the University of Pennsylvania (wrds.wharton.upenn.edu).

expenditure, maximum senior debt to EBITDA, minimum EBITDA, minimum debt service coverage, minimum current ratio, maximum debt to tangible net worth, minimum quick ratio, minimum cash interest coverage, and maximum debt to equity.[9] Appendix 1 lists the definitions of those financial covenants. Following Demerjian and Owens (2016), we annualize variables from income statements and cash flow statements by calculating their four-quarter rolling sums.

After merging the DealScan with quarterly Compustat, we estimate the distance (*Distance*) between covenant thresholds in bank loans and the actual financial ratios. In particular, for the minimum type of covenants, *Distance* equals the actual financial ratio minus the covenant threshold scaled by the standard deviation of the actual financial ratio during the last 20 quarters. For the maximum type of covenants, *Distance* equals negative one multiplied by the ratio of the actual financial ratio minus the covenant threshold to the standard deviation of the actual financial ratio over the last 20 quarters. A negative (positive) *Distance* means covenant violations do (do not) occur. As a borrower may have more than one facility during a quarter, and a facility may also have more than one type of financial covenant, we choose the smallest *Distance* for every borrower-quarter, consistent with Kim et al. (2016). Then we define *DCV* as an indicator variable that equals one if the smallest *Distance* of a borrower-quarter is negative, and zero otherwise.

[9] As the definitions of senior debt and debt service coverage are ambiguous, we exclude two types of covenants, maximum senior debt to EBITDA and minimum debt service coverage. This exclusion should not significantly affect the estimation of debt coverage violations, as the two types are not frequently used in bank loans.

4.3. Regression Discontinuity (RD) Design

DCVs provide an appropriate setting to implement an RD design because covenant violations impose a plausibly exogenous shock on control right transfer (Chava and Roberts, 2008; Roberts and Sufi, 2009a; Kim et al., 2016). In particular, if borrowers are unable to control *precisely* for the assignment variable, the variation in treatment around the cutoff is regarded as randomized. In the context of our paper, any discontinuous change in CDS spreads around the cutoff can identify the effect of control right transfer, thereby allowing us to draw a causal inference and excluding alternative explanations.

A valid RD design requires three assumptions. First, the cutoff should be based on a continuous variable and be unaffected by the treatment. In our paper, the cutoff is based on a continuous distance between actual financial ratio and the covenant threshold. In terms of the second requirement of the cutoff, Lee and Lemieux (2010) document that if firms cannot manipulate the assignment variable *precisely*, the treatment can be regarded as a local randomized experiment. They explain that when firms are unable to conduct precise control over the assignment variable, even if some firms may have the ability to shift the distribution of assignment variable to the right side of the cutoff, *every* individual firm cannot precisely control for the assignment variable around the cutoff. In other words, "the treatment is 'as good as' randomly assigned" (Lee and Lemieux, 2010, p. 295) in the neighborhood of the cutoff.

In the context of covenant violations, although borrowers have incentives to avoid covenant violations, it is hard for them to manipulate covenant violations precisely, supported by both anecdotal evidence and empirical evidence. For instance, Roberts and Sufi (2009b, p. 1671) show that "discussions with commercial lenders indicate that covenant restrictions are often highly contested during the pre-origination negotiations, which suggests that covenants are not simply placed at the managerial chosen threshold." Moreover, Kim et al. (2016) empirically test the manipulation around covenant thresholds and find that there is no clear discontinuity of abnormal accruals around covenant thresholds, mitigating the concern that borrowers can manipulate covenant violations precisely. In addition, even if borrowers can precisely manipulate the assignment variable for several times, they cannot always have precise control over the assignment variable through manipulation, as they need to submit periodic compliance reports to banks who are experts on ex-post monitoring.

The second assumption of a valid RD is that the functional form of outcome with respect to the assignment variable should be specified correctly. Following Chava and Roberts (2008) and Kim et al. (2016), we use a polynomial form of *Distance*, namely, *High Order of Distance*,[10] to control for potential nonlinearity. Furthermore, by focusing on the borrowers that just breach or meet covenant thresholds, we further eliminate the nonlinearity concern. The third assumption of a valid RD is that firms come from the same population prior to receiving the treatment, which is the case in our paper.

To implement the RD design, we estimate the following equation:

$$\Delta Spread_{i,t+1} = \alpha_0 + \alpha_1 DCV_{i,t} + \alpha_2 \Delta ROA_{it} + \alpha_3 \Delta Leverage_{i,t} + \alpha_4 \Delta Size_{i,t}$$

[10] For the *High Order of Distance*, we usually apply a three-order polynomial regression analyses unless stated otherwise.

$$+ \alpha_5 \Delta Stdret_{i,t} + \alpha_6 \Delta Tbill_{i,t} + \alpha_7 Rate\_Long_{i,t} + High\ Order\ of\ Distance$$
$$+ \sum Fiscal\ Quarter_{i,t} + \sum Fiscal\ Year_{i,t} + \sum Calendar\ Quarter_{i,t}$$
$$+ \sum Calendar\ Year_{i,t} + \sum Industry_{i,t} + \varepsilon_{i,t+1} \quad (1)$$

where the dependent variable *ΔSpread1* denotes CDS spreads on the first trading day subsequent to the borrower's SEC filing date of quarter *t* divided by CDS spreads on the first trading day subsequent to the borrower's SEC filing date of quarter *t-1*, then minus one; We also compute *ΔSpread3* for the first three trading days in the same way. *DCV* is a dummy variable that equals one if borrower *i* violates at least one debt covenant in quarter *t*. Appendix 2 defines variables in Eq. (1) and all other variables used in this paper.

We control for factors in structural models used to explain the pricing of credit derivatives (e.g., Black and Scholes, 1973, Merton, 1974, and Callen et al., 2009). In particular, high leverage (*ΔLeverage*), large standard deviation of stock returns (*ΔStdRet*), and low T-bill (*ΔTbill*) are associated with high probability of default, hence pushing up the pricing of credit derivatives. We also control for firm size (*ΔSize*), return on assets (*ΔROA*) and credit rating (*Rate_Long*). As aforementioned, *High Order of Distance* is used to control for potential nonlinearity in the RD design. To mitigate endogeneity concern arising from omitting variables, we add fiscal year fixed effects, fiscal quarter fixed effects, calendar year fixed effects, calendar quarter fixed effects, and Fama-French 38 industry fixed effects in our regressions. By using first-difference (*Δ*) specifications of the regression variables such as *Leverage*, *StdRet*, *Tbill*, *Size*, and *ROA*, we control for firm-specific factors that are time-invariant. In addition, the computations of the dependent variable overlap across periods, thus we cluster the standard errors at the firm level to address potential time-series correlation in the error terms (Petersen 2009).

5. Primary Results

In this section we first report the results on the relation between DCVs and CDS spreads on the trading day(s) subsequent to the SEC filing dates, followed by the regression results on the effect of DCVs, combined with CDS spread changes, on financial reporting conservatism of borrowing firms post DCVs.

5.1. Results on the Relation between DCVs and CDS Spreads

5.1.1. Univariate Analysis

Following bandwidth selection approaches for a local polynomial regression discontinuity estimator proposed by Calonico, Cattaneo, Farrell, and Titiunik (2017), we choose a bandwidth equal to 0.6[11], qualitatively close to the Mean Square Error (MSE)-optimal point estimation using a common bandwidth on each side of the cutoff. The subsample hereinafter refers to the subsample with a bandwidth of 0.6 unless stated otherwise, when we apply different bandwidths in our sensitivity tests.

Table 2 reports descriptive statistics for the full sample, the subsample, non-violating subsample, and violating subsample. Mean and Median values of both *⊿Spread1* and *⊿Spread3* in Panels A and B are not statistically different for the full sample and the subsample, suggesting that the findings of our paper may apply not only

[11] The choice of bandwidth should be narrow enough to compare observations just above and below the cutoff; it should also be wide enough to avoid over-smoothing (Lee and Lemieux 2010). As the choice of bandwidth can affect the accuracy of RD results we use alternative four bandwidths, namely, (−0.2, +0.2), (−0.4, +0.4), (−0.8, +0.8), and (−1.0, +1.0) to test whether the increase in CDS spreads is robust to different bandwidths. Our results (untabulated) hold.

to borrowers who marginally meet or beat the cutoff but also to other borrowers.

[Insert Table 2 about here]

Panels C and D compare violating versus non-violating subsamples. The results of *t*-tests and Wilcoxon Rank Sum tests show that both *ΔSpread1* and *ΔSpread3* in the violating subsample are larger than those in the non-violating subsample, indicating that DCVs might increase CDS spreads. Other variables (except for *Rate_Long*) in the non-violating subsample and the violating subsample are qualitatively similar, consistent with the underlying inference of an RD design as a local randomized experiment. Specifically, qualitatively similar control variables around the cutoff help eliminate the concern that other confounding fundamentals disclosed in borrowers' SEC filings could cause the increase in CDS spreads. Our RD design is documented to be valid through several ways.[12]

5.1.2. Graphical Analysis

To make graphical presentations of the RD design, we divide the subsample with the bandwidth equal to 0.6 into 30 bins[13] on each side of cutoff, based on the x-axis, the smallest *Distance* for every borrower-quarter. Figure 1 plots both the bin averages and

---

12 We examine the validity of our RD design as follows. First, we test borrowers' imprecise control for the distance between covenant thresholds and actual financial ratios to assess whether an RD approach is appropriate for our context. We conduct manipulation testing based on density discontinuity proposed by Cattaneo, Jansson, and Ma (2016a, b). We find that the *t*-value of the manipulation testing is 1.4486 (*p*-value of 0.1474), suggesting no statistical evidence of precise control over the distance between covenant thresholds and the actual financial ratios. Second, as a consequence of a randomized experiment, the distribution of pre-determined baseline covariates should be continuous around the cutoff (Lee and Lemieux, 2010). We find that all control variables do not change discontinuously at the cutoff. Third, we test borrowers' imprecise control by examining the distribution of abnormal accruals around the cutoff. The distributions of discretionary accruals of our sample are continuous around the cutoff.

13 The number of bins is calculated by *min{sqrt(N), 10*ln(N)/ln(10)}*, where *N* is the number of observations in the subsample with bandwidth equal to 0.6.

the local polynomial regression lines to show the degree of discontinuity at the cutoff. The dot denotes the average of changes in CDS spreads in its corresponding bin, and the local polynomial smoothed line represents a high order polynomial regression of changes in CDS spreads on the smallest *Distance*, with the 90% confidence level. We observe a discontinuity in the changes in CDS spreads at the cutoff, which allows the implantation of an RD design. In addition, the distribution of the dots on the left side of the cutoff is dispersed, because participants in the CDS market tend to have more diversified opinions on borrowers' credit risk when DCVs occur than when DCVs do not occur.

[Insert Figure 1 about here.]

5.1.3. Regression Results on the Relation between DCVs and CDS Spreads

Our first hypothesis (H1) is non-directional because the relation between DCVs and CDS spread is a trade-off between the control right transfer and the empty creditor problem. Table 3 provides the results of H1 by running the regression of Eq. (1), using subsamples with the bandwidth equal to 0.6. The dependent variable in columns (1) to (3) and columns (4) to (6) are the change in CDS spreads on the first trading day after borrowers' SEC filing dates and the average change in CDS spreads on the first three trading days after borrowers' SEC filing dates, respectively. In column (1), the indicator variable, *DCV*, is the only independent variable in a regression without control of fixed effects. The coefficient of *DCV* is positive and significant (p = 0.037). In column (2), we control for the factors that affect the pricing of CDS spreads, fiscal year fixed effects, fiscal quarter fixed effects, calendar year fixed effects, calendar quarter fixed effects, and industry fixed effects; the coefficient of *DCV* remains significantly positive (p = 0.034).

[Insert Table 3 about here.]

In column (3), we add *High Order of Distance*, which is the high order polynomials of the smallest *Distance* to control for potential nonlinearity. The coefficient on *DCV* is 0.1035 (p = 0.020), suggesting an average increase of 10.35 percent in the CDS spreads on the first trading day subsequent to the SEC filing dates. This increase in CDS spreads following DCVs signals that participants in the CDS market tend to put a greater weight on the dark side of control right transfer (empty creditor problem) than on its benefits (heightened bank monitoring). That is consistent with the argument that protection of CDS contracts makes banks not interested in ex-post monitoring or triggers banks' incentives to push borrowers into credit events. The results in Columns (4) to (6) are similar. The coefficient of *DCV* in column (6) is 0.1012 (p = 0.025), implying that DCVs increase the average changes in CDS spreads on the first three trading days after borrowers' SEC filing dates by 10.12 percent.

5.1.4. Endogeneity

It is possible that pre-existing CDS trading affects contract terms at the time of bank loan initiation. In particular, if banks already purchase CDS contracts linked to their specific borrowers before the initiation of loans, they may negotiate debt covenants in similar manners due to the importance of efficient debt covenants. However, it is also possible that banks require loose covenants because they can get protection from existing CDS contracts (Shan et al., 2014), or favor tight covenants because they have weak incentives to implement ex-post monitoring. Another scenario is that even if CDS contracts linked to the borrower exist, banks do not buy those CDS contracts before the loan initiation. In the second scenario, banks tend to negotiate debt covenants in similar manners, because efficient debt covenants will decrease the pricing of CDS contracts linked to that loan and therefore reduce banks' cost to purchase those CDS contracts after the loan initiation.

To alleviate any endogeneity concern regarding the correlation between CDS trading and covenant violations, we conduct a simultaneous equations testing by estimating Eq. (1) simultaneously with the following equation:[14]

$$Initial\ Distance_i = \beta_0 + \beta_1 CDS\_traded_i + \beta_2 Log(loanamt)_i + \beta_3 Maturity_i + \beta_4 ROA_i + \beta_5 Leverage_i + \beta_6 Log(firmsize)_i + \sum LoanPurposes + \sum Fiscal\ Quarter + \sum Fiscal\ Year + \sum Calendar\ Quarter + \sum Calendar\ Year + \sum Industry + \eta_{i1} \quad (2)$$

where Eq. (2) is used to estimate the effect of pre-existing CDS trading on covenant tightness at the time of bank loan initiation. *Initial Distance* is the smallest *Distance* between covenant thresholds and covenant variables in the previous quarter of the loan initiation for every borrower-quarter. If borrower *i* initiates more than one bank loan at different quarter, then *Initial Distance* has more than one observed values for the borrower. *CDS_traded* is an indicating variable that equals one if there is pre-existing CDS trading related to borrower *i*, and zero otherwise. *Log(loanamt)* denotes the log of the loan amount and *Maturity* is measured by the number of months. Apart from loan

[14] As the pre-existing CDS trading may affect the initial distance between covenant thresholds and covenant variables in the previous quarter of the loan initiation, and the initial distance is related to *Distance* and *Violation* during the life of the loan, we estimate Eq. (2) to capture the impact of pre-existing CDS on the initial distance.

characteristics, we control for borrower's *ROA*, *Leverage* and *Log(firmsize)* in the previous quarter of the loan initiation. Moreover, we control for time fixed effects, industry fixed effects, and loan purpose fixed effects which classify loans' primary purpose into expansion, corporate purpose and debt repayment.

We report results of simultaneous regressions of Eq. (1) and Eq. (2) in Table 4. The coefficients of *DCV* remain positive and significant, suggesting that the increase in CDS spreads subsequent to DCVs is robust to controlling for potential endogeneity. In addition, the significantly positive coefficients of *ROA* and *Log(firmsize)*, and the significantly negative coefficients of *Leverage* are in line with Demiroglu and James (2010).

[Insert Table 4 about here.]

5.1.5. Sensitivity Analyses

We conduct several sensitivity analyses on the implication of DCVs for borrowing firms' credit risk. First, using the full sample, we implement a polynomial regression as a complement to the exact RD design. With a finite sample, it is impossible to judge whether a nonparametric estimation such as an exact RD design using subsamples around the cutoff is a better specification than a parametric estimation such as a polynomial regression design with low-order polynomials (Lee and Lemieux, 2010). Our results of the polynomial regression (untabulated) also show a positive relation between DCVs and CDS spreads.

Second, the definitions of financial covenants in this paper closely follow the standard definitions suggested by Demerjian and Owens (2016). Their standard definitions have minimum measurement errors in predicting the probability of financial covenant violations. However, to alleviate concerns about the accuracy of Demerjian and Owens (2016)'s definitions of covenants, we also use the data of DCVs in Nini et al. (2012), which implement a text-search algorithm for obtaining covenant violations data from the SEC quarterly filings and therein capture the actual covenant violations. By employing a quasi-regression discontinuity (QRD) design, we test the effect of violations disclosed in SEC filings on changes in CDS spreads on the first trading day and the first three trading days after borrowers' SEC filing dates. Our results (untabulated) hold for the alterative DCV sample.

Finally, Kim et al. (2016) show that DCVs decrease stock price crash risk, implying that DCVs reduce credit risk of borrowers given that the crash risk is an extreme form of downside risk that creditor should be concerned about. Our findings that DCVs increase CDS spreads seem to contradict their results. To reconcile the diverging findings, we estimate the impact of DCVs on stock price crash risk, using the first subsample of firms with CDS data and the second subsample of firms with no CDS data in the Markit database. We find a positive relation between DCVs and stock price crash risk for our CDS sample, which is consistent with our results using CDS spreads, and a negative relation between DCVs and price crash risk for the Non-CDS sample, which is consistent with Kim et al. (2016)'s argument that the control right transfer upon DCVs lowers borrowers' credit risk (results untabulated).[15]

[15] Liu, Ng, Tang, and Zhong (2017) argue that CDS trading reduces stock price crash risk because it reveals negative information on reference firms. In contrast to their paper's focus on the information contents of CDS trading in equity markets, we focus on the effect of DCV on CDS spreads in credit markets, where CDS contracts likely disincentivize lenders from exercising the creditor control rights upon DCV. Our finding that stock price crash risk increases upon DCV, suggests that the effect of lacking

5.2. Results on the Effect of DCVs, Combined with CDS Spreads, on Conservatism

Martin and Roychowdhury (2015) use Basu (1997) model to test the effect of CDS trade initiation on conservatism, and find a reduction in borrowers' accounting conservatism subsequent to the initiation of the CDS trading.[16] We follow their approach, using the Basu model to test the effect of DCVs on the reference entities' accounting conservatism by estimating the following equation:

$$\begin{aligned} X_t = \alpha_0 &+ \alpha_1 R_t + \alpha_2 D_t + \alpha_3 R_t{*}D_t + \alpha_4 DCV_t + \alpha_5 R_t{*}DCV_t + \alpha_6 D_t{*}DCV_t \\ &+ \alpha_7 R_t{*}D_t{*}DCV_t + \alpha_8 FirmSize_t + \alpha_9 MTB_t + \alpha_{10} Leverage_t \\ &+ \alpha_{11} FirmSize_t{*}DCV_t + \alpha_{12} MTB_t{*}DCV_t + \alpha_{13} Leverage_t{*}DCV_t \\ &+ Industry\ FE + \varepsilon \end{aligned} \quad (3)$$

where X is annual net income before extraordinary items scaled by last year's shareholders' equity, R is annual stock return in the 12-month period of 9 months before and 3 months after the fiscal year end, D is an indicator variable that equals one when R is negative and zero otherwise, and t is fiscal year subscript. See Appendix 2 for other variables' definitions. Our hypotheses focus on the coefficient of the three-way interaction term $R_t{*}D_t{*}DCV_t$.

If CDS-protected lenders reduce their demand of accounting conservatism (Martin and Roychowdhury 2015) and ignore the increased credit risk upon DCVs, the coefficient of $R_t{*}D_t{*}DCV_t$ should be insignificantly different from zero, or even negative when borrowers manage earnings more aggressively to avoid violating debt covenants and falling prey to lenders' charge of higher spreads on renegotiated loans of

creditor control rights transfer dominates the information revelation role of CDS trading on stock price crash risk.

[16] We replicate their paper by using our DCV sample including both firms having outstanding debts referenced in CDS contracts and firms not having outstanding debts referenced in CDS contracts (untabulated), showing that CDS firms in our sample are less conservative in financial reporting relative to non-CDS firms post their CDS initiations.

borrowers with a traded CDS (Chakraborty et al., 2015). On the other hand, Tan (2013) provides evidence that creditors exercise their information rights on financial reporting upon DCVs, which causes borrowers to report more conservatively after covenant violations. Tan's finding suggests that the three-way interaction term $R_t*D_t*DCV_t$ should show a positive sign. In addition, we argue that other stakeholders such as institutional holders and lenders not insured by CDS contracts may demand borrowing firms to report more conservatively after they learn about increased credit risk of borrowers post DCVs. Therefore, the net effect of DCVs on accounting conservatism is an empirical issue.

Table 5, column (1) presents regression statistics of Eq. (3) for the sample of reference entities. In our primary sample, we have 8,788 firm-quarter observations. After requiring 12-month (9 months before and 3 months after the fiscal year end) stock return data in CRSP, we get 8,609 firm-quarter observations, equivalent to 2,738 firm-year observations. The coefficient of $R*D*DCV$ is significantly positive (0.164; $p < 0.01$), suggesting that reference entities are more conservative in financial reporting post DCVs.

[Insert Table 5 about here.]

The borrowing firms report more conservatively could be due to creditors, though insured by CDS contracts, still exercise their information rights on financial reporting upon DCVs, and/or other stakeholders' intervention when they are concerned about borrowers' increased credit risk. To test the effect of credit risk, we group our CDS firms into three groups by the magnitude of CDS spread changes (ΔSpread1). When a borrowing firm has multiple DCVs during a fiscal year, we choose the maximum CDS spread increase in the year for each firm. The group of high (low) increase in credit risk consists of the top (bottom) 30% of all firms' max CDS spreads over each fiscal year. The middle 40% firms belong to the medium change in credit risk group.

Table 5, columns (2), (3), and (4) summarize regression results for the three credit risk groups. The coefficient of *R*D*DCV* is the highest (0.201; p <0.01) for the high credit risk group, and lowest (0.100; p < 0.05) for the low credit risk group, and in between (0.124; p <0.01) for the middle group. The F test on the difference in the coefficients on *R*D*DCV* for high versus low credit risk group is significant at the 5% level (4.55; p = 0.033). Although our analyses could not exclude the possibility that creditors whose covenants in debt contracts referenced by any CDS contract are violated still demand more conservative financial reporting of the borrowing firms, our results are consistent with the notion that other stakeholders' intervene borrowers' financial reporting when they learn about increased credit risk from the CDS pricing. We later conduct conditioning analyses by the influence from institutional holders and other creditors to disentangle the effect of other stakeholders.

5.3. Other Stakeholders and Accounting Conservatism

The results in Table 5 indicate that borrowing firms increase accounting conservatism post DCVs, especially when the increase in CDS spreads is high after DCVs. To exploit the role of other stakeholders, we group firms by institutional ownership and the number of loan creditors, respectively.

We partition our reference entities into two subsample—firms with high (low) institutional ownership greater (less) than the sample median institutional holdings by each fiscal year. We then conduct two by two analysis, by grouping firms in each of the high/low institutional ownership subsamples further into two groups of large/small change in credit risk groups on the basis of the ΔSpread1 median level. If institutional shareholders' intervene in reference entities' financial reporting, the combined effects of DCVs and ΔSpread1 on accounting conservatism should be more pronounced for the high institutional ownership subsample.

Table 6, columns (1) and (2) show that for borrowers with a high institutional ownership, the coefficient of *R*D*DCV* is 0.135 (p <0.01) for the high credit risk (ΔSpread1) group, which is statistically different from the coefficient 0.056 (p < 0.10) for the low credit risk group with a F value of 2.57 (P = 0.109). Columns (3) to (4) show that for borrowers with a low institutional ownership, the coefficient of *R*D*DCV* is 0.052 (p < 0.10), which is statistically indifferent from the coefficient for the low credit risk group. Combined, the results provide evidence that the underlying reason for reference entities to report more conservatively post DCVs is possibly institutional owners' demand of more conservative financial reporting after observing the increased credit risk revealed by increased CDS spreads.

[Insert Table 6 about here.]

Similar to the institutional ownership analysis, we partition our reference entities into two subsample—firms with large (small) number of loan lenders above (below) the sample median number of lenders by each fiscal year. We then group firms in each of the two subsample into two subsamples by the level of ΔSpread1. If non-CDS protected lenders intervene in reference entities' financial reporting, the combined effects of DCVs and ΔSpread1 on accounting conservatism should be more pronounced for CDS firms of a large number of lenders.

Table 7, columns (1) and (2) report the regression statistics for the reference entities with a large number of lenders, and (3) to (4) for the firms with a small number of lenders. The large number of lenders group show results similar to those in the first two columns of Table 6, suggesting that borrowing firms in the high increased credit risk group become more conservative in financial reporting relative to the low increased credit risk group. The F test of the difference in the coefficients on *R*D*DCV* for borrowing firms with above median ΔSpread1 values in column (1) and those firms with below median ΔSpread1 values in column (2) is 3.36 (p =0.067), significant at less than 10% level. In contrast, the coefficients on *R*D*DCV* for the reference entities with a small number of lenders are insignificantly different from zero for both groups with above or below median values in ΔSpread1. Combined the results of the two subsamples with a high or low number of lenders, we conclude that other lenders who are not directly involved in DCVs and likely not protected by CDS contracts demand more conservative financial reporting of the borrowing firms after observing increased CDS spreads.

[Insert Table 7 about here.]

A caveat of our above-mentioned results based on the number of lenders is that we do not have data to identify which lenders of a borrowing firm is protected by CDS contracts, we contend that when a borrowing firm has many lenders, the chance is greater for some lenders not protected by CDS contracts. However, the results from institutional ownership and lender number analyses are consistently pointing out to the direction that other stakeholders not protected by CDS contracts have incentives to intervene borrowing firms' financial reporting when CDS pricing indicates increased credit risk of the borrowers.

6. Additional Analysis: Lenders' Likelihood of Using CDS to Hedge Credit Risk

In our first research question, we test the trade-off between the effect of potential benefits associated with the control right transfer and the effect of the empty creditor problem, and find that DCVs cause an increase in CDS spreads, supporting the empty creditor problem. A caveat in our empirical test is that the data on lenders' disaggregated CDS arrangement are not publicly available and aggregated CDS data are largely missing in the Federal Reserve System, disallowing us to exactly attribute the increase in CDS spreads to the empty creditor problem. Therefore, in section 6, we conduct additional analyses based on five conditioning variables as proxies for lenders' high or low likelihood of using CDS to hedge credit risk.[17] We posit that the effect of control right transfer on reducing default risk is less pronounced, or alternatively, the effect of empty creditor problem on disincentivizing lenders from exercising control rights upon DCVs is more pronounced, when lenders as CDS buyers are more likely to participate

[17] To double check whether lenders disclose the underlying reference entities of the CDS in annual reports, we search the 2010 annual reports of the ten main lenders in our sample, namely JPMORGAN CHASE, BANK OF AMER, SUNTRUST, CITIGROUP, MORGAN STANLEY, GOLDMAN SACHS GROUP, BANK OF NY MELLON, BMO FNCL CORP, T D BANK, and KEYBANK. Our cross-checking of the data confirms that these lenders report aggregate CDS data but not CDS data at the reference-entity level.

in the CDS market to hedge credit risk.

The first conditioning variable is banks' foreign exchange derivatives held for purposes other than trading. Prior research shows that foreign exchange derivatives scaled by total assets (*FED*) is a valid instrumental variable for CDS trading (Saretto and Tookes, 2013), because firms holding foreign exchange derivatives tend to be active risk managers and therefore they are more likely to purchase CDS contracts to hedge credit risk associated with loans.[18] Therefore, we expect that borrowers' foreign exchange derivatives aggravate the positive connection between DCVs and CDS spreads. We use the full sample[19] and interact *DCV* in quarter *t* with *FED* in the prior quarter *t-1*[20]. The results are shown in Table 8. In column (1) of Table 8, the coefficient of *FED*DCV* is 0.373 with a *p*-value of 0.037, implying that the average CDS spreads on the first trading day after borrowers' SEC filing dates[21] increase by 38.4 (= 0.373 + 0.011) percent for lenders having a high probability to buy CDS contracts (FED lenders), consistent with our expectation.

[Insert Table 8 about here.]

The second and third conditioning variables are measures of financial distress, namely, *Tier One Ratio* (i.e., tier one risk-based capital ratio) and *Interest Margin* (i.e.,

---

[18] We check the validity of FED as a proxy of lenders' likelihood of using CDS to hedge credit risk. Specifically, we test the relation between banks' use of CDS and banks' use of foreign exchange derivatives using a sample from the FR Y-9C and running the following regression: $CDS_{i,t} = \alpha_0 + \alpha_1 FED_{i,t} + \sum Year_t + \sum Firm_i + \varepsilon_{i,t}$. We find a significantly positive coefficient on $FED_{i,t}$ (untabulated), suggesting a positive association between banks' use of CDS and banks' use of foreign exchange derivatives.

[19] We do not use the narrow-band subsample because after imposing the *FED* data requirement, parent firms of narrow-band subsamples are highly concentrated among several big financial institutions such as JPMorgan Chase & Co., Citicorp, Bank of America, Bank of New York, Wachovia Corp, and Suntrust.

[20] This is because there is no data on when lenders disclose their monthly data of foreign exchange derivatives in the Federal Reserve System, and therefore lenders' lagged *FED* data are more likely to be public information before borrowers' current SEC filing dates relative to lenders' current *FED* data

[21] The results of three trading days CDS spreads (untabulated) are similar through all five conditioning analyses.

the ratio of net interest income to total assets). Lenders with lower Tier One Ratio and lower interest margin are high on their financial distress and more likely to purchase CDS (Minton, Stulz, and Williamson, 2009) to hedge the credit risk of their borrowers through CDS (Subrahmanyam et al, 2014). Hence, we contend that the relation between DCVs and CDS is less positive when *Tier One Ratio* is greater, or when *Interest Margin* is higher. In Table 8, columns (2) and (3) summarize the results on *Tier One Ratio* and *Interest Margin*, respectively. Consistent with our predictions, the interaction term of *Tier One Ratio* and *DCV* has a coefficient of −0.010 ($p < 0.05$) for the one-day CDS spread regression, and the interaction term of *Interest Margin* and *DCV* has a negative coefficient of −2.750 ($p < 0.05$).

Our fourth and fifth conditioning variables are the number of analyst following for borrowers and the loan maturity of borrowers. The transparency of borrowers can curb lenders' incentives to purchase CDS contracts, and thus mitigates the positive relation between CDS spreads and DCVs. As long maturities tend to be high on default risk (Saretto and Tookes, 2013) and renegotiation costs (Robert and Sufi, 2008), we contend that lenders providing long-term loans are more likely to buy CDS contracts for hedging their credit risk. Therefore, we expect that the relation between DCVs and CDS spreads is more positive when borrowers' loans have longer maturities.

In Table 8, columns (4) and (5) present the statistics on *No. Analyst* and *Ave_maturity* (i.e., the arithmetic average maturity of borrowers' loans)[22], respectively.

[22] Since a borrower usually holds multiple loans of various maturities and various amounts, we also compute weighted maturity by taking the loan amount weighted average of a borrower's loans, and the results are similar to the regression using the average maturity measure.

Consistent with our expectation, the coefficients on *No. Analyst*DCV* is −0.004 ($p < 0.05$), suggesting that borrowers with a larger number of analyst following experience a decline in CDS spreads of 0.35 percent more relative to borrowers with a smaller number of analyst following. The interaction terms of *DCV* with *Ave_maturity* has a coefficient of 0.002 ($p < 0.10$), which is in line with our prediction.

7. Conclusion and Discussion

Using a DealScan sample with CDS trading data and employing an RD design, we find an average 10.35 (10.12) percent increase in CDS spreads on the first trading day (the first three trading days) after borrowers' SEC filing dates. Our finding is robust to a variety of sensitivity checks, including the use of alternative measures of credit risk, alternative model specification, different sample selection procedures, different bandwidth selections, and a simultaneous regression approach addressing the endogeneity concern.

We attribute the increase in CDS spreads to lenders' (perceived) participation as protection buyers in the CDS market. To substantiate this attribution, we implement additional analyses conditioning on (1) the lenders' attributes, namely, lenders' FED holding and financial distress (i.e., Tier One Ratio and Interest Margins), and (2) the borrowing firms' attributes, namely, the number of analyst following and the borrowers' loan maturity. These conditioning variables are proxies for the probability of lenders' incentives (lenders' FED holding or financial stress) or disincentives (a great number of analyst following on borrowers or borrowers' short loan maturity) to purchase CDS contracts for credit risk hedging. Consistent with our hypotheses, we show that the increase in CDS spreads upon DCVs is more pronounced when (1) lenders hold FED or have high financial stress (low Tier One ratio and low Interest Margin), and (2) borrowers are followed by a smaller number of analysts or their loans are of longer maturity.

In addition, we find that for borrowing firms incur large increases in CDS spreads upon DCVs, their financial reporting become more conservative post DCVs. We posit that the increase in borrowing firms' reporting conservatism is attributable to the intervention of other stakeholders such as institutional shareholders and non-CDS protected creditors, since prior research shows that CDS-protected lenders lack incentives to exert control right. Consistent with our proposition, we show that our results are the most pronounced when borrowing firms have a high institutional ownership and have a large number of loan lenders who are likely not protected by CDS contracts.

Overall, our findings suggest that the transfer of control right upon DCVs does not play a positive role in reducing borrowers' credit risk when banks are perceived to get protection from CDS contracts, and in turn, CDS spreads increase due to the potential empty creditor problem. Meanwhile, increased CDS spreads provide other stakeholders information on borrowing firms' increased credit risk, which results in other stakeholders to demand more conservative financial reporting of the borrowing firms.

Appendix 1: Covenant definitions

DealScan Covenant	Definition
Max. Debt to EBITDA	(long-term debt + debt in current liabilities) / four-quarter rolling sum of operating income before depreciation
Min. Interest Coverage	four-quarter rolling sum of operating income before depreciation / four-quarter rolling sum of interest expenses
Min. Fixed Charge Coverage	four-quarter rolling sum of operating income before depreciation / (principle lagged four quarters + four-quarter rolling sum of interest expenses)
Min. Net Worth	total assets - total liabilities
Min. Tangible Net Worth	total assets - intangible assets - total liabilities
Max. Leverage	(long-term debt + debt in current liabilities) / total assets
Min. EBITDA	four-quarter rolling sum of operating income before depreciation
Min. Current Ratio	current assets / current liabilities
Max. Debt to Tangible Net Worth	(long-term debt + debt in current liabilities) / (total assets - intangible assets - total liabilities)
Min. Quick Ratio	(account receivables + cash & short-term investment) / current liabilities
Max. Debt to Equity	(long-term debt + debt in current liabilities) / (total assets – total liabilities)

The definitions of covenants in Appendix 2 closely follow covenant standard definitions proposed by Demerjian and Owens (2016) and are based on quarterly Compustat.

Appendix 2: Variables used in the regressions

Variable	Definition
Key variables	
△Spread1	Change in CDS spreads, estimated by the CDS spread in the first trading day after the borrower's SEC filing date of the current quarter divided by the CDS spread in the first trading day after the borrower's SEC filing date of the last quarter minus one.
△Spread3	Average change in CDS spreads, measured as the average CDS spreads in the first three trading days after the borrower's SEC filing date of the current quarter divided by the average CDS spreads in the first three trading days after the borrower's SEC filing date of the last quarter minus one.
DCV	A dummy variable equals one if a borrower violates at least one financial covenant in the quarter, and zero otherwise. The definitions of covenants are in Appendix 1.
R	12-month (9 months before and 3 months after the fiscal year end) stock return derived from CRSP database.
D	An indicator variable equals one if R is negative and zero otherwise.
X	Annual income before extraordinary items divided by the last year's shareholders' equity.
Conditioning variables	
Institutional Ownership	The percentage of institutional shareholdings from the Fact Set/Lion Shares database.
Number of Lenders	The number of lenders in outstanding commercial loans covered by DealScan per borrower per fiscal year as a proxy for other stakeholders.
FED	A lender's foreign exchange derivative position, measured as the ratio of foreign exchange derivatives held for purposes other than trading to total assets.
No.Analyst	The number of analyst following the lender according to I/B/E/S.
TierOneRatio	A lender's Tier one risk-based capital ratio from FR Y-9C data.
InterestMargin	The ratio of net interest income to total assets from FR Y-9C data.
Ave_maturity	The average maturity of a borrower's bank loans.
Control variables	
△ROA	Change in return on assets, measured as ROA in the current quarter minus ROA in the previous quarter, where ROA is computed as earnings before extraordinary items divided by the sum of total liabilities and market value of equity.
△Leverage	Change in leverage, computed as leverage in the current quarter minus leverage in the previous quarter, where leverage is calculated as the ratio of long-term debt plus debt in current liabilities to total assets.
△Size	Change in size between the current and the last quarter, where size is measured as total assets.
△Stdret	Change in the twelve-month rolling standard deviation of stock returns.

ΔTbill	Change in one-year T-Bill rate.
Rate_Long	S&P long-term credit rating. Letters are converted into numerical values. The larger the value, the lower the credit rating.
Distance	The smallest distance among all covenants that a borrower has during one quarter, where for the maximum type of covenants, Distance equals the actual financial ratio minus its corresponding covenant threshold scaled by the past twenty-quarter rolling standard deviation of the actual financial ratio multiplied by negative one; For the maximum type of covenants, Distance equals the actual financial ratio minus its corresponding covenant threshold scaled by the past twenty-quarter rolling standard deviation of the actual financial ratio.

References

Acharya V.V., and T C. Johnson. 2007. Insider Trading in Credit Derivatives. *Journal of Financial Economics* 84: 110-141.

Aghion P., and P Bolton. 1992. An Incomplete Contracts Approach to Financial Contracting. *The Review of Economic Studies* 59: 473-494.

Batta G E., J Qiu, and F Yu. 2016. Credit Derivatives and Analyst Behavior. *The Accounting Review* 91: 1315-1343.

Basu S. 1997. The Conservatism Principle and The Asymmetric Timeliness of Earnings. *Journal of Accounting and Economics* 24: 3-37.

Black F., and M Scholes. 1973. The Pricing of Options and Corporate Liabilities. *Journal of Political Economy* 81: 637-654.

Blanco R., S. Brennan, and I. W. Marsh. 2005. An Empirical Analysis of the Dynamic Relation between Investment-grade Bonds and Credit Default Swaps. *The Journal of Finance* 60: 2255-2281.

Bolton P. and M Oehmke. 2011. Credit Default Swaps and the Empty Creditor Problem. *Review of Financial Studies* 24: 2617-2655.

Callen J L., J Livnat, and D Segal. 2009. The Impact of Earnings on the Pricing of Credit Default Swaps. *The Accounting Review* 84: 1363-1394.

Calonico S., M. D. Cattaneo, M. H. Farrell, and R Titiunik. 2017. Rdrobust: Software for Regression Discontinuity Designs. *The Stata Journal* 17: 372-404.

Chakraborty, I., S. Chava, and R. Ganduri. 2015. Credit Default Swaps and Moral Hazard in Bank Lending. Georgia Institute of Technology, *Working Paper*.

Chava. S., and MR Roberts. 2008. How Does Financing Impact Investment? The Role of Debt Covenants. *Journal of Finance* 63: 2085-2121.

Demiroglu, C. and C M. James. 2010. The Information Content of Bank Loan Covenants. *The Review of Financial Studies* 23: 3700-3737.

Demerjian P R., and E L. Owens. 2016. Measuring the Probability of Financial Covenant Violation in Private Debt Contracts. *Journal of Accounting and Economics* 61: 433-447.

Duffie D., and D Lando. 2001. Term Structures of Credit Spreads with Incomplete Accounting Information. *Econometria* 69: 633-664.

Forte S., and J. I. Pena. 2009. Credit Spreads: An Empirical Analysis on the Informational Content of Stocks, Bonds, and CDS. *Journal of Banking and Finance* 33: 2013-2025.

Freudenberg F., B Imbierowicz, A Saunders, and S Steffen. 2012. Covenant Violations, Loan Contracting, and Default Risk of Bank Borrowers. *Working paper*.

Gao Y., M Khan, and L Tan. 2017. Further evidence on consequences of debt covenant violations. *Contemporary Accounting Research* 34: 1489-1521.

Hu H. T. C., and B. Black. 2008a. Debt, Equity, and Hybrid Decoupling: Governance and Systemic Risk Implications. *European Financial Management* 14: 663-709.

Hu H. T. C., and B. Black. 2008b. Equity and Debt Decoupling and Empty Voting II: Importance and Extensions. *University of Pennsylvania Law Review* 156: 625-739.

International Swaps and Derivatives Association. 2003. 2003 ISDA Credit derivatives definitions.
International Swaps and Derivatives Association. 2009. March 2009 Supplement.
Kim J-B, Y Lin, L Zhang, and Z Zhang. 2016. Creditor Control Rights and Crash Risk: A Regression Discontinuity Approach. *Working Paper.*
Kim O., and R E. Verrecchia. 1994. Market Liquidity and Volume Around Earnings Announcements. *Journal of Accounting and Economics* 17: 41-67.
Lee D.S., and T. Lemieux. 2010. Regression Discontinuity Design in Economics. *Journal of Economic Literature* 48: 281-355.
Lee J., A Naranjo, and S Sirmans. 2014. CDS momentum: slow moving credit ratings and cross-market spillovers. *Working Paper*.
Lee J., A Naranjo, and G Velioglu. 2017. When do CDS spreads lead? Eating events, private entities, and firm-specific information flows. *Journal of Financial Economics* Forthcoming.
Liu J., J Ng, DY Tang, and R Zhong. 2017. CDS Trading and Stock Price Crashes. *Working Paper*.
Martin X., and S Roychowdhury. 2015. Do Financial Market Developments Influence Accounting Practices? Credit Default Swaps and Borrowers' Reporting Conservatism. *Journal of Accounting and Economics* 59: 80-104.
Merton R C. 1974. On the Pricing of Corporate Debt: the Risk Structure of Interest Rates. *The Journal of Finance* 29: 449-470.
Minton B A., M, R Stulz, and R Williamson. 2009. How Much Do Banks Use Credit Derivatives to Hedge Loans? *Journal of Financial Services Research* 35: 1-31.
Morrison AC. 2005. Credit Derivatives, Disintermediation, and Investment Decisions. *Journal of Business* 78: 621-647.
Narayan P. K., S. S. Sharma, and K. S. Thuraisamy. 2014. An Analysis of Price Discovery from Panel Data Models of CDS and Equity Returns. *Journal of Banking and Finance* 41: 167-177.
Nini, G., D. C. Smith, and A. Sufi. 2012. Creditor Control Rights, Corporate Governance, and Firm Value. *Review of Financial Studies* 25: 1713-1761.
Norden L., and M Weber. 2004. Informational Efficiency of Credit Default Swap and Stock Markets: The Impact of Credit Rating Announcements. *Journal of Banking and Finance* 28: 2813-2843.
Norden L, and M Weber. 2009. The Comovement of Credit Default Swap, Bond and Stock Markets: An Empirical Analysis. *European Financial Management* 15: 529-562.
Parlour CA, and A Winton. 2013. Laying off Credit Risk: Loan Sales versus Credit Default Swaps. *Journal of Financial Economics* 107: 25-45.
Petersen M. A. 2009. Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies* 22:435-480.
Qiu J, and F Yu. 2012. Endogenous liquidity in credit derivatives. *Journal of Financial Economics* 103: 611-631.
Ramalingegowda S., and Y Yu. 2012. Institutional Ownership and Conservatism. *Journal of Accounting and Economics* 53: 98-114.

Roberts M. R., and A. Sufi. 2009a. Renegotiation of financial contracts: Evidence from private credit agreements. *Journal of Financial Economics* 93: 159-184.

Roberts M. R., and A. Sufi. 2009b. Control Rights and Capital Structure: An Empirical Investigation. *Journal of Finance* 64: 1657-1695.Saretto A., and H E. Tookes. 2013. Corporate Leverage, Debt Maturity, and Credit Supply: the Role of Credit Default Swaps. *The Review of Financial Studies* 26: 1190-1247.

Shan S C, D Y Tang, and A Winton. 2014. Do Credit Derivatives Lower the Value of Creditor Control Rights? Evidence from Debt Covenants. *Working Paper*.

Subrahmanyam M G., D Y Tang, and S Q Wang. 2014. Does the Tail Wag the Dog? The Effect of Credit Default Swaps on Credit Risk. *The Review of Financial Studies 27: 2927-2960.*

Tan L. 2013. Creditor Control Rights, State of Nature Verification, and Financial Reporting Conservatism. *Journal of Accounting and Economics* 55: 1-22.

Vashishtha, R., 2014. The Role of Bank Monitoring in Borrowers' Disclosure: Evidence from Covenant Violations. *Journal of Accounting and Economics* 57: 176-195.

Wang, Y. and H. Xia. 2014. Do Lenders Still Monitor When They Can Securitize Loans? *Review of Financial Studies* 27(8): 2354-2391.

Zhang Z. 2015. Debt Covenant Violations and Trade Credit. Hong Kong University of Science and Technology, *Working Paper*.

Table 1. Sample selection

Data Filters	
Sample Structure	**Observations**
Collect facilities from the DealScan, keeping facilities with ending dates after our sample beginning period Jan. 1, 2001, and starting dates before our sample ending period Jun. 30, 2012	78,846 facilities of 9,159 borrowers
Exclude non-U.S. borrowers and borrowers in financial industry	64,013 facilities of 6,701 borrowers
Merge with quarterly Compustat based on the DealScan-Compustat link file, excluding facilities with missing financial data	206,387 facility-quarters of 53,492 borrowers-quarters of 3,281 borrowers
Choose facilities with the smallest distance between debt covenant thresholds and actual financial ratios for every borrower in each fiscal quarter, resulting in one smallest-distance facility for each borrower-quarter	53,492 facility-quarters of 53,492 borrowers-quarters of 3,281 borrowers
Merge with the Markit data based on the Markit-Compustat match table, requiring that (1) CDS contracts are 5-year U.S. dollar-denominated and referring to senior unsecured debts with no restructuring clauses, and (2) borrowers have CDS premium either in the first trading day after the SEC filing dates, or in the first three trading days after the SEC filing dates	10,535 borrowers-quarters of 594 borrowers
Require that borrowers have no-missing credit rating data and monthly stock return data from the year 2001 to 2012.	8,788 borrowers-quarters of 517 borrowers

Table 2. Descriptive statistics

Panel A: The full sample and subsample for CDS spreads on the first trading day

	Full sample			subsample				
	Number	Mean	Median	Number	Mean	Median	T test	Z test
∆Spread1	8788	0.060	−0.006	1640	0.057	−0.010	−0.320	−0.798
∆ROA	8683	0.000	0.000	1617	0.000	0.000	0.579	0.618
∆Leverage	8683	−0.001	−0.003	1617	−0.002	−0.003	−1.299	−1.225
∆Size	8683	123.439	47.644	1617	66.447	17.681	−4.013***	−4.880***
∆Tbill	8683	−0.000	0.001	1617	−0.000	0.000	-0.847	−1.049
∆Stdret	8683	−0.026	−0.005	1617	−0.112	−0.062	−1.927*	−2.081**
Rate_long	8683	9.723	9	1617	11.270	11	23.225***	23.406***

Panel B: The full sample and subsample for CDS spreads on the first three trading days

	Full sample			subsample				
	Number	Mean	Median	Number	Mean	Median	T test	Z test
∆Spread3	8706	0.059	−0.007	1615	0.058	−0.007	−0.121	−0.550
∆ROA	8602	0.000	0.000	1592	0.000	0.000	0.621	0.673
∆Leverage	8602	−0.001	−0.003	1592	−0.002	−0.003	−1.190	−1.084
∆Size	8602	124.539	47.765	1592	67.755	17.248	−3.949***	−4.795
∆Tbill	8602	−0.000	0.001	1592	−0.000	0.000	−0.727	−0.925
∆Stdret	8602	−0.027	−0.005	1592	−0.118	−0.074	−2.019**	−2.188**
Rate_long	8602	9.713	9	1592	11.254	11	22.986***	23.170***

Table 2. Descriptive statistics (cont'd)

Panel C: Non-violating versus violating subsamples for CDS spreads on the first trading day

	Non-violating subsample			Violating subsample				
	Number	Mean_nv	Median_nv	Number	Mean_v	Median_v	T test	Z test
∆Spread1	1035	0.043	−0.015	605	0.081	−0.001	−2.168**	−1.656*
∆ROA	1023	0.000	0.000	594	0.001	0.000	−0.898	−0.617
∆Leverage	1023	−0.002	−0.003	594	−0.001	−0.002	−1.009	−1.583
∆Size	1023	76.136	18.683	594	49.759	12.516	1.052	1.391
∆Tbill	1023	−0.000	0.001	594	−0.001	0.000	0.774	0.895
∆Stdret	1023	−0.103	−0.077	594	−0.129	−0.044	0.273	−0.071
Rate_long	1023	10.988	11	594	11.754	12	−6.696***	−6.841***

Panel D: Non-violating versus violating subsamples for CDS spreads on the first three trading days

	Non-violating subsample			Violating subsample				
	Number	Mean_nv	Median_nv	Number	Mean_v	Median_v	T test	Z test
∆Spread3	1019	0.042	−0.017	596	0.084	0.001	−2.342**	−2.028**
∆ROA	1007	0.000	0.000	585	0.001	0.000	−0.956	−0.710
∆Leverage	1007	−0.002	−0.003	585	−0.001	−0.002	−0.920	−1.451
∆Size	1007	76.070	18.68	585	53.443	12	0.891	1.266
∆Tbill	1007	−0.000	0.001	585	−0.000	0.000	0.705	0.888
∆Stdret	1007	−0.109	−0.083	585	−0.134	−0.050	0.271	−0.082
Rate_long	1007	10.971	10	585	11.742	12	−6.673***	−6.806***

The table shows summary statistics for both the full sample and the subsample including non-violation and violation U.S. reference firms during Jan 2001 to Jun 2012, respectively for the CDS spreads on the first trading day subsequent to the SEC filing dates and the first three trading days. "Subsample" means a restricted sample with the bandwidth equal to 0.6. All variables are defined in Appendix 2. We conduct t-tests to test differences in means and Wilcoxon Rank Sum Tests to test differences in medians. All continuous variables are winsorized at 1% and 99% levels. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 3. Debt covenant violation and changes in CDS spreads

	ΔSpread1$_{t+1}$			ΔSpread3$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
DCV$_t$	**0.038****	**0.033****	**0.104****	**0.041****	**0.038****	**0.101****
	(0.037)	**(0.034)**	**(0.020)**	**(0.025)**	**(0.016)**	**(0.025)**
ΔROA$_t$		0.057	0.051		−0.214	−0.202
		(0.952)	(0.959)		(0.828)	(0.839)
ΔLeverage$_t$		0.646	0.641		0.556	0.554
		(0.117)	(0.124)		(0.184)	(0.190)
ΔSize$_t$		−0.000	−0.000		−0.000	−0.000
		(0.288)	(0.278)		(0.188)	(0.182)
ΔStdret$_t$		0.004	0.004		0.002	0.002
		(0.430)	(0.462)		(0.621)	(0.649)
ΔTbill$_t$		0.133	0.164		0.073	0.107
		(0.935)	(0.920)		(0.964)	(0.961)
Rate_Long$_t$		−0.007**	−0.007**		−0.007**	−0.007**
		(0.040)	(0.037)		(0.048)	(0.045)
Constant	0.042***	0.432**	0.369**	0.042***	0.405**	0.369**
	(0.000)	(0.012)	(0.032)	(0.000)	(0.021)	(0.050)
High Order of Distance	No	No	Yes	No	No	Yes
Fiscal Yr FE	No	Yes	Yes	No	Yes	Yes
Fiscal Qtr FE	No	Yes	Yes	No	Yes	Yes
Calendar Yr FE	No	Yes	Yes	No	Yes	Yes
Cal. Qtr FE	No	Yes	Yes	No	Yes	Yes
Industry FE	No	Yes	Yes	No	Yes	Yes
Adj.R-sq	0.003	0.250	0.253	0.003	0.251	0.254
No. of Obs.	1640	1617	1617	1615	1592	1592

This table provides local regression results of Eq. (1) by using subsamples with the bandwidth equal to 0.6. The dependent variable in the first three columns is the change in CDS spreads on the first trading day subsequent to the SEC filing dates; the dependent variable in the last three columns is the average change in CDS spreads on the first three trading days subsequent to the SEC filing dates. All variables are defined in Appendix 2. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 4. Endogeneity concern: a simultaneous equations testing

	(1)	(2)
	△Spread1$_{t+1}$	△Spread3$_{t+1}$
DCV$_t$	**0.021****	**0.023****
	(0.047)	**(0.024)**
ΔROA$_t$	−0.650	−0.789
	(0.181)	(0.100)
ΔLeverage$_t$	0.926***	0.891***
	(0.000)	(0.000)
ΔSize$_t$	−0.000***	−0.000***
	(0.009)	(0.010)
ΔStdret$_t$	0.004	0.003
	(0.128)	(0.204)
ΔTbill$_t$	−0.507	−0.489
	(0.465)	(0.471)
Rate_Long$_t$	−0.005***	−0.005***
	(0.000)	(0.004)
Constant	0.226***	0.211***
	(0.000)	(0.000)
High Order of Distance	Yes	Yes
Fiscal Year FE	Yes	Yes
Fiscal Quarter FE	Yes	Yes
Calendar Year FE	Yes	Yes
Calendar Quarter FE	Yes	Yes
Industry FE	Yes	Yes
No. of Obs.	8692	8611
	Initial Distance	Initial Distance
CDS_traded	−0.151	−0.367
	(0.805)	(0.545)
Log(loanamt)	−0.285	−0.244
	(0.282)	(0.363)
Maturity	0.010	0.009
	(0.360)	(0.381)
ROA	48.951***	50.082***
	(0.002)	(0.002)
Leverage	−8.763***	−8.911***
	(0.000)	(0.000)
Log(firmsize)	1.600***	1.583***
	(0.000)	(0.000)
Constant	−6.084	−6.663
	(0.215)	(0.176)
Loan Purpose FE	Yes	Yes
Fiscal Year FE	Yes	Yes

Fiscal Quarter FE	Yes	Yes
Calendar Year FE	Yes	Yes
Calendar Quarter FE	Yes	Yes
Industry FE	Yes	Yes

This table summarizes the result of Eq. (2) by using the full samples. Specifically, column (1) and column (2) are based on samples that have data on changes in CDS spreads on the first trading day subsequent to borrowers' SEC filing dates and data on average changes in CDS spreads on the first three trading days subsequent to borrowers' SEC filing dates, respectively. We conduct a mixed-process regression. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 5. DCVs, CDS spreads, and accounting conservatism

		Subsamples by ΔSpread1		
	Full Sample	Top 30%	Middle 40%	Bottom 30%
	(1)	(2)	(3)	(4)
Intercept	-0.089**	-0.065	-0.096	-0.135
	(0.047)	(0.446)	(0.171)	(0.103)
R	0.038***	0.051*	0.048**	0.025
	(0.002)	(0.069)	(0.010)	(0.229)
D	0.008	0.031*	0.010	-0.024
	(0.379)	(0.059)	(0.486)	(0.169)
R*D	0.162***	0.217***	0.092*	0.087
	(0.000)	(0.000)	(0.064)	(0.118)
DCV	0.005	0.060	-0.023	0.015
	(0.799)	(0.121)	(0.501)	(0.725)
R*DCV	-0.067***	-0.040***	-0.082***	-0.064***
	(0.000)	(0.009)	(0.000)	(0.000)
D*DCV	-0.010	0.013	-0.037***	-0.030*
	(0.125)	(0.243)	(0.000)	(0.068)
R*D*DCV	**0.164*** **	**0.201*** **	**0.124*** **	**0.100** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.011)**
F test		**4.29** **	**0.26**	
		(0.039)	**(0.613)**	
Firm Size	0.009***	0.012**	0.006	0.011*
	(0.004)	(0.044)	(0.184)	(0.058)
Market to Book	0.006***	0.006***	0.002	0.010***
	(0.000)	(0.005)	(0.295)	(0.000)
Leverage	-0.007***	-0.003	-0.002	-0.012***
	(0.002)	(0.543)	(0.512)	(0.001)
Firm Size*DCV	-0.001	-0.006	0.003	-0.002
	(0.800)	(0.130)	(0.387)	(0.630)
Market to Book*DCV	0.001	-0.001	0.002	0.003
	(0.309)	(0.397)	(0.159)	(0.220)
Leverage*DCV	0.001	0.001	0.001	0.002
	(0.166)	(0.740)	(0.665)	(0.515)
Industry FE	Yes	Yes	Yes	Yes
Adj. R-sq.	0.263	0.368	0.232	0.187
No. of obs.	2,738	912	1,007	819

This table provides the regression results on the effect of DCVs on accounting conservatism using Basu (1997) model, for the full sample, and three subsamples grouped by the distribution of the change in CDS spreads on the first trading day subsequent to the SEC filing dates. All variables are defined in Appendix 2. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 6. DCVs, CDS spreads, and accounting conservatism: Institutional holdings

	Subsamples by Institutional Holdings and ΔSpread1			
	Institutional Ownership>Median		Institutional Ownership<Median	
	ΔSpread1 >Median (1)	ΔSpread1 <Median (2)	ΔSpread1 >Median(3)	ΔSpread1 <Median (4)
Intercept	-0.104	0.040	0.032	-0.127**
	(0.386)	(0.589)	(0.733)	(0.045)
R	0.057**	0.032*	0.057***	0.053***
	(0.027)	(0.059)	(0.008)	(0.003)
D	0.011	0.014	0.016	-0.010
	(0.524)	(0.346)	(0.272)	(0.458)
R*D	0.078	0.106**	0.073	-0.009
	(0.117)	(0.020)	(0.120)	(0.860)
DCV	-0.017	-0.053	-0.037	-0.012
	(0.791)	(0.212)	(0.334)	(0.767)
R*DCV	-0.088***	-0.048***	-0.002	-0.060***
	(0.000)	(0.000)	(0.899)	(0.000)
D*DCV	-0.011	-0.032***	0.008	-0.041**
	(0.436)	(0.005)	(0.462)	(0.041)
R*D*DCV	**0.135*** **	**0.056***	**0.052***	**0.015**
	(0.000)	**(0.080)**	**(0.084)**	**(0.715)**
F value	**2.57**		**0.53**	
	(0.109)		**(0.465)**	
Firm Size	0.014**	0.003	0.009*	0.006
	(0.041)	(0.583)	(0.058)	(0.133)
Market to Book	0.007***	0.003	0.001	0.004**
	(0.009)	(0.107)	(0.529)	(0.035)
Leverage	-0.003	-0.009***	0.005	-0.008***
	(0.564)	(0.006)	(0.231)	(0.008)
Firm Size*DCV	0.001	0.005	0.005	0.001
	(0.852)	(0.273)	(0.204)	(0.788)
Market to Book*DCV	0.004	-0.001	0.001	0.004*
	(0.251)	(0.736)	(0.548)	(0.081)
Leverage *DCV	-0.004	0.006**	-0.006***	-0.001
	(0.143)	(0.030)	(0.005)	(0.561)
Industry FE	Yes	Yes	Yes	Yes
Adj. R-sq.	0.262	0.271	0.251	0.215
No. of obs.	391	525	407	509

This table provides the regression results of Eq. (3) on the effect of DCVs on accounting conservatism using Basu (1997) model, for the full sample, and four subsamples grouped first by the level of institutional holdings and then by ΔSpread1. All variables are defined in Appendix 2. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 7. DCVs, CDS spreads, and accounting conservatism: Number of Lenders

	Subsamples by No. of Lenders and ΔSpread1			
	No. of Lenders>Median		No. of Lenders <Median	
	ΔSpread1 >Median (1)	ΔSpread1 <Median (2)	ΔSpread1 >Median (3)	ΔSpread1 <Median (4)
Intercept	-0.159	-0.055	0.010	-0.146**
	(0.217)	(0.598)	(0.911)	(0.044)
R	0.072**	0.003	0.043*	0.050**
	(0.038)	(0.898)	(0.078)	(0.016)
D	0.048**	-0.004	0.018	-0.005
	(0.020)	(0.801)	(0.299)	(0.769)
R*D	0.223***	0.161**	0.162***	0.095*
	(0.000)	(0.011)	(0.003)	(0.060)
DCV	-0.055	0.021	-0.017	0.068*
	(0.304)	(0.610)	(0.736)	(0.093)
R*DCV	-0.099***	-0.068***	-0.012	-0.065***
	(0.000)	(0.000)	(0.389)	(0.000)
D*DCV	0.003	0.019	-0.021	-0.085***
	(0.828)	(0.115)	(0.121)	(0.000)
R*D*DCV	**0.279*** **	**0.199*** **	**-0.009**	**-0.008**
	(0.000)	**(0.000)**	**(0.762)**	**(0.847)**
F value	**3.36***		**0.00**	
	(0.067)		**(0.992)**	
Firm Size	0.013	0.008	0.005	0.012**
	(0.107)	(0.174)	(0.449)	(0.031)
Market to Book	0.007**	0.004*	0.005**	0.006***
	(0.021)	(0.092)	(0.031)	(0.002)
Leverage	-0.006	-0.004	0.001	-0.010***
	(0.384)	(0.346)	(0.896)	(0.002)
Firm Size*DCV	0.007	-0.004	0.002	-0.007*
	(0.206)	(0.364)	(0.787)	(0.098)
Market to Book*DCV	0.003	-0.002	-0.003	0.001
	(0.114)	(0.314)	(0.241)	(0.569)
Leverage*DCV	-0.005*	0.007***	0.001	0.003
	(0.095)	(0.001)	(0.778)	(0.208)
Industry FE	Yes	Yes	Yes	Yes
Adj. R-sq.	0.445	0.368	0.125	0.167
No. of obs.	663	693	554	828

This table provides the regression results of Eq. (3) on the effect of DCVs on accounting conservatism using Basu (1997) model, for the full sample, and four subsamples grouped first by the number of loan lenders and then by ΔSpread1. All variables are defined in Appendix 2. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Table 8. The relation between DCVs and CDS Spreads: Conditioning analyses by foreign exchange derivatives, tier one ratio, net interest margin, number of analysts following, and average maturity.

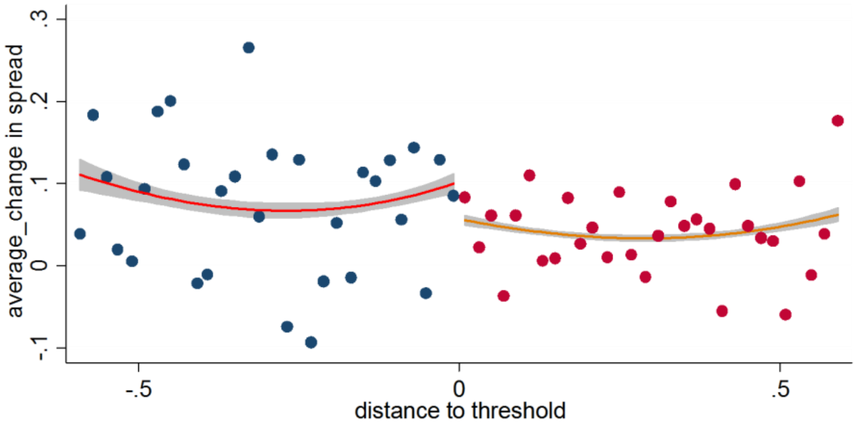
	$\Delta Spread1_{t+1}$				
	(1)	(2)	(3)	(4)	(5)
DCV_t	0.010	0.125***	0.072***	0.058***	-0.057
	(0.425)	(0.003)	(0.002)	(0.004)	(0.483)
FED_{t-1} *DCV_t	**0.373****				
	(0.037)				
FED_{t-1}	0.011				
	(0.867)				
$TierOneRatio_{t-1}$ *DCV_t		**-0.010****			
		(0.014)			
$TierOneRatio_{t-1}$		0.015***			
		(0.000)			
$InterestMargin_{t-1}$ *DCV_t			**-2.750****		
			(0.015)		
$InterestMargin_{t-1}$			5.895***		
			(0.000)		
$No.Analyst_t$ *DCV_t				**−0.004****	
				(0.013)	
$No.Analyst_t$				0.001**	
				(0.022)	
$Ave\_maturity_t$* DCV_t					**0.002***
					(0.083)
$Ave\_maturity_t$					-0.000
					(0.940)
ΔROA_t	−0.734	−0.685	-0.713	−0.730	0.040
	(0.210)	(0.246)	(0.227)	(0.188)	(0.967)
$\Delta Leverage_t$	0.734***	0.720***	0.736***	0.876***	0.698
	(0.000)	(0.000)	(0.000)	(0.000)	(0.110)
$\Delta Size_t$	−0.000***	−0.000***	-0.000***	−0.000	−0.000
	(0.008)	(0.010)	(0.000)	(0.159)	(0.295)
$\Delta Stdret_t$	0.005*	0.005*	0.005	0.002	0.004
	(0.068)	(0.076)	(0.111)	(0.547)	(0.484)
$\Delta Tbill_t$	−3.561***	−3.627***	-3.436***	−1.056	0.226
	(0.000)	(0.000)	(0.000)	(0.145)	(0.893)
$Rate\_Long_t$	−0.005***	−0.005***	-0.004**	−0.005***	−0.008**
	(0.003)	(0.002)	(0.013)	(0.004)	(0.017)
Constant	0.282***	0.160*	0.155*	0.195**	0.387**
	(0.000)	(0.054)	(0.051)	(0.012)	(0.047)
High Order of Distance	Yes	Yes	Yes	Yes	Yes

Fiscal Year FE	Yes	Yes	Yes	Yes	Yes
Fiscal Quarter FE	Yes	Yes	Yes	Yes	Yes
Calendar Year FE	Yes	Yes	Yes	Yes	Yes
Calendar Quarter FE	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes
Adj.R-sq	0.265	0.267	0.267	0.233	0.254
No. of Obs.	6581	6572	6586	6604	1572

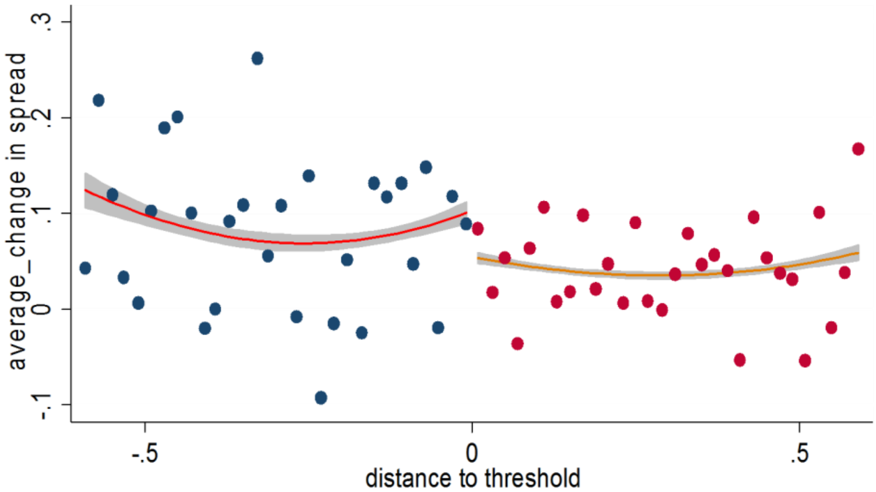
This table shows the QRD results of conditioning analyses from both lenders' (foreign exchange derivatives, tier one ratio, and net interest margin) and borrowers' (number of analysts following and average maturity) perspectives for the relation between DCVs and CDS spreads (ΔSpread1). We obtain the relevant data from the FR Y-9C from the first quarter of 2001 to the second quarter of 2012. Columns (1) to (3) present the effects of lenders' foreign exchange derivative positions, tier-one risk-based capital ratio, and net interest margin, respectively, on the positive relation between DCVs and CDS spreads; Columns (4) and (5) show the impact of borrowers' number of analysts following and average maturity of borrowers' loans, respectively, on the positive relation between DCVs and CDS spreads. All variables are defined in Appendix 2. Robust standard errors are clustered at the firm level. ***, **, and * indicate significance at 1%, 5%, and 10%, separately.

Figure 1. Distribution of change in CDS spreads around the cutoff

(a)



(b)



We divide the subsample with the bandwidth equal to 0.6 into 30 bins on each side of cutoff, based on the x-axis, the smallest *Distance* for every borrower-quarter. A negative *Distance* means that the borrower violates at least one covenant in quarter *t*, and a positive *Distance* stands for no violation in quarter *t*. The dot denotes the average of changes in CDS spreads in its corresponding bin. The local polynomial smoothed line represents a high order polynomial regression of change in CDS spreads on the smallest *Distance*, with the 90% confidence level. Figure 1 (a) plots the subsample that has the data of changes in CDS spreads on the first trading day subsequent to borrowers' SEC filing dates, and Figure 1 (b) plots the subsample that has the data of the average changes in CDS spreads on the first three trading days subsequent to borrowers' SEC filing dates.