Does CDS Trading Affect Debt Contracting? Evidence from Loan and Bond Covenants*

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ABSTRACT

Credit default swaps (CDS) are derivatives on debt securities and have become the most active instrument for credit trading. CDS potentially change the credit market environment as lenders can use CDS to their advantage. Using a comprehensive sample of CDS trading and private credit agreements from 1994 to 2009, we show that reference firms' debt covenants are loosened after CDS start trading. The loosening is more pronounced when more CDS contracts reference the borrowers' debt and when lenders have larger positions in credit derivatives. The results are robust to controlling for the endogeneity of CDS trading. Further analysis suggests a potential mechanism for this finding that CDS help alleviate creditors' concern over conflicts of interest with shareholders. Given that covenants are frequently renegotiated during the life of the loan and that renegotiation is costly to both lenders and borrowers, our findings of covenant loosening are consistent with the view that CDS help mitigate debt contracting friction.

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ABSTRACT

Credit default swaps (CDS) are derivatives on debt securities and have become the most active instrument for credit trading. CDS potentially change the credit market environment as lenders can use CDS to their advantage. Using a comprehensive sample of CDS trading and private credit agreements from 1994 to 2009, we show that reference firms' debt covenants are loosened after CDS start trading. The loosening is more pronounced when more CDS contracts reference the borrowers' debt and when lenders have larger positions in credit derivatives. The results are robust to controlling for the endogeneity of CDS trading. Further analysis suggests a potential mechanism for this finding that CDS help alleviate creditors' concern over conflicts of interest with shareholders. Given that covenants are frequently renegotiated during the life of the loan and that renegotiation is costly to both lenders and borrowers, our findings of covenant loosening are consistent with the view that CDS help mitigate debt contracting friction.

JEL Classification: G21; G32; L14; O16

Keywords: Credit Default Swaps; Debt Covenants; Creditor Protection

I. Introduction

Credit default swaps (CDS) are derivative contracts referencing debt repayments. The CDS market has grown rapidly since its inception in mid-1990s.[1] CDS trading has recently attracted more attention than bond transactions and loan sales, especially after the 2008 credit crisis. CDS provide bank lenders, bondholders, and other credit investors with a venue for credit risk transfer. Do the opportunities in CDS for risk management or risk-taking affect the lending decisions of credit suppliers? While some may sensibly assume that such zero-sum derivative transactions will have no externality, the potential CDS effect on credit supply may be reflected in the price, quantity and other aspects of debt financing. However, little is known on how debt contract terms are affected by the presence and availability of CDS. This study attempts to fill this gap by providing evidence on how debt derivatives trading affects debt contracting through covenant setting.

Covenants are important elements of debt contracts. Traditionally, lenders embed covenants in debt contracts to ensure creditor protection or to encourage monitoring. They serve as financial tripwires to grant creditors with contingent control rights. If CDS change the landscape of the credit market, then covenants setting in the process of debt contracting may be affected accordingly, because CDS potentially change incentives, choices, and relative bargaining power of lenders and borrowers. In this paper, we investigate whether CDS trading affects the strictness of debt covenants at the initial contracting time.

The extant literature has focused on borrower characteristics and lender performance, or the demand side and the supply side of credit market, in understanding debt covenants. Much remains to be explored in covenant choice under different market conditions. The CDS market can shake the credit environment and becomes a new force in setting debt contract terms. On one hand, lenders can use CDS to protect themselves or take advantage of private information after loan origination. Therefore, they may loosen debt covenants as the role of covenants in protecting creditors become less essential. On the other hand, borrowers may increase leverage and become more default risky after CDS trading. Such increase in default risk may beget stricter covenants for the loans issued after CDS start trading. After all, CDS are derivatives and may not have any material effect on debt contracts. Ultimately, it remains an empirical issue to determine the net effect of CDS trading on covenant strictness.

[1]The global CDS notional amount outstanding is US$28.6 trillion in December 2011, according to the *Semiannual OTC Derivatives Statistics* of Bank for International Settlements (BIS).

We construct a comprehensive sample of CDS trading and debt origination from 1994 to 2009 for the empirical analysis. The dataset for CDS trading is obtained from CreditTrade and GFI Group. We identify the first day of CDS trading for each firm from the actual transaction data. To ensure accuracy, we further validate it with Markit quote data. The final dataset contains CDS trading information for 921 U.S. firms from June 1997 to April 2009. CDS trading data is then merged with loan and bond issuance data from Loan Pricing Corporation's DealScan database and Mergent Fixed Income Securities Database (FISD), respectively. The sample includes 10,667 loans and 3,629 bonds originated by CDS firms in the 1994-2009 period.

There are various types of debt covenants. The primary focus of this study is net worth covenants on loans. This choice is made for two reasons. First, net worth is among the most commonly used covenant variable and has least unambiguity in its measure. Accurate measurement of firm value using quarterly reports makes net worth covenants easily implementable. In contrast, the measurement of other covenant variables listed in DealScan database is more debatable.[2] Second, net worth covenants are usually the first to be violated and effectively most binding covenants, as shown by Beneish and Press (1993), Chen and Wei (1993), Sweeney (1994), and Drucker and Puri (2009). Net worth covenants are most related to technical default which could be affected by CDS positions as modeled by Bolton and Oehmke (2011).

We follow Murfin (2012) to measure loan covenant strictness as the probability of covenant violation. My first major finding is that loan net worth covenants become looser after the introduction of CDS trading. This finding is robust to alternative measure of covenant strictness, econometric specification, inclusion of fixed effects for loan purpose, loan origination year and borrower industry and a host of control variables such as loan package size, amount, maturity, seniority and borrower characteristics. Introduction of CDS trading for the median contract strictness (0.496) increases probability of covenant violation within one quarter by 0.053 (or 10.7%). We further show that the loosening effect is stronger when more outstanding CDS contracts reference the borrower's debt. Therefore, the effect of CDS is more pronounced when CDS market is more liquid. Also, the influence of CDS on covenant will dissipate as CDS contracts expire.

The baseline finding shows a negative association between CDS trading and covenant

[2]For instance, Dichev and Skinner (2002) and Drucker and Puri (2009) point out that covenants restricting the borrowers to a maximum debt-to-EBITDA ratio or a maximum debt-to-equity ratio may use different definitions of debt or equity.

strictness. Making causal inference from this association requires the consideration of endogeneity and selection in CDS trading. The specific timing of CDS trading is the source of endogeneity. CDS may trade in anticipation of covenant loosening. However, prior studies find that firms become more leveraged and default risky after CDS trading (Saretto and Tookes (2012), Subrahmanyam, Tang, and Wang (2012)). Debt covenants are usually set tighter for firms that are more risky and subject to more severe debt-equity conflict (Billet, King and Mauer (2007), Demiroglu and James (2010)). Therefore, if anything, CDS traders should expect stricter debt covenants after CDS trading. Nevertheless, we formally address the concerns of endogeneity using two instrumental variables (IV) for CDS trading.[3] The first IV is *Lender Foreign Exchange Hedging*. This instrument is defined as the amount of foreign exchange derivatives that lead banks and bond underwriters use for hedging (not trading) purposes relative to their total loans. Lenders active in foreign exchange derivatives trading likely hedge their loan risk by participating in CDS market, while lender FX hedging is unlikely to drive borrower covenant strictness in other channels. The second IV is *Lender Tier-1 Capital Ratio* which reflects lenders' financial strength from a regulator's point of view. Banks with lower tier-1 capital ratio are more likely to hedge through CDS to meet regulatory compliance. While this ratio is unlikely to have direct impact on covenant tightness as it measures the firm's core equity capital which may not determine the lender's specific contracting strategy. We find that both IVs are valid and strong. The estimation results using instruments show a robust relation between CDS trading and covenant loosening.

CDS firms could be fundamentally different from non-CDS firms. If CDS firms are more likely to have covenant loosening, then the selection of firms for CDS trading can generate the negative relation between covenant strictness and CDS trading. We employ within-firm analysis to address the selection concern. We examine changes in covenant strictness of newly initiated loans before and after the first CDS trading on the borrower's debt. In addition, the sample is restricted to firms that initiate bank loans or issue bonds both before and after CDS introduction to ensure they are the same borrowers. We also employ propensity score matching approach to identify matching firms. After imposing those restriction in the difference-in-differences analysis, net worth covenants on loans are still found to be loosened after CDS trading compared to non-CDS firms. In another way to address the endogeneity and selection concerns, we use the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 ("2005 Bankruptcy Reform") to do a difference-in-difference-difference (triple difference).

[3]Those instrumental variables are previously used by Saretto and Tookes (2012) and Subrahmanyam, Tang, and Wang (2012).

The 2005 Bankruptcy Reform provides an exogeneous shock to creditor protection. Empirical results show that the CDS-covenant loosening effect is more pronounced post 2005 Bankruptcy Reform.

Why are debt covenants looser with CDS trading than without CDS trading? We examine several channels and mechanisms. The first channel is that the lender's concern over the conflicts of interest with its borrower is mitigated by CDS. Therefore, creditors may demand fewer control rights over the firm, resulting in looser covenants. Given limited liquidity in bond market and loan sales market, the development of CDS market provides banks and investors with a new and less expensive way to hedge off their risk exposures to firms. Moreover, since CDS are mainly traded by institutional investors with priviledged information, CDS market is also less subject to the lemon problem which might be severe in secondary loan sales market. Part of the benefit brought by CDS can be passed on to borrowers when lending market is competitive. The sharing rule would depend on the relative bargaining power between the borrower and the lender. If the benefit is from increase in credit supply rather than funding cost, then lenders will loosen covenants instead of lowering loan rates. Indeed, Ashcraft and Santos (2009) find that average cost of debt does not change after the onset of CDS trading.

On lender side, protection from CDS reduces the role of covenants in signalling the lead bank's commitment to monitor, making original tight covenants suboptimal. The new equilibrium may involve looser covenants which can reduce future renegotiation cost or to exchange for higher interest rates. On borrower side, covenants restrict them from taking certain activities; some of them may generate efficient investment outcomes. Therefore, when CDS are available, loosening covenants may be preferred by both lenders and borrowers. A direct test of lender benefit from CDS trading is not feasible as we cannot observe lenders' CDS position on a particular borrower. However, we do find that covenant is loosened more when lenders have a larger aggregate credit derivatives position.

Covenants may not be completely loosened after CDS trading even if both lenders and borrowers can benefit from loosened covenants. When negotiating covenant strictness level, lenders trade off benefit and cost from the control rights allocated by covenants. Loosening covenants may help lenders to maintain their relationship with firms and their reputation in credit market; while it also provides borrowers more risk-shifting opportunities. Other syndicate members may require certain covenants. Loosening covenants too much may also affect the usefulness of CDS as CDS traders taking the other side of the contract may have less incentive to trade. How much would covenants be loosened also depends on the severity

of agency conflict that the firm is subject to, and the relative bargaining power between the lender and the borrower. Both theoretical and empirical studies suggest that, all else equal, borrowers with lower credit quality, poorer information transparency and less bargaining power receive tighter covenants, as banks expect there is more agency conflict in these firms and require more control rights. My empirical findings show that covenants are loosened more when the CDS reference firms are of better credit quality and have larger shareholder advantage. This finding sheds light on the role of CDS in reducing creditors' concern over the borrower's moral hazard problems, as imposing tight covenants might be less useful when such agency problem is less severe.

We further use bond covenants to provide additional evidence for the mechanisms. The average number of bond covenants per issue decreases by 6.6% after CDS trading. The magnitude is both economically and statistically significant. However, the mechanism for bond covenant effect is slightly different, in the sense that arguments related to renegotiation may not apply. Given renegotiation is less essential for bondholders, bondholders may benefit less from reduced ex post renegotiation cost. Also, compared to banks, bondholders rarely monitor as they are not as advantageous as banks in collecting and exploiting private information. Bond covenants are more regarded as a mechanism to ameliorate asset substitution and other managerial opportunism of the firm. Therefore, bond covenants provide a clean environment to demonstrate the agency conflict channel. Loosening in bond covenants provides further evidence that CDS alleviate creditor's agency concern and facilitate bond financing.

This paper is the first, to my knowledge, to empirically study CDS impact on debt covenants and specify mechanisms through different types of covenants. My study adds to the growing literature on the role and determinants of debt covenants (Chava and Roberts (2008), Roberts and Sufi (2009), Gârleanu and Zwiebel (2009), Demiroglu and James (2010), Demerjian (2011), Prilmeier (2011), Murfin (2012), Wang and Xia (2012), among others). We focus on the exogenous effect of CDS trading on covenant choice. My findings help understand debt contracting under new market environment with seemingly innocuous derivatives trading.

My study also contributes to the understanding of the implications of CDS trading, along the lines of Ashcraft and Santos (2009), Bolton and Oehmke (2011), Parlour and Winton (2012), Norden, Silva-Buston and Wagner (2011), Saretto and Tookes (2012), Subrahmanyam, Tang, and Wang (2012), among others. We identify the benefit of CDS trading in reducing contracting friction in both ex ante bargaining and ex post renegotiation, helping complete

the picture for CDS impact on debt financing. Therefore, we substantiate the discussion on the real effects of financial markets, in particular credit derivatives, on firm policies and economic growth as discussed by Bond, Edmans, and Goldstein (2012).

The reminder of the paper is organized as follows: Section II analyzes potential CDS trading impact on covenant strictness under a simple theoretical framework. Section III describes data and empirical specifications. Section IV presents baseline empirical results and addresses endogeneity concerns. Section V discusses channels and underlying mechanisms through which CDS affect covenant strictness. Section VI concludes.

II. Theoretical Framework and Empirical Predictions

In a CDS contract, the protection seller agrees to make payment to the protection buyer in a credit event on a prespecified reference asset. Because of the insurance-like nature, existence of CDS markets can make holding corporate debt more attractive and enable institutional creditors to circumvent regulatory capital requirements. CDS market provides creditors with an alternative venue to diversify risk in a cheaper and easier way. Such benefit may alleviate creditors' concern and ultimately lead to changes in debt contract. In this section, we analyze how this benefit of CDS market results in changes in covenant strictness under a simple theoretical framework.

We consider a firm borrows I dollars from a loan syndicate to fund its investments or other corporate activities. The lead bank of the syndicate is in charge of due diligence as well as negotiating the loan contract with the borrower. Contract terms include loan amount I, loan rate r, maturity T, and, particularly of our interest in this study, covenants. There could be several covenants. The issue we have in mind is on equity as a cushion for creditors. Therefore, we focus on the net worth covenants (including tangible net worth covenants). The lead bank and the borrower agree on the minimum net worth $\underline{w}$ that the borrower must maintain above over the life of the loan. Although we consider a one-period decision problem, there are possible intermediate actions before the maturity of the loan. They may renegotiate the loan contract especially covenant, either voluntarily or mandatorily when loan covenant is violated. The loan may default, in such case lenders will receive δI, where δ is the recovery rate. p is the loan default probability;[4] α is the coordination cost in renegotiation. The lead bank is also responsible for monitoring and renegotiation. The lead bank keeps θ fraction of

[4]For simplicity only consider full default case.

the loan on its book (so loan exposure of the lead bank is θI). It also receives an underwriting fee $\lambda I+c$, where c is the fixed part in the underwriting fee that does not vary with loan amount. The funding cost for the lead bank is f.

Note that p, r, α, δ are functions of $\underline{w}$. p may decrease with $\underline{w}$ (covenant strictness) because looser covenants mean less restriction imposed on the firm, which may induce more risk-taking or other managerial opportunism that may increase loan default risk. Stricter covenants may lead to higher recovery rate δ because covenants serve as "trip-wire" and violation of a tighter covenant is an early alarm of firm's condition.[5] Interest rates (r) may decrease in covenant strictness, *ceteris paribus*, since both of them are debt contracting terms and the bank may trade off the use of them. The expected coordination cost at loan renegotiation at the inception of the loan, α, also depends on $\underline{w}$. The looser the covenant is set, the less possible that the borrower makes a request to relax the covenant after the loan is issued.[6] The lead bank may consider the following terms when setting the optimal covenant threshold: win the loan deal, succeed in participating out the loan, and position well for possible use of CDS in trading and renegotiation in the future. The payoff of the lead bank can be broken down as following:

$$\underbrace{\theta[(1-p)+p\delta]rI-\theta fI}_{\text{Loan Profit}}+\underbrace{(\lambda I+c)}_{\text{Underwriting Fee}}-\underbrace{\theta\alpha I}_{\text{Renegotiation Cost}}+\underbrace{\beta\theta[f_b(p,r,\delta)-f_c(p,r,\delta)]I}_{\text{CDS Benefit-Cost}} \quad \text{(IA.1)}$$

where β describes the sharing rule: higher β represents larger bargaining power of the lender relative to the borrower. Note that although in a typical loan syndicate process, it is the lead bank that negotiates initial contract terms with the borrower, the lead bank is expected to consider participant banks' welfare in doing the maximization because how the contract terms are set will affect potential syndicate members' decision to join in the syndication. The borrower shares a fraction of $(1-\beta)$ of the net benefit of CDS, if there is any. Here f_b and f_c are the functions of the benefit and cost brought by CDS, respectively. Both CDS benefit and cost depend on loan default probability p and recovery rate δ because CDS spread would be higher when loan default probability is higher and when the creditor collects less from liquidation (recovery rate is lower). To the extent of competition in lending market, benefits from CDS are divided among the lead bank, syndicate members and the borrower.

[5]Previous literature finds evidence that violation of tighter covenants result in less severe consequence. For instance, Demiroglu and James (2010) shows violations of tightly set covenants have significantly less of an impact on the borrower's investment spending and net debt issuance than violations of loosely set covenants.

[6]Covenants are renegotiated frequently in practice. Note that theoretically, covenants that are not in violation could also be renegotiated to be tightened. But relaxing the covenant is more common (Beneish and Press (1993, 1995), Sweeny (1994), and Gârleanu and Zwiebel (2009)).

Next we allow CDS benefit to enter the choice variables. Assume both the lead bank and syndicate members fully hedge their exposure using CDS. Then loan default probability p no longer enters its maximization. This is one aspect of CDS benefit. The other aspect could be reflected in renegotiation process by affecting α since CDS may reduce the need for restructuring as the lender is protected. Denote the new interest rate and coordination cost with the presence of CDS with r' and α'. Further simplifying the maximization problem gives:

$$\max_{\underline{w}} \{\theta r'(\underline{w}) - \theta f + \lambda - \theta \alpha'(\underline{w}) - \theta f_c(\underline{w})\} \tag{IA.2}$$

CDS will be traded either when a buyer wants to hedge the risk (may then give out more credit), or when the seller wants to take more risk of the borrower credit. CDS may also fuel the competitiveness of the lending market as banks with higher funding cost may now be able to participate by lending directly or indirectly. CDS help direct lending if capital charge is lowered. Indirectly, high cost banks can become the CDS sellers and take on the credit risk in a different form, which may also leads to higher debt capacity. The other source of benefit is from banks' information advantage in CDS trading. Therefore there is net benefit from CDS and the lead bank obtains part of it. The lead bank's payoff is expected to improve than without CDS:

$$r'(\underline{w}) - \alpha'(\underline{w}) - f_c(\underline{w}) > [(1-p) + \delta p] r(\underline{w}) - \alpha(\underline{w}) \tag{IA.3}$$

where the right handside represents simplified lead bank's payoff without CDS. If CDS is fairly priced then the cost of buying CDS should be equal to the price of risk that is hedged off. This leads to $r' - f_c = r[(1-p) + \delta p]$. Thus we have $\alpha' < \alpha$. Given α increases in $\underline{w}$ we infer $\underline{w}' < \underline{w}$: covenants need to be loosened following CDS introduction. If $r' - f_c < r[(1-p) + \delta p]$ (CDS is overpriced) then covenants will also be loosened; if $r' - f_c > r[(1-p) + \delta p]$ (CDS is underpriced) then the change in covenant strictness is ambiguous.

It is safe to assume that CDS are fairly priced on average. In practice, CDS spread is often used as a clean measure of firms' default risk. With the assumption of fair CDS spreads, the model above predicts covenants would be loosened. Next we move on to discuss how borrowers' payoff is affected by the availability of CDS market. The borrower's total payoff from the loan is:

$$I - rI - vI - (\lambda I + c) + (1-\beta)[f_b(p, r, \delta) - f_c(p, r, \delta)]I \tag{IA.4}$$

where v is the marginal cost of having covenants to the firm: it could be the cost from being

restricted from taking efficient projects by the covenant or the cost due to covenant violation.[7] Note that the cost of having covenants, v, also depends on $\underline{w}$. The cost to the firm of being imposed a covenant is expected to increase in covenant strictness since the firm is more likely to violate a tighter covenant.[8]

If there is any net benefit from CDS trading that can be passed on to the borrower, it may either be reflected in lower interest rate or looser covenants. Lowering interest rates seems to be less possible since the lead bank now pays an extra amount to buy CDS, and its funding cost is not likely to be brought down by CDS. Such benefit is more likely to be reflected covenant loosening. Given the firm is maximizing $I - r'I - \lambda I - v'(\underline{w})I$ after its share of CDS benefit enters the parameters, looser covenants benefit the firm by removing restrictions on its operation, which grants the borrower with more flexibility in making corporate decision, and may reduce the possibility of covenant violation in the future. Therefore, the borrower's situation would be improved after covenants are loosened. One concern is covenant loosening may result in higher interest rate, counter balancing the benefit from reduced restriction. However, this concern would be eliminated as long as the lending market is competitive in some degree. The competition will ensure part of CDS benefit is shared by the borrower.

If syndicate banks also hedge with CDS then loosening of covenants benefits them in a similar way as the lead bank. Suppose syndicate banks funding cost is k. Therefore their profit is $(r-k)(1-\theta)I - \alpha(1-\theta)I$ from the loan. But they may also benefit from CDS trading $U(\underline{w}, \theta)$ depending on (1) their information advantage; (2) their pricing advantage in CDS market. If they do not have much access to CDS market then they will not get favorable pricing and has little benefit from CDS. If the loan only attracts syndicate members without CDS facilities, then the effect of CDS may only confine to lead bank. In this case, the effect from syndicate banks demanding the lead bank's commitment to monitoring through maintaining tight covenants will dominate and covenants may not loosen as much. An interesting setting that may generate unique prediction is when lead bank is active in CDS but syndicate banks are not (or no CDS at all). Then the conflict between lead bank and syndicate banks can actually worsen.

[7] Previous studies have discussed how covenant violation is costly to the borrower. Firms may see significant decline in investment, increased interest rates or material reduction in line of credit. See detailed discussion in Dichev and Skinner (2002), Chava and Roberts (2008), among others.

[8] There is evidence shown by previous literature (such as Demiroglu and James (2010) that violating a tighter covenant generates less severe outcome because of the role of debt covenants serving as the "trip-wire". But this effect seems to be of second-order importance compared with the probability of covenant violation, given that both the firm and the banks have to respond to a violation irrespective of the outcome. The response itself is costly especially for the borrower.

Note that above reasoning is not applicable to bonds. The mechanism for bonds should be simpler as there is no monitoring, syndication, or renegotiation. Then the channel is from potential benefit of CDS trading and increased lending, which results in more competitive lending environment. Therefore, similar to the borrowers in syndicate loan market, bond issuers can demand to share some benefits and obtain looser covenants. However, the potential profit from CDS trading is limited as bondholders may not have much privileged information. Therefore, the only channel is from increased debt capacity. If there is any benefit created by CDS market, bond covenants are expected to be loosened while the economic magnitude could be smaller.

III. Data, Strictness Measure, and Preliminary Result

Our choice of data is largely motivated by the fact that private debt covenant database Dealscan reports the minimum or maximum threshold of covenant variables that the borrower must maintain above or below during the life of the loan. It allows us to calculate the "strictness" of a loan covenant. In contrast, public debt covenant database (Mergent FISD) reports only the title of covenants, without further information about quantitative feature of covenants. Research on covenant strictness (Murfin (2012), Prilmeier (2011), Chava and Roberts (2008), Wang and Xia (2012), etc) mostly focuses on loan covenants instead of bond covenants. However, I do not abandon bond covenant sample in consideration of potentially different purposes and features of using bond covenants.

A. CDS Introduction and Covenant Data

It is worth noting that the CDS introduction data is hard to retrieve from a single data source given that CDS is not traded in centralized exchanges and the central clearing of CDS is a quite recent phenomenon. The final dataset of CDS introduction is derived from two separate sources: CreditTrade and GFI group. The CreditTrade data covers the period from June 1997 to March 2006. GFI data covers the period from January 2002 to April 2009. Both database contain complete information on intra-day CDS quotes and trades. We extract from the real transaction data the exact date when CDS trading began for each firm. Only CDS contracts written on non-sovereign North America corporate issuers enter my sample. The overlapping period from January 2002 to March 2006 of the two database allows me to cross-check the

first CDS trading dates. Given that CDS are traded over-the-counter which makes it hard to pinpoint the first trading date for each firm's CDS, we further validate it with Markit quote data to ensure accuracy. To examine the magnitude of CDS trading impact on covenant strictness, we later on assemble data on the daily number of CDS contracts on each firm's debt, and aggregate it to obtain quarterly observations.

Loan information is extracted from Loan Pricing Corporation's DealScan database. The data consist of private loans made by bank and non-bank lenders to U.S. corporations during the period 1981 to 2011. According to Chava and Roberts (2008), Carey and Hrycray (1999), Dealscan database contains between 50% to 70% of all commercial loans in the U.S. during the early 1990s. From 1995 onward, Dealscan coverage increases to include an even greater fraction of commercial loans. The basic unit of loans reported in Dealscan is facility. Loan amount, maturity, type, purpose and other loan information is reported at facility level. Facilities issued to the same borrower on the same date are grouped into packages. The most pertinent data - restrictive covenants - are documented at package level. To avoid arbitrarily assigning covenants to facilities, we aggregate loan basic information (amount, maturity, type and purpose at package level.[9]

Loan covenant data in Dealscan contain two mutually exclusive categories: net worth covenants and current ratio covenants. Net worth covenants specify the minimum level of total net worth or tangible net worth that the borrower must maintain above during the life of the loan. The latter incorporates 14 major current ratio covenant types, imposing restrictions on firms' financing, investment, interest payment and other aspects of operating performance and other corporate decisions. The most common current ratio covenant is Debt to Assets ratio. This study focuses on net worth covenants for two reasons. First, as suggested by relevant studies such as Chava and Roberts (2008), Drucker and Puri (2009), Dichev and Skinner (2002) point out, current ratio covenants relying on debt, leverage, interest payment and EBITDA have difficulties and ambiguities in measurement. For example, "debt" may refer to short-term debt, long-term debt or total debt. Also firms may have different definition for debt or EBITDA. In contrast, firms' net worth is always explicit and has consistent measure. Second and more importantly, net worth covenants are always violated, causing technical default (Beneish and Press (1993), Chen and Wei (1993), and Sweeney (1994)). According to Bolton and Oehmke (2011), one benefit of CDS is to reduce firms' incentive to

[9]For loan type, we assign the most common type of facilities within one package as the type of this package. For instance, if facilities that account for 75% of the package amount are reported with type "Term Loan" and loan purpose "Working Capital", we will assign "Term Loan" type and "Working Capital" purpose to the package.

default strategically. It is well expected CDS may affect debt contracting through net worth covenants. Because loan covenant data are fairly limited prior to 1994 and incomplete after 2010, we focus on the sample of loans from 1994 to 2009.

Corporate bond data are obtained from Mergent Fixed Income Securities Database (Mergent FISD). FISD contains comprehensive bond issue information such as yield, maturity, offering amount, credit rating, seniority, and whether the issue is secured or enhanced. FISD also offers detailed covenant type information for issues with covenants record. The raw database reports 41 specific bond covenants. Following the spirit of Smith and Warner (1979) we classified all bond covenants into 11 categories. Covenants that put similar restrictions on the firm's activities are regarded as one category. For example, there are covenants restricting future funded debt issuance, secured debt issuance and subordinated debt issuance. We group them into one "debt issuance" covenant. Such classification may help us avoid the case where certain type of covenants that contains more items than others over represent the sample. Since the thresholds of covenant variables are not specified, we measure strictness of bond covenants by counting the number of covenants (essentially the number of covenant categories) for each bond issue.

The final CDS introduction data we use for empirical analysis contain the date when the first CDS trading occurs for 921 unique U.S. firms, covering period from June 1997 to April 2009. Given data availability we are able to extend the sample period three years back to 1994. As table I shows, the number of unique CDS firms peaked in 2001. CDS firms are defined as firms which have a CDS market at any point of time within the 1997-2009 period. The number dropped by nearly two thirds to 279 in 2008, which is in the center of the 2007-2009 credit crisis. By linking CDS introduction data to loan information and restricting the sample to firms that issue loan/bond both before and after CDS introduction, we obtain a sample of 10667 loan packages from 8995 unique CDS firms, covering the period 1994-2009.

The fourth column of Table we reports the number of loan packages from CDS firms which have active *CDS trading* at the time when the loan is initiated. Column 5 shows 1232 out of 10667, or around 11.5% packages contain net worth covenants. This fraction is lower than the percentage 18.2% mentioned in Chava and Roberts (2008). Apart from sample period difference, CDS firms on average receive fewer covenants than non-CDS firms might be the major reason for the lower fraction in my observation. The average strictness of net worth covenants is 0.345. We follow Murfin (2012) to construct the strictness measure, which we will describe in more details in next sub-section. Finally, the last two columns in Table I describe

the average size (US $ 920 million) and maturity (5.1 years) of sample loans. Applying the same approach we obtain the bond sample. It consists of 8935 public bond issues for U.S. corporations from 1994 to 2009. 3629 bond issues are from CDS firms. The average number of covenants per issue is 2.8 as shown in Appendix.[10]

B. Loan Strictness Measure

The main variables of interest in this study is covenant strictness. We construct covenant strictness measure introduced by Murfin (2012), which is expressed in the following formula:

$$\text{STRICTNESS} \equiv p = 1 - \Phi(\frac{w - \underline{w}}{\sigma}), \tag{IA.5}$$

where Φ is the standard normal cumulative distribution function; w is the logarithm of the borrower's net worth (or tangible net worth) value at the end of the quarter prior to loan initiation; $\underline{w}$ is the logarithm of the minimum net worth (or tangible net worth) that the firm must maintain above specified in a net worth covenant; σ is the standard deviation of the quarterly change in the logarithm value of net worth (or tangible net worth) across all firms, varying by 1-digit SIC industry and by year. Alternatively, we estimate σ using 3-year rolling window for *each firm*. This alternative measure may reduce the possibility that small firms' standard deviation is overestimated and their covenant strictness is biased up, but may introduce firm-level volatilities.

To ensure robustness we also construct a simple covenant slackness measure, which is defined as the difference between the current value of net worth at the end of the quarter prior to the inception of the loan and the minimum threshold specified by the covenant, scaled by the current value. One merit of the simple measure is that it reflects the distance to covenant breach without much transformation and is independent of any underlying assumption about the statistical distribution of financial variables. The disadvantage is it results in volatile values. In most analysis of this study, we only report the results of the Murfin (2012) strictness measure, but results from the slackness measure remain quantitatively unchanged.

[10]The average number of covenants per issue is calculated using the total number of bond issues as the denominator. Given that only half of the issues have available covenant information in FISD, this number is underestimated due to dilution effect. However, the fraction of bond issues with covenant information over the years remains almost constant. The potential selection bias caused by data availability is therefore negligible. In empirical analysis we use the alternative measure of number of covenants divided by the number of issues with covenant data available and find similar results.

Bond covenant strictness is measured in a different way due to data format in FISD. With reference to the analysis in Murfin (2012), given all else equal, the number of covenants included in a given contract is reflective of contract tightness because more covenants usually reflect more requirements or restrictions attached. More importantly, since we group individual covenants into 11 types, one type of covenants is specifically binding one aspect of firm activities. More covenants translate to increasing restrictions on borrowers from different angles. Therefore, one can count covenants to measure the strictness of debt contract. It serves as the main measure for bond covenant strictness.

Table II represents univariate analysis of the changes in loan covenant strictness and other loan characteristics after CDS introduction. Panel A compares bank loans from firms with active CDS trading at time t (the quarter or loan origination) when the loan is initiated versus without CDS trading. By the strictness measure scaled by industry-year volatility, loan net worth covenants are loosened by 0.088, or 20.9% after CDS trading is introduced. The alternative strictness measure scaled by firm volatility decreases from 0.362 to 0.253. The decrease is significant at 1% level. Similarly, covenant slackness increases from 0.370 to 0.398, or by 7.5%.[11] In summary, the three measures of covenant strictness/slackness show consistent change after CDS introduction. The average number of packages from firms with CDS trading does not have material change. A breakdown analysis shows that the use of tangible net worth covenants is reduced while the use of total net worth covenants is increased, counterbalancing each other. Moreover, univariate results show that the average size of loan package is increased by 56.9 million (48.5%) while maturity is shortened by approximately 9 months.

Panel B of Table II presents a similar exercise by comparing CDS firms and non-CDS firms. On average, packages from CDS firms have significantly larger size, shorter maturity, fewer and less strict net worth covenants. Specifically, the average net worth covenant strictness of packages from CDS firms is 0.105 (21.6%) looser than that of packages from non-CDS firms. one might be concerned that the observation that CDS firms have less tight covenants drives the result. The difference-in-differences approach can eliminate the concern well by controlling CDS firms and purging out pure effects from CDS trading. Also results from the matched sample (Table VI) show such cross-sectional difference can be well controlled.

To illustrate the main finding intuitively, we plot the change in loan covenant strictness in Figure 1. The average strictness for the loan sample decreases from 0.421 to 0.333, which

[11] Slackness measure is winzorized at 5%, 95% given large volatility in raw values of net worth and covenant threshold. Note that the slackness measure is never adjusted by firm or industry volatility.

translates to decrease in the probability of future covenant violation by about 20%. We also plot the average strictness around loan initiation (untabulated). For loan covenants, the average strictness starts to drop after CDS introduction and the magnitude becomes more significant three quarters after loan inception. One rationale of the observation is that magnitude of the loosening effect becomes more pronounced as the CDS market grows to be deeper and more liquid. Note that year 2001 sees most CDS introduction (as shown in Column 2, Table I), while the amount of outstanding CDS peaked in 2007.

IV. CDS Trading and Covenant Strictness: Empirical Results

A. Baseline Regressions

In main analysis we employ the difference-in-differences specification. The dependent variable is covenant strictness. As for explanatory variables, we construct two CDS variables following Ashcraft and Santos (2009), Saretto and Tookes (2012) and Subrahmanyam, Tang and Wang (2012). One is *CDS Traded*, a dummy representing firms which have a CDS market on its debt at any time during the sample period; the other one is *CDS Trading*, a dummy representing firms which have active CDS trading at time t (the quarter of loan origination). *CDS Traded* is designed to capture unobservable differences between CDS firms and non-CDS firms. *CDS Trading* is the variable we are primarily interested in, since this study aims to investigate time-series changes in covenant strictness after CDS introduction. By incorporating both *CDS Traded* and *CDS Trading* into specification, we am able to purge the effects purely from active CDS trading.

The other explanatory variables are mainly from Prilmeier (2011). In covenant strictness regressions, we include a host of variables that are exogenous to CDS introduction and may determine the choice of covenant strictness. The target is to ensure that the observed impact on covenant strictness exclusively comes from CDS trading and is not driven by other loan/bond or borrower characteristics. Specifically, the control variables include: loan package/bond size, maturity, credit rating[12], whether the loan is secured or not ("Secured" dummy), borrower size (measured by the logarithm of total assets), current ratio, leverage,

[12]For bond issues, only a dummy variable indicating whether a bond issuer is rated or not is available in FISD.

market-to-book ratio, profitability (measured by return-on-assets), cash-to-total assets ratio, the logarithm of (1+Fixed Charge Coverage), the ratio of tangible assets to total assets (tangibility), and Z-score[13]. One caveat of including loan/bond basic information is that they could be determined simultaneously with covenants. To address this concern we run simultaneous regression including and same control variables as robustness check. The results remain qualitatively unchanged. [14]. Control variables describing borrower characteristics are extracted one quarter prior to loan initiation. Note that in loan covenant strictness regression, apart from including fixed year and industry effects to account for any time trend or systematic cross-sectional difference in covenant strictness, we also construct dummy variables for loan purposes to account for any possibility that covenant strictness systematically varies across loans issued for different purposes. Following related literature we group all loans into 6 categories based on loan purpose information from Dealscan: corporate purpose, working capital, debt repayment, takeover, CP backup and others.

Table III presents the baseline difference-in-differences regression results. Main findings are shown in the two tables. In Panel A of Table III we show OLS regression results, while in Panel B we present Tobit regression, since the dependent variable, *Covenant Strictness*, is a censored variable from 0 to 1.[15] In Panel A and B we use two alternative strictness measures; in panel C the slackness measure is used as the dependent variable. Construction of these measures is described in Section III. The independent variable we are interested in is *CDS Trading*. Other explanatory variables include loan package information, borrower characteristics and fixed controls. Specifically, we employ the following specification:

$$\text{Strictness}_{it} = \alpha_1 + \beta_1 \text{CDS Trading}_{it} + \beta_2 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{it} + \epsilon_{1,it} \qquad \text{(IA.6)}$$

where *CDS Trading* is a dummy equal to one if the firm has active CDS trading on its debt at the time (quarter) when loan is initiated. Model (2) and (4) show the difference-in-differences regression results. The coefficients of *CDS Trading* vary from -0.074 to -0.040 across all specifications, but remain both economically and statistically significant. Note that *CDS Trading* and *CDS Traded* are correlated in the sense that firms which have active CDS trading at lending are always classified as CDS firms. The impact is conceivably trivial but

[13]See Appendix B for variable definition.

[14]The magnitude of effects using different regression models is similar. To save space we do not report the results from GMM simultaneous regression.

[15]Around 10% of the sample have covenant strictness larger than 0.5, which means the borrowers appear to be in violation at the time of loan origination. As robustness check we eliminate these observations, and obtain similar results.

we take it into account in specification (1) by allowing only *CDS Trading* to enter regression. Controlling for loan origination year, borrower industry and loan purpose effects, Model2 indicates that the marginal effect from CDS trading on net worth covenant is -0.053. Relative to the average strictness of 0.473 of the whole sample, the negative impact is as large as 11.2%. The fact that *CDS Traded* has negative and significant loadings, which indicates that CDS firms involve looser net worth covenants, could be a concern to interpret the results. Besides doing similar regression using CDS firms only, we also employ matching firm approach to address the concern (see details in next sub-section).

Similar results are obtained by using alternative measure of covenant strictness. In model (3) and (4), the standard deviation used to calculate strictness is estimated from 3-year rolling windows for each firm. The impact of CDS trading is still significantly negative. An interesting observation is the different significance level of explanatory variables and lower R-squares in regressions (3) and (4). It seems from Model (1) and (2) that the strictness measure allowed to vary by industry and year better absorbs some effects from explanatory variables. Overall, baseline regression results using the two measures are essentially consistent. We rely on the first strictness measure in following analysis.

Panel C of Table III reports OLS and Tobit regression results of the slackness measure. The negative coefficients of CDS trading in the slackness equations show the loosening effect remains qualitatively unchanged. According to Model 2, CDS trading increases net worth covenant slackness by 0.003, or by (0.6%) for the median strictness of the whole sample, significant at 5% level. The magnitude of effect is reduced since the slackness measure is not adjusted by volatility of the covenant variable.

To alleviate the effects of unobservable factors that vary across industry, this analysis depends on borrower industry fixed effects. Holding the borrower industry fixed, we eliminate the possibility that the onset of CDS trading is correlated with unobservable industry characteristics that are fixed over time. Covenant strictness appears to have significant time trend. To eliminate the possibility that CDS trading dummies account for unobservable macroeconomic components in time series, we add in loan origination year dummies to ensure that the effects of CDS trading is not driven by business cycle risk. A clear identification for loan-level analysis requires that the type and purpose of the loan are not systematically correlated with covenant strictness. We use fixed loan type and purpose controls to eliminate the concern that the effects from CDS trading are not contaminated by unobservable characteristics related to loan type and loan purpose.

To ensure unbiased estimates of standard errors, we employ weighted regression to eliminate possible heteroscedasticity, since the error term in covenant strictness may not follows the same distribution. We also employ GMM approach to ensure precise results (not tabulated). As pointed out by literature, fixed effects may not fully resolve the selection problem caused by unobservable firm characteristics systematically driving covenant strictness. We further cluster standard errors by firm to eliminate cross-dependence of covenant strictness within firms. As we mentioned, covenant strictness largely depends on macroeconomic conditions and business cycle risk, autocorrelation can be a concern to obtain valid estimation. We examine the Newey-West estimator to ensure robustness.

Other explanatory variables that are statistically significant in the regressions are *Loan Amount, Borrower Size, Profitability, Cash to Assets ratio and Fixed Charge Coverage*. The implication is that borrowers with larger size, lower leverage, more cash, higher profitability and higher fixed charge coverage (lower ratio of interest payment and other fixed charge to operating income) will face looser covenants. This observation supports the view that debt covenants are designed to ensure debt repayment by restricting the borrower from taking excessive risk (Rajan and Winton (1995), for example). The restricting role is expected to be more evident for financially constrained firms.

Results in Table III support the hypothesis that net worth covenants are loosened after CDS start trading. The rationale behind is that by participating in CDS market as protection buyer, lenders find a better way to lay off credit risk apart from secondary market of loan sale and securitization. Given that covenants are designed to control conflicts of interest between debtholder and shareholder, loosening of covenants may suggest that creditors' concern over the borrower's asset substitution and other managerial agency problems, is mitigated. Protected by CDS, lenders have their cash flow rights ensured by CDS contracts and thus may demand less control through covenants over the firm's real decisions. In other words, CDS may substitute covenants as creditor protection device.

The loosening effect is consistent with the finding in Saretto and Tookes (2012), that firms with CDS trading on its debt, are able to maintain higher leverage and longer debt maturity. More relaxed covenants may allow more projects to be financed and facilitate credit supply. Intuitively, the loosening of covenants reflects the benefit from CDS trading. CDS will be traded either because the creditor wants to lay off credit risk or someone else is willing to take on the risk. In either of the case debt capacity can be increased and increased competition in lending market may also push covenants to be relaxed. The benefit may also come from

banks' information advantage, which allows banks to make potential profit in CDS trading. Such benefit in risk diversification and trading opportunity can result in lenders' lowering lending standard and giving up part of their control rights.

The loosening effect would be easier to interpret combined with the finding in Ashcraft and Santos (2009). One primary question that arises from that study is, why the average cost of debt is not lowered, if CDS provides a less expensive way to diversify risk? Our finding that covenants are loosened by CDS trading may provide an answer. If any, such benefit may be reflected in loosened covenants. Especially under the "trade-off" view that interest rates and financial covenants are used as substitutes conditional on other loan and firm characteristics (Jiang, Li and Shao (2010)), covenants would be expected to be loosened if interest rates are not lowered. Further, banks may not have incentive to lower interest rates if banks' funding cost does not change.

B. CDS Market Liquidity and Covenant Loosening

Table IV extends the primary results in Table III by providing evidence on CDS market liquidity. Given the prediction that CDS market drives down covenant strictness, we further hypothesize that the "loosening" effects is stronger as when more CDS contracts are available. More CDS contracts referencing the borrower's debt make it easier for the lender to choose the feasible contract. More CDS contracts also proxy for better market liquidity and competition which allows the lender to better hedge against the risk.

It would be ideal to measure CDS market liquidity by CDS trading volume on each reference firm. Data availability only allows us to observe the number of outstanding CDS contracts. By aggregating the intra-day number of active CDS contracts for each firm by quarter, we obtain the quarterly observation of the number of CDS contracts referencing the borrower's debt. Based on the above analysis, a more liquid CDS market may provide lenders with better chance to hedge, therefore the benefit in reducing contracting friction would also be amplified. An alternative measure is the number of contracts divided by the firm's outstanding debt in the same quarter. This measure can eliminate the concern that the finding is driven by size effect of the firm's debt. Linking the number of CDS contracts information on each borrower's debt to the loan sample we examine how CDS trading impact varies with CDS market liquidity. Similar with Table III, column (1) to (2) in Table IV report regression results of the first strictness measure adjusted by industry and by year while column (3) to

(4) report results of the second strictness measure scaled by firms' 3-year rolling window. Column (2) shows that controlling for CDS firm effect, a one standard deviation increase in the number of CDS contracts on a firm's debt decreases covenant strictness by 10.35%. The negative coefficients remain statistically significant across all specifications. This effect is also economically large in the sense that in more than half (2827 out of 5172) CDS firm-year observations in our sample, there is only one outstanding CDS contract on each firm's underlying debt. Time-series observation shows that the largest cross-firm average number of CDS contracts is barely 3.68.

The baseline findings also echo literature on CDS trading impact on accounting report conservatism. For instance, Gong, Martin and Roychowdhury (2012) documents that the onset of CDS trading is associated with a reduction in borrowing firms' reporting conservatism, because acquiring CDS diminishes lenders' incentives to monitor borrowers. Since covenants are used as important vehicle for monitoring, loosening covenants is in the same spirit of relaxing reporting conservatism.

In addition to better hedging opportunities, a CDS market with better liquidity may also benefit lenders in generating trading profits. The lenders, both lead bank and syndicate members, can become both CDS buyers and sellers (when they have positive information about the borrower). Their information advantage may allow them to profit from trading on private information. Such benefit can also result in covenant loosening.

C. Endogeneity and Selection in CDS Trading

One common concern with the studies on the impact of CDS trading is that CDS trading can be endogenous. The endogeneity could come from two sources. One is reverse causality. That is, the observed "loosening effect" may come from the possibility that setting looser net worth covenants leads to the onset of CDS trading on the firm's debt. In other words, one might be concerned that creditors initiate hedging contracts such as CDS in anticipation of new loans will be initiated. One possible reason that creditors do so is to exchange for higher interests rates by reducing covenant restrictions. This argument may find it hard to establish for two reasons. First, empirical evidence does not show costs of debt significantly change after the CDS trading is introduced (see Ashcraft and Santos (2009) for example). Second, lenders may have reputation concerns for such manipulation activities. Moreover, a number of loans are initiated years after first CDS trading in my sample. As robustness check we

skip short windows, i.e., one year, two years and three years, immediately after CDS trading introduction, and examine whether the loosening effect of CDS trading on covenant strictness is diminished. Appendix C shows the results. It turns out that the effect is even stronger in the sample that excludes short windows. The impact of CDS trading increases from -0.053 in baseline regression (Column 2, Panel A of Table III) to -0.085 (Column 2, Appendix C1). Therefore, a reverse causality is hard to establish here.

The other source is spurious relation. Some unobservable factors may cause both loose covenants and the occurrence of CDS trading. In other words, CDS firms are not randomly selected. However, this concern is also minor given the findings in previous studies that firms that become riskier are more likely to have a CDS market. These firms will see their covenants tightened instead of being loosened. Predictions from the spurious relation are the opposite to my findings.

Although endogeneity is not a severe concern for my study. We still analyze it using econometric techniques. Specifically, the possibility of *self-selection* will result in the error term in specifications correlating with the independent variable *CDS Trading*, making coefficients of *CDS trading* biased estimates. Specifically, we are interested in getting

$$\text{Treatment Effects(TT)} = E(Y_1|X, D = 1) - E(Y_0|X, D = 1) \tag{IA.7}$$

while we are only able to observe

$$\text{Treatment Effects(TT')} = E(Y_1|X, D = 1) - E(Y_0|X, D = 0) \tag{IA.8}$$

where D indicates whether the observation receives treatment. We want to observe how the treatment firms would have behaved if they were not treated. To make TT' as close to TT as possible, we employ the instrumental variable (IV) approach by carrying out a two-stage-least-square (2SLS) regression. Second we use propensity score matching approach by assuming that all factors determining CDS introduction are accessible. The approaches can potentially alleviate the endogeneity concern.

C.1. Instrumental Variable (IV) Regressions

Apart from the concern of selection bias, the timing of CDS trading introduction may also be subject to endogeneity. Specifically, one might be concerned with the possibility that the

error term in regression of covenant strictness is correlated with CDS trading dummy. In other words, components of variation in covenant strictness that are explained by factors apart from CDS trading can be related to CDS trading itself. For instance, changes in borrowers' riskiness over time may explain covenant strictness as well as the onset of CDS trading. We therefore refer to instrumental variable approach to address the any endogeneity concern. We employ two-stage-least-squares (2SLS) regression with instrumental variables. Since our goal is to eliminate the correlation between the error term and the independent variable *CDS Trading*, we will need to find an instrumental variable to get the predicted value of the independent variable which is orthogonal to the error term. In other words, the instrument variable must affect covenant strictness only through *CDS Trading*.

Following Saretto and Tookes (2012), we choose the *Lender Foreign Exchange Derivatives*, the amount of foreign exchange derivatives used for hedging (not trading) purposes relative to total loans of the lead syndicate banks that a firm has borrowed from during the past five years. This variable is constructed for each firm in quarter t as the average across all banks that have served as a syndicate member over the past five years. The ratio is lagged by one quarter when included in the first stage probit regression. Lenders' foreign exchange derivatives data are available from the Federal Reserve's Call Report, which tracks the lending banks' derivatives usage and the compositions of their loan portfolios. The idea is that banks that hedge their loan portfolios are likely to be active risk managers more generally. Thus this instrumental variable captures hedging demand of firms' creditors and is expected to be related to the existence of CDS markets for firms' debt.

The other instrumental variable we choose is lenders' tier-1 capital over total assets. This variable measures a bank's financial strength from a regulator's point of view. Higher tier-1 capital ratio represents larger portion of the bank's core equity capital. Banks that have weaker financial strength is more likely to be required to hedge this risk exposure through CDS market. The first stage probit regression in Appendix C2 indicates the negative relation between tier-1 capital ratio and CDS trading.

The two variables are candidates for instrumental variables in my analysis as they broadly satisfy the two conditions for valid instruments discussed in Roberts and Whited (2011): first, the partial correlation between the instrument and the endogenous variable is not zero. The

relevance condition requires that the coefficient γ in the regression

$$\text{Prob(CDS Trading}_{it}) = \alpha + \beta x_{it-1} + \gamma \text{Lender Foreign Exchange Derivatives or Lender Tier-1 Capital Ratio}_{it-1} + u_{it} \quad \text{(IA.9)}$$

not equal zero, where x_i refers to a set of exogenous variables that explain the onset of CDS trading. The *relevance* requirement essentially translates to the first stage regression. We employ probit regression of *CDS Trading* on t-1 one quarter lag value of the lender's foreign exchange derivatives, controlling for other exogenous variables. Consistent with our intuition, higher lender foreign exchange derivatives hedging position relates to higher probability of CDS trading, and higher lender tier-1 capital ratio relates to lower probability of CDS trading. The partial correlation between instrumental variable and *CDS Trading* is both economically and statistically significant.

The second requirement is the *exclusion* condition, which requires that $cov(instrument, \epsilon)$=0, implying that the only role of the instrument plays in influencing the outcome *Covenant Strictness* is only through its effect on the endogenous variable *CDS Trading*. Lender foreign exchange derivatives position is a macro hedge and characterizes the lender's global risk management strategy, which is not likely to be correlated to its local lending decision. More importantly, the firms in my sample are U.S. firms, making a bank's decision to hedge foreign exchange exogenous to a firm's financing contract terms. Therefore this variable is unlikely to directly affect loan covenant strictness, apart from through the CDS channel. While lender's tier-1 capital ratio represents the lender's balance sheet strength and reflects the regulator's intention. It is hard to establish a story that a bank's decision on lending contract tightness systematically depends on its core equity value. The overidentification test does not reject the null hypothesis that the residuals are uncorrelated with the set of exogenous variables, showing that the instruments are truly exogenous. Finally, second stage regression with the predicted probability of CDS trading (Table V) shows consistent negative effects on covenant strictness, providing further evidence that impact of CDS trading on net worth covenant strictness remains robust to endogeneity of CDS Trading.

C.2. Propensity Score Matching

Our ultimate goal is to purge out marginal effects of CDS trading on covenant strictness, whereas it is impossible to obtain a treatment group to observe what they would have ex-

perienced had it not be the treatment since firms are not randomly assigned to be treated with or without CDS trading. We therefore have to rely on the assumption that all factors determining CDS introduction are accessible. The approach of propensity score matching is mainly aimed to address the selection bias issue. That is, our goal is to observe whether the changes in covenant strictness are still robust after pairing each treatment firm (CDS firm) with a matching firm (non-CDS firm), which is closest to the treatment firm in its probability of having a CDS market. In this we are potentially able to rule out the possibility that any change in covenant strictness is purely due to introduction of CDS trading, instead of other factors that determine the firm to be "selected" into treatment group.

First we use probit regression to estimate the propensity score indicating the possibility that a borrower has CDS trading. The selection model of CDS trading we use follows Ashcraft and Santos (2009), Saretto and Tookes (2012), and Subrahmanyam, Tang, and Wang (2012). Concerned with the trade-off between full information and potential selection biase due to incomplete Compustat information, we try to incorporate as many variables which potentially affect CDS introduction as possible conditioning on that not many variables have missing values. Also with reference to Ashcraft and Santos (2009), the explanatory variables for estimating the propensity score include the one quarter lag of the following: borrower log size, debt-to-assets, book-to-market, cash-to-total assets, equity analyst coverage, log stock market return, log stock market volatility, and bond turnover ratio. To create the matched sample, we start with the treatment sample of CDS firms, but only keep loan-quarter observations from the year 1994 until the first quarter that CDS trading begins. The selection approach left me with 65,873 observations. Probit regression results are tabulated as Appendix C3, which shows that firms with large size, more tangible assets relative to total assets and higher bond turnover have higher propensity of CDS trading.

Next we pair CDS firms with a control group using *Nearest Neighborhood Matching*. Among the 1232 packages from CDS firms, 395 have active CDS trading when the loan is initiated. 392 packages are paired with one matching firm. The difference in propensity score between firms with and without CDS trading decreases from 0.013 to 0.006 after matching.

Table VI reports the regression results of the matched sample. The marginal effect of CDS trading on net worth covenant strictness is -0.078 (18.5%) after controlling for CDS firms, as indicated by the coefficient of *CDS Trading* in column 3. Again to account for multicollinearity between *CDS Trading* and *CDS Trading* we design four specifications in this table. The economic impact is slightly higher than that in baseline regressions (-0.074),

showing the results are robust to endogeneity of CDS trading.

C.3. Bankruptcy Reform and Diff-in-Diff-in-Diff Regression

To further establish the causality between CDS trading and covenant loosening, we introduce the Bankruptcy Abuse Prevention and Consumer Protection Act of 2005 as a regime change which may affect the use of CDS. The act is aimed to reduce bankruptcy fillings and debt write-off by encouraging debtors to file for Chapter 13 instead of direct liquidation through Chapter 7. Creditors are expected to more actively pursue collection from the debtor and have fewer bad debt in the future. Therefore, outside creditor protection is well expected to be strengthened after the enaction of this act. Since CDS is a bankruptcy-related derivative, the role of CDS in protecting creditors could be stronger during the post-reform period, since use of CDS could be more emphasized after the reform was enacted. Therefore, we may expect the effect of CDS also becomes more pronounced after April, 2005.

Specifically, we carry out the following diff-in-diff-in-diff regression

$$\begin{aligned}\text{Strictness}_{it} = \alpha + \beta_1 \text{CDS Trading}_{it} \times \text{Post Bankruptcy Reform}_{it} + \beta_2 \text{CDS Trading}_{it} \\ + \beta_3 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{it} + \epsilon_{1,it}\end{aligned} \tag{IA.10}$$

where *Post Bankruptcy Reform* is a dummy equal to one if the observation is after the second quarter of 2005. As Table VII shows, net worth covenants are loosened more by CDS trading in period when outside creditor protection from state law is stronger. The coefficients of the interaction term of *CDS Trading* and *Post Bankruptcy Reform* range from -0.047 to -0.093, significant at 1% level. The negative effect of the interaction term well supports our conjecture. The use of CDS may be affected by the outside event (bankruptcy reform), and further affects covenant strictness. From model 1 to 4 we allow various controls to enter specification but the results remain consistent and robust. The findings provide strong evidence for the "substitution effect" of CDS trading on tight covenants, in protecting creditors.

Admittedly, the bankruptcy reform may affect covenant strictness in a direct, without through CDS channel. This is shown by the significantly negative coefficients of "Post Bankruptcy Reform" dummy in covenant regression. This finding is consistent with the intuition that covenant use may diminish when other forms of protection become more important (such as protection by law), since debt covenants have long been perceived to be a protection device to avoid shareholder activities that may reduce the value of the firm and

its outstanding debt (Smith and Warner (1979)).

V. Channels and Mechanisms

So far we have shown CDS trading negatively affects covenant strictness. The magnitude is as large as 12.6% as indicated by the difference-in-differences regression results. Note that the finding relies on the assumption that lenders participate in CDS markets as the protection buyer. The impact from CDS trading on covenant strictness could be further supported by showing that covenants are loosened more for lenders who are active in CDS market. Ideally, it is helpful if we show stronger loosening effect when the lender holds larger CDS position on the borrower's debt for hedging purpose. However, CDS is traded over-the-count and such information is hard to retrieve. In this section, we use lenders' credit derivative position to proxy for their activity in CDS market. This test may give us a hint on how much of the loosening effect comes from CDS trading.

A. CDS Trading Effects and Lenders' Credit Derivatives Position

One reasonable proxy for lenders' CDS position for hedging is *lenders' participation* in credit derivative market. Conceivably, banks that are active in credit derivative trading are more likely to hedge through CDS as CDS constitute a major part of the derivative market.

We assemble data from the Office of the Comptroller of the Currency (OCC)'s quarterly reports on banks' and trust companies' activities in derivatives. The dataset reports the names of the top 25 banks and trust companies and their total credit derivatives position in each quarter from the third quarter of 1998. By merging it with the loan covenant sample we are able to identify whether the lender is ranked as one of the top 25 banks in derivatives trading and its position on each loan package.[16] The expectation is that the "loosening effect" is stronger for packages in which the lender is more active in derivative trading. Specifically we are estimating the following equation

$$\begin{aligned}\text{Strictness}_{it} = \alpha + \beta_1 &\text{CDS Trading}_{it} \times \text{Lenders' Credit Derivatives Position}_{it} \\ &+\beta_2 \text{CDS Trading}_{it} + \beta_3 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{it} + \epsilon_{1,it}\end{aligned} \quad \text{(IA.11)}$$

[16]The report only identifies the top 25 active banks for each quarter.

where *Lender's Credit Derivatives Position* has two alternative measures: one is the *lead* bank's credit derivatives position in the quarter of loan initiation; the other is the *syndicate* banks' credit derivatives position, which aggregates *all* syndicate banks' position in a syndicate loan.[17]

Table VIII reports regression results. Column 1 and 2 present results for the whole sample; column 3 and 4 present results for the sub-sample of the most active 25 banks in each quarter according to OCC. The negative coefficients of the interaction terms of CDS trading and lender credit derivatives position strengthen the interpretation that CDS trading affects covenant strictness through lenders' participation in derivatives market. Taking Model 1 as an example, conditional on that the loan is initiated when CDS trading is active, one trillion increase in the lead bank's position in credit derivatives market corresponds to 0.019 (or 4.5%) decrease in net worth covenant strictness. This magnitude is larger than in the sub-sample of the top 25 banks. By visual inspection we observe that top 25 active banks have much larger derivatives position than other banks. Therefore, same amount of increase in derivatives position for the top banks leads to slightly smaller effect than for non-top ones.

B. Agency Conflict Concern and Covenant Loosening

In interpreting the results in Table III and IV, it might be useful to ask whether the CDS effect is stronger when the lender is less concerned with the agency conflict between them. Extant literature points out covenants exist to resolve conflicts of interest both between borrower-lenders and lead bank-syndicate members. When the lender holds CDS, her concern that the manager may transfer wealth from her by taking excessive risk can be reduced. At the same time, syndicate members may not demand as much commitment to monitor the loan by the lead bank as before since syndicate members may also have access to CDS market as protection buyer. We would expect the onset of CDS market may alleviate lenders' concern in both regards, and therefore loosens covenants.

B.1. Debtholder-Shareholder Conflict and Covenant Loosening

In Table IX we explore whether the loosening effect depends on the severity of debtholder-shareholder conflict. Creditors' concern over debt-equity can be measured by the borrowers'

[17]More than 99% of the sample loans are syndicate loans. According to Dealscan, Only 22 out of 10667 sample loans have "sole lender".

credit quality. Suggested by Demiroglu and James (2010), the agency cost of debt is generally thought to be inversely related to the financial condition of the firm. Thus firms with larger size (measured by logarithm of book assets), higher z-score, higher profitability (measured by return on assets) and lower leverage are expected to be less risky and have less uncertainty in future debt repayment. Meanwhile, firms that are larger, less risky, with better profitability are more likely to have a large base of creditors, which may provide them with more outside financing options. Therefore, such firms should be subject to less agency conflict concerns and have larger bargaining power relative to its lender when negotiating a lending contract, which may enable them to obtain looser contract terms.

We create dummies indicating borrowers with larger size, higher leverage or higher Z-score, using the 70% breakpoints among all firms (including both CDS and non-CDS firms) in the same quarter. Model 1 to 4 show that borrowers with higher credit quality see more reduction in covenant strictness. The coefficients of the interaction term indicates that borrowers with larger size, higher z-score, higher profitability and lower leverage see 0.106 (25.1% in percentage change), 0.046 (10.9%) and 0.098 (23.3%) more reduction in covenant strictness, respectively, compared with their counterparts in the other subgroup.

This finding is consistent with the theoretical discussion that part of the benefit of CDS trading can be passed onto the borrower, and the sharing rule depends on the relative bargaining power between the lender and the borrower. Note that a firm's profitability and z-score alone only have immaterial effect on covenant loosening, according to the insignificant coefficients of control variables. This further highlights their impact when interacted with CDS trading dummy. Profitability and default risk may not play a prominent role in determining covenant strictness without CDS, while covenants are loosened significantly more for firms with better operating performance and lower default risk, suggesting that CDS significantly alleviate their creditor's concern over the intrinsic agency risk from the shareholder.

This observation is consistent with Ashcraft and Santos (2009) that CDS mainly benefit firms with better credit quality, and the evidence from the bond sample by Chava, Kumar and Warga (2010) that the likelihood of covenant inclusion will be higher when agency risk for bondholders from shareholders is higher. It is also consistent with both theoretical models and empirical evidence that loans to borrower with *higher* credit quality are more likely to be hedged using CDS.[18] Transferring risk through CDS market may prove to be too costly for borrowers facing high agency conflicts. Overall, the findings suggest the loosening effect of

[18]See Parlour and Winton (2012), and Beyhaghi and Massoud (2012) for examples.

CDS is stronger for the sub-sample of borrowers with less severe conflicts of interest between lenders and shareholders, consistent with the conjecture that CDS alleviate lenders' concern over debt-equity conflict.

B.2. Renegotiation Cost and Covenant Loosening

One of the most important insights of the wave of theoretical financial contracting research is that ex post renegotiation plays a critial role in ex ante optimal contracts (Roberts and Sufi (2009)). Extant literature suggests that as a result of renegotiation costs, creditors are more willing to provide finance ex ante. In the similar spirit, high renegotiation costs may result in looser covenants in initial contracts, as both the manager and lender are aware that future possibility of renegotiation is low. Under the context of this study, the ease of renegotiation would affect allocation of control rights in a similar way: high renegotiation costs would amplify the loosening of covenants in initial contracts since the expectation of renegotiation, a chance to reallocate control rights, is low.

Previous findings on renegotiation suggests the number of creditors plays a crucial role in the ease of renegotiation between creditors and borrowers. Expected renegotiation costs are high when there is a dispersed group of creditors, because extracting concessions from creditors is difficult.

Table X investigates how CDS trading effects vary with the number of lenders (syndicate size). The negative coefficients of the interaction of CDS trading and logarithm of the number of lenders show CDS reduce covenant strictness for larger syndication. This finding suggests the magnitude of CDS' loosening effect depends on the likelihood of renegotiation. It further suggests the role of CDS in mitigating contracting friction: when information set is complete and the market is friction less, renegotiation is not an efficient outcome as it is costly; the rationale of renegotiation is it reflects the accrual of information. My findings on renegotiation costs suggest that CDS may reduce the need for renegotiation by reducing contracting friction in the first place, facilitating relaxation in covenant strictness.

Note that the number of lenders alone has positive effect on covenant strictness, which echoes findings in existing literature: given all else equal, a tighter loan contract makes it easier to solicit more participant banks and form a large syndication, as syndicate members demand covenants as a commitment device which ensures lead bank monitoring. When a CDS market becomes available, syndicate banks may impose less pressure on the lead bank

to enforce monitoring; while a lead bank may also strive less hard to solicit other participants to form a large syndicate. In other words, both the lead bank and syndicate members' ability to tolerate loan risk is enhanced, with the diversification role of CDS. The reduced concern of syndicate members over conflicts of interest with the lead bank can also result in looser covenants. Taken together, the signalling role of tight covenants in committing to diligent monitoring become less prominent when CDS are available.[19]

Note that the coefficients of *CDS Trading* in Table X are not statistically significant. This result reveals the fact that more than 99% of the loan packages during post CDS trading period in our sample involve multiple lenders.

Renegotiation cost is often proxied by liquidation cost of borrower assets in financial distress. The direct measure is the concentration of a firm's industry. To be specific, Column 3 of Table X shows that firms from a concentrated industry see around 15% more covenant loosening than their counterparts from a less concentrated industry. In a highly concentrated industry, the asset specificity of a firm would be high, which increases the cost of liquidation. The increased liquidation cost may increase the possibility of asset fire sale due to limited bidders in the same industry, which may decrease the bargaining surplus that the creditor can gain from liquidation and put the it in disadvantage when the borrower is in distress (Shleifer and Vishny (1992), Garlappi, Shu and Yan (2008)). Therefore, borrowers from a concentrated industry could be expected to involve higher renegotiation cost, intensifying covenant loosening by CDS.

In the reasoning of CDS mitigating contracting friction, the arguments are based on the stylized fact that current covenants are set surprisingly tight and covenant renegotiation is frequent. Relaxation of covenants during subsequent renegotiation is the norm. One might be concerned that the possibility that covenant loosening may introduce more loan risk, leading to more loan risk and covenant violation. To address this concern, we divide the sample into two groups: one with covenant loosening and the other without. In an untabulated table we show borrower default risk (measured by z-score) and probability of covenant violation following the loan initiation are not significantly different from each other, suggesting that loosening of covenants is not found to induce more risk-taking by the borrower. Even if more risk is induced, the argument that CDS may mitigate contracting friction may not be refuted, as the underlying mechanism is CDS reduce creditors' agency conflict concern which result in financial constraints in the form of debt covenants. Once such concern is mitigated and

[19] As additional results we show that loan syndicate size becomes smaller and that lead bank share increases after CDS introduction, consistent with the above argument.

commitment by covenants becomes less important, previously tightness level of covenants may prove to be suboptimal.

B.3. Test of Restructuring Incentive: Evidence from "No-restructuring" CDS

Lenders' agency conflict concern results in tight initial covenants, which are usually relaxed during the course of the loan conditional on more information is revealed or covenant is violated. Thus debt restructuring is the outcome of the changing agency concern over time. When CDS are not in place, the stylized fact is that lenders tend to loosen covenants in subsequent restructuring. In other words, debt restructuring provides the lender with additional opportunity to amend the contract. Our finding in the previous section suggests such value of restructuring as an option is reduced, with the presence of CDS. The new equilibrium is early loosening of covenants at the inception of loans. The loosening effect could be even stronger when the chance of debt restructuring is small.

In this section we investigate the effect of future restructuring chances on covenant loosening. The identification strategy is to use different CDS contractual terms to proxy for markets' anticipation of restructuring possibility. Under the 2003 ISDA Credit Definitions, there are four types of restructuring clauses in CDS contract: full restructuring (FR), modified restructuring (MR), modified-modified restructuring (MMR) and no restructuring (NR). [20] Under NR, restructuring is excluded as credit event. Given the less chance to restructure the debt under NR, it is reasonable to expect that covenants would be loosened more if the lender holds a NR CDS contract. In contrast, the loosening effect would be less prominent under MR, MMR and FR since such contracts allow the creditor to get repayment from CDS seller, which can may restructuring more possible.

Table XI reports how the loosening effect depends on differential CDS contracts. The variable "No-restructuring" is the faction of CDS contracts with NR clauses. "Modified-restructuring" is the fraction of CDS contracts with MR clauses. We are primarily interested in the two types of CDS as they account for the majority of the sample. [21] The observations of NR prior to 2002 in our sample are rare. CDS with NR became prevalent for North American

[20] For FR, MR and MMR, any restructuring qualifies as a trigger event, but the range of obligations that can be delivered in the triggered event varies. Under FR, any obligations with a maturity up to 30 years can be delivered. Under MR, the deliverable obligations are limited to those with maturities within 30 months of the CDS contract's maturity; under MMR, the restriction on maturities is relaxed to 60 months for the restructured debt.

[21] Over the period from 1994 to 2009, CDS contracts with MR accounts for 84.86% of all outstanding CDS contracts, while NR takes up 14.84%.

names around 2007, and increased more after the Big Bang protocol on April 8, 2009. The negative coefficients of the interaction term of *CDS Trading* and "No-restructuring" show a marginal 10% increase in the fraction of CDS contracts with NR amplifies CDS' impact on covenant loosening by 0.011, or by 2.5% in percentage change.

The result provides additional support on the restructuring channel, which reflect the dynamics of lenders' agency conflict concern. It also sheds light on the change in borrowers' incentive under different CDS contracts. The finding suggests borrowers may require even looser covenants when they expect future chance to restructure the debt is small. Alternative mechanisms, such as information or monitoring, may not have the same prediction. If covenants are loosened due to better informed creditor or creditors' less diligent monitoring, the loosening effect may not depend on contractual types of CDS. The link between CDS contractual term and debt restructuring provides a setting to differentiate the agency conflict channel.

C. Is Covenant Loosening due to CDS' Informational Role?

One alternative explanation of CDS loosening covenants is CDS reveals more information about the firm and alleviates information asymmetry between the borrower and the lender. Give the stylized fact that covenants are set excessively tight and routinely relaxed in subsequent renegotiation, Gârleanu and Zwiebel (2009) proposed that because of lenders lacking information about future asset substitution, in equilibrium, firms who do not have as much of such activity at their disposal, will prefer to give strong decision rights to lenders, even though this leads to excessive renegotiation and ex post information acquisition costs, due to the adverse selection problem. On observing CDS relax covenant strictness at inception of loan, one might suspect it is due CDS' informational role. On one hand, CDS may inject more information to the market since institutional investors constitute major market player in trading CDS, which are primarily banks, insurance companies or hedge funds who may trade on their private information; this explains part of the reason why CDS spread is regarded as a clean measure of default risk; on the other hand, CDS may create new information asymmetry as a lender may transfer its credit risk through CDS, which is not visible to outside parties. It is ultimately an empirical question whether the informational role of CDS improves or worsens information environment.

If CDS can inject more information and make creditors better informed then covenants

would be loosened more for firms that are informationally opaque, since firms with more severe information asymmetry are more likely to benefit from CDS revealing information. But the empirical results show the opposite. We follow Murfin (2012) to use the average number of lenders to a firm over the past four transactions to proxy for the firm's information transparency. The intuition behind is firms with better information transparency would find it easier to form a larger lender base. The second measure a dummy indicating whether the firm has analyst estimates on their earnings-per-share (EPS) available in I/B/E/S one quarter prior to loan initiation.

As Table XII shows, Firms with more lenders in the past and analyst coverage available see larger decrease in covenant strictness. Similarly, firms with analyst estimates on their earnings-per-share (EPS) available prior to loan initiation see covenant tightness reduced by 0.049 more than those without analyst coverage. It serves as the evidence that firms with better information transparency receive stronger covenant loosening. This result is not consistent with the information mechanism.

D. Additional Test on Agency Conflict Concern: Evidence from Bond Covenants

So far, the above analysis mainly focuses on loan covenants. However, bond covenants are worthy of investigating given their distinctions from loan covenants in many dimensions: first, banks are monitoring borrowers intensively as they have substantial informational advantage and lending experience, while bondholders are doing much less monitoring on the issuers (borrowers); second, CDS markets and loan (bond) sales are regarded as alternative ways to lay off credit risk from creditors.[22] Better liquidity of secondary bond market makes the protection role of CDS for bondholders could be less prominent than for banks. Lack of alternative ways to spread out credit risk may result in banks relying more on CDS for hedging than bondholders; third, loan covenants are frequently renegotiated while renegotiation rarely happens for bond since bondholders are too scattered and their control rights are perceived to be diluted, resulting in too high renegotiation costs. Bond covenants are therefore regarded as a mechanism to ameliorate agency conflict between bondholders and debtors, given that monitoring and creditor protection are less essential. Therefore, bond covenants may provide a clean environment to examine creditors' reduced concern over asset substitution and other

[22]See, for example, Norden, Silva-Buston and Wagner (2011), Parlour and Winton (2009), among others

managerial opportunism of the borrowing firm.

Lack of quantitative information on bond covenants in FISD does not allow me to calculate a strictness measure as for loans. An alternative measure is the number of covenants for each issue - more covenant use translates to more restrictions on the borrower's activities, especially when the restrictive covenants are imposed on different aspects of the firm's activities.[23] Following the spirit of Smith and Warner (1979) and Billett, King and Mauer (2007), we categorize all bond covenants into 15 types, and then count the number of bond covenants for every issue. We employ similar approach to examine changes in bond covenants by replacing the strictness measure by the count variable

$$\begin{aligned}\text{Number of Bond Covenants}_{it} = \alpha + \beta_1 \text{CDS Trading}_{it} + \beta_2 \text{CDS Traded}_{it} \\ + \gamma_1 \text{Controls}_{it} + \epsilon_{1,it}\end{aligned} \tag{IA.12}$$

Table XIII reports the regression results of the number of bond covenants. Column 1 shows the CDS trading has an average -0.231 impact on bond covenants. In other words, CDS trading reduces the use of bond covenant by 8.6%. The marginal impact of CDS trading on the number of bond covenants per issue is -0.178 (-6.6%), accounting for CDS firm effect as shown in column 3. Note that the number of bond covenants start to drop from the 4th quarter after CDS introduction. The number adjusted by matching firms clipped off from -0.1 in quarter 0 (CDS introduction) to -0.5 in quarter 4, or by 14.3%, compared with the average number in pre-CDS period.

As discussed above, bondholders are scattered and do less monitoring and renegotiation. In addition, bondholders also do not have privileged information as banks so they may not have much pricing advantage and benefit from CDS trading. So bond covenants can serve as a clean environment to examine whether CDS mitigate creditors' concern debt-equity conflict. The negative impact of CDS trading on bond covenants provides strong evidence that CDS well ameliorate creditors' agency concern.

[23] For example, two covenants restricting the firm's dividend payment and future stock issuance respectively are perceived to be "stricter" than only one covenant restricting the firm's dividend payment.

VI. Conclusion

This study provides empirical evidence on how credit default swaps (CDS) trading affects debt contracting through covenant setting. Using CDS trading and debt issuance data from 1994 to 2009, we show that net worth covenants loosen after introduction of CDS trading. The loosening effect is stronger when there are more CDS contracts on the borrower's debt, and when the lender is more actively participating in credit derivatives trading. Further, the loosening reflects diversification benefit of CDS market. First, covenant loosening reduces future debt renegotiation which is costly for both lenders and borrowers; second, covenant loosening reflects reduced creditor concern over their risk exposure. Both lenders and borrowers may benefit from the hedging role of CDS. The results are consistent with the notion that CDS avail creditors a tool to lay off credit risk and reduce credit supply frictions.

This study helps understand the determinants of debt covenants and the implications of CDS trading. CDS have become an important force in the derivative market. Notwithstanding their derivative nature, CDS can have real effects on firm policies, financial development, and economic growth. This paper shows covenants are looser on debt that creditors are more likely to use CDS to hedge. More access to credit facilitates corporate investments and resource allocation. Given recent controversies and ongoing debates on the role of CDS, future research exploring other impacts of CDS trading may prove to be fruitful.

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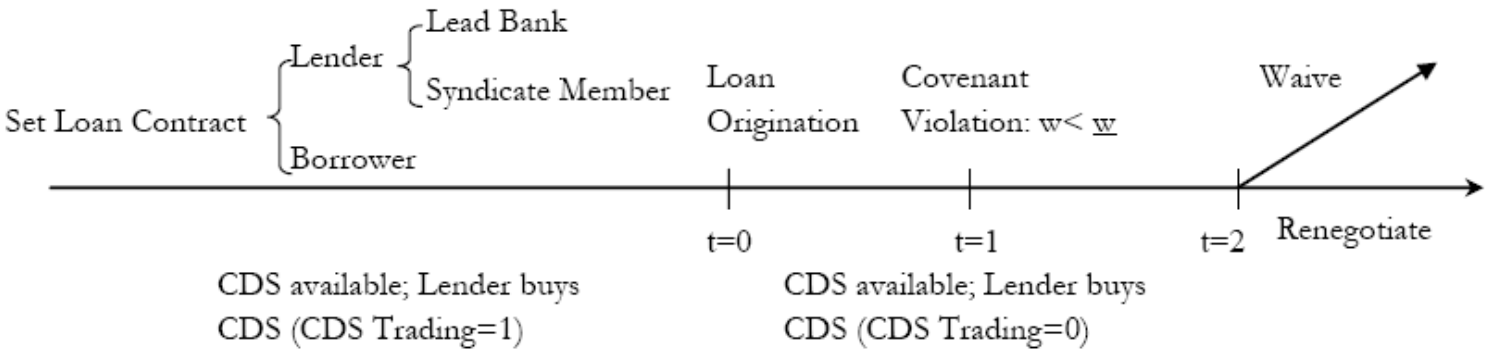

Figure IA.1. Timeline of the Life of Loans

This figure shows the timeline of major events during the life of a loan from CDS firms. A CDS market becomes available before or after loan initiation. Before the loan is originated at t=0, the lead lender negotiates a preliminary deal with the borrower and finds other banks to form a loan syndication. The lead band and the borrower agree on the inital lending contract, which may include one or more covenants. The lead bank holds the responsibility of monitoring the borrower on behalf of other syndicate participants. Suppose a loan covenant is violated at t=1. The lender may take two possible actions following the breach of covenants: waive or renegotitaite covenants or change other contract terms.

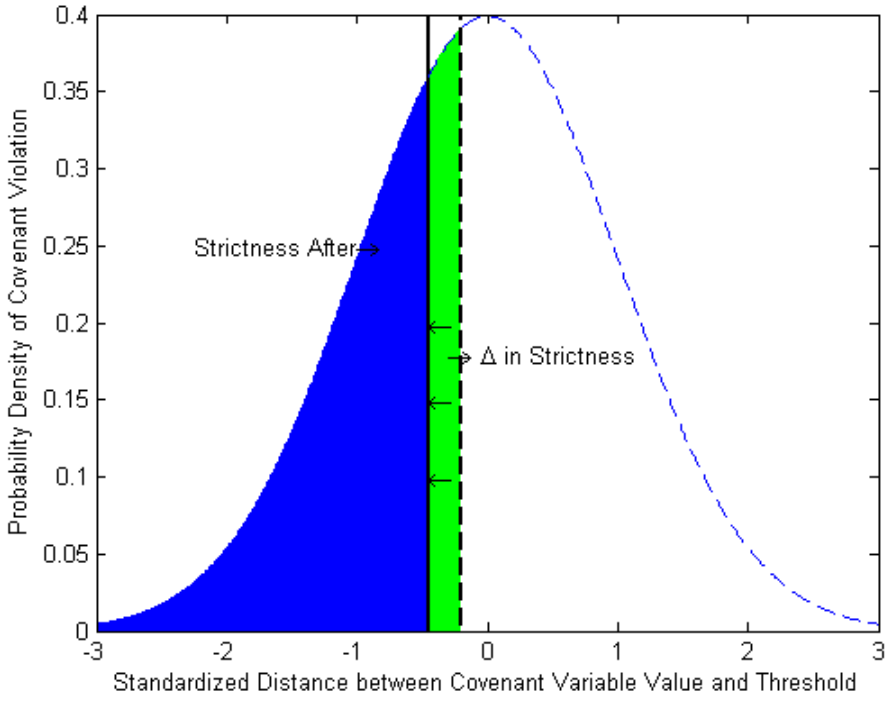

Figure IA.2. Change in Covenant Strictness

This figure plots the average change in covenant strictness after the introduction of CDS trading. The vertical dash line represents normalized distance between the minimum level of net worth specified in net worth covenants (covenant thershold) and the current value of net worth before CDS trading $(\underline{w}_1 - w)/\sigma$, while the vertical solid line represents normalized distance after CDS trading $(\underline{w}_2 - w)/\sigma$. Shadow area represents covenant strictness calculated by STRICTNESS $\equiv$ p = 1 - Φ $(\frac{w-\underline{w}}{\sigma})$. Shadow area to the left of the dash line represents covenant strictness before CDS introduction of the CDS firm sample. Shadow area to the left of the solid line represents covenant strictness after CDS introduction of the CDS firm sample.

Table I
Sample Distribution

This table describes year distribution of sample loans at package level from 1994 to 2009. Panel A describes loans from all sample firms (both CDS and non-CDS firms); panel B describs loans from CDS firms. CDS firms are defined as firms which ever have CDS trading on its debt at any time during the sample period. Column 2 reports the total number of loans. Column 3 reports the number of unique borrowing firms. Column 4 represents the number of loans with any type of covenants (i.e., net worth covenants or current ratio covenants). NW refers to net worth covenants. A loan package contains either a total net worth covenant or a tangible net worth covenant, or neither of them. The fourth column to the right reports average strictness of net worth covenants across all packages. Covenant strictness is calculated following the strictness measure: STRICTNESS $\equiv$ p = 1 - $\Phi[(w - \underline{w})/\sigma]$, where Φ is the standard normal cumulative distribution function; w is the logarithm value of (tangible) net worth of the borrower at the end of the quarter prior to loan initiation; $\underline{w}$ is the logarithm of the minimum (tangible) net worth that the firm must maintain above during the life of the loan specified in a net worth covenant; σ is the standard deviation of the quarterly change in the value of (tangible) net worth across all loan packages, varying by 1-digit SIC industry and by year. Loan size refers to the amount of loan at package level in million US dollars. Maturity refers to the average maturity of facilities of each loan package in years. The last column reports average all-in-drawn spread across loans in a given year.

Panel A. Summary of All Sample

Year	# of Loans	# of Firms	# of Loans with Covenants	# of Loans with NW Covenants	Average Strictness of NW Covenants	Loan Size ($ Million)	Maturity (Years)	Spread (Basis Points)
1994	2805	2122	113	97	.	230.533	5.5	94.57
1995	2987	2220	563	496	0.485	266.793	5.9	81.18
1996	4065	2830	1195	1065	0.488	229.535	5.6	84.11
1997	5185	3398	1381	1216	0.486	254.115	6.0	82.10
1998	4289	2887	997	862	0.479	250.757	5.7	87.15
1999	4356	2782	822	696	0.475	272.109	5.3	102.21
2000	4490	2812	787	630	0.480	300.215	4.4	95.39
2001	4676	2909	793	625	0.478	290.200	4.1	105.02
2002	4699	2989	899	736	0.466	256.214	4.2	119.62
2003	4875	3047	732	577	0.478	264.224	4.6	146.09
2004	5083	3374	683	469	0.466	349.814	5.3	119.22
2005	5151	3340	683	423	0.429	417.500	5.7	100.22
2006	4827	3192	574	333	0.388	441.706	5.7	100.79
2007	4545	3039	454	217	0.452	505.719	6.0	100.67
2008	3418	2408	374	204	0.382	384.912	4.9	158.48
2009	2068	1647	222	113	.	370.506	4.4	358.44
Total	67677	13385	11272	8759	0.472	320.518	5.2	174.80

Panel B. Summary of CDS Sample

Year	# of Loans	# of CDS Firms	# of Loans with Covenants	# of Loans with NW Covenants	Average Strictness of NW Covenants	Loan Size ($ Million)	Maturity (Years)	Spread (Basis Points)
1994	545	372	46	24	.	557.086	5.5	94.57
1995	557	373	80	48	0.421	681.965	6.0	81.18
1996	670	424	216	122	0.435	625.809	6.1	84.11
1997	789	465	264	123	0.421	702.011	6.8	82.10
1998	604	394	194	79	0.378	733.622	5.8	87.15
1999	754	454	215	85	0.380	685.560	5.0	102.21
2000	803	499	261	104	0.412	786.805	3.7	95.39
2001	859	543	304	99	0.409	889.259	3.6	105.02
2002	802	537	354	138	0.368	759.115	3.4	119.62
2003	776	532	323	96	0.409	715.271	4.0	146.09
2004	827	554	394	92	0.368	962.620	5.1	119.22
2005	802	525	394	90	0.303	1093.346	5.8	100.22
2006	704	477	294	61	0.253	1461.742	6.0	100.79
2007	607	416	254	31	0.338	1788.812	6.2	100.67
2008	330	226	128	22	0.237	1657.405	4.6	158.48
2009	238	186	104	18	.	1266.751	3.9	358.44
Total	10667	874	3825	1232	0.345	919.889	5.1	110.54

Table II
Summary Statistics

This table compares average loan covenant strictness/slackness and other loan characteristics. All loan characteristics are reported at package (loan) level. Panel A compares CDS firms'(which have a CDS market on its debt at any point of time during the sample period) loans before and after CDS trading is introduced. Panel B compares loans from CDS firms and those from non-CDS firms (which never have a CDS market during the sample period). Covenant slackness is measured by $\frac{w-\underline{w}}{w}$. The current value of net worth (w) is extracted at the end of the quarter prior to loan initiation. Maturity is the average maturity of facilities of a loan. Loan Amount is the aggregated amount of facilities of a loan. Number of lenders/package refer to the number of all lending banks of a loan. Percentage of secured loans refers to the fraction of secured loans out of all loans. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively.

Panel A. Packages before and after CDS Introduction

Variable	Before	After	Difference
Number of Packages with Net Worth Covenants	0.103	0.097	−0.006
Covenant Strictness Scaled by Industry-year Volatility	0.421	0.333	−0.088***
Covenant Strictness Scaled by Firm Volatility	0.362	0.253	−0.109***
Covenant Slackness	0.370	0.398	0.028*
Maturity (Years)	5.6	4.7	−0.9***
Loan Amount ($ Million)	605.9	1174.3	568.4***
Number of Lenders/Package	13.9	15.6	1.6**
Percentage of Secured Loans	32.9	18.5	−14.4***

Panel B. Packages from CDS Firms and Non-CDS Firms

Varaible	Non-CDS Fims	CDS Firms	Difference
Number of Packages with Net Worth Covenants	0.115	0.100	−0.014***
Covenant Strictness Scaled by Industry-year Volatility	0.487	0.382	−0.105***
Covenant Strictness Scaled by Firm Volatility	0.345	0.314	−0.031***
Covenant Slackness	0.328	0.382	0.054***
Maturity (Years)	5.4	5.1	−0.3***
Loan Amount ($ Million)	253.2	857.8	604.6***
Number of Lenders/Package	4.7	14.7	10.0***
Percentage of Secured Loans	69.7	26.5	−43.2***

Table III
Impact of CDS Trading on Covenant Strictness

This table reports the baseline difference-in-differences regression results of CDS trading impact on covenant strictness. The dependent variable is the strictness measure of net worth covenants. We estimate the standard deviations of the covenant variable by 1-digit SIC industry and by year to calculate covenant strictness for model 1 and 2; for model 3 and 4, we estimate the standard deviations by firm using 3-year rolling windows. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS is actively traded on the borrower's debt when the loan is initiated, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness

Variable	Strictness Measure Scaled by Industry-year Volatility		Strictness Measure Scaled by Firm Volatility	
	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.074***	-0.053***	-0.040***	-0.069***
	(0.005)	(0.006)	(0.014)	(0.016)
CDS Traded	.	-0.030***	.	0.041***
	.	(0.004)	.	(0.011)
Loan Characteristics				
Log (Loan Amount)	0.002*	0.003**	0.019***	0.018***
	(0.001)	(0.001)	(0.003)	(0.003)
Maturity	0.002	0.002	0.002	0.002
	(0.002)	(0.002)	(0.007)	(0.007)
Secured	-0.002	-0.003	-0.001	0.001
	(0.002)	(0.002)	(0.007)	(0.007)
Borrower Characteristics				
Log (Total Assets)	-0.018***	-0.017***	-0.023***	-0.025***
	(0.001)	(0.001)	(0.003)	(0.003)
Current Ratio	0.047	0.042	0.086	0.092
	(0.035)	(0.035)	(0.098)	(0.098)
Market-to-Book	-0.387	-0.334	1.646*	1.591*
	(0.323)	(0.321)	(0.895)	(0.894)
Profitability	-0.006	-0.005	-0.107*	-0.108*
	(0.021)	(0.021)	(0.058)	(0.058)
Cash/Total Assets	0.001	0.005	0.149***	0.145***
	(0.014)	(0.014)	(0.038)	(0.038)
Leverage	0.033***	0.035***	0.170***	0.168***
	(0.009)	(0.009)	(0.025)	(0.025)
Log (1+Fixed Charge Coverage)	-0.004	-0.024	-0.775***	-0.748***
	(0.100)	(0.100)	(0.275)	(0.274)
Tangibility	-0.001	0.000	0.004	0.003
	(0.005)	(0.005)	(0.013)	(0.013)
Z-score	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Intercept	0.555***	0.548***	0.378***	0.388***
	(0.007)	(0.007)	(0.020)	(0.020)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	33.61	34.57	8.92	9.24
Observations	6952	6952	6952	6952

Table IV
Impact of Number of CDS Contracts on Covenant Strictness

This table reports the regression results of the impact of the (scaled) number of CDS contracts on covenant strictness. The dependent variable is the strictness of net worth covenants. In model 1 to 2, we estimate the standard deviations of the covenant variable by 1-digit SIC industry and by year to calculate covenant strictness. In model 3 to 4, we estimate the standard deviations by firm using 3-year rolling windows. The independent variable we are interested in is the number of CDS contracts and the ratio of the number of CDS contracts over the borrower's total debt in the same quarter. The number of CDS contracts is the total number of active CDS contracts on the borrower's debt in the quarter of loan initiation. The total debt value is extracted at the end of the quarter prior to loan initiation. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market on its debt at any time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness

Variable	Strictness Measure Scaled by Industry-year Volatility		Strictness Measure Scaled by Firm Volatility	
	Model1	Model2	Model3	Model4
CDS Market Characteristics				
Number of CDS Contracts	-0.019*	.	-0.008**	.
	(0.010)	.	(0.004)	.
Number of CDS Contracts over Total Debt	.	-0.132***	.	-0.105**
	.	(0.036)	.	(0.052)
CDS Traded	-0.047***	-0.047***	0.015	0.018*
	(0.004)	(0.004)	(0.010)	(0.010)
Loan Characteristics				
Log (Loan Amount)	0.003***	0.003***	0.019***	0.019***
	(0.001)	(0.001)	(0.003)	(0.003)
Maturity	0.002	0.002	0.002	0.003
	(0.002)	(0.002)	(0.007)	(0.007)
Secured	-0.004	-0.004	0.001	0.000
	(0.002)	(0.002)	(0.007)	(0.007)
Borrower Characteristics				
Log (Total Assets)	-0.017***	-0.018***	-0.026***	-0.026***
	(0.001)	(0.001)	(0.003)	(0.003)
Current Ratio	0.041	0.041	0.081	0.087
	(0.035)	(0.035)	(0.098)	(0.099)
Market-to-Book	-0.330	-0.327	1.733*	1.558*
	(0.324)	(0.324)	(0.895)	(0.896)
Profitability	-0.003	-0.003	-0.107*	-0.108*
	(0.021)	(0.021)	(0.058)	(0.058)
Cash/Total Assets	0.005	0.005	0.149***	0.144***
	(0.014)	(0.014)	(0.038)	(0.038)
Leverage	0.035***	0.035***	0.165***	0.170***
	(0.009)	(0.009)	(0.025)	(0.025)
Log (1+Fixed Charge Coverage)	0.000	0.004	-0.714***	-0.723***
	(0.101)	(0.101)	(0.275)	(0.275)
Tangibility	0.001	0.001	0.001	0.002
	(0.005)	(0.005)	(0.014)	(0.014)
Z-score	-0.000	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.001)
Intercept	0.551***	0.551***	0.353***	0.399***
	(0.007)	(0.007)	(0.024)	(0.020)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	33.37	33.30	9.23	8.88
Observations	6952	6952	6952	6952

Table V
CDS Trading and Covenant Strictness: Within-Bank Analysis

This table reports the baseline difference-in-differences regression results of CDS trading impact on covenant strictness of the restricted sample. Panel A reports regression results of the sample in which the lenders lend to both CDS and non-CDS firms in any given year during the sample period. In Panel B, we further restrict the sample to lenders that lend to CDS firms both before and after CDS introduction. The dependent variable is the strictness measure of net worth covenants. Column (1) and (3) report OLS regression and column (2) and (4) report Tobit regression. We estimate the standard deviations of the covenant variable in two ways to calcualte covenant strictness: (1) by 1-digit SIC industry and by year; (2) by firm's 3-year rolling window. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS is actively traded on the borrower's debt when the loan is initiated, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

Panel A. Banks Lending to Both CDS and Non-CDS Firms				
	Strictness Measure Scaled by Industry-year Volatility		Strictness Measure Scaled by Firm Volatility	
Variable	OLS	Tobit	OLS	Tobit
CDS Market Characteristics				
CDS Trading	-0.044***	-0.049***	-0.056***	-0.063***
	(0.007)	(0.007)	(0.016)	(0.023)
CDS Traded	-0.016***	-0.011**	0.029**	0.041**
	(0.005)	(0.005)	(0.012)	(0.017)
Loan Characteristics				
Log (Loan Amount)	0.004**	0.004**	0.022***	0.020***
	(0.002)	(0.002)	(0.004)	(0.006)
Maturity	-0.010***	-0.010***	0.005	-0.030**
	(0.003)	(0.004)	(0.008)	(0.011)
Secured	-0.002	-0.002	0.008	-0.004
	(0.003)	(0.003)	(0.007)	(0.010)
Borrower Characteristics				
Log (Total Assets)	-0.018***	-0.019***	-0.027***	-0.017***
	(0.002)	(0.002)	(0.004)	(0.005)
Current Ratio	0.099	0.084	0.140	-0.468
	(0.108)	(0.109)	(0.271)	(0.356)
Market-to-Book	-0.001	-0.683	3.277*	-0.011
	(0.731)	(0.735)	(1.783)	(2.403)
Profitability	-0.023	-0.048	-0.315***	-0.199
	(0.044)	(0.044)	(0.104)	(0.144)
Cash/Total Assets	0.004	0.006	0.210***	0.144***
	(0.017)	(0.017)	(0.044)	(0.055)
Leverage	0.026**	0.034***	0.128***	0.072*
	(0.013)	(0.013)	(0.032)	(0.042)
Log (1+Fixed Charge Coverage)	-0.048	-0.109	-0.539	0.018
	(0.151)	(0.152)	(0.371)	(0.497)
Tangibility	-0.014**	-0.008	0.009	0.047**
	(0.006)	(0.006)	(0.016)	(0.021)
Z-score	-0.001	0.000	-0.003*	-0.000
	(0.001)	(0.001)	(0.001)	(0.002)
Intercept	0.478***	0.541***	0.253***	0.249***
	(0.019)	(0.011)	(0.046)	(0.035)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	42.88	43.21	11.18	11.37
Observations	4076	4076	4076	4076

Panel B. Banks Lending Both Before and After CDS Introduction				
	Strictness Measure Scaled by Industry-year Volatility		Strictness Measure Scaled by Firm Volatility	
Variable	OLS	Tobit	OLS	Tobit
CDS Market Characteristics				
CDS Trading	-0.034**	-0.038***	-0.043***	-0.044***
	(0.015)	(0.015)	(0.008)	(0.008)
CDS Traded	-0.012**	-0.003	0.031*	0.049***
	(0.005)	(0.007)	(0.017)	(0.018)
Loan Characteristics				
Log (Loan Amount)	0.028***	0.029***	0.007***	0.008***
	(0.005)	(0.005)	(0.003)	(0.003)
Maturity	-0.001	-0.001	-0.016***	-0.016***
	(0.010)	(0.010)	(0.005)	(0.005)
Secured	0.009	0.006	-0.004	-0.004
	(0.009)	(0.009)	(0.005)	(0.005)
Borrower Characteristics				
Log (Total Assets)	-0.031***	-0.032***	-0.024***	-0.025***
	(0.005)	(0.005)	(0.002)	(0.002)
Current Ratio	0.067	0.045	0.136	0.132
	(0.352)	(0.351)	(0.172)	(0.172)
Market-to-Book	4.223**	3.090	0.499	-0.303
	(2.113)	(2.092)	(1.037)	(1.030)
Profitability	-0.464***	-0.498***	-0.061	-0.090
	(0.136)	(0.135)	(0.065)	(0.065)
Cash/Total Assets	0.239***	0.244***	0.011	0.019
	(0.053)	(0.053)	(0.025)	(0.025)
Leverage	0.086**	0.103**	0.015	0.028
	(0.041)	(0.041)	(0.019)	(0.019)
Log (1+Fixed Charge Coverage)	-0.882*	-0.916**	-0.122	-0.239
	(0.453)	(0.451)	(0.229)	(0.228)
Tangibility	0.021	0.027	-0.020**	-0.014
	(0.019)	(0.019)	(0.009)	(0.009)
Z-score	-0.003	-0.002	-0.001	-0.000
	(0.002)	(0.002)	(0.001)	(0.001)
Intercept	0.281***	0.379***	0.493***	0.543***
	(0.055)	(0.051)	(0.027)	(0.026)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	44.16	44.32	14.44	14.53
Observations	3278	3278	3278	3278

Table VI
CDS Endogeneity Control: Instrumental Variable (IV) Approach

This table reports the two-stage-least-square regression results of the impact of CDS trading on covenant strictness. In the first stage we estimate a logit model to obtain the predicted value of the independent variable, *CDS Trading*, using two instrumental variables *Lender Foreign Exchange Derivatives* and *High Tier-1 Capital Ratio*. *Lender Foreign Exchange Derivatives* is the amount of foreign exchange derivatives used for hedging purposes (not trading) relative to the amount of loans of the lead syndicate banks that the firm has borrrowed money from in the past five years. *Tier-1 Capital Ratio* is lenders' tier-1 capital to total assets ratio at the end of the quarter prior to loan initiation, averaged across all lenders of a loan. *High Tier-1 Capital Ratio* is a dummy indicating the lender's tier-1 capital ratio is above the 50% breakpoints across all sample firms in the same year. The explanatory variables include the one quarter lag of the following: logarithm of total assets, leverage, current ratio, cash-to-total assets, market-to-book ratio, profitability, fixed charge coverage, the ratio of tangible assets to total assets, Z-score, log stock market excess return, log stock market volatility. The dependent variable in the second stage is the strictness of net worth covenants. The independent variables of interest are the estimated probabilities of CDS trading. CDS Trading is a dummy variable which takes the value of one if CDS trading referencing the borrower's debt is active, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include loan purpose dummies, loan origination year and borrower industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. First-stage regression results are reported by Appendix Table IV. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility			
Variable	Model1	Model2	Model3
Instrument for CDS Trading			
IV (Forengn Exchange Derivatives Position)	−0.198 * **	.	−0.201 * **
	(0.011)	.	(0.009)
IV (Tier-1 Capital Ratio)	.	−0.156 * **	−0.047 * **
	.	(0.014)	(0.007)
Loan Characteristics			
Log (Loan Amount)	−0.001	0.001	0.006 * **
	(0.002)	(0.001)	(0.001)
Maturity	−0.004	−0.002	−0.002
	(0.003)	(0.003)	(0.002)
Secured	0.002	0.005*	−0.000
	(0.003)	(0.003)	(0.002)
Borrower Characteristics			
Log (Total Assets)	−0.013 * **	−0.011 * **	−0.014 * **
	(0.002)	(0.001)	(0.001)
Current Ratio	0.009	0.096	0.061
	(0.040)	(0.094)	(0.074)
Market-to-Book Ratio	−0.009 * **	−0.000	−0.000
	(0.002)	(0.000)	(0.000)
Profitability	−0.012	0.014	−0.034
	(0.027)	(0.021)	(0.029)
Cash-to-Total Assets	0.049 * **	0.002	0.016
	(0.018)	(0.017)	(0.013)
Leverage	0.039 * **	0.044 * **	0.042 * **
	(0.012)	(0.012)	(0.009)
Log (1+ Fixed Charge Coverage)	−0.086	−0.093	−0.032
	(0.131)	(1.220)	(0.103)
Tangibility	0.002	0.067	−0.007*
	(0.006)	(0.123)	(0.004)
Z-score	0.001	0.007	−0.001 * **
	(0.001)	(0.006)	(0.000)
Intercept	0.538 * **	0.529 * **	0.482 * **
	(0.010)	(0.010)	(0.011)
Fixed Loan Purpose Controls	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes
R-squared (%)	39.34	31.00	50.58
Observations	6952	6952	6952
Hansen's J statistics for over-identifying restrictions: 1.705			

Table VII
CDS Endogeneity Control: Propensity Score Matching

This table reports the covenant strictness regression results with the matched sample, which is formed by matching on CDS trading propensity score. We estimate a logit model to obtain the probability of CDS trading for each loan package observation. The probit regresion results are reported in additonal Table IV. In the logit model for column (1) and (2), the explanatory variables include the one quarter lag of the following: lender's foreign exchange derivative position for hedging purpose, borrower log total assets, leverage, current ratio, cash-to-total assets, profitability, fixed charge coverage, the ratio of tangible assets to total assets, Z-score, equity analyst coverage, log stock market excess return, and log stock market volatility. For model (3) and (4), the explanatory variables *also* include the dummy representing lenders' high tier-1 capital ratio. After propensity scores are obtained, we employ the nearest neighborhood matching to form the control group. The dependent variable is the strictness of net worth covenants. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS trading is active referencing the borrower's debt, and zero otherwise. CDS Traded is a dummy variable if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness Scaled by Industry-year Volatility

	Logit Model1		Logit Model2	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.053***	-0.030*	-0.034***	-0.029***
	(0.021)	(0.015)	(0.011)	(0.010)
CDS Traded	0.035	.	0.010	.
	(0.022)	.	(0.009)	.
Loan Characteristics				
Log(Loan Amount)	-0.004	-0.003	-0.003	-0.003
	(0.009)	(0.010)	(0.005)	(0.004)
Maturity	-0.002	-0.002	-0.009	-0.009
	(0.001)	(0.001)	(0.009)	(0.009)
Secured	-0.022	-0.022	0.005	0.004
	(0.015)	(0.015)	(0.006)	(0.006)
Borrower Characteristics				
Log (Total Assets)	-0.068***	-0.068***	-0.049***	-0.048***
	(0.009)	(0.009)	(0.007)	(0.007)
Current Ratio	0.009	0.009	0.451	0.447
	(0.009)	(0.009)	(0.539)	(0.538)
Market-to-Book	-0.012	-0.009	-0.001	-0.001
	(0.017)	(0.017)	(0.001)	(0.001)
Profitability	-0.419	-0.406	-0.339*	-0.333*
	(0.321)	(0.329)	(0.182)	(0.182)
Cash/Total Assets	0.158	0.161	-0.053	-0.046
	(0.114)	(0.115)	(0.065)	(0.064)
Leverage	0.323***	0.323***	0.052	0.053
	(0.097)	(0.099)	(0.043)	(0.043)
Log(1+Fixed Charge Coverage)	0.003	0.003	-0.233	-0.218
	(0.008)	(0.008)	(0.436)	(0.437)
Tangibility	-0.031	-0.041	0.002	0.003
	(0.032)	(0.032)	(0.020)	(0.020)
Z-score	-0.019**	-0.019**	-0.003*	-0.003*
	(0.008)	(0.008)	(0.002)	(0.002)
Intercept	0.815***	0.815***	0.675***	0.665***
	(0.078)	(0.078)	(0.075)	(0.073)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Controls	Yes	Yes	Yes	Yes
R-squared(%)	50.96	50.88	52.63	52.53
Observations	870	870	870	870

Table VIII
Lender Derivatives Activities, CDS Trading and Covenant Strictness

This table reports the regression results of the impact of lenders' credit derivative positions on the effects of CDS on covenant strictness. The dependent variable is the strictness of net worth covenants. The independent variable we are interested in are the interaction terms of CDS trading and the lead bank's or syndicate banks' aggregate positions in credit derivatives trading (in trillion US dollars). Banks' credit derivatives trading data is from the Office of the Comptroller of the Currency (OCC)'s quarterly reports on bank derivatives activities. In model 1 and 2, lender derivatives activity is measured by the lead bank position in credit derivatives trading in the quarter of loan initiation. In model 3 and 4, lender derivatives activity is measured by the aggregate derivative position of all syndicate banks of each package. CDS Trading is a dummy variable which takes the value of one if there is active CDS market on the borrower's debt at loan inititiation, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading*Lead Bank Credit Derivatives Position	-0.029*	-0.029**	.	.
	(0.015)	(0.015)	.	.
CDS Trading*All Lenders' Credit Derivatives Position	.	.	-0.028**	-0.028**
	.	.	(0.013)	(0.013)
CDS Trading	-0.042***	-0.063***	-0.042***	-0.063***
	(0.013)	(0.011)	(0.013)	(0.011)
CDS Traded	-0.030***	.	-0.030***	.
	(0.007)	.	(0.007)	.
Bank Credit Derivaties Position				
Lead Bank Credit Derivatives Postion	0.005***	0.005***	.	.
	(0.001)	(0.001)	.	.
All Lenders' Credit Derivatives Position	.	.	0.005***	0.004***
	.	.	(0.001)	(0.001)
Loan Characteristics				
Log (Loan Amount)	0.004***	0.003**	0.004***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	0.001	0.002	0.001	0.002
	(0.002)	(0.003)	(0.003)	(0.003)
Secured	-0.002	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics				
Log (Total Assets)	-0.018***	-0.019***	-0.018***	-0.019***
	(0.002)	(0.002)	(0.002)	(0.002)
Current Ratio	0.128*	0.143*	0.128*	0.143*
	(0.072)	(0.074)	(0.072)	(0.074)
Market-to-Book	0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.014	-0.016	-0.014	-0.017
	(0.023)	(0.024)	(0.023)	(0.024)
Cash/Total Assets	0.003	0.001	0.003	0.001
	(0.013)	(0.013)	(0.013)	(0.013)
Leverage	0.032***	0.031***	0.032***	0.031***
	(0.009)	(0.009)	(0.009)	(0.009)
Log (1+Fixed Charge Coverage)	0.060	0.090	0.060	0.091
	(0.111)	(0.115)	(0.111)	(0.115)
Tangibility	-0.001	-0.002	-0.000	-0.002
	(0.006)	(0.006)	(0.005)	(0.006)
Z-score	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	0.617***	0.488***	0.617***	0.487***
	(0.012)	(0.017)	(0.012)	(0.017)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	44.12	43.95	42.93	42.45
Observations	6952	6952	6952	6952

Table IX
Borrower Bargaining Power and Covenant Loosening

This table reports the how CDS trading effects depend on borrower bargaining power relative to its lender. The dependent variable is the strictness of net worth covenants. The independent variables we are interested in are the interaction terms of CDS trading and dummies representing larger borrower size, higher Z-score, higher profitability, and lower leverage, which are determined by the 50% breakpoints across all sample firms (including both CDS and non-CDS firms) at the end of the quarter prior to loan initiation. CDS Trading is a dummy taking the value of one if CDS trading referencing the borrower's debt is active at loan origination, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market on its debt at any time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by the quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading*Large Total Assets	-0.106***	.	.	.
	(0.009)	.	.	.
CDS Trading*High Z-score	.	-0.046***	.	.
	.	(0.010)	.	.
CDS Trading*High Profitability	.	.	-0.098***	.
	.	.	(0.009)	.
CDS Trading*Low Leverage	.	.	.	-0.070***
	.	.	.	(0.012)
CDS Trading	-0.015**	-0.042***	-0.022***	-0.064***
	(0.006)	(0.006)	(0.006)	(0.006)
CDS Traded	-0.034***	-0.030***	-0.030***	-0.030***
	(0.004)	(0.004)	(0.004)	(0.004)
Loan Characteristics				
Log (Loan Amount)	0.003**	0.003**	0.003***	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	0.002	0.002	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Secured	-0.003	-0.003	-0.004*	-0.004
	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics				
Log (Total Assets)	-0.015***	-0.017***	-0.017***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
Current Ratio	0.040	0.044	0.040	0.043
	(0.034)	(0.035)	(0.034)	(0.035)
Market-to-Book	-0.416	-0.341	-0.346	-0.332
	(0.315)	(0.320)	(0.316)	(0.319)
Profitability	-0.006	-0.003	0.005	-0.006
	(0.021)	(0.021)	(0.021)	(0.021)
Cash/Total Assets	0.003	0.006	0.005	0.005
	(0.013)	(0.014)	(0.013)	(0.014)
Leverage	0.036***	0.034***	0.033***	0.032***
	(0.009)	(0.009)	(0.009)	(0.009)
Log (1+Fixed Charge Coverage)	-0.032	-0.009	-0.022	-0.026
	(0.098)	(0.100)	(0.098)	(0.099)
Tangibility	-0.001	-0.001	-0.002	0.001
	(0.005)	(0.005)	(0.005)	(0.005)
Z-score	-0.001	-0.002	-0.000	-0.002
	(0.001)	(0.002)	(0.000)	(0.002)
Intercept	0.541***	0.549***	0.550***	0.549***
	(0.007)	(0.007)	(0.007)	(0.007)
Fixed Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	34.78	34.97	36.69	35.21
Observations	6952	6952	6952	6952

Table X
Within-Syndicate Conflict and Covenant Loosening

This table reports how the effect of CDS on covenant strictness depends on within-synidcate conflict. We are primarily interested in the interaction between CDS trading and within-syndicate conflict measure. We measure within-syndicate conflict by the lead bank's reputation and interaction between the lead bank and the participatns. Lead bank reputation is proxied by the aggregate loan volumn issued by the lead bank in the past year. Interaction between the lead bank and the participants refers to the times of joint lending of the lead bank and any of the participants in the past. We define high lead bank reputation and strong lead-participant interaction as one when values of the two measures are above the 50% breakpoints across all loans in the same year. The dependent variable is the strictness of net worth covenants. CDS Trading is a dummy variable which takes the value of one if CDS trading is active referencing the borrower's debt, and zero otherwise. CDS Traded is a dummy variable if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading*High Lead Bank Reputation	-0.045***	-0.047***	.	.
	(0.015)	(0.014)	.	.
CDS Trading*Strong Lead-Participant Interaction	.	.	-0.049***	-0.051***
	.	.	(0.009)	(0.009)
CDS Trading	-0.066***	-0.050***	-0.080***	-0.063***
	(0.005)	(0.006)	(0.006)	(0.006)
CDS Traded	.	-0.025***	.	-0.025***
	.	(0.004)	.	(0.004)
Within-Syndicate Conflict Measure				
High Lead Bank Reputation	0.005	0.005	.	.
	(0.004)	(0.004)	.	.
Strong Lead-Participant Interaction	.	.	0.007***	0.008***
	.	.	(0.002)	(0.002)
Loan Characteristics				
Log (Loan Amount)	0.003*	0.003**	0.002	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	-0.001	-0.001	-0.000	-0.001
	(0.003)	(0.003)	(0.003)	(0.003)
Secured	-0.001	-0.002	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics				
Log (Total Assets)	-0.024***	-0.022***	-0.024***	-0.022***
	(0.001)	(0.001)	(0.001)	(0.001)
Current Ratio	0.136	0.126	0.129	0.119
	(0.091)	(0.090)	(0.090)	(0.090)
Market-to-Book	0.165	0.219	0.073	0.125
	(0.589)	(0.585)	(0.587)	(0.583)
Profitability	-0.057	-0.051	-0.060	-0.054
	(0.037)	(0.036)	(0.036)	(0.036)
Cash/Total Assets	0.009	0.010	0.009	0.011
	(0.015)	(0.015)	(0.015)	(0.015)
Leverage	0.042***	0.043***	0.041***	0.042***
	(0.011)	(0.011)	(0.011)	(0.011)
Log (1+Fixed Charge Coverage)	0.093	0.061	0.087	0.055
	(0.123)	(0.122)	(0.123)	(0.122)
Tangibility	-0.003	-0.002	-0.003	-0.002
	(0.005)	(0.005)	(0.005)	(0.005)
Z-score	-0.002***	-0.001***	-0.002***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	0.530***	0.521***	0.538***	0.528***
	(0.015)	(0.015)	(0.015)	(0.015)
Loan Purpose Dummies	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	43.93	43.36	44.34	45.07
Observations	5355	5355	5355	5355

Table XI
Renegotiation Cost and Covenant Loosening

This table reports how CDS trading effects on covenant strictness depend on renegoation cost. We split the sample to loans from sole lender and syndicated loans. Syndicate size refers to the logarithm of (1+number of syndicate memebers (including both the lead bank and participating banks))*scaled* by borrower size. The dummy larger syndicate size takes one if syndicate size is above the 50% breakpoint across all sample firms in the same year. CDS Trading is a dummy variable which takes the value of one if CDS trading referencing the borrower's debt is active at loan origination, and zero otherwise. CDS Traded is a dummy variable if the borrower has CDS market at any point of time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include loan purpose dummies, loan origination year and borrower industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility

	Sole Lender		Multiple Lenders			
Variable	Model1	Model2	Model3	Model4	Model5	Model6
CDS Market Characteristics						
CDS Trading	-0.088***	-0.119***	-0.062***	-0.046***	-0.038***	-0.021***
	(0.008)	(0.009)	(0.007)	(0.005)	(0.008)	(0.008)
CDS Traded	-0.042***	.	-0.025***	.	-0.031***	.
	(0.003)	.	(0.002)	.	(0.003)	.
CDS Trading*	.	.	.	.	-0.032***	-0.033***
Large Syndicate Size	.	.	.	.	(0.008)	(0.003)
Large Syndicate Size	.	.	.	.	0.005**	0.005***
	.	.	.	.	(0.002)	(0.002)
Loan Characteristics						
Log (Loan Amount)	-0.001	-0.001	0.004***	0.003**	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	0.001	0.003*	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Secured	-0.001	0.000	-0.002	-0.001	-0.002	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics						
Log (Total Assets)	-0.005***	-0.006***	-0.022***	-0.023***	-0.022***	-0.023***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Current Ratio	-0.018	0.019	0.113	0.123	0.106	0.117
	(0.043)	(0.047)	(0.091)	(0.092)	(0.091)	(0.092)
Market-to-Book	-0.249	-0.294	0.460	0.405	0.409	0.355
	(0.331)	(0.362)	(0.593)	(0.596)	(0.591)	(0.594)
Profitability	-0.010	-0.007	-0.056	-0.062*	-0.055	-0.062*
	(0.014)	(0.015)	(0.037)	(0.037)	(0.037)	(0.037)
Cash/Total Assets	0.007	0.001	0.008	0.006	0.007	0.005
	(0.008)	(0.008)	(0.015)	(0.015)	(0.015)	(0.015)
Leverage	0.003	0.001	0.044***	0.044***	0.044***	0.044***
	(0.005)	(0.006)	(0.011)	(0.011)	(0.011)	(0.011)
Log (1+Fixed Charge Coverage)	-0.056	-0.061	0.116	0.146	0.116	0.148
	(0.065)	(0.071)	(0.124)	(0.125)	(0.123)	(0.124)
Tangibility	0.002	0.003	-0.003	-0.004	-0.003	-0.004
	(0.003)	(0.003)	(0.005)	(0.005)	(0.005)	(0.005)
Z-score	-0.000	0.000	-0.001***	-0.002***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	0.883***	0.899***	0.552***	0.563***	0.550***	0.561***
	(0.022)	(0.024)	(0.014)	(0.014)	(0.014)	(0.014)
Fixed Loan Purpose Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (%)	66.20	59.31	42.95	42.25	42.14	43.51
Observations	1597	1597	5355	5355	5355	5355

Table XII
Test of Restructuring Incentive: Evidence from "No-restructuring" CDS

This table reports the impact of the "No-restructuring" clause in CDS contract on the effects of CDS trading on covenant strictness. The dependent variable is the strictness of net worth covenants. CDS contract with "No-Restructuring" clause exclude debt restructuring from credit events that may trigger CDS repayment. The variable "No-Restrucutring" refers to the ratio of the number of active CDS contracts containing "No-Restructuring" clause to the total number of all active CDS contracts on the borrower's debt in the same quarter of loan initiation. The independent variable we are interested in is the interaction term of CDS Trading and "No-Restructuring". CDS Trading is a dummy variable which takes the value of one if CDS trading referencing the borrower's debt is active at loan origination, and zero otherwise. CDS Traded is a dummy variable if the borrower has CDS market at any point of time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include loan purpose dummies, loan origination year and borrower industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility		
Variable	Model1	Model2
CDS Market Characteristics		
CDS Trading*No Restructuring	−0.091 * **	−0.063 * **
	(0.019)	(0.019)
CDS Traded	.	−0.047 * **
	.	(0.003)
Loan Characteristics		
Log (Loan Amount)	0.004 * **	0.004 * **
	(0.001)	(0.001)
Maturity	0.003	0.001
	(0.002)	(0.002)
Secured	0.001	−0.001
	(0.002)	(0.002)
Borrower Characteristics		
Log (Total Assets)	−0.023 * **	−0.019 * **
	(0.001)	(0.001)
Current Ratio	0.153 * *	0.120*
	(0.075)	(0.073)
Market-to-Book	−0.000	−0.000
	(0.000)	(0.000)
Profitability	−0.014	−0.012
	(0.028)	(0.027)
Cash/Total Assets	−0.001	0.005
	(0.013)	(0.012)
Leverage	0.033 * **	0.034 * **
	(0.009)	(0.009)
Log (1+Fixed Charge Coverage)	0.201*	0.108
	(0.104)	(0.101)
Tanigbility	0.000	0.001
	(0.005)	(0.004)
Z-score	−0.001 * **	−0.001 * *
	(0.000)	(0.000)
Intercept	0.657 * **	0.620 * **
	(0.054)	(0.052)
Loan Purpose Controls	Yes	Yes
Fixed Year Controls	Yes	Yes
Fixed Industry Controls	Yes	Yes
R-squared (%)	43.75	42.72
Observations	6952	6952

Table XIII
Borrower Information Transparency, CDS Trading and Covenant Strictness

This table reports the how CDS trading effects depend on borrower information environment. The dependent variable is the strictness of net worth covenants. The independent variables we are interested in are the interaction term of CDS trading and information transparency measure. Borrower information transparency is measured by a dummy indicating whether the firm has earnings-per-share (EPS) estimates by equity analyst reported by I/B/E/S at the quarter prior to loan initiation, and a dummy representing a larger number of past lenders. Number of past lenders is defined as the average number of lenders in the past four loan transactions (Murfin, 2012) scaled by firm size one quarter prior to loan iniviation. Observations with the scaled number of past lenders above 50% breakpoints across all sample firms in the same year are assigned one. CDS Trading is a dummy taking the value of one if CDS trading referencing the borrower's debt is active at loan origination, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market on its debt at any time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by the quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading*With Analyst Coverage	-0.012**	-0.012**	.	.
	(0.005)	(0.005)	.	.
CDS Trading*Larger Number of Past Lender	.	.	-0.029***	-0.028***
	.	.	(0.009)	(0.009)
CDS Trading	-0.037***	-0.059***	-0.047***	-0.026***
	(0.006)	(0.006)	(0.009)	(0.009)
CDS Traded	.	-0.031***	.	-0.031***
	.	(0.004)	.	(0.003)
Borrower Information Transparency				
With Analyst Coverage	-0.003	-0.002	.	.
	(0.002)	(0.002)	.	.
Larger Number of Past Lenders	.	.	0.003	0.002
	.	.	(0.002)	(0.002)
Loan Characteristics				
Log (Loan Amount)	0.003***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	0.002	0.001	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Secured	-0.000	-0.001	0.000	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics				
Log (Total Assets)	-0.019***	-0.017***	-0.019***	-0.017***
	(0.001)	(0.001)	(0.001)	(0.001)
Current Ratio	0.146**	0.126*	0.128*	0.110
	(0.072)	(0.072)	(0.072)	(0.071)
Market-to-Book	0.000	0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Profitability	-0.020	-0.017	-0.016	-0.014
	(0.027)	(0.027)	(0.027)	(0.027)
Cash/Total Assets	0.001	0.005	-0.001	0.002
	(0.012)	(0.012)	(0.012)	(0.012)
Leverage	0.032***	0.033***	0.034***	0.034***
	(0.009)	(0.009)	(0.009)	(0.009)
Log (1+Fixed Charge Coverage)	0.123	0.092	0.113	0.079
	(0.101)	(0.100)	(0.100)	(0.099)
Tangibility	-0.001	-0.000	-0.003	-0.002
	(0.004)	(0.004)	(0.004)	(0.004)
Z-score	-0.001***	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	0.631***	0.614***	0.625***	0.611***
	(0.052)	(0.052)	(0.052)	(0.051)
Loan Purpose Dummies	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
R-squared (%)	42.60	43.71	43.19	43.71
Observations	6952	6952	6952	6952

Table XIV
Impact of CDS Trading on the Number of Bond Covenants

This table reports OLS and Poisson regression results of the impact of CDS trading on the number of bond covenants. Model (1) and (2) report OLS regression. Model (3) and (4) report Poisson regression. The dependent variable is the number of covenants of each bond issue. Bond covenants information is extracted from Mergent Fixed Income Securities Database (FISD). Following Smith and Warner (1979) we group all bond covenants into 11 categories. Covenants that belong to the same category are regarded as one covenant. The independent variable we are interested in is CDS trading, a dummy equal to one if CDS trading referencing the issuer's debt is active at bond issuance, and zero otherwise. CDS traded is a dummy equal to one if the issuer has an active CDS market at any time during the sample period, and zero if the issuer never has a CDS market. "Not Rated" is a dummy indicating the bond issue does not have a credit rating given by a public rating agency. Bond issuer characteristic variables take their value at the end of the quarter prior to bond issuance. Leverage is the value of book debt divided by book assets. Current Ratio the value of current assets divided by current debt. All specifications include fixed year and industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable Definitions.

Dependent Variable = Number of Bond Covenants				
	OLS Regression		Poisson Regression	
Varaible	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.172*	-0.376***	-0.063*	-0.105***
	(0.092)	(0.091)	(0.034)	(0.029)
CDS Traded	-0.387***	.	-0.075**	.
	(0.121)	.	(0.033)	.
Bond Characteristics				
Log(Issue Size)	0.309***	0.313***	0.106***	0.106***
	(0.064)	(0.064)	(0.020)	(0.020)
Maturity	-0.007**	-0.007***	-0.003*	-0.003*
	(0.003)	(0.003)	(0.001)	(0.001)
Not Rated	0.062	0.073	0.019	0.021
	(0.063)	(0.063)	(0.025)	(0.025)
Issuer Characteristics				
Log (Total Assets)	-0.406***	-0.436***	-0.143***	-0.150***
	(0.041)	(0.039)	(0.013)	(0.013)
Current Ratio	0.153***	0.160***	0.043***	0.044***
	(0.048)	(0.048)	(0.014)	(0.014)
Leverage	1.549***	1.605***	0.366***	0.375***
	(0.419)	(0.417)	(0.126)	(0.126)
Market-to-Book	-0.138***	-0.147***	-0.047***	-0.050***
	(0.044)	(0.044)	(0.015)	(0.015)
Profitability	-6.178***	-7.110***	-1.610**	-1.792**
	(2.390)	(2.373)	(0.778)	(0.773)
Cash/Total Assets	0.999	1.052	0.258	0.270
	(0.721)	(0.718)	(0.170)	(0.170)
Log (1+Fixed Charge Coverage)	-0.189**	-0.221**	-0.048**	-0.061***
	(0.082)	(0.097)	(0.020)	(0.020)
Tangibility	44.215	69.332	-13.722	-10.738
	(48.400)	(52.869)	(15.966)	(15.788)
Z-score	-0.011	-0.009	-0.004	-0.003
	(0.008)	(0.008)	(0.003)	(0.003)
Intercept	3.258***	3.356***	1.176***	1.210***
	(0.760)	(0.760)	(0.230)	(0.230)
Year Fixed Controls	Yes	Yes	Yes	Yes
Industry Fixed Controls	Yes	Yes	Yes	Yes
R-squared (%)	39.92	39.42	37.55	36.42
Observations	6386	6386	6386	6386

Appendices

A. Variable Definition

Variable	Definition
Analyst Coverage	A dummy variable indicating whether the borrower's earnings per share (EPS) estimate is available in I/B/E/S
CDS Traded	A dummy variable indicating whether the borrower has a CDS market on its debt
CDS Trading	A dummy variable indicating whether the borrower has active CDS trading on its debt at the time of loan initiation
Current Ratio	Total current assets/total current liabilities
Fixed Charge Coverage	(Sum of rolling four quarter operating income before depreciation) / (sum of rolling four quarter interest expenses + debt in current liabilities one year prior)
Issue Size	The total amount of the bond issue
Leverage	Total Debt/total assets
Loan Amount	The aggregated amount of facilities of the loan package
Loan Purpose	A dummy variable indicating the loan purpose reported in Dealscan: Corporate purposes, debt repayment, working capital, takeover, CP backup or others
Market-to-Book	Market value of assets/book value of assets
Maturity	The average maturity of facilities within the loan package in years/The maturity of the bond issue
Net Worth	Total assets-total liabilities
Profitability	operating income before depreciation/total assets
Secured	A dummy variable indicating whether the loan is secured
Tangibility	Tangible assets/total assets
Tangible Net Worth	Total assets-total liabilities-intangible assets
Total Debt	Short-term debt + 0.5*long-term debt
Z-score	3.3* Pre-tax operating income / total assets + sales / total assets+ 1.4* retained+earnings/ total assets + 1.2*(current assets - current liabilities)/total assets+0.6* market value of equity / total liabilities

Internet Appendix to

"Does CDS Trading Affect Debt Contracting: Evidence from Loan and Bond Covenants"

Table IA.1
CDS Trading and Covenant Strictness: Tobit Regression

This table reports the baseline difference-in-differences Tobit regression results of CDS trading impact on covenant strictness. The dependent variable is the strictness measure of net worth covenants. We estimate the standard deviations of the covenant variable by 1-digit SIC industry and by year to calculate covenant strictness for model 1 and 2; for model 3 and 4, we estimate the standard deviations by firm using 3-year rolling windows. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS is actively traded on the borrower's debt when the loan is initiated, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

Tobit Regression: Dependent Variable = Covenant Strictness

	Strictness Measure Scaled by Industry-year Volatility		Strictness Measure Scaled by Firm Volatility	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	−0.074 * **	−0.053 * **	−0.040 * **	−0.067 * **
	(0.005)	(0.006)	(0.014)	(0.017)
CDS Traded	.	−0.030 * **	.	0.035 * **
	.	(0.004)	.	−0.012
Loan Characteristics				
Log (Loan Amount)	−0.002	−0.001	0.011 * *	0.011 * *
	(0.002)	(0.002)	(0.005)	(0.005)
Maturity	0.001	0.001	0.000	0.001
	(0.003)	(0.003)	(0.007)	(0.007)
Secured	−0.002	−0.003	0.005	0.006
	(0.003)	(0.003)	(0.007)	(0.007)
Borrower Characteristics				
Log (Total Assets)	−0.020 * **	−0.018 * **	−0.023 * **	−0.025 * **
	(0.001)	(0.001)	(0.004)	(0.004)
Current Ratio	0.050	0.046	0.097	0.101
	(0.037)	(0.037)	(0.105)	(0.105)
Market-to-Book	−0.112	−0.064	2.132 * *	2.072 * *
	(0.346)	(0.343)	(0.975)	(0.974)
Profitability	−0.021	−0.200	−0.127 * *	−0.129 * *
	(0.023)	(0.022)	(0.064)	(0.064)
Cash/Total Assets	0.006	0.009	0.162 * **	0.158 * **
	(0.015)	(0.014)	(0.041)	(0.041)
Leverage	0.051 * **	0.052 * **	0.186 * **	0.184 * **
	(0.010)	(0.010)	(0.028)	(0.028)
Log (1+Fixed Charge Coverage)	−0.077	−0.073	−0.789 * **	−0.765 * *
	(0.107)	(0.106)	(0.302)	(0.302)
Tangibility	−0.003	−0.002	0.002	0.001
	(0.005)	(0.005)	(0.015)	(0.015)
Z-score	−0.000*	−0.000*	−0.001	−0.001*
	(0.000)	(0.000)	(0.001)	(0.001)
Intercept	0.573 * **	0.566 * **	0.397 * **	0.405 * **
	(0.008)	(0.008)	(0.023)	(0.023)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
Pseudo R-squared (%)	30.44	31.56	11.33	9.51
Observations	6952	6952	6952	6952

Table IA.2
CDS Trading and Covenant Slackness

This table reports the baseline difference-in-differences regression results of CDS trading impact on covenant slackness. The dependent variable is the slackness measure of net worth covenants. Covenant slackness is calculated by $\frac{w-\underline{w}}{w}$, where w is the firm's (tangible) net worth value at the end of the quarter prior to loan initiation; $\underline{w}$ is the threshold specified by a (tangible) net worth covenant. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS is actively traded on the borrower's debt when the loan is initiated, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS/Tobit Regression: Dependent Variable = Covenant Slackness

	OLS		Tobit	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	0.051 * *	0.003 * *	0.054 * *	0.009*
	(0.022)	(0.001)	(0.022)	(0.005)
CDS Traded	.	0.068 * **	.	0.063 * **
	.	(0.018)	.	(0.018)
Loan Characteristics				
Log (Loan Amount)	−0.041 * **	−0.043 * **	1.235 * **	1.277 * **
	(0.005)	(0.005)	(0.434)	(0.433)
Maturity	0.011	0.012	−0.042 * **	−0.043 * **
	(0.011)	(0.011)	(0.005)	(0.005)
Secured	0.018*	0.021 * *	0.020*	0.023 * *
	(0.010)	(0.010)	(0.010)	(0.010)
Borrower Characteristics				
Log (Total Assets)	0.038 * **	0.035 * **	0.011	0.012
	(0.005)	(0.005)	(0.011)	(0.011)
Current Ratio	−0.102	−0.091	−0.104	−0.095
	(0.155)	(0.155)	(0.156)	(0.155)
Market-to-Book	3.140 * *	3.002 * *	3.372 * *	3.286 * *
	(1.410)	(1.408)	(1.413)	(1.411)
Profitability	0.019	0.016	0.015	0.013
	(0.092)	(0.092)	(0.092)	(0.092)
Cash/Total Assets	−0.059	−0.067	0.263 * **	0.263 * **
	(0.059)	(0.059)	(0.003)	(0.003)
Leverage	0.237 * **	0.234 * **	−0.052 * *	−0.054 * *
	(0.040)	(0.040)	(0.022)	(0.022)
Log (1+Fixed Charge Coverage)	1.197 * **	1.234 * **	0.243 * **	0.240 * **
	(0.432)	(0.432)	(0.040)	(0.040)
Tangibility	−0.092 * **	−0.094 * **	0.039 * **	0.036 * **
	(0.021)	(0.021)	(0.005)	(0.005)
Z-score	−0.000	−0.000	−0.000	−0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Intercept	0.201 * **	0.222 * **	0.275 * **	0.289 * **
	(0.076)	(0.076)	(0.031)	(0.031)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes
Pseudo R-squared (%)	4.64	5.00	7.45	5.99
Observations	6952	6952	6952	6952

Table IA.3
Endogeneity Control: Skip Short Windows

This table shows robustness of CDS trading impact on strictness of net worth covenants. We skip short windows immediatelly after CDS introduction to alleviate endogeneity concern. We skip one year after CDS introduction in model 1 and 2, two years in model 3 and 4, and three years in model 5 and 6. We are interested in the coefficients of CDS Trading, which is a dummy variable taking the value of one if CDS trading referencing the borrower's debt is active at loan origination, and zero otherwise. CDS Traded is a dummy variable if the borrower has CDS market at any point of time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by the quarterly return on assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include loan purpose dummies, fixed year and industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility

	Skip 1 Year		Skip 2 Years		Skip 3 Years	
Variable	Model1	Model2	Model3	Model4	Model5	Model6
CDS Market Characteristics						
CDS Trading	-0.085***	-0.066***	-0.091***	-0.069***	-0.089***	-0.065***
	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)
CDS Traded	.	-0.031***	.	-0.032***	.	-0.034***
	.	(0.004)	.	(0.004)	.	(0.004)
Loan Characteristics						
Log (Loan Amount)	-0.002	-0.001	-0.001	-0.001	-0.001	-0.000
	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Maturity	0.003	0.001	0.002	0.001	0.002	0.001
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Secured	-0.001	-0.003	-0.002	-0.004	-0.002	-0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Borrower Characteristics						
Log (Total Assets)	-0.018***	-0.016***	-0.018***	-0.016***	-0.017***	-0.016***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Log (Number of Lenders)	0.011***	0.007***	0.006***	0.006***	0.005***	0.005***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Current Ratio	0.052	0.049	0.052	0.047	0.054*	0.049
	(0.034)	(0.034)	(0.034)	(0.033)	(0.033)	(0.032)
Market-to-Book	-0.391	-0.348	-0.440	-0.385	-0.413	-0.356
	(0.313)	(0.312)	(0.309)	(0.306)	(0.301)	(0.298)
Profitability	-0.005	-0.002	-0.001	-0.000	-0.002	-0.001
	(0.021)	(0.020)	(0.020)	(0.020)	(0.020)	(0.020)
Cash/Total Assets	-0.001	0.002	0.000	0.004	-0.003	0.000
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Leverage	0.031***	0.032***	0.029***	0.031***	0.028***	0.030***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)
Log (1+Fixed Charge Coverage)	-0.035	-0.046	-0.019	-0.041	-0.012	-0.036
	(0.098)	(0.097)	(0.097)	(0.096)	(0.094)	(0.093)
Tangibility	-0.001	0.001	-0.001	0.001	-0.002	-0.001
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Z-score	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Intercept	0.561***	0.556***	0.562***	0.554***	0.560***	0.552***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
Fixed Loan Purpose Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Year Controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (%)	31.03	33.82	32.30	33.55	29.54	31.03
Observations	6833	6833	6769	6769	6704	6704

Table IA.4
Instrumental Variable Approach: First Stage Logit Regression

This table shows the first stage logit regression of CDS trading. The instrumental variables are *Lender Foreign Exchange Derivatives* and *High Tier-1 Capital Ratio*. *Lender Foreign Exchange Derivatives* is the amount of foreign exchange derivatives used for hedging purposes (not trading) relative to the total amount of loans of the lead syndicate banks that firms have borrowed money from in the past five years. Data on banks' foreign exchange derivatives position are from the Federal Reserve's Call Report on commercial banks. *High Tier-1 Capital Ratio* is the dummy which takes one if the lender's tier-1 capital ratio is above the median across the sample at the end of the quarter prior to loan initiation, and zero otherwise. Borrower characteristic variables are extracted at the end of the quarter prior to loan origination. Profitability is measured by the quarterly return on assets. The first stage regression includes loan purpose dummies, fixed year and industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

Probit Regression: Dependent Variable = CDS Trading		
Variable	Model1	Model2
Foreign Exchange Currency Derivatives	5.449***	.
	(0.452)	.
Higher Tier-1 Capital Ratio	.	−0.711***
	.	(0.109)
CDS Traded	0.253***	0.251***
	(0.012)	(0.012)
Log (Total Assets)	0.052***	0.701***
	(0.003)	(0.033)
Current Ratio	−0.032	−3.611
	(0.115)	(3.609)
Market-to-Book Ratio	0.341	63.137***
	(1.061)	(16.037)
Profitability	−0.040	−0.172
	(0.069)	(0.922)
Cash-to-Total Assets	0.039	1.221**
	(0.045)	(0.600)
Leverage	0.015	0.530
	(0.029)	(0.430)
Log(1+ Fixed Charge Coverage)	−1.147***	7.879
	(0.039)	(5.409)
Tangibility	0.027*	0.334*
	(0.016)	(0.179)
Z-score	−0.001	−0.085***
	(0.001)	(0.025)
Equity Volatility	−0.008	−0.819
	(0.060)	(0.567)
Equity Excess Return	−0.001	−0.224***
	(0.005)	(0.071)
Intercept	−0.400***	−9.754
	(0.159)	(236.800)
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Loan Purpose Controls	Yes	Yes
Wald Score	259.39***	804.963***
Incremental F-test	45.892	75.113
Pseudo R-squared (%)	55.22	56.64
Observations	6952	6952

Table IA.5
Matched Sample Diagonotics: Nearest Neighbor Matching

This table compares differences in loan and borrower characteristics between CDS firms and Non-CDS firms for the original sample and the nearest neighbor matched sample. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

Variable	Before Matching (CDS-NonCDS)	After Matching (CDS-NonCDS)
Loan Amount ($ Million)	565.511 * **	134.654 * **
Maturity (Years)	−0.370 * **	−0.042 * **
Secured	−0.128 * **	0.010
Total Number of Lenders	4.940 * **	−0.049
With Net Worth Covenants	−0.017 * **	0.006
Strictness of Net Worth Covenants	−0.017 * **	−0.084 * **
Log (Total Assets)	2.536 * **	0.492 * **
Current Ratio	−0.537 * **	−0.005
Tangibility	0.045 * **	−0.040 * **
Cash/Total Assets	−0.018 * **	0.001
Leverage	0.016 * **	0.001
Log (1+Fixed Charge Coverage)	−0.001 * **	0.000
Market-to-Book	−0.064 * **	0.108*
Profitability	0.008 * **	0.000
Z-score	−0.544 * **	−0.145*
Propensity Score	0.041 * *	0.007

Table IA.6
Alternative Propensity Score Matching: Caliper Matching

This table reports the covenant strictness regression results with the matched sample, based on caliper matching of propensity score. We estimate a logit model to obtain the probability of CDS trading for each loan package observation. The logit regresion results are reported in Appendix Table IV. The bandwidth for Caliper matching is 0.25 times the standard deviation of the propensity scores. In model (1) and (2), the explanatory variables include the one quarter lag of the following: lender's foreign exchange derivative position for hedging purpose, borrower log total assets, leverage, current ratio, cash-to-total assets, profitability, fixed charge coverage, the ratio of tangible assets to total assets, Z-score, equity analyst coverage, log stock market excess return, and log stock market volatility. In model (3) and (4), the explanatory variables *also* include the dummy representing lenders' high tier-1 capital ratio. The dependent variable is the strictness of net worth covenants. The independent variable we are interested in is CDS Trading, a dummy variable which takes the value of one if CDS trading is active referencing the borrower's debt, and zero otherwise. CDS Traded is a dummy variable if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. All specifications include fixed loan purpose, loan origination year and borrower industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness Scaled by Industry-year Volatility

	Logit Model1		Logit Model2	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	−0.034 * **	−0.025 * *	−0.032 * **	−0.023*
	(0.011)	(0.012)	(0.011)	(0.012)
CDS Traded	0.013	.	0.012	.
	(0.010)	.	(0.010)	.
Loan Characteristics				
Log(Loan Amount)	0.001	0.002	0.004	0.005
	(0.006)	(0.006)	(0.007)	(0.006)
Maturity	−0.010	−0.010	−0.016	−0.016
	(0.010)	(0.010)	(0.010)	(0.010)
Secured	−0.008	−0.009	−0.008	−0.009
	(0.007)	(0.007)	(0.007)	(0.007)
Borrower Characteristics				
Log (Total Assets)	−0.035 * **	−0.034 * **	−0.038 * **	−0.038 * **
	(0.006)	(0.006)	(0.007)	(0.007)
Current Ratio	−0.206	−0.194	−0.353	−0.331
	(0.422)	(0.422)	(0.436)	(0.433)
Market-to-Book	−0.002	−0.002	−0.003	−0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Profitability	−0.203 * *	−0.187*	−0.257 * **	−0.243 * *
	(0.098)	(0.096)	(0.098)	(0.098)
Cash/Total Assets	−0.049	−0.048	−0.060	−0.059
	(0.054)	(0.054)	(0.054)	(0.054)
Leverage	0.037	0.037	0.047*	0.047*
	(0.030)	(0.029)	(0.028)	(0.028)
Log(1+Fixed Charge Coverage)	−0.230	−0.240	−0.053	−0.061
	(0.287)	(0.287)	(0.288)	(0.287)
Tangibility	−0.008	−0.008	−0.014	−0.013
	(0.014)	(0.014)	(0.015)	(0.015)
Z-score	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Intercept	0.661 * **	0.651 * **	0.673 * **	0.664 * **
	(0.057)	(0.053)	(0.053)	(0.050)
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Controls	Yes	Yes	Yes	Yes
R-squared(%)	42.45	42.16	43.76	43.52
Observations	1121	1121	1121	1121

Table IA.7
Lender Derivatives Activities, CDS Trading and Covenant Strictness: Subsample Analysis

This table reports the regression results of the impact of lenders' credit derivative positions on the effects of CDS on covenant strictness, for the top 25 banks active in CDS trading. The dependent variable is the strictness of net worth covenants. The independent variable we are interested in are the interaction terms of CDS trading and the lead bank's or syndicate banks' positions in credit derivatives trading (in trillion US dollars). Banks' credit derivatives trading data is from the Office of the Comptroller of the Currency (OCC)'s quarterly reports on bank derivatives activities. The list of the top 25 banks are updated every quarter since 1998. In model 1 and 2, lender derivatives activity is measured by the lead bank position in credit derivatives trading in the quarter of loan initiation. In model e and 4, lender derivatives activity is measured by the aggregate derivative position of all syndicate banks of each loan. CDS Trading is a dummy variable which takes the value of one if there is active CDS market on the borrower's debt at loan inititiation, and zero otherwise. CDS Traded is a dummy variable which takes the value of one if the borrower has a CDS market at any point of time, and zero otherwise. Secured is a dummy variable taking the value of one if the loan is secured, and zero otherwise. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. Profitability is measured by quarterly return on assets. Tangibility is the ratio of tangible assets to total assets. All specifications include fixed loan purpose, loan origination year and borrower industry controls. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading*Lead Bank	−0.035 * **	−0.035 * **	.	.
Credit Derivatives Position	(0.014)	(0.014)	.	.
CDS Trading*All Lenders'	.	.	−0.034 * *	−0.034 * *
Credit Derivatives Position	.	.	(0.014)	(0.014)
CDS Trading	−0.039 * *	−0.045 * **	−0.039 * *	−0.045 * **
	(0.019)	(0.017)	(0.019)	(0.017)
CDS Traded	−0.008	.	−0.008	.
	(0.015)	.	(0.015)	.
Bank Credit Derivaties Position				
Lead Bank Credit Derivatives Postion	0.007 * **	0.007 * **	.	.
	(0.002)	(0.002)	.	.
All Lenders' Credit Derivatives Position	.	.	0.007 * **	0.007 * **
	.	.	(0.003)	(0.003)
Loan Characteristics				
Log (Loan Amount)	0.012 * **	0.012 * **	0.012 * **	0.012 * **
	(0.004)	(0.004)	(0.004)	(0.004)
Maturity	−0.001	−0.000	−0.001	−0.000
	(0.008)	(0.008)	(0.008)	(0.008)
Secured	−0.003	−0.003	−0.003	−0.003
	(0.006)	(0.006)	(0.006)	(0.006)
Borrower Characteristics				
Log (Total Assets)	−0.033 * **	−0.033 * **	−0.033 * **	−0.033 * **
	(0.006)	(0.006)	(0.006)	(0.006)
Current Ratio	−0.075	−0.078	−0.071	−0.074
	(0.430)	(0.430)	(0.432)	(0.432)
Market-to-Book	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)
Profitability	−0.022	−0.023	−0.020	−0.021
	(0.184)	(0.185)	(0.185)	(0.185)
Cash/Total Assets	0.030	0.027	0.030	0.027
	(0.035)	(0.036)	(0.036)	(0.036)
Leverage	0.045	0.045	0.045	0.045
	(0.032)	(0.032)	(0.032)	(0.032)
Log (1+Fixed Charge Coverage)	0.100	0.107	0.106	0.112
	(0.383)	(0.387)	(0.383)	(0.387)
Tangibility	−0.006	−0.007	−0.006	−0.007
	(0.018)	(0.019)	(0.018)	(0.019)
Z-score	−0.005*	−0.005*	−0.005*	−0.005*
	(0.003)	(0.003)	(0.003)	(0.003)
Intercept	0.528 * **	0.531 * **	0.525 * **	0.528 * **
	(0.037)	(0.036)	(0.037)	(0.037)
Loan Purpose Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	52.34	52.31	52.48	52.31
Observations	1004	1004	1004	1004

Table IA.8
Year Distribution of the Bond Sample

This table describes year distribution of the bond issues from 1994 to 2009. Column 2 reports the total number of corporate bond issues reported in Mergent Fixed Income Securities Database (FISD). Column 3 reports the number of bond issues from CDS firms. CDS firms are defined as firms which have CDS trading on its debt at any point of time during the sample period. Column 4 represents the number of bond issues with any type of covenants. All corporate bonds are issued with covenants, while not all bond covenant information is recorded in FISD. We summarize bond issues that have a record of covenants in FISD. Following Smith and Warner (1979) we group all bond covenants into 11 categories. Covenants that belong to the same category are regarded as one covenant. Then we count the number of covenant categories for each issue. Column 5 reports the number of secured bond issues. The average number of covenant categories on each bond issue is reported in Column 6. The fourth column to the right report the average bond rating reported by FISD. The rating variable ranges from 1 to 27 as reported in FISD. A larger number represents lower credit quality of the bond issue. The last three columns report average issue size in million US dollars, maturity in years and gross yield spread of the sample bond issues, respectively.

Year	# of Bonds in Total	# of Bonds from CDS Firms	# of Bonds with Covenants	#of Secured Bonds	Average # of Covenants	Rating	Issue Size ($ Million)	Maturity (Years)	Gross Yield
1994	298	4	3	32	3.2	19.831	170.0	11.5	7.992
1995	442	67	59	37	3.0	16.889	170.3	12.5	7.795
1996	519	108	87	11	3.1	15.656	202.1	12.5	7.544
1997	618	178	147	11	3.1	16.953	214.1	12.6	7.452
1998	836	377	306	19	3.2	15.541	259.7	12.3	6.988
1999	590	382	292	14	3.2	16.985	351.1	10.8	7.319
2000	488	359	286	6	2.7	18.959	473.2	8.4	7.770
2001	604	571	389	9	2.8	18.695	537.6	10.5	6.445
2002	542	408	285	10	2.7	13.050	441.9	10.0	6.114
2003	644	477	294	19	2.4	15.155	441.2	11.1	4.902
2004	625	318	215	17	2.5	19.441	357.6	11.8	4.976
2005	506	169	100	16	2.7	19.952	386.5	12.1	5.437
2006	530	87	53	15	2.6	17.326	508.5	11.8	5.939
2007	693	84	63	16	2.5	18.496	549.1	12.1	5.667
2008	428	26	22	6	2.3	19.295	662.9	11.4	6.239
2009	572	14	14	23	2.4	17.434	593.0	9.7	6.430
Total	8935	3629	2615	261	2.8	17.330	398.3	11.4	6.485

Table IA.9
CDS Trading and Bond Covenants: Matched Sample

This table reports OLS and Poisson regression results of the impact of CDS trading on the number of bond covenants for the matched sample, based on nearest neighboor matching on propensity score. Appendix Table IV reports the logit regression of CDS trading to calculate the propensity score. Model (1) and (2) report OLS regression. Model (3) and (4) report Poisson regression. The dependent variable is the number of covenants of each bond issue. The independent variable we are interested in is CDS trading, a dummy equal to one if CDS trading referencing the issuer's debt is active at bond issuance, and zero otherwise. CDS traded is a dummy equal to one if the issuer has an active CDS market at any time during the sample period, and zero if the issuer never has a CDS market. "Not Rated" is a dummy indicating the bond issue does not have a credit rating given by a public rating agency. Bond issuer characteristic variables take their value at the end of the quarter prior to bond issuance. Leverage is the value of book debt divided by book assets. Current Ratio the value of current assets divided by current debt. All specifications include fixed year and industry controls. All results are based on quarterly observations. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and firm-level clustering. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix A for variable Definitions.

Dependent Variable = Number of Bond Covenants

	OLS Regression		Poisson Regression	
	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	−0.301 * **	0.017 * *	−0.111 * **	−0.012 * *
	(0.110)	(0.069)	(0.043)	(0.005)
CDS Traded	−0.557 * **	.	−0.184 * **	.
	(0.177)	.	(0.043)	.
Bond Characteristics				
Log(Issue Size)	0.160	0.198*	0.058*	0.071 * *
	(0.108)	(0.115)	(0.030)	(0.030)
Maturity	−0.003	−0.002	−0.001	−0.001
	(0.005)	(0.005)	(0.002)	(0.002)
Not Rated	0.102	0.114	0.038	0.038
	(0.136)	(0.141)	(0.042)	(0.042)
Issuer Characteristics				
Log (Total Assets)	−0.354 * **	−0.489 * **	−0.115 * **	−0.160 * **
	(0.088)	(0.084)	(0.026)	(0.024)
Current Ratio	0.317 * **	0.299 * **	0.092 * **	0.088 * **
	(0.103)	(0.106)	(0.024)	(0.024)
Leverage	0.966	0.539	0.328	0.179
	(0.797)	(0.863)	(0.216)	(0.213)
Market-to-Book	−0.054	−0.122	−0.023	−0.046
	(0.125)	(0.134)	(0.029)	(0.029)
Profitability	−8.595*	−5.932	−2.893 * *	−1.958*
	(4.600)	(4.880)	(1.208)	(1.187)
Cash/Total Assets	1.392	1.648	0.384	0.457
	(0.993)	(1.045)	(0.293)	(0.292)
Log (1+Fixed Charge Coverage)	−0.185 * *	−0.220 * *	−0.050 * *	−0.060 * **
	(0.091)	(0.098)	(0.020)	(0.020)
Tangibility	0.000	0.000	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Z-score	−0.015	0.030	−0.005	0.010
	(0.090)	(0.096)	(0.019)	(0.019)
Intercept	5.042 * **	5.288 * **	1.680 * **	1.766 * **
	(1.451)	(1.526)	(0.441)	(0.440)
Year Fixed Controls	Yes	Yes	Yes	Yes
Industry Fixed Controls	Yes	Yes	Yes	Yes
R-squared (%)	40.03	38.09	38.03	36.11
Observations	6386	6386	6386	6386