Does Credit Protection Lower the Value of Creditor Control Rights?*

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ABSTRACT

When creditors are concerned of exploitation by borrowers, they may attempt to gain control of the borrowing firm. Debt covenants specify when the creditors can intervene firm operations (e.g., when firm net worth is below a threshold). The consideration of control rights in addition to cash flow rights is a key insight of incomplete contract theories. When creditors can get protection through buying credit default swaps (CDS), they may not rely as much on the control rights embedded in covenants which can incur bargaining and monitoring costs. Using data from 1994 to 2009, we find evidence that debt covenants loosen after CDS on the borrowing firms become available. This effect is more pronounced for borrowers with better information quality and less agency problems. Overall, our findings are consistent with the view that ex post bargaining power affects ex ante security design.

JEL Classification: G21; G32; L14; O16

Keywords: Creditor Control Rights; Loan Covenants; Credit Default Swaps

I. Introduction

A breakthrough in corporate finance theory is the treatment of contingent control rights of creditors, which is separated from the cash flow or ownership of the firm, since the seminal work of Grossman and Hart (1986), as discussed by Bolton (2014). According to the incomplete-contract theory, debt contract design should reflect future renegotiation and relative bargaining power of lender, shareholder and manager. However, empirical work on such theories is nascent. In particular, the implications of ex post bargaining on ex ante security design are important unanswered questions (Roberts, 2014). In this study, we use the advent of credit default swaps (CDS) as a laboratory to study how the initial allocation of control rights depends on whether lenders can buy CDS to protect their cash flow rights.

The rapid growth of CDS and other credit derivatives over the last fifteen years has been accompanied by arguments about how they are likely to affect the enforcement of debt contracts, especially bank loans. Although CDS may allow banks to control their risk more cheaply, offloading risk may also limit the gains from exercising controls over firm and undermine banks' incentives to monitor loans efficiently ex post (see, for example, Parlour and Winton, 2013). In practice, CFOs and loan officers increasingly take the availability of credit protection into account when setting loan contract terms.[1] Because covenants give creditors contingent control rights, changes in lenders' incentives to monitor or renegotiate with borrowers should affect how debt covenants are structured in the first place.[2] In this paper, we empirically examine how the advent of CDS trading for a given firm affects restrictions on firm net worth ("net worth covenants") on subsequent loans to that firm.

Most models of contract design view covenants as contingent control rights that protect lenders and other debt holders from exploitation by a borrowing firm and its shareholders (Smith and Warner, 1979). A key point is that lenders are interested in intervening the firm because their cash flows are contingent on the borrower's status; when lenders can sperate their claims of cash flow rights to CDS seller, they may not view their control rights over the

[1]Habib Motani, a partner at Clifford Chance in London, notes, "when our lending team puts a loan together, they are asked whether it will be deliverable under a credit derivative. If not, then very often it will not be suitable." He also notes that this situation has only emerged in the last several years. (CFO.com, September 26, 2007.)

[2]Relevant theoretical work on covenants includes Smith and Warner (1979), Berlin and Mester (1992), Rajan and Winton (1995), and Gârleanu and Zwiebel (2009). We discuss these papers and related empirical work in the next section.

borrower as valuable, because setting restrictive covenants is costly. Violation of a covenant usually leads to renegotiation between the lender and borrower, with the two bargaining over any gains to be had from keeping the firm out of bankruptcy. Such procedure is time-consuming and likely to fail, leading to costly bankruptcy. More importantly, covenants are often renegotiated even without payment defaults or covenant violation, and they are more often loosened instead of tightened in renegotiations, suggesting that initial covenants are deliberately set too tight. Optimal covenants should trade off the necessity of preventing exploitative behavior against the potential costs of renegotiation and possible bankruptcy.

If lenders buy credit insurance through CDS, however, they will not be as concerned with the exploitative behavior by shareholders, as their cash flow uncertainty is mitigated by CDS ex ante. Ex post, lenders become less interested in helping the borrower avoid bankruptcy via renegotiating the debt.[3] In this case, for any given covenant tightness, the gain from preventing exploitative behavior has not changed, but the likelihood of costly bankruptcy has increased. All else equal, this process should make optimal covenants looser.

One may argue that CDS seller may instead become concerned with possible increase in exploitative behavior by the borrower, and thus demands for more covenants. This is exactly the reason for us to do cross-section analysis, which shows that borrowers less subject to the agency concern see more loosening in their net worth covenants. Another counterbalancing effect comes from the finding that borrowers become more default risky after CDS introduction (Subrahmanyam, Tang and Wang, 2014). Because higher-risk borrowers are typically subject to tighter covenants to prevent risk-shifting and other borrower agency problems, it follows that covenants should be tighter in the presence of CDS trading. Thus, the net impact of CDS on net worth covenants is ultimately an empirical issue.

In order to test these predictions, we construct a comprehensive sample of CDS trading and debt origination from 1994 to 2009. We examine various measures of covenant tightness with a focus on net worth covenants in bank loans, which are most relevant to CDS, as we explain in Section III below. Using Murfin's (2012) method for estimating the probability of covenant violation as our primary measure of covenant tightness, our first major finding is that net worth covenants on loans become looser after the introduction of CDS trading. This finding is robust to alternative measures of covenant strictness and a number of alternative

[3]Bolton and Oehmke (2011) show that credit insurance increases lenders' outside option in renegotiations, so they become tougher bargainers, making bankruptcy more difficult to avoid following covenant violation.

econometric specifications.

Although our baseline finding is consistent with the view that the availability of CDS can make lenders tougher bargainers and loosen optimal covenants, alternative explanations may be at work. For example, CDS trading may be endogenous: lenders that anticipate covenant loosening for other reasons may then find it more advantageous to use CDS to hedge their risk, and this may encourage an active market for the borrower's CDS, as predicted by Parlour and Winton (2013). Alternatively, there may be selection effects: firms that have CDS contracts written on them may differ fundamentally from non-CDS firms in ways that make looser covenants optimal. Our next step is to address these concerns.

To deal with endogeneity, we make use of two instrumental variables for CDS trading. The first instrument is the lender's distance from New York City, where the International Swaps Dealers Association (ISDA) is headquartered. ISDA is the main industry body for CDS rule-making and market development. Banks closer to New York are more likely to be aware of CDS and have access to the CDS market. On the other hand, because distance is predetermined, it is unlikely to have a direct impact on the lender's intrinsic approach to covenant design changes. The second instrument is the amount of foreign exchange (FX) derivatives that the firm's *past* lead banks and bond underwriters use for hedging (not trading) purposes relative to their total loans.[4] Lenders active in foreign exchange derivatives hedging are more likely to have expertise that allows them to hedge their loan risk by participating in the CDS market, but *past* lender FX hedging is unlikely to directly drive the choice of borrower covenant strictness. Our tests show that both instruments are strongly correlated with CDS trading and satisfy the exclusion criterion; moreover, our instrumental variable results continue to show a strong negative relation between the onset of CDS trading and loan contract covenant tightness.

To address selection concerns, we use propensity score matching to construct a matched sample of CDS treated and non-CDS control firms. We then use a difference-in-differences estimator on the matched sample to measure how the actual advent of CDS trading affects debt covenants. The result that the advent of CDS trading leads to looser covenants remains significant, suggesting that the impact of CDS trading on covenant tightness is causal.

[4]This instrument was first developed by Saretto and Tookes (2013), and it was also used by Subrahmanyam, Tang, and Wang (2014).

Our analysis implicitly assumes that banks use CDS linked to their borrowers. This assumption is supported by evidence in Acharya and Johnson (2007). Nevertheless, there is substantial heterogeneity in banks' use of CDS, as some banks do not use CDS at all and others use CDS for trading rather than hedging (Minton, Stulz, and Williamson, 2009). Taking advantage of our unique data on the quantity of CDS trading, we show that the covenant-loosening effect is stronger when more outstanding CDS contracts reference the borrower's debt. To the extent that the number of outstanding contracts serves as a measure of CDS market liquidity and, thus, the ease with which lenders can hedge their exposures to a borrower, this is consistent with the greater availability of CDS contracts, enhancing lender bargaining power and thus increasing optimal covenant looseness. Moreover, the loosening effect we find should be concentrated on loans where the lenders actually use CDS. Because we do not have detailed data on lender's credit derivative portfolios, we cannot test this argument directly. We do, however, have data on lenders' aggregate credit derivative positions. To the extent that a bank with a larger credit derivative portfolio is more likely to have purchased CDS protection on any given borrower for whom CDS are available, we should find that the impact of CDS trading on covenant looseness is increasing in the bank's aggregate credit derivatives position. This is precisely what we find in the data.

Our main finding is consistent with the view that an optimal contract design should minimize renegotiation costs. However, loosening covenants may open doors to agency conflict, allowing borrowers to engage in more risk-shifting. For firms where the underlying risk of agency problems is lower, loosening should have little adverse effect compared to the gains of avoiding bargaining cost, whereas the opposite should be true for firms where the underlying risk of agency problems is higher. Thus, the degree of loosening should be lower for firms that are more subject to concerns about agency problems. Similarly, Gârleanu and Zwiebel (2009) predict that stronger rights should be granted to the lender when information acquisition costs are higher and when renegotiation costs are lower, suggesting that the impact of CDS trading on covenant tightness should be smaller for these firms as well.[5] Indeed, previous empirical work suggests that, all else equal, borrowers with lower credit quality, poorer information transparency, and less bargaining power receive tighter covenants (cf. Demiroglu and James,

[5]More precisely, if a lender tried to loosen credit terms on a borrower with a higher risk of agency conflict while laying off its exposure by buying a CDS, the CDS seller would be concerned that the borrower would now have few constraints and thus would be at high risk of default. To protect itself, the CDS seller would charge a high premium and incur adverse incentives, which in turn would make the CDS transaction less attractive to the lender in the first place.

2010 and Murfin, 2012).

To test these cross-sectional predictions, we first interact an indicator for the advent of CDS trading with proxies for credit quality such as Z-scores and leverage. In all cases, we find that firms with lower credit risk experience significantly greater covenant loosening after CDS trading begins. We then perform similar tests for the interaction of the CDS trading indicator with two proxies for how transparent the borrower is to its banks—namely, whether the firms are covered by stock analysts and whether the number of syndicate participants in the firm's last four loans is above average. Once again, covenant loosening after CDS trading begins is significantly greater for firms that are more transparent. The evidence supports the conjecture that the CDS effect on covenant loosening is stronger when agency and information problems are less severe.

We conduct two additional tests for the renegotiation channel. First, if lenders commit to not renegotiate with the borrower, covenants should be less strict. Indeed, we find that the effect of CDS trading is more pronounced for CDS contracts that exclude renegotiation outcomes from settlements ("no-restructuring" CDS). Second, given that bond covenants tend to be looser than bank loan covenants to begin with (because renegotiation is more costly), one might expect the availability of CDS contracts to have less effect on bonds than on loans.[6] Examining a large sample of bond offerings, we find that the average number of bond covenants per issue decreases after CDS trading, but both the magnitude is economically small and the statistical significance is marginal. This finding is in sharp contrast with the loan covenant result, suggesting that the effect of CDS on covenants at least partly works through the renegotiation channel.

To the best of our knowledge, ours is the first empirical paper to study the impact of CDS trading on debt covenants. Thus, we add to two strands of growing empirical literature. The first is the impact of CDS trading on corporate lending choices and outcomes, including studies by Ashcraft and Santos (2009), Saretto and Tookes (2013), and Subrahmanyam, Tang, and Wang (2014), among others. The second addresses the determinants and role of debt covenants and includes studies by Chava and Roberts (2008), Roberts and Sufi (2009a), Demiroglu and James (2010), Demerjian (2011), Murfin (2012), Nini, Smith, and Sufi (2012), Denis and Wang (2014), Roberts (2014), and Wang and Xia (2014). With the exception of

[6] Gârleanu and Zwiebel (2009) argue that "perhaps the simplest empirical prediction regarding renegotiation costs involves the distinction between public and private debt."

Wang and Xia (2014), who focus on how loan securitization affects covenant tightness, these papers do not address how covenant design is affected by markets for credit risk transfer, which is our key focus.

The upshot of this study is that the introduction of CDS contracts has had a significant impact on debt contract design, particularly for loan contracts, and this is most pronounced for borrowers where the adverse consequences of covenant loosening are likely to be the smallest. Our findings are most consistent with models that focus on the impact of CDS on potential loan renegotiations and the ensuing effects this has on ex ante debt contract design and borrower behavior. As previously noted, initial loan covenants are typically set too tight and are subsequently loosened; thus, our finding that *initial* covenants loosen when CDS are introduced suggests that CDS may improve contracting efficiency, especially for good borrowers. Nevertheless, although our results are certainly consistent with the notion that banks are most likely to actually use CDS when they add value overall to improve contracting efficiency, further work is needed to establish whether and to what extent the effects are welfare-improving.

The remainder of our paper is organized as follows. Section II discusses the relevant theoretical literature, its empirical predictions, and our relationship to existing empirical work. Section III describes our data and empirical specification. Section IV presents our baseline empirical results, addresses endogeneity and selection concerns, and tests more complex predictions of how the effects of CDS trading should vary across firms and lenders. Finally, Section V concludes.

II. Related Literature and Empirical Predictions

We begin this section with a discussion of the related theoretical literature and its empirical implications. As we will observe, although there is relatively little work directly examining how CDS trading affects debt contract terms, the combination of existing theories of debt covenant design and theories of how CDS affects interactions between borrowers and lenders yields a number of predictions we can test in the data. After establishing these predictions, we show how our analysis relates to the existing empirical work on covenant design and the impact of CDS trading on corporate finance.

Theoretical work on CDS trading and borrower-lender interactions emphasizes two effects, both of which follow from the fact that a lender that buys CDS protection on its borrower is now insulated from that borrower's risk of default yet retains the control rights embedded in the loan contract. The first, emphasized by Morrison (2005), Hu and Black (2008), and Parlour and Winton (2013), is that after the lender buys protection against borrower default, it no longer has an incentive to engage in costly loan monitoring or indeed in any costly ex post actions aimed at improving the borrower's situation. If anonymous purchases of CDS protection for a given borrower are possible, any monitoring of that borrower will completely shut down. If, instead, the CDS purchaser's identity is known to its CDS counterparties, banks will only make use of CDS when the benefits of monitoring are negligible to begin with.[7]

The second effect, emphasized by Bolton and Oehmke (2011), Campello and Matta (2013), and Arping (2014), is that because explicit borrower default triggers payments from CDS sellers, lenders with CDS protection now have a tougher bargaining position in loan renegotiations aimed at preventing costly bankruptcy or liquidation. This result in turn will make the borrower more interested in avoiding default, which should lead to a less strategic default aimed at extracting surplus (as in Bolton and Oehmke, 2011) or greater borrower effort in the first place (as in Arping, 2014). Tougher bargaining positions by a lender can, however, have a dark side: lenders may over-insure so that the costs of failed renegotiations exceed any ex ante commitment effects. Moreover, Campello and Matta (2012) show that borrowers whose base level of credit risk is high may inefficiently increase their risk further to nudge lenders away from buying excessive CDS protection.

Beginning with Smith and Warner (1979), theoretical work on covenant design has emphasized how covenants give lenders and other debt holders contingent control rights in situations where borrowers are likely to take advantage of debt holders. Berlin and Mester (1992) and Gârleanu and Zwiebel (2009) show that because borrowers can attempt to renegotiate their debt when covenants are violated, the optimal tightness of covenants will depend on the ease of renegotiation as well as the likelihood of exploitative behavior: factors that make renegotiation less costly or more likely to succeed allow optimal covenants to become tighter, as do factors that make exploitation more likely, such as higher leverage or default risk. Gârleanu

[7]Biais, Heider, and Hoerova (2014) argue that protection sellers will not exert sufficient effort to prevent borrower default to compensate the loss of lender monitoring. Perverse incentives of CDS sellers can even generate endogenous counterparty risk, which in turn weakens the value of CDS protection for buyers.

and Zwiebel (2009) also show that higher asymmetric information between a borrower and lender with regard to the degree of agency problems also favors tighter covenants. Both papers note that to the extent that ease of renegotiation decreases with the number of creditors (as shown by Bolton and Scharfstein, 1996), bank loans should have more and tighter covenants than publicly-traded bonds, as the latter tend to have much more dispersed ownership.

Because the strengthening of creditor rights via CDS protection introduces a liquidation bias, firms may naturally want to alter their debt structures to contract around this bias. Although no study has modeled how the presence of CDS affects the optimal design of loan covenants, one can combine the results of the CDS literature regarding monitoring and renegotiation and the covenant literature as follows. To the extent that CDS make lenders less concerned with exploitation by shareholders, restrictive covenants will be less attractive for borrowers. As a result, borrowers can either (a) try harder to avoid covenant violation in the first place by exerting more effort, choosing safer projects, or reducing leverage, or (b) ask for looser covenants in the first place. Both (a) and (b) involve potential costs. As is well known, avoiding covenant violation may lead firms to pass on actions that actually benefit total firm value (such as choosing risky but profitable projects), whereas looser covenants may open the door to agency problems ex post that the borrower would be better off committing to avoid ex ante.[8] By combining the arguments of Berlin and Mester (1992) and Gârleanu and Zwiebel (2009), who predict that more costly or difficult renegotiation loosens optimal covenants, with those of Bolton and Oehmke (2011), who show that CDS make renegotiation more difficult, we obtain the prediction that covenants should loosen after CDS trading begins.

If CDS also weaken lender monitoring incentives, such loosening effects may, if anything, be intensified. Because lenders that do not monitor will be less able to make informed decisions following a covenant violation, a lender with CDS protection should be even tougher in renegotiation: the lender knows that bankruptcy will result in CDS payoffs, whereas waiving the covenant is an uninformed leap in the dark.[9] It follows that for borrowers for whom the

[8]Note that a higher likelihood of uncontrolled agency problems will cause CDS sellers to demand a higher premium, giving lenders that buy CDS reasons to find ways to control the problems as well.

[9]Matters are somewhat different if, as argued by Rajan and Winton (1995), the failure to monitor impairs lenders' ability to catch covenant violations in the first place. In such a situation, CDS would lead to no effective controls on borrowers, making CDS protection extremely (and perhaps prohibitively) expensive, which should make it less likely for CDS to be available to borrowers when covenants themselves require intensive monitoring, and in fact, CDS are often unavailable to less well-known borrowers with severe potential agency problems. That said, our empirical focus on net worth covenants, which are easily monitored, should make this issue less critical.

threat of agency problems is more severe, loosening covenants is likely to be more costly, as CDS sellers will consequently demand much higher premiums from lenders seeking protection, and tight covenants will lead to better borrower behavior and lower premiums. The reverse should be true for borrowers for whom agency problems are less likely. Less transparent borrowers may also prefer to not loosen covenants, as (in the absence of clear information about borrower quality) CDS sellers will once again demand much higher premiums if covenants are looser. A similar argument suggests that if CDS contracts exclude debt restructuring as a credit event, lenders should loosen covenants more because such contracts further undermine lenders' willingness to renegotiate. By a similar argument, bond covenants should be less affected than loan covenants, as renegotiation with dispersed bondholders is more costly and difficult to begin with.

The theories also make predictions about specific types of covenants that will be differentially affected by CDS trading. CDS do not reduce covenants across the board. Covenants based on more contractable accounting information such as net worth are likely to be more useful in aligning the interests of equity holders and debt holders (Aghion and Bolton, 1992). Bolton and Oehmke's (2011) model of CDS' commitment effect against strategic default should also apply to the transfer of asset value from creditors to shareholders. Because such asset substitution is more likely to occur when a firm's capital base or net worth is low (Gârleanu and Zwiebel, 2009), we expect the CDS effect to be most acute for covenants linked to the borrower's net worth.

Thus far, we have taken for granted that lenders will purchase CDS if they are available at a reasonable cost. As already mentioned, the cost of CDS protection may become unattractive if CDS sellers expect significant agency problems and subsequent defaults. Lenders may also forgo CDS protection if such contracts are difficult to arrange or if the lender has little understanding of the pricing and operation of such contracts.[10] This suggests that lenders will be more likely to purchase CDS if there is a liquid market for these contracts or if the lenders have significant expertise in using credit derivatives. Thus, the impact of CDS on covenants should be more pronounced in these situations.

We now turn to the empirical work on these issues. As we have said, there is a growing body of literature on how CDS affect certain aspects of corporate financing. Acharya and Johnson

[10]Minton, Stulz, and Williamson (2009) argue that banks' CDS positions are mostly for trading purposes; however, if banks do not link CDS to loans, then we should not find any CDS effect on loan terms.

(2007) suggest that lenders trade CDS linked to their borrowers, especially prior to major bad news. Ashcraft and Santos (2009) find that while the introduction of CDS trading has little overall effect on borrowers' subsequent loan rates, borrowers that are transparent or have better credit quality receive somewhat lower rates, whereas borrowers that are more opaque or have lower credit quality receive significantly higher rates. Saretto and Tookes (2013) find that the advent of CDS trading allowed borrowers to increase their leverage and their debt's average maturity. Karolyi (2013) shows that borrowing firms increase their operational risk after CDS begin trading on their debt. Arentsen, Mauer, Rosenlund, Zhang, and Zhao (2014) find similar evidence for mortgages. While Saretto and Tookes's results are consistent with Bolton and Oehmke's prediction that CDS increase debt capacity by increasing creditor bargaining power, the results of Ashcraft and Santos and of Subrahmanyam, Tang, and Wang suggest that this may be problematic, especially in the case of weaker or less transparent borrowers. Whereas these papers focus on the impact of CDS trading on loan pricing and bankruptcy risk, we focus on how the non-price terms of loans are affected, which in turn allows us to gain further insight into the mechanisms involved. Net worth covenants provide with us a setting to examine changes in lenders' incentive to exert control over shareholder's exploitative behavior.

We also contribute to the growing empirical literature on the design and renegotiation of debt covenants, which we have already mentioned. Although most of these papers do not take credit risk transfer issues into account, Wang and Xia (2014) examine whether a bank's activity in overall loan securitization as proxied by CDO underwriting affects its monitoring incentives.[11] Wang and Xia's (2014) study is part of a larger body of literature on how loan securitization has affected corporate lenders' screening and monitoring incentives. Among these papers, Drucker and Puri (2009) find that sold loans tend to be riskier and have tighter and more numerous covenants than loans that are not sold. To the extent that CDS alleviate banks' reliance on loan sales, it is conceivable that banks may accept looser covenants when CDS are available.

[11] Wang and Xia's findings suggest that securitization-active banks monitor their corporate borrowers less than other banks do: loan covenants are looser, borrowers increase risk more after loan origination, and lenders are more likely to waive covenant violations without requiring any change in loan terms. Our paper differs in three key respects: first, and most obviously, we focus on the impact of CDS rather than loan securitization; second, we are able to focus on the impact of CDS activity tied to a specific borrower; third, we examine how differences across borrowing firms affect the impact of CDS on covenant tightness. Finally, CDS typically cover higher-quality borrowers, while junk-rated loans are more often securitized. Therefore, our analysis complements Wang and Xia's analysis.

Our analysis of CDS and loan covenants also adds to prior studies that examine how strengthening creditor protection affects loan price, quantity, and maturity (e.g., Qian and Strahan, 2007, Bae and Goyal, 2009). In concurrent work, Mann (2014) shows that court rulings that enhance creditor rights to patents as collateral lead to looser loan covenants. We contribute to this literature by detailing when and how an alternative means of creditor protection affects covenant design. To the extent that tight covenants entail opportunity costs, renegotiation costs, and even bankruptcy costs, combining lender commitment to be tougher in the event of renegotiation with looser covenants may be attractive in some circumstances (for a more comprehensive discussion, see the survey by Roberts and Sufi, 2009a). This conjecture is supported by our findings.

III. Data, Measure and Summary Statistics

We compile data on CDS introduction and covenants on both public and private debt. Our private debt sample consists of loans extracted from Loan Pricing Corporation (LPC)'s Dealscan. We focus on the initial covenants agreed upon by lenders and borrowers at loan issuance. To calculate covenant strictness measures, we combine firm financial data from Compustat with loan data using the link file provided by Chava and Roberts (2008). Corporate bond issuance data are from the Mergent Fixed Income Securities Database (FISD), which reports the inclusion of various covenants.

A. CDS Introduction Data

CDS introduction data are difficult to retrieve from a single data source, given that CDS are not traded in centralized exchanges (the central clearing of CDS starting in 2013 is after the end of our sample period). Similar to Subrahmanyam, Tang, and Wang (2014), we assemble CDS introduction data from two major transaction data sources: CreditTrade and GFI Group. The CreditTrade data cover the period from June 1997 to March 2006. The GFI data cover the period from January 2002 to April 2009. Both databases contain complete information on intra-day CDS binding quotes and trades. We identify the first trading date for each firm's CDS from these two real transaction data sources. We focus on CDS contracts written on non-sovereign North American corporate issuers. The overlapping period of the two databases from January 2002 to March 2006 allows us to cross-check the first CDS trading dates. We

further validate our CDS introduction dates with Markit quote data to ensure accuracy.

To account for the liquidity of CDS transactions and the ease of access to the CDS market for investors, we retrieve data on the quantity of CDS trading and outstanding positions. The detailed transaction data include contract specifics such as size, maturity and credit event clauses. We assemble data on the daily number of CDS contracts outstanding on each firm's debt, and we aggregate the number of outstanding CDS contracts by quarter to be consistent with the frequency of borrowers' financial information.

B. Loan Data and Covenant Strictness

We obtain loan covenant data and other loan characteristics from Dealscan. The initial sample includes the private debt agreements made by bank and non-bank lenders to U.S. corporations during the period from 1981 to 2012. The Dealscan database contains between 50% and 70% of all commercial loans in the U.S. during the early 1990s (Chava and Roberts, 2008). From 1994 onward, Dealscan coverage increases to include an even greater fraction of commercial loans. Moreover, the first CDS trading in our sample occurred in 1997. Firm fundamentals may have changed significantly from the early observations before CDS trading to after CDS trading if the time span is large. We therefore start our loan sample period in 1994. The loans in Dealscan are reported at the facility level. We link facilities in the same loan packages (deals) to conduct our analysis at the loan package level because loan covenants are designed at this level. Other loan characteristics, such as the dollar amount, maturity, loan type and loan purpose are reported at the facility level. We aggregate facility-level data to the package level. We define the loan amount as the total amount aggregated across facilities that compose a loan package. Loan maturity is the average maturity of all facilities in the same loan package. Loan type is defined as the major type of facilities of a loan.[12]

Loan covenants based on borrowers' financial data can be divided into two categories: net worth covenants and financial ratio covenants. Net worth covenants specify the minimum level of total net worth or tangible net worth the borrower must maintain during the life

[12]Specifically, we define the type that applies to over half the facilities that comprise the package as the "major" type. For instance, if facilities that account for 75% of the package amount are reported with the type "Term Loan" and the purpose "Working Capital," we define the loan as a term loan issued for the purpose of financing working capital.

of the loan. A loan usually contains either a net worth covenant or a tangible net worth covenant, but some loans do not limit minimum net worth. Financial ratio covenants impose restrictions on firms' financing, investment, interest payments and other aspects of operating performance and other corporate decisions. The most common financial ratio covenant is that restricting the debt-to-asset ratio. There are also other qualitative, negative covenants restricting corporate activities.

This study focuses on net worth covenants. Net worth covenants are relatively more effective in controlling debt-equity conflicts by maintaining sufficient equity capital, while financial ratio covenants are more useful in detecting credit deterioration (Christensen and Nikolaev, 2012). Such characterization is also consistent with the theoretical discussion of Aghion and Bolton (1992). If CDS mitigate lenders' concern over shareholder's exploitative behavior, net worth covenants would be most affected, as they are among the most frequently violated and renegotiated covenants (Denis and Wang, 2014). Moreover, net worth covenants often trigger technical defaults (Beneish and Press, 1993, Chen and Wei, 1993, Sweeney, 1994). If CDS reduce firms' incentive to default strategically, which involves transfer of asset value from creditors to shareholers and most likely occurs when net worth is low, is mitigated by CDS as shown by Bolton and Oehmke (2011), then a strict net worth covenant would become sub-optimal. The theory of Gârleanu and Zwiebel (2009) is also more directly relevant to net worth covenants. Finally, firms' net worth is always explicit and can be consistently measured.[13] Therefore, we expect that the effect of CDS trading would have the greatest impact on net worth covenants.[14]

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

$$\text{Strictness} \equiv p = 1 - \Phi(\frac{w - \underline{w}}{\sigma}), \tag{1}$$

where Φ is the standard normal cumulative distribution function; w is the logarithm of the borrower's net worth (or tangible net worth) observed at the end of the quarter prior to loan initiation; $\underline{w}$ is the logarithm of the minimum net worth (or tangible net worth) the firm must maintain as specified in the loan contract; σ is the standard deviation of the quarterly

[13] In contrast, the precise measurement of current ratios on debt, leverage, interest payments and EBITDA can be difficult (Dichev and Skinner, 2002, Chava and Roberts, 2008, Drucker and Puri, 2009).

[14] We have also conducted similar analyses on the changes in current ratio covenants around CDS introduction. As we discuss later, the results, consistent with our expectation, are insignificant.

change in the logarithm value of net worth (or tangible net worth) across all firms in the same one-digit SIC industry. To ensure the robustness of our findings, we estimate the firm-level σ using each firm's net worth data from the preceding three years. This alternative measure incorporates firm-specific information but is constrained by data availability and measurement accuracy.

The strictness measure proposed by Murfin (2012) is economically sensible but computationally advanced. As a further robustness check, we also construct the simple, conventional 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 transformation and is independent of any underlying assumption about the statistical distribution of financial variables. However, this measure does not account for the volatility of the covenant variable. We base our analyses mostly on the two strictness measures and report the results from the slackness measure in the Internet Appendix. The results remain qualitatively unchanged.

C. Overview of the Sample

The final CDS introduction sample for our empirical analysis contains 921 unique U.S. firms with CDS trading starting during the period from June 1997 to April 2009. (Li and Tang (2014) document that approximately 8% of U.S. firms have CDS referencing their debt.) We start our loan and bond issuance sample in 1994 so that every firm has a pre-CDS control sample. Panel A of Table I presents the year-by-year summary of the loans in our sample. The whole sample includes 67,677 loans issued to 13,385 unique firms. Approximately one-eighth (8,759, or 12.9%) of the loans contain a net worth or tangible net worth covenant. The average loan size, maturity and spread are \$320.5 million, 5.2 years and 183.66 basis points (bps), respectively. The average covenant strictness is 0.472 (the probability of the net worth covenant violation over the next year is 47.2%).

Panel B of Table I summarizes the characteristics of loans issued to CDS firms. A total of 5,471 (8.1%) loans are issued to 807 (6%) firms that have an active CDS market referencing their debt at loan origination. The number of unique CDS firms peaked at 485 in 2005. The number dropped to 225 in 2008 during the 2007-2009 credit crisis. Column 4 shows that 532

of the 5,471 loans (or 9.7% of all loans to CDS firms) contain net worth covenants. Column 5 shows that the average strictness of net worth covenants is 0.327 for CDS firms, lower than the average of 0.472 for the whole sample. The average loan size for CDS firms is $966 million, substantially larger than that for the whole sample. Moreover, the maturity (4.6 years) and loan spread (168.11 bps) are slightly lower for CDS firms than the whole sample of loans for both CDS and non-CDS firms.

Table II compares loan covenant strictness and other loan characteristics before and after CDS introduction. Specifically, we compare bank loans issued to firms with active CDS trading at loan initiation versus loans issued to the same firms before CDS trading started. By the strictness measure scaled by industry-year volatility, loan net worth covenants are loosened by 0.094 (or 22.3% relative to the mean) after CDS trading is introduced. The alternative strictness measure scaled by firm volatility decreases from 0.362 to 0.253. This decrease is statistically significant at the 1% level.[15] Table II also shows that covenant slackness increases from 0.370 to 0.398, or by 7.6%.

The three measures of covenant strictness/slackness show consistent change from before to after CDS introduction. The loan size become larger, the loan maturity shorter, and the syndicate size larger after CDS trading. Meanwhile, the number of loans that include net worth covenants does not change significantly. As documented in prior studies, firms referenced by CDS trading are on average larger and have relatively better credit quality. In our data, loans to CDS firms are larger and have shorter maturity, and the strictness of net worth covenants for CDS firms is lower than that for non-CDS firms.

IV. CDS Effect on Covenant Strictness: The Evidence

A. Baseline Results on Loan Covenants

We conduct a difference-in-differences analysis in our main specifications. The dependent variables for our panel regressions using loan-initiation observations are various measures of covenant strictness. For the explanatory variables, we construct two CDS variables following Ashcraft and Santos (2009), Saretto and Tookes (2013) and Subrahmanyam, Tang and Wang

[15]Internet Appendix Figure IA.1 illustrates the loosening in covenant strictness defined as the probability that the firm will breach the covenant. The strictness is represented by the shadow area under the probability density function in the plot. Covenant loosening is represented by the darker, smaller shaded area.

(2014). One is *CDS Trading*, a dummy representing whether the borrower's debt has active CDS trading during the quarter of loan origination. The other is *CDS Traded*, a dummy representing whether the issuer has a CDS market on its debt at any time during the entire sample period. We aim to identify time-series changes in covenant strictness after CDS introduction. Therefore, *CDS Trading* is the variable we are primarily interested in. *CDS Traded* is designed to capture unobservable differences, which may drive the different levels of covenant strictness, between CDS and non-CDS firms. By incorporating both *CDS Trading* and *CDS Traded* into the specifications, we can distinguish the effect from CDS trading while controlling for the CDS firm effect. Moreover, this difference-in-differences setting also helps insulate the CDS effect from any potential time trend in covenant strictness. Specifically, we employ the following specification:

$$\text{Strictness}_{ijt} = \alpha_1 + \beta_1 \text{CDS Trading}_{ijt} + \beta_2 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{ijt} + \epsilon_{ijt} \tag{2}$$

where i represents the borrowing firm, j represents the loan, and t represents the loan origination time. We include a host of control variables that are identified in prior studies as determinants of covenant strictness to ensure that the effect comes from CDS trading and that it is not driven by other loan or borrower characteristics. Specifically, the loan-level control variables include the loan issuance amount, maturity, loan spread and an indicator for whether the loan is secured. The borrower-level control variables include the logarithm of total assets, current ratio, leverage, market-to-book ratio, return-on-assets ratio, cash-to-total assets ratio, fixed charge coverage, tangible-assets-to-total assets ratio, and Altman's Z-score. Controls of borrower characteristics are extracted one quarter prior to loan initiation. In loan covenant strictness regressions, apart from including the loan origination year and borrower industry-fixed effects, we also construct dummy variables for loan purposes to account for any possibility that covenant strictness systematically varies across loans issued for different purposes (such as corporate purposes, working capital, debt repayment, takeover, and CP backup).

Table III presents the baseline OLS regression results under the difference-in-differences framework. The dependent variable for models 1 and 2 is the industry volatility-adjusted strictness measure. Note that *CDS Trading* and *CDS Traded* are correlated because firms that have active CDS trading at loan origination are always classified as CDS firms. We show the estimation results of *CDS Trading* both with and without the inclusion of *CDS Traded*

to demonstrate that the CDS trading effect is distinct from the CDS firm effect. Controlling for the loan origination year, borrower industry and loan purpose effects, model 1 indicates that the marginal effect of CDS trading on net worth covenants is −0.074 (or 15.9% relative to the mean strictness of the whole sample). The coefficient estimate is −0.053 when the CDS firm effect is accounted for. These coefficient estimates are statistically significant and at a plausible economic magnitude. We cluster standard errors by firm to eliminate the cross-dependence of covenant strictness within firms.[16]

Similar results are obtained with the alternative measure of covenant slackness. In models 3 and 4, covenant slackness is a more direct measure of the distance between covenant threshold and the current value of the covenant variable. The impact of CDS trading is significantly positive. An interesting observation is the lower R-squares in models 3 and 4. These findings suggest the slackness measure scaled by firm's net worth introduces more firm idiosyncratic volatilities. Internet Appendix Table IA.1 presents estimates of the Tobit regression, as the dependent variable, *Covenant Strictness*, is a censored variable varying from 0 to 1. The results show that covenants are loosened after CDS introduction by both the strictness and slackness measures, and the findings are robust to both OLS and Tobit regressions.

The estimation results on other explanatory variables are consistent with the literature. For example, borrowers with a larger size, lower leverage, and higher profitability face looser covenants, as debt holders impose more restrictions on firm net worth for financially constrained firms, which are more subject to asset substitution.

Our finding of looser covenants suggest that lenders become less concerned about the shareholder's "skin-in-the game" when they can purchase protection of cash flows from CDS market. In terms of CDS effects on pricing-terms of loans, Shan, Tang, and Yan (2014) and Ashcraft and Santos (2009) find that loan spreads increase after the reference firms' CDS trading. Hence, the lender may be compensated by higher rates while loosening covenants. Table III shows a loosening of covenants even when loan spread is controlled for. Although CDS may not directly benefit borrowers in terms of the lower cost of debt (Ashcraft and Santos, 2009), borrowers may indirectly benefit through less restrictive non-pricing terms.

[16]To ensure unbiased estimates of standard errors, we employ a weighted regression to eliminate possible heteroscedasticity, as the error term in covenant strictness may not follow the same distribution. We also employ the GMM approach and examine the Newey-West estimator to address the concern that the change in covenant strictness is driven by time-varying macroeconomic conditions. The results are similar.

B. Addressing Endogeneity and Selection in CDS Trading

Our study, like other studies on the impact of CDS trading, is subject to the concern that CDS trading can be endogenous. This endogeneity may come from two sources. One source is reverse causality. That is, lenders may initiate a CDS market in anticipation of the lending standards being loosened. In other words, lenders may have a greater demand for hedging contracts such as CDS when they expect a greater supply of loans with less-restrictive covenants. As Parlour and Winton (2013) show, CDS are more likely to be traded when covenants are looser. The other source of endogeneity is the omitted variable problem. Specifically, CDS firms are not randomly assigned in the sense that some factors that drive the covenants to be looser may also determine the likelihood of the firm to be selected into CDS referencing. For instance, changes in borrowers' riskiness over time may explain covenant strictness as well as the onset of CDS trading. However, this concern appears to be minor because Subrahmanyam, Tang and Wang (2014) show that firms become more default-risky after they are referenced with CDS. Higher default risks should drive covenants to become tighter rather than looser. Predictions from the omitted correlated variables are the opposite of our findings.

Nevertheless, we formally address the endogeneity issue using various econometric techniques. The selection of firms into CDS trading will result in biased coefficient estimates on *CDS Trading*, which may be correlated with the regression error term. Specifically, we are interested in obtaining

$$\text{Treatment Effects(TT)} = E(Y_1|X, D = 1) - E(Y_0|X, D = 1) \tag{3}$$

while we are only able to observe

$$\text{Treatment Effects(TT')} = E(Y_1|X, D = 1) - E(Y_0|X, D = 0) \tag{4}$$

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 the propensity score matching approach by assuming that all factors that determine CDS introduction are accessible. These approaches are standard and can potentially alleviate the endogeneity concern.

B.1. Instrumental Variable (IV) Regressions

The endogeneity concern we have is about the correlation between our main variable of interest, *CDS Trading*, and the residual term in the covenant strictness regression. We use instrumental variables for *CDS Trading* to address this correlation issue. The ideal instrument should be affecting covenant strictness only through *CDS Trading*. We follow the guidelines from Roberts and Whited (2012) regarding IVs.

The first instrument, *Lender Foreign Exchange Derivatives*, is selected based on the existing literature, namely, Saretto and Tookes (2013) and Subrahmanyam, Tang and Wang (2014). This instrument is the amount of foreign exchange derivatives used for hedging (not trading) purposes relative to the total loans of the lead syndicate banks a firm has borrowed from during the past five years. This variable is constructed for each firm 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 derivative 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 generally more likely to be active risk managers. Thus, this instrumental variable captures the hedging demand of firms' creditors and is expected to be related to the existence of CDS markets for firms' debt.

The second IV is *Lender's Distance from NYC*, which reflects lenders' access to financial markets. Banks located closer to the New York City are more likely to use CDS, as the main industry body for CDS rule-making and the institute in charge of the auction when CDS contracts are triggered, the International Swaps and Derivatives Association (ISDA), is headquartered in NYC. This ratio is unlikely to have a direct impact on covenant tightness, as it is predetermined and should not affect the lender's specific contracting strategy.

The two variables are candidates for instrumental variables in our analysis, as they broadly satisfy the two conditions for valid instruments discussed by Roberts and Whited (2012): 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

$$\begin{aligned}\text{Prob}(\text{CDS Trading}_{it}) = \alpha + \beta x_{it-1} + \gamma_1 &\text{Lender Foreign Exchange Derivatives}_{it-1} \\ &+\gamma_2 \text{Lender's Distance to NYC}_{it-1} + u_{it}\end{aligned} \tag{5}$$

not equal zero, where x_{it-1} refers to a set of exogenous variables that explain the onset of CDS trading. The *relevance* requirement essentially translates to the first-stage regression (results reported in Internet Appendix Table IA.2). We employ the OLS regression of *CDS Trading* on the t-1 (one-quarter-lagged) value of the *past* lender's foreign exchange derivatives, controlling for other exogenous variables. Consistent with our expectation, a higher lender foreign exchange derivatives hedging position relates to a higher probability of CDS trading, and the probability of a firm being selected into CDS trading decreases in the distance between its lender's headquarters and NYC. The partial correlation between the instrumental variables and *CDS Trading* is both economically and statistically significant.

The second requirement for a valid IV is the *exclusion* condition $cov(\text{IV}, \epsilon)=0$. That is, the instrument influences the outcome *Covenant Strictness* only through its effect on the endogenous variable *CDS Trading*. The lenders' foreign exchange derivatives position is a macro hedge and characterizes the lender's global risk management strategy. More importantly, the firms in our sample are U.S. firms, making a bank's decision to hedge foreign exchange exogenous to its domestic borrowers' U.S. dollar-denominated loan contracts. Therefore, this variable is unlikely to directly affect loan covenant strictness. While the geographic distance between a lender and the New York City is predetermined, which should not affect its contracting strategy with individual borrowers. It is difficult to propose that the closer a bank is to the New York City, the more likely the bank imposes looser (or tighter) covenants on its borrower. Finally, the overidentification test does not reject the null hypothesis that the residuals are uncorrelated with the set of exogenous variables (J-statistics 0.665), indicating that the instruments are indeed exogenous.

The second-stage estimation results using the fitted values of *CDS Trading* are reported in Table IV. We first use the two IVs separately in models 1 and 2 and then jointly in model 3. The coefficient estimates on the instrumented *CDS Trading* from all three specifications are negative and statistically significant at 5% or better. This evidence is consistent with a causal interpretation of the CDS effect on loan covenant strictness. Recognizing the limitations of the IV approach (Roberts and Whited, 2012), we next use an alternative approach to further tackle the endogeneity concern.

B.2. Propensity Score Matching

Our ultimate goal is to purge out the marginal effects of CDS trading on covenant strictness. However, it is impossible to obtain a treatment group to observe what they would have experienced had it not been the treatment because firms are not randomly assigned to be treated with or without CDS trading. The approach of propensity score matching is aimed to address the selection bias issue. We attempt 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) whose propensity of having CDS trading is nearest to the treatment firm. We need to ensure that any change in covenant strictness is purely due to the advent of CDS trading instead of other factors that determine the firm's "selection" into the treatment group.

First, we use probit regression to estimate the propensity score, which measures the possibility that a borrower's debt is referenced with CDS trading. The selection model of CDS trading we use follows Ashcraft and Santos (2009), Saretto and Tookes (2013), and Subrahmanyam, Tang, and Wang (2014). The sample we use for the first-stage regression includes all loan quarters for non-CDS firms, and only the loan quarter observations from the year 1994 until the first quarter that CDS trading begins for CDS firms. Given the trade-off between full information and possible selection bias due to incomplete Compustat information, we incorporate all relevant variables that may potentially affect CDS introduction conditioning on data availability. The explanatory variables for estimating the propensity score include the one-quarter lag of the following: past lender's foreign exchange derivatives position (for hedging), the logarithm of the distance between the lender and the New York City, the logarithm of total assets, debt-to-assets ratio, book-to-market ratio, cash-to-total assets ratio, excess stock return, and the logarithm stock return volatility.

Next, we pair CDS firms with a control group using *Nearest Neighborhood Matching*. Among the 532 loans with (tangible) net worth covenants issued to CDS-referenced firms, the borrowers of 392 loans are paired with one matching firm each. Internet Appendix Table IA.3 reports the comparison of loan characteristics for CDS and non-CDS firms before and after matching. Loans from the matched firms have much more similar characteristics to loans from CDS firms. The difference in the propensity score between firms with and without CDS trading decreases from 0.041 before matching to 0.007 after matching. More importantly, the

propensity score difference is statistically insignificant after matching.

Table V reports the regression results using the matched sample constructed from a prediction model including the past lenders' foreign exchange derivatives position for hedging (models 1 and 2) and the lender's distance to New York (models 3 and 4). Again, to account for multicollinearity between *CDS Trading* and *CDS Traded*, we design four specifications in this table. Models 2 and 4 include CDS firm effects. The coefficient estimate for *CDS Trading* in model 2 is -0.053, which is statistically significant at the 1% level, suggesting a strong effect of CDS trading on net worth covenant loosening after controlling for CDS firm effects in this matched sample. The negative effects of CDS trading are significant with or without the CDS firm control. In addition to nearest neighbor matching, we also employ caliper matching with 0.25 times the standard deviation of the propensity scores as the bandwidth. The regression results of the caliper-matched sample are shown in Internet Appendix Table IA.4 and are similar to the results in Table V.

B.3. Pre-existence of CDS and Within-bank Analysis

To further address the identification concern that the loosening effect is due to lenders' initiation of the CDS market in anticipation of lowered lending standards, we employ the regression on a restricted sample of loans. This sample skips loans that are issued immediately after the advent of CDS. The idea is that lenders may well anticipate the changes in lending standards in the recent period, while it is difficult to anticipate the changes in the remote future. If loans to CDS firms are issued years after CDS introduction and contain significantly looser covenants than loans to non-CDS firms, then we would be more confident in concluding that the result is not due to the anticipation effect because it is difficult to anticipate in the first place. The results are precisely consistent with our expectation. As shown in the Internet Appendix Table IA.5, the loosening effects are found to be robust in the restricted sample, which excludes loans issued within one year, two years and three years following CDS introduction, suggesting that reverse causality does not explain our finding. The effect of CDS trading on covenant strictness is slightly larger than it is in the base regressions. For instance, for loans that are issued three years after CDS introduction, covenants are loosened by 0.089 (or 19.1% compared with the mean strictness of the whole sample) when other differences between CDS and non-CDS firms are controlled for.

One might argue that the covenant loosening can be due to different lending strategies employed by different banks. One case could be that banks that lend to CDS firms always write looser contracts, regardless of whether the borrower is CDS-referenced. Such a pre-determined bank-borrower match may lead to our finding that CDS loosen covenants. To address this concern, we restrict the sample of lending banks to those that lend to both CDS and non-CDS firms. Furthermore, we restrict those banks to CDS firms both before and after CDS trading. Panels A and B of Internet Appendix Table IA.6 show the results of the "within-bank" analysis and demonstrate that our findings are robust to the selection of banks. Heterogeneity in banks' lending strategies does not drive the loosening of covenants by CDS.

C. Liquidity and Bank Use of CDS

Thus far, we have shown that covenants are looser for new loans issued after the advent of CDS. Our analysis implicitly assumes that lenders actually use the CDS of their borrowers. Acharya and Johnson (2007) and Shan, Tang and Yan (2014) provide evidence supporting this assumption (see Augustin, Subrahmanyam, Tang, and Wang (2014) for more detailed discussions). In this section, we demonstrate that the CDS effect on covenant loosening is stronger when the CDS market is more liquid and when lenders are indeed active CDS users.

C.1. CDS Market Liquidity

CDS strengthen lenders' bargaining power against shareholders. Consequently, lenders are tougher to renegotiate with when the borrower is in financial distress and debt restructuring is helpful for the borrower. A tougher creditor bargaining position increases the costs of both renegotiations and bankruptcy. Tight covenants are no longer optimal in this case and, thus, should be loosened. If this hypothesis holds, we should observe stronger covenant-loosening effects when the CDS market referencing the borrower's debt is more liquid because the lenders' position would be further strengthened in a liquid CDS market due to the greater ease of access to the CDS market and to trade CDS at fair prices.

We construct measures of CDS market liquidity to test the above prediction. CDS liquidity is difficult to measure because CDS contracts are not exchange-traded and not continuously traded. Our transaction data record each trade from this source as well as the specific contract

terms, such as expiration dates. Therefore, we can calculate for each reference issuer the trading volume given a time period, such as a quarter, by counting the total number of transactions, which is our first CDS liquidity measure. We also calculate the outstanding CDS positions at any given time by summing all contracts that have not yet matured. The positions are in dollar terms. We further scale this dollar amount by the total value of debt outstanding of the reference firm to make the ratio more comparable across large and small firms. This relative CDS outstanding amount can be understood as the "open interest" of CDS, and it is our second liquidity measure.

We extend the baseline analysis by replacing the CDS trading indicator with those two CDS market liquidity measures. The regression estimation results are reported in Table VI. The dependent variable for all specifications is the loan covenant strictness measure scaled by industry-year volatility (we find similar results using the strictness measure scaled by firm-level volatilities). Model 1 shows a significant and negative coefficient estimate for *CDS Trading Volume* while controlling for CDS firm characteristics and other loan and firm characteristics. The results are similar in model 3 when we use a one-month observation window instead of a one-quarter observation window.[17] This result suggests that covenants loosen more when the reference firm's CDS are more actively traded during the period of loan contract design and origination.

We find similar results when we use the scaled outstanding CDS amount as the liquidity measure in models 2 and 4 in Table VI. When there is a larger CDS position outstanding relative to the firm's debt at the time of loan origination, the covenant loosens more. It is conceivable that part of the outstanding CDS positions is held by existing lenders (see Acharya and Johnson, 2007). Differently put, it is safe to assume that this measure is positively correlated with the lender's hedged positions. When much of the firm's debt is already hedged with CDS, creditors will be better able to initiate the new loan. Hence, they can offer looser covenants. Once the loan is issued, the lenders may further find the CDS market to be valuable for future hedging and trading opportunities.

[17]The loan syndication process usually takes between one and three months. Ivashina and Sun (2011) document that the number of days between the formal start of syndication and the loan closing day is, on average, approximately four weeks. Before the launch, the lead bank discusses the deal structure with the issuer and obtains credit ratings.

C.2. Lenders' Use of Credit Derivatives

If covenants are indeed loosened due to lenders' access to the CDS market, the effects should be concentrated on loans where the lenders are active users of CDS contracts. If we can observe each lender's CDS portfolio holdings to identify when and whether the lenders use CDS referencing the specific borrower, then we can directly test whether the loosening effects only exist for such lenders using the borrower's CDS. Unfortunately, we do not have such detailed information on lenders' CDS portfolios. Regulations require the disclosure of only the lenders' aggregate credit derivatives position (recently, the positions have been separated into hedging and trading positions, but in our sample period, only the aggregate is reported). Therefore, we use such aggregate data to test whether CDS effects on loan covenants are stronger when the lenders have larger credit derivatives positions.

We obtain lenders' credit derivatives data from the Federal Reserve's FR Y-9C quarterly report on bank credit derivatives positions for commercial banks and bank holding companies. We interact the lenders' credit derivatives positions in the quarter of loan initiation with the CDS trading dummy.

$$\begin{aligned}\text{Strictness}_{ijt} = \alpha + \beta_1 &\text{CDS Trading}_{ijt} \times \text{Lenders' Credit Derivatives Position}_{ijt} \\ &+\beta_2 \text{CDS Trading}_{ijt} + \beta_3 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{ijt} + \epsilon_{1,ijt}\end{aligned} \tag{6}$$

where *Lenders' Credit Derivatives Position* has two alternative measures: one is the *lead* banks' credit derivatives position in the quarter of loan initiation; the other is the *syndicate* banks' credit derivatives position, which aggregates *all* syndicate banks' positions in the quarter of loan initiation.

Table VII reports regression results with a focus on the interaction term between borrower CDS referencing and lender CDS position. The first two columns count the lead lenders' credit derivatives positions, and columns 3 and 4 count all lenders' credit derivatives positions. The coefficient estimates on the interaction terms are negative and statistically significant in all specifications. Moreover, the stand-alone effect of *CDS Trading* remains negative and significant. Hence, lender CDS usage enhances the effect of CDS trading on covenant strictness. The findings from Table VII demonstrate that lenders impose less-restrictive covenants on borrower's net worth when the lenders use CDS to hedge their credit exposures.

We conduct a robustness check to address the concern that CDS positions are skewed towards large lenders (Minton, Stulz, and Williamson, 2009). Specifically, we examine the sub-sample of the top 25 banks that are active in credit derivatives trading. The top 25 banks are all large banks and are thus more comparable. The regression results are presented in Internet Appendix Table IA.8. The result is similar to, although slightly stronger than, the results using the full sample of banks. Overall, loan covenants are loosened when there is a CDS market for the borrower's debt, especially when the lenders are active users of CDS.

D. Mechanism: Agency and Renegotiation Consideration

Covenants are the most often renegotiated of all loan contract terms (Roberts, 2014). In this section, we reveal the specific situations under which CDS effects are most pronounced to understand the source of the CDS effect. Our exploration is guided by theoretical predictions from Gârleanu and Zwiebel (2009). Specifically, there are three key elements of Gârleanu and Zwiebel's (2009) theory: potential transfer from debt to equity, information asymmetry, and renegotiation costs. We construct tests based on all three. Because covenants are usually set tight and loosened in the subsequent renegotiations, if CDS make lenders tougher and less willing to renegotiate, then CDS should loosen covenants in the first place, as we have already shown. Furthermore, the loosening effect should differ across firms based on the costs of covenant loosening, as looser covenants open doors to agency conflict. The cost depends on the severity of borrower-lender conflicts and the ease of renegotiations.

D.1. Severity of Potential Debt-to-Equity Transfer

Although looser covenants can reduce renegotiation costs, they may open doors to exploitative behavior. For firms for which the underlying risk of agency problems is lower, the loosening of covenants has little cost compared to the gains of avoiding costly renegotiations; the opposite is true for firms for which the underlying risk of agency problems is higher. As Gârleanu and Zwiebel (2009) note, even though their results are robust to many generalizations, the results depend on the assumption that the borrower is more informed about the division of the surplus rather than the total surplus. Their distinguishing prediction is that covenant strictness should increase with asymmetric information regarding the potential for asset substitution or other such transfers. Such potential for transfer from debt to equity varies across firms: it

should be more prominent for firms close to financial distress but more remote for profitable and high credit quality firms.

We construct various measures of the potential transfer from debt to equity. As suggested by Demiroglu and James (2010), the agency cost of debt is generally thought to be inversely related to the financial condition of the borrowing firm. Risk-shifting, or asset substitution, is a more pertinent concern for firms closer to default. Firms with higher profitability (measured by return on assets), lower leverage and a larger Z-score are expected to be less risky and have less uncertainty in future debt repayment. Gaming incentives for profitable firms would be lower, as there is more potential return from keeping the firm over the long run rather than milking the firm in the short run and risking creditor punishment. Moreover, firms with better credit quality and higher profitability are more likely to have a large base of lenders, 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 their lender when negotiating a lending contract, leading to a larger degree of covenant loosening.

We distinguish firms with higher profitability, lower leverage and a larger Z-score using the 50% breakpoints of all sample firms in the same quarter from other firms. We report the estimation results in Table VIII, with a key interest in the interaction term between the CDS trading indicator and the agency severity dummies. As expected, firms that are more profitable, less levered and more distant from default see a greater reduction in covenant strictness following the advent of CDS. The coefficient estimates on the interaction terms are both statistically significant and economically meaningful. The results are robust to the inclusion of the CDS firm effect.

Our finding supports the prediction of Bolton and Oehmke (2011) that "the commitment benefits of CDS are largest for firms whose creditors' bargaining position is weak in the absence of CDS." Shareholders from more profitable and less-levered firms have an advantageous position when bargaining against creditors. These observations also corroborate the findings of Ashcraft and Santos (2009) that CDS mainly benefit firms with better credit quality. Both the theoretical models and the empirical evidence show that loans to borrowers with *higher* credit quality are more likely to be hedged using CDS.[18] Transferring risks through the CDS market may prove too costly for borrowers facing high agency conflicts. If the CDS seller

[18]See Parlour and Winton (2013) and Minton, Stulz and Williamson (2009) for examples.

charges a high premium, it will make the purchase of CDS for protection less attractive to the lender in the first place. Indeed, the results are consistent with our expectations.

D.2. Borrower Information Transparency

The theory of Gârleanu and Zwiebel (2009) is motivated by information asymmetry. More specifically, the authors assume that the creditor is less informed regarding the potential transfer from debt to equity associated with future investments. Accordingly, creditors lending to less-transparent firms should be more concerned about the potential transfer from debt to equity. Such firms receive tighter initial covenants because lenders require more control rights when there is more uncertainty regarding debt repayment in the future. We expect that the effect of CDS trading on covenant loosening will be stronger for informationally transparent borrowers.[19] For opaque firms, the CDS seller will demand much higher premiums, especially if loan covenants are looser. If CDS also weaken lender-monitoring incentives, lenders may be less able to make informed decisions following a covenant violation and may thus become even tougher in renegotiation. These adverse effects would be stronger for less-transparent firms, so lenders may not loosen covenants for these firms as much as they would for transparent firms.

We construct two commonly used information transparency measures to test the above predictions. The first is based on analyst coverage, specifically, the number of analysts providing estimates on the borrowing firms' earnings-per-share (EPS) using data from I/B/E/S one quarter prior to loan initiation. Analysts follow the firms closely and release research reports to the market on a regular basis. Hence, firms followed by analysts are more transparent. The second measure is the average number of lenders lending to the firm in the past four loan transactions. Information hold-up by banks will be less severe when there are more bank lenders (Santos and Winton, 2008). Additionally, the ability to obtain financing from a larger lender base signals a better information environment for the borrower. We use indicator variables for high transparency versus low transparency using the sample median as the cutoff point.

We regress loan covenant strictness on the interaction between the CDS trading and firm

[19]Kim, Shroff, Vyas, and Wittenberg-Moerman (2014) show that firms voluntarily disclose more earnings information after their debt is referenced by CDS contracts. Martin and Roychowdhury (2014) find evidence consistent with firms reporting less conservatively post-CDS trading to avoid covenant violations.

transparency indicators. The estimation results are provided in Table IX. Models 1 and 2 show that the covenant-loosening effect of CDS trading is more pronounced for firms with analyst coverage than for firms without analyst coverage. The coefficient estimate on the interaction term is nontrivial compared to that of CDS trading itself. Models 3 and 4 demonstrate that firms borrowing from more banks in the past see a greater decrease in covenant strictness in the new loans issued after CDS introduction. These findings suggest that following CDS trading, loan covenants are loosened to a greater extent for more transparent firms.

D.3. Committing to Not Renegotiate: "No-restructuring" CDS

The key assumption of the "incomplete contract" framework is that the parties signing the contract cannot commit to not renegotiate their contract (Hart and Moore, 1999). If creditors can commit to not renegotiate, then many incentive problems can be solved. In our case, if the lenders can increase their commitment to not renegotiate, then covenants can be looser and closer to first best. Thus far, we have used the presence of CDS to show that firms result in less-strict initial loan covenants because lenders become less interested in renegotiation to help the debtor out of distress when CDS provide more outside options to lenders. If creditors can credibly commit to not renegotiate, then the initial covenants can be even looser. Bolton and Oehmke (2011) argue that "CDS introduce gains from contracting by allowing the lender to commit not to renegotiate debt unless the renegotiation terms are attractive enough for creditors." In this subsection, we construct a more precise test for this tougher creditor in the renegotiation conjecture by differentiating CDS contract types based on the inclusion of credit events that trigger the payment, regardless of the effects of borrower credit quality on covenant strictness.

CDS contracts are of different types in terms of settlement clauses. In particular, some contracts will include debt restructuring as a credit event. Under the 2003 ISDA Credit Definitions, there are four types of restructuring clauses in CDS contracts: full restructuring (FR), modified restructuring (MR), modified-modified restructuring (MMR) and no restructuring (NR). 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 NR, restructuring is excluded as a credit event. 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. Subrahmanyam, Tang, and Wang (2014) provide more details on the restructuring clauses.

Under "no-restructuring" CDS contracts, CDS buyers will not be paid by the sellers if the debt is restructured and will only be compensated when the reference firms file for bankruptcy. Clearly, if creditors are protected by "no-restructuring" CDS contracts, their incentive to renegotiate is lower and their commitment to not renegotiate is stronger.[20] Therefore, we expect that the effect of CDS on covenant loosening will be greater when there are more "no-restructuring" CDS outstanding.

Table X reports the estimation results regressing loan covenant strictness on the measure of the lender's renegotiation incentive, the "no-restructuring" ratio, which is the ratio of CDS contracts with NR clauses of the total CDS contracts referencing the firm's debt in the quarter of loan origination. The coefficient estimate on this NR-CDS ratio (equivalent to the interaction term of *CDS Trading* and "*No-restructuring*" *Ratio*) is -0.103 and statistically significant at the 1% level. For two borrowers with CDS trading, if the CDS of one all include restructuring and the other all exclude restructuring, holding everything else the same, their loan covenant strictness can be different by a factor of 0.103 (recall from Table II that the before-after difference is -.089 for CDS firms without controlling for any other factors). NR CDS have an effect on top of CDS trading and the CDS firm. The magnitude of the coefficient estimate on NR CDS is even larger than that on CDS Trading. The results are supportive of the hypothesis that CDS affect covenant strictness through the impact on the lender's renegotiation incentive, as predicted by Gârleanu and Zwiebel (2009) and Bolton and Oehmke (2011).

D.4. Non-renegotiable Debt Contract: Evidence from Bond Covenants

Bonds are already non-negotiable before the advent of CDS. Hence, any additional effect on renegotiation from CDS will have little effect on bond covenants, although there could be other reasons why CDS affect covenants.[21] In a sense, the bond sample gives us a placebo test to potentially falsify the renegotiation cost mechanism.

[20] If creditors also sell CDS, they may have an incentive to loosen covenants so that credit events are less likely to be triggered.

[21] Feldhütter, Hotchkiss, and Karakaş (2014) use the pricing difference between CDS and bonds to measure the value of creditor control rights embedded in bonds.

Renegotiation cost is less relevant for bond covenants because bond payments are more difficult to renegotiate due to diverse ownership and coordination problems resulting from free rider concerns. Indeed, Gârleanu and Zwiebel (2009) note that "perhaps the simplest empirical prediction regarding renegotiation costs involves the distinction between public and private debt." Bond covenants are different from loan covenants in many dimensions. For instance, banks monitor borrowers more intensively than bondholders do, as the former have an informational advantage and lending expertise, while bondholders have dispersed ownership, making monitoring and renegotiation more difficult. The CDS market can be a more important venue for hedging for banks than bondholders because the secondary loan market is less liquid than the secondary bond market and the ways to diversify risks for banks in the secondary loan market are lacking.

Berlin and Mester (1992) and Gârleanu and Zwiebel (2009) show that the optimal covenant strictness depends on the ease of renegotiation: factors that make renegotiation more costly allow optimal covenants to be looser. In addition, to the extent that ease of renegotiation decreases with the number of creditors, bonds should have fewer and looser covenants. If bondholders start with looser covenants and renegotiation is less relevant, the effects of CDS on bond covenants are expected to be smaller than for loans, as a tougher creditor is a less-severe concern given that renegotiation rarely happens in the first place. However, bond covenants are still used for agency concerns (bank lenders may even team up with the borrower to exploit bond holders in certain circumstances), and CDS would still exert an effect.

We obtain corporate bond data from the Mergent Fixed Income Securities Database (FISD), which contains comprehensive bond issuance information, including the offering amount, maturity, yield spread, credit rating, seniority, and whether the issue is secured or enhanced. FISD specifies the title of covenants included in bond issues. The raw database reports 41 specific types of bond covenants. Following Smith and Warner (1979), Billett, King and Mauer (2007), and Chava, Kumar, and Warga (2010), we classify all bond covenants into 11 categories. Covenants that impose restrictions on similar corporate activities are regarded as the same type of covenant. For example, there are covenants restricting future funded debt issuance, secured debt issuance and subordinated debt issuance, which form one "debt issuance" covenant. This classification mitigates the concern that certain types of covenants that contain more items than others dominate the sample. FISD does not provide a threshold on covenant variables, so we measure the strictness of bond covenants by counting the number

of different types of covenants on the bond. The more covenants attached to one bond issue, the tighter the control from bond investors on the borrower. Internet Appendix Table IA.9 summarizes bond characteristics by year. The whole sample consists of 8,935 public bonds issued by U.S. corporations from 1994 to 2009, 3,304 of which are from CDS firms that have an active CDS market at bond origination. On average, one bond issue in our sample contains 2.7 different types of covenants.

We employ a similar approach to examine the effect of CDS on bond covenants by replacing the strictness measure with the count variable

$$\text{Number of Bond Covenants}_{ijt} = \alpha + \beta_1 \text{CDS Trading}_{ijt} + \beta_2 \text{CDS Traded}_{it} + \gamma_1 \text{Controls}_{ijt} + \epsilon_{ijt} \quad (7)$$

We estimate both OLS and Poisson regressions, given that the dependent variable is a count number. Table XI presents the regression results of the number of bond covenants. The results show that the number of bond covenants decreases after CDS trading. The statistical significance level is marginal at 10% when the CDS firm effect is included. In addition, the economic magnitude of the CDS effect is small.

We further consider the endogeneity and selection issues as we did for loan covenants. We use the nearest neighbor-matching approach to construct a matching sample of bond covenants. The regression results for both the OLS and Poisson specifications of the matched sample are reported in Panel B of Table XI. The magnitude of the marginal effect of CDS is reduced substantially, and the CDS trading effect becomes statistically insignificant. (We also find insignificant results when we use the IV estimation.) Compared to loan covenants, bond covenants are little affected by CDS trading. The weaker effects on bond covenants support our conjecture that the effects of CDS on covenant strictness mainly work through the agency conflict/debt renegotiation channel.

V. Conclusion

This study provides empirical evidence on how the trading of credit default swaps (CDS) affects the design of debt covenants. Using CDS trading and debt issuance data from 1994 to 2009, we show that net worth covenants are looser for new loans issued after the introduction

of CDS trading. By insuring lenders against default, CDS make lenders tougher in debt renegotiations. Looser covenants can be optimal when renegotiation and bankruptcy costs outweigh information and agency problems. The loosening effect is stronger when the CDS market is deeper, when the lender takes on larger credit derivatives positions, and when borrowers have better credit quality and greater transparency. This evidence is consistent with the view that CDS substitute for covenants as credit protection devices and that the availability of CDS alleviates creditor concern over agency conflicts.

Our work furthers the understanding of the determinants of debt covenants and the implications of credit derivatives trading. Notwithstanding their derivative nature, CDS can have real effects on firm policies and financial contracting. We show that the availability of CDS can have a substantial impact on ex ante allocation of control rights by affecting the tightness of initial debt covenants and the consequent contracting frictions. Our findings can provide useful evidence for policy debates given the increasing regulatory actions on CDS (e.g., the implementation of Title VII of Dodd-Frank Act). Nevertheless, although our evidence is consistent with the view that covenant loosening by CDS is beneficial to both lenders and borrowers, establishing the overall welfare effect of CDS requires further study.

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Appendix: Variable Definition

Variable	Definition
CDS Market Characteristics	
CDS Trading	A dummy variable indicating whether there are CDS contracts referencing its debt at the time of loan/bond initiation
CDS Traded	A dummy variable indicating whether the borrower ever had a CDS market on its debt at any time during the sample period
CDS Trading Volume	The number of CDS trades referencing the borrower's debt in the quarter (or month) of loan initiation
CDS Outstanding Amount /Total Amount of Debt	The number of outstanding CDS contracts referencing the borrower's debt in the quarter (or month) of loan initiation over the total amount of debt outstanding of the borrower by the end of the prior quarter
Loan/Bond Characteristics	
Covenant Strictness	1 - $\Phi[(w - \underline{w})/\sigma]$, where Φ is the standard normal cumulative distribution function; w is the logarithm of the 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 required by a net worth covenant; σ is the standard deviation of the quarterly change in the value of (tangible) net worth across all loans, varying by (1) the 1-digit SIC industry and year (industry-year volatility); (2) the firm in 3-year rolling windows (firm volatility). We construct two strictness measures using the two measures of net worth volatility
Covenant Slackness	$\frac{w-\underline{w}}{w}$, where 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 required by a net worth covenant
Number of Bond Covenants	Following the spirit of Smith and Warner (1979), Billett, King and Mauer (2007), and Chava, Kumar, and Warga (2010), we group all bond covenants into 11 categories based on the aspects of firm performance that are required/restricted by bond covenants, then we count the number of covenant categories contained in each bond issue as the number of bond covenants per bond issue
Loan Amount ($Million)	The aggregated amount of facilities that comprise a loan package in $million
Issue Size ($Million)	The initial amount of a bond issue in $million
Maturity (Years)	For loan, it is the average maturity of the facilities that comprise a loan package; for bond, it is the initial maturity of the bond issue
Loan Spread	The average all-in-drawn spread of facilities that compose a loan package
Secured	A dummy variable indicating whether the loan is secured by collateral
Number of Lenders/Loan	The number of banks that participate in the loan syndicate, including both lead banks and participating banks
Not Rated	A dummy variable indicating the bond is not rated by a rating agency
Borrower/Issuer Characteristics	
**All firm financial information is extracted at the end of the quarter prior to loan/bond issuance*	
Total Assets ($Million)	The total book assets of the firm
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)
Leverage	Total book debt/total assets
Total Amount of Debt	Short-term debt + 0.5*long-term debt outstanding
Market-to-Book	Market value of equity/book value of equity

(Continued Next Page)

Appendix: Variable Definition - *Continued*

Variable	Definition
Borrower/Issuer Characteristics	
Net Worth	Total assets - total liabilities
Tangible Net Worth	Total assets - total liabilities - intangible assets
Profitability	Operating income before depreciation/total assets
Tangibility	Tangible assets/total assets
Altman's Z-score	3.3* EBIT/total assets + 0.999* 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
Excess Stock Return	The quarterly stock return less the value-weighted market return, calculated from monthly returns
Stock Return Volatility	The standard deviation of monthly stock returns in a given quarter
Borrower with Analyst Coverage	A dummy variable indicating whether the borrower's earnings per share (EPS) estimate by equity analysts is available in I/B/E/S
Number of Past Lenders	The number of syndicate lenders that participated in the past four lending transactions scaled by the borrower's book assets in the quarter prior to loan initiation

Table I
Sample Distribution

This table describes the number and strictness of covenants and other loan characteristics of sample loans. We average the values across loans at package level by year from 1994 to 2009. A loan (package) is composed of facilities (tranches). Sample loans are provided by Loan Pricing Corporation (LPC)'s Dealscan database. Panel A describes loans issued to all sample firms (both CDS and non-CDS firms). Panel B describes loans to firms that have CDS contracts referencing its debt at loan issuance. Column 2 reports the total number of loans. Column 3 reports the number of unique borrowing firms. Column 4 reports the number of loans issued with net worth 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. Column 5 reports the strictness of net worth covenants averaged across loans. 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, required by 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 the 1-digit SIC industry and by year. Loan size refers to the amount of loan at package level in $ million. Maturity refers to the average maturity of facilities of each loan package in years. The last column reports the all-in-drawn spreads in basis points averaged across loans.

Panel A. Summary of All Sample Loans

Year	# of Loans	# of Unique Firms	# of Loans with NW	Strictness of NW	Loan Size ($ Million)	Maturity (Years)	Spread (bps)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1994	2805	2122	97	0.445	230.5	5.5	172.76
1995	2987	2220	496	0.485	266.7	5.9	162.34
1996	4065	2830	1065	0.487	229.5	5.6	175.16
1997	5185	3398	1216	0.485	254.1	6.0	164.38
1998	4289	2887	862	0.479	250.7	5.7	169.30
1999	4356	2782	696	0.474	272.1	5.3	182.12
2000	4490	2812	630	0.480	300.2	4.4	176.42
2001	4676	2909	625	0.481	290.2	4.1	183.01
2002	4699	2989	736	0.467	256.2	4.2	200.57
2003	4875	3047	577	0.478	264.2	4.6	208.32
2004	5083	3374	469	0.468	349.8	5.3	179.36
2005	5151	3340	423	0.431	417.5	5.7	145.49
2006	4827	3192	333	0.395	441.7	5.7	140.86
2007	4545	3039	217	0.453	505.7	6.0	139.29
2008	3418	2408	204	0.390	384.9	4.9	177.10
2009	2068	1647	113	0.399	370.5	4.4	312.70
Total	67677	13385	8759	0.465	320.5	5.2	183.66

Panel B. Summary of Loans to CDS Firms

Year	# of Loans	# of Unique Firms	# of Loans with NW	Strictness of NW	Loan Size ($ Million)	Maturity (Years)	Spread (bps)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1997	18	12	2	0.218	1250.7	8.5	179.88
1998	78	44	1	0.206	1016.6	4.3	164.17
1999	170	79	10	0.324	850.7	3.1	156.51
2000	284	148	21	0.360	843.4	3.6	160.99
2001	435	249	46	0.354	924.1	3.3	166.72
2002	549	357	86	0.338	766.7	3.0	164.98
2003	629	422	73	0.390	692.9	3.7	168.08
2004	726	483	83	0.361	863.0	4.8	167.42
2005	746	485	81	0.286	984.5	5.5	170.36
2006	671	454	58	0.218	1152.8	5.8	169.13
2007	598	409	31	0.338	1345.2	6.1	171.89
2008	329	225	22	0.217	1100.3	4.3	165.90
2009	238	186	18	0.380	969.3	3.8	180.11
Total	5471	807	532	0.332	966.0	4.6	168.11

Table II
Comparison of Loans Issued Before and After CDS Introduction

This table compares the average loan covenant strictness, slackness and other characteristics of loans issued by CDS firms before and after CDS trading is introduced. All loan characteristics are calculated at loan (package) level. Covenant strictness is calculated following the strictness measure: 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 required by a net worth covenant; σ is the standard deviation of the quarterly change in the value of (tangible) net worth across all loans, varying by (1) the 1-digit SIC industry and year (Industry-year Volatility); (2) the firm in 3-year rolling windows (Firm Volatility). We construct two strictness measures using the two measures of net worth volatility. A larger strictness measure represents a stricter covenant. Covenant slackness is calculated as $\frac{w-\underline{w}}{w}$. A larger value of slackness represents a looser covenant by construction. The current value of net worth (w) is extracted at the end of the quarter prior to the loan initiation. Maturity is the average maturity of facilities that compose a loan package. Loan amount is the aggregated amount of facilities that compose a loan package. Number of lenders/loan refers to the number of lead banks and participating banks in a loan syndicate. Percentage of secured loans refers to the percentage of loans secured by collateral out of all loans. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively.

Variable	Before CDS Trading	After CDS Trading	Difference
Covenant Strictness Scaled by Industry-year Volatility	0.421	0.332	-0.089^{***}
Covenant Strictness Scaled by Firm Volatility	0.362	0.253	-0.109^{***}
Covenant Slackness	0.370	0.398	0.028^{*}
Maturity (Years)	5.6	4.6	-0.9^{***}
Loan Amount ($ Million)	605.9	966.0	360.1^{***}
Number of Lenders/Loan	13.9	15.6	1.6^{**}
Percentage of Secured Loans (%)	32.9	18.5	-14.4^{***}
Number of Loans with Net Worth Covenants	0.103	0.097	−0.006

Table III
Impact of Borrower CDS on Covenant Strictness

This table reports the baseline difference-in-differences regression results of the effects of CDS trading in borrower's name on loan covenant strictness (or slackness). The dependent variables is the strictness (or slackness) 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 models 1 and 2; for models 3 and 4, we use a covenant slackness measure, which is calculated as $\frac{w-\underline{w}}{w}$, where w is the firm's (tangible) net worth value at the end of the quarter prior to loan initiation; $\underline{w}$ is the minimum (tangible) net worth that the firm must maintain during the life of the loan, required by the (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 are actively traded in 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 ever had a CDS market at any point of time during the sample period, and zero otherwise. Loan amount is the aggregated amount of facilities that comprise a loan package. Maturity is the average maturity of facilities that comprise a loan package. Secured is a dummy variable taking the value of one if the loan is secured by collateral, and zero otherwise. Loan spread is the average all-in-drawn spread of the facilities of a loan package. Current ratio is the ratio of current assets over current liabilities. Leverage is the book leverage calculated as the (short-term debt +0.5*long-term debt)/total assets. Profitability is measured by quarterly return on assets. Fixed charge coverage is calculated as (sum of rolling four quarter operating income before depreciation)/(sum of rolling four quarter interest expenses + debt in current liabilities one year prior). Tangibility is the ratio of tangible assets to total assets. Altman's Z-score is calcuated as $3.3^* \frac{\text{EBIT}}{\text{total assets}} + 0.999^* \frac{\text{sales}}{\text{total assets}} + 1.4^* \frac{\text{retained earnings}}{\text{total assets}} + 1.2^* \frac{\text{working capital}}{\text{total assets}} + 0.6^* \frac{\text{market value of equity}}{\text{total liabilities}}$. Borrower characteristic variables are extracted at the end of the quarter prior to loan initiation. Dealscan reports 6 loan purposes: corporate purposes, debt repayment, working capital, takeover, CP backup and others. All specifications include loan purpose, loan origination year and borrower industry fixed effects. Numbers in parentheses are standard errors adjusted for heteroskedasitisity and clustered at firm-level. ***, **, and * represent statistical significance at 1%, 5% and 10% level, respectively. See Appendix for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness

	Strictness Measure Scaled by Industry-year Volatility		Slackness Measure Scaled by Firm Net Worth	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.074***	-0.053***	0.063***	0.031**
	(0.005)	(0.006)	(0.024)	(0.015)
CDS Traded	.	-0.030***	.	0.048*
	.	(0.004)	.	(0.027)
Loan Characteristics				
Log (Loan Amount)	0.002*	0.003**	-0.036***	-0.037***
	(0.001)	(0.001)	(0.008)	(0.008)
Maturity	0.002	0.002	0.009	0.009
	(0.002)	(0.002)	(0.013)	(0.013)
Secured	-0.002	-0.003	0.021*	0.022**
	(0.002)	(0.002)	(0.011)	(0.011)
Loan Spread	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Borrower Characteristics				
Log (Total Assets)	-0.018***	-0.017***	0.034***	0.031***
	(0.001)	(0.001)	(0.008)	(0.008)
Current Ratio	0.047	0.042	-0.901**	-0.879
	(0.035)	(0.035)	(0.432)	(0.433)
Market-to-Book	-0.387	-0.334	5.342**	5.215*
	(0.323)	(0.321)	(2.263)	(2.270)
Profitability	-0.006	-0.005	-0.155	-0.124
	(0.021)	(0.021)	(0.244)	(0.243)
Cash/Total Assets	0.001	0.005	-0.150**	-0.154**
	(0.014)	(0.014)	(0.074)	(0.074)
Leverage	0.033***	0.035***	0.241***	0.238***
	(0.009)	(0.009)	(0.073)	(0.073)
Log (1+Fixed Charge Coverage)	-0.004	-0.024	1.346**	1.411**
	(0.100)	(0.100)	(0.577)	(0.581)
Tangibility	-0.001	0.000	-0.098***	-0.100***
	(0.005)	(0.005)	(0.025)	(0.025)
Z-score	-0.000	-0.000	0.003	0.003
	(0.000)	(0.000)	(0.002)	(0.002)
Intercept	0.555***	0.548***	0.264***	0.286***
	(0.007)	(0.007)	(0.070)	(0.070)
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	33.61	34.57	8.92	5.53
Observations	6952	6952	6952	6952

Table IV
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 an OLS model to obtain the predicted value of the independent variable, *CDS Trading*, using two instrumental variables *FX Derivatives Position* (IV1) and *Lender's Distance to NYC* (IV2). *FX Derivatives Position* 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 borrowed money from in the past five years. *Lender's Distance to NYC* is the geographic distance between the headquarter of the lead bank and the New York City. When there are multiple lead lenders, we take the average of the distance measures across lead lenders. We allow IV1, IV2, and both IV1 and IV2 to enter the first-stage regressions for models 1 to 3, respectively. In the first-stage regressions, the dependent variable is *CDS Trading*, 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. The explanatory variables include the one quarter lag of the following: the logarithm of total assets, leverage, current ratio, cash-to-total assets, market-to-book ratio, profitability, fixed charge coverage, tangibility, Z-score, excess stock return, and the logarithm of stock market volatility. The dependent variable in the second stage is the strictness of net worth covenants calculated with the industry-year volatility. The independent variable of interest is the fitted value of CDS trading estimated from the instrumental variables. We use the same control variables as we use in the baseline regressions. To conserve space we don't report the coefficients of control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 Internet Appendix Table IA4. See Appendix for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility			
Variable	Model1	Model2	Model3
Fitted Value of CDS Trading			
CDS Trading (IV1)	-0.083^{**}		
	(0.035)		
CDS Trading (IV2)		-0.268^{***}	
		(0.101)	
CDS Trading (IV1 + IV2)			-0.251^{**}
			(0.118)
Intercept	0.611^{***}	0.721^{***}	0.465^{***}
	(0.062)	(0.071)	(0.059)
Loan Characteristics Controls	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes
R-squared (%)	44.85	56.84	53.56
Observations	4517	3328	3328

Table V
CDS Endogeneity Control: Propensity Score Matching

This table reports the covenant strictness regression results of a matched sample of loans, which is formed by matching on the propensity scores of CDS trading. We estimate a probit model to obtain the propensity score of CDS trading for each loan observation. The explanatory variables are the same as we use in the first-stage IV regression. In the first-stage regressions for columns 1 and 2 (prediction model 1), the explanatory variables include the one quarter lag of the following: lender's foreign exchange derivative position for hedging purpose, the logarithm of borrower's total assets, leverage, current ratio, cash-to-total assets, profitability, fixed charge coverage, tangibility, Z-score, excess stock return, and the logarithm of stock return volatility. For columns 3 and 4 (prediction model 2), we also include the geographic distance between the lead lender and the NYC. After propensity scores are obtained, we employ the nearest neighborhood matching to form the control group. We select the one from the same 2-digit SIC industry non-CDS firms that has the nearest propensity score to the CDS firm as the matching firm. Then we extract the loans issued by the matching firm in the same year as the CDS firm to form the matching group of loans. The dependent variable is the strictness of net worth covenants calculated from the industry-year volatility. The independent variable we are interested in is *CDS Trading*, a dummy variable which takes the value of one if there is CDS contracts referencing the borrower's debt at loan initiation, and zero otherwise. *CDS Traded* is a dummy taking one if the borrower has a CDS market at any point of time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. We omit the coefficients of control variables to conserve space. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

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

	Matched on Propensity Scores from Prediction Model1		Matched on Propensity Scores from Prediction Model2	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.030*	-0.053***	-0.029***	-0.034***
	(0.015)	(0.021)	(0.010)	(0.011)
CDS Traded	.	0.035	.	0.010
	.	(0.022)	.	(0.009)
Intercept	0.815***	0.815***	0.665***	0.675***
	(0.078)	(0.078)	(0.073)	(0.075)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	50.88	50.96	52.53	52.63
Observations	2620	2620	2620	2620

Table VI
Impact of Borrower CDS Market Liquidity on Covenant Strictness

This table reports the regression results of the effects of CDS market liquidity on loan covenant strictness. The dependent variable is the strictness of net worth covenants. The independent variables of interest are (1) the number of CDS trades referencing the borrower's debt in the quarter (or month) of loan initiation (*CDS Trading Volume*), and (2) the number of outstanding CDS contracts referencing the borrower's debt in the quarter (or month) of loan initiation divided by the amount of total outstanding debt in the prior quarter (*CDS Outstanding Amount/Total Amount of Debt*). In models 1 and 2, we calculate CDS trading volume and outstanding CDS contracts on quarterly basis. In models 3 and 4, we calculate the independent variables on a monthly basis. In all specifications, we control for CDS firm fixed effect, *CDS Traded*, a dummy variable taking the value of one if the borrower has a CDS market on its debt at any time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions in Table III. To conserve space we do not report coefficients of all control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

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

	# of CDS Contracts in the Quarter of Loan Initiation		# of CDS Contracts in the Month of Loan Initiation	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading Volume	-0.019*	.	-0.007**	.
	(0.010)	.	(0.003)	.
CDS Outstanding Amount	.	-0.132***	.	-0.165***
/Total Amount of Debt	.	(0.036)	.	(0.040)
CDS Traded	-0.047***	-0.047***	-0.054***	-0.056***
	(0.004)	(0.004)	(0.004)	(0.004)
Intercept	0.551***	0.551***	0.621***	0.620***
	(0.007)	(0.007)	(0.066)	(0.066)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	33.37	33.30	36.29	36.61
Observations	6952	6952	6952	6952

Table VII
Lender Credit Derivatives Activities and the Impact of CDS on Covenant Strictness

This table reports the regression results of the impact of lenders' credit derivatives positions on the effects of CDS trading on covenant strictness. 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 syndicate lenders' credit derivatives positions (in $trillion). Lenders' credit derivatives positions are extracted at the quarter of loan initiation. Banks' credit derivatives trading data are provided by the Federal Reserve Consolidated Financial Statements for Bank Holding Companies ("FR Y-9C") and the Office of the Comptroller of the Currency (OCC) Quarterly Report on Bank Derivatives Activities. In models 1 and 2, we interact *CDS trading* with the *lead lenders' credit derivatives position* in the quarter of loan initiation. In models 3 and 4, we interact *CDS trading* with the aggregated credit derivatives positions of *all* syndicate lenders that participate in a syndicate loan in the quarter of loan initiation. *CDS Trading* is a dummy variable which takes the value of one if there is active CDS trading in 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 time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. To conserve space we do not report all coefficients of control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
Lender Credit Derivatives Position				
CDS Trading*Lead Lenders' Credit Derivatives Position	-0.029**	-0.029*	.	.
	(0.014)	(0.015)	.	.
Lead Lenders' Credit Derivatives Postion	0.005***	0.005***	.	.
	(0.001)	(0.001)	.	.
CDS Trading*All Lenders' Credit Derivatives Position	.	.	-0.028**	-0.028**
	.	.	(0.013)	(0.013)
All Lenders' Credit Derivatives Position	.	.	0.004***	0.005***
	.	.	(0.001)	(0.001)
CDS Market Characteristics				
CDS Trading	-0.063***	-0.042***	-0.063***	-0.042***
	(0.011)	(0.013)	(0.011)	(0.013)
CDS Traded	.	-0.030***	.	-0.030***
	.	(0.007)	.	(0.007)
Intercept	0.488***	0.617***	0.487***	0.617***
	(0.017)	(0.012)	(0.017)	(0.012)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	43.95	44.12	42.45	42.93
Observations	6952	6952	6952	6952

Table VIII
Borrower Credit Quality and the Impact of CDS on Covenant Strictness

This table reports how borrower credit quality affects the impact of CDS trading on covenant strictness. The dependent variable is the strictness of net worth covenants scaled by industry-year volatility. The independent variables we are interested in are the interaction terms of *CDS trading* and dummies representing whether the borrowing firm has higher profitability, lower leverage, or higher Altman's Z-score, which are determined by the 50% breakpoints across all sample firms at the end of the quarter prior to loan initiation. *CDS Trading* is a dummy taking the value of one if there is an active CDS market referencing the borrower's debt at loan origination, and zero otherwise. *CDS Traded* is a dummy taking the value of one if the borrower has a CDS market on its debt at any time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. To conserve space we do not report all coefficients of control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

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

Variable	Model1	Model2	Model3	Model4	Model5	Model6
Borrower Credit Quality						
CDS Trading*High Profitability	-0.089***	-0.089***	.	.	.	.
	(0.009)	(0.009)	.	.	.	.
High Profitability	0.001	0.001	.	.	.	.
	(0.003)	(0.003)	.	.	.	.
CDS Trading*Low Leverage	.	.	-0.082***	-0.081***	.	.
	.	.	(0.010)	(0.010)	.	.
Low Leverage	.	.	-0.002	-0.002	.	.
	.	.	(0.004)	(0.004)	.	.
CDS Trading*High Z-score	.	.	.	.	-0.043***	-0.044***
	.	.	.	.	(0.011)	(0.011)
High Z-score	.	.	.	.	-0.008**	-0.006*
	.	.	.	.	(0.003)	(0.003)
CDS Market Characteristics						
CDS Trading	-0.022***	-0.019**	-0.032***	-0.008**	-0.061***	-0.038***
	(0.008)	(0.007)	(0.009)	(0.003)	(0.008)	(0.008)
CDS Traded	.	-0.032***	.	-0.032***	.	-0.032***
	.	(0.006)	.	(0.006)	.	(0.006)
Intercept	0.633***	0.619***	0.627***	0.614***	0.634***	0.621***
	(0.065)	(0.065)	(0.065)	(0.065)	(0.066)	(0.066)
Loan Characteristics Controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared (%)	38.93	39.64	38.62	39.32	37.18	37.86
Observations	6952	6952	6952	6952	6952	6952

Table IX
Borrower Information Transparency and the Impact of CDS on Covenant Strictness

This table reports how borrower information transparency affects the impact of CDS trading on covenant strictness. The dependent variable is the strictness of net worth covenants scaled by industry-year volaility. The independent variables we are interested in are the interactions of *CDS trading* and borrower information transparency measures. In columns 1 and 2, borrower information transparency is measured by *Borrower with Analyst Coverage*, a dummy representing whether the firm has earnings-per-share (EPS) estimates by equity analyst reported by I/B/E/S in the quarter prior to loan initiation. In columns 3 and 4, borrower information transparency is measured by *Large Number of Past Lenders*, a dummy taking one if the number of lenders participating in the past four loan issuances of the borrower scaled by the borrower size exceeds the 50% breakpoints of the same ratio among all borrowers in our sample in the same year. *CDS Trading* is a dummy taking the value of one if there is active CDS trading referencing the borrower's debt at loan origination, and zero otherwise. *CDS Traded* is a dummy taking one if the borrower ever has a CDS market on its debt at any time during the sample period, and zero otherwise. We use the same control variables as we use in the baseline regressions. To conserve space we do not report the coefficients of all control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
Borrower Information Transparency				
CDS Trading*Borrower with Analyst Coverage	-0.012**	-0.012**	.	.
	(0.005)	(0.005)	.	.
Borrower with Analyst Coverage	-0.003	-0.002	.	.
	(0.002)	(0.002)	.	.
CDS Trading*Large Number of Past Lenders	.	.	-0.029***	-0.028***
	.	.	(0.009)	(0.009)
Large Number of Past Lenders	.	.	0.003	0.002
	.	.	(0.002)	(0.002)
CDS Market Characteristics				
CDS Trading	-0.059***	-0.040***	-0.047***	-0.026***
	(0.006)	(0.006)	(0.009)	(0.009)
CDS Traded	.	-0.031***	.	-0.031***
	.	(0.004)	.	(0.003)
Intercept	0.631***	0.614***	0.625***	0.611***
	(0.052)	(0.052)	(0.052)	(0.051)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	42.60	43.71	43.19	43.71
Observations	6952	6952	6952	6952

Table X
Lender Renegotiation Incentives and the Impact of CDS on Covenant Strictness: "No-Restructuring" CDS

This table reports results of regressions that examine the impact of the "No-Restructuring" clause in CDS contracts on covenant strictness. The dependent variable is the strictness of net worth covenants. CDS contracts with "No-Restructuring" clause exclude debt restructuring from credit events that can trigger CDS repayment. Depending on the range of obligations that can be delivered in the triggered credit events, there are three other types of restructuring clauses in CDS contracts : full restructuring (FR), modified restructuring (MR), and modified-modified restructuring (MMR). In this table, the independent variable we are interested in is "No-Restructuring" ratio, which refers to the ratio of the number of outstanding CDS contracts containing "No-Restructuring" clause relative to the total number of all outstanding CDS contracts in the same borrower's debt in the quarter of loan initiation. *CDS Trading* is a dummy variable taking one if there is active CDS trading referencing the borrower's debt at loan origination, and zero otherwise. *CDS Traded* is a dummy variable if the borrower has CDS market at any time during the sample period, and zero otherwise. We use the same control variables as in the baseline regressions. To conserve space we do not report all coefficients of the control variables. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

OLS Regression: Dependent Variable = Covenant Strictness Scaled by Industry-year Volatility		
Variable	Model1	Model2
"No-Restructuring" CDS		
"No Restructuring" Ratio	-0.102^{***}	-0.103^{***}
	(0.029)	(0.029)
CDS Market Characteristics		
CDS Trading	-0.068^{***}	-0.044^{***}
	(0.006)	(0.007)
CDS Traded	.	-0.068^{***}
	.	(0.006)
Intercept	0.620^{***}	0.657^{***}
	(0.052)	(0.054)
Loan Characteristics Controls	Yes	Yes
Borrower Characteristics Controls	Yes	Yes
Year Fixed Effects	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes
R-squared (%)	42.72	43.75
Observations	6952	6952

Table XI
Impact of Borrower CDS on the Number of Bond Covenants

This table reports regression results of the impact of CDS trading on the number of bond covenants. Panel A reports the baseline regressions of the full sample of public bonds. Panel B reports the results of the matched sample of public bonds. Models 1 and 2 report the OLS regression results. Models 3 and 4 report the Poisson regression results. The dependent variable is the number of covenants included in each bond issue. Bond covenant information is extracted from Mergent Fixed Income Securities Database (FISD). Following the spirit of Smith and Warner (1979) we group all bond covenants into 11 categories. Covenants that belong to the same category are regarded as one covenant. In Panel B, the matched sample is formed based on nearest neighborhood matching on propensity scores. The propensity scores are obtained from estimating a probit model in which the dependent variable is *CDS Trading*, a dummy taking one if there are CDS contracts referencing the issuer's debt in the quarter of bond issuance, and zero otherwise. The explanatory variables include one quarter lag of the following: logarithm of total assets, market-to-book, current ratio, profitability, cash-to-total assets ratio, leverage, the logarithm of (1 + fixed charge coverage), tangibility, Z-score, excess stock return and the logarithm of stock return volatility. We select from the non-CDS firms in the same 2-digit SIC industry the one with the nearest propensity score to CDS firm, then we extract bonds of the selected non-CDS firm issued in the same year as the treatment firm to form the control group of bonds. The independent variable we are interested in is *CDS Trading*, a dummy taking one if there is an active CDS market referencing the issuer's debt at bond issuance, and zero otherwise. *CDS Traded* is a dummy taking 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. *Issue Size* refers to the initial amount of each bond issue. *Not Rated* is a dummy indicating the bond issue is not rated by a public rating agency. Bond issuer characteristics variables take their value at the end of the quarter prior to bond issuance. All specifications include bond issuance year and issuer industry fixed effects. 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 for variable definitions.

Panel A. Full Sample Results				
Dependent Variable = Number of Bond Covenants				
	OLS Regression		Poisson Regression	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.376***	-0.172*	-0.105***	-0.063*
	(0.091)	(0.092)	(0.029)	(0.034)
CDS Traded	.	-0.387***	.	-0.075**
	.	(0.121)	.	(0.033)
Bond Characteristics				
Log (Issue Size)	0.313***	0.309***	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	0.073	0.062	0.021	0.019
	(0.063)	(0.063)	(0.025)	(0.025)
Issuer Characteristics				
Log (Total Assets)	-0.436***	-0.406***	-0.150***	-0.143***
	(0.039)	(0.041)	(0.013)	(0.013)
Current Ratio	0.160***	0.153***	0.044***	0.043***
	(0.048)	(0.048)	(0.014)	(0.014)
Leverage	1.605***	1.549***	0.375***	0.366***
	(0.417)	(0.419)	(0.126)	(0.126)
Market-to-Book	-0.147***	-0.138***	-0.050***	-0.047***
	(0.044)	(0.044)	(0.015)	(0.015)
Profitability	-7.110***	-6.178***	-1.792**	-1.610**
	(2.373)	(2.390)	(0.773)	(0.778)
Cash/Total Assets	1.052	0.999	0.270	0.258
	(0.718)	(0.721)	(0.170)	(0.170)
Log (1+Fixed Charge Coverage)	-0.221**	-0.189**	-0.061***	-0.048**
	(0.097)	(0.082)	(0.020)	(0.020)
Tangibility	0.693	0.442	-0.107	-0.137
	(0.528)	(0.484)	(0.157)	(0.159)
Z-score	-0.009	-0.011	-0.003	-0.004
	(0.008)	(0.008)	(0.003)	(0.003)
Intercept	3.356***	3.258***	1.210***	1.176***
	(0.760)	(0.760)	(0.230)	(0.230)
Year Fixed Effects	Yes	Yes	Yes	Yes
Issuer Industry Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	39.42	39.92	36.42	37.55
Observations	8935	8935	8935	8935

Panel B. Matched Sample Results				
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
	(0.069)	(0.110)	(0.005)	(0.043)
CDS Traded	.	-0.557***	.	-0.184***
	.	(0.177)	.	(0.043)
Bond Characteristics				
Log (Issue Size)	0.198*	0.160	0.071**	0.058*
	(0.115)	(0.108)	(0.030)	(0.030)
Maturity	-0.002	-0.003	-0.001	-0.001
	(0.005)	(0.005)	(0.002)	(0.002)
Not Rated	0.114	0.102	0.038	0.038
	(0.141)	(0.136)	(0.042)	(0.042)
Issuer Characteristics				
Log (Total Assets)	-0.489***	-0.354***	-0.160***	-0.115***
	(0.084)	(0.088)	(0.024)	(0.026)
Current Ratio	0.299***	0.317***	0.088***	0.092***
	(0.106)	(0.103)	(0.024)	(0.024)
Leverage	0.539	0.966	0.179	0.328
	(0.863)	(0.797)	(0.213)	(0.216)
Market-to-Book	-0.122	-0.054	-0.046	-0.023
	(0.134)	(0.125)	(0.029)	(0.029)
Profitability	-5.932	-8.595*	-1.958*	-2.893**
	(4.880)	(4.600)	(1.187)	(1.208)
Cash/Total Assets	1.648	1.392	0.457	0.384
	(1.045)	(0.993)	(0.292)	(0.293)
Log (1+Fixed Charge Coverage)	-0.220**	-0.185**	-0.060***	-0.050**
	(0.098)	(0.091)	(0.020)	(0.020)
Tangibility	0.001	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)
Z-score	0.031	-0.015	0.010	-0.005
	(0.096)	(0.090)	(0.019)	(0.019)
Intercept	5.288***	5.042***	1.766***	1.680***
	(1.526)	(1.451)	(0.440)	(0.441)
Year Fixed Effects	Yes	Yes	Yes	Yes
Issuer Industry Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	38.09	40.03	36.11	38.03
Observations	6386	6386	6386	6386

Internet Appendix to

"Does Credit Protection Lower the Value of Creditor Control Rights?"

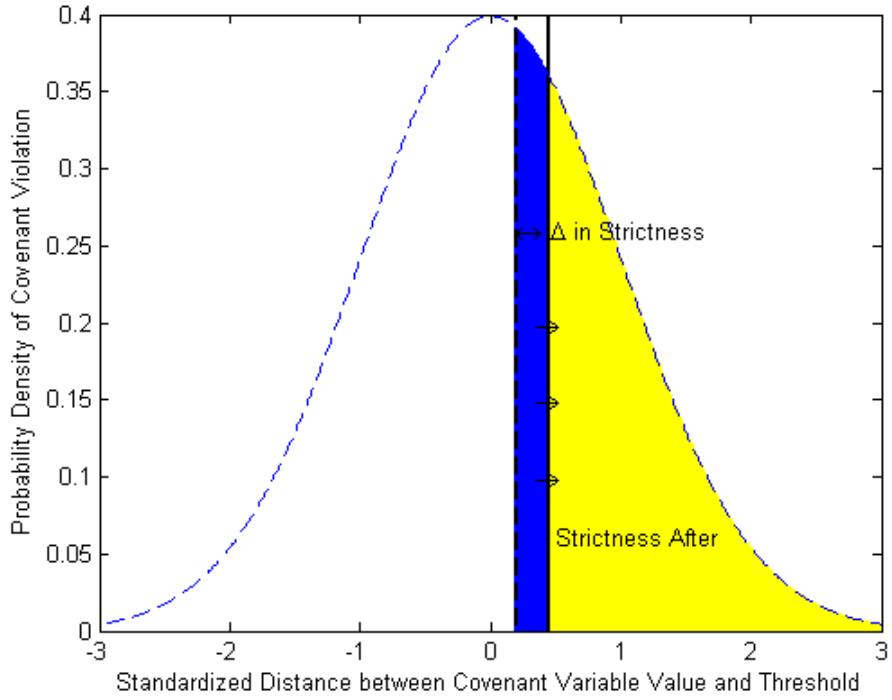

Figure IA.1. Change in Covenant Strictness for Loans Issued before and after CDS Introduction
This figure illustrates the average change in covenant strictness after CDS introduction. The y-axis represents the probability of covenant violation in the quarter following loan initiation. The vertical dash line represents the normalized distance $((w - \underline{w}_1)/\sigma)$ between the logarithm of the minimum level of net worth specified in net worth covenants ($\underline{w}_1$) and the logarithm of the current value of net worth at loan initiation (w), scaled by the volatility of the changes in the covenant variable by industry-year or by 3-year rolling window at firm-level (σ), for firms that borrowed before CDS trading is introduced. The vertical solid line represents the normalized distance $((w - \underline{w}_2)/\sigma)$ for firms that borrowed after CDS trading is introduced ($\underline{w}_2$ is the new covenant threshold). By construction, the shadow area represents covenant strictness calculated as 1 - Φ $(\frac{w-\underline{w}}{\sigma})$. Shadow area to the right of the dash line represents covenant strictness before CDS introduction. Shadow area to the left of the solid line (yellow area) represents covenant strictness after CDS introduction. The blue area represents the change in covenant strictness. (Note: This figure is to illustrate the construction of the strictness measure and is not plotted by real numbers.)

Table IA.1
Impact of CDS on Covenant Strictness: Tobit Regressions

This table reports the baseline difference-in-differences Tobit regression results of the effects of CDS trading on covenant strictness. The dependent variable is the net worth covenant strictness scaled by industry-year volatilities of net worth for models 1 and 2; the dependent variable is the net worth covenant strictness scaled by firm-level net worth volatilities using 3-year rolling windows for models 3 and 4. The independent variable we are interested in is *CDS Trading*, a dummy variable taking one if there are CDS contracts referencing the borrower's debt at loan initiation, and zero otherwise. *CDS Traded* is a dummy variable taking the value of one if the borrower has a CDS market at any time during the sample period, and zero otherwise. We include the same control variables as in the baseline regressions. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 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
Intercept	0.573***	0.566***	0.397***	0.405***
	(0.008)	(0.008)	(0.023)	(0.023)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
Pseudo R-squared (%)	30.44	31.56	11.33	9.51
Observations	6952	6952	6952	6952

Table IA.2
First Stage Regressions of the Instrumental Variable Approach

This table shows the first-stage OLS regression of CDS trading. The sample is composed of loans in Dealscan with the instrumental variable and financial information available. The dependent variable is *CDS Trading*, a dummy taking one if there are CDS contracts referencing the borrower's debt in the quarter of loan initiation. The instrumental variables are *FX Derivatives Position* and *Lender's Distance to NY*. *FX Derivatives Position* is the amount of foreign exchange derivatives used for hedging purposes (not trading) relative to the total amount of loans of the syndicate lead banks that the firm has 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 and bank holding companies. *Lender's Distance to NYC* is the geographic distance between the location of the headquarter office of the lead lender and the New York City. Other explanatory variables are extracted at the end of the quarter prior to loan origination. Excess stock return and stock return volatility are calculated from monthly stock returns. The first stage regression includes year and industry fixed effects. Following Ashcraft and Santos (2009), Saretto and Tookes (2013), and Subrahmanyam, Tang and Wang (2014), we form the sample by keeping loans for CDS-referenced firms originiated from 1994 until the first quarter when CDS trading started, and all loans issued by the non-CDS borrowers. 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 for variable definitions.

OLS Regression: Dependent Variable = CDS Trading			
Variable	Model1	Model2	Model3
Instruments for CDS Trading			
FX Derivatives Position	5.957***	.	5.851***
	(0.584)	.	(0.581)
Lender's Distance to NYC	.	-1.142***	-1.129***
	.	(0.087)	(0.087)
Other Explanatory Variables			
Log (Total Assets)	0.121***	0.069***	0.068***
	(0.002)	(0.005)	(0.005)
Market-to-Book	11.943***	16.684***	15.841***
	(1.876)	(1.894)	(1.889)
Cash-to-Total Assets	0.089*	0.084*	0.077
	(0.051)	(0.051)	(0.051)
Excess Stock Return	-0.022***	-0.027***	-0.026***
	(0.006)	(0.006)	(0.006)
Log (Stock Return Volatility)	0.072	-0.154***	-0.148***
	(0.057)	(0.057)	(0.057)
Intercept	-0.693***	0.686***	0.683***
	(0.047)	(0.116)	(0.116)
Year Fixed Effects	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes
F-Statistics	95.61***	88.10***	88.72***
Hansen's J-Statistics	NA	NA	0.665
R-squared (%)	38.56	38.86	39.31
Observations	13764	11061	11061

Table IA.3
Matched Sample Diagonotics: Nearest Neighbor Matching on Propensity Scores

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. The matching is based on the propensity of CDS trading estimated from a probit model, in which the dependent variable is *CDS Trading*, a dummy taking one if there are CDS contracts referencing the borrower's debt in the quarter of loan initiation, and the explanatory variables include the instruments and other explanatory variables we use in Internet Appendix Table IA2. Then we select the one from non-CDS firms in the same 2-digit SIC industry with the nearest propensity score to the CDS firm as the matching firm. We extract loans issued by the matching firms in the same year as the matched CDS firms to form to control group of loans. CDS firms refer to firms that ever have a CDS market referencing its debt at any time during the sample period. Non-CDS firms refer to firms that never have a CDS market during the sample period. Borrower characteristic variables take the value at the end of the quarter prior to loan initiation. The numbers in the first column are the mean of the differences in the corresponding variables between CDS and non-CDS firms before matching. The numbers in the second column are the mean of the differences in the corresponding variables between CDS firms and their one-on-one matched firms. *Loans with Net Worth Covenants* reports the differences in the percentage of loans with a net worth covenant out of all loans issued to CDS firms and non-CDS firms. ***, **, and * represent significance level of 1%, 5% and 10% level, respectively, at which the differences are statistically different from zero. See Appendix for variable definitions.

Variable	Before Matching (CDS Firm - Non-CDS Firm)	After Matching (CDS Firm - Non-CDS Firm)
Loan Amount ($Million)	604.611***	134.654***
Maturity (Years)	−0.330***	−0.042***
Loans with Net Worth Covenants	−0.042***	0.006
Number of Lenders/Loan	10.053***	−0.049
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.4
CDS Endogeneity Control: Caliper Matching on Propensity Scores

This table reports the covenant strictness regression results with the matched sample, which is formed based on the caliper matching on propensity scores. We estimate a probit model to obtain the propensity scores of CDS trading for each loan observation. The bandwidth for Caliper matching is 0.25 times the standard deviation of the propensity scores. For columns 1 and 2, the explanatory variables include the one quarter lag of the following: past lender's foreign exchange derivative position for hedging purpose, the logarithm of borrower's total assets, book leverage, current ratio, cash-to-total assets, profitability, fixed charge coverage, the ratio of tangible assets to total assets, Z-score, equity analyst coverage, excess stock return, and the logarithm of stock market volatility. For columns 3 and 4, the explanatory variables *also* include the variable measuring the geographic distance between the headquarter office of the lead lender and the New York City. When there are multiple lead lenders in the loan syndicate, we take the average of the geographic distance between lenders' headquarter location to the NYC. 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 there are CDS contracts referencing the borrower's debt in the quarter of loan initiation, 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. Other variables are the same as we use in the baseline regressions. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

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

	Prediction Model1		Prediction Model2	
Variable	Model1	Model2	Model3	Model4
CDS Market Characteristics				
CDS Trading	-0.025**	-0.034***	-0.023*	-0.032***
	(0.012)	(0.011)	(0.012)	(0.011)
CDS Traded	.	0.013	.	0.012
	.	(0.010)	.	(0.010)
Intercept	0.651***	0.661***	0.664***	0.673***
	(0.053)	(0.057)	(0.050)	(0.053)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	42.16	42.45	43.52	43.76
Observations	2711	2711	2711	2711

Table IA.5
Impact of Borrower CDS on Covenant Strictness: Restricted Sample of Loans by Skipping Short Windows

This table shows the regression results of the effects of CDS trading on covenant strictness with a restricted sample of loans. We exclude loans issued within short windows immediatelly after CDS introduction to alleviate endogeneity concern. Specifically, we exclude loans issued within one year after first CDS introduction in models 1 and 2, loan issued within two years in models 3 and 4, and loan issued within three years in models 5 and 6. We are interested in the coefficients of *CDS Trading*, a dummy variable taking the value of one if there are CDS contracts referencing the borrower's debt at loan origination, and zero otherwise. *CDS Traded* is a dummy variable if the borrower has CDS market at any time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 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)
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)
Loan Characteristics						
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Characteristics						
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Borrower Industry Fixed						
Effects	Yes	Yes	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	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.6
Impact of Borrower CDS on Covenant Strictness: Within-Bank Analysis

This table reports the baseline difference-in-differences regression results of the impact of CDS trading on covenant strictness of restricted samples. Panel A restricts the sample to loans from banks that lend to both CDS and non-CDS firms during the sample period. Panel B further restricts the sample to loans from banks that lend to CDS firms both before and after CDS introduction. The dependent variable is the net worth covenant strictness. Columns 1 and 3 report OLS regression and columns 2 and 4 report Tobit regression. We estimate two alternative measures of volatilities of the changes in net worth 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 taking the value of one if there are CDS contracts referencing 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 time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

Panel A. Sub-sample of Loans from 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)
Intercept	0.478***	0.541***	0.253***	0.249***
	(0.019)	(0.011)	(0.046)	(0.035)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	42.88	43.21	11.18	11.37
Observations	5134	5134	5134	5134

Panel B. Sub-sample of Loans from 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**	-0.031*	-0.003	-0.049**
	(0.005)	(0.017)	(0.007)	(0.018)
Intercept	0.281***	0.379***	0.493***	0.543***
	(0.055)	(0.051)	(0.027)	(0.026)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	44.16	44.32	14.44	14.53
Observations	4936	4936	4936	4936

Table IA.7
Lender Credit Derivatives Activities and the Impact of Borrower CDS on Covenant Strictness: Top 25 Banks

This table reports the regression results of the impact of lenders' credit derivatives positions on the effects of CDS on covenant strictness for the top 25 banks active in credit derivatives trading. The dependent variable is the strictness of net worth covenants scaled by industry-year volatility. The independent variables we are interested in are the interaction terms of CDS trading and the lender's positions in credit derivatives trading (in $trillion). Banks' credit derivatives trading data are from the Office of the Comptroller of Currency (OCC)'s quarterly report on bank's derivatives activities. In models 1 and 2, we interact CDS trading with the lead lenders' credit derivatives positions in the quarter of loan initiation. In models 3 and 4, we interact CDS trading with the aggregated credit derivatives positions of all lending banks in the loan syndicate. *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 time during the sample period, and zero otherwise. Other control variables are the same as we use in the baseline regressions. All specifications include loan purpose, loan origination year and borrower industry fixed effects. 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 for variable definitions.

OLS Regression: Dependendent Variable = Covenant Strictness Scaled by Industry-year Volatility				
Variable	Model1	Model2	Model3	Model4
Lender Credit Derivatives Position				
CDS Trading*Lead Lenders'	-0.035***	-0.035***	.	.
Credit Derivatives Positions	(0.014)	(0.014)	.	.
Lead Lenders' Credit	0.007***	0.007***	.	.
Derivatives Postions	(0.002)	(0.002)	.	.
CDS Trading*All Lenders'	.	.	-0.034**	-0.034**
Credit Derivatives Positions	.	.	(0.014)	(0.014)
All Lenders' Credit	.	.	0.007***	0.007***
Derivatives Positions	.	.	(0.003)	(0.003)
CDS Market Characteristics				
CDS Trading	-0.045***	-0.039**	-0.045***	-0.039**
	(0.017)	(0.019)	(0.017)	(0.019)
CDS Traded	.	-0.008	.	-0.008
	.	(0.015)	.	(0.015)
Intercept	0.531***	0.528***	0.528***	0.525***
	(0.036)	(0.037)	(0.037)	(0.037)
Loan Characteristics Controls	Yes	Yes	Yes	Yes
Borrower Characteristics Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Borrower Industry Fixed Effects	Yes	Yes	Yes	Yes
Loan Purpose Fixed Effects	Yes	Yes	Yes	Yes
R-squared (%)	52.31	52.34	52.31	52.48
Observations	1004	1004	1004	1004

Table IA.8
Distribution of the Bond Sample

This table describes the distribution of the bond issues from 1994 to 2009 by year. Panel A reports covenants and other characteristics of bonds averaged across all bond issuance in our sample. Panel B reports covenants and other characteristics of bonds averaged across bonds issued by firms that have CDS contracts referencing its debt at bond issuance. Column 2 reports the total number of corporate bond issues reported in Mergent Fixed Income Securities Database (FISD). Column 3 reports the average offering amount of each issue in $million. Column 4 reports the average maturity in years at issuance. Column 5 reports the average yield spread. The bond rating variable ranges from 1 to 27 as reported in FISD. A larger number represents lower credit quality of the bond issue. Column 7 reports the average number of covenants of each issue. 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 as the number of bond covenants for each bond issue.

Panel A. Bonds Issued by All Sample Firms

Year	Number of Issues	Issue Amount ($Million)	Maturity (Years)	Yield (%)	Rating	# of Covenants
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1994	298	170.0	11.5	7.992	19.8	3.2
1995	442	170.3	12.5	7.795	16.9	3.0
1996	519	202.1	12.5	7.544	15.7	3.1
1997	618	214.1	12.6	7.452	17.0	3.1
1998	836	259.7	12.3	6.988	15.5	3.2
1999	590	351.1	10.8	7.319	17.0	3.2
2000	488	473.2	8.4	7.770	19.0	2.7
2001	604	537.6	10.5	6.445	18.7	2.8
2002	542	441.9	10.0	6.114	13.1	2.7
2003	644	441.2	11.1	4.902	15.2	2.4
2004	625	357.6	11.8	4.976	19.4	2.5
2005	506	386.5	12.1	5.437	20.0	2.7
2006	530	508.5	11.8	5.939	17.3	2.6
2007	693	549.1	12.1	5.667	18.5	2.5
2008	428	662.9	11.4	6.239	19.3	2.3
2009	572	593.0	9.7	6.430	17.4	2.4
Total	8935	347.7	12.1	7.108	19.0	2.7

Panel B. Bonds Issued by CDS Firms						
Year	Number of Issues	Issue Amount ($Million)	Maturity (Years)	Yield (%)	Rating	# of Covenants
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1997	6	243.9	7.7	5.811	5.8	2.7
1998	75	415.7	14.2	6.563	11.0	2.3
1999	85	655.9	10.2	6.821	12.2	2.3
2000	153	598.3	7.8	7.711	15.9	2.5
2001	247	655.3	10.6	6.414	17.3	2.4
2002	321	578.7	10.7	5.907	9.6	2.3
2003	388	531.0	11.4	4.849	11.4	2.3
2004	313	510.9	10.8	4.906	14.2	2.4
2005	263	543.1	11.8	5.403	14.9	2.6
2006	353	639.6	11.8	6.095	13.3	2.5
2007	397	734.3	12.7	5.879	12.9	2.5
2008	277	803.5	12.0	6.318	15.4	2.4
2009	426	668.0	9.9	6.316	15.5	2.4
Total	3304	626.3	11.2	5.867	13.6	2.4