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Abstract

There have been widespread claims that credit derivatives such as the credit default swap (CDS) have lowered the cost of firms' debt financing by creating for investors new hedging opportunities and information. However, these instruments also give banks an opaque means to sever links to their borrowers, thus reducing lender incentives to screen and monitor. In this paper, we evaluate the effect that the onset of CDS trading has on the spreads that underlying firms pay at issue when they seek funding in the corporate bond and syndicated loan markets. Employing matched-sample methods, we find no evidence that the onset of CDS trading affects the cost of debt financing for the average borrower. However, we do find economically significant adverse effects to risky and informationally-opaque firms. It appears that the onset of CDS trading reduces the effectiveness of the lead bank's retained share in resolving any asymmetric information problems that exist between a lead bank and non-lead participants in a loan syndicate. On the plus side, we do find that CDS trading has a small positive effect on spreads at issue for transparent and safe firms, in which the lead bank's share is much less important. Moreover, we document that the benefit of CDS trading on spreads increases once the market becomes sufficiently liquid. In sum, while CDS trading has contributed to the completeness of markets, it has also created new problems by reducing the effectiveness of lead banks' loan shares as a monitoring device—thus creating a need for regulatory intervention.

Key words: credit default swaps, loan spreads, credit spreads

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1 Introduction

The market for credit derivatives has experienced spectacular growth in the last decade. From a total notional amount of $600 billion in 1999, this market grew to $17 trillion by 2006. The development of this market has been widely credited as the source of substantial improvements to the financial system and the economy. Former Federal Reserve Board Chairman Alan Greenspan observed that "The new instruments of risk dispersion have enabled .... banks ....to divest themselves of much credit risk.... These increasingly complex financial instruments have contributed .... to the development of a far more flexible, efficient, and hence resilient financial system ....."[1] In turn, Paul Tucker, Executive Director for Markets at the Bank of England, has argued that "[T]he innovation of credit derivatives has plausibly taken us a further step towards complete markets, in effect providing a richer market for credit insurance than previously existed...reducing the price of risk."[2] In this paper, we focus on one of these general claims: whether or not credit derivatives have reduced the cost of debt for corporate borrowers.

Single-name credit default swaps (CDSs) are the most liquid of the credit derivatives currently traded and form the basic building blocks for more complex structured credit products.[3] A 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.[4] The protection seller charges an insurance premium for the protection it offers, usually expressed as an annualized percentage of the notional value of the transaction, and is paid until default or maturity, whichever is first. If the credit event occurs, the buyer is compensated for the loss incurred as a result of the credit event. When this happens, the default swap can be settled at par against either physical delivery of a reference asset (physical settlement) or the notional amount minus the post-default market value of the reference asset determined by a dealer poll (cash settlement).[5] Either way, the value of the buyer's portfolio is restored to the

[1] In Greenspan's speech "Economic Flexibility" before her Majesty's Treasury Enterprise conference (London, January 26, 2004).

[2] In Tucker's speech at the Euromoney Global Borrowers and Investors Forum (London, 23 June 23, 2005).

[3] 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 further details.

[4] The five events often 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.

[5] 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

initial notional amount. If there is no default event before the maturity of the contract, the protection seller pays nothing.

The design of a CDS contract has features which could ultimately lower the cost of debt to the underlying borrowers. In particular, this instrument creates new hedging opportunities and information that are not currently available to investors. Until very recently, corporate credit risk has been essentially untradable. Liquidity in the secondary market for corporate bonds has traditionally been limited by the fact that many investors continue to hold their bonds until maturity (Alexander, Edwards and Ferri 1998), making it costly to trade large amounts of credit risk in that market. While the secondary market for loans has experienced a rapid growth in recent years (Kamstra, Roberts and Shao (2006)), bank loans remain quite illiquid. Under these circumstances, the development of the CDS market provided banks and investors with a new, albeit less expensive way, to hedge or lay off their risk exposures to firms.[6] Even though CDSs are security specific, not firm specific, firms that have traded CDSs give their banks and bondholders added opportunities to diversify their credit exposures.[7] Some of the savings arising from these diversification opportunities, including those resulting from banks' more efficient use of their costly capital, could be passed on to borrowers. In this case, firms with CDSs could indeed be able to borrow from banks and to issue bonds at lower interest rates.

The development of the CDS market could also lead to a reduction in the cost of debt by virtue of the new information it reveals on firms. There is abundant evidence that banks get access to private information when they extend loans to firms.[8] Little of this information is made public at the time the loan is originated. Further, the secondary market for loans is still a relatively poor source of information on firms because only a reduced number of loans trade in this market. A relatively higher number of corporate bonds trade in the secondary market, but the liquidity problems that still characterize this market coupled with the diversity of

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.

[6]The CDS market also provides bondholders with a viable way to short credit risk. The lack of a market for repurchase agreements (repos) for most corporates makes shorting bonds infeasible. 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. CDSs, in contrast allow them to shorten credit risk at a known cost for long time spans: default swaps with maturities of up to 10 years can be easily contracted.

[7]Duffie (2007) provides an extensive discussion of the alternative ways banks can use credit derivatives to hedge their exposures to borrowers. Hirtle (2007) studies whether these benefits accrue generally to borrowers by measuring the linkage between a bank's use of credit derivatives and the terms of credit offered to all firms.

[8]See, for example, James (1987), Lummer and McConnell (1989), Best and Zhang (1993) and Billett, Flannery and Garfinkel (1995).

coupon structures and embedded options also hamper the information content of this market. In contrast, CDSs' prices are a relatively clean measure of the spread that investors require to bear a firm's default risk by virtue of the homogeneity of CDSs. In addition, the heterogeneous set of market participants together with the opportunities that these derivatives offer investors to trade risk create the conditions for the CDS market to play an important role in the price discovery process. Note that a CDS is like a traded insurance contract against credit losses, but in contrast to an insurance contract, it is not necessary to hold an insured asset 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. These possibilities, which are hard to replicate in the secondary loan or bond markets, make the CDSs' prices a potentially important source of new information on firms.[9] Consistent with this assertion, Hull, Predescu, and White (2004) find that the CDS market anticipates credit rating events. Further, Longstaff, Mithal, and Neis (2004), Norden and Weber (2004), and Blanco et al. (2005) all find that CDS market plays a more important role in the price discovery process than the bond market, and Norden and Wagner (2006), in turn, find that CDS' spreads help explain subsequent monthly changes in aggregate loan spreads. Moreover, Acharya and Johnson (2005) document the presence of information flow from the CDS market to the equity market, especially for firms that have a large number of bank relationships and during times of financial stress (i.e. credit rating downgrade).

This informational role of the CDS market could lead to a reduction in the cost of debt by reducing, for example, the information premium investors demand on firms' bonds. It could also lead to a reduction in loan interest rates by reducing the informational advantage of incumbent banks. As Rajan (1992) notes, banks have more incentive to monitor borrowers than does dispersed "arm's length" debt, but the private information which they 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. While investigating the interest rates firms pay on their banks loans, Santos and Winton (2007) find evidence consistent with this idea that banks earn informational rents.

Thus far we have identified two channels through which the development of the CDS market could contribute to a reduction in the cost of debt to firms. The development of the CDS market may have yet another implication for the cost of debt financing; one which has deserved far less attention and which may not be advantageous to firms. By giving banks a new mechanism to lay off their credit exposures, the CDS market also gives them a new opportunity to sever their credit links to borrowers after the loan has been originated in a

[9] 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.

fashion that is unobservable to the firm and outside investors. This is important because a bank without direct exposure to the borrower has a reduced incentive to monitor the firm ex post.[10] The device that lead banks in loan syndicates use to commit to ex post monitoring — holding a share of the loan at origination — looses some of its effectiveness for firms with trading CDS as it becomes easier for banks to buy credit protection for these firms.[11] In this regard, a bank's decision to buy protection for its exposures to borrowers has many similarities with its decision to sell its loans in the secondary market, a decision which researchers have found to affect borrowers negatively. Dahiya, Puri and Saunders (2000), for example, find that the stock returns of borrowers are negatively impacted by the loan sale announcement, and Kamstra, Roberts, and Shao (2005) find that loans that are likely to be resold have higher interest rates. Following this evidence from the secondary loan market, the CDS market by reducing banks' ex post monitoring incentives could also affect loan interest rates negatively.

This effect of the CDS market is likely to be important. We still lack detailed information indicating how much of banks' activity in the CDS market is "pure" trading and how much of it is related to hedging of their loan exposures, but there is evidence that banks are increasingly using this market to hedge the credit exposures they originate through their lending business. According to a survey by the British Bankers Association (2006) half of the protection banks bought in the CDS market in 2005 and 2006 was to cover exposures resulting from their lending activity.[12] Note that, in contrast to the sale of the loan which often requires the consent of the borrower, lead banks do not need to seek this consent when they choose to buy protection for their loan exposures.[13] Further, this effect of bank monitoring is likely to go beyond the loan market. In particular, following Datta, Iskandar-Datta, and Patel (1999) finding that firms with bank debt are able to issue in the public bond market for the first time at lower credit spreads, a finding which the authors argue derives from bank monitoring, the effect of the CDS market on banks' monitoring incentives could also affect negatively the

[10]For models that highlight the importance of the monitoring function of banks see for example Campbell and Kracaw (1980), Diamond (1984), Ramakrishnan and Thakor (1984) and Fama (1985). Morrison (2005) makes this point precisely with respect to CDS.

[11]See Drucker and Puri (2007) for evidence on how banks and firms adjust the loan contract design in order to reduce the agency problems arising from the sale of the loan.

[12]The evidence unveiled by Minton, Stulz and Williamson (2006) showing that the likelihood of a bank being a net protection buyer is positively related to the percentage of commercial and industrial loans in the bank's loan portfolio also suggest that banks do use this market to manage the credit exposures they build through their lending activity.

[13]According to the LPC database, for the approximately 1/3 of the loans for which there is data available, 89% of the loans require the borrower consent. This number drops to 27% if you assume that the loans where this variable is missing do not require the borrower consent.

spreads firms need pay to issue bonds.

It follows from these potential effects of the CDS market that the cost of debt to firms could either increase or decrease following the onset of CDS trading. Who are the likely winners and losers? The diversification channel seems likely to benefit the riskier firms the most while the information channel seems likely to benefit informationally opaque firms the most. On the other hand, the negative effect resulting from a reduction in bank monitoring is likely to affect the risky and opaque firms the most as these are the firms that benefit more from bank monitoring. In the end, whether the CDS market lowers the cost of debt to firms depends on the relative importance of the cost savings they may enjoy as a result of these derivatives new hedging opportunities and the information their prices reveal on firms vis-á-vis the cost premium they may face as a result of the decline in banks' monitoring incentives. Thus, ultimately, the effect of the CDS market on the cost of debt to firms must be determined empirically. That is the subject of this paper. We start by investigating whether the onset of CDS trading lowers the cost of bond financing. To this end, we compare the ex ante credit spreads firms pay on the public bonds they issue after their CDSs start to trade with the spreads they use to pay beforehand, controlling for firm, bond and other determinants of bond credit spreads. In addition, we use a matched sample approach to control for the potential endogeneity of the set of firms with traded CDSs. We then investigate, based on a similar analysis, whether the onset of CDS trading, lowers the interest rates firms pay to borrow from banks. Finally, to ascertain the relative importance of the benefits of the CDS market with the relative importance of the costs of this market to firms, we investigate whether the onset of CDS trading had a more pronounced effect on the bond spreads and loan spreads for riskier firms versus safer firms, and for informationally opaque firms versus more transparent firms.

Contrary to the claim that the development of the CDS market has lowered interest rates, we do not find evidence that the average firm with a traded CDS has benefited from a reduction in the credit spreads it pays to issue in the bond market or the spreads it pays to borrow from banks. However, we do find evidence that the onset of CDS trading has affected negatively the cost of debt financing in both of these markets for the riskier firms as well as those that are more informationally opaque. These findings are quite robust as they hold for multiple measures of firm risk and multiple proxies of firm opacity. They also hold both when we account for the potential endogeneity of the firms that have traded CDSs through our matched sample and when we limit our analysis to our sample of firms with traded CDSs. Further, we find that this differential effect of CDS trading does not arise from differences in the liquidity of firms' CDSs. On a positive note, we do find evidence, of a small reduction in the spreads that safer firms and more informationally transparent firms pay to borrow in the bond market and from banks after their CDS start to trade. Moreover, we document that CDS market liquidity increases the amount of a loan syndicated by the lead bank and increases the number of participants in the syndicate. Together, our results suggest that the hedging opportunities and information revealed through the CDS market help lower firms' cost of debt. In the case of riskier and more informationally opaque firms, these benefits, however, are overwhelmed by the costs resulting from a reduction in bank monitoring which likely arises when banks buy protection for their credit exposures to borrowers.

The remainder of our paper is organized as follows. The next section presents our methodology and the data sets we use in our analysis. That section also characterizes our sample of firms with CDSs contracts. Section 3 documents the impact of CDS trading both on the cost of bond financing and the cost of bank funding for the average firm. Section 4 investigates the differential impact of CDS trading across borrower risk and opacity as well as CDS market liquidity. Section 5 develops supporting evidence for our interpretation of results, and Section 6 concludes the paper.

2 Methodology, data and sample characterization

2.1 Methodology

We identify the impact of CDS trading on the cost of debt funding using two approaches. In the first approach, we focus on the sample of firms that become traded – referred to as the Traded sample – and exploit differences in the timing of the onset of CDS trading across these firms. Here, the impact of trading is measured by comparing the outcomes of firms that have become traded relative to other firms that will but have not yet become traded. In the second approach, we identify a sample of firms that are never traded but have similar characteristics to those that do – referred to as the Matched sample – and use these firms as a control group. Under this approach, the benefit of credit derivatives is identified by the differential change in spreads at issue for Traded sample firms relative to Matched sample firms across the onset of trading. Each of these approaches obviously has its strengths and weaknesses. While the second approach does not require an assumption that timing is exogenous, it does require the use of firms in a control group which appear to be dissimilar. In particular, for most firm-level controls, the distance between firms which are traded later in the sample and firms which are traded early in the sample than is much closer than the distance between firms that are traded and firms that are never traded. We feel that both approaches are useful, and are comforted by the fact that our conclusions do not change between them.

We start our investigation of the effect of CDS trading on the cost of debt by looking at the ex ante credit spreads that firms pay to issue in the bond market because many CDS contracts that trade are written on bonds. The investigation of such an effect through bond pricing, however, poses important challenges. The complex structure of bond covenants and the optionality embedded in many of these covenants generally makes it difficult to price bonds. In addition, almost every publicly-traded firm that issues debt is traded in the CDS market by the end of the sample, which makes it difficult to construct a matched sample. For these reasons, and because the mechanisms behind a potential effect of CDS on bond spreads are also likely to lead to an effect on the cost of bank debt, we repeat the analysis described above and investigate whether the onset of CDS trading lowers the interest rates firms pay on their bank loans in the second part of our methodology. We describe next in detail the tests we perform in our methodology.

2.1.1 CDS trading and ex ante bond credit spreads

Our tests to investigate the effect of CDS trading on ex ante bond credit spreads build on the following model of bond spreads:

$$BOND\ SPREAD_{it} = c + \alpha_1\ TRADING_{it} + \alpha_2\ TRADED_i + X'_{it-1}\,\psi + YB'_{it}\,\nu + Z'_t\,\eta + \epsilon_{it}. \quad (1)$$

where $BOND\ SPREAD_{it}$ is the weighted average of the credit spreads (over the Treasury with the same maturity of the bond) at issue date of the public bonds issued by firm i in quarter t where the weights are the issue amount of each bond. $TRADING$ is a dummy variable that takes the value 1 for the bonds that firm i issues after its CDS starts to trade. This is our main variable of interest as it tells us whether the credit spreads on bonds issued after the firm's CDS starts to trade are different from those observed on bonds issued beforehand. $TRADED$ is a dummy variable which equals 1 for the firms in the Traded sample. We use this variable when we expand our sample of traded firms to include our sample of matched firms.

We investigate whether the onset of CDS trading lowers bond ex ante credit spreads controlling for a set of firm-specific variables, X, a set of bond features, YB, and a set of other variables, Z, which are unrelated to the firm or bond characteristics, but vary over time and are likely to affect bond credit spreads. We discuss these controls next, starting with our set of firm-specific variables. These variables attempt to proxy for the risks of the firm. One of these variables is $LN\ SALES$ (the log of the firm's sales). This variable attempts to control for the risk of the firm's overall risk. Since larger firms are usually better diversified across customers, suppliers, and regions, we expect this variable to have a negative effect on bond credit spread. The next subset of variables attempts to control for the risk of the firm's *debt*. Included in this subset is $PROFMARGIN$, the firm's profit margin (net income divided by sales); $LEVERAGE$, the leverage ratio (debt over total assets); $LN\ IVOLATILITY$, the implied volatility of the firm's stock return; $R\&D$, the firm's expenses with R&D scaled by sales; $RATING$, the firm's credit rating; and $MKTBOOK$, the firm's market to book ratio.[14] More profitable firms are better able at servicing their debt and so we would expect these firms to pay lower credit spreads on their bonds. Firms with more volatile stock and firms with higher leverage are more likely to default on their debt. For this reason, we expect these variables to have a positive effect on bond ex ante credit spreads. We account for the firm expenses on R&D to control for the quality of the asset base that debt holders can draw on in default. Because these assets are more difficult to value and often are more firm specific, we expect debtholders to demand higher compensation from firms with more of these assets. We account for the firm's credit rating to control for the risk of its debt because of rating agencies claim they have information on the firm that is not publicly available. We control for 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.

Our next set of controls, *YB*, attempts to capture bond features that are likely to affect credit spreads. This set includes $LN\ BOND\ AMT$, the log of the issue amount, $LN\ BOND\ MAT$, the log of the bond maturity in years, and a set of dummy variables to identify callable bonds, $CALLABLE$, bonds with a sinking fund, $SINK\ FUND$, and bonds with a put option, $PUTABLE$. Larger bond issues may represent more credit risk, requiring therefore a higher yield, but they may also allow economies of scale; so the sign of this variable's effect on bond spreads is ambiguous. Bonds with longer maturities may face greater credit risk, but they are more likely to be issued by firms that are thought to be more creditworthy; again, the effect on credit spread is ambiguous. Callable bonds give issuers the option to call back their bonds prior to maturity; so we expect these bonds to carry higher spreads. Bonds with a put option give a similar option but to bondholders; so we expect these bonds to carry lower credit spreads. Lastly, even though the existence of a sinking fund lowers the risk to bondholders, given that these funds are more often created by riskier issuers we may find that bonds with a sinking fund carry higher credit spreads.

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

The model is estimated by OLS, uses robust standard errors clustered at the firm level, and employs weights equal to the inverse of the number of firm issues. Out of concern that

[14]Our $RATING$ variable is a decreasing linear function of the firm credit rating. We use this conversion as opposed to dummy variables for each individual credit rating because of our sample size.

our set of bond controls is jointly determined with bond spreads, we estimate our models both with and without our set of bond controls. Further, because the credit spreads on bonds may vary across firms, we estimate our models both with a pooled regression and with firm fixed effects.

2.1.2 CDS trading and loan credit spreads

We describe next the tests we use in the second part of our methodology to investigate whether the onset of CDS trading affect the interest rates firms pay on their bank loans. Our tests build on the following model of loan spreads

$$LOAN\ SPREAD_{it} = c + \beta_1\, TRADING_{it} + \beta_2\, TRADED_i + X'_{it-1}\,\gamma + YL'_{it}\,\mu + Z'_t\,\zeta + \epsilon_{it}. \quad (2)$$

where $LOAN\ SPREAD_{ijt}$ 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. $TRADING$ is a dummy variable that takes the value 1 for the loans that firm i takes out after its CDS starts to trade. As in the first part of our methodology, 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. $TRADED$ is a dummy variable that identifies a firm in the Traded sample, which we use when we expand our sample of traded firms to include a sample of matched firms.

We investigate whether trading on a CDS contract lower interest rates on bank loans controlling for the set of firm-specific variables, X, and the set of time dummies, Z, we used in our model of bond credit spreads. In addition, we control for a set of loan features, YL, which we describe next. That set includes the log of loan amount, $LN\ LOAN\ AMT$; and the log of the loan maturity in years, $LN\ LOAN\ MAT$. Larger loans may represent more credit risk, raising the loan rate, but they may also allow economies of scale in processing and monitoring the loan; so the sign of this variable's effect on loan spreads is ambiguous. Longer maturity loans may face greater credit risk, but they are more likely to be granted to firms that are thought to be more creditworthy; again, the effect on spread is ambiguous. Included in our set of loan controls are also 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, $GUARANTOR$. All else equal, any of these features should make the loan safer, decreasing the spread, but it is well known that lenders are more likely to require these features if they think the firm is riskier (see for example Berger and Udell (1990)), so the relationship may be reversed. Lastly, we include 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,

$WORKING\ CAP$, and control for the size of the loan syndicate by including the number of lenders in the syndicate, $LENDERS$. Larger syndicates do not necessarily imply a higher competition to extend a loan to a firm because syndicate participants act cooperatively. In contrast, larger loans usually have larger syndicates. Thus, the effect of this variable on spreads is ambiguous for the same reasons we discussed above regarding the effect of the size of the loan on spreads.

As with the study of bond issues, the model is estimated by OLS, uses robust standard errors clustered at the firm level, and employs weights equal to the inverse of the number of firm loan issues. Moreover, 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. Also, because the interest rates on loans may vary across firms, we estimate our models both with a pooled regression and with firm fixed effects.

2.2 Data

The data for this project came from several sources. We start with the universe of publicly-traded non-financial firms in the quarterly CRSP-Compustat database. This database is also our source of information on firms' income and condition as well as on their long-term credit rating. We use the CRSP database to gather information on firms' stock prices and number of shares outstanding during our sample period. We then match these publicly-traded firms to historical information on actual and implied equity market volatilities using Optionmetrics. We further match these firms 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 to measure the onset of trading in credit derivatives for a reference entity. This data source provides daily market CDS spreads on a number of CDSs traded in different currencies, maturities, and documentation clauses for each borrower. We identify for each borrower the first date that a US dollar-denominated contract is traded at a five-year maturity, and use this date as the onset of trading. After tedious hand-matching the Markit data to Compustat-CRSP, we have 513 firms that become traded in the CDS market from the first quarter of 2001 to the fourth quarter of 2005. In order to identify our Traded sample, we start with the subset of firms that are ever traded in the CDS market according to Markit. We remove the 88 firms that start trading in the first month 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 434 traded firms.

2.2.1 The bond sample

We use the Mergent Fixed Investment Securities Database (FISD) to determine the bond issuance activity of our sample firms both before and after their CDSs start to trade. This database contains information on virtually all public bonds issued in the United States since 1980. We also use this database to identify the non-convertible bonds issued by these firms, and to gather information on these bonds, including the date of issue, ex ante yield spread, maturity, amount of issue and on the bond covenants.

For the bond analysis, the sample of 434 firms is merged with FISD bond database, and we focus our bond pricing analysis on CDS-traded firms that issue one bond in the twelve quarters before trading and another bond in the eight quarters after trading. 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 111 traded firms corresponding to 426 firm-quarters of bond issuance.

The first four columns of Table 1 characterize our sample of traded firms during quarters of bond issuance, 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 suggests that firm performance does not change with the onset of CDS trading. The increase in firm sales is likely attributed to an aging effect. There is a reduction in implied stock volatility, but volatility is falling in the last half of the sample for all firms.There seems to be a slight deterioration in the credit quality of these firms, as defined by their credit rating, because the portion of double-A rate firms decreases while that of tripe-B rated firms increases. There does appear to be an increase in the available information about traded firms. The fraction of unrated firms decreases to zero, and the number of equity analysts covering these firms increases. Consistent with this hypothesis, we do observe a reduction in the price bid-ask spread after trading starts. Given these limited changes in traded firms, it is not surprising that bond investors did not react to the onset of CDS trading, as suggested by the absence of significant changes in the bottom panel of Table 1, which compares bonds issued by traded firms before trading starts with those issued afterwards.

One obviously has to be careful to draw strong conclusions from these findings because they are based on a univariate analysis and do not take into account the potential endogeneity of those firms with CDSs contracts. When investigating a similar introduction of options on the equity market, Mayhew and Mihov (2004) document that trading in equity derivatives is followed by an increase in volatility, but the authors show that effect is largely driven by sample selection. In order to mitigate the potential impact of endogeneity, we implement the matched sample methodology developed in the literature.[15] To create the sample of matched firms, we start with our sample traded firms, but only keep firm-quarters from the first quarter of 2001 until the first quarter that CDS trading begins. To these firms, we add the sub-sample of firms that remain untraded in the CDS market through the end of our sample period. 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 of the untraded firms, assigning counterfactual trading dates using those firms with the highest predicted probability of trading in each quarter that trading starts, provided that they have bond issues in the twelve quarters before and eight quarters after this date. [16] This procedure leaves us with a sample of 51 firms corresponding to 115 firm-quarters of bond issuance.

The last four columns of Table 1 compare the Traded sample with our sample of matched firms in the quarter before trading starts, either real or assigned. The top panel suggests that our Traded sample is safer than our matched sample. Firms in the traded sample are larger, more profitable, and have lower stock volatility. The Traded sample also has a higher portion of double-A rated firms and a lower portion of single-B rated firms. That panel also suggests that firms in the traded sample are more transparent. They have more analyst coverage and have lower price bid-ask spreads. The bottom panel of the table illustrates that investors have noticed these differences. Traded firms are able to make larger bond issues and to issue bonds with lower credit spreads.

2.2.2 The loan sample

We rely on the Loan Pricing Corporation's (LPC) Dealscan database in order to document the bank borrowing activity of our sample firms. 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,

[15]For another application of this matching technique to credit derivatives, see Ashcraft and Rosenberg (2006) who analyze the impact of credit derivatives trading on equity market efficiency and liquidity.

[16]The Probit model includes as covariates a one quarter lag of the following: equity analyst coverage, log stock market volatility, lag stock market return, dummy for presence of credit rating, log sales, debt-to-assets, book-to-market, and the log of equity trading volume.

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 aggregate by firm-quarter, using loan size as a weight.

For the loan analysis, the 434 firms which start trading after January 2001 are merged with LPC Dealscan. We restrict the sample to Traded firms that issue in the twelve quarters before trading and again in the eight quarters afterwards, and to firms with a credit rating of no better than $A+$ or no worse than B in the quarter before trading. These restrictions leave us with a Traded sample of 173 firms corresponding to 742 firm-quarters of loan issuance.

The first four columns of Table 2 suggest that the performance of traded firms does not change dramatically with the onset of CDS trading. After trading starts, there is a reduction in implied stock volatility but as we noted earlier volatility is falling in the last half of the sample for all firms. Following the onset of trading, there is a deterioration in the credit quality of firms, which appears to be more pronounced among the traded firms that take out loans, possibly because this sample is larger than the traded sample we use in our bond analysis. There is a reduction in the market-to-book ratio and a more generalized increase in the fraction of firms with lower credit ratings following the beginning of CDS trading. As before, we find that firms become more informationally transparent after CDS trading. The fraction of unrated firms decreases as does their price bid-ask spreads. There is during the same time period an increase in the volatility of stock analysts estimates, but this change is not as robust as the previous changes. The bottom panel of Table 2 shows that lenders reacted to the deterioration in firm performance by demanding higher spreads on these firms' loans and by adjusting some loan covenants. Following the onset of CDS trading, there is an increase in the fraction of loans with dividend restrictions and in the fraction of loans with a guarantor.

We adopt the same methodology we adopted before to create a matched sample for our loan spread analysis. We first merge the sub-sample of 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. After we follow a similar procedure to that we adopted to create the matched sample for our bond spread analysis we are left with a sample of 152 matched firms corresponding to 476 firm-quarters of loan issuance.

The last four columns of Table 2 compare the sample of traded firms to the sample of matched firms we identified for our loans spread analysis in the quarter before trading starts, either real or assigned. The top panel shows that as with our bond sample, the traded sample in our loan analysis is safer and more informationally transparent than the matched sample we created. The bottom panel, in turn, shows that lenders, like bondholders, have noticed these differences and required lower spreads on their loans to traded firms. This difference is also likely attributable to the difference in the portion of firms in the two samples with access to the public bond market as this access tends to lower significantly the interest rates firms pay on their loans (see, for example, Santos and Winton (2007)). Lenders have also adjusted the terms of their loans to the two sets of firms in a way that reflect their difference in risk. Note, for instance, that trade firms are less likely to face dividend restrictions or required to post collateral or to have a guarantor than firms in the matched sample.

In sum, based on our univariate analysis, we do not detect a reduction in the external cost of debt following the onset of CDS trading. To the contrary, there appears to be an increase in the cost of debt, particularly in the cost of bank debt, after a firm's CDS starts to trade. These findings do not lend support to the claims often made that the increase use in CDSs contracts have contributed to a reduction in the cost of debt. It remains to be seen, however, whether these results continue to hold once we account for the other determinants of the cost of debt as well as the potential endogeneity of our sample of traded firms, and the other changes that occurred to these firms around the same time.

3 Does the CDS market lower the cost of debt to firms?

In this section we present the results of our investigation on the effect of the onset of CDS trading on firms' cost of debt. We first discuss whether firms with trading CDS contracts benefit from a reduction in the ex ante credit spreads on the bonds they issue after trading starts on their CDSs. Then, we discuss if these firms benefit from a reduction in the interest rates they pay on the bank loans they take out after trading starts on their CDSs.

3.1 The CDS market and the cost of bond financing

Table 3 shows the results of our multivariate analysis on the effect of CDS trading on the ex ante bond credit spreads. 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 bond controls. The third and sixth column add firm fixed effects.

No matter which sample we consider and which specification we look at, the results indicate that on average the bonds that firms issue after their CDSs contracts start to trade do not carry statistically significant lower credit spreads than the bonds they issued beforehand. The only exceptions to this pattern are models 1 and 2, which were estimated on the traded sample alone and based on all of the controls we consider. But, even in these cases, the difference between the credit spreads of bonds is not statistically significant at any of the usual levels of confidence.

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. Note that 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 a credit rating pay higher interest rates. The relationship between ex ante credit spreads and the firm's credit rating is convex, but is strictly decreasing within the sample. Our results also show, as expected, that firms with higher stock volatility pay higher credit spreads on their bonds. In contrast, firms with more growth opportunities pay lower credit spreads. Regarding the bond controls, they indicate that, as expected, callable bonds carry higher credit spreads. These controls also suggest that larger issues carry higher credit spreads, but this effect is only statistically significant in one specification (model 6). Contrary to expectations, we find that none of the remaining bond controls have a statistically significant effect on ex ante credit spreads, a result possibly attributable to the small sample of firms under consideration.

In summary, according to our findings, the average firm does not benefit from a reduction on the credit spreads it has to offer investors in the primary market in order to raise bond financing once trading starts in its CDS. We next investigate the effect of CDS trading on the interest rates that firms have to pay on the bank loans they take out subsequently to the onset of trading on their CDSs.

3.2 The CDS market and the cost of bank funding

Table 4 shows the results of our multivariate analysis on the potential effect of CDS trading on loan spreads. As we did in the case of bonds, 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.

According to our findings, there is some evidence, albeit limited, that on average loans that firms take out after their CDSs start to trade carry lower interest rates than the loans they took out beforehand. This result is more evident in the specification that accounts only for firm characteristics (models 1 and 4). According to the fourth model, though, about 40% of the estimated impact of CDS trading from the first column can be explained by selection. Nonetheless, the economic impact of trading is still 10 basis points relative to the matched sample. With a mean spread of 109 basis points in the quarter before trading starts for the Traded sample, this estimated impact is economically large even if it is statistically significant only at the 10% confidence level. These findings, however, do not hold up to closer scrutiny. In particular, we continue to find a reduction in loan spreads following the onset of CDS trading when we expand that specification to account for our set of loan controls, but the economic impact of trading drops substantially and its effect on loan spreads is not longer statistically different from zero (models 2 and 5). That negative relationship even goes away when we add firm fixed effects (models 3 and 6).

With respect to the firm controls that we use in our regressions, those that are statistically significant are generally consistent with the discussion given in the Methodology section. 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. Larger loans pay lower interest rates suggesting the existence of economies of scale in the loan granting business. Loans with more lenders, which also tend to be the larger loans, also carry lower interest rates. All else equal, secured loans should be safer, but it is well known that lenders are more likely to demand collateral from riskier borrowers (see for example Berger and Udell (1990) or Santos and Winton (2007)), thus explaining the opposite relationship that we find. Longer maturity loans are perceived to be riskier, thus explaining their higher spreads, as are loans for certain purposes, particularly those to finance takeovers.

In sum, in contrast to our findings showing that CDSs have not contributed to a reduction in the credit spreads firms have to pay in the primary market to issue bonds, our later findings based on loan interest rates suggest that CDSs may have contributed to a reduction in the interest rates they pay on their bank loans. This finding, however, is not particularly robust as that reduction stops being statistically different from zero once we consider loan characteristics. These results run counter the claims that the development of the CDS market has lowered the cost of debt. It is possible, however, that the development of the CDS market did not lower the cost of debt for the *average* firm, but it lowered this cost for those firms that are more likely to benefit from the price discovery of CDSs or the risk diversification opportunities offered by these instruments, that is, informationally opaque firms and riskier firms, respectively. It is also possible that these positive effects of the CDS market are offset by the costs arising from a reduction in bank monitoring. We investigate these possibilities next.

4 Which borrowers' cost of debt is affected by the CDS market

An important function of the CDS market is the provision of a new, possibly more efficient, way for investors to hedge their credit risk exposures to firms. Assuming that some of these benefits are passed on to firms, one would expect riskier firms to benefit more than safer firms from this effect of the CDS market. Further, assuming that the new risk hedging opportunities are available under equal terms to both investors and banks, would expect the benefits associated with them to appear both in the bond market as well as in the loan market.

A less obvious but also important is the role that the CDS market has come to play in the price discovery process. As the academic literature surveyed above has shown, CDSs' prices often lead stock prices and bond prices, making them a source of new and valuable information on firms. This information is likely valuable both in the bond as well as in the loan market. For instance, it is likely to reduce the information premium investors demand when they underwrite bonds. It is also likely to reduce the informational advantage that incumbent banks have on their borrowers, thereby increasing the competition to extend loans to these firms. To date, academic studies have documented this role of CDSs' prices for samples of firms rated investment grade only. Assuming that this effect applies to all firms, one would expect that informationally opaque firms to benefit more than transparent firms from this effect of the CDS market.

On the other hand, one must keep in mind the possibility that the CDS market worsens banks' incentives to monitor borrowers during the life of the loan. Lead banks in loan syndicates usually retain a significant share of the loan as a way to commit to continue monitoring the borrower ex post and align its incentives with those of the syndicate participants. The CDS market gives the lead bank the option to hedge this exposure, thereby, reducing its monitoring incentives. Further, the lead bank can do that without the knowledge of outside lenders, which reduces the value of the retained share. This could lead to an increase in loan interest rates, which is likely to affect those borrowers which to benefit the most with bank monitoring, namely riskier and informationally opaque firms. To the extent that bond investors free-ride off of bank monitoring, this suggests that this adverse impact may also affect the bond pricing. As the lead bank's retained share is most important for risky and informationally-opaque borrowers, it follows that one would expect any adverse impact of CDS trading to affect these firms the most.

We proceed to test these hypotheses next by measuring the differential impact of CDS trading across borrower risk and information opacity. Further, out of concern that investors and banks may not be able to buy credit protection under similar terms across these firm types, we investigate if the differential effect of CDS trading across these borrower types varies with the liquidity in the CDS market.

4.1 The CDS market and borrower risk

In order to study whether the effect of the CDS trading on the cost of debt varies with the firm risk, we add to our models of bond and loan spreads a set interactions of borrower proxies for risk with our TRADING variable. More specifically, we consider three alternative measures of firm risk to differentiate firms according to their risk, namely the leverage of the firm $LEVERAGE$, the log of the implied volatility of the firm's stock $LN\ IVOLATILITY$, and a dummy variable if the firm's long-term credit is investment-grade $IGRADE$. Each of these variables is measured in the quarter before the onset of CDS trading. In the latter case, we use a dummy variable to split our firms in two groups depending on whether their credit rating in the quarter before the onset of CDS trading is investment grade or not.

Estimated coefficients and standard errors are displayed in Table 5. The top panel of the table reports the results for the effect of CDS on the cost of bond financing while the bottom panel reports the results for the effect of CDS trading on the cost of bank funding. As with the previous tables, each panel reports on its left-hand side the results of the models estimated with the traded sample alone, while its right-hand side reports the results of the models estimated with the combined traded and matched samples. In the interest of space, we report only the coefficients on those variables which are important to ascertain whether the effect of CDS trading on the cost of firms' debt varies with the risk of the firm. However, included in these models are also all of the firm controls, and the bond and loan controls we used in the models reported in Tables 3 and 4 (results available from the authors upon request). Moreover, we focus our analysis on the most conservative specification which includes both firm and time fixed effects.

The results form Table 5 document that the CDS market has a larger beneficial impact on safer firms, or equivalently, a larger adverse impact on more risky firms. These results stand regardless of whether we consider bond spreads or loan spreads, or whether rely on the results from the traded sample alone or those which also account for the matched sample. In particular, the interactions of $LEVERAGE$ and $LN\ IVOLATILITY$ with $TRADING$ are always positive and statistically significant. The coefficient on $LEVERAGE$ from column (4) suggests that a one standard deviation decrease in the ratio of debt-to-assets (0.1589) is associated with a 20.26 basis point reduction in the cost of corporate debt issue, or a 8.55 basis point reduction in the cost of syndicated loan issue, following the onset of CDS trading. The coefficient on $LNIVOLATILITY$ in column (5) implies that a one standard deviation increase (0.4661) in the log of stock market volatility increases the cost of capital by 30.44 basis points for bonds and 8.70 basis points for loans. [17] While the measured interaction of $IGRADE$ with

[17] Note that the main effect on TRADING in columns (1) and (4) measure the impact of CDS trading on a firm with zero leverage. On the other hand, the main effect in columns (2) and (5) refer to a firm with equity

$TRADING$ is not different statistically from zero, the coefficient of 20.2 basis points for bonds and 8.7 basis points for loans is always negative and economically significant, suggesting that firms with an investment grade credit rating have a reduction the cost of debt issue relative to high-yield firms. When applying these coefficient estimates to the actual variation in risk in our sample, they imply a modest benefit for the safest firms and an economically significant adverse impact for the most risky firms.

4.2 The CDS market and borrower opacity

In order to investigate if the impact of CDS trading on the cost of debt varies with the transparecny of firms, we consider three proxies for firm transparency which have been extensively used in the literature: the number of stock analysts $ANALYSTS$, the volatility of the earnings forecast errors of these analysts $ESTVOL$, and lastly, the bid-ask spread on the firm's stock price $PRICE\ BID - ASK$. Each of these variables is measured in the quarter before the onset of trading. Following the empirical evidence which suggests that analyst coverage is negatively correlated with information asymmetry either because analysts increase the information available on the firm or because they extend coverage to more transparent firms, we assume that firms with more analyst coverage are less informationally opaque.[18] Further, given that analysts are more likely to disagree on their earnings forecasts on firms that are more informationally opaque, we assume that there is a positive correlation between information opacity and the volatility of analysts forecasts, our second proxy for information transparency. Lastly, following the studies which use bid-ask spread as a measure of information asymmetry between sellers and buyers, we assume that the bid-ask spread on the firm's stock price is correlated with the information opacity of the firm.[19]

Table 6 has a similar format to Table 5, and reports the results of our investigation on the potential role of firms' information opacity on the effect that CDS trading may have on the cost of debt. Regardless of whether we consider the effect on bond spreads or the effect on

market implied volatility of equal to 1, which would be one of the riskiest firms. Finally, the main effect in columns (3) and (6) measures the impact of CDS trading for high-yield firms.

[18]Hong, Lim and Stein (2000), Barth and Hutton (2000), Bowen, Chen and Cheng (2004), and Chang, Dasgupta and Hilary (2006) all report results consistent with the hypothesis that stock analysts are a source of new and valuable information on firms. Bhushan (1989), Francis and Soffer (1997), Lang and Lundholm (1993) and Healy and Wahlen (1999), in turn, report results consistent with the idea that analysts follow firms that disclose more information and are easier to understand.

[19]This literature, which includes Amihud and Mendelson (1986), Yohn (1998), Lenz and Verrechia (2000), Kalimipalli and Warga (2002), Sadka and Sadka (2004), builds on the work of Glosten and Milgrom (1985) and Kyle (1985) showing that information asymmetry between potential buyers and sellers introduces adverse selection into secondary markets and reduces market liquidity.

loan spreads, the results suggest that the onset of CDS trading benefits the most transparent firms while having an adverse impact on the most opaque firms. Using the coefficient on $ANALYSTS$ from column (4), a increase in the number of equity market analysts by 1 will reduce the bond spread by 2.72 basis points for bonds and 0.94 basis points for loans. A reduction in the standard deviation of earnings forecasts by its own standard deviation (0.038) is associated with a reduction in bond spreads of 26.3 basis points and in loan spreads of 9.5 basis points. Along the same lines, the coefficient on $PRICE\ BID - ASK$ documents that a one-standard deviation increase in the ratio of equity bid-ask spread to price (153 basis points) corresponds to a 25.2 basis point increase in bond spreads at issue, or a 10.71 basis point increase in loan spreads at issue. Together, these results suggest an economically significant relationship between both bond and loan spreads and CDS trading for transparent firms.[20] As with the interaction of CDS trading with risk, these coefficient estimates imply a modest benefit for the most transparent firms and an economically significant adverse impact on opaque firms.

In sum, we do not find evidence that trading on CDSs has contributed to a reduction or an increase in the cost of debt financing for the *average* firm with a CDS contract. However, we find robust evidence that safer firms as well as transparent firms benefited more from the onset of CDS trading when it comes to the cost they pay to raise funding in the bond market well as the loan market than riskier and informationally opaque firms.

Importantly, the findings we presented above suggest that the latter firms may have even been penalized with the onset of trading on their CDSs' contracts. Together, these results suggest that the impact of CDS trading on firms operates largely through worsening information asymmetries between a borrower and investors, and reject the importance diversification and information channels. However, we acknowledge that our hypotheses about the impact of CDS trading on risky and opaque firms under these channels presumes that investors can purchase credit insurance on equal terms across firm type. When informed investors like banks participate in the CDS market, there will be a lemons premium when buying default protection against risky and informationally opaque firms, which limits the extent to which these borrowers can benefit. In order to rule out this interpretation of our results, we next investigate if these differential effects continue to hold when we account for the liquidity in the CDS market.

[20]Note that the main effect on TRADING in columns (1) and (4) measure the impact of CDS trading on a firm with zero equity analyst coverage. On the other hand, the main effect in columns (2) and (5) refer to a firm with a zero standard deviation for the one-year earnings forecast. Finally, the main effect in columns (3) and (6) measures the impact of CDS trading for firms with a zero bid-ask spread relative to price.

4.3 Does CDS market liquidity matter?

Liquidity is potentially important in the CDS market because these instruments trade over-the-counter. Controlling for the liquidity of CDSs, however, poses some challenges. As in other OTC markets, since there is no centralized reporting of trades, there is no information about the volume of overall trading on firms' CDSs contracts. To add to these difficulties, our data source does not contain any information on CDS market volume. Further, we could not rely on CDSs inclusion in the popular "CDX.NA.IG 5 year" index to control for liquidity because by construction most of the firms in our sample are not part of this index.[21] For these reasons, we chose to proxy for the liquidity of CDSs contracts by the number of quotes on a given business day used to construct the 5-year CDS spread.

To construct our proxy for CDS liquidity, we start by identifying among our traded firms those whose CDSs become liquid during the sample period, that is, those whose CDSs get at least quotes from five different dealers during the sample period. Note that while 10 percent of our Traded sample beings trading as liquid by this definition, 90 percent becomes liquid by the end of our sample period. For the average Traded firm, it takes 5 quarters from the onset of trading to become liquid. In order to distinguish these firms from the remaining traded firms, we created the dummy variable LIQUID which is equal to 1 if that firm ever receives five quotes. Next, we created the dummy variable TRADING x LIQUID which takes the value 1 for LIQUID firms starting the first time that the number of quotes crosses this threshold.

Using this proxy, we investigate if differences in the liquidity of the CDS market across firms explain our findings documenting a differential impact of CDS trading across borrower risk and opacity. Since liquidity is likely negatively correlated with borrower risk and opacity, it seems important to include a reasonable measure of liquidity in the specifications from Tables 4 and 5 before making serious conclusions about the impact of the CDS market on borrowers. Moreover, the impact of a liquid CDS market deserves independent study, because many of the benefits of a CDS market (e.g. information production) presume adequate liquidity. To ascertain this possibility, we added our control for CDSs' liquidity to the models reported in Tables 5 and 6 which we used to investigate whether the effect of CDS trading on the cost of debt varied with the risk of the firm or with the opacity of the firm.

The new results are reported in Tables 7 and 8. A quick look at these tables shows

[21] This index is a portfolio of 125 5-year swaps, covering equal principal amounts of debt of each 125 named North American investment-grade issuers. Almost all of the firms that are part of this index had CDS traded in the first period of our sample, which means that they were excluded from the analysis. Further, even though every six months a new index is constructed, there is a small turnover over time. Of the 128 investment grade firms in our loan sample, only 5 make into this index during the sample period.

that the coefficient on TRADING x LIQUID is negative, especially for loans in the bottom panel, suggesting that firms whose CDSs become liquid benefit from a larger reduction in the cost of debt following the onset of trading on their CDSs. The magnitude of the coefficient on TRADING x LIQUID – about 11 basis points – as well as its statistical significance does not change substantially when we account for the potential endogeneity of our sample of traded firms, suggesting therefore that the reduction in the loan interest rates we detected is not driven by the selection of firms with trading CDSs.

It appears, therefore, that liquidity in the CDS market does play an important independent role on the effect of CDS trading on firms' future cost of debt. The absence of an effect of CDS trading on the cost of debt for the *average* firm is partly due to differences in CDSs' liquidity; firms with liquid CDSs benefit from both a statistically significant and economically meaningful reduction on the interest rates they pay on their bank loans once their CDSs start to trade widely. We do not find a similar effect on bond spreads, but this may be partly due to our small sample of firms with CDSs that issue public bonds frequently. More importantly, note that the coefficients on risk and information opacity barely change in Tables 7 and 8 from those in Tables 5 and 6, making it is apparent that differences in CDSs' liquidity alone do not explain our earlier findings. After controlling for CDSs' liquidity, we continue to find differences in the impact of both bond spreads and loan spreads which followed the onset of CDS trading across firm risk and information opacity safer. Further, we continue to find signs that while some safer and transparent firms benefited in terms of a reduction in the cost of debt with the onset of CDS trading some risky as well as informationally opaque firms were in fact penalized with the onset of trading on their CDSs' contracts. In other words, the data continue to provide more support for the hypothesis that CDS trading has an adverse impact on the cost of debt capital. In the next section we investigate this issue more closely.

4.4 Winners and losers

Thus far, we have documented a differential impact of CDS trading across borrower risk and opacity. We have also documented that some firms (safer and transparent) did benefit with the onset of CDS trading and some firms (risky and more informationally opaque) found the cost of debt to go up after their CDSs became traded. However, we have not actually documented whether or not that differential effect is largely driven by a reduction in spreads by safe and transparent firms or by an increase in spreads by risky and opaque firms. In other words, are there more firms that benefited with trading on their CDSs' contracts than firms that were in fact penalized with trading on their CDSs'? In order to investigate this issue more thoroughly, we use the coefficients from the bottom panel of Tables 7 and 8 in order to document the impact of CDS trading across firm characteristics and market liquidity on loan spreads at issue in Figures 1 through 6. There is one figure for each of our six measures of borrower risk and information opacity, and three lines in each figure. The solid line illustrates the cross-sectional CDF of a borrower characteristic (e.g. LEVERAGE in Figure 1) measured in the quarter before the onset of trading. The dashed line plots the impact of CDS trading on loan spread for firms with less than five quotes in the CDS market, while the dash-dotted line plots a similar effect for firms with more than five quotes.

Figure 1 documents that when the CDS market is illiquid, only 9 percent of firms are able to issue syndicated loans at lower spreads, with a mean benefit of 4.3 basis points, while the remaining riskier firms pay higher spreads, with a mean of 25.3 basis points. However, once the CDS market becomes liquid, approximately one-third of firms benefit, with a mean reduction in spreads of 10.3 basis points, while adverse impact on the riskiest firms is reduced to 19.3 basis points. Figure 2 documents a similar picture when investigating implied equity market volatility. In particular, about 6.5 percent of firms benefit with a mean benefit of 6.5 basis points (while the remaining riskier firms pay on average 22.7 basis points more), but 41 percent of firms benefit when the CDS market is liquid, with a mean benefit of 13.1 basis points (while the riskiest firms pay on average 16.1 basis points more). Focusing on information opacity, Figure 6 illustrates that only 5.8 percent of firms benefit from illiquid CDS trading with a mean benefit of 3.8 basis points (while remaining more opaque firms pay 37.4 basis points more), while 54 percent benefit from liquid CDS trading with a mean benefit for this group of 10 basis points (while the most opaque firms pay 31.3 basis points more).

In summary, the news is not all bad, as there is some evidence that the most safe and transparent firms benefit from the onset of CDS trading, especially once the market becomes sufficiently liquid. That being said, these results do suggest that the differential impact across borrower risk and information opacity measured above is largely driven by an increase in spreads by risky and opaque firms instead of a decrease in spreads for safe and transparent firms. In other words, the first order impact of the onset of trading in the CDS market on the cash market is to increase the cost of debt issuance.

5 The dark side of the CDS market

Our finding that the CDS market has affected negatively the cost of debt to risky and informationally opaque firms may come as a surprise, but it is consistent with the negative effect on firm value that borrowers experience when banks decide to sell their loans in the secondary market. In the case of loan sales, researchers have attributed this effect to the reduction in bank monitoring which is likely to follow when the bank to sell the loan and to the negative signal that decision sends about the borrower's financial condition. Dahiya, Puri and Saunders

(2000), for example, report that the post-loan sale period is characterized by a large incidence of bankruptcy fillings by the borrowers whose loans are sold.

All of the results we have unveiled thus far account for firms' financial condition both before and after the onset of CDS trading, suggesting that our findings are not driven by a potential deterioration in these firms' financial condition. Further, we have investigated this issue more closely by using proxies for firm performance (i.e. credit rating, equity return) as a dependent variable in regressions similar to those implemented in Tables 3 and 4 in order to ensure that the measured impact of the onset of trading (or liquid trading, for that matter) is not simply driven by underlying trends in firm fundamentals. It appears, therefore, that our findings are driven by a potential reduction in banks' monitoring which is more likely to occur once the firms has a trading CDS as it becomes easier for the bank to buy protection for the credit exposure it has to this firm.

In what follows we attempt to provide more supporting evidence for this explanation of our findings. A recent literature documents that lead banks in loan syndicates use the retained share in order to align their incentives with those of syndicate participants and commit to future monitoring.[22] When banks have the ability to hedge credit exposures through CDS, it seems natural to think that the fraction of a loan retained becomes much less important in resolving asymmetric information problems between a lead bank and the usual participants in a syndicated loan. Neither the firm nor a participant bank is aware if the lead bank hedges any exposure it has to the underlying firm through the lead share, which clearly reduces the usefulness of this mechanism for aligning the incentives of the lead bank with other participants. On the other hand, the development of a liquid market for CDS could potentially offset this problem by increasing the demand for syndicated loans by new investors, particularly hedge funds.[23]

In order to test these hypothesis, we start with the baseline specification used in Table 4, but consider the impact that the onset of CDS trading and the onset of liquid CDS trading has on the share of the loan retained by the lead bank and the number of lenders. The table has a similar format to Table 4, with the first three columns estimated only over the Traded sample and the final three columns estimated over the Traded and Matched sample. The first and fourth columns use firm controls, the second and fourth add loan controls (except for the number of lenders), and the last column uses firm fixed effects. Each model employs a full set of time effects. Standard errors are clustered for heteroscedasticity and clustered at the firm level in specifications without firm fixed effects.

The top panel investigates the impact of CDS trading on the lead bank retained share.

[22]See Sufi (2007), Ivashina (2006), and Casolaro, Focarelli, and Pozzolo (2007).

[23]See the discussion by Hennessy (2005).

Note that the retained share is missing for most banks in the LPC Dealscan data set, which significantly reduces the number of observations, but this is recurring problem in the related academic literature. The estimated coefficients in the third row of the panel suggest that the onset of illiquid CDS trading is followed by an increase in the lead bank retained share. Column (4) suggests that the lead bank must retain an additional 5.784 percentage points, which is large relative to the mean retained share for TRADED firms of 19 percentage points. It appears that other loan participants understand the adverse impact of the onset of CDS trading, which makes it harder for the lead bank to syndicate the loan. It follows that the increase in spreads following the onset of CDS trading can be explained in part by the worsening of the underlying information problem and the need for the lead bank to initially assume a greater exposure to the underlying borrower. However, note that the estimated coefficients in the fourth row of the panel suggest that the onset of liquid CDS trading is followed by a reduction in the lead bank retained share, and that this effect more than offsets the increase following the onset of trading. For example, in the specification from column (6) which includes, the retained share falls on net by 3.85 percentage points. These results are complemented in the bottom panel which investigates the impact of CDS trading on the number of lenders in the syndicate. The third column documents that the onset of illiquid CDS trading has no impact on the number of lenders, but the fourth column documents that liquid CDS trading is followed by a significant increase in the number of lenders. The fourth column suggests that liquid trading is associated with an additional 1.694 lenders, which is economically large relative to a mean of 11.2 for traded firms. It follows that liquid CDS trading helps reduce the cost of credit to firms in part through a reduction in the share retained by the lead bank which is accomplished by broadening the investor base for syndicate loans.

6 Final remarks

Despite widespread claims by economists and policymakers about the benefits of credit derivatives, the average corporate borrower has not yet seen a lower cost of debt capital. More interestingly, the types of firms that one expects would naturally benefit the most – risky and informationally opaque firms – appear to have been adversely affected by the CDS market while the types of firms that one might expect to benefit the least – safe and transparent firms – have benefitted from a small reduction in both bond and loan spreads at issue. These results appear to be explained by the fact that the CDS market gives banks an option to hedge corporate exposures, which reduces the effectiveness of retained share in aligning the incentives of a lead bank with other participants in a loan syndicate. We document that the share retained by the lead bank in a syndicated loan actually increases following the onset of CDS trading.

Since these incentives are most important for risky and opaque borrowers, it is no surprise that these are the firms which suffer the most. At the same time, we do document that the CDS market does have an offsetting positive impact on firms once it becomes sufficiently liquid. Not only is there a direct impact of CDS market liquidity on borrower spreads-at-issue, but we document that market liquidity permits a lead bank to reduce its retained share as well as sell the loan to a larger number of participants.

Together, these results suggest that the impact of credit derivatives on borrowers has not been as positive as one might expect. If the adverse impact of the CDS market on risky and opaque borrowers is indeed created by the reduced usefulness of retained exposure, there might be a scope for policy to remedy this problem. In particular, regulators might consider requiring a lead bank in a syndicate to disclose any hedges of retained positions to outside investors. It seems possible that such disclosures would improve outcomes for everyone, including those of the borrower, by mitigating concerns that the lead bank does not have the proper incentives.

Table 1
Characterization of the "Bond traded sample"[a]

Variables	Traded sample: Before vs after CDS trading				Traded vs matched sample			
	Before	After	Difference	p value	Matched	Traded	Difference	p value
A. Firm characteristics								
LN SALES	6.964	7.223	0.260	0.005	5.675	7.061	1.386	0.000
R&D	0.005	0.006	0.001	0.643	0.006	0.006	0.000	0.972
MKTBOOK	1.625	1.528	-0.096	0.214	1.405	1.538	0.132	0.205
PROFMARGIN	0.052	0.026	-0.026	0.474	-0.065	0.084	0.149	0.072
LEVERAGE	0.414	0.408	-0.006	0.678	0.396	0.411	0.015	0.572
LN IVOLATILITY	-0.934	-1.113	-0.179	0.000	-0.892	-0.972	-0.080	0.261
RATING (%)								
AA	0.013	0.000	-0.013	0.082	0.000	0.000	0.000	.
A	0.310	0.215	-0.095	0.025	0.098	0.279	0.181	0.003
BBB	0.283	0.450	0.167	0.000	0.235	0.324	0.089	0.234
BB	0.332	0.260	-0.072	0.104	0.451	0.342	-0.109	0.194
B	0.058	0.075	0.017	0.472	0.216	0.054	-0.162	0.009
UNRATED	0.004	0.000	-0.004	0.317	0.000	0.000	0.000	.
PRICE BID-ASK	0.035	0.029	-0.006	0.000	0.036	0.035	-0.001	0.540
ANALYSTS	9.624	11.055	1.431	0.008	5.510	9.838	4.328	0.000
UNCOVERED	0.027	0.015	-0.012	0.401	0.000	0.009	0.009	0.317
ESTVOL	0.028	0.035	0.007	0.062	0.032	0.034	0.001	0.879
B. Bond characteristics								
BOND SPREAD	254.645	274.680	20.035	0.195	378.855	273.698	-105.158	0.000
LN BOND AMT	12.698	12.882	0.185	0.003	12.039	12.760	0.721	0.006
CALLABLE	0.564	0.566	0.002	0.964	0.580	0.585	0.005	0.947
PUTABLE	0.057	0.030	-0.026	0.160	0.080	0.065	-0.015	0.739
SINK FUND	0.093	0.058	-0.035	0.154	0.100	0.095	-0.005	0.918
LN BOND MAT	2.204	2.240	0.036	0.501	2.187	2.147	-0.040	0.559
Observations	226	200	426		51	111	162	

[a] "Bond traded sample": Firms with a CDS that started to trade over the 2001:Q2-YY time period that had a credit rating of no better than $A+$ or no worse than B in the quarter before trading, and which issue at least one bond in the 12 quarters before trading and at least another bond in the eight? quarters afterwards. "Matched sample": See the Methodology subsection for the criteria we adopted to identify the firms that matched our "Bond traded sample". LN SALES: 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. LN IVOLATILITY: Log of implied volatility of the firm's stock. RATING: Firm's long-term credit rating. PRICE BID-ASK: Bid-ask spread of the firm's tock price. ANALYSTS: Number of equity analyst estimates of earnings. UNCOVERED: Dummy variable equal to 1 for firms with no equity analyst coverage. ESTVOL: Standard deviation of analyst estimates of earnings. BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. LN BOND AMT: Log of the bond issue. CALLABLE: Callable bonds. PUTABLE: Bonds with a put option. SINK FUND: Bonds with a sinking fund. LN BOND MAT: Log of bond maturity.
Source: Authors' computations.

Table 2

Characterization of the "Loan traded sample"[a]

Variables	Traded sample: Before vs after CDS trading				Traded vs matched sample			
	Before	After	Difference	p value	Matched	Traded	Difference	p value
A. Firm characteristics								
LN SALES	7.014	7.062	0.049	0.434	5.933	6.972	1.039	0.000
R&D	0.017	0.013	-0.004	0.353	0.011	0.018	0.007	0.128
MKTBOOK	1.788	1.587	-0.201	0.005	1.697	1.620	-0.077	0.411
PROFMARGIN	0.028	0.036	0.008	0.614	-0.013	0.042	0.055	0.093
LEVERAGE	0.358	0.345	-0.013	0.246	0.335	0.353	0.018	0.337
LN IVOLATILITY	-0.932	-1.131	-0.199	0.000	-0.881	-0.983	-0.102	0.042
RATING (%)								
AA	0.010	0.000	-0.010	0.045	0.000	0.000	0.000	.
A	0.381	0.289	-0.092	0.008	0.153	0.318	0.165	0.000
BBB	0.391	0.468	0.077	0.035	0.287	0.422	0.135	0.010
BB	0.167	0.185	0.018	0.515	0.382	0.231	-0.151	0.003
B	0.023	0.055	0.032	0.025	0.178	0.029	-0.149	0.000
UNRATED	0.028	0.000	-0.028	0.001	0.000	0.000	0.000	.
PRICE BID-ASK	0.035	0.031	-0.004	0.001	0.038	0.035	-0.004	0.038
ANALYSTS	9.634	10.075	0.441	0.387	7.134	9.590	2.456	0.000
UNCOVERED	0.043	0.029	-0.014	0.303	0.013	0.029	0.016	0.301
ESTVOL	0.029	0.034	0.005	0.063	0.026	0.033	0.007	0.096
B. Loan characteristics								
LOAN SPREAD	96.617	111.973	15.356	0.021	169.330	108.584	-60.746	0.000
CORPURPOSES	0.193	0.365	0.171	0.000	0.194	0.241	0.046	0.304
REFINANCE	0.105	0.026	-0.079	0.000	0.208	0.143	-0.065	0.122
TAKEOVER	0.076	0.020	-0.056	0.000	0.148	0.064	-0.084	0.014
WORKCAPITAL	0.127	0.215	0.088	0.001	0.222	0.148	-0.074	0.084
LN LOAN AMT	20.141	20.130	-0.012	0.877	19.556	20.232	0.676	0.000
DIVRESTRICT	0.321	0.415	0.094	0.008	0.604	0.394	-0.210	0.000
SECURED	0.170	0.212	0.042	0.142	0.460	0.248	-0.211	0.000
GUARANTOR	0.030	0.080	0.050	0.003	0.088	0.029	-0.059	0.024
LENDERS	10.233	12.353	2.119	0.000	8.623	11.234	2.611	0.000
LN LOAN MAT	2.866	3.162	0.296	0.000	3.436	3.143	-0.292	0.000
Observations	396	346	742		152	173	325	

[a] "Loan traded sample": Firms with a CDS that started to trade over the 2001:Q2-YY time period that had a credit rating of no better than $A+$ or no worse than B in the quarter before trading, and which issue borrow from banks at least once in the 12 quarters before trading and at least once in the eight? quarters afterwards. "Matched sample": See the Methodology subsection for the criteria we adopted to identify the firms that matched our "Loan traded sample". LN SALES: 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. LN IVOLATILITY: Log of implied volatility of the firm's stock. RATING: Firm's long-term credit rating. PRICE BID-ASK: Bid-ask spread of the firm's tock price. ANALYSTS: Number of equity analyst estimates of earnings. UNCOVERED: Dummy variable equal to 1 for firms with no equity analyst coverage. ESTVOL: Standard deviation of analyst estimates of earnings. LOAN SPREAD: All-in-drawn-loan spread over Libor at the time of the loan origination. 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. LN LOAN AMT: 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. LN LOAN MAT: Log of loan maturity.
Source: Authors' computations.

Table 3
Effect of CDS trading on ex ante bond credit spreads[a]

Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-3.478	-2.518	1.779	6.658	5.431	18.375
	(17.982)	(17.656)	(19.421)	(15.035)	(14.860)	(14.808)
TRADED				-23.615	-25.170	
				(18.024)	(17.340)	
FIRM CONTROLS						
LN SALES	-6.979	-6.549	-20.006	-0.175	0.214	-1.537
	(8.853)	(9.303)	(13.860)	(7.362)	(7.589)	(12.999)
R&D	41.365	47.333	265.022	-26.558	-27.918	256.071
	(197.660)	(205.449)	(259.057)	(216.967)	(224.406)	(238.522)
MKTBOOK	-27.882***	-27.542***	-19.929	-32.211***	-31.969***	-27.741**
	(8.847)	(8.736)	(12.290)	(8.897)	(8.671)	(11.263)
PROFMARGIN	-21.349	-15.391	24.127	-29.238	-25.330	5.194
	(17.636)	(16.663)	(20.653)	(19.965)	(20.438)	(21.301)
LEVERAGE	70.140	73.850	-85.193	67.058	71.570	24.451
	(56.638)	(55.669)	(107.231)	(50.947)	(49.169)	(89.529)
LN IVOLATILITY	105.388***	104.615***	79.724**	109.462***	108.461***	67.652**
	(25.914)	(25.483)	(35.335)	(20.614)	(20.357)	(30.496)
RATING	-20.720**	-20.257**	-27.286**	-27.429***	-25.143***	-22.928***
	(8.888)	(9.007)	(12.630)	(6.511)	(6.628)	(8.279)
$RATING^2$2	2.216***	2.190***	3.466***	2.556***	2.449***	2.553***
	(0.474)	(0.475)	(0.737)	(0.337)	(0.341)	(0.609)
BOND CONTROLS						
LN BOND AMT		-0.443	18.388		2.329	12.955**
		(8.595)	(11.455)		(4.119)	(6.034)
CALLABLE		25.123**	8.225		18.839*	3.136
		(11.564)	(10.868)		(11.363)	(10.220)
PUTABLE		10.500	4.491		20.125	3.948
		(23.296)	(24.173)		(22.519)	(22.126)
SINKFUND		3.355	-12.319		-28.399	-29.045
		(19.301)	(23.496)		(18.815)	(21.290)
LN BOND MAT		-11.782	3.599		-12.203	-1.425
		(13.301)	(12.249)		(12.794)	(11.837)
Observations	371	371	371	477	477	477
R-squared	0.71	0.71	0.88	0.73	0.74	0.90

[a] The sample refers to all firm-years of bond issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. Models (1), (2), (4) and (5) estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. Models (3) and (6) estimated with robust standard errors and firm fixed effects. The dependent variable is BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. TRADED: Duumy variable that is equal to 1 for firms that ever have a CDS that trade. TRADING: Duumy variable that is equal to 1 for bonds after the firm's CDS begins to trade. LN SALES: 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. LN IVOLATILITY: Log of implied volatility of the firm's stock. RATING: Equals the number associated with the firm credit rating. We used the following conversion AAA=1, AA=2,..., B=6. LN BOND AMT: Log of the bond issue. CALLABLE: Callable bonds. PUTABLE: Bonds with a put option. SINK FUND: Bonds with a sinking fund. LN BOND MAT: Log of bond maturity. Included in the regressions but not shown in the table are also dummy variables for each quarter in the sample period.
Source: Authors' computations.

Table 4
Effect of CDS trading on loan spreads at origination[a]

Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-15.972**	-5.580	1.908	-9.545*	-5.383	7.687
	(6.743)	(5.598)	(6.243)	(5.617)	(4.900)	(5.171)
TRADED				-5.524	-1.366	
				(6.638)	(5.449)	
FIRM CONTROLS						
LN SALES	-10.284**	2.264	-5.644	-15.781***	-5.128	-6.862
	(4.365)	(3.031)	(9.250)	(3.700)	(3.347)	(8.373)
R&D	-2.615	20.333	-39.108	-22.249	-11.210	-5.942
	(45.133)	(40.191)	(45.729)	(28.911)	(27.416)	(30.819)
MKTBOOK	-8.158***	-6.064**	-1.258	-7.720***	-6.649***	-1.883
	(3.033)	(2.441)	(2.640)	(1.975)	(1.800)	(1.917)
PROFMARGIN	9.425	-1.467	4.220	0.413	-8.088	-6.757
	(19.471)	(18.591)	(21.317)	(15.462)	(14.556)	(17.985)
LEVERAGE	93.905***	84.727***	103.138***	133.057***	122.895***	132.272***
	(28.699)	(20.583)	(30.423)	(22.471)	(19.402)	(27.984)
LN IVOLATILITY	37.321***	20.866**	-2.080	56.628***	44.065***	24.731***
	(11.618)	(8.166)	(9.671)	(8.176)	(7.827)	(8.892)
RATING	-8.489	-6.928*	-13.610***	-14.641***	-13.220***	-12.303***
	(6.588)	(3.949)	(2.398)	(3.818)	(2.889)	(2.254)
$RATING^2$	1.106***	0.872***	1.176***	1.137***	0.936***	0.870***
	(0.383)	(0.217)	(0.130)	(0.240)	(0.183)	(0.142)
LOAN CONTROLS						
CORPPURPOSES		18.532***	19.338***		17.891***	16.780***
		(5.178)	(4.864)		(5.181)	(4.562)
REFINANCE		18.663**	7.014		16.777**	9.695
		(7.965)	(7.119)		(7.117)	(7.013)
TAKEOVER		23.267**	24.040***		34.292***	30.486***
		(10.779)	(8.422)		(9.005)	(8.840)
WORKCAPITAL		21.275***	18.289**		22.485***	19.442***
		(7.038)	(7.127)		(5.975)	(6.469)
LN LOAN AMT		-8.032***	-5.592*		-7.284***	-4.345
		(2.408)	(3.338)		(2.699)	(2.835)
DIVRESTRICTIONS		5.721	1.743		3.689	-2.167
		(5.556)	(6.506)		(4.704)	(5.822)
SECURED		64.942***	49.519***		51.424***	34.442***
		(9.808)	(11.371)		(6.859)	(7.533)
GUARANTOR		-14.989*	-9.327		8.512	1.520
		(8.975)	(8.098)		(8.132)	(10.757)
LENDERS		-0.639**	-0.989***		-0.765**	-0.641*
		(0.312)	(0.364)		(0.308)	(0.348)
LN LOAN MAT		4.197	7.354**		7.034**	7.468**
		(2.738)	(3.260)		(2.918)	(3.057)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.68	0.76	0.88	0.67	0.73	0.86

[a] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. Models (1), (2), (4) and (5) estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. Models (3) and (6) estimated with robust standard errors and firm fixed effects. The dependent variable is LOANSPREAD: the all-in-drawn-loan spread over Libor at the time of the loan origination. TRADED: Duumy variable that is equal to 1 for firms that ever have CDS trade. TRADING: Duumy variable that is equal to 1 after CDS begins to trade. LN SALES: 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. LN IVOLATILITY: LOog of implied volatility of the firm's stock. RATING: Equals the number associated with the firm credit rating. We used the following conversion AAA=1, AA=2,..., B=6. 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. LN LOAN AMT: 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. LENDERS: Number of lenders in the loan syndicate. LN LOAN MAT: 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.
Source: Authors' computations.

Table 5
Effect of CDS trading on the cost of debt for riskier firms

Effect on ex ante bond credit spreads[a]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-65.962**	67.709**	17.344	-33.450	81.611**	31.326
	(30.318)	(30.173)	(23.117)	(29.273)	(35.095)	(21.156)
TRADING x LEVERAGE	161.889**			127.412*		
	(64.274)			(68.569)		
TRADING x LNIVOLATILITY		66.702**			65.299**	
		(26.390)			(31.693)	
TRADING x INVGRADE			-24.303			-20.234
			(24.112)			(24.718)
Observations	371	371	371	477	477	477
R-squared	0.88	0.88	0.88	0.90	0. 90	0.90

Effect on loan credit spreads[b]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-18.436*	5.363	6.000	-11.219	25.808**	14.085
	(9.842)	(11.192)	(10.915)	(9.739)	(11.013)	(10.823)
TRADING x LEVERAGE	57.803**			53.775*		
	(23.823)			(27.464)		
TRADING x LN IVOLATILITY		3.591			18.672**	
		(8.774)			(9.308)	
TRADING x IGRADE			-5.006			-8.716
			(9.918)			(10.744)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.88	0.88	0.88	0.87	0.87	0.87

[a] The sample refers to all firm-years of bond issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. TRADING: Duumy variable that is equal to 1 for bonds after the firm's CDS begins to trade. LEVERAGE: Total debt over assets measured the quarter the firm's CDS starts to trade. LN IVOLATILITY: Log of implied volatility of the firm's stock measured the quarter the firm's CDS starts to trade. IGRAGE: Dummy variable equalt to 1 if the firm is rated investment grade in the quarter before its CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and bond controls used in Table 3 and dummy variables for each quarter in the sample period.

[b] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is LOANSPREAD: the all-in-drawn-loan spread over Libor at the time of the loan origination. TRADING: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. LEVERAGE: Total debt over assets measured the quarter the firm's CDS starts to trade. LN IVOLATILITY: Log of implied volatility of the firm's stock measured the quarter the firm's CDS starts to trade. IGRADE: Dummy variable equalt to 1 if the firm is rated investment grade in the quarter before its CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and loan controls used in Table 4 and dummy variables for each quarter in the sample period.

Source: Authors' computations.

Table 6
Effect of CDS trading on the cost of debt for informationally opaque firms

Effect on ex ante bond credit spreads[a]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	23.449	-11.851	-54.603	44.858	-2.635	-39.342
	(30.947)	(19.829)	(34.813)	(27.811)	(15.991)	(35.388)
TRADING x ANALYSTS	-2.386			-2.717		
	(1.991)			(2.190)		
TRADING x ESTVOL		569.791***			691.217***	
		(202.602)			(219.168)	
TRADING x PRICE BID-ASK			0.163**			0.165*
			(0.082)			(0.099)
Observations	371	371	371	477	477	477
R-squared	0.88	0.88	0.88	0.90	0.90	0.90

Effect on loan credit spreads[b]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	14.377*	-1.748	-5.041	16.903**	-0.953	-16.801
	(8.606)	(6.585)	(11.727)	(8.203)	(5.960)	(11.836)
TRADING x ANALYSTS	-1.306**			-0.941*		
	(0.525)			(0.538)		
TRADING x ESTVOL		119.108			250.943***	
		(86.188)			(91.205)	
TRADING x PRICE BID-ASK			0.020			0.070**
			(0.031)			(0.032)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.88	0.88	0.88	0.87	0.87	0.87

[a] The sample refers to all firm-years of bond issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. TRADING: Duumy variable that is equal to 1 for bonds after the firm's CDS begins to trade. ANALYSTS: Number of equity analyst estimates of earnings measured the quarter the firm's CDS starts to trade. ESTVOL: Standard deviation of analyst estimates of earnings measured the quarter the firm's CDS starts to trade. PRICE BID-ASK: Bid-ask spread of the firm's tock price measured the quarter the firm's CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and bond controls used in Table 3 and dummy variables for each quarter in the sample period.

[b] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is LOANSPREAD: the all-in-drawn-loan spread over Libor at the time of the loan origination. TRADING: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. ANALYSTS: Number of equity analyst estimates of earnings measured the quarter the firm's CDS starts to trade. ESTVOL: Standard deviation of analyst estimates of earnings measured the quarter the firm's CDS starts to trade. PRICE BID-ASK: Bid-ask spread of the firm's tock price measured the quarter the firm's CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and loan controls used in Table 4 and dummy variables for each quarter in the sample period.

Source: Authors' computations.

Table 7

CDS liquidity and effect of CDS trading on the cost of debt for riskier firms[a]

Effect on bond spreads						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-67.840**	68.898**	17.536	-47.143	77.098**	26.808
	(32.380)	(30.702)	(23.278)	(33.876)	(36.668)	(22.095)
TRADING x LIQUID	5.049	-7.133	-3.754	19.146	9.041	12.277
	(21.543)	(20.408)	(20.628)	(19.761)	(18.835)	(19.051)
TRADING x LEVERAGE	165.416**			141.446*		
	(68.464)			(72.412)		
TRADING x LN IVOLATILITY		67.331**			64.533**	
		(26.743)			(31.985)	
TRADING x IGRADE			-24.135			-21.174
			(24.014)			(24.847)
Observations	371	371	371	477	477	477
R-squared	0.88	0.88	0.88	0.90	0.90	0.90

Effect on loan spreads						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	-16.757*	8.545	5.961	-5.782	32.229***	18.483*
	(9.963)	(11.292)	(10.948)	(10.277)	(11.447)	(10.984)
TRADING x LIQUID	-10.774*	-11.187*	-10.559*	-11.899**	-12.432**	-11.490**
	(5.873)	(5.869)	(5.905)	(5.612)	(5.613)	(5.674)
TRADING x LEVERAGE	57.671**			53.893*		
	(24.386)			(28.213)		
TRADING x LN IVOLATILITY		5.136			19.390**	
		(8.782)			(9.350)	
TRADING x IGRADE			-3.000			-7.500
			(9.973)			(10.833)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.88	0.88	0.88	0.87	0.87	0.87

[a] The sample refers to all firm-years of bond issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. TRADING: Duumy variable that is equal to 1 for bonds after the firm's CDS begins to trade. TRADING x LIQUID: Duumy variable that is equal to 1 for bonds after the firm's CDS becomes liquid i.e. after it starts to get 5 dealer quotes. LEVERAGE: Total debt over assets measured the quarter the firm's CDS starts to trade. LN IVOLATILITY: Log of implied volatility of the firm's stock measured the quarter the firm's CDS starts to trade. IGRADE: Dummy variable equalt to 1 if the firm is rated investment grade in the quarter before its CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and bond controls used in Table 3 and dummy variables for each quarter in the sample period.

[b] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is LOANSPREAD: the all-in-drawn-loan spread over Libor at the time of the loan origination. TRADING: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. TRADING x LIQUID: Duumy variable that is equal to 1 for bonds after the firm's CDS becomes liquid i.e. after it starts to get 5 dealer quotes. LEVERAGE: Total debt over assets measured the quarter the firm's CDS starts to trade. LN IVOLATILITY: Log of implied volatility of the firm's stock measured the quarter the firm's CDS starts to trade. IGRADE: Dummy variable equalt to 1 if the firm is rated investment grade in the quarter before its CDS starts to trade.Included in the regressions but not shown in the table are also all of the firm and loan controls used in Table 4 and dummy variables for each quarter in the sample period.

Source: Authors' computations.

Table 8

CDS liquidity and effect of CDS trading on the cost of debt for informationaly opaque firms

Effect on bond spreads[a]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	23.398	-11.428	-54.672	41.138	-4.790	-42.413
	(31.220)	(19.840)	(34.994)	(28.255)	(16.473)	(35.292)
TRADING x LIQUID	-0.552	-7.738	-6.840	15.739	5.836	9.250
	(21.192)	(20.555)	(20.535)	(18.991)	(19.168)	(18.886)
TRADING x ANALYSTS	-2.375			-3.009		
	(2.038)			(2.224)		
TRADING x ESTVOL		577.864***			682.048***	
		(209.126)			(227.503)	
TRADING x PRICE BID-ASK			0.165**			0.162
			(0.083)			(0.099)
Observations	371	371	371	477	477	477
R-squared	0.88	0.88	0.88	0.90	0.90	0.90

Effect on loan spreads[b]						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADING	14.941*	-0.074	-5.526	20.945**	4.464	-12.049
	(8.606)	(6.585)	(11.727)	(8.500)	(6.674)	(12.235)
TRADING x LIQUID	-9.558	-10.755*	-11.511**	-11.044**	-11.438**	-12.774**
	(5.964)	(5.893)	(5.830)	(5.612)	(5.610)	(5.591)
TRADING x ANALYSTS	-1.214**			-0.835		
	(0.528)			(0.536)		
TRADING x ESTVOL		117.648			246.577***	
		(86.646)			(91.501)	
TRADING x PRICE BID-ASK			0.026			0.073**
			(0.031)			(0.032)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.88	0.88	0.88	0.87	0.87	0.87

[a] The sample refers to all firm-years of bond issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is BOND SPREAD: Ex ante credit spread over Treasury with the same maturity of the bond. TRADING: Duumy variable that is equal to 1 for bonds after the firm's CDS begins to trade. TRADING x LIQUID: Duumy variable that is equal to 1 for bonds after the firm's CDS becomes liquid i.e. after it starts to get 5 dealer quotes. ANALYSTS: Number of equity analyst estimates of earnings measured the quarter the firm's CDS starts to trade. ESTVOL: Standard deviation of analyst estimates of earnings measured the quarter the firm's CDS starts to trade. PRICE BID-ASK: Bid-ask spread of the firm's tock price measured the quarter the firm's CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and bond controls used in Table 3 and dummy variables for each quarter in the sample period.

[b] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. All models estimated with robust standard errors and firm fixed effects. The dependent variable is LOANSPREAD: the all-in-drawn-loan spread over Libor at the time of the loan origination. TRADING: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. TRADING x LIQUID: Duumy variable that is equal to 1 for bonds after the firm's CDS becomes liquid i.e. after it starts to get 5 dealer quotes. ANALYSTS: Number of equity analyst estimates of earnings measured the quarter the firm's CDS starts to trade. ESTVOL: Standard deviation of analyst estimates of earnings measured the quarter the firm's CDS starts to trade. PRICE BID-ASK: Bid-ask spread of the firm's tock price measured the quarter the firm's CDS starts to trade. Included in the regressions but not shown in the table are also all of the firm and loan controls used in Table 4 and dummy variables for each quarter in the sample period.

Source: Authors' computations.

Table 9
The impact of trading on lead bank share and number of lenders[a]

Effect on lead bank share						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADED				-2.399	-2.373	
				(3.572)	(2.915)	
TRADED x LIQUID	1.294	3.743		0.760	3.694	
	(3.185)	(2.794)		(2.957)	(2.463)	
TRADING	5.995*	4.885*	4.094	5.784*	4.724*	4.116
	(3.490)	(2.623)	(4.820)	(3.156)	(2.400)	(3.564)
TRADING x LIQUID	-9.011***	-5.984**	-9.193**	-8.206***	-4.431	-7.907*
	(3.092)	(2.695)	(4.632)	(3.122)	(2.829)	(4.045)
Observations	291	291	291	448	448	448
R-squared	0.18	0.43	0.79	0.21	0.43	0.86

Effect on number of lenders						
Variables	Traded sample			Traded and matched sample		
	1	2	3	4	5	6
TRADED				-0.146	-0.451	
				(0.735)	(0.650)	
TRADED x LIQUID	0.557	0.517		0.762	0.744	
	(0.765)	(0.709)		(0.666)	(0.612)	
TRADING	0.020	0.057	0.078	0.148	0.313	0.088
	(0.765)	(0.660)	(0.971)	(0.670)	(0.588)	(0.697)
TRADING x LIQUID	2.093**	1.498*	1.196	1.694**	1.266*	0.920
	(0.825)	(0.761)	(0.886)	(0.761)	(0.697)	(0.800)
Observations	702	702	702	1,151	1,151	1,151
R-squared	0.12	0.32	0.54	0.12	0.34	0.57

[b] The sample refers to all firm-years of loan issuance three years before CDS trading starts and two years after trading begins for the Traded Sample in the first three columns and the combined Traded and Matched Sample in the last three columns. Models (1), (2), (4) and (5) estimated with robust standard errors and clustered by firm to correct for correlation across observations of a given firm. Models (3) and (6) estimated with robust standard errors and firm fixed effects. The dependent variable is the retained share of the lead bank (LEADSHARE) in the top panel and the number of lenders (NUMLENDERS) in the bottom panel. The reported regressors are described below. TRADED: Dummy variable that is equal to 1 for firms that are ever traded in the CDS market. TRADED x LIQUID: Dummy variable that is equal to 1 for firms that ever have 5 quotes. TRADING: Duumy variable that is equal to 1 for loans taken out by the firm after its CDS begins to trade. TRADING x LIQUID: Dummy variable that is equal to 1 for bonds after the firm's CDS becomes liquid i.e. after it starts to get 5 dealer quotes. Included in the regressions but not shown in the table are also dummy variables for each quarter in the sample period as well as the firm-level controls described in Table 4. Moreover, models (2), (3), (5) and (6) include the loan controls from Table 4 except for the number of lenders.
Source: Authors' computations.

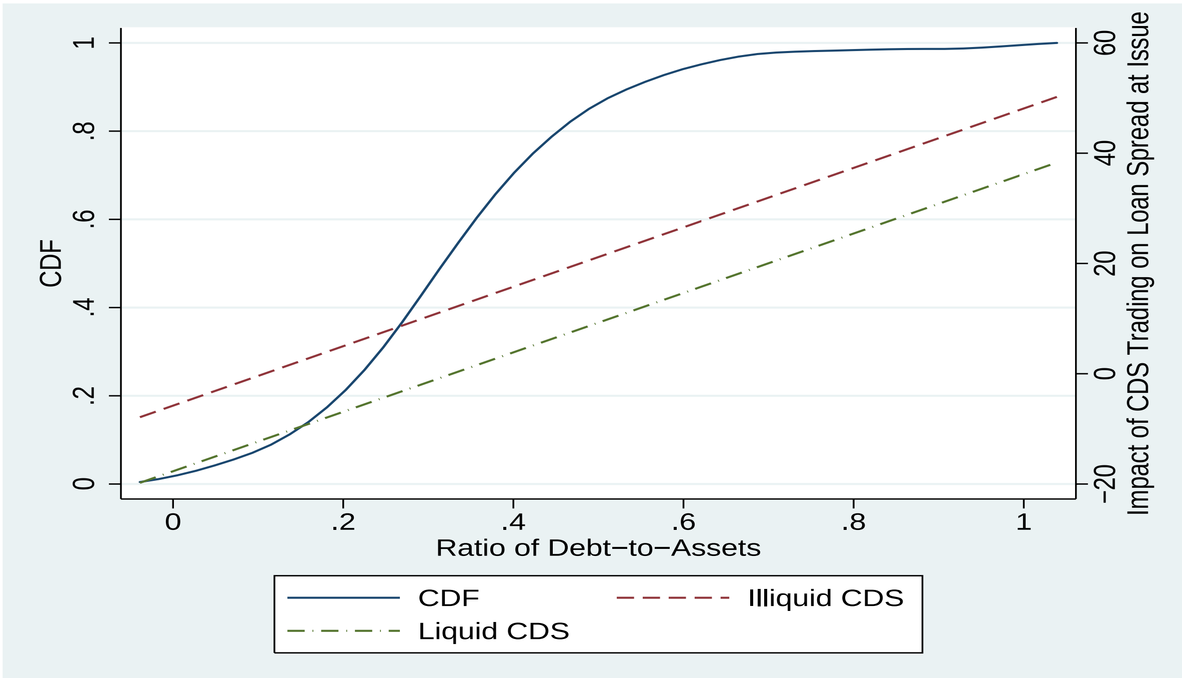

Figure 1: Impact of CDS on Loan Spreads Across Leverage

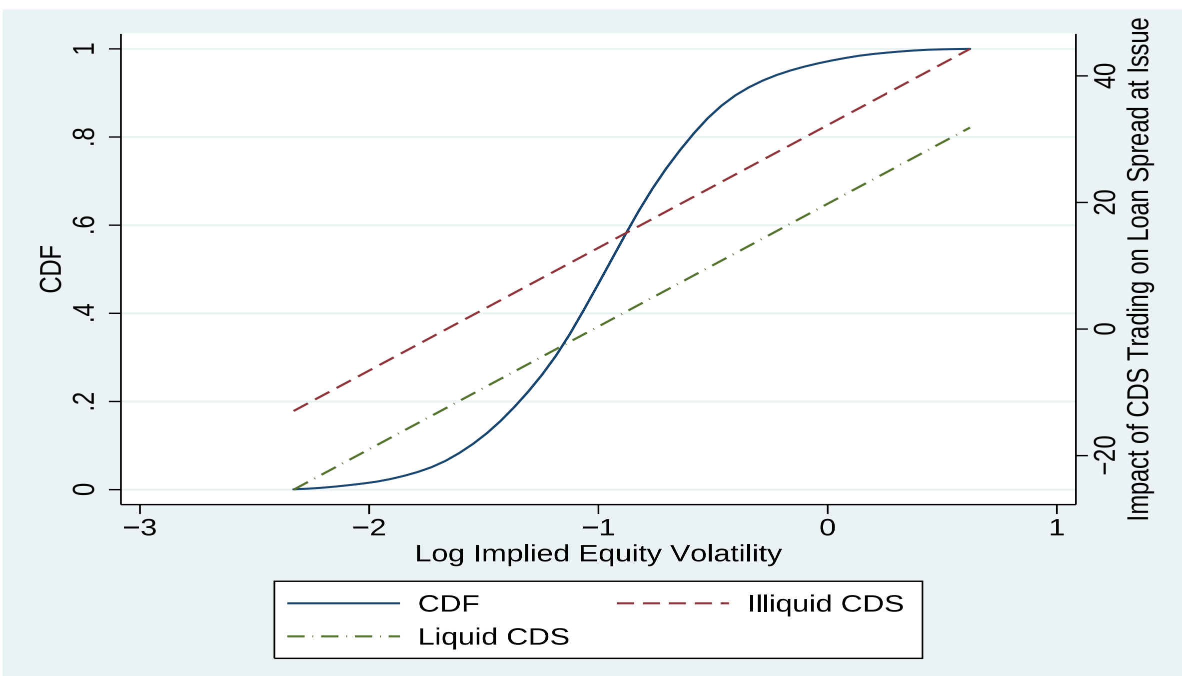

Figure 2: Impact of CDS on Loan Spreads Across Log Equity Volatility

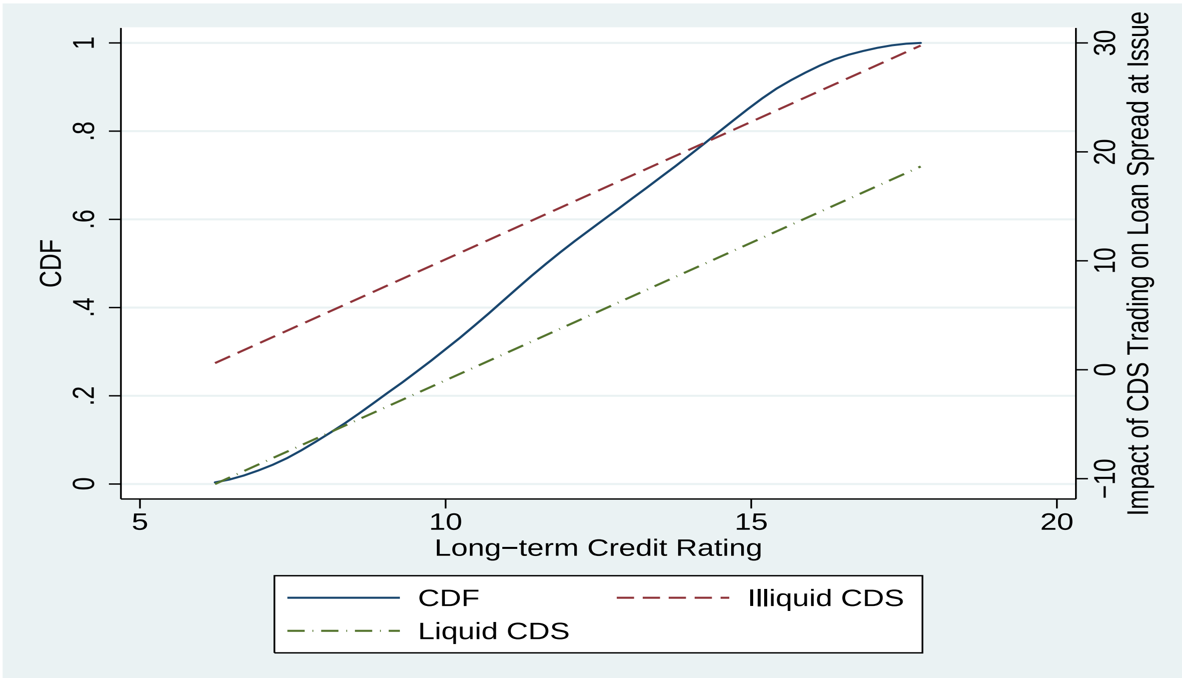

Figure 3: Impact of CDS on Loan Spreads Across Credit Rating

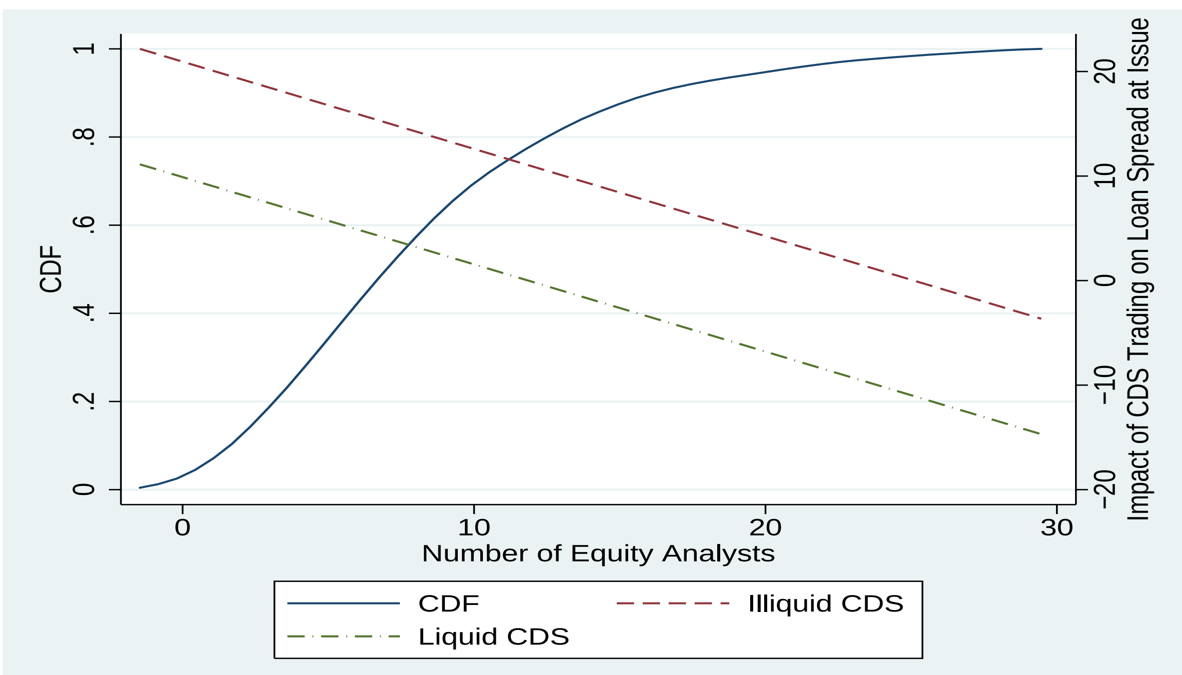

Figure 4: Impact of CDS on Loan Spreads Across Analyst Coverage

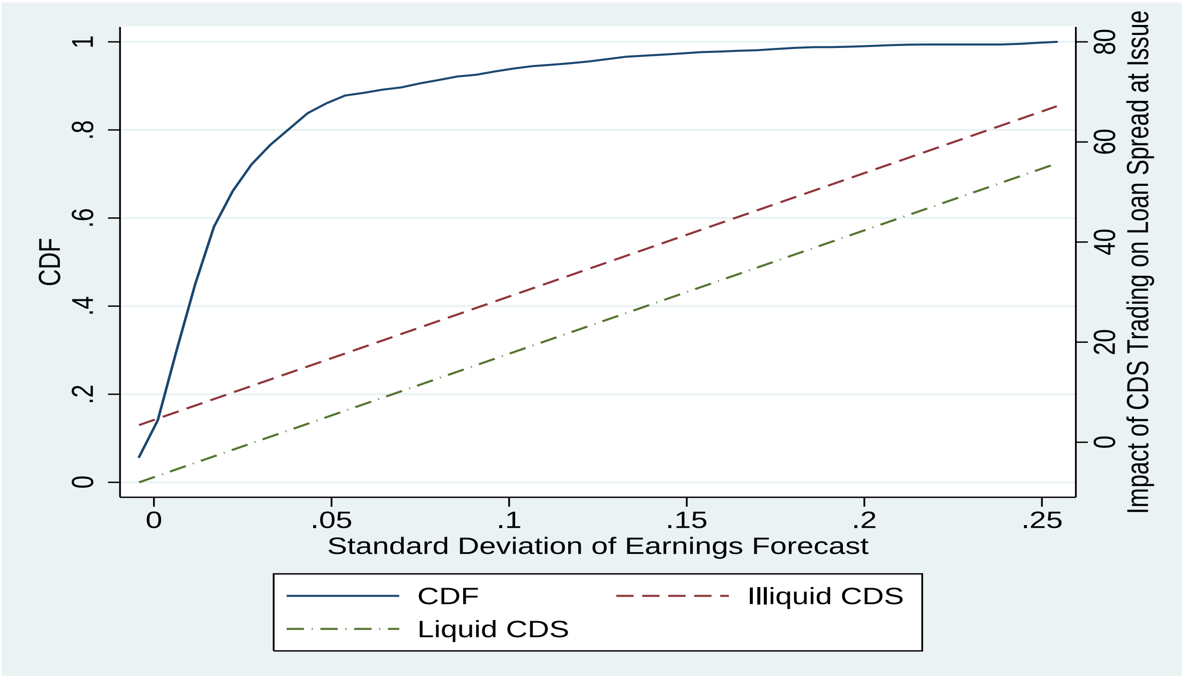

Figure 5: Impact of CDS on Loan Spreads Across Earnings Forecast Volatility

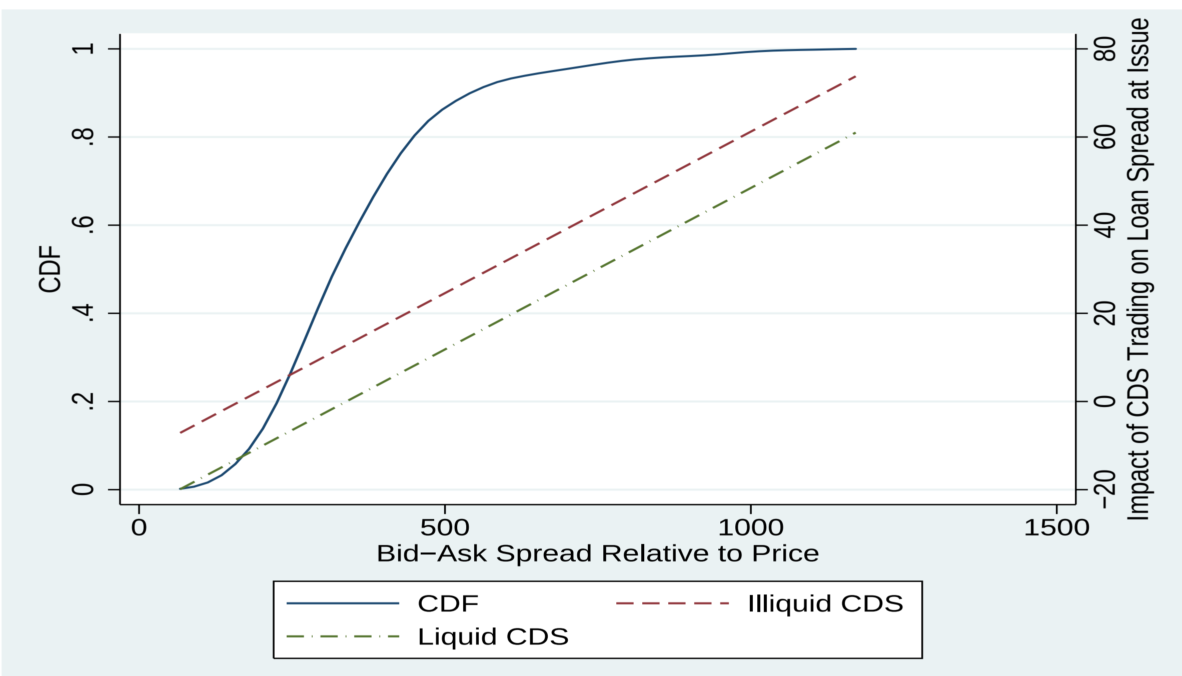

Figure 6: Impact of CDS on Loan Spreads Across Equity Bid-Ask Spread

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