Has the development of the structured credit market affected the cost of corporate debt?

Adam B. Ashcraft*

Research Department
Federal Reserve Bank of New York
33 Liberty St.
New York, NY 10045
E-mail: adam.ashcraft@ny.frb.org

João A. C. Santos*

Research Department
Federal Reserve Bank of New York
33 Liberty St.
New York, NY 10045
E-mail: joao.santos@ny.frb.org

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Abstract

The rapid development of structured credit markets permits investors to assume credit risk that in aggregate is frequently many times larger than the amount of debt actually issued by an underlying borrower. Given the apparent increased appetite for corporate credit risk by investors, and the additional information revealed in the structured credit markets, a natural question to ask is whether the development of these markets has been associated with a reduction in the cost of debt financing, giving firms an opportunity to operate with greater leverage. Using Markit data identifying when trading in credit default swaps begins for each borrower, we fail to find any evidence of that CDS trading has an impact on syndicated loan spreads or non-price terms for the average firm. However, we document evidence that CDS trading helps borrowers issue syndicated loans more frequently and take on more leverage relative to a matched sample of untraded firms, consistent with an increase in credit supply.

1 Introduction

During the last decade, credit derivatives have become important instruments to lay off or take on credit risk. From a total notional amount of $600 billion in 1999, the credit-derivatives market grew to $17 trillion by 2006. To date, most of the research on credit derivatives has focused on the price determinants of these contracts. In this paper, we focus instead on the potential effects of the development of the credit derivatives market on the underlying entities of these contracts. Given that credit derivatives provide investors with new risk diversification opportunities, a natural question to ask is whether firms with credit default swaps have benefited from a reduction in the cost of the external funding they raise after their CDSs start to trade.

Single-name credit default swaps (CDSs) are the most liquid of the several credit derivatives currently traded and form the basic building blocks for more complex structured credit products.[1] A single-name CDS is an instrument that provides its buyer with a lump sum payment made by the seller in the case of default (or other credit event) of an underlying reference entity.[2] If there is no default event before the maturity of the contract, the protection seller pays nothing. The protection seller charges a fee for the protection it offers the buyer of the CDS. This fee, which is usually expressed as an annualized percentage of the notional value of the transaction, is recorded as the CDS rate and is paid until default or maturity, whichever is first.[3]

The CDS contract is commonly based on the agreement prepared by the International Swaps and derivatives Association (ISDA), an association of market participants. In particular, the contract outlines the legal definition of the situations where the protection seller needs to compensate the protection buyer, namely the "credit event". The five situations usually included in the contract that give rise to compensation by the seller are: If the reference entity fails to meet payment obligations when they are due; bankruptcy; repudiation or moratorium (for sovereign entities); material adverse restructuring of debt; acceleration or default obligation. If default occurs, the buyer is compensated for the loss (possibly hypothetically) incurred as a result of the credit event. When this happens, the default swap can be settled in one of two ways. The default payment is either repayment at par against physical delivery of a reference

[1] Other basic credit derivatives include total return swaps, where the return from one asset or group of assets is swapped for the return on another, and credit spread options, which are options on the spread between the yield earned on two assets. See Fitch (2005) for a detailed survey of the credit derivatives market.

[2] A default swap only pays out if the reference entity defaults; reductions in value unaccompanied by default do not compensate the buyer in any way. Also, the default event must be verifiable by publicly available information or an independent auditor.

[3] Should a default event happen, the accrued fee is also paid.

asset (physical settlement) or the notional amount minus the post-default market value of the reference asset determined by a dealer poll (cash settlement).[4] Either way, the value of the buyer's portfolio is restored to the initial notional amount.

The strong growth of the credit derivatives market in recent years has transformed the corporate debt market for at least two reasons. First, CDSs have become benchmarket instruments in the price discovery process in these markets. The CDS market price is a comparatively clean measure of the spread required by investors to bear a firm's default risk. The diversity of individual bond features such as seniority, coupon structure and embedded options together with the fact that many investors follow a buy and hold strategy have contributed to comparatively low liquidity in the corporate bond market, and consequently to the presence of a liquidity premia in corporate bond spreads. In contrast, the homogeneity of CDS contracts coupled with the low transaction costs and a large and heterogeneous set of market participants have led to a comparatively high liquid CDS market. Further, the fact that the CDS market gives investors new opportunities to trade risk which are not present in the bond or the secondary market for loans has also helped it to become a forum within which an important portion of the price discovery takes place.[5] As is apparent from our description of a CDS, this instrument functions like a traded insurance contract against the losses arising to its creditors from a firm's default. The legal distinction between a CDS and an insurance contract comes from the fact that it is not necessary to hold an insured asset (eg the underlying bond or loan) in order to claim compensation under a CDS. Thus, speculators can take long (short) positions in credit risk by selling (buying) protection without needing to trade the cash instrument. It is hard to replicate this in the secondary loan or even the bond market (more on this next).

Second, CDSs arguably provide the easiest way to trade credit risk. Many corporate bonds are bought by investors who hold them to maturity (Alexander, Edwards and Ferri (1998)). Secondary market liquidity is therefore often poor making the purchase of large amounts of credit risk difficult and costly (Schultz (1998)). Further, credit derivatives are a viable way to short corporate credit risk. The lack of a market for repurchase agreements (repos) for most corporates makes shorting bonds unfeasible. Even if a bond can be shorted on repo, investors can only do so for relative short periods of time (one day to one year), exposing them to changes in the repo rate. On the other hand, credit derivatives, especially

[4]Physical delivery is the dominant form of settlement in the market. The delivery of obligations in case of physical settlement can be restricted to a specific instrument, though usually the buyer may choose from a list of qualifying obligations, as long as they rank pari passu with (have the same seniority as) the reference obligation. This latter feature is commonly referred to as the delivery option.

[5]Diamond and Verrecchia (1987), for example, show that in the presence of short-sales constraints, good and particularly bad news is impounded into the price more slowly than in the absence of constraints.

credit default swaps, allow investors to go short credit risk at a known cost for long time spans: default swaps with maturities of up to 10 years can be easily contracted, but liquidity rapidly decreases for longer terms.

Despite the new opportunities that CDS offer investors, and potentially also to firms, to date, the empirical research on CDSs has focused almost exclusively on the pricing of these instruments.[6] For example, the available evidence showing that CDSs' prices are an important source of new information on the firm may have implications for firms. Blanco et al. (2005) find that CDS spreads lead bond spreads and Hull et al. (2004) find that the CDS market anticipates credit rating events. The new information that comes with CDSs' trading could in principle reduce the informational advantages banks often have over their borrowers and consequently reduce the cost of bank funding for firms with CDS that trade. As Rajan (1992) notes, banks have more incentive to monitor borrowers than does dispersed "arm's length" debt, but the private information which banks gain through monitoring allow them to "hold up" borrowers – if the borrower seeks to switch to a new funding source, it is pegged as a lemon regardless of its true financial condition. Granted, even though CDSs' prices are a new source of information, the informational advantage banks may have on borrowers that are candidates to have CDSs contracts that trade may not be large. Because the reference assets of most of these contracts are bonds, the reference entities of these contracts are usually listed firms with public bond and thus subject to the scrutiny of the stock and bond markets as well as of credit rating agencies and bond analysts.

More importantly, the new opportunities that the market for CDSs offer investors to trade credit risk may be a source of gains to firms. Even though CDSs are security specific, a firm that has a trading CDS in essence has given its investors added opportunities to diversify their exposure to the firm. Everything else equal, this should make it easier and less costly for firms with traded CDSs to issue in the public bond market again. Given the aforementioned limitations of the bond market to diversify risk, in contrast with the previous information effect of CDSs, this effect may give rise to significant gains to firms. These gains may be particularly important during downturns where investors shy away from the bond market and bond spreads increase significantly.[7] Similarly, these new diversification opportunities should make it easier and less costly for firms with traded CDSs to borrow from banks. Given that the secondary market for loans is still small and the inherent difficulties banks face to sell their loans the

[6]See, for example, Cossin et al. (2002), Zhang (2003), Houweling and Vorst (2004), Norden and Weber (2004), Hull, Predescu, and White (2004), Ericsson et al. (2004 and 2005), Longstaff, Mithal, and Neis (2004), Zhang et al. (2005), Berndt et al. (2004), and Blanco et al. (2005).

[7]For evidence on the impact of the state of the economy on bond credit spreads see Santos (2005), Bernanke (1993) and Fama and French (1989).

CDS' market provides an alternative forum for banks to lay off risk giving them opportunities to extend credit to these firms at lower interest rates.

Our results document that trading in credit derivatives is followed by an increase in syndicated loan issuance and firm leverage that is plausibly related to supply. In this draft we are unable to find any evidence that this increase in supply is being driven by spreads or non-price terms on syndicated bank loans. The next draft of the paper will investigate the impact of credit derivatives trading on the supply of corporate bond credit.

The remainder of our paper is organized as follows. The next section outlines the data sets and sample restrictions used in our analysis. Section 3 documents the impact of CDS on the cost of syndicated bank lending. Section 4 concludes the paper.

2 Data and sample characterization

The data for this project are combined from several sources. We start with the universe of publicly-traded non-financial firms in the quarterly CRSP-Compustat database. In addition to information on borrower income and condition from Compustat, we rely on the long-term credit rating as a proxy for firm risk. CRSP data is used as source of information on firms' stock prices and number of shares outstanding during our sample period. These publicly-traded firms are matched to historical information on actual and implied equity market volatilities using Optionmetrics, and to historical information on analyst coverage and the standard deviation of earnings forecasts from IBES. Each of the variables used in the analysis from these data sets is windsoriszed at the 5th and 95th percentiles in order to mitigate the influence of outliers on results.

We use a data set from Markit in order to measure the onset of trading in credit derivatives for a reference entity. The underlying data provides daily market CDS spreads on a number CDS traded in different currencies, maturities, and documentation clauses for each borrower. We identify the first date for each borrower that a dollar-denominated contract is traded at a five-year maturity, and use this date the onset of trading. After tedious hand-matching the Markit data to CRSP-Compustat, we have 501 firms that become traded in the CDS market over our sample period.

We rely on the Loan Pricing Corporation's (LPC) Dealscan database in order to document the borrowing activity of firms with CDSs. This database contains information on some non-syndicated loans, but most of its entries are syndicated loans. It goes as far back as the beginning of the 1980s, but in the first part of that decade the database has a somewhat reduced number of entries. However, its comprehensiveness has increased steadily over time. We also use this database to obtain information on individual loans, including their date, purpose

and type, spread over Libor, maturity and seniority status, and to collect information on the lending syndicate, including the identity and number of banks in the syndicate. We focus on revolving loan issues, which we aggregated by firm-quarter, using loan size as a weight.

Finally, we use the Securities Data Corporation's (SDC) Domestic New Bond Issuances database to determine the bond issuance activity of our firms that have traded CDSs both before and after their CDSs start to trade. This database contains information on virtually all public bonds issued in the United States since 1970. We also use this database to identify the non-convertible bonds issued by these firms, and to gather information on these bonds, including their date of issue, their gross and ex ante yield spreads, their maturity and credit rating, and their underwriters.

2.1 Loan Sample characterization

Our analysis in this draft focuses on the impact of credit derivativs on the syndicated loan market for two reasons. First, most firms that issue public bonds end up being traded in the credit derivatives market by the end of the sample, which makes it difficult to construct a meaningful control sample that could plausibly identify the counterfactual outcomes of the traded firms in absence of trading. This issue cannot be understated as existing research has documented that sample selection issues are important in identifying the impact of trading on outcomes. The second issue is that corporate bond spreads are much more noisy than syndicated loan spreads, in part due to the greater optionality of bonds which is not well-documented in the SDC data. It is not rare to find firms with speculative-grade credit ratings to be issuing debt at a negative spread. We will nonetheless develop strategies to deal with these issues in a future draft of the paper, recognizing in some sense that the corporate bond market is likely to be first place where credit derivatives have an impact.

We start with the subset of firms that are ever traded in the CDS market according to Markit. We remove the 114 firms that start trading in the first quarter of 2001 when the Markit data begins because we are not sure if trading actually begins during the quarter or if this is the first time that the CDS dealers decided to keep data for these firms. This leaves us with 387 traded firms. This sample is merged with LPC Dealscan, and we focus our analysis on traded firms that issue one loan in the 12 quarters before trading and another loan in the eight quarters after trading. This sample restriction leaves us with 159 traded firms. Finally, in order to ensure that there are enough borrowers in each risk bucket, we restrict the analysis to firms that had a credit rating of no better than $A+$ or no worse than $B-$ in the quarter before trading. This leaves us with a sample of 148 traded firms corresponding to 461 firm-quarters of loan issuance.

Next, we merge the sub-sample of 1660 firms that are never traded in the CDS market

with the sub-sample of revolving loan issues in LPC Dealscan in order to identify firm-quarters when these firms borrowed in the previous 12 quarters and in the next eight quarters. This leaves us with a sample of 475 untraded firms. We also impose the restriction in this sample that the firm had a credit rating of no better than $A+$ or no worse than $B-$ in the quarter before trading. This leaves us with a sample of 186 untraded firms.

A natural challenge in our analysis is dealing with the possibility that the onset of trading is a non-random event. Existing research on the introduction of options on the equity market documents that trading in equity derivatives is followed by an increase in volatility, but note that effect is largely driven by sample selection. For example, see Mayhew and Mihov (2004). In order to mitigate the impact that this problem has on our ability to analyze the impact of trading, we implement the matched sample methodology developed in this literature, and successfully implemented in Ashcraft and Rosenberg (2006) who analyze the impact of credit derivatives trading on equity market efficiency and liquidity.

We start with our sample of traded firms, but only keep firm-quarters from the first quarter of 2001 until trading starts. To this sample we add the 186 untraded firms meeting sample restrictions. Using this data, we estimate a probit model where the dependent variable is a dummy variable if the firm becomes traded in the current quarter and explanatory variables include multiple lags of firm controls meant to predict the onset of trading. Using estimated coefficients from this Probit model, we build a sub-sample the untraded firms, assigning counterfactual trading dates using those firms with the highest predicted probability of trading in each quarter that trading starts. We are left with a sample of 134 firms corresponding to 222 firm-quarters of loan issuance, which we will refer to as the "matched sample".

Table 1 characterizes our sample of traded firms, comparing these firms before and after credit derivatives start to trade. The table reports unweighted means of each variable listed by row for firm-quarters of issuance before trading in the first column and after trading in the second column. The third column reports the change while the fourth column reports the p-value for a t-test that this change is statistically equal to zero. The top panel of the table documents a deterioration in firm performance after trading, as there is a reduction in the market-to-book ratio (MKTOBOOK), an increase in the fraction of firms with lower credit ratings, an increase in the log of equity market volatility (LSTOCKVOL). The bottom panel of the table documents that lenders reacted to this deterioration in performance by adjusting terms, as reflected by an increase in spread (LOANSPREAD), an increase in the fraction of loans with dividend restrictions (DIVRESTRICT) or security (SECURED) or a guarantor (GUARANTOR).

Table 2 compares the sample of matched firms to those from the sample of traded firms in the quarter before trading starts, either real or assigned. The top panel documents

that firms in the traded sample are much larger (LSALES) and have better credit ratings than the matched sample, but have lower market-to-book ratios (MKTBOOK) than firms in the traded sample. Importantly, note that both samples of firms have comparable leverage ratios. The bottom panel documents that lenders respond to these differences with loan terms, as spreads are much higher for the matched sample firms, who are also more likely to face dividend restrictions (DIVRESTRICT) or be required to post collateral (SECURED) or have a guarantor (GUARANTOR).

3 Credit derivatives and the cost of bank funding

In this section we present the results of our investigation on the potential effects of CDS trading on the cost of bond funding. We first discuss whether firms with CDSs contracts that trade benefit from a reduction in the interest rates on their loans. Then we discuss whether CDS trading has affected aspects of bank loans other than interest rates, including the loan size and maturity, the frequency of bank borrowing and the covenants in the loan contract. Lastly, we discuss whether these effects of CDS trading are uniform across firms with these financial instruments or whether they vary for example between smaller and larger firms, between opaque and more transparent firms, or between riskier and safer firms.

3.1 Methods

The methodology we adopt to investigate the impact of CDS trading on the cost of banking funding has two parts. In the first part, we investigate the effect of CDSs' trading by comparing the interest rates on loans firms use to pay before their CDS start to trade with the interest rates on their loans afterwards controlling for firm and loan characteristics that previous research finds help explain loan spreads. Because the set of firms with CDSs on their securities is likely not to be exogenous, in the second part of our methodology we add to our sample of firms with CDSs' contracts a sample of matched firms that do not have traded CDSs' contracts and use this enlarged sample to investigate the effect of trading on CDSs on loan spreads.

We describe next in detail the tests we perform in the two parts of our methodology. Our tests build on the following model of loan spreads

$$LOAN\ SPREAD_{it} = c + \alpha_1 \cdot CDS_i + \alpha_2 \cdot CDSX_{it} + X'_{it-1}\,\psi + Y'_{it}\,\nu + Z'_t\,\eta + \epsilon_{ijt}. \qquad (1)$$

where $LOAN\ SPREAD_{it}$ is the all-in drawn spread over Libor at issue date for loans issued to firm i in quarter t, which is a standard measure of loan pricing. CDS is a dummy variable that identifies a firm in the Traded sample. $CDSX$ is a dummy variable that takes the value 1 for the loans that firm i takes out after its CDS starts to trade. This is our main variable of

interest as it tells us whether the interest rates on loans taken out after the CDS on a firm's security starts to trade are different from those observed on loans taken out beforehand.

We investigate whether trading on a CDS contract lower interest rates on bank loans controlling for a set of firm–specific variables, X, a set of loan features, Y, and a set of other variables, Z, which are unrelated to the firm or loan characteristics, but vary over time and are likely to affect the risk of the firm. We discuss these controls next, starting with the firm-specific variables that we use. These variables are proxies for the risks of the firm. A subset of these variables, $SALES$, the firm's real sales, attempts to control for the risk of the firm's overall risk. Older firms are typically better established and so less risky. Similarly, larger firms are usually better diversified across customers, suppliers, and regions. So, we expect these variables to have a negative effect on the bond gross spread. The next subset of variables attempts to control for the risk of the firm's *debt*. It includes the firm's $PROFMARGIN$ is the firm's profit margin (net income divided by sales); $LEVERAGE$, the leverage ratio (debt over total assets); and its $STOCKVOL$. The higher the $STOCKVOL$. the higher the firm's risk, so we expect this variable to have a positive effect on the gross spread. More profitable firms are better able at servicing their debt and so we would expect these firms to pay lower interest rates on their loans. For the same reasons, we expect firms with higher leverage and stock volatility to pay higher interest rates on their loans. $R\&D$, the firm's expenses with R&D scaled by sales, in turn, control for the quality of the asset base that debt holders can draw on in default.

We also control for $MKTBOOK$, the firm's market to book ratio, which proxies for the value the firm is expected to gain by future growth. Although growth opportunities are vulnerable to financial distress, we already have controls for the tangibility of book value assets. Thus, this variable could have a negative effect on spreads if it represents additional value (over and above book value) that debt holders can in part access in the event of default.

Lastly, we control for the firm's credit rating, $RATING$, and square of the credit rating, as rating agencies claim they have information on the firm that is not publicly available. We create our $RATING$ variable using the following conversion of the firm's credit rating into a scalar $AAA = 1,\ AAA- = 2,\ AA+ = 3,\ AA = 4,\ AA- = 5, \cdots$.[8]

Our next set of controls ,Y, attempts to capture loan features that are likely to affect the interest rates. This set includes the loan amount, $AMOUNT$; the loan maturity in years, $MATURITY$; dummy variables for secured loans, $SECURED$, loans to borrowers that face dividend restrictions in connection with the loan, $DIVIDEND\ REST$, and loans to borrowers with a guarantor, $GUARANTOR$. This set also includes the number of lenders in the syndicate

[8]We opted for using this conversion as opposed to dummy variables for each individual credit rating because of our sample size.

$LENDERS$, and a dummy variable for those loans with a single lender $SINGLENDER$. Finally, this set of controls includes dummy variables to control for the purpose of the loan, namely corporate purposes, $CORPORATE\ PURP$; repay existing debt, $REFINANCE$; finance a takeover, $TAKEOVER$; and for working capital, $WORKING\,CAP$.

Our final set of controls, Z, is a set of time dummies (one for each quarter) to control for things that are unrelated to the firm or loan characteristics, but which vary over time such as the overall state of the economy, and thus are likely to affect loan interest rates.

We estimate our models of loan spreads both with and without our set of loan controls because some of these controls may be jointly determined with loan spreads. Furthermore, because the interest rates on loans may vary across firms, we estimate our models both with a pooled regression and with firm fixed effects.

3.2 Credit derivatives and loan spreads

Table 3 shows the results of our multivariate analysis on the determinants of loan spread. We report the results for both the sample of traded firms alone in the first three columns of the table and the sample of traded and matched firms in the last three columns of the table. The first and fourth columns use the full set of firm controls and quarter fixed effects. The second and fifth columns add to these covariates the full set of loan controls. The third and sixth column add borrower fixed effects.

No matter which sample we consider, and which specification we look at the results indicate that on average the loans that firms take out after their CDSs' contracts start to trade carry lower interest rates than the loans they took out beforehand, but the difference between the interest rates on these loans is not statistically significant at any of the usual levels of confidence. The economic impact of estimated coefficients is no more than six basis points relative to the matched sample with borrower fixed effects. With a mean spread of 98 basis points in the quarter before trading starts for the traded sample, this implies a fairly modest reduction in spreads. In other words, it appears from these results that having a CDS that trades even though it offers new opportunities to diversify the risk of the firm it does not bring a statistically significant reduction in the interest rate that the average firm with a trading CDS pays on its bank loans.

With respect to the firm controls that we use in these regressions, those that are statistically significant are generally consistent with the discussion given in the Methodology section. Many of these controls are not statistically significant because we also account in our models for the credit rating of the firm. Firms with worse credit rating pay higher interest rates. The relationship between loan interest rates and the firm's credit rating is convex, but is strictly decreasing within our sample. Our results also show, as expected, that firms with

higher stock volatility and leverage pay higher interest rates on their loans. In contrast, larger firms and firms with more growth opportunities pay lower interest rates.

With regards to our loan controls, they too are generally consistent with expectations. Loans with longer maturities pay higher interest rates. The same is true of larger loans suggesting the absence of economies of scale in the loan granting business. Note, however, that loans with more lenders, which also tend to be the larger loans, carry lower interest rates. Loans for takeovers are perceived to be riskier and therefore cary higher interest rates. All else equal, secured loans should be safer, and therefore carry lower interest rates, but it is well known that lenders are more likely to require this feature as well as other features that protect them in the event of default, if they think the firm is riskier (see for example Berger and Udell (1990)), thus explaining the opposite relationship that we find.

In summary, our investigation of the effect of CDS trading on loan interest rates appear to suggest that the average firm with these contracts does not benefit from a reduction in the interest rates on its loans. In other words, while these contracts provide new opportunities for investors and banks to diversity the risks of firms, we do not find evidence of savings in the cost of bank funding for firms with these contracts.

3.3 Credit derivatives and other loan terms

Even though we do not find evidence of a reduction in the loan interest rates, the firm could still benefit from trading in its CDS contract, for example, if it is able to take out larger loans or loans with fewer restrictive covenants afterwards. To this end, we investigate whether the size and maturity of loans taken out are affected by CDS trading. Similarly, we investigate if CDS trading affects the likelihood of the loan being secured, and the likelihood of the borrower facing dividend restrictions or being required to have a guarantor. Lastly, we investigate whether CDS trading affects the frequency with which the firm borrows from banks. The results of these tests are reported in Table 4.

As in the previous table, the first seven columns of Table 4 are estimated over the traded sample alone while the last seven columns are estimated over both the traded and matched samples. The first six columns refer to dependent variables connected to non-price terms, which include the log of loan amount, log of maturity, a dummy variable for security, a dummy variable for dividend restrictions, a dummy variable for guarantor. The seventh column uses all firm-quarters and estimates the probability that the firm borrowers in a quarter.

As with loan interest rates, it appears that trading on a firm's CDS contract does not affect the terms of the loans the firm takes out afterwards. CDS trading Looking over the estimated coefficients on $CDSX$ in the regressions that investigate the term loans, it is clear that there are no changes in non-price terms for the average firm traded firm relative to

the matched sample. However, CDS trading does appear to increase the frequency the firm borrows from banks. Looking at the estimated coefficient on $CDSX$ we find an increase in the frequency of borrowing, particularly when we contrast traded firms to the matched sample (last column of Table 4).

3.4 Which borrowers benefit from credit derivatives trading?

While the average firm might not benefit from the additional risk diversification opportunities or greater information production created by credit derivatives with lower spreads, better non-price terms or even credit availability certain firms may be more prone to benefit from trading on their CDS contracts. For example, one might expect that small, risky, or informationally-opaque firms to benefit more from an increase in the supply of credit than large, safe, transparent borrowers. At the same time, large firms are likely to benefit more from opportunities for lenders to hedge or diversify concentrated exposures. In order to test these hypotheses, we investigate the differential impact that trading has had on the spread, non-price terms, and frequency of issuance for borrowers in the syndicated loan market in Table 5.

We add to the basic specification used in Tables 3 and 4 a set interactions of borrower proxies for risk and transparency measured in the quarter before trading with a dummy variable for the onset of trading. These measures include the log of sales (LSALES), the log of stock market volatility (LSTOCKVOL), the credit rating (RATING), the equity-market bid-ask spread relative to price (BID-ASKSD), the number of analysts following the stock (EQY-ANALYSTS), and the standard deviation of analyst earnings forecasts (EARNFORVOL). The second panel of Table 5 reports result relative to the matched sample.

Locking at both panels of Table 5, it is apparent that most of the variables that we interacted with the CDSX dummy are not statistically significant, suggesting therefore that absence of an effect of CDS trading we identified in the previous subsections applies to all firms. There are some exceptions, though. For example, the coefficients in the first two columns in both panels indicate that firms with low risk (LSTOCKVOL) or high analyst coverage (EQYANALYSTS) seem to benefit from a reduction in spreads and an increase in loan amounts, consistent with an increase in the supply of credit. The results in the last column of both panels, however, indicate that low risk firms reduce their borrowing frequency, possibly because that increase in the size of their loans.

4 Credit derivatives and firm behavior

While there is evidence outlined above that CDS trading permits firms to issue loans more frequently, a natural question is whether this has any real impact on firm balance sheets. In

this section, we study this possibility. Specifically, we investigate if CDS trading affected the firm leverage or risk. We do this using all firm-quarters of the traded and matched samples over the analysis window. Our proxy for firm risk is the log of the implied volatility of firm equity returns.

4.1 Methods

We estimate following equation over all firm-quarters in the analysis window:

$$Y_{it} = c + (\alpha_1) \cdot CDS_i + \alpha_2 \cdot CDSX_{it} + X'_{it-1}\,\psi + Y'_{it}\,\nu + Z'_t\,\eta + \epsilon_{it}. \tag{2}$$

where Y_{it} is either the ratio of debt-to-assets $LEVERAGE_{it}$ or the log of implied stock market volatility $LISTOCKVOL_{it}$ for firm i in quarter t. We use the same set firm controls as above, with the exception that we omit $LEVERAGE$ when it is a dependent variable and omit $LNSTOCKVOL$ when implied stock volatility is the dependent variable.

4.2 Results

Table 6 documents the impact of trading on firm leverage and risk using a differences-in-differences regression approach. Standard errors are corrected for heteroskedasticity and clustered at the firm level in specifications. The first two columns are estimated using only the traded sample while the second two columns are estimated using both the traded and matched sample.

The first and third columns of the table documents that relative to the matched sample, the leverage of the traded sample of firms increases in the two years following the onset of trading. Note that since leverage and risk are inputs to the model of sample selection, this result is not being driven by trends in either dependent variable that existed before the onset of trading. A comparison of the coefficient on trading $CDSX$ between the first and third columns documents that the measured effect is coming from firms in the traded sample being able to maintain leverage a time when firms in the matched sample are being forced to reduce it.

Given the frequency distribution of quarters when trading starts, much of this result is likely driven by the stress in the corporate bond market in 2002 due to historically high levels of default. When interpreted in this fashion, the coefficient in the third column is even more impressive, as it suggests that there might be an increase in the supply of credit during times of stress, an important point in the argument over whether or not credit derivatives promote financial stability. Since COMPUSTAT does not permit one to break debt out into bank loans and corporate bonds, the rest of this paper tries to explain this increase in leverage by focusing

on the impact that credit derivatives have had on issuance in each of the syndicated loan and corporate bond markets.

5 Final remarks

The strong growth of the credit derivatives market in recent years is important for at least two reasons. CDSs have become benchmarket instruments in the price discovery process. In addition, they offer a new and very efficient way to trade credit risk. In this paper we have argued that these developments, in particular, the new risk diversification opportunities that CDS contracts offer investors could increase the supply of credit to firms and reduce their cost of external debt funding.

In this version of the paper we focus our investigation of the effect of CDS on bank funding. Our results document that trading in credit derivatives is followed by an increase in syndicated loan issuance and firm leverage that is plausibly related to supply. We were unable to find any evidence that this increase in supply is being driven by spreads or non-price terms on syndicated bank loans. In the next draft of the paper will investigate the impact of credit derivatives trading on the supply and cost of public debt funding.

Table 1
Characterization of the "Traded sample"[a]

Variables	Before CDS trading	After the CDS trading	Difference	p value
		Firm characteristics		
LSALES	6.9990	7.1009	0.1018	0.1425
R&D	0.0170	0.0133	-0.0037	0.3931
MKTBOOK	1.8099	1.5755	-0.2343	0.0045
PROFMARGIN	0.0423	0.0502	0.0078	0.5639
LEVERAGE	0.3403	0.32843	-0.0118	0.3276
LSTOCKVOL	-0.9773	-1.2140	-0.2366	0.0000
RATING (%)				
AA	0.0097	0.0000	-0.0097	0.0822
A	0.3961	0.3206	-0.0754	0.0602
BBB	0.3993	0.5000	0.1006	0.0158
BB	0.1623	0.1603	-0.0020	0.9476
B	0.0032	0.0190	0.0158	0.0807
UNRATED	0.0292	0.0000	-0.0292	0.0023
		Loan characteristics		
LOANSPREAD	91.9820	101.5773	9.5952	0.1899
CORPURPOSES	0.1877	0.3684	0.1806	0.0000
REFINANCE	0.0918	0.0229	-0.0689	0.0002
TAKEOVER	0.0820	0.0229	-0.0591	0.0010
WORKCAPITAL	0.1366	0.2026	0.0659	0.0365
LLOANAMT	20.2160	20.1366	-0.0793	0.3465
DIVRESTRICT	0.3153	0.3684	0.0531	0.1823
SECURED	0.1567	0.1793	0.0226	0.4721
GUARANTOR	0.0292	0.0747	0.0454	0.0145
LENDERS	16.4195	16.9142	0.4947	0.6139
SINGLELENDER	0.0185	0.0231	0.0046	0.6966
LMATURITY	2.7019	3.1064	0.4045	0.0000
# observations	227	234	461	461

[a] Sample limited to firm-years of issuance, 3 years before trading and 2 years after trading starts. Also, sample limited to firms with a credit rating of A, BBB, or BB in quarter before trading. The additional credit ratings that appear in the table are due to migration, including unrated. LOANSPREAD: Loan spread over Libor at the time of the loan origination. LSALES: Log of sales. R&D: Research and development expenses over sales. MKTBOOK: Market to book ratio. PROFMARGIN: Net income over sales. LEVERAGE: Total debt over assets. LSTOCKVOL: Log of stock volatility (standard deviation of the firm stock return). CORPURPOSES: Dummy variable equal to 1 when loan is for corporate purposes. REFINANCE: Dummy variable equal to 1 when loan is to repay existing debt. TAKEOVER: Dummy variable equal to 1 when loan is for takeover purposes. WORKCAPITAL: Dummy variable equal to 1 when loan is for working capital purposes. LLOANAMT: Log of loan amount. DIVRESTRICT: Dummy variable equal to 1 when borrower is subject to dividend restrictions. SECURED: Dummy variable equal to 1 when loan is secured. GUARANTOR: Dummy variable equal to 1 when borrower has a guarantor. LENDERS: Number of lenders in the loan syndicate. SINGLENDER: Dummy variable equals to 1 when the loan syndicate has a single lender. LMATURITY: Log of loan maturity.
Source: Authors' computations.

Table 2

Matched versus traded samples in the quarter before trading begins[a]

Variables	Sample		Difference	p value
	Matched	Traded		
		Firm characteristics		
LSALES	5.8332	6.9368	1.1036	0.0000
R&D	0.0138	0.0170	0.0031	0.6250
MKTBOOK	1.7038	1.6070	-0.0968	0.4018
PROFMARGIN	0.0156	0.0475	0.0319	0.0651
LEVERAGE	0.3381	0.3378	-0.0002	0.9923
LSTOCKVOL	-1.0001	-1.0857	-0.0855	0.1785
RATING (%)				
AA	0.0000	0.0000	0.0000	.
A	0.2083	0.3382	0.1299	0.0258
BBB	0.3229	0.4118	0.0888	0.1650
BB	0.4688	0.2500	-0.2188	0.0006
B	0.0000	0.0000	0.0000	.
UNRATED	0.0000	0.0000	0.0000	.
		Loan characteristics		
LOANSPREAD	128.2389	98.3750	-29.8639	0.3345
CORPURPOSES	0.2667	0.1500	-0.1167	0.4172
REFINANCE	0.0667	0.0000	-0.0667	0.3173
TAKEOVER	0.0667	0.0500	-0.0167	0.8415
WORKCAPITAL	0.3333	0.2500	-0.0833	0.6035
LLOANAMT	19.4939	20.2372	0.7433	0.0432
DIVRESTRICT	0.3333	0.3000	-0.0333	0.8390
SECURED	0.4000	0.2000	-0.2000	0.2110
GUARANTOR	0.0667	0.0500	-0.0167	0.8415
LENDERS	13.6063	18.3000	4.6937	0.2440
SINGLELENDER	0.0667	0.0000	-0.0667	0.3173
LMATURITY	0.4064	0.3807	-0.0257	0.8435
# observations	148	134	282	282

[a] Sample limited to firm-years of issuance, 3 years before trading and 2 years after trading starts. Also, sample limited to firms with a credit rating of A, BBB, or BB in quarter before trading. The additional credit ratings that appear in the table are due to migration, including unrated. LOANSPREAD: Loan spread over Libor at the time of the loan origination. LSALES: Log of sales. R&D: Research and development expenses over sales. MKTBOOK: Market to book ratio. PROFMARGIN: Net income over sales. LEVERAGE: Total debt over assets. LSTOCKVOL: Log of stock volatility (standard deviation of the firm stock return). CORPURPOSES: Dummy variable equal to 1 when loan is for corporate purposes. REFINANCE: Dummy variable equal to 1 when loan is to repay existing debt. TAKEOVER: Dummy variable equal to 1 when loan is for takeover purposes. WORKCAPITAL: Dummy variable equal to 1 when loan is for working capital purposes. LLOANAMT: Log of loan amount. DIVRESTRICT: Dummy variable equal to 1 when borrower is subject to dividend restrictions. SECURED: Dummy variable equal to 1 when loan is secured. GUARANTOR: Dummy variable equal to 1 when borrower has a guarantor. LENDERS: Number of lenders in the loan syndicate. SINGLENDER: Dummy variable equals to 1 when the loan syndicate has a single lender. LMATURITY: Loan maturity.
Source: Authors' computations.

Table 3

Effect of CDS on loan spreads at issue date[a]

Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
CDS				1.8703	3.8557	
				(6.9870)	(6.4396)	
CDSX	-9.2310	-4.4539	-3.8049	-4.9741	-2.3114	-5.6523
	(6.7220)	(6.2398)	(7.0423)	(6.1623)	(5.7772)	(6.2576)
FIRM CONTROLS						
LSALES	-1.7440	3.0968	-3.8188	1.1454	3.8755	7.6082
	(4.2790)	(3.5711)	(10.6711)	(3.3338)	(3.2283)	(10.0272)
R&D	-64.3713	-44.7093	-109.5969*	-14.0635	-3.1323	-112.6122*
	(43.9142)	(43.8749)	(61.8863)	(43.0073)	(42.0943)	(66.3165)
MKTBOOK	-4.6311	-4.8012	1.5812	-5.4075***	-5.3274***	2.5304
	(3.1139)	(3.0964)	(3.3465)	(1.6815)	(1.4273)	(3.2891)
PROFMARGIN	-42.5431	-40.7841	-10.3713	-51.8393	-57.3941	-11.8304
	(53.6562)	(52.5848)	(43.8472)	(39.7941)	(38.8670)	(40.8910)
LEVERAGE	22.8539	28.2378	31.8387	42.4151**	32.2915*	15.6767
	(23.3979)	(21.1281)	(37.5876)	(20.9148)	(19.1412)	(34.5431)
LSTOCKVOL	27.9529***	18.6283*	12.9325	16.1958*	8.0868	7.2957
	(9.1705)	(9.8474)	(13.9081)	(8.5035)	(7.6179)	(12.3928)
RATING	-43.4165***	-35.4209***	-33.3202***	-46.2184***	-37.8116***	-31.7594***
	(7.6627)	(7.0812)	(8.6113)	(5.9437)	(5.3547)	(10.0863)
RATING^2	3.1508***	2.6016***	2.7517***	3.2360***	2.7036***	2.6034***
	(0.3717)	(0.3495)	(0.5089)	(0.2935)	(0.2831)	(0.5280)
LOAN CONTROLS						
CORPURPOSES		11.9527**	8.6037		10.6603*	9.0825
		(5.6586)	(5.3161)		(5.4291)	(6.0482)
REFINANCE		20.7657**	1.6954		18.8715*	2.4953
		(9.0905)	(11.8541)		(10.5277)	(11.6440)
TAKEOVER		22.0401	23.2574*		37.8713***	10.6400
		(14.0653)	(11.8614)		(11.0081)	(11.2566)
WORKCAPITAL		11.6480	-0.3920		17.4700***	5.3939
		(7.1022)	(8.0940)		(6.2252)	(6.9318)
LLOANAMT		-1.7941	-0.0479		3.0305	-0.2535
		(2.7910)	(4.3126)		(2.8324)	(3.7606)
DIVRESTRICT		5.9199	-9.4696		5.8765	-6.2563
		(5.9485)	(7.2183)		(5.4010)	(6.8611)
SECURED		36.8371***	42.7590***		23.4820***	30.9348**
		(9.0692)	(15.8427)		(7.8438)	(12.1356)
GUARANTOR		-6.6044	4.8557		-2.1845	8.8621
		(13.8326)	(12.5850)		(11.5232)	(11.3531)
LLENDERS		-0.5503**	-0.0969		-0.9512***	-0.1845
		(0.2258)	(0.2835)		(0.2398)	(0.2613)
SINGLELENDER		3.3951	-27.0053		-9.6582	-6.5796
		(22.6240)	(20.5104)		(19.0233)	(18.2200)
LMATURITY		0.2189	10.2050**		2.4982	6.1650
		(3.5168)	(4.3862)		(3.7134)	(4.0460)
R^2	0.79	0.82	0.92	0.76	0.79	0.93
# observations	436	436	436	645	645	645

[a] Models models estimated by OLS with robust standard errors clustered appropriately. Models (3) and (6) estimated with firm fixed effects. The dependent variable is LOANSPREAD: Loan spread over Libor at the time of the loan origination. CDSX: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. CDS: Duumy variable that is equal to 1 for loans of firms with CDS that begin to trade during the sample period. LSALES: Log of sales. R&D: Research and development expenses over sales. MKTBOOK: Market to book ratio. PROFMARGIN: Net income over sales. LEVERAGE: Total debt

over assets. LSTOCKVOL: Log of stock volatility (standard deviation of the firm stock return). RATING: Equals the number associated with the firm credit rating. We used the following conversion from rating to number (AAA = 1, AAA- = 2, AA+ = 3,AA = 4,AA- = 5, ...). CORPURPOSES: Dummy variable equal to 1 when loan is for corporate purposes. REFINANCE: Dummy variable equal to 1 when loan is to repay existing debt. TAKEOVER: Dummy variable equal to 1 when loan is for takeover purposes. WORKCAPITAL: Dummy variable equal to 1 when loan is for working capital purposes. LLOANAMT: Log of the loan amount. DIVRESTRICT: Dummy variable equal to 1 when borrower is subject to dividend restrictions. SECURED: Dummy variable equal to 1 when loan is secured. GUARANTOR: Dummy variable equal to 1 when borrower has a guarantor. LLENDERS: Log of the number of lenders in the loan syndicate. SINGLENDER: Dummy variable equals to 1 when the loan syndicate has a single lender. LMATURITY: Log of the maturity of the loan. Included in the regressions but not shown in the table are also dummy variables for each quarter in the sample period. Values in parenthesis are standard errors values.
Source: Authors' computations.

Table 4
Effect of CDS on on other loan features[a]

Variables	Traded sample						Traded and matched sample					
	Loan Amt	Loan Mat	Loan Secure	Div Restri	Guaran tor	Borrowing frequency	Loan Amt	Loan Mat	Loan Secure	Div Restri	Guaran tor	Borrowing frequency
CDS							0.0846	-0.0195	-0.0103	0.0793	0.0100	0.0298
							(0.1364)	(0.0965)	(0.0531)	(0.0640)	(0.0290)	(0.0195)
CDSX	-0.0372	-0.0405	-0.0503	-0.0573	0.0164	0.0798***	0.0258	-0.0099	-0.0112	-0.0484	0.0256	0.0475**
	(0.1341)	(0.1003)	(0.0484)	(0.0708)	(0.0315)	(0.0247)	(0.1194)	(0.0923)	(0.0452)	(0.0597)	(0.0309)	(0.0235)
FIRM CONTROLS												
LSALES	0.3935***	-0.0046	-0.0384	-0.0881**	0.0376	0.0307**	0.4698***	0.0161	-0.0148	-0.0768**	0.0138	0.0095
	(0.0721)	(0.0588)	(0.0309)	(0.0366)	(0.0237)	(0.0124)	(0.0638)	(0.0447)	(0.0289)	(0.0325)	(0.0187)	(0.0096)
R&D	0.8024	-0.1126	-0.3777	-0.2571	-0.2056	0.7024*	1.2341	0.0265	-0.2298	-0.5428	-0.2499**	0.5933**
	(1.0563)	(0.6228)	(0.2973)	(0.6633)	(0.1552)	(0.4228)	(1.0523)	(0.6015)	(0.4084)	(0.6739)	(0.1241)	(0.2898)
MKTBOOK	0.0181	-0.0292	-0.0048	0.0254	0.0067	-0.0070	0.0087	-0.0143	-0.0159	0.0394**	-0.0063	0.0010
	(0.0480)	(0.0480)	(0.0153)	(0.0334)	(0.0085)	(0.0106)	(0.0554)	(0.0233)	(0.0152)	(0.0178)	(0.0049)	(0.0101)
PROFMARGIN	0.9334*	0.2602	0.0884	0.0500	0.0073	-0.0065	1.1105***	0.5932	0.1509	0.0782	0.0216	-0.0062
	(0.4786)	(0.2364)	(0.0752)	(0.1559)	(0.0563)	(0.0849)	(0.4155)	(0.3810)	(0.1080)	(0.1592)	(0.0505)	(0.0394)
LEVERAGE	0.9633**	-0.4536	-0.1760	-0.2453	-0.0929	0.2266***	1.3350***	-0.1843	0.1009	0.0887	-0.1220	0.2118***
	(0.4450)	(0.3358)	(0.1898)	(0.2158)	(0.1341)	(0.0759)	(0.3300)	(0.2298)	(0.1573)	(0.1767)	(0.0955)	(0.0602)
LSTOCKVOL	-0.2331	0.1204	0.1219*	0.2118**	-0.0266	0.0252	-0.3659**	-0.0500	0.1598**	0.1948***	0.0136	0.0216
	(0.1599)	(0.1419)	(0.0715)	(0.0860)	(0.0607)	(0.0298)	(0.1503)	(0.0980)	(0.0702)	(0.0698)	(0.0351)	(0.0228)
RATING	0.0310	-0.2153**	-0.1874***	-0.0573	-0.0007	0.0121	-0.1703	-0.2245***	-0.2006***	-0.0545	-0.0006	-0.0127
	(0.1167)	(0.0836)	(0.0440)	(0.0428)	(0.0197)	(0.0174)	(0.1079)	(0.0536)	(0.0319)	(0.0394)	(0.0146)	(0.0227)
$RATING^2$	0.0008	0.0141***	0.0127***	0.0050**	0.0008	-0.0011	0.0113**	0.0152***	0.0130***	0.0049**	0.0006	-0.0000
	(0.0057)	(0.0048)	(0.0025)	(0.0022)	(0.0013)	(0.0009)	(0.0054)	(0.0030)	(0.0019)	(0.0021)	(0.0009)	(0.0010)
R^2	0.23	0.47	0.50	0.33	0.13	0.06	0.29	0.43	0.48	0.31	0.08	0.07
# observations	436	436	436	436	436	1759	645	645	645	645	645	3141

[a] Models estimated by OLS with robust standard errors clustered appropriately. All models, except the model on borrowing frequency, are estimated on the sub-sample of firm-quarters when a loan is issued. Models on the borrowing frequency are estimated on the full sample of firm-quarters. The dependent variable in each of the models is as follows: LLOANAMT (Log of the loan amount); LMATURITY (Log of the maturity of the loan); SECURED (Dummy variable equal to 1 when loan is secured); DIVRESTRICT (Dummy variable equal to 1 when borrower is subject to dividend restrictions) GUARANTOR (Dummy variable equal to 1 when borrower has a guarantor) and BORROWING FREQUENCY (Dummy variable equal to 1 if the firm issued a loan during the quarter). CDSX: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. CDS: Duumy variable that is equal to 1 for loans of firms with CDS that begin to trade during the sample period. LSALES: Log of sales. R&D: Research and development expenses over sales. MKTBOOK: Market to book ratio. PROFMARGIN: Net income over sales. LEVERAGE: Total debt over assets. LSTOCKVOL: Log of stock volatility (standard deviation of the firm stock return). RATING: Equals the number associated with the firm credit rating. We used the following conversion from rating to number (AAA = 1, AAA- = 2, AA+ = 3,AA = 4,AA- = 5, ...). Included in the first stage regressions but not shown in the table are also dummy variables for each quarter in the sample period. Values in parenthesis are standard errors values.
Source: Authors' computations.

Table 5
Effect of CDS on loan spreads and other loan terms: Further analysis[a]

Variables	Traded sample						
	Loan Spread	Loan Amt	Loan Mat	Loan Secure	Div Restri	Guaran tor	Borrowing frequency
CDSX	-3.8009	-0.0869	-0.2197	-0.2110	0.2474	-0.1969	0.1096
	(24.3937)	(0.4521)	(0.4889)	(0.1985)	(0.2255)	(0.1357)	(0.1081)
CDSX-LSALES	1.7101	-0.0124	0.0141	0.0208	-0.0069	0.0287**	0.0147
	(1.8144)	(0.0406)	(0.0366)	(0.0153)	(0.0220)	(0.0130)	(0.0096)
CDSX-LSTOCKVOL	61.4410*	-4.0699***	-0.4568	0.1891	0.5538	-0.2100	0.6047***
	(33.2145)	(0.8314)	(0.5009)	(0.2749)	(0.4453)	(0.2451)	(0.1060)
CDSX-RATING	-1.8066	-0.0004	0.0016	0.0027	-0.0302*	0.0100	-0.0072
	(2.0728)	(0.0376)	(0.0384)	(0.0173)	(0.0178)	(0.0117)	(0.0087)
CDSX-BID-ASKSD	401.1630	-7.6692	3.8115	1.5724	2.2730	-0.9467	0.8040
	(278.5653)	(6.8914)	(5.2197)	(2.5572)	(3.1288)	(2.2541)	(1.3802)
CDSX-EQTANALYSTS	-1.7577***	0.0388***	-0.0073	-0.0050	-0.0037	-0.0052	-0.0014
	(0.5856)	(0.0121)	(0.0104)	(0.0051)	(0.0077)	(0.0032)	(0.0023)
CDSX-EARNFORVOL	119.4189	2.0209	0.2532	-0.2664	0.1460	0.0977	0.2479
	(94.5694)	(1.9324)	(1.1830)	(0.6102)	(1.0095)	(0.6248)	(0.2837)
FIRM CONTROLS							
LSALES	-1.8460	0.3948***	-0.0071	-0.0453	-0.0825**	0.0261	0.0100
	(4.2257)	(0.0712)	(0.0640)	(0.0321)	(0.0356)	(0.0202)	(0.0132)
R&D	-59.1040	0.7416	-0.1086	-0.3785	-0.2446	-0.2054	0.4537
	(42.0169)	(0.9569)	(0.6077)	(0.2866)	(0.6623)	(0.1609)	(0.3340)
MKTBOOK	-2.5388	-0.0043	-0.0229	-0.0012	0.0336	0.0110	0.0029
	(2.5302)	(0.0501)	(0.0463)	(0.0140)	(0.0334)	(0.0078)	(0.0105)
PROFMARGIN	-36.2073	0.7074	0.2583	0.0974	0.0715	0.0173	0.0820
	(51.8282)	(0.4636)	(0.2548)	(0.0717)	(0.1477)	(0.0572)	(0.0667)
LEVERAGE	30.4412	0.8004*	-0.4174	-0.1425	-0.2166	-0.0883	0.1522**
	(22.5598)	(0.4045)	(0.3216)	(0.1753)	(0.2212)	(0.1310)	(0.0670)
LSTOCKVOL	30.2376***	-0.3378**	0.1090	0.1256*	0.2095**	-0.0118	0.0392
	(9.1637)	(0.1565)	(0.1622)	(0.0723)	(0.0908)	(0.0577)	(0.0325)
RATING	-43.2987***	0.0022	-0.2097**	-0.1838***	-0.0663	0.0031	-0.0069
	(7.5377)	(0.1183)	(0.0815)	(0.0424)	(0.0448)	(0.0169)	(0.0145)
$RATING^2$	3.1557***	0.0033	0.0137***	0.0124***	0.0060**	0.0005	-0.0002
	(0.3683)	(0.0060)	(0.0049)	(0.0025)	(0.0024)	(0.0012)	(0.0008)
R^2	0.80	0.27	0.48	0.50	0.33	0.16	0.09
# observations	431	431	431	431	431	431	1655

[a] Table continues on the next page.

Table 5 (continued)
Effect of CDS on loan spreads and other loan terms: Further analysis[a]

Variables	Traded and matched sample						
	Loan Spread	Loan Amt	Loan Mat	Loan Secure	Div Restri	Guaran tor	Borrowing frequency
CDSX	-46.3866*	0.1788	-0.3284	-0.1500	0.2615	-0.2231*	0.0840
	(24.6977)	(0.4050)	(0.3834)	(0.1822)	(0.2439)	(0.1323)	(0.0965)
CDSX-LSALES	1.0488	-0.0245	0.0218	0.0210	-0.0052	0.0368**	0.0130
	(2.0307)	(0.0412)	(0.0336)	(0.0150)	(0.0238)	(0.0155)	(0.0095)
CDSX-LSTOCKVOL	107.2724***	-3.3624***	-0.1944	0.1022	0.3270	-0.3379	0.4980***
	(37.6108)	(0.7208)	(0.4609)	(0.2840)	(0.4447)	(0.2668)	(0.1016)
CDSX-RATING	3.0082	-0.0130	0.0155	0.0001	-0.0327*	0.0111	-0.0086
	(1.9809)	(0.0347)	(0.0271)	(0.0167)	(0.0182)	(0.0115)	(0.0070)
CDSX-BID-ASKSD	345.6795	-7.7467	1.9461	1.8362	3.9628	-1.6682	1.3436
	(322.3728)	(6.3668)	(4.7600)	(2.6760)	(3.2044)	(2.4244)	(1.2827)
CDSX-EQTANALYSTS	-1.5024**	0.0364***	-0.0070	-0.0044	-0.0055	-0.0059*	-0.0014
	(0.6384)	(0.0116)	(0.0105)	(0.0056)	(0.0083)	(0.0032)	(0.0022)
CDSX-EARNFORVOL	139.7010	2.2325	0.4242	-0.5250	-0.2706	0.0263	0.2548
	(119.3578)	(2.0169)	(1.2445)	(0.6276)	(0.9980)	(0.6279)	(0.2794)
FIRM CONTROLS							
LSALES	1.1432	0.4772***	0.0131	-0.0205	-0.0740**	0.0044	-0.0019
	(3.2765)	(0.0647)	(0.0461)	(0.0294)	(0.0316)	(0.0160)	(0.0097)
R&D	-1.2052	1.1088	0.0833	-0.2618	-0.5325	-0.2467*	0.3246
	(41.8825)	(1.0098)	(0.6127)	(0.4024)	(0.6767)	(0.1350)	(0.2238)
MKTBOOK	-5.0536***	-0.0004	-0.0123	-0.0144	0.0433**	-0.0039	0.0047
	(1.6650)	(0.0543)	(0.0232)	(0.0150)	(0.0173)	(0.0041)	(0.0088)
PROFMARGIN	-48.5970	0.9541**	0.5997	0.1565	0.1129	0.0375	0.0372
	(39.3508)	(0.3936)	(0.3895)	(0.1076)	(0.1560)	(0.0519)	(0.0397)
LEVERAGE	46.4412**	1.2485***	-0.1708	0.1180	0.1281	-0.1296	0.1162**
	(20.4229)	(0.3190)	(0.2234)	(0.1490)	(0.1732)	(0.0937)	(0.0474)
LSTOCKVOL	15.5972*	-0.3938**	-0.0552	0.1549**	0.2005***	0.0219	0.0152
	(8.3603)	(0.1545)	(0.1037)	(0.0711)	(0.0726)	(0.0339)	(0.0274)
RATING	-45.1029***	-0.1858*	-0.2210***	-0.1978***	-0.0594	0.0002	-0.0248
	(5.7007)	(0.1101)	(0.0514)	(0.0308)	(0.0399)	(0.0132)	(0.0185)
$RATING^2$	3.1382***	0.0126**	0.0149***	0.0128***	0.0054**	0.0005	0.0006
	(0.2833)	(0.0055)	(0.0028)	(0.0018)	(0.0021)	(0.0008)	(0.0009)
R^2	0.77	0.31	0.43	0.48	0.31	0.10	0.07
# observations	639	639	639	639	639	639	2873

[a] Models estimated by OLS with robust standard errors clustered appropriately. All models, except the model on borrowing frequency, are estimated on the sub-sample of firm-quarters when a loan is issued. Models on the borrowing frequency are estimated on the full sample of firm-quarters. The dependent variable in each model is as follows: LOANSPREAD: Loan spread over Libor at the time of the loan origination. LLOANAMT (Log of the loan amount); LMATURITY (Log of the maturity of the loan); SECURED (Dummy variable equal to 1 when loan is secured); DIVRESTRICT (Dummy variable equal to 1 when borrower is subject to dividend restrictions) GUARANTOR (Dummy variable equal to 1 when borrower has a guarantor) and BORROWING FREQUENCY (Dummy variable equal to 1 if the firm issued a loan during the quarter). CDSX: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. CDS: Duumy variable that is equal to 1 for loans of firms with CDS that begin to trade during the sample period. BID-ASKSD: bid-ask spread relative to price measured in quarter before trading. EQTANALYSTS: number of equity analysts measured in quarter before trading. EARNFORVOL: standard deviation of earnings forecasts measured in quarter before trading. FIRM CONTROLS: Includes all of the firm controls we use in Table 3. Included in the regressions but not shown in the table are also dummy variables for each quarter in the sample period. Values in parenthesis are standard errors values.
Source: Authors' computations.

Table 6

Effect of CDS on leverage and implied stock volatility[a]

Variables	Traded sample		Traded and matched sample	
	LEVERAGE	LISTOCKVOL	LEVERAGE	LISTOCKVOL
CDS			0.0710***	0.0361
			(0.0183)	(0.0299)
CDSX	0.0064	0.0470*	0.0229*	0.0366
	(0.0153)	(0.0271)	(0.0137)	(0.0234)
FIRM CONTROLS				
LSALES	-0.0152	0.0028	-0.0273***	0.0027
	(0.0117)	(0.0178)	(0.0100)	(0.0157)
R&D	-0.6686***	0.7663**	-0.5905***	0.9150***
	(0.1884)	(0.3532)	(0.1658)	(0.2457)
MKTBOOK	0.0104	0.0544***	0.0070	0.0245**
	(0.0127)	(0.0133)	(0.0124)	(0.0101)
LEVERAGE		-0.5945***		-0.5829***
		(0.1171)		(0.0818)
LSTOCKVOL	-0.1197***		-0.1175***	
	(0.0226)		(0.0188)	
PROFMARGIN	-0.0722**	-0.1896***	-0.0257	-0.1558***
	(0.0328)	(0.0623)	(0.0252)	(0.0382)
RATING	-0.0121	-0.1160***	-0.0284**	-0.1394***
	(0.0109)	(0.0160)	(0.0118)	(0.0216)
$RATING^2$	0.0020***	0.0098***	0.0026***	0.0103***
	(0.0007)	(0.0010)	(0.0006)	(0.0010)
R^2	0.30	0.63	0.27	0.61
#observations	1759	1682	3141	2845

[a] Models estimated by OLS with robust standard errors clustered appropriately. CDSX: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. CDS: Duumy variable that is equal to 1 for loans of firms with CDS that begin to trade during the sample period. LSALES: Log of sales. R&D: Research and development expenses over sales. MKTBOOK: Market to book ratio. PROFMARGIN: Net income over sales. LEVERAGE: Total debt over assets. LSTOCKVOL: Log of stock volatility (standard deviation of the firm stock return). RATING: Equals the number associated with the firm credit rating. We used the following conversion from rating to number (AAA = 1, AAA- = 2, AA+ = 3,AA = 4,AA- = 5, ...). Included in the regressions but not shown in the table are also dummy variables for each quarter in the sample period. Values in parenthesis are standard errors values.
Source: Authors' computations.

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