Corporate Hedging, Contract Rights, and Basis Risk*

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ABSTRACT

A hedging contract can be terminated by a counterparty when a firm experiences an event of default, such as a credit downgrade, covenant violation, or bankruptcy. We build the model and show that counterparties are more likely to exercise their termination rights when a firm performs poorly and owes them money, leaving the firm exposed to risk at the worst possible time. Although the termination right reduces the hedging cost, it is inefficient because the counterparty exercising it does not consider the externality imposed on the firm. As a result, firms may hedge less, particularly when bankruptcy costs are high, and are more likely to liquidate. Using detailed hedging data, we find that derivatives are terminated in 60% of default cases and that such terminations help explain low corporate hedging in distress. We also find support for model predictions.

JEL codes: G30, G32

Keywords: hedging, risk management, derivatives, event of default, distress, basis risk, ISDA

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I. Introduction

Derivative contracts are highly standardized and are governed by the International Swaps and Derivatives Association (ISDA) Master Agreements that apply to all over-the-counter (OTC) derivative transactions.[1] To protect a counterparty against a failure to pay and to reduce counterparty risk, a standard agreement contains an "event of default" clause, which may be triggered by a firm's default on its obligations, bankruptcy filing, misrepresentation, credit downgrade, covenant violation, or a merger without full assumption of liabilities. Triggering an event of default gives the counterparty the right, but not the obligation, to close its derivative agreement with the firm prior to maturity, and this right is often exercised in practice. In this paper, we examine the exercise policy of such termination rights and study how they affect firms' risk management policies and the likelihood of firm liquidation. We show that because both the availability of the termination right to a counterparty and the incentive to exercise it are negatively correlated with firm performance, firms are deprived of their hedging portfolios precisely when hedging has most value.

To determine the optimal exercise policy of the termination right from a counterparty's perspective, we build a theoretical model that incorporates realistic frictions. All else equal, the derivative counterparty that originated the contract (usually a large bank) is reluctant to terminate the contract because it values continuing business with the firm (e.g., because of recontracting costs, the value of relationship banking, or the ability to cross-sell other products). However, when the firm performance deteriorates, the counterparty may prefer to exercise the right and receive the immediate cash payment rather than attempt to recover it from the bankrupt firm later, when the value of the firm's assets and collateral is reduced.[2]

[1] A major advantage of OTC derivatives over exchange-traded derivatives is that the former are flexible and allow the counterparties to tailor the terms of the contracts to suit their desired risk profiles, take large positions without a significant price impact, post less collateral, or enter into contracts with longer maturities. More than 90% of end-users indicate that they use OTC derivatives (Franzen (2000)), and their notional amount has grown to more than $600 trillion by 2022 (Bank for International Settlements).

[2] Because of Safe Harbor provisions of the Bankruptcy Code, derivatives may have priority over other claims in bankruptcy (see, e.g., Edwards and Morrison (2005), Roe (2011), Bolton and Oehmke (2015)). Nevertheless, the

The model shows that it is optimal for the counterparty to terminate the hedging contract with the firm when its fair value exceeds a certain threshold. In addition, the exercise threshold decreases in firm's expected bankruptcy costs and basis risk of its hedging portfolio. Intuitively, the latter is because basis risk increases the likelihood that the firm owes money to the counterparty in case of firm liquidation, decreasing expected repayment. The implication to the firm of the counterparty's optimal exercise policy is that the firm becomes unhedged at the time when it needs protection the most. First, the right only becomes active when the firm experiences a contractual event of default, which typically occurs when the firm is already in a financial distress. Second, the counterparty is more likely to exercise the right when the firm owes it a payment and when bankruptcy is expected to be more costly.

Building on this result, we show that the early termination of the derivative portfolio by the counterparty is inefficient in a sense that it benefits the counterparty exercising the right less than it hurts the firm. Note that the benefit to the counterparty accrues mainly because it can claim its contractual payments early. Yet, for the firm, losing the hedging portfolio at a time of distress increases the probability of liquidation, which taxes *all* assets of the firm. For this reason, even though the termination right reduces the cost of derivatives to the firm, the disadvantage of higher ex-post risk outweighs the ex ante cost savings. In turn, the possibility of termination of the firm's hedging portfolio reduces its incentive to hedge ex ante. Somewhat counterintuitively, the termination right can make a firm want to hedge less when its bankruptcy costs are high. This is because the counterparty is more likely to exercise the termination right with higher bankruptcy costs, rendering the hedging contract less effective. Overall, although hedging is still desirable for risk reduction absent any cost of hedging, the termination right reduces the value of hedging to the firm.

payment to derivative counterparties can only be made after the confirmation of the debtor's plan by the court (which may take years), and even then, the payment is usually a fraction of the actual amount (Holland and Knight (2009)). Additionally, the Bankruptcy Court for the Southern District of New York ruled in 2009 that unless a non-defaulted counterparty to the ISDA Master Agreement terminates the agreement promptly after the firm enters bankruptcy, it waives its right to do so. This ruling in particular implies that derivative contracts that are not terminated promptly following a firm's bankruptcy filing essentially receive the same priority in bankruptcy as other senior claims.

We enhance the model by introducing several extensions that incorporate realistic features of the data. Take, for instance, a scenario frequently observed in the data: the counterparty in the derivative transaction is also a firm's lender or its afliate. Relevant to this case, we show that the firm's lenders are made worse off by the exercise of the termination right. Essentially, the lenders end up shouldering extra bankruptcy costs and forfeiting some asset value to shareholders, as the firm's assets become riskier in the absence of hedging. Consequently, if the derivative counterparty holds a large enough stake in the firm's debt and has to internalize the prospective losses to lenders, it might choose not to exercise the termination right.

We next take the model to the data and test its empirical predictions regarding the exercise policy of contract termination rights and corporate hedging outcomes. To do so, we collect detailed hedging data for the period 1996-2021 for firms where we can precisely measure firms' risk exposures: oil and gas producers (SIC 1311), coal producers (SIC 1220), and commercial airlines (SIC 4512).[3] We additionally gather data on the events of default,[4] the number and identities of firm derivative counterparties, collateral requirements, and disclosed derivative terminations. Finally, to broaden our inference beyond firms in these industries, we use textual analysis for all firms in Compustat/SEC universe to identify events of default and derivative terminations.

Using the sample of commodity producers and airlines, we find that counterparties exercise their termination rights 60% of the time following an event of default and are more likely to do so when their derivative contracts are in-the-money. Further, we find that corporate hedging using financial derivatives drops sharply when the firm experiences an event of default, consistent with derivative terminations taking place, and that firms do not imme-

[3]These industries provide an excellent setting to study risk management practices due to their strong exposures to commodity prices and the existence of well-developed derivative markets. For many other industries, the bulk of hedging focuses on interest rate or foreign exchange risks.

[4]We obtain information on the events of default from the UCLA LoPucki Bankruptcy Research Database that records bankruptcy petitions and the database compiled by Dou, Taylor, Wang, and Wang (2021) and Ma, Tong, and Wang (2022). We complement these data with fraud-related accounting restatements and credit downgrades since these events can also constitute events of default and trigger derivative terminations.

diately re-hedge to the prior level. For example, in specifications with firm and industry by year fixed effects, we find that firms are 19% less likely to use derivatives upon triggering an event of default and that their hedge ratios and hedge maturities drop by 19% and 8 months, respectively. All of these effects are more pronounced when the event of default is associated with the high-cost ("free fall") rather than the low-cost ("prepackaged/prenegotiated") bankruptcy,[5] which is consistent with the model's prediction that terminating derivatives is more attractive for the counterparties when a prospective bankruptcy is more costly.

That over-the-counter derivative contracts can be terminated following an event of default offers a new insight into an intriguing evidence that distressed firms tend to hedge less. Whenever an event of default is triggered, the affected contracts are effectively removed from the books, and it appears as if the firm unwinds its hedging positions. Additionally, the continuing event of default, risk-shifting preferences near default, fixed costs of hedging, and collateral constraints may impede the company's ability to quickly re-contract to the prior level. Some firms may attempt to re-hedge using the exchange-traded derivatives, but these derivatives offer less customization and require cash collateral, making them less suitable. Overall, the results suggest that derivative terminations may be one of the reasons why firms hedge less in distress and provide a complementary explanation to the mechanisms proposed by Jensen and Meckling (1976) and Rampini, Sufi, and Viswanathan (2014).

To mitigate a potential concern that derivative terminations may proxy for poor firm performance, we also perform a placebo test for firms in the coal industry. The coal industry presents a useful laboratory because coal firms hedge both using financial derivatives, which are governed by the ISDA Master Agreements, and supply agreements, which are not. If derivative terminations proxy for worse firm fundamentals and firms voluntarily unwind their hedging programs once in distress, then both hedging with derivatives and hedging

[5]The prenegotiated and prepackaged bankruptcies are considered to be less costly because there is a preliminary agreement reached between shareholders and creditors on the terms of a reorganization plan. Such bankruptcies typically allow firms to save on legal fees and tend to settle faster (see, e.g., Tashjian, Lease, and McConnell (1996) and Betker (1997)).

with supply agreements should be affected. In contrast, we find that only hedging with derivatives drops following events of default, while hedging with supply agreements is unaffected, consistent with derivative terminations rather than lower firms' willingness to hedge driving a decline in corporate hedging. In addition, these results give further support to the findings by Almeida, Hankins, and Williams (2021), who document that hedging with purchase obligations (PO) does not drop significantly in distress.

Finally, we use plausibly exogenous variation in the decision of counterparties to terminate their derivative contracts to examine the effect of terminations on hedging. Specifically, we use for identification the Bench Ruling that was issued in *Lehman Brothers v. Metavante* case in the U.S. Bankruptcy Court for the Southern District of New York on September 15, 2009. The Bench Ruling states that a party to a swap agreement cannot rely on Section 2(a)(iii) of the ISDA Master Agreement to withhold payments otherwise due to the bankrupt counterparty if it fails to promptly terminate the contract following the bankrupt counterparty's event of default (Marchetti (2010)).[6] This ruling has significantly increased the incentive of counterparties to terminate their contracts with the defaulting firm. Indeed, we show in a difference-in-differences setting that the likelihood of derivative terminations increased several-fold for firms with New York jurisdictions after the Bench Ruling. More importantly, we also show in a triple-difference setting that firms with New York court jurisdictions experience larger reductions in their hedge ratios upon the events of default after the Bench Ruling.

The paper is organized as follows. Section II provides institutional details on the ISDA Master Agreements. Section III offers a brief overview of the existing literature. In Section IV, we present a model of a counterparty's decision to exercise the termination option and

[6] In the past, counterparties relied on Section 2(a)(iii) of the Master Agreement to claim that, when they opt not to terminate the contract, they may refrain from making payments owed to the defaulted entity for as long it remains in default (McNamara and Metrick (2019)). For example, several prior cases in London resulted in a court determination that Section 2(a)(iii) is effective to suspend payment obligations of a non-defaulting party until the default is cured, potentially resulting in an indefinite suspension of such obligations.

discuss the implications for firms. Section V describes our data sources and presents the empirical results. The last section concludes.

II. Institutional Background

Here we briefly describe the contingencies and consequences of terminating a hedging position under the ISDA Master Agreement. Over-the-counter derivative contracts are governed by the Master Agreements, with the standard being the ISDA Master Agreements of 1992, 2002, or 2012 published by the International Swaps and Derivatives Association (ISDA.org).[7] These contracts serve all OTC derivative transactions, both in the United States and internationally, and help the involved parties to minimize legal uncertainty and contracting costs by avoiding negotiations of the legal terms on a transaction-by-transaction basis. The ISDA Master Agreements describe how parties can enter into bilateral contracts, make payments, and arrange collateral, and they are not product-specific, meaning that parties who signed a bilateral agreement for a particular class of transactions can make all future transactions subject to the same agreement and only need to negotiate the economic terms of the new contract, such as notional amount or maturity.

The agreements also contain termination clauses that are intended to reduce credit exposure of the involved parties and that become active upon an event of default by one of the parties or a termination event (Franzen (2000)). There are eight standard events of default, which allow the non-defaulting party to close the derivative position before maturity, but most agreements include additional events in the attached schedules or credit support annexes. The standard events for the party at fault include: a) failure to pay or deliver;

[7] The main difference between the ISDA Master Agreements of 1992 and 2002 is in the calculation of amounts owed on early termination (see, e.g., Charles (2012) and McNamara and Metrick (2019)). The 1992 agreement allows the non-defaulting counterparty to choose between the "Market Quotation" or "Loss" methods. The "Market Quotation" method requires to procure three quotations from leading dealers on the amounts they would expect to pay or receive to enter into a replacement transaction with the non-defaulting party, whereas the "Loss" method requires the non-defaulting party to make a good faith determination of its total losses or gains stemming from the termination. In contrast, the 2002 agreement uses a hybrid "Close-Out" approach to calculate amounts owed on early termination.

b) breach of agreement; c) credit support default (e.g., a cessation of a financial guarantee by a third party); d) misrepresentation; e) default under a specified transaction (e.g., a failure to pay when due under the securities lending agreement); f) cross-default (e.g., a default on a loan or a breach of a financial covenant); g) bankruptcy; and h) merger without full assumption of liabilities. The parties can also specify additional events of default in the agreement, which tend to be credit-related, such as a credit downgrade by one or more credit rating agencies. Finally, there are termination events which, although nobody is at fault, warrant the early termination, such as a tax law change resulting in taxes being imposed on transactions, illegality, or a merger of a party resulting in a deterioration in its credit quality.

Upon an event of default or a termination event with respect to one party (the "defaulting party"), the other party is entitled to terminate all the outstanding transactions or the affected transactions pursuant to the event, value them, and net out amounts owed by the defaulting party from any amounts that may be owed to the defaulting party. Thus, the event of default creates an option, but usually not the requirement, to close the agreement. Also, as most other agreements, the derivative agreements allow for short grace periods, which provide parties with an opportunity to remedy the issue right to close out is only exercisable for as long as the relevant event of default or termination event is continuing.

Once the qualified event is triggered and the position is to be closed, the parties must decide on how to calculate the final net payment. Only the party with the greater debt is liable to pay the netted amount.[8] The ISDA Master Agreement provides that the close-out amount is determined by assessing the amount of the losses incurred (or the gains realized) in replacing the terminated transactions or by providing the economic equivalent of the material terms of the terminated transactions.

In sum, the hedging contracts may be closed after a number of events. Following such events, the final amount is calculated as a replacement value of the position to be cancelled,

[8]The single agreement concept reduces counterparty credit risk by ensuring that settlement payments, margin payments, and close-out payments only flow from the party who owes the greater amount.

and the payments for the multiple positions are netted.

III. Literature

We contributes to the literature on corporate hedging, which examines the determinants of risk management policies and channels for value creation, such as taxes, bankruptcy costs, and investment.[9] We contribute to this literature by showing that derivative terminations have significant explanatory power for firms' observed hedging outcomes and that such terminations may impede firms from realizing the full benefits of hedging.

The topic that we study is closely related to the recent studies examining the preferential treatment of derivatives in bankruptcy (e.g., Edwards and Morrison (2005), Roe (2011), and Bolton and Oehmke (2015)). Specifically, we build on Bolton and Oehmke (2015) who theoretically examine priority conflicts in bankruptcy between debtholders and derivative counterparties, comparing scenarios where derivatives have priority over all other senior claims and scenarios where they do not. Their work shows that the privileged status of derivatives effectively transfers risk to debtholders, thereby increasing the cost of borrowing, while the positive effect of the privileged status of derivatives comes from cross-netting benefits for derivative writers who serve as counterparties to many firms with imperfectly correlated defaults. Our model differs from Bolton and Oehmke (2015) in that we endogenize the exercise policy of contract termination rights and consider their effect on firm hedging policy and the likelihood of firm liquidation.

[9] Corporate hedging can increase shareholder value by reducing tax liability (Smith and Stulz (1985), Graham and Smith (1999)), increasing debt capacity (Leland (1998), Haushalter (2000), Graham and Rogers (2002)), reducing financing costs and improving access to finance (Bolton, Chen, and Wang (2011), Cornaggia (2013)), increasing corporate investment and international trade (Froot, Scharfstein, and Stein (1993), Campello, Lin, Ma, and Zou (2011)), reducing costs of financial distress (Fehle and Tsyplakov (2005), Purnanandam (2008), Gilje and Taillard (2017), Ellul and Yerramilli (2013)), improving contract terms with firm customers, creditors, and managers (Bessembinder (1991)), and alleviating information asymmetries (DeMarzo and Duffie (1995), Manconi, Massa, and Zhang (2018)). Several papers examine determinants of hedging policies related to managerial risk-aversion and compensation contracts (Stulz (1984), Tufano (1996), Knopf, Nam, and Thornton (2002), Bodnar, Giambona, Graham, and Harvey (2019)), lender interests and binding covenants (Babenko, Bessembinder, and Tserlukevich (2023)), and economies of scale (Nance, Smith, and Smithson (1993), Geczy, Minton, and Schrand (1997)).

The theory pioneered by Rampini and Viswanathan (2010) and Rampini, Sufi, and Viswanathan (2014) focuses on the effect of collateral constraints on corporate hedging. Their insight is that the opportunity cost of engaging in risk management is forgone current investment and therefore constrained firms hedge less.[10] Rampini, Sufi, and Viswanathan (2014) test the theory predictions using a sample of U.S. commercial airlines and find, in particular, that hedging drops when airlines enter distress, which we also confirm in a broader sample of firms. Unlike Rampini and Viswanathan (2010), we model costly firm liquidation and therefore do not allow for a full collateralization of all claims, and we show that firms facing higher bankruptcy costs may hedge less. Further, terminations of OTC derivative contracts documented in our paper may amplify the effect of collateral constraints on hedging because such contracts typically require less collateral than the exchange-traded derivatives.

Our study is also related to the literature on risk management by means other than OTC derivatives. For example, Phillips and Moon (2020) find that firms' may use purchase contracts to partially substitute for hedging with derivatives. More generally, firms can reduce financial hedging while increasing operational hedging (Hoberg and Moon (2017)). Recent papers by Almeida, Hankins, and Williams (2017) and Almeida, Hankins, and Williams (2021) show that purchase obligations (POs), which are the forward contracts with suppliers, are used by many firms as a risk management tool. Almeida, Hankins, and Williams (2021) build a model where POs relax the firm liquidity constraints and find that firms in distress shift away from derivatives to POs. We argue that the important difference between POs and OTC derivatives is that the former are not subject to the ISDA Master Agreements, which allows firms that use them to stay hedged following an event of default. Consistent with this argument, we find that counterparty derivative terminations have no explanatory power for the dynamics of POs in distress, while they can explain the dynamics of hedg-

[10] Consistent with their predictiions, Vuillemey (2019) finds that higher networth banks engage in more interest rate hedging. Bretscher, Schmid, and Vedolin (2018) argue that risk management through swaps is risky for constrained firms and that although constrained firms hedge more, they are left more exposed to risk even after hedging.

ing with derivatives. We also find that distressed firms are able to partially reinstate their hedging positions using the less customized exchange-traded instruments, such as futures.

IV. Model

To analyze the effect of derivative terminations on firms' hedging outcomes, we build a simple model that features a firm with risky cash flows and fixed liabilities. The firm manages a portfolio of derivatives, which partially hedges fluctuations in its cash flow. At date 1, the firm's cash flows can reach a certain low threshold, which triggers a contractual event of default. This event gives the derivative counterparty an option to terminate its contract with the firm prematurely. Subsequent to the occurrence of the event of default, the firm can either recover or get liquidated. The outcome depends on additional cash flow realizations, the counterparty's endogenous decision to keep or terminate the derivative contract, and the performance of the firm's remaining derivative portfolio.

A. Preliminaries

We consider three dates: 0, 1, and 2. The firm has random cash flows, C_1 and C_2, which are realized at dates 1 and 2, respectively. These cash flows can take one of two values, $C_1 \in \{C_1^L, C_1^H\}$ and $C_2 \in \{C_2^L, C_2^H\}$. The likelihood of a low cash flow realization at date t is p_t. The firm also carries fixed liabilities, D_1 and D_2, scheduled for payment at dates 1 and 2, as illustrated in Figure 1. While we refer to these liabilities as "debt" in the model, they could include any fixed liabilities, such as employee wages or payments owed to suppliers.

Unless explicitly stated otherwise, we assume the counterparty issuing derivatives, referred to as the bank, is default-free. The primary financial instrument used in our analysis is a standard forward contract, signed by the firm and the bank at date 0. This forward contract matures and settles at date 2, unless an event of default occurs before the contract's maturity. The value of the firm's derivative portfolio to the bank at date 1, denoted as V_1, can take one of two possible values: $V_1 \in \{V_1^L, V_1^H\}$, where $V_1^L < 0$, $V_1^H > 0$. A positive value of V_1 implies that the firm owes money to the bank, whereas a negative value signifies that the bank owes money to the firm. In line with the approach taken by Bolton and Oehmke (2015), we assume that the value of this derivative portfolio is linked to an underlying asset, such as a commodity price, which is imperfectly correlated with the firm's cash flows,

$$P[V_1^H|C_1^H] = P[V_1^L|C_1^L] = \rho, \tag{1}$$

where $\rho > 1/2$ because the derivative portfolio is a hedging asset. A higher value of ρ indicates a lower level of *basis risk*, signifying a stronger correlation between the derivative portfolio's value and the firm's cash flows.

At date 2, the derivative portfolio evolves to $V_2 \in \{V_1 + \delta_H, V_1 + \delta_L\}$, where $\delta_H > 0$, $\delta_L < 0$, with the innovations in the derivative value being positively correlated with the firm's cash flows,

$$P(\delta_H|C_2^H) = P(\delta_L|C_2^L) = \rho. \tag{2}$$

We assume the derivative value is a martingale, $V_1 = E(V_2)$, which implies the following restriction on model parameters,[11]

$$(1 - p_2)(\rho\delta_H + (1 - \rho)\delta_L) + p_2((1 - \rho)\delta_H + \rho\delta_L) = 0. \tag{3}$$

We next define the circumstances under which an event of default can occur at date 1. In practice, an event of default can be triggered by various factors, such as a firm's credit rating downgrade, covenant violation, or a missed interest payment. For simplicity, we focus on the scenario where an event of default is triggered by a violation of the firm's networth covenant,

$$C_1 - D_1 - V_1 < 0. \tag{4}$$

[11]For example, if the high and low cash flows are equally likely, $p_2 = 1/2$, this condition implies that the hedging portfolio value can increase or decrease by the same amount, $\delta_H = -\delta_L$.

We assume that condition (4) is satisfied only after the adverse changes in the cash flows and the forward price, $C_1 = C_1^L$ and $V_1 = V_1^H$.

Given an event of default, the bank has the right to continue the contract with the firm until maturity or to terminate it early; in the latter case, the bank recovers from the firm the current value of the contract V_1.[12] We assume that continuing the contract with the firm, as opposed to terminating it, has benefits for the bank, $\theta > 0$, which are realized only if the firm is not liquidated. These benefits could capture the value of the ongoing relationship between the firm and the bank (e.g., the bank can cross-sell other products to the firm or has an informational advantage over other market participants).

The firm can only be liquidated at date 2, with the liquidation taking place if the firm networth at is negative

$$C_1 + C_2 - D_1 - D_2 - V_2 < 0. \tag{5}$$

To fix the ideas, we assume that inequality (5) is satisfied only if the firm experiences two consecutive low cash flow realizations, C_1^L and C_2^L, and, in addition, the derivative value is either $V_2 = 0$ (firm is unhedged) or $V_2 = V_1 + \delta_H$ (the derivative portfolio moves against the firm at date 2). These assumptions jointly imply that hedging is valuable and that firms that continue to hedge beyond date 1 have better chances of avoiding costly liquidation.

In the event of firm liquidation, the derivative value payable to the bank V_2 is subject to bankruptcy costs α. These costs may reflect payment delays from a liquidating firm to its counterparties because the payments can only be made after the court's confirmation of the debtor's plan or may reflect incomplete payments.[13] Finally, we assume that the forward position is not excessive.

Assumption 1. $\rho(C_1^L + C_2^L) > V_1^H$.

[12] For simplicity, we assume the cash flow at date 1 is sufficient to pay to the terminating counterparty, $C_1^L > V_1^H$.

[13] Although bankruptcy costs experienced by derivative counterparties may be lower compared to those by other claim holders, they are non-trivial in practice (Holland and Knight (2009)). Our model could be easily extended to accomodate different bankruptcy costs experienced by derivative holders and other senior claim holders.

This assumption is always satisfied when there is no basis risk ($\rho = 1$) because $C_1^L > V_1^H$. When basis risk is the highest, $\rho = 1/2$, this assumption implies that the average cash flow over two periods is larger than the portfolio that hedges these cash flows.

B. Exercise Policy

We now turn attention to the bank's decision to terminate or keep the derivative contract. Recall that the option is only available conditional on an event of default, i.e., when $C_1 = C_1^L$ and $V_1 = V_1^H$. The bank elects to terminate the derivative contract if an immediate payoff from such an action exceeds the expected continuation value,

$$\begin{aligned} V_1^H > (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta\right) + p_2\rho\left(V_1^H + \delta_L + \theta\right) \\ + p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha)\,. \end{aligned} \tag{6}$$

The first two terms on the right-hand side of (6) reflect the expected value to the bank if the firm recovers, either because firm cash flows improve (the first term) or because the hedging portfolio offsets the low cash flows (the second term), whereas the last term represents the payoff to the bank in case of firm liquidation. Using (3), we can rewrite (6) as

$$V_1^H > \frac{\theta(1-p_2+\rho p_2)}{\alpha p_2(1-\rho)} - \delta_H \equiv V^*. \tag{7}$$

Intuitively, the contract is more likely to be terminated if the value of the derivative to the bank is higher as it exposes the bank to higher expected bankruptcy costs. Second, higher bankruptcy costs, α, and higher basis risk, $1-\rho$, make the termination of the contract more attractive for the bank. Finally, the larger benefits from continuing the contract, captured by θ, reduce the bank's incentive to terminate early. Given the optimal exercise policy and assuming $V_1^H > V^*$, we can find the value of the termination right at date 0 as

$$R_0 = p_1(1-\rho)\left(\alpha p_2(1-\rho)(V_1^H + \delta_H) - \theta(1-p_2+p_2\rho)\right). \tag{8}$$

Assuming that the derivative contract is priced competitively, the termination right makes the contract cheaper for the firm by the amount R_0.

C. Firm Value and the Inefficiency of the Termination Right

Although the termination right makes the derivatives cheaper for the firm, it has a negative effect on the probability of firm survival, which in turn increases expected bankruptcy costs and affects the prices of claims on the firm's assets. Below, we analyze how the values of equity and debt claims are affected ex post by the exercise of the termination right. We then analyze how the presence of the termination right affects the ex ante firm value.

Proposition 1. *Suppose $V_1^H > V^*$. Then:*

1. *The ex post change in the value of debt as a result of the derivative termination is*

$$\begin{aligned} \Delta D &= -p_2\rho\left(D_1 + D_2 + V_1^H - C_1^L - C_2^L\right) + p_2\left(1-\rho\right)\left(1-\alpha\right)\delta_H \\ &\quad -\alpha p_2 \rho\left(C_1^L + C_2^L - V_1^H\right). \end{aligned} \tag{9}$$

2. *The ex post change in the value of equity as a result of the derivative termination is*

$$\Delta E = p_2\left(\rho\left(D_1 + D_2 + V_1^H - C_1^L - C_2^L\right) - (1-\rho)\delta_H\right), \tag{10}$$

3. *The ex post change in the firm value as a result of the derivative termination is negative,*

$$\Delta V = \Delta E + \Delta D = -\alpha p_2\left(\rho\left(C_1^L + C_2^L - V_1^H\right) + (1-\rho)\,\Delta_H\right) < 0. \tag{11}$$

The proposition shows how the exercise of the right changes the value of debt and equity claims. Because the unhedged firm is riskier, the debtholders are worse off through the first term in (9), which is partially offset by the second term related to the basis risk. Debtholders are also worse off because of the higher bankruptcy costs, captured by the last term in (9). In contrast, the higher risk as a result of the derivative termination has a positive effect on the value to shareholders, reflected in the first term in (10), which is partially offset by the second term related to basis risk. Note, however, that because the shareholders have no control over the exercise of the right, this effect is unintentional and is a result of the actions of the counterparty. Finally, the proposition shows that the total firm value decreases after the derivative termination because of higher bankruptcy costs.

Next, we show that the inclusion of the termination right also decreases the ex ante firm value.

Proposition 2. *Suppose $V_1^H > V^*$. Then:*

1. *The inclusion of the termination right increases the expected bankruptcy costs by*
$$E(\Delta BC) = p_1 p_2 (1-\rho)\alpha \left(\rho(C_1^L + C_2^L) - V_1^H\right) > 0, \tag{12}$$
2. *The termination right is inefficient, i.e., it decreases the ex ante firm value,*
$$E(\Delta V) = -E(\Delta BC) - \theta p_1 (1-\rho)(1 - p_2 + p_2\rho) < 0. \tag{13}$$

The expected bankruptcy costs increase because the firm has a higher probability of liquidation after the termination of the derivative contract. However, there is a mitigating factor: by paying V_1^H to the counterparty at $t = 1$, the firm reduces its assets prior to liquidation, which lowers its bankruptcy costs. The second part of the proposition shows that the termination right reduces the ex ante firm value, which is a result of the higher expected bankruptcy costs and the loss of the relationship value benefits following the contract termination.

D. The Incentive to Hedge and Bankruptcy Costs

We next examine the benefits of hedging for the firm, which are defined as a gain in firm value from hedging. Perhaps somewhat surprisingly, we find that when the bank has the termination right, higher bankruptcy costs, α, could lower the firm's incentive to hedge.

Corrolary 1. *Let the threshold bankruptcy cost parameter α^* be a solution to $V^*(\alpha^*) = V_1^H$.*

1. *With the termination right, the firm's expected benefits of hedging are given by*
$$H = \alpha p_1 p_2 \rho (C_1^L + C_2^L) + \theta(1 - p_1 p_2 (1-\rho)), \qquad \text{if } \alpha < \alpha^*, \tag{14}$$
$$H = \alpha p_1 p_2 \left(\rho^2 (C_1^L + C_2^L) + (1-\rho) V_1^H\right) + \theta(1 - p_1(1-\rho)(1 + p_2\rho)), \quad \text{if } \alpha > \alpha^*, \tag{15}$$

and they are non-monotonic in bankruptcy costs α.

2. *The termination right reduces a firm's ex ante incentive to hedge.*

The corollary reveals that firms facing higher bankruptcy costs do not necessarily have a greater incentive to hedge. Indeed, as shown by the corollary, there is a discontinuous decrease in the hedging benefits at the critical point α^*. The underlying rationale is that the likelihood of the bank exercising the termination right increases with α, which in turn increases the probability of firm liquidation. The corollary shows that this results in larger expected bankuptcy costs and lower relationship value. This exercise of the termination right effectively strips the firm of its hedging benefits at a point where hedging is most valuable in mitigation of the risk of liquidation.

E. Derivative Collateralization

So far, we have worked under the presumption that derivatives obligations cannot be collateralized. This assumption is reasonable for firms where collateral is scarce or where the existing lending agreements restrict the firm from offering its collateral to derivative counterparties.[14] Nonetheless, some derivative contracts can be collateralized, especially in industries that rely more on the exchange-traded futures. In this section, we therefore extend the model to allow for derivative collateralization.

We assume a part of the cash flow, C_0, is realized early and may be pledged as collateral to derivative counterparties.[15] For consistency, we adjust the cash flow at date 1 to $C_1 \in \{C_1^L - C_0, C_1^H - C_0\}$. The collateral is assumed to be insufficient to cover payments to the bank in all contingencies, $C_0 < V_1^H$. As in our base model, we maintain the assumption that if a termination payment is due at date 1, it is sourced from the cash flows C_1, making the collateral relevant only upon liquidation. Surplus collateral, if any, is reimbursed to the firm.

[14] Commonly, lending agreements restrict the firm from collateralizing its derivative contracts unless the counterparty involved is the lending institution itself (Babenko, Bessembinder, and Tserlukevich (2023)).

[15] For brevity, we do not present a formal foundation of the endogenous liquidity constraint that limits the amount that can be pledged; for a detailed discussion, see Almeida, Hankins, and Williams (2021).

Collateral affects the counterparty's payoff in the event of firm liquidation and therefore also affects its decision to exercise the termination right. Should liquidation occur when the derivative contract has value $V_2 > 0$, the net payment to the bank is $C_0+(1-\alpha)(V_2-C_0)$. This approach captures the preferential treatment of derivatives in bankruptcy by allocating the amount C_0 for the counterparty before the bankruptcy costs are levied on assets. Following similar steps as before, we show that the counterparty exercises the right at V_1^H when

$$V_1^H > V^* + C_0, \tag{16}$$

implying that the posted collateral, C_0, increases the threshold for the exercise. If the collateral is sufficiently large, the right is never exercised by the counterparty and is worthless. If the right is exercised at V_1^H, its value is given by

$$\tilde{R}_0 = p_1(1-\rho)\left(\alpha p_2(1-\rho)(V_1^H + \delta_H - C_0) - \theta(1 - p_2 + \rho p_2)\right) < R_0. \tag{17}$$

Thus, the posted collateral not only diminishes the counterparty's incentive to exercise the termination right but also lowers the value of the right even if its exercise is optimal. We maintain the assumption that bankruptcy costs are levied on all firm's assets, now reduced by the amount of the posted collateral, $C_1^L + C_2^L - C_0$. Bondholders receive the residual assets after derivative payouts and bankruptcy costs.

Proposition 3. *Suppose $V_1^H > V^* + C_0$ and collateral C_0 is posted to the derivative counterparty. Then:*

1. *The termination right increases the expected bankruptcy costs by*

$$E(\Delta \tilde{BC}) = \alpha p_1 p_2 (1-\rho)\left(\rho(C_1^L + C_2^L) - V_1^H + C_0(1-\rho)\right) > E(\Delta BC) > 0, \tag{18}$$

2. *The termination right is inefficient, i.e., it decreases the ex ante firm value,*

$$E(\Delta \tilde{V}) = -E(\Delta \tilde{BC}) - p_1(1-\rho)\theta(1 - p_2 + p_2\rho) < E(\Delta V) < 0. \tag{19}$$

The proposition mirrors the base case and shows that when the bank elects to exercise the termination right despite the firm's posting of collateral C_0, the inefficiency of the termination right increases. Intuitively, the posted collateral reduces the expected bankruptcy costs for the firm that uses derivatives, making their termination less desirable.

Finally, note that when the derivative contracts are settled more frequently, it has a similiar effect to that of collateral.[16] In particular, higher settlement frequency of derivative contracts lowers the counterparty's incentive to exercise its termination right, and, conditional on exercise being optimal, the termination right still decreases firm value.

F. Bundled Hedging and Lending

In practice, the lenders may require in some cases that the firm hedges with the lender's specialized derivatives desk or with the lender's affiliates. Therefore, we consider an extension where the interests of the counterparty and the interests of the lender are aligned.

Proposition 4. *Suppose the counterparty (bank) holds fraction κ of the firm's debt claim.*

1. *The termination right is exercised at V_1^H if*

$$V_1^H \quad > \quad V^* + \frac{\kappa\,(-\Delta D)}{\alpha p_2(1-\rho)}. \tag{20}$$

where V^* and ΔD are given in (7) and (9), respectively.

2. *If, in addition, ΔD is negative, then there exists a minimum stake κ^* in the debt claim,*

$$\kappa^* \quad = \quad \frac{\alpha p_2(1-\rho)\left(V_1^H - V^*\right)}{-\Delta D}, \tag{21}$$

which, when bundled with the counterparty's claim, guarantees that the right is optimally abandoned.

[16] Typically, only the current contractual payment is settled, but the derivative instrument may remain either in- or out-of-the-money after settlement. The frequency at which over-the-counter derivatives are settled varies widely and depends on the type of derivative and the preferences of the involved parties. Many OTC derivatives are settled monthly, but are not "marked to market" as futures. For OTC derivatives with longer-term maturities, such as interest rate swaps, settlement periods can be extended to quarterly, semi-annual, or even annual.

The intuition of Proposition 4 is straightforward. A stake in the firm's debt claim makes the firm's counterparty partly internalize the negative consequences of the contract termination on the value of debt (Proposition 1 shows that the debt claim is affected negatively except for the case of high basis risk). A high enough stake κ therefore guarantees that the right is never exercised.

V. Empirical Analysis

In the empirical analysis, we focus on several key predictions of the model. First, we examine the exercise policy of derivative termination rights and show that exercise is more likely when firm performance is poor, the event of default is associated with higher bankruptcy costs, and the contract has a higher fair value to the counterparty. Second, we show that firms' hedge ratios drop significantly after the events of default, and that these drops are concentrated in cases with confirmed derivative terminations. Third, we address a potential issue that derivative terminations do not cause lower firm hedging, but instead proxy for worse financial performance.

A. Data Sources

Our analysis requires data on firms' events of default and outstanding derivative portfolios, as well as information on whether firms' counterparties terminate any derivative contracts in response to the events of default. For a smaller sample of commodity producers and airlines, these data are hand-collected from firms' financial statements. For a broad sample of publicly-traded firms, these data come from the textual search of the annual financial statements and Compustat.

A.1. Events of Default

We obtain information on three types of firms' events of default: bankruptcies and non-payment, credit downgrades, and misrepresentation. A number of events come from the sample of Chapter 11 bankruptcy filings contained in the Florida-UCLA-LoPucki Bankruptcy Research Database. The advantage of this dataset is that it has information on the exact timing of bankruptcies, their types (e.g., "free fall," "prenegotiated," or "prepackaged"), and bankruptcy courts. The disadvantage, however, is that the database does not cover smaller firms (i.e., firms with assets less than $100 million, measured in 1980 dollars). We therefore extend this dataset using events of default from the database compiled by Dou, Taylor, Wang, and Wang (2021) and Ma, Tong, and Wang (2022).[17] We also hand-collect from firms' 10-K and 10-Q statements the additional events of default related to bankruptcies and non-payment for the sample of firms where we have detailed hedging data: oil and gas producers, coal producers, and scheduled airlines. For cases when multiple events of default are triggered, we identify the date of the first event of default.

Because derivative terminations can be triggered by misrepresentation- and credit-related events, we also obtain data on fraud-related accounting restatements from Audit Analytics and credit downgrades of firms' long-term debt from Compustat. The latter data is available through February, 2017. A credit downgrade is equal to one if there is a credit downgrade of a firm's domestic long-term debt by S&P during the fiscal year and is equal to zero otherwise. Similarly, a fraud-related accounting restatement is equal to one if there is an accounting restatement during the fiscal year that identifies fraud and/or there is an investigation by the SEC and is equal to zero otherwise. Overall, we have 2,578 credit-related, 709 misrepresentation-related, and 854 bankruptcy and non-payment related events of default.

We also use the standard textual analysis tools to search for keywords related to default in firms' annual statements for all Compustat firms with the available CIK identifier during the

[17]This database merges the information on bankruptcies filed by public, nonfinancial U.S. firms from 1981 to 2012 using New Generation Research's Bankruptcydata.com, Public Access to Court Electronic Records (PACER), National Archives at various locations, and U.S. Bankruptcy Courts for various districts. See the data description and applications in Chen, Dou, Guo, and Ji (2020), Ma, Tong, and Wang (2022), and Liu, Schmid, and Yaron (2020). We exclude Chapter 7 bankruptcy filings because the model distinguishes between the events of default and firm liquidations. We are grateful to Winston Dou and Wei Wang for kindly sharing their data with us.

period 1996-2021.[18] We start in 1996 because by this year all publicly listed firms had to post their electronic filings on the EDGAR platform.[19] We search for keywords ("default", "event of default", "bankrupt", "defaulted", "bankruptcy," and "Chapter 11"). For normalization, we also count the total number of whole words in the annual statement. Appendix C provides the summary of variables and keywords used in the textual search.

A.2. Hedging Portfolios

The detailed information on firms' hedging portfolios for commodity producers and airlines is collected from the financial statements. The basic information on the extent of risk management for all Compustat firms is obtained from derivative gains and losses in Compustat and the textual analysis of firms' financial statements.

Specifically, for a sample of commodity producers and airlines, we construct the hedge ratios following the methodology in Babenko, Bessembinder, and Tserlukevich (2023). Oil and gas firms (SIC Code 1311) typically enter into swaps, collars, and options to hedge crude oil and natural gas prices. We calculate their hedge ratios as the number of barrels of oil equivalent hedged for the next year, divided by the number of barrels of oil equivalent produced next year. A barrel of oil equivalent (BOE) is the amount of energy in one barrel of crude oil and is equivalent to the amount of energy in 6,000 cubic feet of natural gas.

Airlines (SIC Code 4512) mostly hedge the prices of jet fuel, which is a major input to their production and accounts for approximately 20% of operating costs. They typically hedge by using derivative instruments linked to the prices of heating oil, crude oil, petroleum, diesel, or jet fuel, and we use as a measure of hedge ratio the percentage of next year anticipated

[18]Tools used in textual analysis (see Loughran and McDonald (2016) for the survey) have been used to identify the tone of financial statements (Loughran and McDonald (2011)), financing constraints (Hoberg and Maksimovic (2015), innovation (e.g., Hoberg, Phillips, and Prabhala (2014)), competition (Hoberg and Phillips (2016)), and the role of financial regulators (Lowry, Michaely, and Volkova (2020)).

[19]The annual (10-K) statements are retrieved from the SEC's EDGAR, ignoring any subsequently filed restatements. Before proceeding with the main analysis, we search the header for the firm name, identifier, the date of the report, and the stated end-of-fiscal-year date. A firm-year observation is dropped if we are unable to find the name of the firm, the date of the report, or the end of the fiscal year in the statement.

fuel needs hedged, as reported by the firms.

For coal firms (SIC Code 1220), we focus on hedging of ther imporatant input to production – diesel price – which is hedged using financial derivatives such as swaps and options. In addition, we also record the percentage of anticipated coal production hedged by these firms through long-term delivery contracts and supply agreements. Important for our purposes, these contracts are not considered derivatives and therefore are not regulated by the ISDA. The counterparty (buyer of coal) cannot terminate the agreement if the firm (supplier of coal) experiences default, but there are provisions for penalties ("liquidated damages") if the supplier breaches the agreement or fails to supply the contracted quantities.

For a broader sample of Compustat firms, we follow the previous literature, e.g., Almeida, Hankins, and Williams (2021), to construct an indicator variable, *Derivative User*, whereby we classify a firm as a derivative user if the firm posts (positive or negative) unrealized gains or losses (variable AOCIDERGL, "Accumulated Other Comprehensive Income - Derivative Unrealized Gain/Loss") or if it has non-zero derivative gains/losses reported after net income (CIDERGL, "Comprehensive Income - Derivative Gains/Losses"). The data availability for these variables starts in January 2001.[20] When one or both variables are different from zero, we infer that the company uses derivatives during the year.

Our analysis also employs an alternative measure of the derivative use based on the textual search. An advantage of this alternative measure is that it is also available prior to 2001. To identify and quantify the derivative use, we run a simple wordcount in the text, looking for the following words, including the wildcards ("collar", "derivative", "hedg", "risk management", "forwards", "forward contract", "swap"). We do not include the word "futures" in the count of hedging-related words because futures are exchange-traded and therefore are not subject to the terms of ISDA agreements. Nevertheless, we separately collect data on futures and use it in some of the placebo tests.

[20]Few firms voluntarily report these data prior to 2001, but we take data only starting from 2001 in order to avoid sample selection bias.

A.3. Additional Data: Termination Events and Derivative Fair Value

To identify the termination events in the sample of commodity producers and airlines, we manually read parts of the financial statements that discuss hedging. Specifically, we set derivative terminations equal to one if either in the year directly prior to the bankruptcy filing, the year of bankruptcy filing, or the year following a firm mentions in its 10-K or 10-Q forms that the counterparties terminated derivatives following an event of default. In cases when we find no such statements but the firm hedged prior to bankruptcy, we set derivative terminations to zero. Thus, to the extent that some firms experience derivative terminations but do not disclose such facts in their financial statements, our measure of derivative terminations may be biased downward.

For the broad Compustat/SEC sample, we parse the SEC filings and search for the fragments of text that satisfy the following conditions. The fragment must contain any keyword (including wildcards) that indicates that the contract has ended ("terminat", "liquidat", "unwound," "cancel", and "close"), any of the keywords pointing to the nature of the contract ("deriv", "hedg", "swap", "position") and any of the keywords pointing to the reason for termination or a governing document ("event of default", "master agreement", "master contract", "ISDA", "hedging agreement"). As a final step, we manually verify that the paragraphs identified by the program are indeed about the termination events and for each termination event pick the date of the first disclosure. Our procedure identifies 1,125 derivative termination events.

Finally, to estimate moneyness of the hedging portfolios for commodity producers and airlines, we collect the derivative fair value reported at the fiscal year-end prior to the event of default from firms' financial statements. For consistency, we collect the fair value only for commodity hedging and ignore interest rate swaps and foreign-exchange derivatives.

B. Empirical Results

B.1. Summary Statistics

In Panels A and B of Table 1, we report the summary statistics for the main variables in the broad sample. According to the Compustat-based measure, derivatives are used by approximately 21.1% of sample firms. Hedging intensity, measured by the number of hedging-related words mentioned in a firm's 10-K filing divided by the total number of words in the 10-K, averages 0.083%. Notably, the correlation between the two measures of hedging is 57% despite significant differences in variable construction. We also report that firms in the sample spend, on average, 0.32% of firm-years in bankruptcy, have a credit downgrade in 1.62% of firm-years, and a fraud-related accounting restatement in 0.37% of firm-years. The average frequency of default-related words is 0.046%, and this variable is positively correlated with the event of default due to bankruptcy, with a correlation of 24%. As identified by the textual search, 13.2% of firms in the sample use exchange-traded futures for hedging, which are not regulated by the ISDA Master Agreements. Derivative terminations, as identified by our procedure, take place in 0.40% of firm-years, and Panel B reports on the reasons for derivative terminations disclosed by the firms.[21] Finally, the table also reports statistics for firm characteristics that we use as control variables in our tests.

Panels C and Panel D provide summary statistics for the detailed sample of oil and gas producers, scheduled airlines, and coal producers. We focus on these industries because firms operating in them have a clear and measurable exposure to commodity prices, which allows us to measure their hedge ratios more precisely. Perhaps not surprisingly, firms in the detailed sample hedge more aggressively than firms in the broad Compustat/SEC sample. In fact, 59.2% of firms in the detailed sample use derivatives to hedge commodity prices. Notably, information for this sample allows to glean the details of firms' hedging portfolios.

[21] A complementary Table IA.3 of the Internet Appendix lists the reasons for *voluntary* derivative terminations that we use in some of the placebo tests. The common reasons for voluntary terminations include debt retirement and refinancing, asset purchases and sales, and the levels of exchange or interest rates, and the bankruptcy of the derivative counterparty.

Specifically, the hedge ratio averages 31.3% and maturity of derivative contracts averages 15.3 months. Firms in this sample spend more time in bankruptcy, with 3.1% of firm-years having a bankruptcy,[22] of which 1.4% are "prepackaged/prenegotiated" bankruptcies and 1.7% are "free-fall" bankruptcies. Firms in the detailed sample have higher asset tangibility, ROA, and leverage and lower market-to-book ratios than firms in the Compustat/SEC sample.

Panel D of Table 1 also provides statistics for the sample of bankrupt firms that are part of the detailed sample. The average fair value of derivatives prior to bankruptcy is positive at $41.9 million, indicating that hedging is at least partly effective. In fact, only in 24.0% of cases, firms report negative fair value of derivatives the year before bankruptcy, whereas it is positive for 53.7% of firms. For firms that have derivatives prior to the bankruptcy, we also manually search their SEC filings for any of the events associated with derivative terminations. We find that 59.8% of firms explicitly mention in their annual statements that all or some their outstanding derivative positions have been terminated by the counterparty. The table also reports on the number of derivative counterparties and the fraction of derivative counterparties that are lenders or lender affiliates of the firm, whenever such information is disclosed in firms' financial statements. Firms, on average, have three derivative counterparties prior to the event of default, with some firms reporting more than 10 different counterparties. Also, approximately half of counterparties are known to be firm lenders.

B.2. Exercise Policy of Derivative Termination Rights

We test the predictions of the model by first examining the exercise policy of termination rights. In particular, we examine how different types of events of default are related to derivative terminations by the counterparties, whether lower firm profitability and higher perceived cost of bankruptcy are associated with more terminations, and how the moneyness of derivative contracts and the counterparty being a lender affect the exercise strategy.

[22]There are two events of default in this sample where the firm defaulted on its loan, but did not file for bankruptcy, which we classify as bankruptcies for convenience.

Table 2 reports the results for the broad Compustat/SEC sample, where the dependent variable is derivative terminations (in %).[23] In the first two specifications, we examine the propensity to exercise derivative termination rights conditional on one of the three types of events of default: bankruptcy, credit downgrade, or a fraud-related earnings restatement. We find that all three types of events are associated with derivative terminations, but the economic magnitude is substantially higher for bankruptcies, with the likelihood of derivative terminations increasing more than ten-fold relative to its unconditional mean.

Consistent with the predictions of the model, we also observe across all specifications that higher firm profitability is associated with a lower probability of derivative terminations, with a one standard deviation increase in firm ROA lowering the probability of derivative terminations by 5% relative to its mean. Specifications 3 and 4 split the bankruptcies into high-cost ("free fall") and low-cost ("prenegotiated" or "prepackaged") bankruptcies. The model predicts that, all else being equal, the counterparty is more likely to terminate the derivative contract once an event of default has been triggered if it expects larger bankruptcy costs. The prenegotiated and prepackaged bankruptcies are generally considered to be less costly because there is a preliminary agreement reached between firm shareholders and significant creditors on the terms of a reorganization plan prior to the filing of the bankruptcy petition with the Court. Such bankruptcies allow firms to save on legal and professional fees and tend to settle faster (see, e.g., Tashjian, Lease, and McConnell (1996) and Betker (1997)). In our sample, the average time spent in bankruptcy is 268 days for prenegotiated/prepackaged bankruptcies, whereas it is 636 days for free fall bankruptcies. The coefficient on the high-cost bankruptcies is approximately 40% higher, but the difference in coefficients in not statistically significant. The last two specifications show that derivative terminations increase with the frequency of mentions of default events in firms' financial statements, with a one standard deviation increase in the frequency of mentions of default events translating into

[23] We estimate the linear probability model, rather than Logit or Probit, because of multiple fixed effects.

approximately 50% increase in derivative terminations relative to its mean. Finally, the results indicate that derivative terminations are more likely in highly-levered and large firms (e.g., because of a higher propensity of these firms to hedge).

We next examine a direct prediction of the model that derivative terminations are related to moneyness of the derivative contract. These tests are done on the detailed sample, where we observe the fair value of derivatives prior to default. The additional benefit of the detailed sample is that the quality of derivative termination data is higher and that we observe (for some firms) the fraction of derivative counterparties that are also lenders. Table 3 presents the results of OLS regressions, where the dependent variable is equal to one if there are derivative terminations by the counterparties reported in the firm's 10-K and is zero otherwise. Consistent with the model, a larger fair value of derivatives reported by the firm is associated with significantly lower probability of termination. For example, based on the results in column 4, having a negative fair value of derivatives prior to default (which means a positive value for the counterparty), is associated with 25.1% lower probability of contract right exercise. In line with the predictions of the model, the table also shows that, conditional on bankruptcy filing, a free fall bankruptcy (which is likely to have a higher cost) is associated with 23% to 31% higher probability of derivative terminations. Finally, we observe that that having lenders as counterparties is associated with 27% lower probability of derivative terminations, consistent with lenders partially internalizing the fact that derivative terminations can lower the recovery on their debt.

B.3. Relation Between Firm Hedging and Events of Default

Having examined the exercise policy of contract termination rights, we next turn to analyze firms' hedging outcomes. For this purpose, we focus on the detailed sample because it allows us to measure more precisely firms' exposures to commodity prices and their corresponding hedge ratios. In the Internet Appendix, we also report some of the corresponding tests for the broad Compustat/SEC sample.

To see how hedging is related to derivative terminations, we start by examining changes in firms' hedging portfolios around the events of default. We expect to see no decline in hedging in any year if the firms are able to re-hedge quickly. We keep in the sample only those firms that have hedging data for both year -1 and 0 relative to the event of default and that hedge in year -1. Figure 2 shows the dynamics of hedge ratios (top panel) and the fraction of firms hedging (bottom panel) around these events. There is a sharp decline in both the hedge ratios (from 55.8% to 29.3%) and the fraction of firms hedging (from 100% to 57.4%) in the year when an event of default is triggered. Further, the decline is partly reversed the following year. For example, the average hedge ratio comes back to 43.3% in year 1, consistent with the logic that firms attempt to re-hedge the lost portfolios.

Figure 3 shows the dynamics of corporate hedging by the type of bankruptcy, where we classify all bankruptcies into "prenegotiated/prepackaged" and "free fall" categories. Consistent with the predictions of the model, Figure 3 shows that the average hedge ratios and the fraction of firms hedging drop more sharply when an event of default is associated with free fall bankruptcies. For example, the fraction of firms hedging decreases from one year prior to the year of the event of default by approximately 22% for prenegotiated/prepackaged bankruptcy cases, and it decreases by approximately 66% for free fall bankruptcy cases.

We next examine the relation between a firm's bankruptcy filing and its hedging policy in the detailed sample.[24] Table 4 gives the results of OLS regressions with firm and year or firm and industry-year fixed effects, where the dependent variables are the hedge ratio (columns 1-2), the hedge maturity (columns 3-4), and an indicator variable equal to one if the firm hedges commodity price exposure (columns 5-6). As the results indicate, the incidence of bankruptcy has a negative and significant effect on hedging. For example, based on columns 1 and 3, a bankruptcy-related event of default is associated with a 19% decrease in hedge ratios and approximately 8-month shorter maturity. Panel B also shows that the effect of

[24] In Table IA.1 of the Internet Appendix, we report the corresponding results for the broad Compustat/SEC sample, and find similar results.

events of default on hedging is more pronounced for the high-cost rather than the low-cost bankruptcies. The latter finding is consistent with the view that terminating derivatives is more attractive for the counterparties when a bankruptcy is perceived to be more costly.

B.4. Do Derivative Terminations Explain Observed Hedging Outcomes?

While the results in Table 4 are consistent with our explanation that bankruptcies trigger events of default and result in substantial derivative terminations by the counterparties, they can also be potentially consistent with other explanations. For example, firms may be voluntarily decreasing their use of derivatives in distress because shareholders benefit from risk-shifting near default or because a combination of collateral constraints and worsening financing conditions causes firms to voluntarily unwind their hedging programs to save cash for other needs. To address these concerns, we leverage our detailed sample, where we observe whether the firm experienced any derivative terminations by the counterparties around a particular bankruptcy petition filing or other event of default.

Figure 4 illustrates the dynamics of firms' hedge ratios around events of default for cases with confirmed derivative terminations and without. As is evident from the figure, the decrease in both hedge ratios and the fraction of firms hedging is more pronounced for firms that experience derivative terminations. For example, the fraction of firms hedging decreases from 100% (only firms that hedged are included in the sample) to approximately 45% for cases with derivative terminations and to 86% for firms without confirmed terminations. Interestingly, hedge ratios and the fraction of firms hedging partly rebound after an event of default and are similar for cases with confirmed derivative terminations and without two years after an event of default has been triggered. These results also suggest that lower hedging as a result of derivative terminations was likely suboptimal for firms.

Table 5 examines the relation between hedging policies and events of defaults with confirmed derivative terminations and without in a multivariate regression setting with firm and year (or industry-year) fixed effects. The results convey similar intuition to those in Figure

4, with hedge ratios, hedge maturities, and fraction of firms hedging decreasing significantly more when there are derivative terminations by the counterparties. These results help to allay the concerns that a decrease in corporate hedging is purely voluntary.

B.5. Placebo Tests: Hedging with OTC Derivatives, Supply Agreements, and Exchange-Traded Futures

To further mitigate the concerns that firms voluntarily unwind their hedging once in distress and to address a specific issue that derivative terminations may proxy for a more severe deterioration of firm financial health, we consider an additional test from the coal industry. As mentioned previously, the coal industry presents a useful laboratory because coal firms often hedge both using derivatives, which are governed by the ISDA Master Agreements, and using coal supply agreements, which are not. Specifically, the coal producers typically hedge the prices of their main input to production, diesel fuel, using swaps and options. In contrast, they almost invariably hedge the prices of their output, coal, using long-term delivery contracts and supply agreements.[25] If derivative terminations simply proxy for worse financial conditions and firms voluntarily wind down their hedging programs in distress, then we should see that both hedging with derivatives and hedging with supply agreements are affected. In contrast, if firms hedging drops mostly because of counterparties exercising their right to terminate the derivatives, we should see that only hedging with derivatives is affected, while hedging with supply agreements is not.

The results in Table 6 show that the effect of event of default on firm hedging outcomes depends on the type of hedging in place. For example, the hedge ratios calculated using diesel derivatives used to hedge the anticipated diesel fuel needs decrease by approximately 33.6% at the onset of bankruptcies with confirmed derivative terminations. In contrast, the

[25]For example, Partiot Coal Corp. states in its 10-K: "To manage this risk, we have entered into swap contracts with financial institutions. As of December 31, 2008, the notional amounts outstanding for these swaps included 9.5 million gallons of heating oil, which expire throughout 2009 and 9.0 million gallons of heating oil expiring throughout 2010. We expect to purchase approximately 25 million gallons of diesel fuel annually." The same filings also states: "In 2008, approximately 78% of our coal sales were under long-term (one year or greater) contracts. Our approach is to selectively renew, or enter into new, coal supply contracts when we can do so at prices we believe are favorable."

hedge ratios calculated using the fraction of coal hedged through supply agreements are not significantly affected by bankruptcies with confirmed derivative terminations and show a small positive coefficient. Overall, these results are consistent with derivative terminations causing a decline in corporate hedging when an event of default is triggered and do not support a story that derivative terminations proxy for greater incentive of the firm to voluntary decrease its hedging. In addition, these results may help explain the findings by Almeida, Hankins, and Williams (2021), who document that hedging with purchase obligations (PO) does not drop significantly in distress and that firms substitute purchase obligations for financial derivatives once in distress.

As an additional placebo test we also consider how firm hedging with futures, which are traded on exchanges rather than over-the-counter and therefore are not subject to the terms of ISDA agreements, is related to the events of default. Table 7 reports the results for the broad Compustat/SEC sample, where the dependent variable is equal to one if firm mention use of futures in its SEC filings, and is equal to zero otherwise. Interestingly, we observe that futures use does not drop significantly upon the occurrence of the events of default, and, in fact, increases significantly. These results highlight the fact that some firms may attempt to re-hedge their lost portfolios using exchange-traded securities, which is also consistent with the narrative given by some firms.[26] In particular, the results in column 4 indicate that it is in cases when the event of default is followed by derivative terminations that the futures use increases the most.

[26]For example, Genworth Financial, Inc. states in its 10-Q: "...almost all of our master swap agreements contain credit downgrade provisions that allow either party to assign or terminate derivative transactions if the other party's long-term unsecured debt rating or financial strength rating is below the limit defined in the applicable agreement...During October 2017 this counterparty terminated approximately 800 million notional with us, which we have rehedged using financial futures."

B.6. The Effect of Derivative Terminations on Firm Hedging: *Lehman Brothers v. Metavante* Court Case

To identify exogenous variation in derivative terminations and, in particular, the variation unrelated to firm financial conditions, we use the change in policy that affected the derivative counterparties' incentive to terminate their contracts, conditional on the event of default. Specifically, we use the Bench Ruling issued on September 15, 2009 by the U.S. Bankruptcy Court for the Southern District of New York in *Lehman Brothers* v. *Metavante* case.

As a background, in 2007 Metavante Corp. entered into an interest rate swap with Lehman Brothers Special Finance (LBSF) under an ISDA Master Agreement (see Marchetti (2010) for details). On October 3, 2008, LBSF has filed for Chapter 11 bankruptcy protection, which qualified as an event of default under the ISDA agreement and gave Metavante an option to terminate its interest rate swap early. Metavante, however, chose not to terminate the swap at that time, in part because termination would require it to make a large payment to LBSF. In addition, Metavante did not to make the next three quarterly payments it owed to LBSF under the interest rate swap contract, arguing it had a right to withhold payments pursuant to Section 2(a)(iii) of the ISDA Master Agreement as long as LBSF was in default.

On May 29, 2009, LBSF filed a motion to compel Metavante to make owed payments on the swap, and Metavante filed an objection with the court. The U.S. Bankruptcy Court for the Southern District of New York considered the case and issued the Bench Ruling, which held that a party to a swap agreement could not rely on Section 2(a)(iii) of the ISDA Master Agreement to withhold payments otherwise due to the bankrupt counterparty, provided it had not terminated the contract. In addition, the Court ruled that a party to an ISDA Master Agreement waives it right to terminate the agreement if it fails to terminate it "promptly" following the bankrupt's counterparty event of default.

According to Marchetti (2010), this ruling was unanticipated and has surprised many market participants. Important for our purposes, this ruling has significantly increased the incentive of counterparties to terminate their contracts with the defaulting firm, particularly for New York firms where the Court took a clear position. We therefore rely on the Bench Ruling for identification purposes. Specifically, we use a difference-in-differences setting, where we compare derivative terminations for firms that fall under New York court jurisdiction versus those that do not, before and after the ruling. We assume that a given firm falls under NY court jurisdiction if it is either incorporated in the state of New York or if has its headquarters in the state.[27] Table IA.2 of the Internet Appendix presents the average firm characteristics for firms with NY court jurisdictions and other jurisdictions for the year directly preceding the Bench Ruling. Overall, the characteristics of firms are not statistically different, with the exception of asset tangibility, which is significantly lower for firms with NY court jurisdictions, perhaps reflecting the higher cost of the real estate in New York.[28]

Figure 5 shows the results of the difference-in-difference estimation around the Bench Ruling graphically. As is evident in the figure, there are no significant pre-trends in derivative terminations prior to the ruling. In fact, the coefficients on NY court jurisdiction indicators are indistinguishable from zero for all five years before the ruling. In contrast, the coefficients on NY court jurisdiction indicators are positive, ranging from 0.5% to 1.9%, and statistically significant at the 10% level for all the years after the ruling, except year 5. Table 8 also reports the corresponding estimation results, which show that derivative terminations increase after the Bench Ruling. For example, based on specification 1, derivative terminations increase post-Bench Ruling for firms with New York jurisdictions by a factor of 3.[29]

[27]Since the Bankruptcy Reform Act of 1978, firms have the choice of the bankruptcy court of their state of incorporation or any jurisdiction that is home to the firm's headquarters or major assets (Ellias (2018)). Because of forum shopping, not all firms that are allowed to file in a given bankruptcy court will file in this court. Nevertheless, Ellias (2018) shows that firms often to choose the Southern District of New York Court when given the choice.

[28]In unreported tests, we find that including the additional fixed effects based on the quartiles of asset tangibility does not affect results in a significant way.

[29]Tables IA.3 and IA.4 in the Internet Appendix show the corresponding results to those of Table 8, but using the derivative contract closures which are not due to the terminations by the counterparty. For example, firms may state that they closed their derivative contracts after refinancing, asset spin-off, or because of the lender requirements. In contrast to contract terminations by the counterparties, the instances of such unrelated events are not more frequent after the Metavante case ruling.

In specifications 4 to 6, we examine how the greater incentive to terminate contracts affects firms' hedging outcomes, conditional on default. Specifically, we use a triple-difference setting, where the dependent variable is *Derivative User* and regress it on the indicator of event of default, NY court jurisdiction, and post Metavante indicator. The results show that firms in New York experienced significantly larger reductions in their hedging upon the events of default associated with bankruptcy filings after the Bench Ruling, which is consistent with our interpretation that derivative terminations drive firms' hedge ratios.

In the Internet Appendix, we also present an additional test that helps to distinguish alternative explanations to low corporate hedging in distress. In this test, we limit the sample of firms to oil and gas producers and construct the return to oil based on the movements in the West Texas Intermediate (WTI) crude oil spot price during the one month prior to an event of default. The idea is that when an oil and gas firms default following an increase in oil prices, their hedging portfolio is more likely to be in-the-money for the counterparty and therefore the firm is more likely to experience derivative terminations. The results in Table IA.3 show that indeed the negative effect of bankruptcy on firm hedging policies is more pronounced for firms that defaulted following an increase in the spot price of crude oil, which supports the idea that derivative terminations drive firms' hedge ratios.

VI. Conclusion

We formally investigate the role of termination rights in over-the-counter hedging contracts, analyzing the optimal exercise strategies, their implications for firm hedging outcomes, and the effects on the likelihood of firm survival. Our study contributes to the theories that tackle the design and application of hedging instruments. More generally, we contribute to the understanding of firm hedging policies as documented in previous studies.

Using detailed data on hedging portfolios in the commodity industries, we show that the exercise of these rights occurs very frequently, conforms to predicted behavior, and has a material effect on firms' hedging policies. We also demonstrate that hedging using supply agreements and exchange-traded futures, which are governed by different contractual terms and lack standard event of default clauses, does not decrease when firms experience bankruptcies and derivative terminations. These findings suggest that, after the counterparties terminate the contracts, the firms hedge less overall and switch to less customized hedging that possibly requires a higher cash collateral and a higher cost.

Our theory and empirical results address important policy questions. Firstly, our findings primarily suggest that the flexibility to terminate early, as allowed in OTC hedging contracts, may not be the best method to protect derivative issuers from systemic risk. We have theoretically demonstrated that the implicit costs of termination provisions are higher for firms than the benefits of protecting a counterparty. Secondly, we discuss ways to reduce risks for firms. We show that the probability of contract termination decreases if the contract is settled more frequently, when the collateral requirement is higher, the corporation signs the contract with a single counterparty, or when financing and hedging activities are bundled together.

Appendix A. Treatment of Hedging Contracts in Default

1. *"On October 1, 2008, we received a notice of early termination from BNP Paribas with respect to our natural gas and interest rate swap derivatives."* (Aurora Oil and Gas Corp., 2008 10-K report, in default with lenders).

2. *"The Company's Bankruptcy Petition in July 2015 represented an event of default under Sabine's existing derivative agreements resulting in a termination right by counterparties on all derivative positions at July 15, 2015. Additionally, certain of the Company's derivative positions were terminated prior to July 15, 2015 as a result of defaults under Sabine's derivative agreements that occurred prior to the filing of the Bankruptcy Petition."* (Forest Oil Group, 2015 10-K report)

3. *"On June 14, 2018, the Company's hedging counterparty, Koch Supply & Trading LP, terminated the only outstanding hedge contract resulting in a settlement of $0.5 million."* (PetroQuest Energy Inc., 2019 10-K report)

4. *"The convertible note hedging transactions have since been terminated in connection with our Chapter 11 proceedings."* (Stone Energy Corp. 2016 10-K report)

5. *"In February 2010, the administrative agent under our credit facilities liquidated all of our existing hedge contracts and applied the proceeds thereof to amounts owed under the facilities. As a result, our production is currently unhedged."* (Saratoga Resources Inc., 2010 10-K report)

Forced liquidation of derivative positions. *"Pursuant to ARP's restructuring support agreement, ARP completed the sale of substantially all of its commodity hedge positions on July 25, 2016 and July 26, 2016 and used the proceeds to repay $233.5 million of borrowings outstanding under the ARP's first lien credit facility"* (Atlas Energy Group, 2017 10-K report, referring to a defaulted Subsidiary "ARP")

6. *"Our hedging arrangements contain standard events of default, including cross default provisions, that, upon a default, provide for (i) the delivery of additional collateral, (ii) the*

termination and acceleration of the hedge, (iii) the suspension of the lenders' obligations under the hedging arrangement" (ATP Oil and Gas, 2010 10-K report)

7. *"The filing of the Chapter 11 Petitions triggered an event of default under each of the agreements governing our derivative transactions ("ISDA Agreements")... As a result, our counterparties were permitted to terminate, and did terminate, all outstanding transactions governed by the ISDA Agreements."* (Breitburn Energy Partners, 2016 10-K report)

8. *"our ability to enter into new commodity ... will be dependent upon either entering into unsecured hedges or obtaining Bankruptcy Court approval to enter into secured hedges. As a result, we may not be able to enter into additional commodity derivatives covering our production in future periods on favorable terms or at all."* (Blue Ridge Mountain Resources. 2015 10-K report)

9. *"United had also put in place hedges for 7% of its estimated fuel consumption for the first half of 2003. However, as a result of the filing of the Chapter 11 Cases, the derivatives counterparties terminated all outstanding swap contracts, leaving United completely unhedged.* (United Airlines)

10. *"The following shall constitute Additional Termination Events...a Ratings Event I shall occur with respect to Party A if the long-term and short-term senior unsecured deposit ratings of Party A cease to be rated at least A and A-1 by Standard & Poor's Ratings Service...Ratings Event II shall occur with respect to Party A if the long-term senior unsecured deposit rating of Party A ceases to be rated higher than BBB-..."* (Schedule of ISDA Master Agreement, dated Feb 21, 2007, between Credit Suisse (counterparty) and the World Omni Auto Receivables)

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Figure 1. Model Diagram

The figure illustrates the evolution of a firm's cash flows over time $t \in (0, 1, 2)$, with cash flows C_t, fixed liabilities D_t, and the value of the derivative portfolio to the bank, V_t. The probabilities of low cash flow in the first and second periods are p_1 and p_2, respectively. Parameter α represents the costs levied in the event of firm liquidation, while parameter θ captures the value to the counterparty of continuing business with the firm if the firm is not liquidated. The conditions for triggering the event of default at $t = 1$ and firm liquidation at $t = 2$ are detailed in the text.

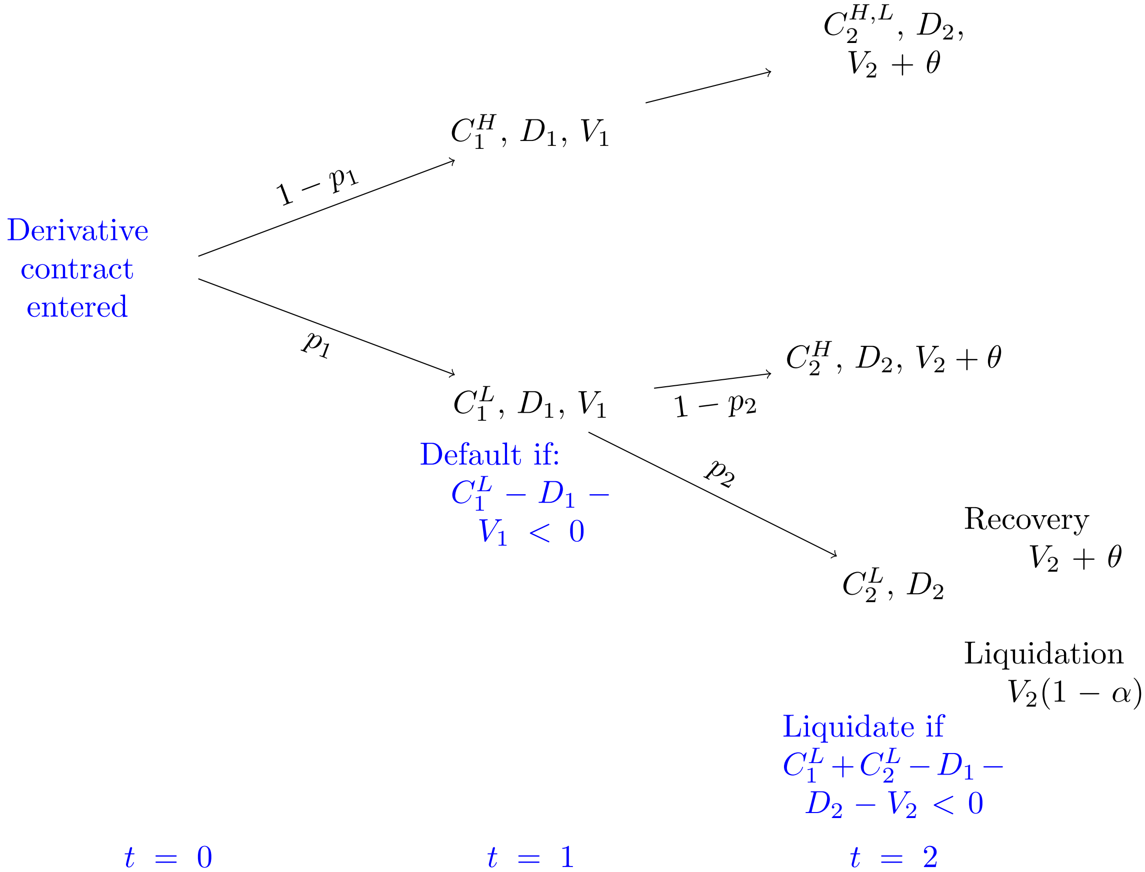
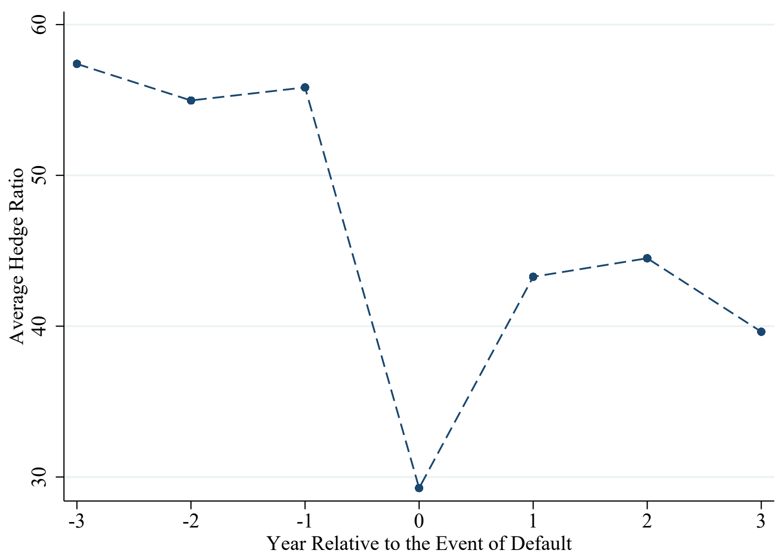


Figure 2. Events of Default and Risk Management

The figure shows the evolution of the average hedge ratios and the fraction of firms hedging the commodity prices around the event of defaults. The sample consists of oil and gas firms (SIC 1311), coal firms (SIC 1220), and scheduled airlines (SIC 4512) during the period 1996-2021. Year 0 indicates the year during which the bankruptcy petition was first filed. Firms are included in the sample if they have non-missing data both in Year -1 and Year 0 and have positive hedge ratio in Year -1. All variables are defined in Appendix C.



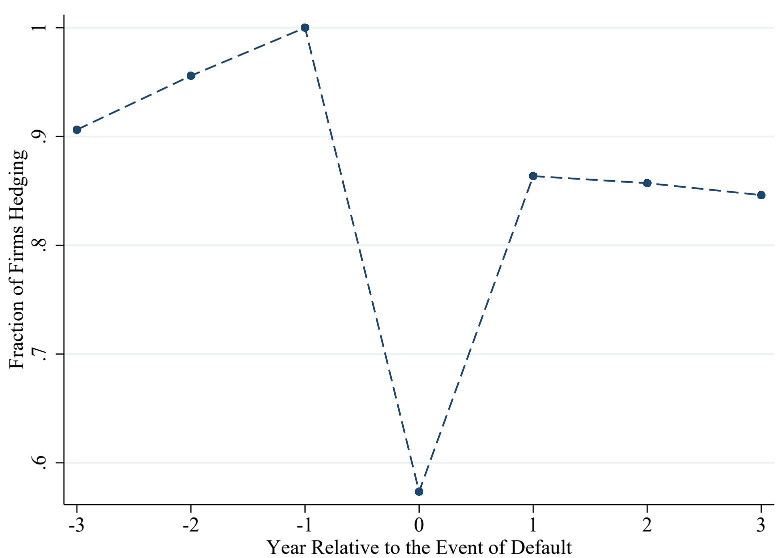
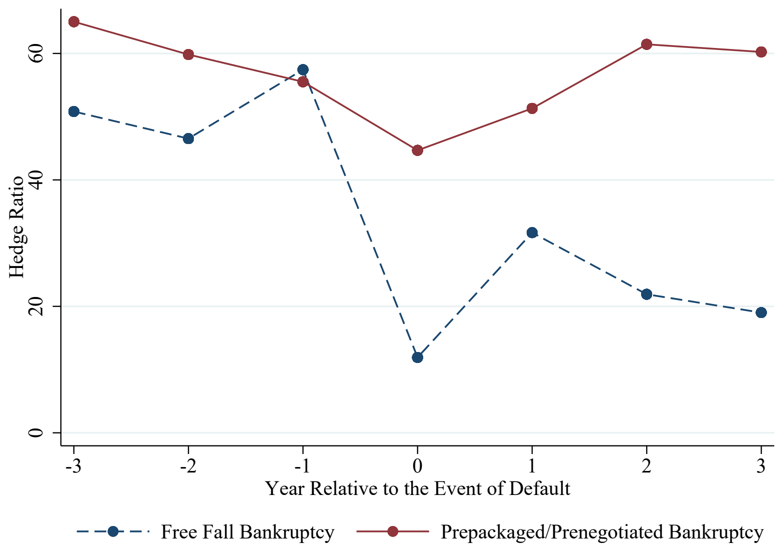


Figure 3. Type of Bankruptcy

The figure shows the evolution of the average hedge ratio and the average fraction of firms hedging the commodity prices around events of default, separately for firms that experience a prenegotiated or prepackaged bankruptcy and for firms that experience a "free fall" bankruptcy. The sample consists of oil and gas firms (SIC 1311), coal firms (SIC 1220), and scheduled airlines (SIC 4512) during the period 1996-2021. Year 0 indicates the year during which the bankruptcy petition was first filed. Firms are included in the sample if they have non-missing data both in Year -1 and Year 0 and have positive hedge ratio in Year -1. All variables are defined in Appendix C.



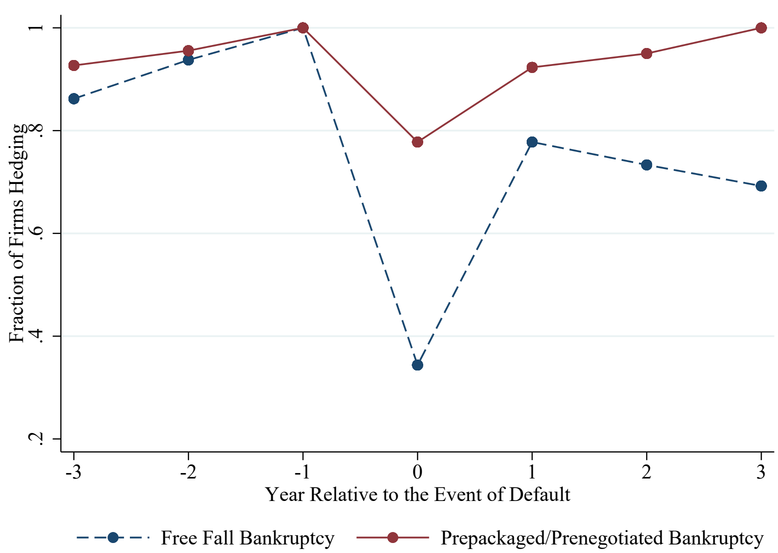
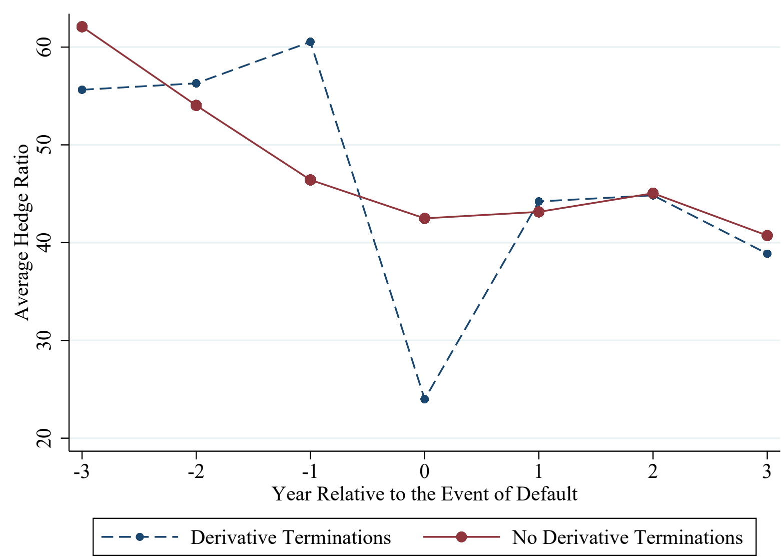
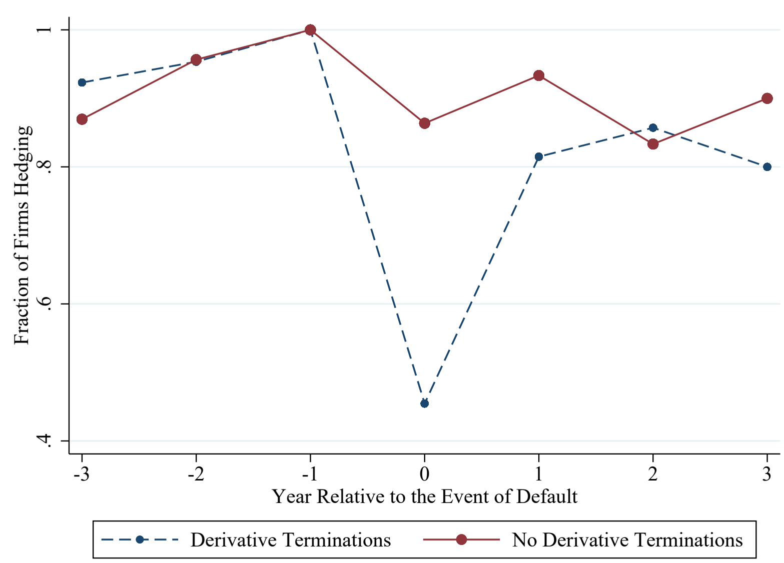


Figure 4. Derivative Terminations and Risk Management

The figure shows the average hedge ratio and the average fraction of firms hedging the commodity prices around events of default, separately for the cases with the derivative terminations by the counterparties reported in firms' 10-K forms and without such reported terminations. The sample consists of oil and gas firms (SIC 1311), coal firms (SIC 1220), and scheduled airlines (SIC 4512) during the period 1996-2021. Year 0 indicates the year during which the bankruptcy petition is first filed. Firms are included in the sample if they have non-missing data both in Year -1 and Year 0 and have positive hedge ratio in Year -1. All variables are defined in Appendix C.





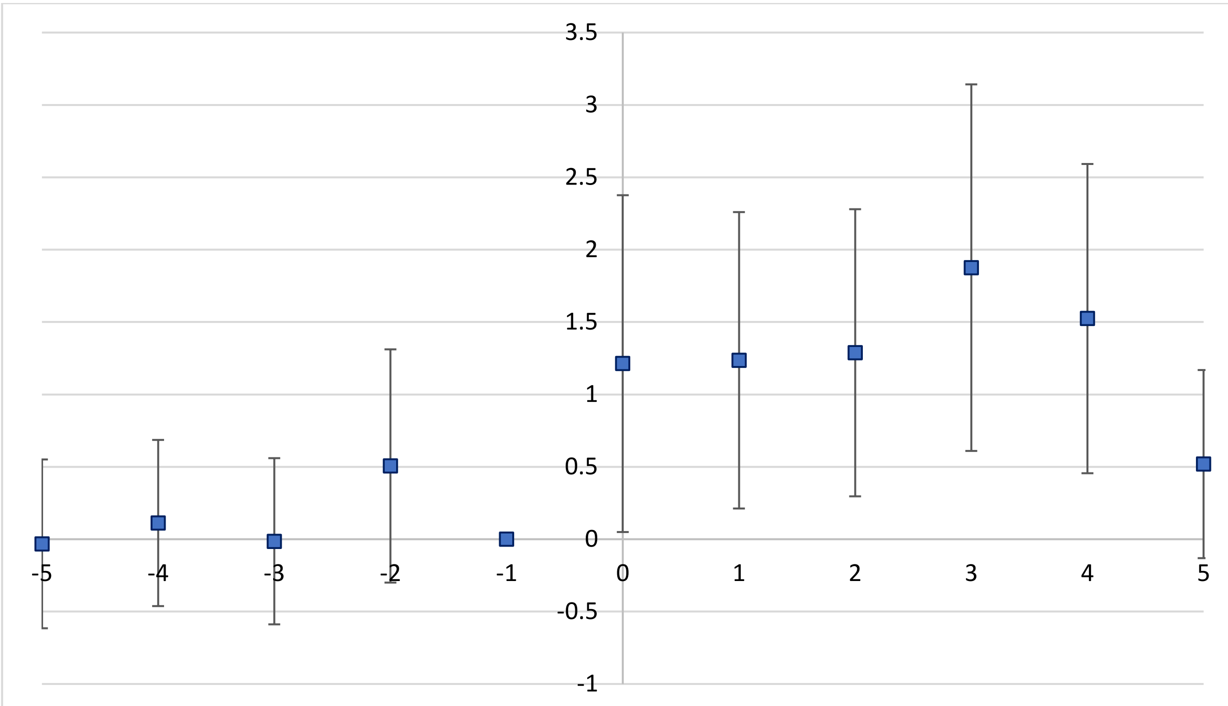


Figure 5. Derivative Terminations and Metavante v. Lehman Brothers Court Ruling. This figure displays the OLS regression coefficients β_k and their respective 90% confidence intervals, estimated from the following model: $Termination_{it} = \alpha_i + \nu_t + \sum_{k=-5}^{k+5} \beta_k \times NY_{it} \times D_k + \varepsilon_{it}$, where the dependent variable is an indicator variable equal to one if there are derivative terminations for firm i during year t, multiplied by 100. The model includes firm and year fixed effects, variable NY_{it} is equal to one if a firm i is either incorporated or has headquarters in New York state in year t and is equal to zero otherwise, and D_k is an indicator variable equal to one for observations in year k relative to the date of the Bench Ruling (September 15, 2009).

Appendix B. Proofs

Proof of Proposition 1. If a termination right is not exercised, then the value of equity at time 1 upon realization of C_1^L and V_1^H is

$$\begin{aligned} E_H &= (1-p_2)\left(C_1^L + C_2^H - V_1^H - \rho\delta_H - (1-\rho)\,\delta_L - D_1 - D_2\right) \\ &\quad + p_2\rho\left(C_1^L + C_2^L - V_1^H - \Delta_L - D_1 - D_2\right). \end{aligned} \tag{22}$$

If a termination right is exercised, then the value of equity upon realization of C_1^L and V_1^H is

$$E_T = (1-p_2)\left(C_1^L + C_2^H - V_1^H - D_1 - D_2\right), \tag{23}$$

Taking the difference between E_T and E_H yields expression (10) in the proposition. Similar steps for the debt value produce the following expressions

$$\begin{aligned} D_H &= (1-p_2+p_2\rho)\,(D_1+D_2) + p_2\,(1-\rho)\,(1-\alpha)\left(C_1^L + C_2^L - V_1^H - \delta_H\right), \quad (24) \\ D_T &= (1-p_2)\,(D_1+D_2) + p_2\,(1-\alpha)\left(C_1^L + C_2^L - V_1^H\right). \quad (25) \end{aligned}$$

Taking the difference between D_T and D_H yields expression (9) in the proposition. □

Proof of Proposition 2. Consider first a firm that hedges with a contract without a termination right. The firm is liquidated in two states: (V_1^H, δ_H) and (V_1^L, δ_H). Hence, the total expected bankruptcy costs incurred by bondholders and the derivative counterparty are

$$E(BC_H) = \alpha p_1 p_2 (C_1^L + C_2^L)((1-\rho)^2 + \rho(1-\rho)) = \alpha p_1 p_2 (1-\rho)(C_1^L + C_2^L). \tag{26}$$

Similarly, the expected bankruptcy costs of a firm that hedges with a contract with a termination right are

$$E(BC_T) = \alpha p_1 p_2 (1-\rho)(C_1^L + C_2^L - V_1^H) + \alpha p_1 p_2 \rho (1-\rho)(C_1^L + C_2^L). \tag{27}$$

Taking the difference between BC_T and BC_H produces (12). To obtain the second result, note that the right reduces the ex ante relationship value to the counterparty by

$$p_1(1-\rho)\theta(1-p_2+p_2\rho). \tag{28}$$

By combining the above expression with the change in the bankruptcy costs (12), we obtain the ex ante firm value change (13). The reader can check that (13) is also equal to the sum of the value of the termination right, R_0, and the ex post firm value change $(\Delta E + \Delta D)$ in Proposition 1, multiplied by the probability of the termination right exercise, $p_1(1-\rho)$. □

Proof of Corrolary 1. Take as a benchmark the expected bankruptcy costs of an unhedged firm which is liquidated after two low cash flows

$$E(BC_0) = p_1 p_2 \alpha (C_1^L + C_2^L). \tag{29}$$

The firm has lower bankruptcy costs because of hedging. For the case of no derivative termination, i.e., when $\alpha < \alpha^*$, we have

$$E(BC_0) - E(BC_H) = \alpha p_1 p_2 \rho (C_1^L + C_2^L), \tag{30}$$

For the case of hedging with derivative terminations, i.e., when $\alpha > \alpha^*$,

$$E(BC_0) - E(BC_T) = \alpha p_1 p_2 \left(\rho^2 (C_1^L + C_2^L) + (1-\rho) V_1^H\right), \tag{31}$$

From Assumption 1, it follows $E(BC_T) < E(BC_H)$, i.e., the firm's benefit from hedging decreases when the bankruptcy costs parameter α increases from below to above the threshold α^*. Additionally, we account for the relationship value, which is equal to $\theta(1 - p_1 p_2 (1-\rho))$ when the termination right is not exercised ($\alpha < \alpha^*$), and $\theta(1 - p_1(1-\rho)(1 + p_2\rho))$ when the right is exercised ($\alpha > \alpha^*$). It is easy to see that the expected relationship value decreases in the case with the terminations. □

Proof of Proposition 3. The expected bankruptcy costs of a firm that hedges with a contract that does not have a termination right and posts collateral C_0 are

$$E(\tilde{BC}_H) = \alpha p_1 p_2 ((1-\rho)^2 (C_1^L + C_2^L - C_0) + \rho(1-\rho)(C_1^L + C_2^L - V_1^L - \delta_L)), \tag{32}$$

Similarly, the expected bankruptcy costs of a firm that hedges with a contract that has a termination right and posts collateral C_0 are

$$E(\tilde{BC}_T) = \alpha p_1 p_2 ((1-\rho)(C_1^L + C_2^L - V_1^H) + \rho(1-\rho)(C_1^L + C_2^L - V_1^L - \delta_L)), \tag{33}$$

Taking the difference between (33) and (32) produces (18). □

Proof of Proposition 4. If a counterparty owns κ proportion of firm's debt claim, it exercises the termination right if

$$\begin{aligned} V_1^H \quad &> (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta\right) + p_2\rho\left(V_1^H + \delta_L + \theta\right) \\ &\quad + p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha) - \kappa\left(-\Delta D\right). \end{aligned} \tag{34}$$

where $(-\Delta D)$ is the expected loss to debtholders given in (9). By simplifying (35), we obtain condition (20). Setting (20) to equality gives the critical value of κ in (21). □

Appendix C. Variable Definitions

Variable	Definition
Derivative user	An indicator variable equal to one if the firm has non-zero unrealized gains or losses (AOCIDERGL, "Accumulated Other Comprehensive Income - Derivative Unrealized Gain/Loss") or non-zero derivative gains/losses reported after net income (CIDERGL, "Comprehensive Income - Derivative Gains/Losses").
Hedging intensity	The number of hedging-related words in a firm's 10-K divided by the total word count (keywords: hedging, hedge(s), hedged, derivative(s), swap(s), collar(s), risk management, forward contract, and forwards) (SEC EDGAR).
Commodity hedger	An indicator variable equal to one if the firm hedges commodity prices during the year (detailed sample).
Hedge ratio	Oil and gas firms: The sum of the outstanding notional amounts of oil and gas derivatives for the next fiscal year, divided by the next year oil and gas production (%). We use the universal MMcfe energy units, with one barrel of oil being equivalent to six thousand cubic feet of natural gas. Airlines: the percentage of fuel expenses hedged. Coal firms: the percentage of expected diesel expenses hedged (detailed sample).
Hedge maturity	Maximum maturity of outstanding commodity hedges (detailed sample).
Bankruptcy	Chapter 11 bankruptcy during the fiscal year (UCLA-LoPucki BRD, supplemented with additional data, as explained in the text).
Low-cost bankruptcy (prepackaged)	Chapter 11 bankruptcy during the fiscal year that is classified as prepackaged or prenegotiated (UCLA-LoPucki BRD).
High-cost bankruptcy (free fall)	Chapter 11 bankruptcy during the fiscal year that is *not* classified as prepackaged or prenegotiated (UCLA-LoPucki BRD).
Default-related words frequency	The number of default-related words (default(ed), event of default, bankrupt, bankruptcy) in 10-K form divided by the total word count (SEC EDGAR).
Credit downgrade	An indicator variable equal to one if there is at least one credit downgrade by S&P of a firm's domestic long-term debt during the fiscal year.
Accounting restatement	An indicator variable equal to one if there is an accounting restatement during the fiscal year (Audit Analytics).
Firm size	The logarithm of the book value of assets.
Market-to-book ratio	The sum of long-term and short-term debt and the market value of equity, divided by the book value of assets.
Book leverage	The sum of long- and short-term debt, divided by the book value of assets.
Firm ROA	The sum of EBIT and depreciation, divided by the book value of assets.
Asset tangibility	Net plant, property and equipment, divided by the book value of assets.

Table 1. Summary Statistics The sample in Panel A and Panel B consists of all US-incorporated firms during the period 1996-2021 that have non-missing accounting information. Panel A provides the summary statistics for the main variables, and Panel B lists reasons for derivative terminations given in financial statements. The sample in Panel C and Panel D consists of all US-incorporated oil and gas producing firms (SIC Code 1311), commercial airlines (SIC 4512), and coal producing firms (SIC 1220) during the period 1996-2021 that have non-missing accounting information in Compustat and non-missing hedging data in 10-K or 10-KSB public filings. Panel C provides the summary statistics for this sample, and Panel D provides statistics for firms that default one year prior to default. Derivative terminations in Panel D are based on the manual search of financial statements during the year of and one year after the default event. All variables are defined in Appendix C.

Panel A: Compustat/SEC Sample	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Derivative user	135,413	0.211	0.408	0	0	0
Book assets, $M	191,045	8,606	86,738	26	180	1,105
Firm size	191,045	5.074	2.881	3.257	5.193	7.007
Asset tangibility	191,045	0.237	0.267	0.028	0.126	0.362
Firm ROA	176,134	0.009	0.226	-0.035	0.058	0.135
Market-to-book ratio	191,045	4.082	13.785	0.695	1.166	2.318
Book leverage	191,045	0.337	0.834	0.011	0.151	0.352
Event of default (bankruptcy), %	191,045	0.318	5.628	0	0	0
High-cost bankruptcy (free fall), %	191,045	0.199	4.455	0	0	0
Low-cost bankruptcy (prepackaged), %	191,045	0.119	3.445	0	0	0
Credit downgrade, %	159,237	1.619	12.621	0	0	0
Accounting restatement (fraud-related), %	191,045	0.371	6.081	0	0	0
Hedging intensity, %	116,802	0.083	0.135	0.003	0.024	0.101
Default-related words frequency, %	116,802	0.046	0.073	0.002	0.019	0.050
Use of exchange-traded futures	116,802	0.132	0.338	0	0	0
Derivative terminations, %	191,045	0.401	6.323	0	0	0
NY	172,617	0.078	0.268	0	0	0

Panel B: Reasons for Derivative Terminations	*N*	*%*
Firm bankruptcy	60	5.33
Merger	54	4.80
Default, cross-default	14	1.24
Credit rating, covenant violation	9	0.80
Contract breach, misrepresentation	4	0.36
Unspecified	984	87.47
Total	1,125	100.00

Panel C: Detailed Sample	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Commodity hedger	3,399	0.592	0.492	0	1	1
Hedge ratio, %	3,399	31.23	42.74	0	15.66	54.25
Hedge maturity, months	3,430	15.34	18.38	0	12	24
Log hedge maturity	3,430	1.847	1.598	0	2.565	3.219
Event of default	3,433	0.031	0.173	0	0	0
High-cost bankruptcy (free fall)	3,433	0.017	0.128	0	0	0
Low-cost bankruptcy (prepackaged)	3,433	0.014	0.119	0	0	0
Firm size	3,433	6.103	2.497	4.428	6.251	7.904
Asset tangibility	3,433	0.719	0.219	0.627	0.792	0.879
Market-to-book ratio	3,433	1.741	5.535	0.748	1.049	1.557
Firm ROA	3,351	0.064	0.209	0.001	0.107	0.182
Book leverage	3,433	0.360	0.440	0.140	0.303	0.464
Fuel expense/oper. expenses (airlines)	407	20.21	9.83	13.10	18.69	27.30
Hedge ratio based on supply agreements (coal producers), %	225	73.47	35.17	70.00	88.00	97.00

Panel D: Detailed Sample: Bankruptcies	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Hedge ratio, %	121	41.88	47.80	5.32	37.62	63.80
Commodity hedger	121	0.785	0.412	1	1	1
Hedge maturity (months)	121	18.15	16.27	6	12	24
May be required to post collateral	105	0.181	0.387	0	0	0
Number of counterparties	70	3	4	0	1	6
Counterparties are lenders	88	0.566	0.460	0	0.75	1
High-cost bankruptcy (free fall)	122	0.508	0.502	0	1	1
Derivative fair value, $M	121	44.50	182.24	0	0.20	22.10
Negative derivative fair value	121	0.240	0.429	0	0	0
Positive derivative fair value	121	0.537	0.501	0	1	1
Derivative terminations	97	0.598	0.493	0	1	1

Table 2. Derivative Terminations and Events of Default (Compustat/SEC Sample)
The dependent variable is equal to one if there are derivative terminations by the counterparties, as identified based on the textual serach of firm's filings, and is equal to zero otherwise. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Derivative Terminations, %*					
Bankruptcy	5.308***	5.255***				
	[4.49]	[4.39]				
Credit downgrade	0.786***	0.784***				
	[2.73]	[2.63]				
Accounting restatement	1.141**	1.187**				
(fraud-related)	[2.09]	[2.13]				
High-cost bankruptcy			6.389***	6.303***		
(free fall)			[4.22]	[4.07]		
Low-cost bankruptcy			4.526***	4.685***		
(prepackaged)			[2.78]	[2.88]		
Default-related words					2.721***	2.604***
frequency					[4.59]	[4.37]
Firm size	0.130***	0.173***	0.113***	0.150***	0.171***	0.183***
	[4.56]	[4.89]	[4.70]	[5.04]	[3.91]	[4.22]
Market-to-book ratio	0.001	0.000	-0.000	-0.001	0.001	-0.002
	[0.58]	[0.18]	[-0.15]	[-0.32]	[0.53]	[-0.68]
Asset tangibility	0.085	0.243	0.025	0.152	0.140	0.334
	[0.59]	[1.14]	[0.20]	[0.79]	[0.47]	[1.06]
Firm ROA	-0.233**	-0.283***	-0.190**	-0.244***	-0.266**	-0.285**
	[-2.55]	[-2.65]	[-2.41]	[-2.61]	[-1.99]	[-2.14]
Book leverage	0.135**	0.155**	0.125***	0.155***	0.110	0.100
	[2.35]	[2.33]	[2.61]	[2.67]	[1.30]	[1.14]
Observations	144,850	122,842	173,594	146,676	105,133	101,908
R-squared	0.123	0.133	0.114	0.125	0.124	0.138
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	No	Yes	No	Yes	No	Yes

Table 3. Derivative Terminations, Fair Value at Default, and Lenders as Counterparties (Detailed Sample)

The dependent variable is equal to one if there are derivative terminations by the counterparties reported in firm's 10-K forms during the year when there is an event of default or the year following, and is equal to zero otherwise. All independent variables are measured at the last fiscal year-end before the event of default. The sample consists of bankruptcies by oil and gas producing firms (SIC Code 1311), commercial airlines (SIC 4512), and coal producing firms (SIC 1220) during the period 1996-2021 that have non-missing accounting information in COMPUSTAT and non-missing hedging data in 10-K or 10-KSB public filings. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable:		*Derivative Terminations*		
Derivative fair value ($000s)	-0.448***	-0.350***	-0.587***	
	[-2.93]	[-2.91]	[-3.97]	
High-cost bankruptcy (free fall)	0.297***	0.312***	0.231**	0.231**
	[3.04]	[3.05]	[2.25]	[2.25]
Counterparties are lenders		-0.270**		
		[-2.39]		
Negative derivative fair value				0.251**
				[2.29]
Hedge ratio			0.002*	0.001
			[1.89]	[1.52]
Firm size			0.045	0.040
			[1.19]	[0.99]
Market-to-book ratio			0.464**	0.352
			[2.19]	[1.51]
Asset tangibility			-0.434	-0.361
			[-0.91]	[-0.71]
Book leverage			-0.368	-0.294
			[-1.57]	[-1.19]
Firm's ROA			0.088	0.072
			[0.92]	[0.81]
Observations	96	65	91	91
R-squared	0.166	0.226	0.198	0.195
Industry FE	Yes	Yes	Yes	Yes

Table 4. Events of Default and Risk Management (Detailed Sample)

The table reports the estimates of the OLS regressions. The dependent variable in columns 1-2 is the hedge ratio (%); the dependent variable in columns 3-4 is the hedge maturity, measured as the logarithm of one plus the number of months till expiration of the contract with the longest maturity; and the dependent variable in columns 5-6 is an indicator equal to one if the firm hedges commodity price exposure and is equal to zero otherwise. The sample consists of all US-incorporated oil and gas producing firms (SIC 1311), commercial airlines (SIC 4512), and coal producing firms (SIC 1220) during the period 1996-2021 that have non-missing accounting information in COMPUSTAT and non-missing hedging data in 10-K or 10-KSB public filings. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A.	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Hedge Ratio*		*Hedge Maturity*		*Commodity Hedger*	
Event of default	-17.283***	-18.827***	-0.542***	-0.615***	-0.162***	-0.192***
	[-3.24]	[-3.42]	[-3.06]	[-3.42]	[-2.95]	[-3.38]
Firm size	6.096***	6.086***	0.247***	0.262***	0.068***	0.072***
	[3.52]	[3.51]	[4.98]	[5.39]	[4.65]	[5.07]
Market-to-book ratio	0.166	0.220	-0.002	0.001	-0.001	-0.000
	[0.77]	[0.99]	[-0.33]	[0.08]	[-0.43]	[-0.03]
Asset tangibility	2.623	2.972	0.380	0.383	0.085	0.093
	[0.26]	[0.29]	[1.46]	[1.47]	[0.98]	[1.06]
Firm ROA	-12.029**	-13.762**	-0.124	-0.140	-0.014	-0.005
	[-2.44]	[-2.59]	[-1.00]	[-1.15]	[-0.37]	[-0.14]
Book leverage	-3.605	-3.768	0.109	0.105	0.051*	0.050*
	[-1.21]	[-1.24]	[1.18]	[1.13]	[1.77]	[1.73]
Observations	3,301	3,298	3,333	3,330	3,301	3,298
R-squared	0.532	0.537	0.741	0.750	0.703	0.715
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry*Year	No	Yes	No	Yes	No	Yes

Panel B.	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Hedge Ratio*		*Hedge Maturity*		*Commodity Hedger*	
High-cost bankruptcy	-21.536***	-23.545***	-0.710***	-0.802***	-0.207***	-0.246***
(free fall)	[-2.72]	[-2.72]	[-2.83]	[-3.05]	[-2.64]	[-2.89]
Low-cost bankruptcy	-12.350*	-13.708**	-0.354	-0.419*	-0.111	-0.133*
(prepackaged)	[-1.84]	[-2.14]	[-1.49]	[-1.81]	[-1.53]	[-1.89]
Firm size	6.108***	6.106***	0.247***	0.263***	0.068***	0.073***
	[3.54]	[3.54]	[5.01]	[5.42]	[4.68]	[5.10]
Market-to-book ratio	0.159	0.218	-0.003	0.000	-0.001	-0.000
	[0.74]	[0.98]	[-0.37]	[0.06]	[-0.46]	[-0.04]
Asset tangibility	2.613	2.965	0.379	0.382	0.085	0.093
	[0.26]	[0.29]	[1.45]	[1.47]	[0.98]	[1.06]
Firm ROA	-11.978**	-13.644**	-0.120	-0.134	-0.013	-0.004
	[-2.42]	[-2.55]	[-0.96]	[-1.08]	[-0.35]	[-0.10]
Book leverage	-3.499	-3.693	0.113	0.107	0.052*	0.051*
	[-1.18]	[-1.22]	[1.21]	[1.15]	[1.79]	[1.75]
Observations	3,301	3,298	3,333	3,330	3,301	3,298
R-squared	0.532	0.538	0.741	0.750	0.703	0.715
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry*Year	No	Yes	No	Yes	No	Yes

Table 5. Bankruptcies with Derivative Terminations and Without (Detailed Sample)

The table reports the estimates of the OLS regressions. The dependent variable in column 1 is the hedge ratio (%); the dependent variable in column 2 is the hedge maturity, measured as the logarithm of one plus the number of months till expiration of the contract with the longest maturity; and the dependent variable in column 3 is an indicator variable equal to one if the firm hedges commodity price exposure and is equal to zero otherwise. The sample consists of all US-incorporated oil and gas producing firms (SIC 1311), commercial airlines (SIC 4512), and coal producing firms (SIC 1220) during the period 1996-2021 that have non-missing accounting information in COMPUSTAT and non-missing hedging data in 10-K or 10-KSB public filings. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Hedge Ratio*		*Hedge Maturity*		*Commodity Hedger*	
Event of default with	-31.457***	-33.464***	-1.325***	-1.419***	-0.438***	-0.472***
derivative terminations (a)	[-4.05]	[-4.24]	[-4.41]	[-4.65]	[-4.93]	[-5.18]
Event of default without	-9.196*	-10.172*	-0.105	-0.152	-0.005	-0.026
derivative terminations (b)	[-1.66]	[-1.82]	[-0.57]	[-0.83]	[-0.08]	[-0.43]
Firm size	6.191***	6.170***	0.252***	0.267***	0.070***	0.074***
	[3.55]	[3.52]	[5.05]	[5.43]	[4.70]	[5.09]
Market-to-book ratio	0.168	0.220	-0.002	0.000	-0.001	-0.000
	[0.78]	[0.99]	[-0.32]	[0.06]	[-0.41]	[-0.03]
Asset tangibility	3.008	3.352	0.401	0.403	0.093	0.100
	[0.30]	[0.32]	[1.52]	[1.53]	[1.06]	[1.12]
Firm ROA	-11.768**	-13.495**	-0.106	-0.121	-0.009	0.000
	[-2.38]	[-2.53]	[-0.87]	[-1.00]	[-0.24]	[0.00]
Book leverage	-3.461	-3.555	0.117	0.116	0.054*	0.054*
	[-1.19]	[-1.20]	[1.31]	[1.29]	[1.92]	[1.91]
Observations	3,301	3,298	3,333	3,330	3,301	3,298
R-squared	0.533	0.539	0.744	0.753	0.708	0.719
t-stat for $(a) - (b)$	-2.33**	-2.41**	-3.46***	-3.56***	-3.99***	-4.08***
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No	Yes	No
Industry*Year	No	Yes	No	Yes	No	Yes

Table 6. Placebo Test: Hedging with Derivatives and Hedging with Supply Agreements

The table reports the estimates of the OLS regressions. The sample consists of coal producing firms (SIC 1220) during the period 1996-2021 that have non-missing accounting information in COMPUSTAT and non-missing hedging data in 10-K or 10-KSB public filings. In columns 1-3 we consider hedging using derivatives (coal firms hedge input, diesel fuel, using derivatives). In columns 4-6, we consider hedging using supply agreements, which are physical delivery contracts that do not involve derivatives (coal firms hedge output, coal, using supply agreements). The dependent variable in columns 1 and 4 is the hedge ratio (%); the dependent variable in columns 2 and 5 is the hedge maturity, measured as the logarithm of one plus the number of months till the expiration of the contract with the longest maturity; and the dependent variable in columns 3 and 6 is an indicator variable equal to one if the firm hedges commodity price exposure and is equal to zero otherwise. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable:	(1) *Hedge Ratio*	(2) *Hedge Maturity*	(3) *Commodity Hedger*	(4) *Hedge Ratio*	(5) *Hedge Maturity*	(6) *Commodity Hedger*
Event of default with	-33.646***	-1.477***	-0.488***	1.655	0.093	-0.010
derivative terminations (a)	[-11.44]	[-5.39]	[-6.87]	[0.72]	[0.64]	[-0.29]
Event of default without	2.934	-0.155	-0.055	-15.550	-0.460	-0.184
derivative terminations (b)	[0.26]	[-0.48]	[-0.48]	[-1.10]	[-0.68]	[-1.03]
Firm size	8.149	0.012	0.044	-2.142	0.086	0.004
	[1.30]	[0.04]	[0.47]	[-1.22]	[0.66]	[0.35]
Market-to-book ratio	-0.033	-0.003	-0.000	-0.048	0.001	0.000
	[-0.45]	[-0.73]	[-0.24]	[-0.67]	[0.28]	[0.50]
Asset tangibility	17.688	1.088	0.196	-4.573	-0.344	-0.060
	[1.08]	[1.37]	[0.93]	[-0.42]	[-0.82]	[-0.95]
Firm ROA	-9.885	0.721	0.087	2.000	-0.080	-0.048
	[-1.05]	[0.95]	[0.33]	[0.30]	[-0.26]	[-1.09]
Book leverage	14.118	1.149**	0.267	0.228	0.047	-0.022
	[1.46]	[2.19]	[1.32]	[0.03]	[0.11]	[-0.50]
Observations	209	229	209	217	204	217
R-squared	0.728	0.713	0.748	0.935	0.940	0.953
t-stat for $(a)-(b)$	-3.14***	-3.12***	-3.21***	1.20	0.80	0.96
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Hedging type		Diesel Derivatives			Coal Supply Agreements	

Table 7. Events of Default and Exchange-Traded Futures (Compustat/SEC Sample)

The table reports the estimates of the OLS regressions. The sample consists of firms covered by Compustat and SEC EDGAR (except utilities) during the period 1996-2021. The dependent variable is equal to one if a firm's 10-K mentions futures and is zero otherwise. Default-related words frequency is the number of default-related words in a firm's 10-K divided by the total word count (%). Other variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Variable:	*Use of Exchange-Traded Futures*			
Bankruptcy	0.044**			
	[2.00]			
Credit downgrade	0.002			
	[0.27]			
Accounting restatement (fraud-related)	0.028**			
	[2.35]			
High-cost bankruptcy (free fall)		0.039		
		[1.35]		
Low-cost bankruptcy (prepackaged)		0.062**		
		[2.26]		
Default-related words frequency			0.339***	
			[18.52]	
Event of default with derivative terminations				0.129**
				[2.11]
Event of default without derivative terminations				0.038*
				[1.74]
Firm size	0.016***	0.016***	0.017***	0.016***
	[6.85]	[7.22]	[7.45]	[7.19]
Market-to-book ratio	0.001**	0.001*	0.001**	0.001*
	[2.46]	[1.88]	[2.12]	[1.88]
Asset tangibility	0.005	0.009	0.006	0.009
	[0.33]	[0.60]	[0.39]	[0.58]
Firm ROA	-0.016**	-0.018***	-0.014**	-0.018***
	[-2.50]	[-2.70]	[-2.09]	[-2.70]
Book leverage	0.003	0.004	-0.001	0.004
	[0.76]	[0.88]	[-0.15]	[0.87]
Observations	92,588	105,133	105,133	105,133
R-squared	0.619	0.618	0.621	0.618
Year FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Table 8. Metavante Court Case: Derivative Terminations and Hedging

The table reports the estimates of the OLS regressions. The dependent variable in columns 1-3 is an indicator variable of derivative determinations based on the textual search; the dependent variable in columns 4-6 is equal to one if the firm has non-zero unrealized gains or losses or non-zero derivative gains/losses reported after net income in Compustat, and it is equal to zero otherwise. The sample consists of firms in Compustat (except utilities) during the period 2005-2014. *Post Metavante* is equal to one if fiscal year ends after Metavante Court Case ruling (September 15, 2009). *NY* is equal to one if the firm can file for bankruptcy in the U.S. Bankruptcy Court for the Southern District of New York. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Derivative Terminations, %*			*Derivative User*		
Post Metavante	0.556***	0.654***	0.710***	0.013*	0.007	0.006
	[3.64]	[3.40]	[3.31]	[1.68]	[0.73]	[0.58]
NY×Post Metavante	0.946***	0.893***	1.022***	-0.002	0.002	0.003
	[3.51]	[3.09]	[3.23]	[-0.14]	[0.11]	[0.22]
Event of default				-0.048	-0.059	-0.052
				[-0.71]	[-0.86]	[-0.72]
Event of default ×Post Metavante				-0.023	-0.001	0.009
				[-0.31]	[-0.02]	[0.12]
Event of default×NY				0.343***	0.352***	0.331***
				[3.56]	[3.27]	[3.07]
Event of default×NY ×Post Metavante				-0.489***	-0.537***	-0.515***
				[-3.20]	[-3.24]	[-3.28]
Firm size			0.181**			0.050***
			[2.13]			[11.96]
Market-to-book ratio			0.001			0.001**
			[0.13]			[2.45]
Asset tangibility			0.315			0.015
			[0.65]			[0.69]
Firm ROA			-0.341			-0.025***
			[-1.43]			[-2.69]
Book leverage			0.060			0.041***
			[0.35]			[7.02]
Observations	69,310	55,850	51,105	67,553	54,812	50,211
R-squared	0.150	0.163	0.164	0.754	0.769	0.766
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	No	Yes	Yes	No	Yes	Yes

Internet Appendix to "Corporate Hedging, Contract Rights, and Basis Risk" by Ilona Babenko and Yuri Tserlukevich

Table IA.1. Events of Default and Risk Management (Compustat/SEC Sample)
The table reports the estimates of the OLS regressions. The sample consists of firms covered by Compustat (except utilities) during the period 1996-2021. The dependent variable in Panel A is equal to one if the firm has non-zero unrealized gains or losses or has non-zero derivative gains/losses reported after net income in Compustat and it is equal to zero otherwise. The dependent variable in Panel B is the number of hedging-related words in a firm's 10-K divided by the total word count (%). Default-related words frequency is the number of default-related words in a firm's 10-K divided by the total word count (%). Other variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A.	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:			*Derivative User*			
Event of default	-0.111***	-0.083***				
(bankruptcy)	[-3.99]	[-2.97]				
High-cost bankruptcy			-0.153***	-0.139***		
(free fall) (a)			[-3.50]	[-3.19]		
Low-cost bankruptcy			-0.056**	-0.011		
(prepackaged) (b)			[-2.06]	[-0.44]		
Default-related words					-0.034	-0.026
frequency					[-1.34]	[-1.05]
Firm size	0.044***	0.049***	0.044***	0.049***	0.051***	0.052***
	[17.00]	[15.42]	[17.01]	[15.43]	[13.12]	[13.12]
Market-to-book ratio	0.001***	0.001***	0.001***	0.001***	0.001***	0.001***
	[6.65]	[4.93]	[6.66]	[4.93]	[4.36]	[3.56]
Asset tangibility	-0.019*	0.001	-0.019*	0.001	0.003	0.027
	[-1.70]	[0.05]	[-1.70]	[0.05]	[0.14]	[1.17]
Firm ROA	-0.027***	-0.028***	-0.027***	-0.028***	-0.016*	-0.022**
	[-4.23]	[-3.82]	[-4.21]	[-3.80]	[-1.75]	[-2.45]
Book leverage	0.031***	0.042***	0.031***	0.042***	0.046***	0.051***
	[8.42]	[9.17]	[8.42]	[9.16]	[8.36]	[8.99]
Observations	123,043	102,002	123,043	102,002	72,075	70,282
R-squared	0.711	0.721	0.711	0.722	0.705	0.719
t-stat for $(a) - (b)$	n/a	n/a	-1.88*	-2.55**	n/a	n/a
Year FE	Yes	No	Yes	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	No	Yes	No	Yes	No	Yes

Panel B.	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:			*Hedging Intensity*			
Event of default	-0.030***	-0.029***				
(bankruptcy)	[-5.03]	[-4.82]				
High-cost bankruptcy			-0.042***	-0.042***		
(free fall) (a)			[-5.22]	[-5.06]		
Low-cost bankruptcy			-0.010	-0.009		
(prepackaged) (b)			[-1.37]	[-1.25]		
Default-related words					-0.086***	-0.092***
frequency					[-15.03]	[-16.05]
Firm size	0.016***	0.015***	0.016***	0.015***	0.016***	0.015***
	[17.10]	[16.36]	[17.12]	[16.38]	[17.03]	[16.29]
Market-to-book ratio	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
	[4.03]	[3.12]	[4.04]	[3.12]	[3.71]	[2.77]
Asset tangibility	-0.007	-0.005	-0.007	-0.005	-0.006	-0.004
	[-1.20]	[-0.84]	[-1.19]	[-0.83]	[-1.06]	[-0.71]
Firm ROA	-0.002	-0.003	-0.002	-0.003	-0.003	-0.004*
	[-1.01]	[-1.23]	[-1.00]	[-1.21]	[-1.40]	[-1.65]
Book leverage	0.011***	0.012***	0.011***	0.012***	0.012***	0.014***
	[7.33]	[8.56]	[7.33]	[8.56]	[8.13]	[9.44]
Observations	105,133	101,908	105,133	101,908	105,133	101,908
R-squared	0.655	0.672	0.655	0.672	0.656	0.673
t-stat for $(a) - (b)$	n/a	n/a	-2.95***	-3.00***	n/a	n/a
Year FE	Yes	No	Yes	No	Yes	No
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	No	Yes	No	Yes	No	Yes

Table IA.2. Derivative Terminations and Other Variables Prior to the Bench Ruling

The table compares the means of various variables for firms with New York court jurisdictions and for firms with other courts' jurisdictions. Firm is determined to have a New York court jurisdiction if either its headquarters are located in the state of New York or it is incorporated in New York. The means are calculated using data for the period prior to the Bench Ruling issued in *Lehman Brothers v. Metavante* court case (September 15, 2009). p-values for the difference in means based on the standard errors clustered by firm are reported below.

	New York Jurisdictions	*Other Court Jurisdictions*	p-value
Derivative user	0.236	0.247	0.592
Derivative terminations	0.455	0.921	0.178
Firm size	5.487	5.441	0.721
Market-to-book ratio	1.200	1.322	0.297
Firm ROA	0.016	0.013	0.811
Asset tangibility	0.128	0.261	0.000***
Book leverage	0.253	0.242	0.617

Table IA.3. Reasons for Early Derivative Contract Closures Unrelated to Terminations by the Counterparty

The table lists the stated reasons for early closures of derivative contracts unrelated to terminations by the counterparty, as disclosed by firms in their financial statements. The sample consists of US-incorporated firms during the period 1996-2021.

Reasons for Early Contract Closures	*N*	*%*
Debt issuance, retirement, or refinancing	983	34.32
Asset sale or spin off	82	2.86
Counterparty bankruptcy or default	75	2.62
Purchase agreement, transaction, securitization	43	1.50
Exchange rates or interest rates levels	36	1.26
Hedge ineffectiveness	24	0.84
Accounting or regulation	15	0.52
Lender requirements	8	0.28
Liquidity reasons	6	0.21
Unspecified	1,511	52.76
Total	2,864	100.00

IA.4. Placebo Test: Metavante Court Case and Early Contract Closures

The table reports the estimates of the OLS regressions. The dependent variable is an indicator variable of early derivative contract closures, unrelated to the terminations by the counterparty. The sample consists of firms in Compustat (except utilities) during the period 2005-2014. *Post Metavante* is equal to one if fiscal year ends after Metavante Court Case ruling (September 15, 2009). *NY* is equal to one if the firm can file for bankruptcy in the U.S. Bankruptcy Court for the Southern District of New York. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent Variable:	*Early Derivative Contract Closures, %*		
Post Metavante	-0.001	-0.001	-0.001
	[-0.17]	[-0.25]	[-0.24]
NY×Post Metavante	0.001	0.002	0.002
	[0.18]	[0.37]	[0.35]
Firm size			0.003***
			[2.66]
Market-to-book ratio			0.000
			[0.83]
Asset tangibility			0.002
			[0.34]
Firm ROA			-0.004
			[-1.16]
Book leverage			0.004***
			[2.67]
Observations	69,310	55,850	51,105
R-squared	0.207	0.219	0.220
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry*Year FE	No	Yes	Yes

Table IA.5. Oil Price Movements Before Bankruptcy and Effect of Bankruptcy on Hedging (Oil & Gas Firms)

The table reports the estimates of the OLS regressions. The dependent variable in column 1 is the hedge ratio (%); the dependent variable in column 2 is the hedge maturity, measured as the logarithm of one plus the number of months till expiration of the contract with the longest maturity; and the dependent variable in column 3 is an indicator variable equal to one if the firm hedges commodity price exposure and is equal to zero otherwise. *Positive Oil Return* is equal to one if during the one-month prior to a firm's bankruptcy the spot price of crude oil increased and is equal to zero otherwise. *Negative Oil Return* is equal to one minus *Positive Oil Return*. The sample consists of all US-incorporated oil and gas producing firms (SIC Code 1311) during the period 1996-2021 that have non-missing accounting information in Compustat and non-missing hedging data in 10-K or 10-KSB public filings. All variables are defined in Appendix C. T-statistics based on heteroskedasticity-consistent standard errors clustered by the firm are reported in brackets. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dependent Variable:	*Hedge Ratio*	*Hedge Maturity*	*Commodity Hedger*
Bankruptcy×Positive 1-month	-36.334***	-0.865***	-0.270***
oil return (a)	[-3.71]	[-3.56]	[-3.69]
Bankruptcy×Negative 1-month	-6.801	-0.352	-0.101
oil return (b)	[-0.72]	[-0.97]	[-0.99]
Firm size	6.063***	0.261***	0.071***
	[3.34]	[5.14]	[4.80]
Market-to-book ratio	0.282	-0.001	-0.001
	[0.83]	[-0.12]	[-0.27]
Asset tangibility	3.478	0.531*	0.135
	[0.30]	[1.83]	[1.40]
Firm ROA	-14.031**	-0.194	-0.006
	[-2.48]	[-1.53]	[-0.15]
Book leverage	-4.603	0.092	0.051*
	[-1.42]	[0.97]	[1.73]
Observations	2,654	2,666	2,654
R-squared	0.513	0.742	0.712
t-stat for $(a)-(b)$	-2.17**	-1.17	-1.35
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes