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Abstract

A recent change to the U.S. tax code (IRS Regulation TD9599) lowered the costs certain creditors incur when restructuring debt out of court. We use this setting to show how CDS spreads gauge the cost wedge between in- versus out-of-court distress resolution. CDS spreads declined by record figures on the regulation's announcement, with declines concentrated among distressed firms with higher ratios of syndicated loans — the credit category treated by TD9599. Critically, distressed firm's loan renegotiation rates more than doubled, reducing their exposure to financial distress costs, which we estimate are up to 36% of firm value. Those firms' access to syndicated loans increased while associated interest markups declined.

Key words: Debt renegotiation, taxes, bankruptcy, credit default swaps, credit access.
JEL classification: G33, G32.

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Abstract

A recent change to the U.S. tax code (IRS Regulation TD9599) lowered the costs certain creditors incur when restructuring debt out of court. We use this setting to show how CDS spreads gauge the cost wedge between in- versus out-of-court distress resolution. CDS spreads declined by record figures on the regulation's announcement, with declines concentrated among distressed firms with higher ratios of syndicated loans — the credit category treated by TD9599. Critically, distressed firm's loan renegotiation rates more than doubled, reducing their exposure to financial distress costs, which we estimate are up to 36% of firm value. Those firms' access to syndicated loans increased while associated interest markups declined.

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1 Introduction

Firms unable to meet their obligations often attempt to renegotiate with creditors out of court. These renegotiations are thought to be beneficial since mutually-agreed restructurings avoid the deadweight costs of drawn-out legal battles. Numerous frictions, however, stand in the way of parties reaching side agreements, often leading them to bankruptcy court (see, e.g., Asquith et al. (1994)). Key to this dynamic, the extent to which debt restructuring costs shape renegotiation remains poorly understood. Given the immense amount of claims that end tied up in court proceedings every year (nearly $100 billion were added to Chapter 11 proceedings in 2015 alone), it is crucial for researchers and policymakers to gauge how important restructuring costs are for bankruptcy risk, and how much value out-of-court renegotiation may preserve.

This paper examines a policy-induced shift in out-of-court renegotiation frictions, analyzing a well-identified connection between debt restructuring costs and the likelihood that debt renegotiation takes place. The study also gauges first-order value and contracting implications of out-of-court restructurings, including the availability of credit to firms facing distress and the composition of their debt. The analysis exploits a recent IRS rule that modified the tax payments that certain lenders owe upon restructuring debt out of court. Regulation TD9599 (which we describe in detail shortly) was adopted on September 12, 2012 and significantly reduced the amount of taxes owed upon the restructuring of syndicated loans — this without treating other types of debt. Remarkably, the IRS ruling had extraordinary retroactive legal powers over loans that were originated in the past — several years before the regulation was proposed. The passage of TD9599 introduces differential levels of tax incentives across different classes of creditors within the same firm, providing unique insights into trade-offs involved in distressed-debt renegotiations.

Taxes represent a major obstacle to out-of-court renegotiation in the U.S. (see Gilson (1997)). Creditors incur large tax liabilities on restructured debt and those costs erode the value over which parties can bargain out of court, promoting in-court resolution. Prior to 2012, the tax treatment of loans renegotiated out of court was highly punitive, as lenders would owe taxes on so-called "phantom gains." Specifically, creditors who acquired distressed debt in private transactions and restructured it out of court would owe taxes based on the difference between the purchase price and the loan's original *par value* — creditors would owe taxes on large unrealized gains. Accordingly, the more deeply distressed the borrower, the higher the lender's tax burden on a restructured loan. Regulation TD9599, however, modified the tax exposure of some types of corporate debt. Crucially, the new regulation allowed syndicated loans to be reclassified as "public debt" in light of soft dealer quotes made available in that market. As such, since TD9599, gains associated with restructured syndicated loans use the *secondary market price* for distressed debt — as opposed to the par value — to assess taxable capital gains. The unique feature of the IRS rule is that it led to a reduction in the costs of out-of-court distress resolution, while leaving taxes accruing to in-court proceedings unchanged.[1] Our analysis shows that the 2012 tax policy change had important consequences for the likelihood that firms and creditors renegotiate debt out of court. It also assesses how much value was saved as a result.

To identify the 2012 policy effects, we first look at the market price reaction of an instrument directly linked to corporate default: credit default swaps (CDS). Critically for our purposes, CDS contract payments are only triggered by in-court default, and not by out-of-court renegotiation.[2] CDS spreads gauge the relative likelihood of bankruptcy, as they reflect the amount buyers are willing to pay to insure against in-court default resolution. In our base investigation, we show that examining changes in CDS spreads around TD9599 helps one gauge the effect of out-of-court renegotiation costs on bankruptcy risk. Our identification strategy is strengthened by the fact that TD9599 only affected certain types of loans, doing so retroactively. Using this regulatory wrinkle, one can gauge the impact of that tax change on firm bankruptcy risk according to the weight of those specific loans on the firm's pre-existing debt composition.

[1] In bankruptcy court, creditors exchange their existing claims for new bonds, cash, or equity, with taxes assessed on the market values of the newly-issued securities. TD9599 had no legal bearing on these in-court security exchanges.

[2] Single-name CDS contracts are written agreements between a buyer and a seller that reference a firm's debt. The buyer pays the seller a periodic fee (the CDS spread) and the seller makes a lump-sum payment if the underlying reference experiences a credit event. Since April 2009, the International Swaps and Derivatives Association (ISDA) has defined a credit event to be a default on the underlying debt issue, but not an out-of-court restructuring.

We note that, in theory, TD9599 could either increase or decrease the odds of out-of-court renegotiation in the presence of CDS contracts. Given the endogeneity of CDS insurance, it is important that we begin our analysis by modeling tax changes in the presence of CDS markets. We do so with principles predicated on the standards employed by the IRS. In our model, a borrower can either declare bankruptcy or try to renegotiate its debt out of court. If the borrower files for bankruptcy, lenders that bought CDS insurance receive the full value of the debt, while uninsured lenders are exposed to losses. If out-of-court renegotiation occurs, lenders owe taxes based on the applicable tax law: the difference between the debt purchase price and either (1) the par value of the renegotiated debt (*pre-TD9599*), or (2) the market value of the renegotiated debt (*post-TD9599*). When the borrower's fundamentals are strong, bankruptcy risk is low regardless of the tax rule and lenders' CDS insurance decision. When the borrower is distressed, however, bankruptcy may be avoided when the fraction of uninsured lenders is sufficiently large. Our model determines when this is the case as a function of its primitives: the borrower's financial condition and the tax regime. These same primitives form the foundation of our empirical identification strategy as well. One key insight of our model is that, for distressed borrowers, TD9599 unambiguously reduces out-of-court restructuring costs of the credit facilities it contemplates, independently of CDS insurance. Our framework also helps us model the impact of TD9599 on distressed firms' bankruptcy rates and asset values.

We test our model's base predictions using a triple-differences strategy that focuses on how CDS spreads change around the announcement of TD9599. We do so examining a sample of non-financial firms with CDSs traded on their debt. Since TD9599 only affected syndicated loans, we compare spread changes across firms with high versus low ratios of syndicated loans to total debt. Because bankruptcy risk is most sensitive to renegotiation costs among firms with weak fundamentals, we further interact the syndicated loans–debt ratio with financial distress measures, such as Altman's Z-Score and Merton's Distance-to-Default. In short, our triple-differences estimates identify changes in CDS spreads following the passage of TD9599 across firms in different distress categories and at different ends of the syndicated loans–debt ratio spectrum, as suggested by our model.

We first show that average CDS spreads declined by 26 basis points in the 2-week window around the announcement of TD9599. This is the single largest drop in spreads since the Financial Crisis. Remarkably, this spread reduction was concentrated among firms for which out-of-court renegotiation costs presumably declined the most: spreads dropped by 53 basis points for distressed firms at the top of the syndicated loans–debt ratio distribution, but only by 21 points for distressed firms at the bottom of that loan ratio distribution. On the other end of the spectrum, for non-distressed firms, spread change differences across high and low syndicated loans–debt ratios were close to 0 basis points. Confirming the logic of our differences-operator strategy, we find that the CDS spread difference between high and low syndicated loans–debt ratio firms increased monotonically with measures of financial distress around the regulation's announcement. In economic terms, our estimates indicate that bankruptcy likelihood fell 17% for distressed firms that financed primarily with the type of debt that received beneficial tax treatment from regulation TD9599.

Next, we show that loan renegotiation occurred more frequently after TD9599, in line with the predictions of our model and the expectations of the CDS market. This is a particularly important finding since it allows us to identify direct, first-order implications of the 2012 tax change. To perform this analysis, we put together a database containing information on all occasions in which borrowers renegotiate with syndicate lenders out of court. Our data cover amendments to loans' principal, maturity, and markups — the types of legal "material changes" that trigger tax payments in the U.S.[3] We match this information with data from firms with syndicated loans outstanding in 2012 and find that distressed firms' renegotiation rates more than doubled after TD9599 was adopted.

We take our analysis one step further by estimating the value that out-of-court renegotiation creates for distressed firms. A simple extension of our model allows one to gauge financial distress costs based on returns to distressed firms' various outstanding securities on

[3] Our database codifies 2,410 loan renegotiation events occurring between 1996 and 2014. To the best of our knowledge, this is the largest available dataset on out-of-court renegotiations.

TD9599's announcement. We first show that abnormal stock and bond returns were highest for distressed–high-syndicate loans firms — firms whose renegotiation tax costs were most directly modified by TD9599. Naturally, the abnormal returns we identify reflect the joint increase in pledged asset values when firms restructure out of court (in lieu of bankruptcy) and the decline in bankruptcy risk. Our CDS estimates, however, allow us to identify the decline in bankruptcy risk, so we can assess gains in asset values that are due to reduced financial distress costs. Our procedure indicates that financial distress costs equal up to 36% of asset values, depending on the time horizon of distressed firms' investors.[4] We also conduct a sensitivity analysis that shows that distress costs are highly likely to exceed 10% of asset values. In all cases, the savings to firms and investors is far greater than tax revenue foregone by the IRS. On balance, our financial distress cost examination implies that policies that ease out-of-court debt restructurings bear important positive externalities.

Expanding our examination of direct, first-order effects of the 2012 tax regulation, we study how the syndicated loan market responded to the reduction in renegotiation costs. We find that markups on loans issued to distressed firms following TD9599's passage dropped by 22 basis points (8% of the sample mean) relative to non-distressed firms. We also find that distressed firms became significantly more likely to obtain a new loan after TD9599. Notably, our tests show that distressed borrowers gained greater access to the syndicated loan market and were able to borrow at lower rates, suggesting that lenders passed on to borrowers some of the gains from cheaper out-of-court renegotiation. These firms also adjusted the composition of their capital structures, as loans–debt ratios rose 9%.

We conduct a number of robustness checks to shore up our inferences. One potential concern with our base tests is that CDS spreads of distressed–high-syndicate loans firms may be more volatile than the spreads of other firms, hence vary more following any market or regulatory innovations. To investigate this possibility, we re-estimate our specification over a large number of experimental windows from January 2010 through December 2012, assigning a "placebo event"

[4]We note that these costs are at the high end of the range of estimates featured in the prior literature (e.g., Andrade and Kaplan (1998), Ameida and Philippon (2007), and Hortaçsu et al. (2013)).

to each window. We find that the drop in spreads for distressed–high-syndicate loans firms following the actual TD9599 announcement is by far the largest. To rule out other confounding stories, we verify that CDS spreads do not drop for distressed firms financed by lenders with low marginal tax rates; lenders that would not enjoy the tax benefits of TD9599 on restructurings. Finally, we find no discernible patterns among relevant macroeconomic variables (such as VIX) or firms' operating performance around the TD9599 announcement. A remaining confounding effect would need to clear a high threshold: it would have to coincide with TD9599's announcement and reduce bankruptcy risk only for those firms that are distressed and have high syndicated loans–debt ratios, where loans were granted by lenders facing high enough tax rates.

Our paper is related to empirical work examining how out-of-court renegotiation costs affect debt restructuring and financing (e.g., Benmelech and Bergman (2008), Roberts and Sufi (2009), Denis and Wang (2014), and Morellec et al. (2015)). We contribute to this literature by providing evidence that tax-induced reductions in restructuring costs lead to significantly more debt renegotiations, subsequently increasing distressed borrowers' value and future financing opportunities. To our knowledge, we are the first to use CDSs to track changes in firms' renegotiation likelihood. Our estimates of the value generated by out-of-court renegotiation also contribute to the understanding of financial distress costs (e.g., Bris et al. (2006)).

Our study also relates to recent work showing how CDS markets affect firms' access to credit and bankruptcy. Saretto and Tookes (2013), Ashcraft and Santos (2009), and Hirtle (2009) show that firms with CDSs written on their debt obtain loans with lower markups and increase their leverage. Bolton and Oehmke (2011), Campello and Matta (2012), and Subrahmanyam et al. (2014) show that CDS-insured lenders can make bankruptcy a more likely outcome when borrowers are distressed. We build on this literature by showing how reductions in restructuring costs can reduce the likelihood of bankruptcy outcomes even in the presence of CDS.

Lastly, our study contains important implications for policymakers. All of our findings are derived from a real-world relaxation of renegotiation constraints. We show that deadweight distress costs are substantial when renegotiated debt is taxed at par values (which is customary worldwide). Our results imply that policies that reduce renegotiation costs can improve contracting efficiency, reduce bankruptcy likelihood, preserve corporate value, and ultimately increase the availability of credit at lower cost for firms facing distress. The study shows that these welfare-enhancing outcomes can be achieved at relatively low regulatory costs.

The rest of the paper is organized as follows. Section 2 describes the tax treatment of renegotiated debt, explaining the statutory changes introduced by Regulation TD9599. Section 3 introduces our model. Section 4 discusses our data and testing methodology. Section 5 presents empirical results on CDS spreads, loan renegotiation rates, and distress costs. An additional set of outcomes associated with the passage of TD9599 are examined in Section 6. Section 7 contains robustness checks. Section 8 concludes.

2 Background on IRS's Regulation TD9599

This section describes the tax treatment of out-of-court debt restructurings in the U.S. It also discusses the critical features of Regulation TD9599.

2.1 Tax Treatment of Debt Restructuring

When a debt issue is significantly modified outside of a legal bankruptcy procedure, the IRS treats the restructuring as a taxable exchange of the old debt issue for a new one. A significant modification is a change in the issue's principal, maturity, timing of interest payments, yield (if the change is greater than 25 basis points), or recourse status. Such restructurings may generate capital income, which debtholders must report to the IRS.

Debtholders' tax obligations will depend on whether the IRS classifies the debt as publicly or privately traded. For *privately-traded* debt, taxes are based on the difference between the *par value* of the newly-renegotiated debt contract and either (1) the debt's market price when the debtholder purchased it, or (2) the debt's original par value if the debtholder is the original lender. Out-of-court debt renegotiations typically modify the maturity date or yield, but

Figure 1. Example of Debt Classification and Debtholder Taxes upon Renegotiation

	Debt is privately traded	Debt is publicly traded
Debtholder purchases issue on secondary market	$.35 \times (100 - 40) = 21$ *Large tax on unrealized gain*	$.35 \times (50 - 40) = 3.5$ *Small tax on capital gain*
Original lender retains debt	$.35 \times (100 - 100) = 0$ *No tax credit*	$.35 \times (50 - 100) = -17.5$ *Tax credit received*

the par value almost never changes (see Asquith et al. (1994)). Accordingly, for distressed debt, the par value is generally far higher than the market price. As such, a debtholder that purchases debt on the secondary market may owe taxes on a "phantom gain" that exceeds the actual capital gain from the restructuring. Alternatively, when the original lender retains and restructures the debt, it may experience a capital loss, yet it receives no tax credits.

For *publicly-traded* debt, in contrast, debtholders owe taxes on the difference between the *market value* of the renegotiated debt and (1) the debt's market price when the debtholder purchased it, or (2) the debt's original par value if the debtholder is the original lender. In this case, a debtholder that purchased the issue on the secondary market owes taxes only on the capital gain from restructuring the debt. When the debtholder is the original lender, it receives a tax credit reflecting its capital loss on the debt. Therefore, for both types of debtholders, the tax treatment is far more favorable when restructuring publicly-traded debt.[5]

Figure 1 displays an example of debtholders' tax obligations upon debt restructuring. In the example, a borrower issues debt with par value of 100 that subsequently becomes distressed. The figure shows taxes first for a debtholder that purchases the issue on the secondary market for 40 and then restructures it. The market value of the restructured debt is 50, but the par value does not change. The debtholder's tax rate is 35%. When the debt is classified as privately traded, the debtholder owes tax of 21 — more than twice the capital gain from the investment. This happens because the IRS bases taxes on the debt's par value instead of its

[5]Debtholders may eventually owe additional taxes on publicly-traded debt if a distressed borrower's financial conditions recover and it repays the issue in full. However, at the time of renegotiation the incidence of these taxes is highly uncertain, and any payments are levied only years into the future. In contrast, debtholders that renegotiate privately-traded debt owe the largest realizable tax payment immediately.

fair market value. When the debt is classified as publicly traded, in contrast, the debtholder owes a much-lower 3.5 on the capital gain from the renegotiation.

Next, the figure shows that the original lender also benefits from restructuring publicly traded debt. In this case, the lender receives a tax credit of 17.5 for the capital loss on the issue. When the debt is privately traded, the lender pays no tax, but also receives no tax credit.

For completeness, we note that borrowers that restructure publicly-traded debt incur "cancellation of debt income" (CODI), which is equal to the spread between the issue's original par value and the market price of the modified issue. However, highly distressed borrowers typically owe little tax on CODI. One reason is that the IRS provides an equal-sized tax credit, called an "original issue discount." Moreover, many distressed borrowers are unprofitable and carry large tax loss credits, which offset taxes owed upon renegotiation. Because of such credits, the median distressed firm in our sample had a marginal tax rate of just 4% when TD9599 took effect.[6] In contrast, all but two major syndicate lenders had tax rates of 35%, and we show in Section 7.3 that the market discounted the effects of TD9599 for those low-tax lenders. On net, reclassifying distressed debt from privately to publicly traded generates large tax savings for lenders, and little to no tax liabilities for borrowers.

2.2 Change in Debt Classification under TD9599

Prior to TD9599, taxes were based on a 1994 regulation that classified debt as publicly traded if it satisfied one of three conditions:

1. The issue is listed on a securities exchange or traded in a market.
2. The issue's price appears in a quotation medium.
3. A price quote can be obtained from dealers or traders.

[6]We obtain marginal tax rates from John Graham. Throughout the paper, tax rates are after interest payments. Distressed firms in our sample owed little tax because 36% had negative pre-tax income in 2011, and 50% possessed tax-loss carryforwards accumulated from previous years (equal to 23% of assets on average).

TD9599 subtly added to the above three conditions that debt would also be classified as public if a "soft quote" could be obtained from one broker, dealer, or pricing service. As it turned out, syndicated loans could easily satisfy this new condition. The industry immediately recognized the importance of this amendment and syndicated loans were reclassified *en masse* from private to public debt.[7]

Officials from the U.S. Treasury initially suggested plans to review the tax definition of public debt during a Practicing Law Institute Conference held in October 2009. The IRS took the lead crafting regulatory language for the tax change. Following the standard U.S. rulemaking procedure, the agency released an initial proposal for public comment on January 6, 2011. The IRS provided no timetable for when the proposed changes would be adopted. Approval of the changes was by no means certain, as over one-third of IRS proposals are abandoned.[8] The final version of TD9599 was announced on September 12, 2012.

Since TD9599 took effect, the IRS has treated renegotiated debt as public if either the original or modified issue meets the conditions outlined in the regulation. As such, a syndicated loan that was issued before TD9599, but is restructured afterwards, is reclassified as public debt for tax purposes. Notably, this feature of the tax change mitigates selection biases in our analysis as the tax treatment under TD9599 affects loans that were issued well before the regulation was even debated. Indeed, research shows that firms adjust their debt structure only very slowly (Leary and Roberts (2005)) and in our sample almost no firms increased loan usage between TD9599's initial proposal and final announcement.

[7] At the time, Cleary Gottlieb, a leading international law firm, stated: "The final regulations are likely to cause most syndicated loans to be treated as publicly traded, especially as a result of the fact that indicative quotes — a term that is very broadly defined — may cause a loan to be publicly traded."

[8] The IRS's "discard rate" and its rulemaking speed are both the second-highest among U.S. government agencies (see Yackee and Yackee (2012)). Section 6 examines the market reaction to the initial proposal.

3 A Model of Debt Renegotiation with Taxes and CDSs

It is important for our empirical analysis to show how the tax costs of debt renegotiation depend on the existence of CDSs on a firm's debt. We model this in turn. As in the incomplete contracting framework of Hart and Moore (1998) and Bolton and Scharfstein (1990), our model assumes that future cash flows cannot be contracted upon ex ante, which may lead to ex post renegotiation. We introduce two innovations to the existing theoretical models. First, lenders owe taxes on the gains from renegotiation based on the applicable tax law. Second, lenders are allowed to buy CDS before renegotiation occurs and they face a coordination problem characterized by strategic uncertainty: lenders' payoffs depend on the aggregate of CDS contracts on the firm's debt and they are uncertain about the insurance decisions of other lenders. Importantly, because CDS positions are not verifiable, lenders cannot resolve the coordination problem by writing contracts contingent on their insurance choices. The analysis generates several testable predictions for how TD9599 affects CDS spreads and financing conditions in the loan market.

3.1 Set Up

The economy has three periods $t = 0, 1, 2$. There is a borrower and a continuum of lenders indexed by $i \in I$.[9] The borrower needs financing and issues a measure 1 of debt securities in $t = 0$. Each security promises to pay 1 unit of funds in $t = 2$ in exchange for a price p paid in $t = 0$. Each lender has a unit demand for securities and the borrower raises funds from a subset of mass 1 of lenders. All players are risk neutral and there is no discounting.

With probability $\lambda \in (0, 1)$ the borrower's performance is "high" and generates a verifiable cash flow of $y > 1$ in $t = 2$. With probability $1-\lambda$ the borrower's performance is "low," in which case the value of the borrower's assets depends on whether debt is restructured out of court or in court (bankruptcy) in $t = 2$. If the debt is restructured in court, the assets have a verifiable recovery ratio of $r \in (0, 1)$. In the event of an out-of-court renegotiation, the assets have a pos-

[9]Results are qualitatively similar if we consider a finite number of lenders. However, the assumption of a continuum greatly simplifies the analysis and is commonly used in global games models like ours (see, e.g., Morris and Shin (2003))

itive value of $v(\theta)$, where θ is unknown to all participants until $t = 2$ and is drawn from a continuously differentiable and strictly positive density k with support on the real line. We assume $v(\theta)$ is continuous, strictly increasing, approaches zero ($v(\theta) \to 0$) as $\theta \to -\infty$, and converges to a high value ($v(\theta) \to \overline{v} > 1$) as $\theta \to \infty$. As a result, out-of-court restructuring is efficient if and only if $\theta \geq v^{-1}(r)$. We also assume that $v(\theta)$ is nonverifiable in $t = 0, 1$, but verifiable to the borrower and participating lenders in $t = 2$. The commonplace interpretation is that the out-of-court value of the assets when the borrower's performance is low is too uncertain or complex to be contracted upon in $t = 0, 1$, with complexity being resolved in $t = 2$. This opens room for out-of-court renegotiation between the parties in $t = 2$. We also assume that $v(\theta)$ is non-verifiable to lenders, so the borrower cannot pledge existing assets to obtain financing.

Renegotiation in $t = 2$ proceeds as follows. The borrower offers to each lender i an amount q_i. If a lender rejects the borrower's offer, renegotiation fails. In this case, the borrower is declared bankrupt and each lender is entitled to receive r in court. If all lenders accept the borrower's offer, assets are worth $v(\theta)$ and each lender receives q_i. The borrower receives $v(\theta) - \int q_i di$.

We follow Hellmann et al. (2000) and take that lenders can gamble in order to increase profits. In particular, if lenders choose not to insure and renegotiation succeeds, they receive an additional expected payment of $\alpha \in (0, 1 - r]$. However, uninsured lenders receive no extra payments when the borrower declares bankruptcy. Alternatively, lenders can buy CDS protection, which pays $1 - r$ in the event of bankruptcy in $t = 2$, in exchange for a fee of f or "spread" paid up front.

Each lender i's insurance decision is made in $t = 1$, after receiving a noisy signal about the borrower's fundamental given by

$$x_i = \theta + \sigma \eta_i, \tag{1}$$

where $\sigma > 0$ and the noise term η_i is i.i.d. according to a continuous and integrable density h with support on the real line. In the spirit of Kyle (1985), the CDS market is populated by uninformed CDS providers and noise traders. CDS providers behave competitively, setting the

Figure 2. Model Timing

Period $t = 0$	Period $t = 1$	Period $t = 2$
• Borrower issues debt of 1 in exchange for p	• Lenders receive signals x_i about the fundamental θ • Lenders choose whether to buy CDS protection	• If cash flow y is realized performance is high • Otherwise there is renegotiation: (i) if renegotiation succeeds assets are worth $v(\theta)$ (ii) otherwise they yield r

CDS fee equal to expected CDS payment. They observe the net demand for CDS at $t = 1$, but do not know whether the buyers of CDS are debt holders. Noise traders do not act strategically: their exogenous trades ensure the market is perfectly liquid ("infinitely deep"), implying that CDS providers do not learn about the probability of bankruptcy from CDS net demand.[10] We assume that although lenders' insurance positions are observed by all participants in $t = 2$, they cannot be contracted upon. This is consistent with market practice as CDS positions do not have to be disclosed, which makes commitment to fixed levels of insurance impossible.

Importantly for our purposes, we model the real-world feature that lenders pay a tax rate of $\tau < r$ on the gains from renegotiations that occur out of court. Following TD9599, the amount of taxes paid depends on whether debt securities are classified as private or public. If private, taxes are levied on the difference between the *par* value and the purchase price: $\tau(1 - p)$. If public, the tax rate applies to the difference between the debt's *market* value upon renegotiation and the purchase price: $\tau(q_i - p)$.

3.2 Equilibrium and Results

We focus on the case in which the borrower's performance is low. We first solve for the borrower's offer to lenders that induces renegotiation, separately for each tax classification of debt. Next, we show how the relationship between taxes and renegotiation likelihood depends on the

[10] Our characterization of the CDS market is supported by evidence showing this to be a highly liquid market where informed lenders profit at the expense of noise traders (e.g., Acharya and Johnson (2007)).

fraction of lenders that purchase insurance. We then study lenders' decision to acquire CDS insurance, and the resulting equilibrium CDS spread f and debt price p.

Lenders agree to renegotiate if the borrower offers a stake in the continuation firm that exceeds their outside option, which is 1 if the lender is insured and r otherwise. The borrower optimally offers each lender i a stake that just meets this outside option. Let q_i^{par} and q_i^{mkt} be the offers made to lender i when the tax rate applies to the *par* $(1-p)$ and *market* $(q_i^{mkt}-p)$ taxable incomes, respectively. Then

$$q_i^{par} - \tau (1-p) = q_i^{mkt} - \tau \left(q_i^{mkt} - p\right) = \max\{r, 1-s_i\}, \tag{2}$$

where $s_i = 1$ if lender i does not have a CDS and 0 if otherwise. Rearranging Eq. (2) yields $q_i^{mkt} = (\max\{r, 1-s_i\} - \tau p)(1-\tau)^{-1}$ and $q_i^{par} = q_i^{mkt} + \tau\left(1 - q_i^{mkt}\right)$.

These expressions show that when $q_i^{mkt} < 1$, the borrower must make a higher offer to induce renegotiation when taxes apply to par values (where debt is classified as private) than when taxes apply to market values (debt is classified as public). Note that $q_i^{mkt} < 1$ leads to renegotiation only when lenders are not insured. When lenders are insured, the borrower must offer a net-of-tax payment $q_i^{mkt} \geq 1$; otherwise lenders force bankruptcy and claim the CDS payout of 1. However, in this case lenders owe more taxes when debt is public $\left(\tau\left(q_i^{mkt} - p\right)\right)$ than when debt is private $(\tau(1-p))$. It follows that the impact of TD9599 on out-of-court renegotiation depends on whether lenders are insured with CDS.

We now solve for the relationship between renegotiation outcome and the fraction of insured lenders. Out-of-court renegotiation under tax rule $j \in \{par, mkt\}$ fails if and only if:

$$v(\theta) < Q^j(l) \equiv \; l q_i^j (s_i = 1) + (1-l)\, q_i^j (s_i = 0), \tag{3}$$

where l is the fraction of lenders that do not insure. When $l = 1$, renegotiation can succeed for offers below 1, and $Q^{mkt} \leq Q^{par}$. Conversely, when all lenders insure $(l = 0)$ the borrower must offer more when taxes are levied on market values, so $Q^{mkt} \geq Q^{par}$. Since taxes are the same when the out-of-court offer equals the face value of debt, there exists a critical level of uninsured lenders such that $Q^{mkt} = Q^{par} = 1$.[11]

Re-arranging (3) yields the threshold fraction of uninsured lenders $P^j(\theta) \equiv Q^{j^{-1}}(v(\theta))$ that causes renegotiation to fail under each tax classification:

$$P^{mkt}(\theta) = [1 - v(\theta) + \tau(v(\theta) - p)](1 - r)^{-1}, \tag{4}$$

$$P^{par}(\theta) = P^{mkt}(\theta) + \tau(1 - v(\theta))(1 - r)^{-1}. \tag{5}$$

When $l < P^j(\theta)$, the borrower's asset value $v(\theta)$ is too low to generate net-of-tax offers that match insured lenders' CDS payouts. If the out-of-court value of the assets of a poorly-performing borrower is sufficiently high ($v(\theta) \geq 1$), the borrower is able to repay all lenders, in which case renegotiation and taxes play no role. However, if the borrower is in financial distress ($v(\theta) < 1$), expressions (4) and (5) show that the threshold value $P^{par}(\theta)$ is higher than $P^{mkt}(\theta)$. This implies that, for any given fraction of insured lenders, renegotiation is easier when taxes apply to market values. Yet, lenders' insurance levels are endogenously chosen and likely differ depending on the tax regime.

To generate testable predictions that contemplate the borrower's financial condition and the tax regime, we need to endogenize the demand for CDS $(1 - l)$, the CDS spread f, and the price of debt p. This is a challenging problem because each individual lender's payoff of insuring depends on the fraction l of other lenders who remain uninsured. We use global games techniques to solve for the unique equilibrium of the lenders' insurance game.[12] The equilibrium is in switching strategies around a cutoff θ_j^{**}: each lender buys CDS whenever the signal about the out-of-court value of the assets is below the cutoff, and remains uninsured whenever it is above. The analysis allows us to compute the probability of bankruptcy (and hence the CDS spread) as a function of the borrower's financial condition and the tax regime. We present the key features of the equilibrium here. The full solution is presented in Appendix A.

[11] Since $q_i^{par} = q_i^{mkt} + \tau\left(1 - q_i^{mkt}\right)$ (from (2)), the critical level of uninsured l^* such that $Q^{mkt} = Q^{par}$ satisfies $l^*\left(1 - q_i^{mkt}(s_i = 1)\right) + (1 - l^*)\left(1 - q_i^{mkt}(s_i = 0)\right) = 0$, which is equivalent to the case in which $q_i^{mkt}(s_i = 1) = q_i^{mkt}(s_i = 0) = 1$, which implies $Q^{mkt} = Q^{par} = 1$.

[12] See Carlsson and van Damme (1993) and Morris and Shin (2003) for a detailed discussion of global games.

Proposition 1. *Suppose that the borrower's probability of financial distress $K\left(v^{-1}\left(1\right)\right)$ is sufficiently large. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 1$ is characterized as follows: (i) lenders follow monotone strategies with cutoff θ_j^{**} such that no lender insures if $\theta > \theta_j^{**}$ and all lenders insure if $\theta < \theta_j^{**}$, and (ii) CDS providers charge a CDS fee given by f_j^*, where*

$$\theta_j^{**} = {P^j}^{-1}\left(\left[\alpha - \left(1-r\right)\left(1 - K\left(\theta_j^{**}\right)\right)\right]\alpha^{-1}\right), \tag{6}$$

$$f_j^* = \left(1-\lambda\right)K\left(\theta_j^{**}\right)\left(1-r\right). \tag{7}$$

Moreover, the probability of bankruptcy is lower when taxes apply to market values: $\theta_{mkt}^{**} < \theta_{par}^{**}$.

As discussed earlier, $P^{par} \geq P^{mkt}$ when the borrower is distressed ($v\left(\theta\right) \leq 1$). In this case, renegotiation only succeeds when a large fraction of lenders do not insure. Yet, when lenders do not insure, the tax burden of renegotiating debt is lower when taxes are based on market prices, reducing the offer the borrower must make to induce renegotiation. Proposition 1 shows that, if the probability that the borrower is in distress is sufficiently large, lenders coordinate more often on not insuring when taxes are based on market values than on par values.

To complete the equilibrium, our last step must determine the price of debt p_j^*. Since lenders are competitive, the equilibrium p_j^* satisfies the following breakeven condition in $t = 0$:

$$\begin{aligned} p_j^* &= K\left(\theta_j^{**}\left(p_j^*\right)\right)\left[1 - f_j^*\right] + \left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)\left[\lambda + \left(1-\lambda\right)\left(r+\alpha\right)\right] \\ &= \lambda + \left(1-\lambda\right)\left(r+\alpha\right) - \left(1-\lambda\right)K\left(\theta_j^{**}\left(p_j^*\right)\right)\left[\alpha - \left(1-r\right)\left(1 - K\left(\theta_j^{**}\right)\right)\right]. \end{aligned} \tag{8}$$

The right-hand side of (8) is positive and less than 1, so there exists p_j^* in the unit interval that satisfies the equality. Moreover, the equilibrium price of debt p_j^* is decreasing in the probability of bankruptcy given distress. Notably, the borrower's cost of financing is affected by the tax rule through $\theta_j^{**}\left(p_j\right)$. From Proposition 1, one concludes that the equilibrium financing cost is lower when taxes apply to market values and the borrower's probability of facing financial distress is high enough. We now characterize the full equilibrium of the game starting in $t = 0$:

Proposition 2. *Suppose that the borrower's probability of financial distress $K\left(v^{-1}(1)\right)$ is sufficiently large. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 0$ is characterized as follows: (i) the borrower issues debt at price p_j^*, (ii) lenders follow monotone strategies with cutoff $\theta_j^{**}\left(p_j^*\right)$ such that no lender insures if $\theta > \theta_j^{**}\left(p_j^*\right)$ and all lenders insure if $\theta < \theta_j^{**}\left(p_j^*\right)$, and (iii) CDS providers charge a fee given by $f_j^*\left(p_j^*\right)$, where*

$$\theta_j^{**}\left(p_j^*\right) = P^{j^{-1}}\left(\left[\alpha - (1-r)\left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)\right]\alpha^{-1}\right), \tag{9}$$

$$f_j^*\left(p_j^*\right) = (1-\lambda) K\left(\theta_j^{**}\left(p_j^*\right)\right)(1-r), \tag{10}$$

$$p_j^* = \lambda + (1-\lambda)(r+\alpha) - (1-\lambda) K\left(\theta_j^{**}\left(p_j^*\right)\right)\left[\alpha - (1-r)\left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)\right]. \tag{11}$$

Moreover, the probability of bankruptcy, the CDS fee, and the cost of financing are lower when taxes apply to market values: $\theta_{mkt}^{**}\left(p_{mkt}^*\right) < \theta_{par}^{**}\left(p_{par}^*\right)$, $f_{mkt}^*\left(p_{mkt}^*\right) < f_{par}^*\left(p_{par}^*\right)$, $p_{mkt}^* > p_{par}^*$.

The last step of our model analysis is to derive an expression that shows how the value of a borrower's assets varies with the tax regime. This result is important because it allows us to estimate the value preserved by out-of-court renegotiation relative to bankruptcy proceedings. Since the lending market is competitive, the borrower receives the entire net present value of a reduction in restructuring costs. As a result, the change in asset value caused by a modification in taxes is fully reflected in the borrower's payoff. The borrower's payoff conditional on low performance in $t = 2$ is $v(\theta) - Q^j(1)$ if $\theta > \theta_j^{**}\left(p_j^*\right)$ (successful out-of-court renegotiation) and 0 if $\theta < \theta_j^{**}\left(p_j^*\right)$ (bankruptcy). Therefore, the expected net-tax value of the assets in $t = 0$ is

$$\begin{aligned} U_j &= p_j^* + \lambda(y-1) + (1-\lambda)\int_{\theta_j^{**}\left(p_j^*\right)}^{\infty}\left(v(\theta) - Q^j(1)\right) dK(\theta) \qquad (12) \\ &= \lambda y + (1-\lambda)\int_{\theta_j^{**}\left(p_j^*\right)}^{\infty}\left(v(\theta)+\alpha\right) dK(\theta) + (1-\lambda)\int_{-\infty}^{\theta_j^{**}\left(p_j^*\right)} V_B^j \, dK(\theta) \\ &\quad - (1-\lambda)\int_{\theta_j^{**}\left(p_j^*\right)}^{\infty}\left(Q^j(1) - r\right) dK(\theta), \end{aligned}$$

where $v(\theta)+\alpha$ is the value of the assets when out-of-court renegotiation succeeds and $V_B^j = 1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)(1-r)$ is the hedged recovery when bankruptcy is declared.[13] From Eq. (12) we can show that the value of the borrower's assets is decreasing both in the probability of bankruptcy $\theta_j^{**}\left(p_j^*\right)$ and in the aggregate offer when no lender insures $Q^j(1)$. According to Proposition 2, the probability of bankruptcy is lower and the price of debt is higher when taxes apply to market values. In addition, the aggregate offer when all lenders remain uninsured is decreasing in the price of debt, and is always higher when taxes apply to par values. It follows that the borrower's asset value is higher when taxes apply to market values.

Proposition 3. *Under the conditions of Proposition 2, the equilibrium value of the borrower's assets in $t = 0$ is higher if taxes apply to market values versus par values; this is due to both a positive increase in direct tax savings and a strictly higher probability of out-of-court renegotiation, which reduces both the size and the incidence of financial distress costs.*

The direct and indirect effects described in Proposition 2 can be decomposed as follows:

$$\frac{U_{mkt}-U_{par}}{1-\lambda} = \underbrace{\int_{\theta_{par}^{**}\left(p_{par}^*\right)}^{\infty} \left(Q^{par}(1) - Q^{mkt}(1)\right) dK(\theta)}_{\text{direct increase in tax savings}} - \underbrace{\int_{\theta_{mkt}^{**}\left(p_{mkt}^*\right)}^{\theta_{par}^{**}\left(p_{par}^*\right)} \left(Q^{mkt}(1) - r\right) dK(\theta)}_{\text{tax increase due to higher renegotiation}}$$

$$+ \underbrace{\int_{\theta_{mkt}^{**}\left(p_{mkt}^*\right)}^{\theta_{par}^{**}\left(p_{par}^*\right)} \left(v(\theta) + \alpha - V_B^{par}\right) dK(\theta)}_{\text{reduction in incidence of distress costs}} + \underbrace{\int_{-\infty}^{\theta_{mkt}^{**}\left(p_{mkt}^*\right)} \left(V_B^{mkt} - V_B^{par}\right) dK(\theta)}_{\text{reduction in hedging costs}}. \tag{13}$$

The first two terms on the right-hand side of Eq. (13) represent the overall tax savings when taxes apply to market versus par values. There is a direct reduction in taxes paid in any given renegotiation, but also an indirect tax increase due to more frequent renegotiations. The last two terms capture the reduction in distress costs. A higher probability of renegotiation not only lowers the incidence of distress costs, but also reduces the costs of hedging. The latter

[13] The hedged recovery equals $r + \left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)(1-r)$, where $\left(1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)\right)(1-r)$ is the profit made by informed lenders at the expense of noise traders (see Kyle (1985)).

effect folllows from the reduction in the likelihood of bankruptcy, which reduces the actuarially fair CDS fee and increases informed lenders' profits at the expense of noise traders. To our knowledge, the hedging component of distress costs has not been previously considered by literature on corporate bankruptcy.

As we explain in more detail below, Eq. (13) can be used to estimate distress costs. $Q^j(1)$ can be pinned down using Eq. (2) and parameters that are straightforward to measure using our data. The two remaining unknowns on the right-hand side are the expected out-of-court value, $E\left[v(\theta)+\alpha|\theta^{**}_{mkt}(p^*_{mkt})\leq\theta\leq\theta^{**}_{par}\left(p^*_{par}\right)\right]$, and the probability of bankruptcy conditional on distress, $K\left(\theta^{**}_j\left(p^*_j\right)\right)$, which both depend on the functional forms $K(\cdot)$ and $v(\cdot)$. Assuming a distribution for the bankruptcy process, it is possible to estimate the probability of bankruptcy in a given period from Eq. (10), using the expected present value of the stream of per-period CDS spreads in place of $\frac{f^*_j(p^*_j)}{1-\lambda}$.[14] The out-of-court value can then be solved for after replacing the left-hand side of Eq. (13) with the announcement returns on a firm's securities following a change in the tax regime.

3.3 Testable Hypotheses

One can derive several testable implications from our model. The most important are summarized in the following set of hypotheses.

Hypothesis 1: *The CDS spread associated with the debt of a distressed borrower is lower when taxes apply to market values versus par values.*

Hypothesis 2: *The probability that a distressed borrower renegotiates debt out of court is higher when taxes apply to market values versus par values.*

Hypothesis 3: *The asset value of a distressed borrower is higher when taxes apply to market values versus par values, due both to direct tax savings and higher out-of-court renegotiation.*

Hypothesis 4: *The cost of financing a distressed borrower is lower when taxes apply to market values versus par values.*

The results above motivate the empirical tests of the next section. We use the adoption of

[14]In our estimation procedure, we follow Duffie (1999) and assume that bankruptcy follows a Poisson process.

TD9599 as a surrogate for a change from a system in which debt restructuring taxes are based on par values to a system in which those taxes are based on market values.

4 Sample and Empirical Methodology

This section describes the data and empirical specifications used throughout the rest of the paper. We first describe our tests of CDS spread changes around the announcement of TD9599, and then our tests of the tax change's effects on the syndicated loan market.

4.1 Testing Effects on CDS Spreads

4.1.1 Sampling Procedure

We compile a sample of firms that were active in the syndicated loans market and had outstanding CDS when the regulation was announced. Our sampling procedure starts with the thousand firms with the most CDS contracts outstanding, identified from a list published by the Depository Trust & Clearing Corporation (DTCC) on a weekly basis since October 2008. We restrict our analysis to these firms because the market for their CDS contracts is substantially more liquid than that of other firms (Oehmke and Zawadowski (2016)), thus spreads may more accurately reflect investors' beliefs about the tax change.

We merge the DTCC sample with several other databases. We collect spreads for standard, 5-year CDS contracts from Thomson Reuters's Datastream. All of our CDSs comply with current ISDA standards via "No Restructuring" clauses, which means that out-of-court restructurings do not trigger CDS payments. We calculate the amount of syndicated loans outstanding using data from LPC-Dealscan. Data on firm fundamentals are from Compustat and stock prices from CRSP.

Our raw sample contains 1,014 reference entities that appear in the DTCC database in the 6-week (two-sided) window around the TD9599 announcement. We exclude 193 state-owned entities, 363 foreign firms that are not in Compustat or have never participated in the U.S. loan market, and 106 U.S. financial institutions. We also drop 65 firms that do not have standard 5-year CDS contracts in Datastream and 13 that are not in CRSP. We further exclude 10 firms with illiquid CDSs. We are left with a sample of 264 individual firms.

4.1.2 Identification Strategy and Empirical Specification

Our model predicts that lowering the tax costs associated with out-of-court restructuring should lead to a decline in CDS spreads. TD9599's debt reclassification scheme works as an instrument for such change. Notably, the regulation only reduced syndicate lenders' tax liabilities associated with the out-of-court renegotiation. As such, the regulation's effects should be larger for firms whose overall debt obligations at the time of the announcement contained more of those loans. Our model further predicts that firms with weak financial conditions should benefit more from the tax change. These firms are on the verge of bankruptcy, so their CDS spreads should respond more to tax-induced reduction of out-of-court debt restructuring costs.

These predictions motivate us to compare firms along two dimensions at the introduction of TD9599: (1) the ratio of syndicated loans to total debt, and (2) the degree of financial distress. We implement this comparison using a triple-differences specification for firm i at time t:

$$\begin{aligned}
CDS\ Spread_{i,t} = \alpha &+ \beta_1 Distressed_{i,t-1} + \beta_2 HighSyndicate_{i,t-1} + \beta_3 PostTD_t \\
&+ \beta_4(Distressed_{i,t-1} \times PostTD_t) + \beta_5(HighSyndicate_{i,t-1} \times PostTD_t) \\
&+ \beta_6(Distressed_{i,t-1} \times HighSyndicate_{i,t-1}) \\
&+ \beta_7(Distressed_{i,t-1} \times HighSyndicate_{i,t-1} \times PostTD_t) + \delta x_{i,t-1} + \epsilon_{i,t} \qquad (14)
\end{aligned}$$

The baseline specification models weekly CDS spreads. We measure $Distressed_{i,t-1}$ using, alternatively, Altman's Z-Score and Merton's Distance-to-Default.[15] When using Z-Score, we set $Distressed_{i,t-1}$ equal to 1 for firms with Z-Score ≤ 1.8 and 0 for firms with Z-Score ≥ 2.7, omit-

[15]Distance-to-Default is based on the Merton (1974) model, in which a firm defaults when its asset value falls below book value of debt. It equals the number of standard deviations by which the natural logarithm of (asset market value/debt book value) must fall in order for default to occur.

ting firms with Z-Score values between these thresholds. This classification is based on Altman (2000), who finds that Z-Scores above and below those thresholds predict bankruptcy, while Z-Scores in the intermediate region too often misclassify firms' bankruptcy risk. For Distance-to-Default, existing work does not establish values that explicitly characterize distress. In our base analysis we set $Distressed_{i,t-1}$ equal to 1 for firms with a Distance-to-Default value below the sample median, and 0 for firms with above-median values. Our results are robust to choosing different quantile cut-offs. We cluster standard errors at the firm level to account for possible serial correlation in CDS spread levels.

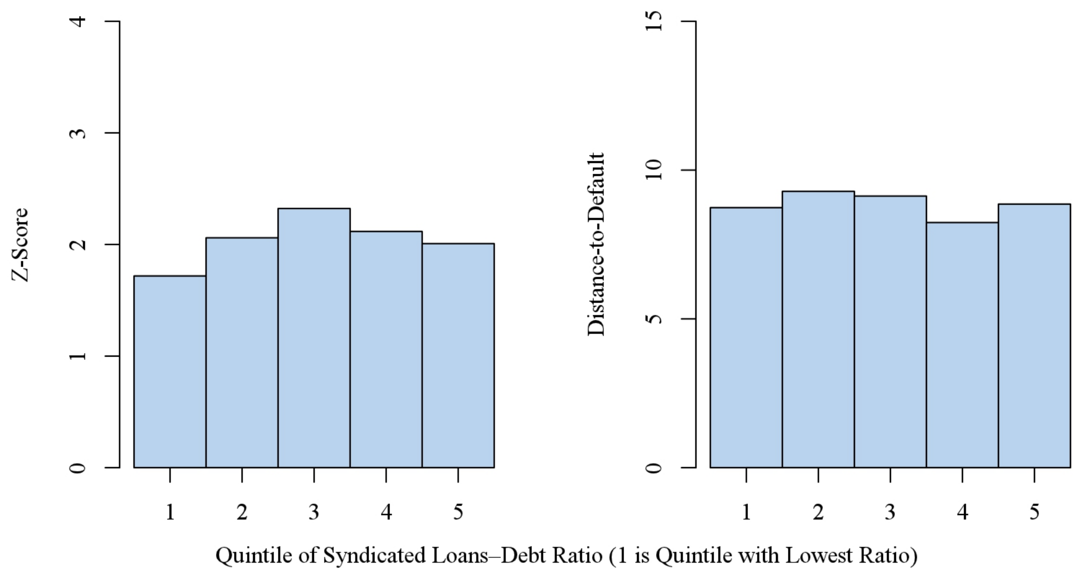
$HighSyndicate_{i,t-1}$ equals 1 for firms with syndicated loans–debt ratios in the highest tercile and 0 for firms with loans–debt ratios in the lowest tercile. We omit firms with loans–debt ratios in the middle tercile in order to generate sufficient contrast in our key treatment variable.[16] $PostTD_t$ equals 1 for arbitrarily-chosen weeks after the announcement of TD9599, and 0 for weeks before. $x_{i,t-1}$ is a vector of firm-level variables that prior work has found to affect credit spreads (e.g., Collin-Dufresne et al. (2001) and Ericsson et al. (2009)), as well as industry and credit rating fixed effects. Appendix B contains detailed definitions for each variable.

The primary coefficient of interest in our triple-differences model (14) is β_7. A negative estimate indicates that CDS spreads decreased more following TD9599's announcement for distressed firms with high loans–debt ratios. This would support our model's predictions that the tax change reduces bankruptcy risk the most for firms that have weak fundamentals and finance themselves primarily with syndicated debt.

In order for Eq. (14) to identify the CDS market's response to the tax change, bankruptcy risk should be unrelated to the component of debt that is "treated" by our legal instrument (TD9599). Table 1 presents firm-level summary statistics for the variables used in the analysis of CDS spreads. Panel A shows that distressed and non-distressed firms have very similar statistics for the syndicated loans–debt distribution. Moreover, Panel B shows that firms with high and low syndicated loans–debt ratios are similar along many key characteristics, including

[16]Our results are qualitatively similar if we use quartiles or quintiles.

Figure 3. Relationship between Syndicated Loans–Debt Ratio and Firm Distress



Z-Score and Distance-to-Default are averaged across sample firms in each quintile of the loans–debt ratio distribution. They are measured at the end of the most recent fiscal year prior to the September 12, 2012 TD9599 announcement. The measures are adjusted for size differences across the loans–debt ratio distribution using a regression analysis that controls for firm size.

Z-Score, leverage, and performance. Not surprisingly, firms that finance mostly with syndicated loans are smaller than firms that use more public debt. Notably, the level of CDS spreads across high- and low-loan firms does not differ significantly after accounting for firm size.

<u>Table 1 About Here</u>

Figure 3 provides further confirmation that firm distress is unrelated to the syndicated loans–debt distribution after adjusting for firm size differences. We regress Z-Score and Distance-to-Default on *Log Assets* for each quintile of the syndicated loans–debt ratio. The figure plots the coefficients for each quintile fixed effect (quintile 1 has the lowest ratio), and shows that our distress measures do not vary across the loans–debt distribution.

Summary statistics suggest that our TD9599-treated and control firms are ex-ante similar along key dimensions that affect CDS spreads. In light of our triple-differences approach, an omitted variable would bias our results only if it *coincided* with the TD9599 announcement, and led to a sudden decrease in bankruptcy risk *only* for firms with weak fundamentals *and* high loans–debt ratios. This is a high bar for a plausible omitted variables case, and we conduct numerous robustness checks in Section 7 to further rule out the possibility.

4.2 Testing Effects on Out-of-Court Renegotiation

We corroborate our tests on CDS spreads by examining whether the tax change led to an increase in out-of-court renegotiation of syndicated loans. TD9599 reduces renegotiation tax costs for distressed loans, whose market prices are far below the par value upon which taxes were previously assessed. Our model predicts that loans issued to distressed firms should be renegotiated more frequently after the regulation takes effect. We analyze the effect of TD9599 on out-of-court renegotiation across the syndicated loan market using a large sample of loans issued to publicly-traded, non-financial firms.

We start by compiling a novel database that tracks out-of-court renegotiations between borrowers and their syndicate lenders. The raw data are from Thomson One, and contain a wide range of information for loans issued to 3,327 firms from 1996 to 2014. Importantly for our purposes, the database contains an indicator for whether a given loan is an amendment to a previously issued facility, as well as that facility's identification number.[17] Using this information, we link amendments to original loans and identify 2,410 renegotiation events.[18] Each such event is a change to the loan's principal, maturity, or markups. Notably, these are precisely the material renegotiations on which the IRS levies taxes (see Section 2). This database is, to the best of our knowledge, the largest sample of loan renegotiations that any study has compiled. It allows for a much broader examination of out-of-court debt restructuring than previous papers, which often study rare events, such as distressed debt exchanges (e.g., Gilson

[17]Thomson One collects amendment data directly from syndicate lenders and requires documentation confirming that the syndicate voted to approve the amendment. The data are significantly more accurate and suitable for analysis than the information that LPC-Dealscan reports on loan amendments. One problem with LPC-Dealscan's data is that no link exists between original and renegotiated loans, thus amendments are often misclassified as newly-issued facilities (see Roberts (2015)).

[18]For loans that are renegotiated multiple times, we link the first amendment to the original loan, and subsequent amendments to the most recent previous amendment.

et al. (1990) and Franks and Torous (1994)), or analyze a limited sample of hand-collected loans (e.g., Roberts and Sufi (2009) and Roberts (2015)).

Using our loan renegotiation data, we estimate a Probit difference-in-differences model for each loan l outstanding at firm i:

$$\begin{aligned} \textit{Loan Renegotiated}_{l,i,t} = {} & \alpha + \gamma_1 \textit{Distressed}_{i,t-1} + \gamma_2 \textit{PostTD}_t \\ & + \gamma_3(\textit{Distressed}_{i,t-1} \times \textit{PostTD}_t) + \delta x_{i,t-1} + \lambda z_{l,i,t-1} + \epsilon_{l,i,t} \end{aligned} \tag{15}$$

We sample firm i's outstanding loans in two time periods, the 12 months before and 12 months after TD9599's November 13, 2012 effective date.[19] $\textit{Loan Renegotiated}_{l,i,t}$ equals 1 for loans that are amended during the post-TD9599 period, and 0 otherwise. Our tests omit renegotiations that led to only very small changes in loan terms, which the IRS did not consider to be material amendments. $\textit{Distressed}_{i,t-1}$ is based on the Z-Score from the start of each period, while $\textit{PostTD}_t$ equals 1 for the 12-month period after TD9599 takes effect and 0 for the period before. $x_{i,t-1}$ contains the same control variables and fixed effects of Eq. (14). $z_{l,i,t-1}$ is a vector of loan characteristics commonly used in the literature (e.g., Ivashina (2009) and Ivashina and Sun (2011)).

The key coefficient in Eq. (15) is γ_3, which estimates the change in the out-of-court renegotiation rates for distressed loans after TD9599's adoption, relative to non-distressed loans. A positive coefficient would support our model's prediction that levying taxes on market rather than par values leads to greater renegotiation of these loans, with the anticipation of this effect underlying the changes in CDS spreads around TD9599's announcement.

[19] Eq. (15) defines the post-TD9599 period based on the regulation's effective date since only loans renegotiated after this date could be treated as public debt (see Section 2). We use 12-month periods to account for documented seasonal patterns in the syndicated loan market (see Murfin and Petersen (2016)).

4.3 Testing Effects on Loan Access and Costs

We conduct additional tests to examine whether TD9599 produced externalities over loans issued after the regulation was announced. Our model predicts that lenders anticipate renegotiating more frequently in the future with distressed borrowers, and pass on to them some of the expected benefits ex ante by reducing financing costs. Borrowers in turn should raise a greater proportion of new financing by issuing loans, instead of debt contracts that were unaffected by the tax change. We test this prediction using difference-in-differences models that analyze loans signed before and after TD9599's announcement. Similarly to our loan renegotiation tests, our sample contains syndicated loans issued to public, non-financial firms.

We first examine distressed firms gain greater access to syndicated loan financing using a firm-level Probit regression:

$$\begin{aligned} Issued\ Loan_{i,t} &= \alpha + \phi_1 Distressed_{i,t-1} + \phi_2 PostTD_t \\ &+ \phi_3 (Distressed_{i,t-1} \times PostTD_t) + \delta x_{i,t-1} + \epsilon_{i,t} \end{aligned} \tag{16}$$

This regression contains two observations per firm, one for the 12-month period before and one for the 12-month period after TD9599. $Issued\ Loan_{i,t}$ equals 1 for firms that signed a syndicated loan in period t, and 0 for firms that did not. A positive coefficient on γ_3 would indicate that the fraction of distressed firms receiving a new syndicated loan increased after TD9599, relative to non-distressed firms.

We also use (16) to examine the composition of firms' debt financing. First, we estimate the Probit regression for $Issued\ Bond_{i,t}$, which equals 1 for firms that issued a bond in period t. (Recall, TD9599 did not change bonds' tax classification.) Second, we use OLS regressions to test for changes to *New Loans/Total Debt Issuance*, which is the principal of new loans divided by the total (sum) principal of new loan and bond issues. We also use regression analysis to examine the year-on-year change to the loans–debt ratio (*Chg. Loans–Debt Ratio*). We collect data on loan issuance from LPC-Dealscan and bonds from Mergent FISD. Summary statistics are in Panel C of Table 1.

Finally, we study whether TD9599 reduces distressed firms' financing costs using regressions with observations for each new loan l:

$$\begin{aligned} New\ Loan\ Markup_{l,i,t} &= \alpha + \phi_1 Distressed_{i,t-1} + \phi_2 PostTD_t \\ &+ \phi_3(Distressed_{i,t-1} \times PostTD_t) + \delta x_{i,t-1} + \lambda z_{l,i,t-1} + \epsilon_{l,i,t} \end{aligned} \quad (17)$$

$New\ Loan\ Markup_{i,t}$ is the percentage-point all-in drawn spread on the loan, which borrowers pay on top of a floating base rate (e.g., LIBOR). Data on new loan terms are from LPC-Dealscan.

5 Main Results: Renegotiation and Bankruptcy Costs

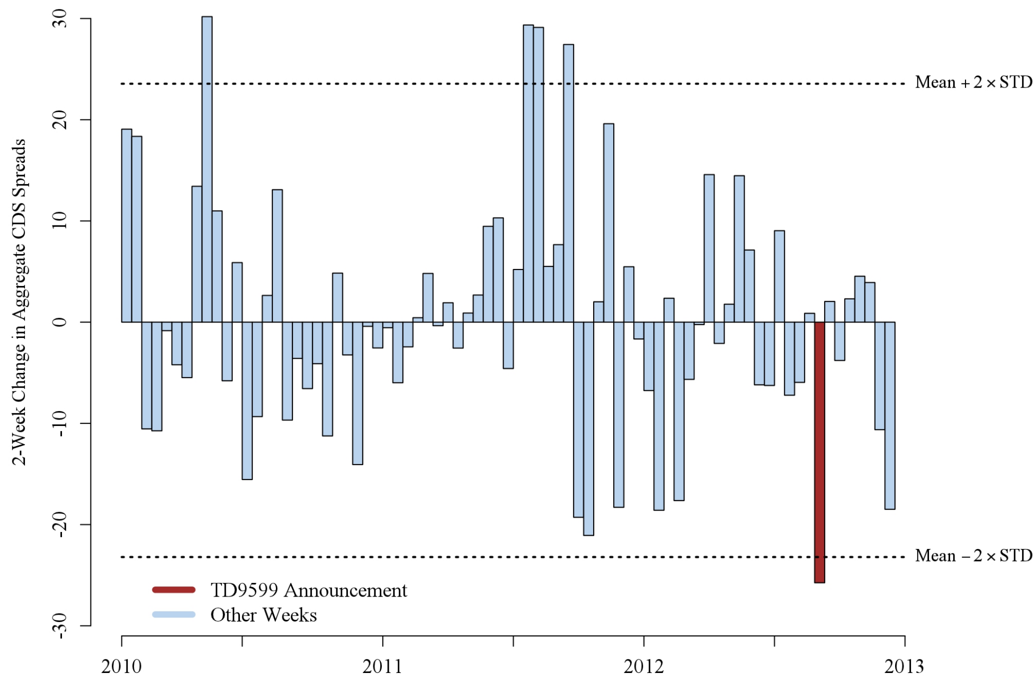
5.1 Effects on CDS Spreads

Our model predicts that CDS spreads should decline following the IRS announcement of Regulation TD9599. We examine this in Figure 4 by plotting bi-weekly changes in spreads from 2010 to 2012, averaged across all firms in our sample. The figure shows that CDS spreads dropped by 26 basis points when the IRS announced the new regulation — the single largest drop for our sample firms since the depths of the Financial Crisis in mid-2009. This suggests that TD9599 had a measurable impact on overall bankruptcy risk.

Next, we examine whether CDS spreads dropped more for firms that are more affected by the tax change. Following our priors, in Figure 5 we partition our sample firms according to their pre-existing financial distress levels (based on Z-Score) and use of syndicated loans. In particular, we use a 2 × 2 partition classifying firms into 4 buckets: (1) Distressed–High Syndicate Loans, (2) Distressed–Low Syndicate Loans, (3) Non-Distressed–High Syndicate Loans, and (4) Non-Distressed–Low Syndicate Loans. For each bucket, we plot characteristic-adjusted spreads from 10 weeks prior through 10 weeks after the IRS announcement.[20] We normalize

[20]Specifically, for each bucket we regress firms' weekly CDS spreads on firm leverage, firm size, and weekly

Figure 4. Change in Aggregate CDS Spreads on TD9599 Announcement



Spread changes are averaged over all sample firms, for each 2-week block since January 2010. Dashed lines show the mean 2-week change plus or minus 2 standard deviations.

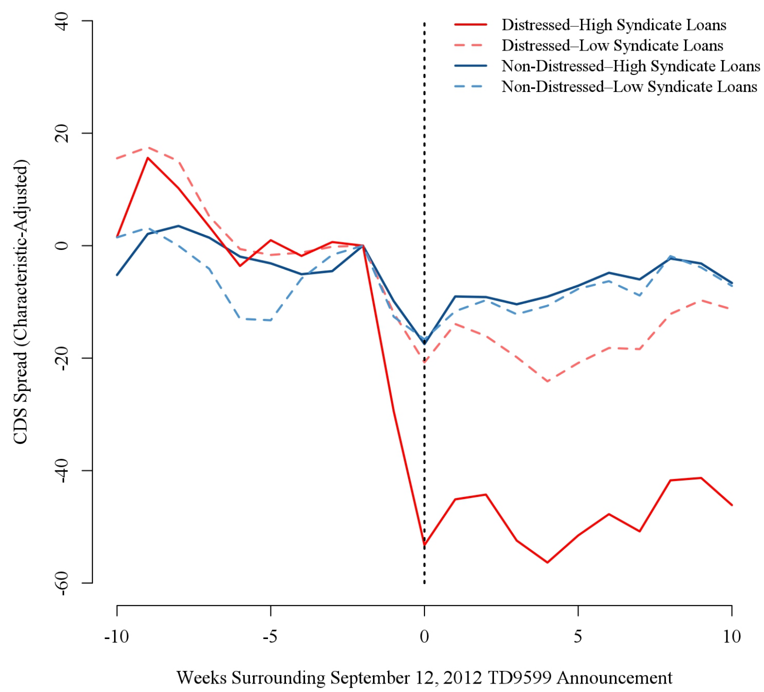
spreads to 0 right before TD9599 was announced and trace how spreads diverge afterwards.

Figure 5 shows that CDS spreads dropped by 53 basis points at TD9599's announcement for Distressed–High Syndicate Loans firms. Spreads dropped by a much-smaller 21 basis points for Distressed–Low Syndicate Loans firms, 18 basis points for Non-Distressed–High Syndicate Loans firms, and by just 17 basis points for Non-Distressed–Low Syndicate Loans firms. In other words, the drop in spreads is proportional to TD9599's impact on firms' tax costs of renegotiation. These are just rough estimates of the impact of TD9599, but the patterns shown are striking. They agree with the hypothesis that firms with more syndicated loans and weaker fundamentals gain the most from a reduction in taxes owed upon out-of-court debt renegotiation.

We next estimate changes in CDS spreads around the passage of TD9599 using our triple-differences regression model (Eq. (14)). Panel A (Panel B) of Table 2 contains regressions with distress measured by Z-Score (Distance-to-Default). Both panels first present estimates for a

fixed effects. The plots in Figure 5 are the coefficients on the weekly effects for each bucket.

Figure 5. Drop in CDS Spreads, by TD9599's Impact on Renegotiation Costs



Sample firms are sorted in 4 buckets based on firm distress and syndicated loans–debt ratio, and spreads are averaged over each bucket. Distressed firms have 2012 Z-Score $\leq$ 1.8, and Non-Distressed firms have Z-Score $\geq$ 2.7. High Syndicate Loans firms have a loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicate Loans firms have a loans–debt ratio in the lowest tercile. Plots are adjusted for time-invariant differences in spread levels using a regression analysis that controls for firm size and leverage.

window of 2 weeks before through 2 weeks after the TD9599 announcement. These results most precisely estimate the immediate effects of the tax change. We also show estimated effects for wider 4- and 6-week (two-sided) windows around the announcement. The regressions in columns (1) through (3) control for firm characteristics that could influence CDS spreads. Columns (4) through (6) include firm-fixed effects.

In Panel A, the triple interaction coefficient $Distressed \times HighSyndicate \times PostTD$ is negative and significant across all windows and specifications. Column (1) shows that on TD9599's announcement, CDS spreads decreased 36 basis points more for distressed firms carrying mostly tax-treated debt (syndicated loans) than for distressed firms using non-treated debt. This coefficient is statistically significant at the 1% test level. The results in the wider windows are similar (columns (2) and (3)), and the drop is even larger and more statistically significant in the firm-fixed effect models (columns (4) through (6)). Notably, coefficient estimates for $HighSyndicate \times PostTD$ are small and insignificant — that is, absent distress risk, the loans–debt ratio has no effect on CDS spreads. This suggests that unobservable characteristics that are common to high-syndicated loan firms are unlikely to explain our results. The coefficients on $Distressed \times PostTD$ are negative, supporting our hypothesis that TD9599's effects are modulated by firm financial conditions. Results in Panel B (based on Distance-to-Default) resemble those of Panel A. Distressed–High Syndicate Loans firms experienced large decreases in spreads after TD9599 relative to Distressed–Low Syndicate Loans firms, ranging from 29 to 42 basis points across different windows. Estimates are statistically significant in all regressions.

TABLE 2 ABOUT HERE

The economic magnitude of our main results is significant, yet sensible given TD9599's substantial reduction in renegotiation costs. For Distressed–High Syndicate Loans firms, spreads dropped by 52 basis points overall in the 2-week window around the regulation's announcement.[21] This is a 20% decrease in distressed firms' spreads, from an average of 261 basis points before the announcement (see Panel A of Table 1) to 209 basis points afterward.

The results in Table 2 support our model's prediction that reducing the tax costs of debt renegotiation should cause CDS spreads to drop (Hypothesis 1). We find that the reduction in spreads on TD9599's announcement is monotonic in firm distress and the amount of treated debt, as our model predicts. The results suggest that demand fell for default insurance on those firms most affected by the tax change, which is consistent with markets anticipating that lower taxes lead to greater success in out-of-court renegotiations.

Most corporate finance and asset pricing studies measure distress using Z-Score (e.g., Sufi (2009) and Campbell et al. (2008)), and in our particular setting, Z-Score provides two advantages over Distance-to-Default. First, the literature offers clearer predictions about which

[21] This number is the sum of the coefficients on $PostTD$, $Distressed \times PostTD$, $HighSyndicate \times PostTD$, and $Distressed \times HighSyndicate \times PostTD$ from Column (1) in Panel A of Table 2: –14.09 + (–3.27) + 1.67 + (–36.07) = –51.76.

Z-Score values indicate financial distress. Second, Z-Score is available for more sample firms than Distance-to-Default. To conserve space, throughout the rest of the paper we report results for financial distress measured via Z-Score. An online appendix contains robustness tests that measure distress using information contained in both Z-Score and Distance-to-Default.

5.2 Effects on Loan Renegotiation

Our finding that CDS spreads fell on TD9599's announcement implies that the market expected lenders to more frequently restructure distressed debt out of court. This is consistent with our model's prediction that levying taxes on market instead of par values reduces renegotiation costs. We now turn to the central question of whether out-of-court renegotiation rates on syndicated loans rose following TD9599.

Table 3 presents marginal effects from Probit regressions based on Eq. (15).[22] We exclude renegotiation events in which a loan's key terms (principal, maturity, and markup) changed by amounts that the IRS does not consider as sufficiently important for tax reassessment. The positive and statistically significant coefficients on $Distressed \times PostTD$ show that distressed firms are more likely to renegotiate their outstanding loans out of court after TD9599 takes effect. The magnitude of the increase is economically large. Note that the renegotiation rate for individual loans in the 2 years prior to TD9599 was only 1.9%. The coefficient estimate of 0.028 in Column (3) indicates that renegotiation rates rose by 147% in the 12 months after the tax change; that is, average renegotiation rates reach 4.7 percentage points. The estimation points to a remarkable increase in the odds of out-of-court debt restructurings following a tax-induced reduction in renegotiation costs.

<u>TABLE 3 ABOUT HERE</u>

To complement our investigation, we gathered data on in-court bankruptcy filings around

[22] Table 3 excludes the *Covenant* indicator because Thomson Reuters did not collect covenant information for part of our sample period.

TD9599's passage. The overall number of bankruptcies is small and formal tests lack sufficient statistical power. Nonetheless, we find that in the year after TD9599, only one firm defaulted after renegotiating a loan out of court, compared to 29 in the years before the tax change.

Our results suggest that the price of insurance on distressed firms' bankruptcy risk fell when TD9599 was announced, and that the market's expectations were confirmed as distressed firms engaged in more out-of-court renegotiation with their syndicate lenders. The evidence supports our model's prediction that reducing taxes owed upon renegotiation removes a key cost to efficient debt resolution.

5.3 How Much Value is Preserved via Debt Renegotiation? Assessing Financial Distress Costs

In light of our results, it is important that we assess the economic value that out-of-court renegotiation generates for distressed firms. By reducing the need to resolve debt claims through formal court proceedings, TD9599 alleviated some of the costs imposed on firms facing the risk of bankruptcy. In this section, we show how a simple extension of our model allows one to estimate these costs, and to compare the resulting savings from TD9599 to foregone tax revenue.

In short, our model shows that the net-of-tax price changes of distressed firms' debt and equity claims on TD9599's announcement can be decomposed into two parts: (1) a decrease in bankruptcy probability, and (2) an increase in asset values because debt is more likely to be restructured out of court. Our key insight is that one can use CDS spreads to measure changes in bankruptcy risk, thus identifying financial distress costs.[23]

5.3.1 Description of the Procedure

We write distressed firms' capital structures as consisting of three securities: syndicated loans l, bonds b, and equity e. Each security $s \in \{l, b, e\}$ represents a share ω_s of the capital structure.

[23] Our model also shows how to calibrate the direct savings from TD9599's reduction in renegotiation taxes using easily measurable parameters.

Following Eq. (12) of our model, for each tax regime $j \in \{par, mkt\}$ we specify

$$M^j = (1 - p_B^j) \times U_R^j + p_B^j \times V_B^j - T^j, \tag{18}$$

where $M^j = \frac{U^j - \lambda y}{1-\lambda}$ is the distressed firm's market value, $p_B^j = K\left(\theta_j^{**}\left(p_j^*\right)\right)$ is the probability of bankruptcy, $U_R^j = E\left[v\left(\theta\right) + \alpha | \theta \geq \theta_j^{**}\left(p_j^*\right)\right]$ is the expected value of assets when the firm renegotiates out of court, $V_B^j = 1 - K\left(\theta_j^{**}\left(p_j^*\right)\right)(1-r)$ is the hedged recovery in the event of bankruptcy, and $T^j = \omega_l\left(1 - p_B^j\right)\left(Q^j\left(1\right) - r\right)$ is tax paid when renegotiating loans out of court.

The change in market value upon the announcement of TD9599 is the equivalent of Eq. (13) of our model, and is given by

$$M^{mkt} - M^{par} = \underbrace{\left(p_B^{par} - p_B^{mkt}\right) \times \left(V_R - V_B^{par}\right) + p_B^{mkt} \times \left(V_B^{mkt} - V_B^{par}\right)}_{\text{reduction in distress costs}} + \underbrace{\left(T^{par} - T^{mkt}\right)}_{\text{tax savings}}, \tag{19}$$

where $V_R = E\left[v\left(\theta\right) + \alpha | \theta_{mkt}^{**}\left(p_{mkt}^*\right) \leq \theta \leq \theta_{par}^{**}\left(p_{par}^*\right)\right]$ is the expected out-of-court value of the assets in the states where renegotiation occurs only because of TD9599.

Eq. (19) shows that TD9599 alleviates two types of financial distress costs. The first is a reduction in the incidence of pre-TD9599 distress costs $(V_R - V_B^{par})$ due to a higher renegotiation likelihood. The second is a decrease in hedging costs $(V_B^{mkt} - V_B^{par})$, which results from higher profits that informed lenders make at the expense of noise traders in the CDS market (cf. Acharya and Johnson (2007)).[24] Eq. (19) also shows that TD9599 impacts firm value through its net effect on out-of-court renegotiation taxes: a direct reduction in taxes paid in each renegotiation net of extra tax owed because renegotiation occurs more frequently.

We measure asset values and taxes as the sum of the amounts allocated to each security; i.e., $V_R = \sum_s V_{R,s}$, $V_B^j = \sum_s V_{B,s}^j$, and $T^j = \sum_s T_s^j$. Without loss of generality, we assume that taxes and bankruptcy values are shared proportionally among the firm's claimholders: $T_s^j = \omega_s T^j$ and $V_{B,s} = \omega_s V_B^j$. As will be clear below, this assumption does not affect the overall estimate of distress costs $\frac{V_R - V_B^{par}}{M^{par}} = \sum_s \omega_s \frac{V_{R,s} - V_{B,s}^{par}}{M_s^{par}}$.

[24]Intuitively, because fairly-priced CDS fees decline after TD9599, lenders who are better informed about the likelihood of bankruptcy can make more profit from trading CDS.

Rewriting (19) for each security, dividing both sides by M_s^{par}, and normalizing $M^{par} = 1$ gives:

$$\frac{M_s^{mkt} - M_s^{par}}{M_s^{par}} - \left(T^{par} - T^{mkt}\right) = (p_B^{par} - p_B^{mkt}) \times \frac{(V_{R,s} - V_{B,s}^{par})}{M_s^{par}} + p_B^{mkt} \times \left(V_B^{mkt} - V_B^{par}\right). \quad (20)$$

The left side of Eq. (20) shows the return on security s around TD9599's announcement $\frac{M_s^{mkt}-M_s^{par}}{M_s^{par}}$ net of tax savings $T^{par}-T^{mkt}$. This return equals the drop in bankruptcy probability $p_B^{par} - p_B^{mkt}$ multiplied by each security's share of pre-TD9599 distress costs $\frac{V_{R,s}-V_{B,s}^{par}}{M_s^{par}}$, plus the reduction in hedging costs $p_B^{mkt} \times \left(V_B^{mkt} - V_B^{par}\right)$.[25]

To measure distress costs, we first estimate p_B^{par} and p_B^{mkt} using the drop in CDS spreads documented in Section 5.1. We measure $\frac{M_s^{mkt}-M_s^{par}}{M_s^{par}}$ as security s's announcement-date cumulative abnormal return (CAR), and calibrate $T^{par} - T^{mkt}$ using our data and estimates from previous studies. Our model informs us how to measure $p_B^{mkt} \times \left(V_B^{mkt} - V_B^{par}\right)$ in terms of bankruptcy probabilities and the in-court recovery rates. We plug all of these values into (20) and solve for $\frac{V_{R,s}-V_{B,s}^{par}}{M_s^{par}}$. Finally, we measure the firm's total pre-TD9599 distress costs as the sum over the individual securities $V_R - V_B^{par} = \sum_s \omega_s \frac{V_{R,s}-V_{B,s}^{par}}{M_s^{par}}$. We then subtract the reduction in hedging expense $V_R - V_B^{mkt} = V_R - V_B^{par} - \left(V_B^{mkt} - V_B^{par}\right)$, thus obtaining our estimate of post-TD9599 distress costs. To calculate the total benefits of TD9599, we multiply the drop in bankruptcy risk $p_B^{par} - p_B^{mkt}$ by our distress cost estimates, and compare this to the decrease in IRS revenue (equal in size to firms' tax savings $T^{par}-T^{mkt}$). Details of these calculations are in Appendix C.

Finally, we examine how sensitive our estimates are to key determinants of distress costs. Naturally, a firm's risk of declaring bankruptcy grows larger over time. If investors hold distressed firm's securities for a long time, then much of the price changes on TD9599's announcement are due to the tax change's impact on bankruptcy probability, rather than reduced exposure to financial distress costs. Accordingly, we follow the literature by estimating results for a standard 5-year investor horizon, and also a longer 10-year horizon (cf. Almeida and Philippon (2007)). We further analyze sensitivity to our estimates of the change in CDS

[25] If we multiply both sides of Eq. (20) by ω_s and sum across all securities, we obtain Eq. (19).

spreads, by using a bootstrapping procedure to derive 95% confidence intervals for bankruptcy rates and distress costs.[26]

5.3.2 Distress Cost Estimates

The estimates associated with our procedure are presented in Table 4. Panel A reports the CARs of distressed firms' securities, Panel B estimates the drop in bankruptcy likelihood from CDS spreads, and Panel C computes the financial distress costs.

<u>TABLE 4 ABOUT HERE</u>

To calculate stock and bond CARs in Panel A, we sort our sample firms into 4 portfolios based on distress and syndicated loan ratios; these groupings are the same as in Figure 5. Abnormal stock returns are based on the Fama-French 3-factor model (Fama and French (1993)). The procedures for calculating bond and loan returns are described in detail in Appendix C. CARs are averaged across all portfolio firms over the event windows shown in the table.[27]

Panel A shows that only the stocks of Distressed–High Syndicate Loans firms outperformed the market around the tax announcement. These firms earned a 2.02% CAR in the shorter (–1,+2) day window and a 3.84% CAR in the 4-day window (roughly one week) around TD9599; both estimates are highly statistically significant. Our results further show that bond returns rose monotonically with TD9599's tax-implied impact over the same trading windows. In particular, Distressed–High Syndicate Loans firms earned a CAR of 2.21% in the (–4,+4) window. In contrast, the CAR of Distressed–Low Syndicate Loans firms is 1.5%, and non-distressed firms's CARs are statistically indistinguishable from 0. The panel also shows equity CARs from a portfolio of 21 syndicated lenders that arranged more than 95% of outstanding loan principal in our sample. These lenders' stocks earned a 3.12% CAR. We infer from this

[26]We re-sample Distressed–High Syndicate Loans 1,000 times and re-estimate the results of Column (1) of Table 2, Panel A. The confidence interval is based on the 2.5 and 97.5 percentiles of the resulting distribution.
[27]To account for the fact that the event date is the same for all firms, we calculate t-statistics using Brown and Warner (1980)'s Crude Dependence Adjustment method.

estimate that the return on distressed loans was 2.85%.[28]

Panel B estimates the implied decrease in distressed borrowers' bankruptcy probability from the drop in CDS spreads on TD9599's announcement. We apply the reduced-form model of Duffie (1999) to 5-year CDS contracts with a 60% in-court recovery rate (the standard rate applied by market pracitioners). We calibrate the drop in CDS spreads using the results of Column (1) of Panel A in Table 2, which show that spreads fell from 261 to 209 basis points for the average Distressed–High Syndicate Loans firm. The results show that the 5-year bankruptcy rate fell from 27.6% to 22.9%. In other words, TD9599 reduced bankruptcy probability by 17%. The results show that the 10-year rate dropped by a similar amount, from 47.7% to 40.5%.

Panel C presents our estimates of financial distress costs. We use results from the previous two panels in our calculations. We set the market return on equity $\frac{M_e^{mkt}-M_e^{par}}{M_e^{par}}$ to 0.0384, based on the stock CAR for the 4-day window from Panel A. We use 0.0221 for the bond return $\frac{M_b^{mkt}-M_b^{par}}{M_b^{par}}$, and 0.0285 for the implied loan return $\frac{M_l^{mkt}-M_l^{par}}{M_l^{par}}$. Tax savings $T^{par} - T^{mkt}$ are 0.74% of assets for the 5-year horizon and 0.54% for the 10-year horizon (see Appendix C). We measure $\omega_l = 0.136$, $\omega_b = 0.345$, and $\omega_e = 0.518$ based on the capital structure of the average distressed firm in our sample.[29]

In the baseline case where investor horizon is 5 years, the pre-TD9599 distress costs are 38.5% of asset values, the reduction in hedging costs is 2.4%, and total distress costs are 36.1%. If instead investors have a 10-year horizon, then the pre-TD9599 distress costs are 15.9%, hedging costs decrease by 3.6%, and total distress costs are 12.3%. As expected, when investor horizon is shorter, the reduced incidence of financial distress after TD9599 explains relatively more of the market response's to the tax change. Nevertheless, the confidence intervals show that even over long horizons, distress costs are highly likely to exceed 10% of firm value.

Finally, we calculate that in the baseline case, the total expected savings to firms and their

[28]Notably, this result is not due to a shock to the overall finance industry; we find that U.S. commercial and investment banks that were not active in the syndicated loan market at the time earned a CAR of −1.71% in the same 4-day window (t-statistic of −1.98).

[29]The average firm has market capitalization of \$27.7 million. It also has total debt of \$25.8 million and a loans–debt ratio of 0.28, implying loan holdings of \$7.2 million and bond holdings of \$18.6 million.

investors from more frequent out-of-court renegotiation is $293 billion. These savings are more than double the expected drop in IRS tax revenue of $129 billion. (These numbers are based on total assets of $17.3 trillion for all firms active in the syndicated loan market in 2012.) For a 10-year horizon the total savings are $152, compared to a $93 drop in tax revenue. Our procedure thus shows that policies that ease debt restructurings frictions can generate significant benefits for the overall economy.

In all, our estimates indicate that firms preserve a substantial amount of value by restructuring debt claims out of court. Notably, our estimates fall approximately within the 10–30% range of combined direct and indirect costs found in previous work (e.g., LoPucki and Doherty (2004)), Hortaçsu et al. (2013), and Andrade and Kaplan (1998)). We contribute to this literature by providing new, detailed estimates implying that the magnitude of financial distress depends critically on investor horizon. We also show that TD9599 reduces CDS hedging costs (a previously unstudied component of financial distress) by 2% to 4% of firm value; this drop is similar in economic magnitude to the impact of in-court legal fees (Bris et al. (2006)).

6 Effects On Loan Contracts

Our results show that TD9599 lead to more frequent renegotiations of outstanding loans. We now investigate whether the tax change produced additional benefits by affecting the availability and the terms of loans issued after the regulation's adoption.

We first examine whether distressed borrowers gained access to more syndicated loans. We do this by using Eq. (16) to compare distressed and non-distressed firms' likelihood of issuing different debt contracts around TD9599's announcement. Panel A of Table 5 reports the results, with coefficients representing the marginal effects of each variable. In Column (1), the coefficient on $Distressed \times PostTD$ indicates that distressed borrowers were 8% more likely to obtain a new loan in the year after the regulation was announced. Notably, Column (2) shows that firms did not change their issuance of bonds, whose tax status was unaffected by the regulation. Instead, distressed borrowers became more likely to issue precisely the type of contract that TD9599 treated — exactly as one would expect if the tax change increased syndicate lenders' expected payoffs from contracting with riskier borrowers.

Table 5 About Here

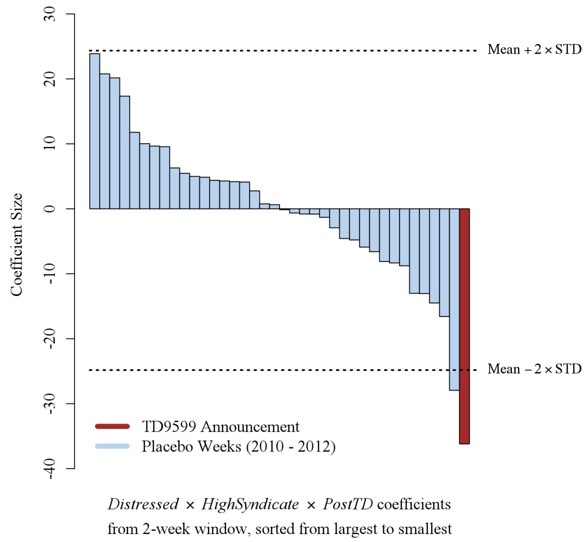
Panel B examines the structure of new debt issues after TD9599, and the resulting effects on firms' capital structures. The sample in these regressions contains only firms that raised debt around the announcement. In Column (3), we find that TD9599 led distressed firms to shift new financing from bonds to syndicated loans. Column (4) shows that as a result, the fraction of loans in the firms' overall debt profiles rose by 9%. These results indicate that firms adjusted borrowing composition once the tax wedge between syndicated loans and other debt issues was reduced.

In Table 6 we study whether distressed firms' financing costs fell after TD9599. We do this using the loan-level model of Eq. (17). The negative coefficients on $Distressed \times PostTD$ show that markups on new syndicated loans did fall, but only for distressed borrowers. The 22-basis point drop in Column (3) represents a 8% drop for these firms' markups relative to their pre-announcement mean of 270 basis points. This reduction in markups is particularly striking since Table 5 shows that more loans were issued to riskier borrowers after TD9599.

Table 6 About Here

Results in Tables 5 and 6 show that distressed firms gained increased access to the syndicated loan market after TD9599 and were able to borrow at lower cost. The findings support the prediction that lower taxes increase syndicated lenders' expected payoffs from distress renegotiation, and that those lenders ultimately pass some of the gains to their borrowers. These results cannot be explained by a contemporaneous change to the overall cost of credit, because firms also substituted away from issuing non-treated debt.

Figure 6. Change in CDS Spreads, TD9599 versus Placebo Events



Placebo events are constructed by splitting the sample into 38 non-contiguous 4-week blocks from January 2010 to December 2012. For each block, the regression from Column (1) of Table 2 Panel A is estimated with $PostTD$ equal to 1 on the 3$^{\text{rd}}$ and 4$^{\text{th}}$ week of the block. Bars are the coefficients on $Distressed \times HighSyndicate \times PostTD$ for each block, sorted from largest to smallest. Dashed lines show the mean coefficient plus or minus 2 standard deviations.

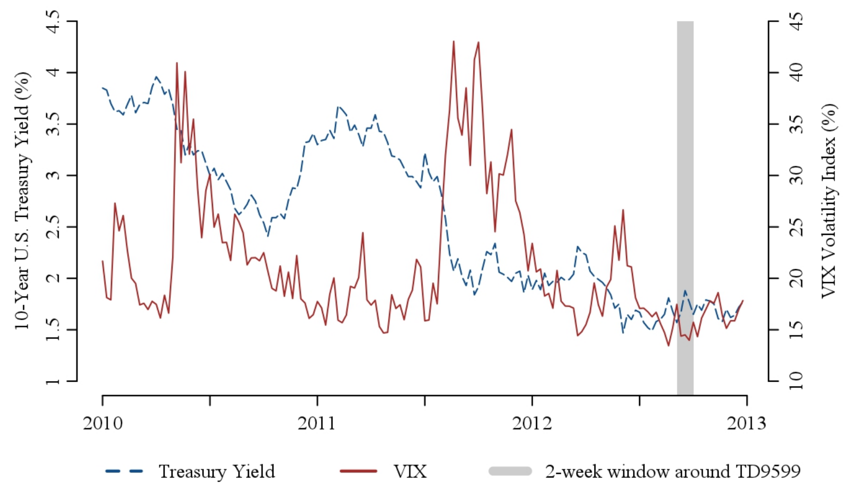
7 Robustness Checks

We conclude our analysis by testing whether unobserved heterogeneity across firms could explain the decrease in CDS spreads around TD9599's announcement. For example, if distressed firms with high loans–debt ratios have more volatile CDS spreads, then arguably, *any* shock coinciding with TD9599 could produce larger declines in those firms' spreads. It is important to validate our results by testing whether they could be explained by these sorts of differences.

7.1 Placebo Test

We first conduct a placebo analysis. We split the sample period from January 2010 through December 2012 into 38 non-contiguous 4-week blocks. In each block, we repeat the regression from Column (2) of Panel A in Table 2, however we re-define $PostTD$ to equal 1 in the 3^{rd} and 4^{th} week of each block. We exclude the weeks surrounding the announcements of the proposed and final versions of TD9599. Figure 6 plots the distribution of the resulting coefficients on

Figure 7. Macroeconomic Changes around TD9599 Announcement



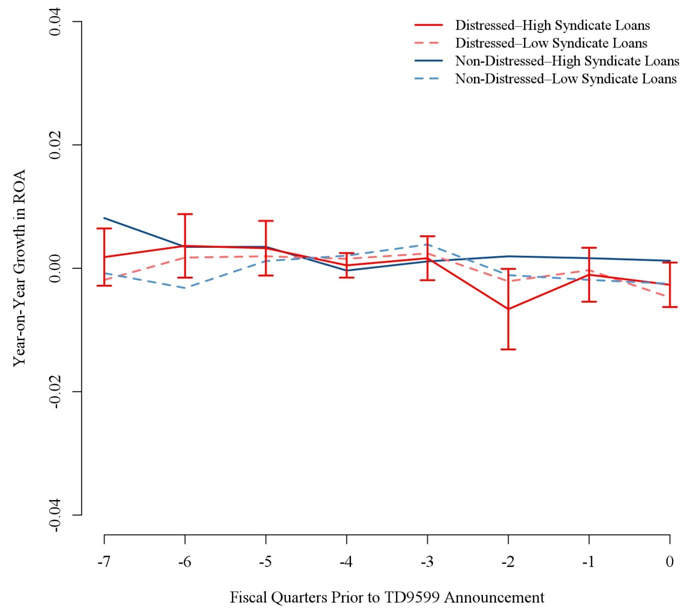
Treasury Yield is the weekly value of the yield on a nominal 10-year U.S. Treasury Bond, and VIX is the weekly value of the VIX volatility index.

the interaction term $Distressed \times HighSyndicate \times PostTD$ from each block, sorted from largest to smallest coefficient. We find that the change in CDS spreads around TD9599's announcement is by far the largest decrease out of all 38 blocks. Indeed, the interaction term is negative and statistically significant at the 5% level in only 1 of the placebo blocks (note the 2-standard deviation bands in Figure 6). This analysis confirms that the drop in CDS spreads around TD9599 is an exceptional event for the firms most affected by the regulation.

7.2 Confounding Events

Another concern is that TD9599's announcement may have coincided with a contemporaneous shock that disproportionately affected Distressed–High Syndicate Loans firms and caused their CDS spreads to fall. To investigate this possibility, we first examine in Figure 7 the time-series of two key macroeconomic indicators: the yield on the 10-year U.S. Treasury Bond and the VIX volatility index. A large drop in borrowing costs or economic uncertainty could perhaps explain the unprecedented reduction in bankruptcy risk that we have documented. However, Figure 7 shows that interest rates and market volatility did not change substantially around

Figure 8. Operating Performance Prior to TD9599 Announcement



Sample firms are sorted in 4 buckets based on firm distress and syndicated loans–debt ratio, and the change in ROA is averaged over each bucket. Distressed firms have 2012 Z-Score $\leq$ 1.8, and Non-Distressed firms have Z-Score $\geq$ 2.7. High Syndicate Loans firms have a loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicate Loans firms have a loans–debt ratio in the lowest tercile. Year-on-year changes are measured as ROA in a fiscal quarter minus ROA in the same quarter one year earlier. Bars represent the 95% confidence interval of ROA changes of Distressed–High Syndicate Loans firms.

the TD9599 announcement.

Second, we test whether the operating performance of Distressed–High Syndicate Loans firms deteriorated relative to that of other firms before TD9599 was announced. Weakening performance could have made those firms' CDS spreads more sensitive to any contemporaneous improvement in business conditions. Figure 8 plots changes in ROA in the 8 quarters prior to the TD9599 announcement, for the same 4 buckets of firms as in Figure 5. To account for seasonal variation in earnings, we calculate year-on-year changes by comparing ROA in one fiscal quarter to the same quarter from the previous year. The figure shows that Distressed–High Syndicate Loans firms' performance was statistically indistinguishable from that of other firms during this period (note the 95% confidence interval bars).

7.3 Examining Lenders' Tax Rates

We further rule out contemporaneous shocks by testing whether the announcement-date drop in CDS spreads varies with *syndicated lenders'* tax rates. TD9599 should have had little effect on the out-of-court renegotiation costs of lenders possessing tax loss carryforwards in 2012, which could have been used to offset renegotiation taxes in the absence of the regulatory change. Three banks arranged 84% of the syndicated loans outstanding to firms in our CDS sample. JP Morgan and Bank of America had marginal tax rates of 35% in 2012, but Citigroup's tax rate was just 1% due to large tax loss carryforwards that the bank accumulated in 2008. Among other lenders, Goldman Sachs also possessed carryforwards that reduced its marginal tax rate to 3%. If the drop in CDS spreads reflects an increase in out-of-court renegotiation likelihood due to lower tax costs, then spreads should have fallen less for borrowers financed by Citigroup or Goldman Sachs.

In Table 7, we restrict our analysis to distressed firms and repeat our triple-differences analysis by comparing firms based on syndicated loans–debt ratio and the tax rate of their syndicated loan arrangers. *High-Tax Lender* equals 1 for firms that in September 2012 held loans arranged by banks other than Citigroup or Goldman Sachs, and 0 for firms that only held loans arranged by these banks.[30] Our results show that CDS spreads fell significantly more for borrowers financed by high-tax lenders, thus providing further confirmation that bankruptcy risk fell due to TD9599.

<u>TABLE 7 ABOUT HERE</u>

7.4 Examining the Regulatory Approval Process

We wrap up our checks by examining whether the market reaction to TD9599's initial proposal is also consistent with our hypotheses. If CDS investors anticipated that the proposed changes could promote out-of-court renegotiation, we should observe some drop in spreads upon the

[30] We identify lead arrangers based on Ivashina (2009). When no lender in the syndicate has this title, we identify lead arrangers as those lenders that receive lead arranger credit in LPC-Dealscan.

proposal's January 2011 release. Naturally, the CDS market's ability to price in the potential benefits of TD9599 will be limited by several sources of uncertainty about the breadth and timing of the actual changes later implemented (if any). Rulemaking proceeds more slowly at the IRS than at almost any other U.S. agency, with regulations on average adopted 2.3 years after initial proposal. Notably, regulatory language frequently changes from the initial to final version, so markets may not have anticipated precisely which debt contracts TD9599 would treat. As such, drops in CDS spreads around the initial proposal should be smaller in magnitude and significance than the effects documented on TD9599's final announcement.

This is precisely what we find in Table 8. The table repeats the analysis from Panel A of Table 2 after replacing *PostTD* with *PostProposal*, an indicator that equals 1 for weeks after the January 6, 2011 proposal. In this table, *Distressed* and *HighSyndicate* are based on firms' Z-Scores and loans–debt ratios at the end of 2010. The results show that spreads for Distressed–High Syndicate Loans firms fell 20 basis points in the 4-week window, and 29 basis points in the 6-week window, around the proposal. These figures are substantially smaller than the drop on the September 2012 announcement, and represent only a 8% reduction in pre-proposal mean spreads. The coefficients on *Distressed* × *PostProposal* and *HighSyndicate* × *PostProposal* show that spreads did not react for Distressed–Low Loans or Non-Distressed–High Loans firms.

<u>TABLE 8 ABOUT HERE</u>

In all, our results show that distressed–high-syndicate loans firms' CDS spreads dropped following regulatory announcements, but did not fall during the placebo weeks shown in Figure 6. This is further evidence that the CDS market responded to TD9599 rather than to random contemporaneous events.

8 Conclusion

We model and test the effect of changes in debt restructuring costs on out-of-court renegotiation, financing costs, and value of distressed firms. We do so examining a change in the U.S. tax code (Regulation TD9599) that reduced the taxes lenders pay when restructuring syndicated loans out of court. Using data from CDS markets, we show how the markets anticipated a drop in costly bankruptcy proceedings for distressed firms that financed mostly with treated loans relative to similar firms that issued other types of debt.

In line with the CDS market's expectations, we find that out-of-court renegotiation of distressed syndicated loans rose sharply following TD9599. We develop a novel procedure that combines CDS estimates of bankruptcy likelihood with changes in the value of firms' traded securities, showing that debt restructuring allows firms to avoid financial distress costs of 36% of total value. We further show that loan markets responded to the tax-induced reduction in renegotiation costs by granting distressed firms access to more, cheaper credit.

In all, our paper presents well-identified evidence that out-of-court restructuring costs represent a major impediment to debt renegotiation for distressed firms. Our results imply that removing one particular transaction cost — the taxation of renegotiated loans at book instead of market values — leads to a 17% reduction in bankruptcy likelihood. This generates surplus for both borrowers and lenders, facilitating the expansion of credit. Since taxes are a commonly-used policy tool, the analysis provides insights into how altering regulatory constraints can improve welfare in financial distress.

References

[1] Acharya, V. and T. Johnson, 2007, "Insider trading in credit derivatives," *Journal of Financial Economics* 84, 110–141.

[2] Agarwal, V. and R. Taffler, 2008, "Comparing the performance of market-based and accounting-based bankruptcy prediction models," *Journal of Banking & Finance* 32, 1541–1551.

[3] Almeida, H. and T. Philippon, 2007, "The risk-adjusted cost of financial distress," *Journal of Finance* 62, 2557–2586.

[4] Altman, E., 2000, "Predicting financial distress of companies: Revisiting the Z-Score and ZETA models," NYU Working Paper.

[5] Altman, E. and B. Karlin, 2009, "The re-emergence of distressed exchanges in corporate restructurings," NYU Working Paper.

[6] Andrade, G. and S. Kaplan, 1998, "How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed," *Journal of Finance* 53, 1443–1493.

[7] Ashcraft, A.B. and J. Santos, 2009, "Has the CDS market lowered the cost of corporate debt?," *Journal of Monetary Economics* 56, 514–523.

[8] Asquith, P., Gertner, R. and D. Scharfstein, 1994, "Anatomy of financial distress: An examination of junk-bond issuers," *Quarterly Journal of Economics* 109, 625–658.

[9] Bessembinder, H., Kahle, K.M., Maxwell, W.F. and D. Xu, 2009, "Measuring abnormal bond performance," *Review of Financial Studies* 22, 4219–4258.

[10] Benmelech, E. and N. Bergman, 2008, "Liquidation values and the credibility of financial contract renegotiation: Evidence from U.S. airlines," *Quarterly Journal of Economics* 123, 1635–1677.

[11] Bolton, P. and M. Oehmke, 2011, "Credit default swaps and the empty creditor problem," *Review of Financial Studies* 24, 2617–2655.

[12] Bolton, P. and D. Scharfstein, 1990, "A theory of predation based on agency problems in financial contracting," *American Economic Review* 80, 93–106.

[13] Bolton, P. and D. Scharfstein, 1996, "Optimal debt structure and the number of creditors," *Journal of Political Economy* 104, 1–25.

[14] Bris, A., Welch, I. and N. Zhu, 2006, "The costs of bankruptcy: Chapter 7 liquidation versus chapter 11 reorganization," *Journal of Finance* 61, 1253–1303.

[15] Brown, S. and J. Warner, 1980, "Measuring security price performance," *Journal of Financial Economics* 8, 205–258.

[16] Campbell, J.Y., Hilscher, J. and J. Szilagyi, 2008, "In search of distress risk," *Journal of Finance* 63, 2899–2939.

[17] Campello, M. and R. Matta, 2012, "Credit default swaps and risk-shifting," *Economics Letters* 117, 639–641.

[18] Carlsson, H. and E. van Damme, 1993, "Global games and equilibrium selection," *Econometrica* 61, 989–1018.

[19] Collin-Dufresne, P., Goldstein, R. S. and J. Martin, 2001, "The determinants of credit spread changes," *Journal of Finance* 56, 2177–2207.

[20] Das, S. R., Hanouna, P. and A. Sarin, 2009, "Accounting-based versus market-based cross-sectional models of CDS spreads," *Journal of Banking & Finance*, 33, 719–730.

[21] Denis, D. J. and J. Wang, 2014, "Debt covenant renegotiations and creditor control rights," *Journal of Financial Economics*, 113, 348–367.

[22] Diamond, D., 2004, "Committing to commit: Short-term debt when enforcement is costly," *Journal of Finance* 59, 1447–1479.

[23] Duffie, D., 1999, "Credit swap valuation," *Financial Analysts Journal* 55, 73–87.

[24] Ericsson, J., Jacobs, K. and R. Oviedo, 2009, "The determinants of credit default swap premia," *Journal of Financial and Quantitative Analysis* 44, 109–132.

[25] Fama, E. and K. French, 1993, "Common risk factors in the returns on stocks and bonds," *Journal of Financial Economics* 33, 3–56.

[26] Franks, J. and W. Torous, 1994, "A comparison of financial recontracting in distressed exchanges and Chapter 11 reorganizations," *Journal of Financial Economics* 35, 349–370.

[27] Gilson, S., 1997, "Transaction costs and capital structure choice: Evidence from financially distressed firms," *Journal of Finance* 52, 161–196.

[28] Gilson, S., John, K. and L.H.P. Lang, 1990, "Troubled debt restructurings: An empirical study of private reorganization of firms in default," *Journal of Financial Economics* 27, 315–353.

[29] Guo, X., Jarrow, R. and H. Lin, 2008, "Distressed debt prices and recovery rate estimation," *Journal of Derivates Research* 11, 171–204.

[30] Hart, O. and J. Moore, 1998, "Default and renegotiation: A dynamic model of debt," *Quarterly Journal of Economics* 114, 1–41.

[31] Hellmann, T., Kevin M. and J. Stiglitz, 2000, "Liberalization, moral hazard in banking, and prudential regulation: Are capital requirements enough?," *American Economic Review* 90, 147–165.

[32] Hirtle, B., 2009, "Credit derivatives and bank credit supply," *Journal of Financial Intermediation* 18, 125–150.

[33] Hortaçsu, A., Matvos G., Syverson, C. and S. Venkataraman, 2013, "Indirect costs of financial distress in durable goods industries: The case of auto manufacturers," *Review of Financial Studies* 26, 1248–1290.

[34] Ivashina, V., 2009, "Asymmetric information effects on loan spreads," *Journal of Financial Economics* 92, 300–319.

[35] Ivashina, V., and Z. Sun, 2011, "Institutional demand pressure and the cost of corporate loans," *Journal of Financial Economics* 99, 500–522.

[36] Kyle, A., 1985, "Continuous auctions and insider trading," *Econometrica* 53, 1315–1336.

[37] Leary, M. and M. Roberts, 2005, "Do firms rebalance their capital structures?," *Journal of Finance* 60, 2575–2619.

[38] LoPucki, M. and J. Doherty, 2004, "The determinants of professional fees in large bankruptcy reorganization cases," *Journal of Empirical Legal Studies* 1, 111–141.

[39] Merton, R. C., 1974, "On the pricing of corporate debt: The risk structure of interest rates," *Journal of Finance* 29, 449–470.

[40] Moody's Investors Service, 2012, "Annual default study: Corporate default and recovery rates, 1920–2011," available at *https://www.moodys.com*.

[41] Morellec, E., Valta, P. and A. Zhdanov, 2015, "Financing investment: The choice between bonds and bank loans," *Management Science*, 61, 2580–2602.

[42] Morris, S. and H. Shin, 2003, "Global games: Theory and applications," in Dewatripont, M., Hansen, M. and S. Turnovsky (Eds), *Advances in economics and econometrics (proceedings of the Eighth World Congress of the Econometric Society)*, Cambridge University Press.

[43] Murfin, J. and M. Petersen, 2016, "Loans on sale: Credit market seasonality, borrower need, and lender rent seeking," Forthcoming, Journal of Financial Economics.

[44] Oehmke, M. and A. Zawadowski, 2016, "The anatomy of the CDS market," Forthcoming, Review of Financial Studies.

[45] Roberts, M.R., 2015, "The role of dynamic renegotiation and asymmetric information in financial contracting," *Journal of Financial Economics* 116, 61–81.

[46] Roberts, M.R. and A. Sufi, 2009, "Renegotiation of financial contracts: Evidence from private credit agreements," *Journal of Financial Economics* 93, 159–184.

[47] Saretto, A. and H. Tookes, 2013, "Corporate leverage, debt maturity and credit supply: The role of credit default swaps," *Review of Financial Studies* 26, 1190–1247.

[48] Subrahmanyam, M., Tang, D. Y. and S.Q. Wang, 2014, "Does the tail wag the dog? The effect of credit default swaps on credit risk," *Review of Financial Studies* 27, 2927–2960.

[49] Sufi, A., 2007, "Information asymmetry and financing arrangements: Evidence from syndicated loans," *Journal of Finance* 62, 629–668.

[50] Sufi, A., 2009, "Bank lines of credit in corporate finance: An empirical analysis," *Review of Financial Studies* 22, 1057–1088.

[51] Vassalou, M. and Y. Xing, 2004, "Default risk in equity returns," *Journal of Finance* 59, 831–868.

[52] Yackee, J.W. and S.W. Yackee, 2012, "Delay in notice and comment rulemaking: Evidence of systemic regulatory breakdown?," in Coglianese, C. (Ed), *Regulatory breakdown: The crisis of confidence in U.S. regulation)*, University of Pennsylvania Press.

Appendix A

Insured lenders receive a constant payoff $\pi \equiv 1 - f$ whether a credit event occurs or not. Uninsured ones receive a payoff of $\overline{\pi} = \lambda + (1 - \lambda)(r + \alpha)$ when renegotiation succeeds and $\underline{\pi} = \lambda + (1 - \lambda) r$ when renegotiation fails. Therefore, lender i's net payoff of not insuring over insuring is

$$\Pi_i = \begin{cases} \overline{\pi} - \pi, \text{ if } P^j(\theta) \leq l \\ \underline{\pi} - \pi, \text{ if } P^j(\theta) > l \end{cases}. \tag{A.1}$$

The net payoff Π_i is increasing in the fraction of lenders that do not insure (strategic complementarity) and in the fundamental θ (state monotonicity), which determines the value of the borrower's assets out of court. Specifically, if $\overline{\pi} > \pi$ and $\underline{\pi} < \pi$, lenders face an enormous coordination problem. Since $v(\theta)$ is continuous, $v(\theta) \to 0$ as $\theta \to -\infty$, and $v(\theta) \to \overline{v} > 1$ as $\theta \to \infty$, there exists $\overline{\theta}$ such that $v\left(\overline{\theta}\right) = 1$ and $P^{mkt}\left(\overline{\theta}\right) = P^{par}\left(\overline{\theta}\right) = \tau(1-p)(1-r)^{-1} < 1$. Because $v(\theta)$ is strictly increasing, the borrower is able to fully repay all the debt if $\theta \geq \overline{\theta}$, in which case each lender has a dominant strategy not to insure. Analogously, since $r > \tau$, $P^{mkt}(\theta) \to (1 - \tau p)(1 - r)^{-1} > 1$ as $\theta \to -\infty$, which implies there exists $\underline{\theta}$ such that $P^{mkt}(\underline{\theta}) = 1$. Thus, $P^{par}(\theta) > P^{mkt}(\theta) > 1$ if $\theta < \underline{\theta}$, in which case each lender has a dominant strategy to insure. However, for values of θ such that $P^j(\theta) \in \left(\tau(1-p)(1-r)^{-1}, 1\right]$, both mutual insuring and not insuring are self-enforcing outcomes. Because in our setup investors are privately informed about θ, they are uncertain about which decisions their fellows try to coordinate on. Lenders' decisions thus depend on their beliefs about both the fundamental θ and the fraction l of lenders that do not insure.

Suppose lenders follow a monotone strategy with a cutoff k, that is, they do not insure if their signal is above k and insure otherwise. Lender i's expectation about the fraction of lenders that do not insure conditional on θ is simply the probability that any lender observes a signal above k, that is, $1 - H\left(\frac{k-\theta}{\sigma}\right)$. This proportion is less than z if $\theta \leq k - \sigma H^{-1}(1 - z)$. Each lender i calculates this probability using the estimated distribution of θ conditional on his signal x_i. A well known result in the literature of global games is that as $\sigma \to 0$ this probability equals z for $x_i = k$. That is, the threshold type believes that the proportion of lenders that do not insure follows the uniform distribution on the unit interval.

By focusing on the situation when signals become nearly precise, we focus on strategic uncertainty rather than on fundamental uncertainty. The equilibrium cutoff can then be computed by using the fact that the threshold type must be indifferent between insuring and not insuring given his beliefs about l. Let θ_j^* be the cutoff under tax regime j. Then θ_j^* is such that

$$\int_0^{P^j\left(\theta_j^*\right)} \left(\underline{\pi} - \pi\right)\, dl + \int_{P^j\left(\theta_j^*\right)}^1 \left(\overline{\pi} - \pi\right)\, dl = 0, \tag{A.2}$$

which yields the condition

$$P^j\left(\theta_j^*\right) = \left(\overline{\pi} - \pi\right)\left[\left(1-\lambda\right)\alpha\right]^{-1}. \tag{A.3}$$

The threshold in (A.3) exists and is unique for $\overline{\pi} > \pi$ and $\underline{\pi} < \pi$. However, these payoff depend on the CDS fee f, which is endogenous. Our strategy is to assume these conditions hold and solve for the equilibrium demand for CDS taking f as given. Then we show in the full characterization of the equilibrium with endogenous CDS fees that there is a unique cutoff satisfying (A.2). These results for a fixed CDS fee f are formalized in Lemma 1 below.

Lemma 1. *Suppose there exists ϵ such that $\overline{\pi} - \pi > \epsilon > 0 > -\epsilon \geq \underline{\pi} - \pi$. In the limit $\sigma \to 0$, the unique equilibrium of the game starting in $t = 1$ for a given f is in monotone strategies with cutoff θ_j^* and has all lenders not insuring if $\theta > \theta_j^*$ and insuring if $\theta < \theta_j^*$, where*

$$\theta_j^* = {P^j}^{-1}\left(\left(\overline{\pi} - \pi\right)\left[\left(1-\lambda\right)\alpha\right]^{-1}\right)$$

Proof of Lemma 1. Morris and Shin (2003) prove this result for a general class of global games that satisfies the following conditions: (i) Π_i increasing in θ, (ii) Π_i increasing in l, (iii) there exists a unique θ^* that satisfies $\int_0^1 \Pi_i dl = 0$, (iv) there exists $\overline{\theta}$, $\underline{\theta}$, and $\epsilon > 0$ such that $\Pi_i \leq -\epsilon$ for all $l \in [0,1]$ and $\theta \leq \underline{\theta}$ and $\Pi_i > \epsilon$ for all $l \in [0,1]$ and $\theta \geq \overline{\theta}$, (v) continuity of $\int_0^1 g\left(l\right)\Pi_i dl$ with respect signal x_i and density g, and (vi) the expected value of η_i is finite. The assumptions that $r > \tau$ and that $\overline{\pi} - \pi > \epsilon > 0 > -\epsilon \geq \underline{\pi} - \pi$ imply (i), (ii), (iii), (iv). Condition (v) is clearly satisfied. Condition (vi) is assumed in the description of the model. □

The results above characterized lenders' demand for insurance for a given CDS fee f. In order to find the equilibrium demand for CDS we need to determine its supply. CDS providers are competitive and the fee they charge is such that the break even in expectation. This requirement implies that

$$f_j = \left(1-\lambda\right)K\left(\theta_j^*\right)\left(1-r\right). \tag{A.4}$$

Therefore, the CDS fee f_j charged by CDS providers is increasing in the "quantity demanded" $K\left(\theta^*\right)$, that is, the probability of a credit event conditional on distress. The equilibrium CDS fee is the one that simultaneously satisfies supply and demand. Plugging (A.4) into (A.2) gives the following condition for the equilibrium cutoff θ_j^{**}:

$$\int_0^{P^j\left(\theta_j^{**}\right)} \left(1-\lambda\right)\left(1-r\right)\left[K\left(\theta_j^{**}\right) - 1\right]\, dl + \int_{P^j\left(\theta_j^{**}\right)}^1 \left(1-\lambda\right)\left[\alpha - \left(1-r\right)\left(1 - K\left(\theta_j^{**}\right)\right)\right]\, dl = 0. \tag{A.5}$$

This equation simplifies to

$$\alpha\left[1 - P^j\left(\theta_j^{**}\right)\right] - \left(1-r\right)\left[1 - K\left(\theta_j^{**}\right)\right] = 0, \tag{A.6}$$

which leads to the proof of Proposition 1.

Proof of Proposition 1. With endogenous f_j, Π_i clearly satisfies conditions (i), (ii), and (v) in the proof of Lemma 1. Condition (vi) is assumed in the model. Therefore, it suffices to show (iii) and (iv). We show that these conditions hold for $K\left(v^{-1}(1)\right)$ sufficiently large. As $\theta \to v^{-1}\left(Q^j(1)\right)$, we have that $P^j(\theta) = {Q^j}^{-1}(v(\theta)) \to 1$, such that the left-hand side of (A.6) becomes $-(1-r)\left[1-K\left(\theta_j^{**}\right)\right]$, which is negative. If $\theta \to v^{-1}(1)$, $P^j(\theta) = {Q^j}^{-1}(v(\theta)) \to \tau(1-p)(1-r)^{-1}$, such that it approaches $\alpha\left[1-\tau(1-p)(1-r)^{-1}\right]-(1-r)\left[1-K\left(v^{-1}(1)\right)\right]$, which is positive for $K\left(v^{-1}(1)\right)$ large enough. Therefore, there exists $\theta_j^{**} \in \left(v^{-1}\left(Q^j(1)\right), v^{-1}(1)\right)$ such that (A.6) holds. Since $P^j(\cdot)$ is strictly decreasing and $K(\cdot)$ is strictly increasing, the left-hand side of (A.6) is strictly increasing. Thus, there is a unique such θ_j^{**}, which establishes (iii). It follows that $\overline{\pi} - \pi = (1-\lambda)\left[\alpha - (1-r)\left(1-K\left(\theta_j^{**}\right)\right)\right] > 0$ and $\underline{\pi} - \pi = (1-\lambda)(1-r)\left[K\left(\theta_j^{**}\right)-1\right] < 0$, which shows (iv) also holds. Finally, since $P^{mkt}(\theta) < P^{par}(\theta)$ for all $\theta < v^{-1}(1)$, it follows from (A.6) that $\theta_{mkt}^{**} < \theta_{par}^{**}$. □

Proof of Proposition 2. Follows from Proposition 1 and the price of debt expression in (8). □

Proof of Proposition 3. Let us explicitly write the aggregate offer as a function of both l and p as $Q^j(l,p)$. Using the results in the proof of Proposition 1 and taking the difference of (12) when $j = mkt$ and $j = par$ yields:

$$
\begin{aligned}
\frac{U_{mkt} - U_{par}}{1-\lambda} &= \int_{\theta_{par}^{**}\left(p_{par}^{*}\right)}^{\infty} \left(Q^{par}\left(1, p_{par}^{*}\right) - Q^{mkt}\left(1, p_{mkt}^{*}\right)\right) dK(\theta) \\
&+ \int_{-\infty}^{\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)} (1-r)\left(K\left(\theta_{par}^{**}\left(p_{par}^{*}\right) - K\left(\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)\right)\right)\right) dK(\theta) \\
&+ \int_{\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)}^{\theta_{par}^{**}\left(p_{par}^{*}\right)} \left[\left(v(\theta) + \alpha - \left(Q^{mkt}\left(1, p_{mkt}^{*}\right) - r\right)\right) - \left(1 - K\left(\theta_{par}^{**}\left(p_{par}^{*}\right)\right)(1-r)\right)\right] dK(\theta) \\
&> \int_{\theta_{par}^{**}\left(p_{par}^{*}\right)}^{\infty} \left(Q^{par}\left(1, p_{par}^{*}\right) - Q^{mkt}\left(1, p_{mkt}^{*}\right)\right) dK(\theta) \\
&+ \int_{\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)}^{\theta_{par}^{**}\left(p_{par}^{*}\right)} \left[\left(v(\theta) + \alpha - \left(Q^{mkt}\left(1, p_{mkt}^{*}\right) - r\right)\right) - \left(1 - K\left(\theta_{par}^{**}\left(p_{par}^{*}\right)\right)(1-r)\right)\right] dK(\theta) \\
&> \int_{\theta_{par}^{**}\left(p_{par}^{*}\right)}^{\infty} \left(Q^{mkt}\left(1, p_{par}^{*}\right) - Q^{mkt}\left(1, p_{mkt}^{*}\right)\right) dK(\theta) \\
&+ \int_{\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)}^{\theta_{par}^{**}\left(p_{par}^{*}\right)} \left[\left(v(\theta) + \alpha - \left(Q^{mkt}\left(1, p_{mkt}^{*}\right) - r\right)\right) - \left(1 - K\left(\theta_{par}^{**}\left(p_{par}^{*}\right)\right)(1-r)\right)\right] dK(\theta) \\
&> \int_{\theta_{mkt}^{**}\left(p_{mkt}^{*}\right)}^{\theta_{par}^{**}\left(p_{par}^{*}\right)} \left[v(\theta) - \left(Q^{mkt}\left(1, p_{mkt}^{*}\right)\right) + \alpha - (1-r)\left(1 - K\left(\theta_{par}^{**}\left(p_{par}^{*}\right)\right)\right)\right] dK(\theta) > 0. \quad \square
\end{aligned}
$$

Appendix B

This appendix contains definitions of the variables used in this paper. Programs to derive the dataset are available on request.

Variable Name	Definition	Data Source
1. Dependent Variables		
CDS Spread	The weekly spread on a firm's 5-year CDS contracts with no-restructuring clauses.	Thomson Reuters Datastream
Loan Renegotiated	Equals 1 for loans that were renegotiated during the year, and 0 otherwise. Renegotiations are based on Thomson One data item *AMENDED_FLAG*. We exclude renegotiated loans that cannot be matched to an original loan at the same firm.	Thomson One
Issued Loan	Equals 1 for firms that issued a syndicated loan in the corresponding 12-month period, and 0 otherwise.	LPC-Dealscan
Issued Bond	Equals 1 for firms that issued a bond in the corresponding 12-month period, and 0 otherwise.	Mergent FISD
New Loans/Total Debt Issuance	The total principal of newly issued loans (LPC data item *FACILITYAMT*) divided by the total principal of newly issued loans plus the total face value of newly issued bonds (FISD data item *OFFERING_AMT*).	LPC-Dealscan, Mergent FISD
Chg. Loans–Debt Ratio	The year-on-year change in *Syndicated Loans–Debt* (defined below).	LPC-Dealscan, Compustat
New Loan Markup	The percentage-point markup on new syndicated loan issues, based on data item *ALLINDRAWN*.	LPC-Dealscan
2. Key Explanatory Variables		
Distressed	Equals 1 for firms with 2012 Z-Score $\leq$ 1.8, and 0 for firms with Z-Score $\geq$ 2.7. In Table 8 it is based on 2011 Z-Score. Only in Table 2 Panel B, it equals 1 for firms with below-median Distance-to-Default values, and 0 for firms with above-median values. Z-Score is defined below. Distance-to-Default is calculated following Vassalou and Xing (2004).	Compustat, CRSP
HighSyndicate	Equals 1 for firms with a syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with a 1 ratio in the lowest tercile. This variable is set to missing for firms with syndicated loans–debt ratio in the middle tercile. The syndicated loans–debt ratio is defined below.	LPC-Dealscan, Compustat
PostTD	Equals 1 for observations after the September 12, 2012 TD9599 announcement, and 0 for observations before. In Table 3 only, it equals 1 for observations after TD9599's November 13, 2012 effective date.	
PostProposal	Equals 1 for observations after the January 6, 2011 TD9599 initial proposal, and 0 for observations before.	
High-Tax Lender	Equals 1 for firms with one or more outstanding loans in 2012 that were arranged by a lender other than Citigroup or Goldman Sachs, and 0 for firms with only loans arranged by these banks. For banks that hold loans with multiple lead arrangers, this variable is set to 0 when one of the arrangers is Citigroup or Goldman Sachs. The lead arranger is the lender with data item *LENDERROLE* equal to "Admin agent" or "Syndications agent". If no lender in a syndicate has one of these roles, then the lead arranger is the lender with *LEADARRANGERCREDIT* equal to "Yes".	LPC-Dealscan
Z-Score	The sum of 1.2 × (Current Assets – Current Liabilities)/Total Assets + 1.4 × Retained Earnings/Total Assets + 3.3 × EBIT/Total Assets + 0.6 × Market Capitalization/Total Liabilities + Total Sales/Total Assets. Current Assets is Compustat data item *ACT*, Current Liabilities is *LCT*, Total Assets is *AT*, Retained Earnings is *RE*, EBIT is *EBIT*, Total Liabilities is *LT*, and Total Sales is *SALE*. Market capitalization is the firm's stock price (CRSP data item *PRC*) multiplied by shares outstanding (*SHROUT*). All Z-Score component variables are measured at the end of the most recent quarter ending before September 2012 (or the most recent fiscal year end prior to January 2011, in Table 8 only), and are winsorized at the 1-99% level.	Compustat, CRSP

Syndicated Loans–Debt	The issue-date principal of all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. Issue-date principal is LPC data item *FACILITYAMT*, summed over all loans outstanding to each firm. Total debt is Compustat data item *LT*. A loan is outstanding if its issue date is before the start of fiscal year 2012, and its maturity date is after the start of fiscal year 2012 (or if it is issued before the start of fiscal year 2011, in Table 8 only). Our sample excludes loans that are syndicated outside the United States. The loans–debt ratio is bounded from above by 1.	LPC-Dealscan, Compustat
3. Control Variables		
Leverage	The sum of debt in current liabilities (Compustat data item *DLC*), long-term debt (*DLTT*), and preferred stock (*PSTK*), divided by this number plus market capitalization (defined in the same way as for *Z-Score*). This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat, CRSP
Log Assets	The natural logarithm of 1 plus the firm's total assets (data item *AT*). This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level. In Table 1, *Assets* is the unlogged value of this variable.	Compustat
Return on Assets	The ratio of net income before interest expenses to total assets. Net income before interest expenses is the sum of data items *NI* and *XINT*. Total assets is data item *AT*. This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Tangibility	The ratio of plant, property and equipment (data item *PPENT*) to total assets (*AT*). This variable is measured at the end of the firm's fiscal year, and is winsorized at the 1-99% level.	Compustat
Industry Fixed Effect	A fixed effect based on the firm's Fama-French 12-industry classification, obtained from *http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html*.	Ken French's Data Library
Credit Rating Fixed Effect	A fixed effect based on a numeric index of Standard & Poor's credit rating for the firm's long-term debt (data item *SPLTICRM*). The index ranges from 1 for a "AAA" rating to 21 for a "D" or "SD" rating.	Compustat
Loan Size	The natural logarithm of loan principal (LPC data item *FACILITYAMT* or Thomson One data item *AMT*).	LPC-Dealscan, Thomson One
Loan Duration	The number of years until a loan matures, calculated as the difference between LPC data items *FACILITYSTARTDATE* and *FACILITYENDDATE*, or Thomson One data items *SIGN_DATE* and *AMT*.	LPC-Dealscan, Thomson One
Covenant	Equals 1 for loans with at least one covenant provision (i.e., those facilities listed in LPC table "New Worth Covenant" or "Financial Covenant"), and 0 otherwise.	LPC-Dealscan
Performance Pricing	Equals 1 for loans with a performance pricing grid (those facilities listed in LPC table "Performance Pricing", or based on Thomson One data item *PERF_PRICECODE*), and 0 otherwise.	LPC-Dealscan, Thomson One

Appendix C

This appendix contains the details of our procedure for calculating firms' financial distress costs.

Calculating bond returns. We use the mean-adjusted model described in Bessembinder et al. (2009).[31] We obtain secondary-market prices from TRACE. We add accrued interest and calculate the trade-weighted average price for each bond on each day. The bond return is the daily change in this weighted average price. We calculate each bond's abnormal return by subtracting its average spread over the U.S. Treasury Bond with the closest maturity. This spread is estimated over a window of (–150,–30) trading days prior to TD9599's announcement. Bonds that trade on fewer than 60 days during this window are omitted. For firms with multiple bonds outstanding, we take the average of all bond returns on that date, weighted by bond principal.

Inferring market return on loans. We infer the market return on distressed firms' loans, $\frac{M_l^{mkt}-M_l^{par}}{M_l^{par}}$, from the stock CAR of a portfolio of 21 large syndicate lenders on TD9599's announcement. This CAR (which we denote r_e^L) is a levered claim on lenders' assets. We assume that lenders' stocks rise because TD9599 affects the value of their distressed loan holdings; there is no contemporaneous change in the value of lenders' other assets. We further assume that the average distressed loan held by a large syndicate lender is representative of the average loan issued to a distressed borrower in our sample.

Accordingly, the change in the equity value of syndicate lenders' distressed loan holdings is r_e^L/ψ, where ψ is the fraction of lenders' total assets held in distressed loans. Note that this is a levered claim on the distressed loans. Our goal is to estimate the unlevered market return on the loans, so we delever the equity stake using the formula: $r_e^L/\psi = r_u^L + D/E \times (1-\tau) \times (r_u^L - r_d^L)$, where r_u^L is the unlevered return on loans, D/E is the average lender's debt-equity ratio, τ is its tax rate, and r_d^L is its cost of debt.

The large lenders in our sample held 17.85% of assets in commercial loans just prior to TD9599's announcement. We assume that 54% of these loans are issued to distressed firms, because this is the percentage of firms in our sample with Z-Score ≤ 1.8. This yields $\psi = 0.1785 \times 0.54 = 0.0964$. The average debt-equity ratio for these lenders is 14.3.[32] The annual debt cost for lenders is 3.76%, based on data from Aswath Damodaran's website. We uncompound this into a weekly value $r_d^L = 0.06\%$, to match the window of our syndicated lender event study. We set $\tau = 26\%$, which is the average marginal tax rate for the large syndicate lenders obtained from John Graham's website. Plugging in these inputs yields $r_u^L = 2.51\%$, which we use for the market return on loans $\frac{M_l^{mkt}-M_l^{par}}{M_l^{par}}$ in (20).

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[31] Abnormal bond returns can also be calculated using matching portfolios or factor models. These methods are redundant in our setting because we sort firms into portfolios based on distressed and loans–debt ratio.

[32] For each lender, we collect bank holding company data from the Federal Reserve Call Reports. Each lender's ratio of commercial loans to total assets is data items (1766+J458+6566+6570)/2170, and its D/E ratio is data item 2948 divided by the market value from CRSP. All data items are measured on June 30, 2012.

Estimating drop in bankruptcy probability. We follow Duffie (1999) to calculate the decrease in bankruptcy probability implied by the drop in CDS spreads on TD9599's announcement. The reduced-form model assumes that default follows a Poisson process, so that for each tax regime $j \in \{par, mkt\}$,

$$\text{CDS Spread}_j = (1 - \text{Recovery Rate}) \times \frac{\sum_{t=i}^{T} exp^{-yt} \times (exp^{-h_j(t-1)} - exp^{-h_j t})}{\sum_{t=1}^{T} exp^{(-h_j+y)t}} \tag{C.1}$$

where h is the bankruptcy hazard rate, y is the interest rate, and t is the payment period. We solve the model for 5-year CDS spreads with quarterly payouts. We use an annual interest rate of 0.67%, based on the yield of a zero-coupon 5-year U.S. Treasury bond on September 11, 2012.

We solve separately for h_{par} and h_{mkt}. We set CDS Spread_{par} equal to the pre-TD9599 average of 261 basis points for distressed firms, and CDS Spread_{mkt} equal to 209 basis points, based on the drop of 52 basis points on TD9599's announcement estimated in Column (1) of Table 2, Panel A. For $N \in 5, 10$, we calculate bankruptcy rates over an N-year horizon as $p_B^{par} = 1 - e^{-h_{par}N}$ and $p_B^{mkt} = 1 - e^{-h_{mkt}N}$, and show the percentage drop in these rates in Table 4, Panel B.

Estimating tax savings from TD9599. We use Eq. (2) of our theoretical model to express $T^{par} - T^{mkt}$ in terms of estimable parameters. This equation yields $Q^{par}(1) - r_l = \tau \times (1-p)$, $Q^{mkt}(1) - r_l = \tau \times (r_l - p)/(1-\tau)$, and $T^{par} - T^{mkt} = \omega_l \times [(1 - p_B^{par}) \times \tau \times (1-p) + (1 - p_B^{mkt}) \times \tau \times (r_l - p)/(1-\tau)]$. In this expression, τ is the tax rate of syndicate lenders, r_l is the in-court recovery rate on syndicated loans, and p is the secondary market price of distressed loans prior to out-of-court renegotiation.

We set $\tau = 0.26$ using John Graham's data. We use $r = 0.709$ based on the recovery rate on defaulted loans in 2011 (Moody's Investors Service (2012)). We also set $p = 0.709$, based on evidence that distressed debt typically trades at prices close to in-court recovery rates (Guo et al. (2008)).[33] Our calculations in Section 5.3.2 yield $\omega_l = 0.136$. We calibrate p_B^{par} and p_B^{mkt} from the drop in CDS spreads, separately for 5-, and 10-year horizons, as explained above. Using these values, we calculate $T^{par} - T^{mkt}$ as 0.74% and 0.54% of total assets for the 5-, and 10-year horizons, respectively. Finally, we subtract these values from $\frac{M_s^{mkt} - M_s^{par}}{M_s^{par}}$ when calculating each security's share of distress costs in Table 4, Panel C.

Estimating reduction in hedging costs. Our model shows that $p_B^{mkt} \times (V_B^{mkt} - V_B^{par}) = p_B^{mkt} \times (p_B^{par} - p_B^{mkt}) \times (1-r)$.[34] We use the drop in CDS spreads to estimate p_B^{par} and p_B^{mkt}. The recovery rate on the firm's overall debt liabilities r is set to .495, which was the weighted average in-court recovery rate on loan and bond issues in 2011 (Moody's Investors Service (2012)).

[33]Note that the size of tax savings decreases with p, while our estimate of total distress costs increases. Therefore calibrating $p = 0.709$ leads to a conservative estimate of financial distress.

[34]Specifically, $V_B^j = 1 - K(\theta_j^{**}(p_j^*))(1-r)$ and $K(\theta_j^{**}(p_j^*)) = p_B^j$.

Table 1. Summary Statistics

Panel A. Firm Characteristics by Distress Level

	Distressed					Non-Distressed					Distressed –	
	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Non-Distressed	*t*-stat
CDS Spread	260.96	344.37	82.17	151.97	294.01	141.85	251.46	57.19	69.20	139.72	119.11	2.24**
Syndicated Loans–Debt	0.29	0.27	0.10	0.21	0.40	0.30	0.22	0.15	0.21	0.47	-0.01	-0.24
Z-Score	1.10	0.56	0.81	1.15	1.54	3.90	1.03	3.21	3.58	4.44	-2.80	-23.16***
Leverage	0.44	0.19	0.29	0.43	0.55	0.19	0.11	0.12	0.16	0.25	0.25	8.94***
Assets	39,959	54,033	8,762	20,506	41,839	20,952	17,897	7,421	14,776	31,618	19,007	2.52**
Return on Assets	0.06	0.04	0.04	0.06	0.08	0.11	0.05	0.07	0.11	0.13	-0.05	-6.73***
Tangibility	0.44	0.25	0.19	0.45	0.65	0.32	0.21	0.14	0.25	0.48	0.12	3.04***

Panel B. Firm Characteristics by Syndicated Loans–Debt Ratio

	High Syndicate Loans					Low Syndicate Loans					High Loans –	
	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Low Loans	*t*-stat
CDS Spread	298.34	389.30	88.70	173.13	383.29	142.88	135.46	56.20	88.57	156.56	155.45	3.12***
Syndicated Loans–Debt	0.59	0.23	0.40	0.53	0.76	0.07	0.05	0.00	0.08	0.11	0.53	19.60***
Z-Score	2.09	1.37	1.20	1.81	3.10	1.74	1.22	0.89	1.37	2.36	0.35	1.64
Leverage	0.38	0.23	0.22	0.31	0.55	0.35	0.21	0.17	0.32	0.46	0.03	0.94
Assets	12,061	10,691	5,055	8,281	15,949	50,794	56,014	15,497	33,921	55,099	-38,732	-6.11***
Return on Assets	0.07	0.06	0.05	0.07	0.09	0.07	0.04	0.05	0.07	0.09	0	0.46
Tangibility	0.38	0.25	0.19	0.34	0.59	0.40	0.28	0.12	0.39	0.65	-0.02	-0.57

Panel C. Debt Issue Characteristics by Distress Level

	Distressed					Non-Distressed					Distressed –	
	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Mean	St. Dev.	25th Pct.	Median	75th Pct.	Non-Distressed	*t*-stat
Loan Renegotiated	0.02	0.13	0	0	0	0.03	0.17	0	0	0	-0.01	- 1.71*
Issued Loan	0.42	0.49	0	0	1	0.40	0.49	0	0	1	0.02	0.88
Issued Bond	0.32	0.47	0	0	1	0.19	0.40	0	0	0	0.13	5.79***
New Loans/Total Debt Issuance	0.50	0.47	0	0.26	1	0.64	0.45	0.11	1	1	-0.15	-4.67***
Chg. Loans–Debt Ratio	0	0.27	-0.05	0	0.06	0.04	0.33	-0.06	0	0.16	-0.04	-2.77***
New Loan Markup	2.70	1.58	1.62	2.25	3.25	1.75	1.19	1.12	1.50	2.00	0.94	9.98***

This table presents summary statistics for our sample. The sample in Panels A and B contains non-financial firms in the intersection of the Compustat, LPC-Dealscan, and DTCC databases. Observations in these panels are at the firm level, and are from the month prior to the September 12, 2012 TD9599 announcement. In Panel C, *Loan Renegotiated* is measured for all loans outstanding in the year before TD9599, at a sample of non-financial and utilities firms in the intersection of the Compustat and Thomson One. Other debt characteristics are measured for new loans or bonds issued in the year before TD9599's announcement, at non-financial and utilities firms in the intersection of the Compustat and LPC-Dealscan. Distressed firms have 2012 Z-Score $\leq$ 1.8, and Non-Distressed firms have Z-Score $\geq$ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). High Syndicate Loans firms have a syndicated loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicate Loans firms have a loans–debt ratio in the lowest tercile. All variable definitions are in Appendix B. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 2. CDS Market Response to TD9599

Panel A: Distress based on Z-Score

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks	4 weeks	6 weeks	2 weeks	4 weeks	6 weeks
Distressed	-64.60	-62.91	-63.63			
	(-1.33)	(-1.36)	(-1.42)			
HighSyndicate	-12.65	-8.88	-6.64			
	(-0.33)	(-0.25)	(-0.19)			
PostTD	-14.09***	-8.29**	-6.16	-14.35***	-8.69**	-6.60
	(-2.86)	(-2.51)	(-1.21)	(-2.67)	(-2.57)	(-1.26)
Distressed × *PostTD*	-3.27	-8.72*	-13.53**	-2.70	-8.07*	-12.87**
	(-0.56)	(-1.94)	(-2.15)	(-0.42)	(-1.76)	(-2.02)
HighSyndicate × *PostTD*	1.67	-2.45	-5.30	1.26	-2.87	-5.77
	(0.29)	(-0.55)	(-0.85)	(0.20)	(-0.68)	(-0.95)
Distressed × *HighSyndicate*	76.79	73.57	72.17			
	(1.46)	(1.49)	(1.50)			
Distressed × *HighSyndicate* × *PostTD*	-36.07***	-30.63**	-27.66*	-40.97***	-34.79***	-31.95**
	(-2.77)	(-2.51)	(-1.98)	(-2.91)	(-2.82)	(-2.30)
Leverage	168.51**	168.58**	167.16**			
	(2.10)	(2.17)	(2.19)			
Log Assets	1.37	1.76	3.13			
	(0.11)	(0.14)	(0.25)			
Return on Assets	-165.28	-190.60	-206.04			
	(-0.48)	(-0.58)	(-0.64)			
Tangibility	-17.85	-13.74	-12.65			
	(-0.28)	(-0.22)	(-0.21)			
Industry Fixed Effects	Yes	Yes	Yes	No	No	No
Credit Rating Fixed Effects	Yes	Yes	Yes	No	No	No
Firm Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	383	765	1,146	399	797	1,194
Adjusted R^2	0.931	0.935	0.935	0.995	0.995	0.994

Table 2 — Continued

Panel B: Distress based on Distance-to-Default

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks	4 weeks	6 weeks	2 weeks	4 weeks	6 weeks
Distressed	41.06	35.48	35.02			
	(1.10)	(1.02)	(1.03)			
HighSyndicate	17.64	17.13	16.56			
	(0.90)	(0.90)	(0.88)			
PostTD	-10.83***	-11.57***	-13.21***	-9.72***	-9.92***	-11.36***
	(-4.77)	(-4.29)	(-4.43)	(-4.59)	(-4.68)	(-4.91)
Distressed × *PostTD*	-22.84***	-14.46**	-11.93	-23.95***	-16.63**	-14.47*
	(-3.27)	(-2.32)	(-1.56)	(-3.11)	(-2.53)	(-1.80)
HighSyndicate × *PostTD*	-1.07	-0.92	0.20	-2.16	-2.57	-1.81
	(-0.35)	(-0.26)	(0.05)	(-0.68)	(-0.81)	(-0.51)
Distressed × *HighSyndicate*	39.97	44.80	46.82			
	(0.94)	(1.11)	(1.19)			
Distressed × *HighSyndicate* × *PostTD*	-31.08**	-37.21**	-42.09***	-28.74*	-33.42**	-38.15**
	(-2.08)	(-2.52)	(-2.69)	(-1.76)	(-2.20)	(-2.42)
Leverage	156.12	156.93	150.49			
	(1.44)	(1.48)	(1.45)			
Log Assets	-4.99	-5.60	-5.73			
	(-0.42)	(-0.48)	(-0.49)			
Return on Assets	160.95	123.79	91.94			
	(0.93)	(0.79)	(0.60)			
Tangibility	35.32	39.77	42.81			
	(0.70)	(0.81)	(0.89)			
Industry Fixed Effects	Yes	Yes	Yes	No	No	No
Credit Rating Fixed Effects	Yes	Yes	Yes	No	No	No
Firm Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	475	949	1,422	479	957	1,434
Adjusted R^2	0.912	0.917	0.917	0.992	0.993	0.992

This table examines the change in CDS spreads around the September 12, 2012 TD9599 announcement. The sample contains non-financial firms in the intersection of the Compustat, LPC-Dealscan, and DTCC databases. Each column is a triple difference-in-differences regression, with observations at the firm-week level for 2-, 4-, and 6-week (two-sided) windows around the announcement. The dependent variable in each regression is weekly CDS spreads. In Panel A, *Distressed* equals 1 for firms with 2012 Z-Score $\leq$ 1.8 and 0 for firms with Z-Score $\geq$ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). In Panel B, *Distressed* equals 1 for firms with below-median values of Distance-to-Default, and 0 for firms with above-median values. *HighSyndicate* equals 1 for firms with syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with loans–debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. *PostTD* equals 1 for weeks after September 12, 2012, and 0 otherwise (the announcement week is omitted). *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. All control variables are winsorized at the 1-99% level. Columns (1) through (3) include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). *t*-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 3. Syndicated Loan Renegotiation after TD9599

Dependent Variable	*Loan Renegotiated*		
Distressed	-0.015	-0.013	-0.015
	(-1.37)	(-1.13)	(-1.21)
PostTD	-0.003	-0.004	-0.006
	(-0.43)	(-0.53)	(-0.73)
Distressed×PostTD	0.028**	0.027**	0.028**
	(2.13)	(2.06)	(2.15)
Log Assets		-0.004	-0.004
		(-0.78)	(-0.87)
Leverage		-0.029	-0.030
		(-1.21)	(-1.23)
Tangibility		0.026	0.026
		(1.13)	(1.12)
ROA		-0.032	-0.034
		(-0.92)	(-0.96)
Log Total Loans		0.011***	0.010**
		(2.59)	(2.34)
Loan Size			0.001
			(0.51)
Loan Duration			0.005**
			(2.56)
Performance Pricing			0.004
			(0.37)
Industry Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes
Observations	3,712	3,712	3,712
Pseudo R^2	0.114	0.138	0.156

This table examines whether the reduction in debt restructuring costs due to TD9599 induced more frequent loan renegotiation among distressed firms. The sample contains non-financial and utilities firms in the intersection of the Compustat and Thomson One databases that have at least one syndicated loan outstanding. Each column is a Probit regression, with one observation for each loan outstanding in the 12-month period before and 12-month period after TD9599's November 13, 2012 effective date. Coefficients represent the marginal effects of each variable, and can be compared to the 0.019 unconditional frequency of loan renegotiation during the 2 years before TD9599 took effect. *Loan Renegotiated* equals 1 for loans that are renegotiated during the year, and 0 otherwise. We exclude renegotiation events in which the loan's key terms (principal, maturity, and markup) change by less than 5% on average. *Distressed* equals 1 for distressed firms with Z-Score $\leq$ 1.8 and 0 for non-distressed firms with Z-Score $\geq$ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). *PostTD* equals 1 for the year after TD9599 took effect, and 0 for the year before. *Log Assets* is the natural logarithm of total assets. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is property, plant, and equipment divided by total assets. *Log Total Loans* is the natural logarithm of the firm's total loans outstanding during the year. *Credit Line* equals 1 for credit lines, and 0 for term loans. *Loan Size* is the natural logarithm of the loan's issue-date principal. *Loan Duration* is the number of years until the loan matures, measured at the start of the year. All continuous control variables are measured at the end of the previous fiscal year and are winsorized at the 1-99% level. All regressions include industry fixed effects based on the Fama-French 48-industry classification, fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms), and fixed effects for loans that are issued or mature during the year. *t*-statistics are in parentheses, and are based on standard errors clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 4. Reduction in Financial Distress Costs due to TD9599

Panel A: Change in Market Value of Borrower's Securities

	Equity Returns				Bond Returns			
Type of Firm	Distressed		Non-Distressed		Distressed		Non-Distressed	
Event Window	(–1, +2)	(–4, +4)	(–1, +2)	(–4, +4)	(–1, +2)	(–4, +4)	(–1, +2)	(–4, +4)
High Syndicate Loans	2.02%**	3.84%***	-0.21%	–0.37%	1.83%**	2.21%**	0.45%	0.57%
	(2.13)	(2.70)	(–0.34)	(–0.40)	(2.48)	(1.99)	(1.37)	(1.18)
Low Syndicate Loans	–1.17%**	–1.44%*	0.24%	0.24%	1.38%**	1.50%*	1.08%**	0.81%
	(–2.25)	(–1.84)	(0.35)	(0.24)	(2.50)	(1.81)	(2.28)	(1.15)

Loan Returns	
Syndicate Lenders' Equity CAR, (–4,+4) Window	3.12%*
	(1.83)
Implied Return on Borrower's Loans	2.85%

	Panel B: CDS-Implied Bankruptcy Rates			Panel C: Financial Distress Cost Estimates		
Time Horizon	Pre-TD9599 Rate	Post-TD9599 Rate	Drop in Probability	Pre-TD9599 Distress Costs	Decrease in Hedging Costs	Post-TD9599 Distress Costs
5 years	27.6%	22.9%	4.7%	38.5%	2.4%	36.1%
		(20.6%, 24.6%)	(3%, 7%)	(23.5%, 67.2%)	(1.5%, 3.6%)	(19.9%, 65.6%)
10 years	47.7%	40.5%	7.2%	15.9%	3.6%	12.3%
		(36.9%, 43.2%)	(4.5%, 10.8%)	(15.5%, 45.5%)	(2.2%, 5.4%)	(10.1%, 43.3%)

This table presents our estimates of the changes in bankruptcy likelihood and financial distress costs due to TD9599. The sample contains non-financial firms in the intersection of the Compustat, LPC-Dealscan, and DTCC databases. Panel A estimates the market return on distressed firms' stocks, bonds, and loans when TD9599 is announced. We sort firms' stocks and bonds into 4 portfolios based on distress and loans–debt ratio. Distressed firms have 2012 Z-Score ≤ 1.8, and Non-Distressed firms have Z-Score ≥ 2.7. High Syndicate Loans firms have a loans–debt ratio in the highest tercile of the sample distribution, and Low Syndicate Loans firms have a loans–debt ratio in the lowest tercile. CARs are the sum of daily stock or bond returns over different event windows, averaged across all portfolio firms. Stock return data are from CRSP. Abnormal stock returns are based on the Fama-French 3-factor model (Fama and French (1993)). Factor exposures are estimated over a window of (-150,-30) trading days prior to TD9599's announcement. Firms that trade on fewer than 30 days during this estimation window are omitted. Bond price data are from TRACE. Bond returns are calculated using the daily average price weighted by trade size, and include accrued interest. Each firm's return is the average of the returns of all bonds trading on that day, weighted by bond principal. Abnormal returns are based on the mean-adjustment method (Bessembinder et al. (2009)), which subtracts each bond's average spread over a U.S. Treasury Bond with the closest maturity. This spread is estimated over a window of (-150,-30) trading days prior to TD9599's announcement. Bonds that trade on fewer than 60 days during this window are omitted. The CAR for syndicated lenders' stocks is for a portfolio of 21 syndicated lenders that each arranged at least 50 syndicated loans outstanding in 2012. Abnormal stock returns for lenders are calculated in the same way as for other firms. We infer the market return on distressed firms' loans from this CAR using the procedure described in Appendix C. For all returns, t-statistics are in parentheses. Standard errors are calculated using Brown and Warner (1980)'s Crude Dependence Adjustment to account for the contemporaneous event date across all firms. *, **, and *** represent statistical significance at the 10, 5, and 1% levels. Panel B uses the Duffie (1999) model to estimate the decrease in bankruptcy probability on TD9599's announcement. The decrease is based on the change in CDS spreads for Distressed–High Syndicate Loans firms estimated in Column (1) of Panel A in Table 2. We assume quarterly CDS premium payments. We set the annual risk-free rate to 0.67% and the in-court recovery on CDS-referenced debt to 60%. We calculate bankruptcy probabilities over 5- and 10-year horizons. Panel C presents our calculation of financial distress costs. We use results from panels A and B as inputs, and estimate tax savings from TD9599 following the procedure described in Appendix C. Each individual security's weight in the capital structure is based on data from the average distressed firm in our sample. In panels B and C, each estimate's 95% confidence interval is in parentheses. We derive this confidence interval using a bootstrap procedure that re-estimates the drop in bankruptcy probability from Panel B 1,000 times.

Table 5. Access to Debt Markets and Composition of Issuance after TD9599

	Panel A. Extensive Margin		Panel B. Intensive Margin	
Dependent Variable	*Issued Loan*	*Issued Bond*	*New Loans/Total Debt Issuance*	*Chg. Loans–Debt Ratio*
Window around Announcement	12 months		12 months	
Distressed	-0.07**	0.09***	-0.15***	-0.04*
	(-2.39)	(3.49)	(-4.05)	(-1.79)
PostTD	-0.08***	0.01	-0.06**	-0.11***
	(-3.20)	(0.59)	(-2.22)	(-5.33)
Distressed × *PostTD*	0.08**	-0.03	0.10**	0.09***
	(2.20)	(-0.96)	(2.40)	(3.33)
Leverage	0.10*	-0.11**	0.22***	-0.08*
	(1.94)	(-2.43)	(3.18)	(-1.74)
Log Assets	0.06***	0.05***	-0.04***	-0.01
	(8.50)	(8.10)	(-3.92)	(-0.78)
Return on Assets	0.31***	-0.05	0.26*	0.00
	(3.08)	(-0.56)	(1.74)	(0.02)
Tangibility	-0.06	0.07*	-0.13**	-0.06*
	(-1.35)	(1.87)	(-2.17)	(-1.75)
Industry Fixed Effects	Yes	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes	Yes
Observations	2,843	2,839	1,515	1,502
Pseudo/Adj. R^2	0.066	0.279	0.254	0.046

This table examines distressed firms' issuance of new debt securities around the September 12, 2012 TD9599 announcement. The sample contains non-financial firms in the intersection of the Compustat, LPC-Dealscan, and CRSP databases. Each regression has two observations per firm, one each for the 12-month period before and 12-month period after the TD9599 announcement (September 2012 is excluded). Panel A contains Probit regressions, and coefficients represent the marginal effects of each variable. *Issued Loan* equals 1 for firms that issued a syndicated loan in the respective 12-month period, and 0 otherwise. *Issued Bond* is defined similarly, for bond issues in the 12-month period. Panel B contains OLS regressions. *New Loans/Total Debt Issuance* is the total principal of newly issued loans divided by the total principal of new loan and bond issues. *Chg. Loans–Debt Ratio* is the year-on-year change in the loans–debt ratio. Columns (3) and (4) contain only firms that issued loans or bonds around the TD9599 announcement. In all columns, *Distressed* equals 1 for firms with 2012 Z-Score ≤ 1.8, and 0 for firms with Z-Score ≥ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). *PostTD* equals 1 for the period after September 2012, and 0 for the period before September 2012. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Log Assets* is the natural logarithm of total assets. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. All regressions include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). All control variables are measured at the end of the previous fiscal year and are winsorized at the 1-99% level. *t*-statistics are in parentheses, and are based on heteroskedasticity-robust standard errors. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 6. TD9599 and Financing Costs on New Syndicated Loans

Dependent Variable	*New Loan Markup*		
Window around Announcement	12 months		
Distressed	0.73***	0.48***	0.43***
	(5.90)	(3.97)	(3.65)
PostTD	0.07	-0.03	-0.05
	(0.83)	(-0.35)	(-0.70)
Distressed × *PostTD*	-0.21*	-0.24**	-0.21**
	(-1.75)	(-2.12)	(-1.98)
Leverage		0.97***	0.85***
		(3.67)	(3.31)
Log Assets		-0.17***	-0.18***
		(-4.28)	(-4.20)
Return on Assets		-0.94	-0.99
		(-1.49)	(-1.59)
Tangibility		-0.18	-0.18
		(-0.99)	(-0.98)
Loan Size			-0.01
			(-0.29)
Loan Duration			-0.14***
			(-3.73)
Covenant			-0.20***
			(-3.64)
Performance Pricing			-0.16***
			(-2.84)
Industry Fixed Effects	Yes	Yes	Yes
Credit Rating Fixed Effects	Yes	Yes	Yes
Observations	2,015	1,718	1,707
Adjusted R^2	0.369	0.438	0.468

This table examines distressed firms' financing costs around the September 12, 2012 TD9599 announcement. The sample contains new syndicated loans received by non-financial firms in the intersection of the Compustat, LPC-Dealscan, and CRSP databases. Each column is an OLS regression, with one observation for each new syndicated loan signed by a firm in the 12-month window around the TD9599 announcement (September 2012 is excluded). *New Loan Markup* is the percentage-point all-in drawn spread on new syndicated loan issues. *Distressed* equals 1 for firms with 2012 Z-Score $\leq$ 1.8, and 0 for firms with Z-Score $\geq$ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). *PostTD* equals 1 for loans signed after September 2012, and 0 for loans signed before September 2012. *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Log Assets* is the natural logarithm of total assets. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Loan Size* is the natural logarithm of loan principal. *Loan Duration* is the number of years until the loan matures. *Covenant* equals 1 for loans with at least one covenant provision, and 0 otherwise. *Performance Pricing* equals 1 for loans with a performance pricing grid, and 0 otherwise. All regressions include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). All control variables are measured at the end of the previous fiscal year and are winsorized at the 1-99% level. *t*-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 7. Effect of TD9599 on CDS Spreads: High- versus Low-Tax Lenders

Dependent Variable	*CDS Spread*					
Window around Announcement	2 weeks	4 weeks	6 weeks	2 weeks	4 weeks	6 weeks
High-Tax Lender	-63.25**	-61.45**	-59.61**			
	(-2.14)	(-2.17)	(-2.15)			
HighSyndicate	25.15	24.83	25.13			
	(0.57)	(0.60)	(0.62)			
PostTD	-18.81***	-17.79***	-20.19***	-18.81***	-17.79***	-20.19***
	(-4.04)	(-4.13)	(-3.91)	(-3.73)	(-3.98)	(-3.82)
High-Tax Lender × *PostTD*	4.35	2.41	1.63	4.35	2.33	1.53
	(0.78)	(0.45)	(0.25)	(0.72)	(0.42)	(0.23)
HighSyndicate × *PostTD*	-10.61	-7.17	-4.30	-10.61	-7.17	-4.30
	(-1.07)	(-0.99)	(-0.56)	(-0.99)	(-0.95)	(-0.55)
High-Tax Lender × *HighSyndicate*	72.35	72.32	72.83			
	(1.38)	(1.47)	(1.51)			
High-Tax Lender × *HighSyndicate* × *PostTD*	-35.20*	-37.13**	-40.52**	-35.20*	-37.05**	-40.42**
	(-1.89)	(-2.16)	(-2.17)	(-1.74)	(-2.08)	(-2.12)
Leverage	124.75	120.91	118.84			
	(1.60)	(1.64)	(1.66)			
Log Assets	10.14	10.96	12.48			
	(0.75)	(0.83)	(0.95)			
Return on Assets	266.78	252.78	222.67			
	(0.47)	(0.47)	(0.43)			
Tangibility	-98.32	-98.64	-100.67			
	(-1.40)	(-1.48)	(-1.55)			
Industry Fixed Effects	Yes	Yes	Yes	No	No	No
Credit Rating Fixed Effects	Yes	Yes	Yes	No	No	No
Firm Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	248	496	744	248	496	744
Adjusted R^2	0.949	0.953	0.954	0.995	0.996	0.995

This table examines how the change in CDS spreads on the September 12, 2012 TD9599 announcement varies with the tax rates of firms' syndicated loan arrangers. The sample contains distressed firms (2012 Z-Score $\leq$ 1.8) in the intersection of the Compustat, LPC-Dealscan, and DTCC databases. Financial firms are omitted. Each column is a triple difference-in-differences regression, with observations at the firm-week level for 2-, 4- and 6-week (two-sided) windows around the announcement. The dependent variable in each regression is weekly CDS spreads. *High-Tax Lender* equals 1 for firms with one or more outstanding loans in 2012 that were arranged by a lender other than Citigroup or Goldman Sachs, and 0 for firms with only loans arranged by these banks. (Citigroup and Goldman Sachs had marginal tax rates close to 0% in 2012). *HighSyndicate* equals 1 for firms with syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with loans-debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2012 divided by total debt in 2012. *PostTD* equals 1 for weeks after September 12, 2012, and 0 otherwise (the announcement week is omitted). *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. All control variables are winsorized at the 1-99% level. Columns (1) through (3) include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). *t*-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.

Table 8. CDS Reaction to TD9599 Initial Proposal

Dependent Variable			*CDS Spread*			
Window around Announcement	2 weeks	4 weeks	6 weeks	2 weeks	4 weeks	6 weeks
Distressed	-38.09	-34.91	-34.28			
	(-1.17)	(-1.12)	(-1.13)			
HighSyndicate	-3.60	-4.25	-4.36			
	(-0.18)	(-0.21)	(-0.23)			
PostProposal	2.62	1.52	-2.02	1.09	0.11	-3.40
	(1.30)	(0.64)	(-0.64)	(1.27)	(0.06)	(-1.13)
Distressed × *PostProposal*	-0.31	0.77	-1.75	-0.11	-0.22	-3.70
	(-0.10)	(0.22)	(-0.32)	(-0.04)	(-0.07)	(-0.74)
HighSyndicate × *PostProposal*	5.77	8.33	9.19	5.81	7.19	6.70
	(0.95)	(1.33)	(1.39)	(1.07)	(1.54)	(1.22)
Distressed × *HighSyndicate*	23.29	23.49	25.43			
	(0.82)	(0.84)	(0.89)			
Distressed × *HighSyndicate* × *PostProposal*	-13.19	-20.08**	-28.78**	-13.97	-18.85**	-30.76**
	(-1.46)	(-2.12)	(-2.11)	(-1.64)	(-2.30)	(-2.23)
Leverage	116.43	114.90	113.38			
	(1.59)	(1.62)	(1.64)			
Log Assets	1.54	0.54	-0.10			
	(0.12)	(0.05)	(-0.01)			
Return on Assets	2.52	-1.21	-12.89			
	(0.03)	(-0.01)	(-0.14)			
Tangibility	-31.24	-31.24	-31.61			
	(-0.85)	(-0.88)	(-0.93)			
Industry Fixed Effects	Yes	Yes	Yes	No	No	No
Credit Rating Fixed Effects	Yes	Yes	Yes	No	No	No
Firm Fixed Effects	No	No	No	Yes	Yes	Yes
Observations	372	743	1,113	372	743	1,113
Adjusted R^2	0.868	0.876	0.875	0.996	0.996	0.984

This table examines the change in CDS spreads around the January 6, 2011 TD9599 initial proposal. The sample contains non-financial firms in the intersection of the Compustat, LPC-Dealscan, and DTCC databases. Each column is a triple difference-in-differences regression, with observations at the firm-week level for 2-, 4-, and 6-week (two-sided) windows around the announcement. The dependent variable in each regression is weekly CDS spreads. *Distressed* equals 1 for firms with 2011 Z-Score ≤ 1.8 and 0 for firms with Z-Score ≥ 2.7 (firms with Z-Score between 1.8 and 2.7 are omitted). *HighSyndicate* equals 1 for firms with syndicated loans–debt ratio in the highest tercile of the sample distribution, and 0 for firms with loans–debt ratio in the lowest tercile (firms in the middle tercile are omitted). The loans–debt ratio is principal for all syndicated loans outstanding at the start of fiscal year 2011 divided by total debt in 2011. *PostProposal* equals 1 for weeks after January 6, 2011, and 0 otherwise (the proposal week is omitted). *Leverage* is the sum of debt in current liabilities, long-term debt, and preferred stock, divided by this number plus market capitalization. *Return on Assets* is net income plus interest expense, divided by total assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. All control variables are winsorized at the 1-99% level. Columns (1) through (3) include industry fixed effects based on the Fama-French 12-industry classification and fixed effects for firms' long-term credit ratings from Standard & Poor's (including a fixed effect for unrated firms). t-statistics are in parentheses. Standard errors are clustered at the firm level. *, **, and *** represent statistical significance at the 10, 5, and 1% levels.