Corporate Hedging, Contract Rights, and Basis Risk*

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ABSTRACT

A hedging contract can be terminated by a counterparty following a firm's event of default, such as a credit downgrade, covenant violation, or bankruptcy. This right is often exercised. Our model shows that although the termination right reduces hedging costs, it can reduce firm value because the counterparty exercising it does not consider the externality imposed on the firm. Consequently, firms hedge less, especially when facing high bankruptcy costs, and are more likely to enter liquidation. Using detailed hedging data, we confirm the model's predictions and provide an explanation for low hedging during financial distress.

JEL codes: G30, G32

Keywords: hedging, risk management, derivatives, event of default, counterparty, basis risk, distress, contract, 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 become unhedged precisely when hedging has most value.

To understand the implications of termination rights, we build a model of corporate hedging with basis risk. We focus on two practical considerations in the derivatives industry. First, the derivative counterparty that originated the hedging contract, typically a 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). Second, the counterparty faces various costs of dealing with defaulted firm and may therefore prefer to receive an immediate payment rather than pursuing recovery

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

from the firm later when the value of the firm's assets and collateral is reduced.[2]

The model shows that the counterparty finds it optimal to terminate the hedging contract when the amount owed by the firm exceeds a certain threshold. Intuitively, the more the contract is in-the-money, the greater the counterparty's potential losses in the event of a firm's liquidation. The implication of this exercise policy is that the firm becomes unhedged precisely at the time when hedging is most valuable. This is because the right is activated following an event of default, which occurs when the firm is already in a financial distress. Additionally, the counterparties are more likely to exercise the right when the firm owes them money and when the potential liquidation is more costly.

Building on this result, we show that the early termination of a derivative contract is inefficient in the sense that it benefits the counterparty exercising the right less than it harms the firm. Intuitively, the counterparty benefits primarily by claiming its contractual payments early. However, for the firm, losing its hedging portfolio during a period of distress increases the probability of liquidation, which taxes *all* assets of the firm. Consequently, even though the termination right reduces the cost of derivatives for the firm, the disadvantage of higher ex post risk outweighs the cost savings, reducing the firm's incentive to hedge ex ante. Somewhat counterintuitively, the termination right can even make a firm want to hedge less when its bankruptcy costs are higher. This occurs because higher bankruptcy costs increase the likelihood that the counterparty will exercise the termination right, thereby making the hedging contract less effective for the firm.

We enhance the model by introducing several extensions motivated by observed stylized facts. Take, for instance, a scenario frequently observed in the data: the counterparty in

[2]Because of the safe harbor provisions of the Bankruptcy Code, derivatives have priority over other claims in bankruptcy (Edwards and Morrison (2005)). Nevertheless, the 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, if derivative contracts are not terminated promptly following a bankruptcy filing, they effectively receive the same priority as other senior claims.

the derivative transaction is also a firm's lender or its affiliate. Relevant to this case, we show that the firm's lenders are made worse off by the exercise of the right. Essentially, they end up shouldering extra bankruptcy costs and forfeiting some asset value because the firm's assets become riskier in the absence of hedging. Consequently, if the derivative counterparty holds a stake in the firm's debt and has to partly internalize the prospective losses to lenders, it might choose not to exercise the termination right. In another extension, we show that when the firm has multiple derivative counterparties who can decide, either sequentially or simultaneously, whether to exercise their rights, the incentives to exercise are generally stronger and may give rise to inefficient equilibria.

Using the model, we explore why the early termination right is a standard feature in derivative contracts. Policy and legal scholars often appeal to systemic risk and the need to protect large market players. It is also possible that firms find the lower cost of the contract more salient than its benefits in the unlikely event of distress, similar to how individuals often focus on the cost of insurance rather than its benefits. However, we show that this right can also facilitate contracting under frictions such as adverse selection or moral hazard. In the model's extension with heterogeneous firms and asymmetric information about liquidation risks, the termination right helps mitigate adverse selection by allowing counterparties to withdraw if they learn negative information, encouraging broader market participation.

We take the model to the data and test its empirical predictions regarding the exercise policy of contract rights and firms' hedging outcomes. To do so, we collect detailed hedging data for the period 1996-2021 for firms in industries where we can precisely measure 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 firms' 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 the Compustat/SEC universe to identify events of default and derivative terminations.

Using the detailed sample of commodity producers and airlines, we find that following an event of default, counterparties exercise their termination rights in approximately 59% of the cases 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 firms experience events of default, consistent with derivative terminations taking place, and that firms do not immediately re-hedge to the prior levels. For example, in specifications with firm and industry by year fixed effects, we find that firms are 20% less likely to use derivatives following a bankruptcy-related event of default and that their hedge ratios and hedge maturities drop by 20% and 5 months, respectively. 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 there are high potential costs.

That over-the-counter derivative contracts can be terminated following an event of de-

[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.

[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)).

fault offers a new insight into 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 firms unwind their hedging positions. Additionally, the continuing event of default, risk-shifting preferences of equity 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 (and we find some evidence of this), but these derivatives offer less customization and require more collateral, rendering them imperfect substitutes. 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 further examine a potential alternative explanation that firms may voluntarily unwind their derivative portfolios in distress, we perform a placebo test for firms in the coal industry. The coal industry presents a useful laboratory because firms in this industry hedge both using financial derivatives, which are governed by the ISDA Master Agreements, and supply agreements, which are not. If firms voluntarily unwind their hedging programs in distress, then both hedging with derivatives and hedging with supply agreements should be affected. In contrast, we find that only hedging with derivatives drops following events of default and derivative terminations, while hedging with supply agreements is unaffected, consistent with derivative terminations rather than lower firms' willingness to hedge driving a decline in corporate hedging. These results give further support to the findings by Almeida, Hankins, and Williams (2020), who document that hedging with purchase obligations (PO) does not drop significantly in distress.

To sharpen identification and examine the effect of terminations on hedging, we also use plausibly exogenous variation in the decision of counterparties to terminate their contracts. Specifically, we use the Bench Ruling 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 stated 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 increased the incentive of counterparties to terminate their contracts. Indeed, we show in a difference-in-differences setting that the likelihood of derivative terminations increased by a factor of 2.8 for firms with New York court jurisdictions after the 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.

II. Institutional Background

Over-the-counter derivative contracts are governed by master agreements, with the ISDA master agreements of 1992, 2002, or 2012, published by the International Swaps and Derivatives Association, serving as the standard.[7] These contracts serve all OTC derivative transactions, both in the United States and internationally, and help the involved parties to

[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 as it remains in default (McNamara and Metrick (2019)). For example, court cases in London, such as *Lomas v. JFB Firth Rixson, Inc.*, 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.

[7] The main difference between the ISDA master agreements of 1992 and 2002 lies in the calculation of amounts owed on early termination (Charles (2012), 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.

minimize legal uncertainty and contracting costs by avoiding negotiations of the legal terms on a transaction-by-transaction basis. For example, ISDA reportedly has access to approximately 3,000 professionals available to modify documents as legal and economic circumstances evolve, and it works closely with the government while lobbying for its interests (Sherrill (2015), Borowicz (2022)).

The ISDA master agreement describes 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; 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 additional events of default 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 early termination, such as a tax law change, illegality, or a merger resulting in a credit quality deterioration.

Upon an event of default with respect to one party (the "defaulting party"), the other party is entitled to terminate any or all the outstanding transactions. 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.[8] Once the qualified event is triggered and the position is to be closed, the parties calculate the final net payment. Only the party with the greater debt is liable to pay the netted amount. For example, if a derivative counterparty is due $10 million on a swap from the firm and owes $3 million on another contract to the firm, the payments can be netted so that the derivative counterparty does not need to make the $3 million payment and expects a payment of $7 million upon termination.

III. Literature

We contribute 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 add 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 legal and finance studies exam-

[8]The option is generally exercisable as long as the relevant event of default is continuing. However, the Bankruptcy Court for the Southern District of New York ruled that it has to be exercised "promptly" following bankruptcy.

[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 (2024)), and economies of scale (Nance, Smith, and Smithson (1993), Geczy, Minton, and Schrand (1997)).

ining the preferential treatment of derivatives in bankruptcy (e.g., Edwards and Morrison (2005), Sherrill (2015), Lubben (2010b), Roe (2011), and Bolton and Oehmke (2015)). Most closely, we build on Bolton and Oehmke (2015) who theoretically examine priority conflicts in bankruptcy between debtholders and derivative counterparties. 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.

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. 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.[11] Recent papers by Almeida, Hankins, and Williams (2017) and Almeida, Hankins, and Williams (2020) show that purchase obligations (POs), which are the forward contracts with suppliers, are used by many firms as a risk management tool. Almeida,

[10]Consistent with their predictions, 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.

[11]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)) or by issuing flexible debt (Guntay, Prabhala, and Unal (2004)).

Hankins, and Williams (2020) build a model where POs alleviate 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 bound by ISDA Master Agreements, which allows firms that use them to stay hedged following an event of default. Consistent with this argument, we find that derivative terminations have no explanatory power for the dynamics of POs in distress, while they can explain the dynamics of hedging with derivatives.

IV. Model

We model a firm that hedges its cash flows with a portfolio of derivatives. The firm's cash flows can reach a certain low threshold, triggering a contractual event of default. This event gives the derivative counterparty an option to terminate its contract with the firm prematurely. Subsequent to the event of default, the firm can either recover or be liquidated. The outcome depends on additional cash flow realizations, the counterparty's endogenous decision to keep or terminate the contract, and the performance of the firm's remaining derivative portfolio.

A. Preliminaries

There are three dates: 0, 1, and 2. The hedging contract is entered into at date 0. The firm has random cash flows, $C_1 \in \{C_1^L, C_1^H\}$ and $C_2 \in \{C_2^L, C_2^H\}$, which are realized at dates 1 and 2, respectively. The likelihood of a *low* cash flow realization, C_t^L, is denoted as p_t. The firm has fixed liabilities D, due at date 2, as illustrated in Figure 1.[12] While we refer to D as "debt," it could also include other fixed liabilities, such as employee wages or payments

[12] The model could be easily modified to also include debt due at date 1. Note that lenders would agree to roll over debt due at date 1 because the immediate liquidation is costlier than potential liquidation in certain states.

owed to suppliers. Since debt provides no benefits in the model, we treat it as given and do not solve for the optimal capital structure.

The firm's counterparty issuing derivatives, referred to simply as the counterparty, is risk-neutral and default-free. The hedging instrument is a standard forward contract, which matures and settles at date 2, unless an event of default occurs before the contract's maturity. Under this contract, the contractual amount payable to the counterparty at date 1, denoted as V_1, can take one of two possible values: $V_1 \in \{V_1^L, V_1^H\}$, where $V_1^L < 0 < V_1^H$. A positive value of V_1 implies that the firm owes money to the counterparty, whereas a negative value implies that the counterparty owes money to the firm. In line with the approach taken by Bolton and Oehmke (2015), we assume that the value of the derivative portfolio is linked to some 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 $\rho \in (\frac{1}{2}, 1]$ because the portfolio is a hedging asset. A higher value of ρ indicates lower *basis risk* or a stronger correlation between the portfolio's value and the firm's cash flows.

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

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

We set $V_0 = 0$ and assume the dynamics of the forward contract satisfies $V_t = E(V_{t+1})$, which in particular implies the following restriction[13]

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

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

An event of default by the firm can occur at date 1. In practice, 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 after the negative shocks to the cash flows and the firm's derivative portfolio, i.e., if $C_1 = C_1^L$ and $V_1 = V_1^H$.

Given an event of default, the counterparty has the right to continue the contract with the firm until maturity or to terminate it early.[14] In the latter case, the counterparty recovers from the firm the current value of the contract V_1.[15] We assume that continuing the contract, as opposed to terminating it, has benefits for the counterparty, θ, 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 counterparty (e.g., the counterparty can cross-sell other products to the firm or has an informational advantage over other market participants).

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

$$C_1 + C_2 - D - V_2 < 0. \tag{4}$$

To fix the ideas, we assume that (4) 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 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 payments to bondholders and to the counterparty are

[14] In the base model, we consider only full termination of the contract or no termination at all. In the Internet Appendix, we extend the model to allow for a fraction λ of the portfolio to be terminated and find that, under certain assumptions, the counterparty may prefer partial termination.

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

subject to proportional costs α.[16] The costs to the counterparty may reflect payment delays from a liquidating firm because payments can only be made after the court's confirmation of the debtor's plan, or they may reflect incomplete payments. We assume that the hedging portfolio is not excessively large, i.e.,

$$\rho(C_1^L + C_2^L) > V_1^H. \tag{5}$$

This assumption rules out speculation with derivatives and is always satisfied if there is no basis risk because $C_1^L > V_1^H$. At the maximum basis risk, $\rho = 1/2$, this assumption implies that the average cash flow over two periods is larger than the value of the portfolio that hedges these cash flows.

Finally, note that the value of the contract to the counterparty, which we denote Y_t, generally differs from V_t because of the counterparty risk and the relationship value. For example, the forward with the initial value of $V_0 = 0$ can have value $Y_0 < 0$ to the counterparty, implying a positive fee that the firm must pay to enter the contract.

B. Exercise Policy

We now turn attention to the counterparty's decision to terminate the derivative contract. Recall that the termination right is only available in the event of default, i.e., conditional on C_1^L and V_1^H. The counterparty elects to terminate the contract if an immediate payoff, V_1^H, exceeds the expected continuation value,

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

[16]While the base model assumes that the costs imposed on derivative counterparties and other claim holders in the event of firm liquidation are the same, the results do not critically depend on this assumption. In the Internet Appendix, we examine the case where derivative counterparties incur lower costs ($\alpha_h < \alpha$) and demonstrate that the key results of the model remain robust under this alternative assumption.

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

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

From (7), it follows that the contract is more likely to be terminated if the value of the derivative to the counterparty is higher. Higher costs, α, and higher basis risk, $1-\rho$, also make the termination of the contract more attractive. Finally, the larger benefits from continuing the contract, captured by θ, reduce the counterparty's incentive to terminate early. If $V_1^H > V^*$, then the termination right increases the value of the contract to the counterparty by

$$\Delta Y_0 = p_1(1-\rho)\left(\alpha p_2(1-\rho)(V_1^H + \delta_H) - \theta(1 - p_2 + p_2\rho)\right), \tag{8}$$

which is the difference between the LHS and the RHS of (6), multiplied by the probability of exercise, $p_1(1-\rho)$. The value of the contract with the right is

$$Y_0 = \theta - p_1(1-\rho)\left(\alpha p_2 \rho \left(V_1^L + \delta_H\right) + \theta\left(1 + p_2\rho\right)\right). \tag{9}$$

Assuming that the derivative contract is priced competitively, the price charged to the firm is $-Y_0$. The inclusion of the termination right makes the contract cheaper to the firm by the amount ΔY_0.

C. Firm Value and the Inefficiency of the Termination Right

Although the termination right makes the derivatives cheaper for the firm, it also 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 debt and equity are ex post affected 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 $V_1^H > V^*$.*

1. *The change in the $t = 1$ value of debt as a result of the derivative termination is*

$$\begin{aligned} \Delta\mathcal{D}_1 &= -p_2\rho\left(D + V_1^H - C_1^L - C_2^L\right) + p_2\left(1-\rho\right)\left(1-\alpha\right)\delta_H \\ &\quad -\alpha p_2\rho\left(C_1^L + C_2^L - V_1^H\right), \end{aligned} \tag{10}$$

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

$$\Delta E_1 = p_2\left(\rho\left(D + V_1^H - C_1^L - C_2^L\right) - (1-\rho)\delta_H\right), \tag{11}$$

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

$$\Delta E_1 + \Delta\mathcal{D}_1 = -\alpha p_2\left(\rho\left(C_1^L + C_2^L - V_1^H\right) + \left(1-\rho\right)\delta_H\right) < 0. \tag{12}$$

Intuitively, because the derivative termination leaves the firm unhedged and hence riskier, the debtholders are worse off through the first term in (10), which is partially offset by the second term related to the basis risk. Debtholders are also worse off because of higher bankruptcy costs, captured by the last term in (10). In contrast, the higher risk has a positive effect on the value of equity, as reflected in the first term in (11). This effect is partially offset by the second term related to basis risk. If basis risk is limited, i.e.,

$$(1-\rho)/\rho < \left(D + V_1^H - C_1^L - C_2^L\right)/\delta_H, \tag{13}$$

then it is easy to see that the debt value decreases and the equity value increases with the derivative termination. Note that because the shareholders have no control over the exercise of the right, this "risk-shifting" effect is unintentional and is a result of the actions of the counterparty. Finally, the proposition shows that the total firm value decreases as a result of the derivative termination, which occurs because of higher bankruptcy costs.

Next, we show that the inclusion of the termination right decreases the ex ante firm value, defined as the firm owner's proceeds from issuing debt, equity, and purchasing the derivative contract.

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

The inclusion of the termination right increases the firm's expected total bankruptcy costs, and it decreases the ex ante firm value

$$\Delta\mathcal{V}_0 = -\alpha p_1 p_2 (1-\rho)\left(\rho(C_1^L + C_2^L) - V_1^H\right) - \theta p_1 (1-\rho)(1 - p_2 + p_2\rho) < 0. \tag{14}$$

The first term is the expected bankruptcy costs, imposed on the bondholders and the counterparty, which increase because contract termination increases the probability of firm liquidation. However, there is a mitigating factor: by paying V_1^H to the counterparty at date 1, the firm reduces its assets prior to liquidation, which lowers its bankruptcy costs. The second term reflects the loss of relationship value to the counterparty, which increases the cost of hedging to the firm.[17]

D. The Incentive to Hedge

We next consider the benefits of hedging, which are defined as a gain in firm value from entering the contract. As we show in Proposition 2, these benefits are lower when the termination right is included. Perhaps somewhat surprisingly, we further show that when

[17]The reader can verify that (14) can also be obtained as the sum of the change in the contract value, ΔY_0, given in (8), and the ex post firm value change due to termination, $\Delta E_1 + \Delta\mathcal{D}_1$, given in Proposition 1, multiplied by the ex ante probability of the termination right exercise, $p_1(1-\rho)$.

the counterparty has the termination right, higher bankruptcy costs, α, could lower the firm's incentive to hedge.[18]

Corollary 1. *Let the threshold bankruptcy cost parameter α^* be a solution to $V^*(\alpha^*) = V_1^H$. Let H_0 be the difference between the value of hedged and unhedged firm. With the termination right, the firm's expected benefits of hedging are given by*

$$H_0 = \alpha p_1 p_2 \rho (C_1^L + C_2^L) + \theta(1 - p_1 p_2 (1-\rho)), \qquad \text{if } \alpha \leq \alpha^*, \tag{15}$$

$$H_0 = \alpha p_1 p_2 \left(\rho^2 (C_1^L + C_2^L) + (1-\rho) V_1^H\right) + \theta(1 - p_1(1-\rho)(1+p_2\rho)), \qquad \text{if } \alpha > \alpha^*, \tag{16}$$

and $H_0(\alpha)$ has a downward jump at $\alpha = \alpha^*$.

The corollary reveals that firms facing higher bankruptcy costs do not necessarily have a greater incentive to hedge. Indeed, there is a discontinuous drop in the benefits of hedging to the firm at the threshold value α^*. The underlying rationale is that the likelihood of the counterparty exercising the termination right increases with α, which in turn increases the probability of costly firm liquidation.

E. Derivative Collateralization

This assumption that derivative obligations cannot be collateralized is reasonable for many firms with scarce pledgeable collateral or for those firms where existing lending agreements restrict them from offering collateral to derivative counterparties.[19]

We now extend the model and assume a part of the cash flow, C_0, is available early and may be pledged as collateral to derivative counterparties. 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

[18] We also prove this Corollary in the Internet Appendix under a modified assumption that the counterparty's bankruptcy cost parameter α is a fixed fraction of the lender's α. The incentives to exercise the right are lower in this case; the results of the Corollary remain valid.

[19] Commonly, lending agreements restrict the firm from collateralizing its derivative contracts unless the counterparty involved is the lending institution itself (Babenko, Bessembinder, and Tserlukevich (2024)).

to cover payments to the counterparty in all contingencies, $C_0 < V_1^H$.[20] We assume that the collateral is transferred immediately and costlessly at the liquidation or when the contract is terminated. Should liquidation occur when the derivative value is $V_2 > C_0$, the net payment to the counterparty is $C_0 + (1-\alpha)(V_2 - C_0)$.

Following similar steps as in Section IV.B, we show that the counterparty exercises the right if

$$V_1^H > V^* + C_0, \tag{17}$$

implying that the posted collateral, C_0, linearly increases the exercise threshold. If the collateral is sufficiently large, then the right is never exercised by the counterparty. If the right is exercised at V_1^H, then it changes the value of the contract by

$$\Delta\tilde{Y}_0 = p_1(1-\rho)\left(\alpha p_2(1-\rho)(V_1^H + \delta_H - C_0) - \theta(1 - p_2 + \rho p_2)\right) < \Delta Y_0. \tag{18}$$

Thus, the posted collateral not only diminishes the counterparty's incentive to exercise the termination right, but also lowers the value of the right.

Proposition 3. *Suppose collateral C_0 is posted.*

1. *If $V_1^H < V^* + C_0$, then the termination right is never exercised and does not affect the ex ante firm value.*

2. *If $V_1^H \geq V^* + C_0$, then the termination right increases the firm's expected bankruptcy costs and decreases the ex ante firm value*

$$\Delta\tilde{\mathcal{V}}_0 = -\alpha p_1 p_2 (1-\rho)\left(\rho(C_1^L + C_2^L) - V_1^H + C_0(1-\rho)\right) - p_1(1-\rho)\theta(1 - p_2 + p_2\rho) < 0. \tag{19}$$

[20]For brevity, we do not model the endogenous liquidity constraint that limits the amount that can be pledged; for a detailed discussion, see Almeida, Hankins, and Williams (2020).

The proposition mirrors the base case but adds collateral. It shows that when collateral C_0 is relatively large, the termination right is irrelevant to firm value. However, if collateral is not large enough to preclude exercise, the termination right still decreases firm value.[21]

F. Bundled Hedging and Lending

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

Proposition 4. *Suppose the counterparty holds fraction κ of the firm's debt claim. Then:*

1. *The termination right is exercised if*

$$V_1^H \quad > \quad V^* + \frac{\kappa\left(-\Delta\mathcal{D}_1\right)}{\alpha p_2(1-\rho)}, \tag{20}$$

   where V^* and $\Delta\mathcal{D}_1$ are given in (7) and (10), respectively.

2. *If (13) holds, then there exists a minimum stake $\kappa^* \in [0,1]$ in the debt claim,*

$$\kappa^* \quad = \quad \frac{\alpha p_2(1-\rho)\left(V_1^H - V^*\right)}{-\Delta\mathcal{D}_1}, \tag{21}$$

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

The intuition of Proposition 4 is straightforward. A stake in the firm's debt makes the counterparty internalize the negative consequences of the contract termination on the

[21] Also note that when the derivative contracts are settled frequently, it has a similar effect to that of collateral. 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 annual.

value of debt (Proposition 1 shows that, under (13), the value of debt is affected negatively and equity positively). A high enough stake κ therefore guarantees that the right is never exercised.

G. Multiple Counterparties

Another common feature of the data is that firms can have multiple and potentially heterogeneous derivative counterparties. Assuming they cannot coordinate, counterparties can decide to exercise their termination rights either sequentially or simultaneously. The key intuition is that the exercise of the right by one of the counterparties may increase the probability of firm's liquidation, thereby affecting the incentives to continue for another counterparty.[22]

We first consider a sequential-move game. Suppose the firm's derivative portfolio is with two counterparties. Counterparty A owns fraction γ of the portfolio, moves first, and has benefits of continuing business with the firm allocated proportionally as $\gamma\theta_A$. Counterparty B holds the rest of the portfolio, moves second, and has benefits $(1-\gamma)\theta_B$, where we assume $\theta_B < \theta_A$.[23] We focus on a more interesting case where counterparty A would have and counterparty B would not have exercised the right had it owned the entire portfolio,

$$V^*(\theta_B) > V_1^H > V^*(\theta_A), \tag{22}$$

where $V^*(\theta)$ is the exercise threshold given in (7). The exercise of one of the counterparties matters for the decisions of another counterparty if it increases the probability of firm liquidation. Specifically, we assume

$$C_1^L + C_2^L - D - V_1^H - \delta_L \max\{1-\gamma, \gamma\} < 0. \tag{23}$$

[22] The legal scholars (see Lubben (2010a), Lubben (2010b)) argue that the Bankruptcy Code's safe harbor provisions encourage the runs on the firms by the derivative counterparties who hold claims on the same financial assets.

[23] Whereas heterogeneity in θ is important for the sequential-moves equilibrium, the order of the moves is not.

The proposition below shows that, under these assumptions, the exercise of the first counterparty lowers the threshold for exercise by the second counterparty.

Proposition 5. *Counterparty B exercises its termination right if* $V_1^H > \widehat{V}(\theta_B)$*, where*

$$\widehat{V}(\theta_B) \equiv \frac{(1-p_2)\theta_B}{\alpha p_2(1-\rho)} - \delta_H < V^*(\theta_B). \tag{24}$$

Next, consider a simultaneous-move game, where each counterparty independently decides whether to exercise its termination rights. For simplicity, we assume that $\theta_A = \theta_B = \theta$ and assume that had a single counterparty owned the entire portfolio, exercise would be suboptimal, $V_1^H < V^*(\theta)$.

Proposition 6. *If* $V_1^H > \widehat{V}(\theta)$*, then there are two pure-strategy equilibria, one where both counterparties exercise their rights and one where both do not. The counterparties' equilibrium payoffs are given in the Appendix.*

This is a variation of a *Stag-Hunt* game that has two equilibria: both parties exercise their right ("hunt hare") or both parties continue the contract ("hunt stag"). The equilibrium where both parties exercise the rights is safer, but has lower payoffs and hence is inefficient. The second equilibrium describes cooperation and each counterparty obtains a higher payoff by retaining the contract with the firm.

H. Rationale for Contracting with Termination Rights

Our study argues that contract termination rights may increase the likelihood of firm liquidation and impose costs on firms that outweigh the benefits to counterparties. A natural question, then, is why these contract rights are put in place and what other benefits they provide. One potential justification for these rights is the argument made for the existence of safe harbor provisions in the U.S. Bankruptcy Code (Sherrill (2015)), namely that by protecting important financial institutions during times of distress, they reduce systemic risk in the economy.[24] While modelling systemic risk is beyond the scope of our paper, we note that, in the context of our model, the exercise of termination rights by one counterparty can increase the likelihood of firm liquidation, making other counterparties (which could be important institutions) more vulnerable or triggering a cascade of terminations. Thus, it is possible that, in some situations, contract rights can exacerbate systemic risk.

Other benefits of contract termination rights include their potential to mitigate moral hazard problems. The idea is that by making the consequences of triggering an event of default more severe for a firm ex post, contract termination rights provide a stronger ex ante incentive for managers to avoid these contingencies by exerting greater effort.

Finally, contract termination rights may help mitigate the adverse selection problem. In the Internet Appendix, we extend our framework to consider two types of firms—low-bankruptcy-cost firms ($\alpha = \underline{\alpha}$) and high-bankruptcy-cost firms ($\alpha = \overline{\alpha}$). At the time of entering into a hedging contract, the counterparty does not observe the firm's type (as it is private information) and assigns equal probabilities to each type. However, the counterparty learns the firm's type at the intermediate date when contract rights may be exercised. We demonstrate that, in this setting, low-bankruptcy-cost firms may be unable to hedge without contract termination rights due to the prohibitively high cost of hedging contracts, but would be able to hedge if such rights are in place. Intuitively, termination rights reduce the exposure to counterparty risk by giving it the option to close out the contract after learning the firm's bankruptcy costs, thus limiting potential losses. With this option in place, the contract can be priced lower, enabling all firms to participate.

[24]However, this argument has been criticized by others (e.g., Lubben (2010b), Cloar (2013)).

V. Empirical Analysis

In the empirical analysis, we focus on the 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 expected 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 the smaller sample of commodity producers and airlines, these data are hand-collected from firms' financial statements. For the 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 four types of firms' events of default: bankruptcies and non-payment, credit downgrades, covenant violations, and misrepresentation. A number of events come from the sample of Chapter 11 bankruptcy filings 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).[25] 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.

Besides bankruptcy filings, derivative terminations can be triggered by events related to misrepresentation. To capture this, we use data on fraud-related accounting restatements obtained from Audit Analytics. A fraud-related restatement is assigned a value of one if there is an accounting restatement during the fiscal year that identifies fraud and/or if there is a related investigation by the SEC; otherwise, it is set to zero. For credit-related events of default, we collect data on credit downgrades of firms' long-term debt from Compustat, which is available through February 2017. A credit downgrade is set to one if a firm's domestic long-term debt is downgraded by S&P during the fiscal year, and is set to zero otherwise. Lastly, data on covenant violations is sourced from the database compiled by Dyreng, Ferracuti, Hills, and Kubic (2022), which identifies whether a firm is in violation of its covenants based on a detailed review of the firm's SEC filings for the priod between January 31, 2000 and December 31, 2016.[26] In total, our initial dataset includes 1,863 covenant violations, 3,262 credit downgrades, 733 misrepresentation-related events, and 1,058 bankruptcy and

[25] 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 (2023), 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 sharing their data with us.

[26] We are grateful to Scott Dyreng, Elia Ferracuti, Robert Hills, and Matthew Kubic for generously sharing their data with us.

non-payment-related events.

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 period 1996-2021. We start in 1996 because by this year all publicly listed firms had to post their electronic filings on the EDGAR platform.[27] 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.

Specifically, for a sample of commodity producers and airlines, we construct the hedge ratios following the methodology in Babenko, Bessembinder, and Tserlukevich (2024). 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

[27] 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.

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 fuel needs hedged, as reported by the firms in their 10-Ks.

For coal firms (SIC Code 1220), we focus on hedging of the important 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 Almeida, Hankins, and Williams (2020) 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.[28] When one or both variables are different from zero, we infer that the company uses derivatives during the year.

A.3. Termination Events and Derivative Fair Value

To identify termination events in the detailed sample of commodity producers and airlines, we manually read parts of the financial statements that discuss hedging. Specifically, we set

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

derivative terminations equal to one if either in the year directly prior to the bankruptcy filing, the year of bankruptcy filing, or the next year 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 statement but the firm had hedged prior to the event, we set derivative terminations to zero. 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 identify the date of the first disclosure. Our procedure identifies 1,121 confirmed 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 24.5% of sample firms. Firms in the sample spend, on average, 0.4% of firm-years in bankruptcy, have a credit downgrade in 2.0% of firm-years, covenant violation in 1.5% of firm-years, and a fraud-related accounting restatement in 0.4% 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 26%. As identified by the textual search, 11.9% 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 textual analysis, take place in 0.43% of firm-years, and Panel B reports on the reasons for derivative terminations disclosed by the firms.[29] Finally, the table also reports statistics for firm characteristics that we use as control variables in our tests.

Panels C and 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. Perhaps not surprisingly, firms in the detailed sample hedge more aggressively than firms in the broad Compustat/SEC sample. In fact, 59.7% 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. Specifically, the hedge ratio averages 32.0% and maturity of derivative contracts averages 15.6 months.

[29] A complementary Table IA.4 of the Internet Appendix lists the reasons for voluntary early derivative contract closures used in some of the placebo tests. These reasons include debt retirement and refinancing, asset purchases and sales, and changes in exchange or interest rates.

Firms in this sample spend more time in bankruptcy, with 2.8% of firm-years having a bankruptcy,[30] of which 1.2% are "prepackaged/prenegotiated" bankruptcies and 1.6% 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 provides statistics for the sample of bankrupt firms included in the detailed analysis that had a positive hedge ratio prior to bankruptcy. The average fair value of derivatives before bankruptcy is positive, at $56.7 million, indicating that hedging is at least partially effective. In fact, 68.4% of firms report a positive fair value of derivatives in the year prior to bankruptcy. Further, we find that 59.4% of firms in this sample 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. The median firm has three derivative counterparties prior to the event of default, with some firms reporting more than 10 different counterparties. Also, counterparties are often reported to be firm lenders for firms that provide this information.

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.

[30]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 parsimony.

Table 2 reports the results for the broad Compustat/SEC sample, where the dependent variable is derivative terminations (in %).[31] In the first two specifications, we analyze the propensity to exercise derivative termination rights, conditional on one of three types of events of default: bankruptcy, credit downgrade, or fraud-related earnings restatement. The results indicate that both bankruptcies and credit downgrades are significantly associated with derivative terminations, although the economic magnitude is substantially larger for bankruptcies. Specifically, the likelihood of derivative terminations increases more than ten-fold compared to its unconditional mean in bankruptcy cases. In the next two specifications, we include events of default related to covenant violations, which are available for a subset of the sample. The results demonstrate that derivative terminations also increase significantly following covenant violations.[32]

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 approximately 15% relative to its mean. Specifications 5 and 6 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

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

[32] The pairwise correlations between different events of default in our sample are all positive but modest (below 0.06). The lower statistical significance of credit downgrades and restatements in specifications 3 and 4 is due to the smaller sample size rather than correlations with covenant violations.

on legal and professional fees and tend to settle faster (Tashjian, Lease, and McConnell (1996), Betker (1997)). In our sample, the average time spent in bankruptcy is 268 days for prenegotiated/prepackaged bankruptcies compared to 636 days for free fall bankruptcies. The coefficient on the high-cost bankruptcies is approximately 25% higher, but the difference in coefficients in not statistically significant. The last two specifications demonstrate that derivative terminations increase with the frequency of mentions of default events in firms' financial statements. A one-standard-deviation increase in the frequency of such mentions corresponds to approximately a 70% increase in derivative terminations relative to its mean. Finally, the results indicate that derivative terminations are more likely in highly-levered and large firms, which could be 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 additional information, such as 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 (indicating a positive value for the counterparty) is associated with a 26.1% 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 a 22% to 32% higher probability of derivative terminations.

Furthermore, we observe that having lenders as counterparties is associated with a 28% lower probability of derivative terminations, consistent with lenders partially internalizing the impact of derivative terminations on reducing recovery rates for 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 firms' hedging outcomes. For this purpose, we focus on the detailed sample because it allows us to measure firms' exposures to commodity prices and their corresponding hedge ratios.

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 (left top panel) and the fraction of firms hedging (right top 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.

The bottom panels of Figure 2 show 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, 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 event of default and its hedging policy in the detailed sample. An event of default is equal to one is there is a bankruptcy filing, credit downgrade, or a covenant violation for a given firm-year. 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 in Panel A indicate, the event of default has a negative and significant effect on hedging. For example, based on column 2, an event of default is associated with approximately 8% decrease in hedge ratios. In Panel B, we repeat the analysis but focus only on events of default related to bankruptcies, as both the model and the results in Table 2 suggest that these events should results in more derivative terminations. Indeed, we find that the incidence of bankruptcy has a large and negative effect on hedging. For example, based on columns 2 and 4, a bankruptcy-related event of default is associated with a 20% decrease in hedge ratios and approximately 5-month shorter maturity. Finally, Panel C shows that the effect of 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 related event of default.

Figure 3 illustrates the dynamics of firms' hedge ratios around bankruptcy-related 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 bankruptcies 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 3, with hedge ratios, hedge maturities, and fraction of firms hedging decreasing significantly more when there are derivative terminations by the counterparties.[33] These results help to allay the concerns that a decrease in corporate hedging is purely voluntary.

[33]We focus on bankruptcies because detailed data on termination events is available for this sample. For completeness, Table IA.1 in the Internet Appendix presents similar results for all events of default, using derivative terminations identified through textual searches for events other than bankruptcies.

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.[34] 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 hedge ratios calculated using the fraction of coal hedged through supply agreements are not

[34] For example, Patriot 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 filing 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."

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 (2020), 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 mentions in its SEC filings using futures, and is equal to zero otherwise. Interestingly, we observe that futures use does not drop upon the occurrence of bankruptcies or the events of default more broadly, and, in fact, increases. These results highlight the fact that firms may attempt to re-hedge their lost portfolios using exchange-traded securities, which is also consistent with the narrative given by some firms.[35] In particular, the results in specifications 4 and 5 indicate that it is in cases when the bankruptcy or the event of default is followed by derivative terminations that the futures use increases the most.

[35] 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.[36] Table IA.3 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 at the 5% level, 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.[37]

Figure 4 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 0.2% to 1.7%, and statistically significant at the 5% level for all the years after the ruling, except year 1. Table 8 also reports the corresponding estimation results, which show that derivative terminations increase after

[36] 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.

[37] 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.

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 2.8.[38]

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.6 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.

[38]Tables IA.4 and IA.5 in the Internet Appendix show the corresponding placebo 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 close their derivative contracts after debt 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 in New York after the Metavante case ruling, decreasing the scope for potential alternative explanations.

VI. Conclusion

In this paper, we theoretically and empirically analyze the exercise strategies of termination rights in over-the-counter derivative contracts. We investigate the dependence of these strategies on factors such as firms' expected bankruptcy costs, portfolio basis risk, moneyness of derivative contracts, the number of counterparties, and the bundling of lending and risk management. We show that termination rights have important implications for firms' hedging policies, the likelihood of firm survival, and firm value.

Using detailed data on hedging portfolios, we find that the exercise of termination rights is frequent in the data, conforms to predicted behavior, and has persistent negative effect on firms' hedging policies. We also demonstrate that hedging using supply agreements and exchange-traded futures, which are governed by different contractual terms, does not decrease when firms experience events of default and derivative terminations. These findings suggest that, after the counterparties terminate OTC contracts, firms reduce hedging and switch to less customized and potentially more expensive hedging instruments.

Our theoretical and empirical results address important policy questions, appealing to government regulators concerned with the role of derivatives in the economy. First, our findings suggest that the option to terminate early, as allowed in OTC hedging contracts, may not be the most efficient way to protect derivative issuers from systemic risk. We theoretically demonstrate that the implicit costs of termination provisions are higher for firms than the benefits of protection for counterparties. Second, we discuss ways to reduce risks for firms. We show that the probability of contract termination is lower if firm has fewer counterparties, the collateral requirement is higher, and if financing and hedging activities are bundled together.

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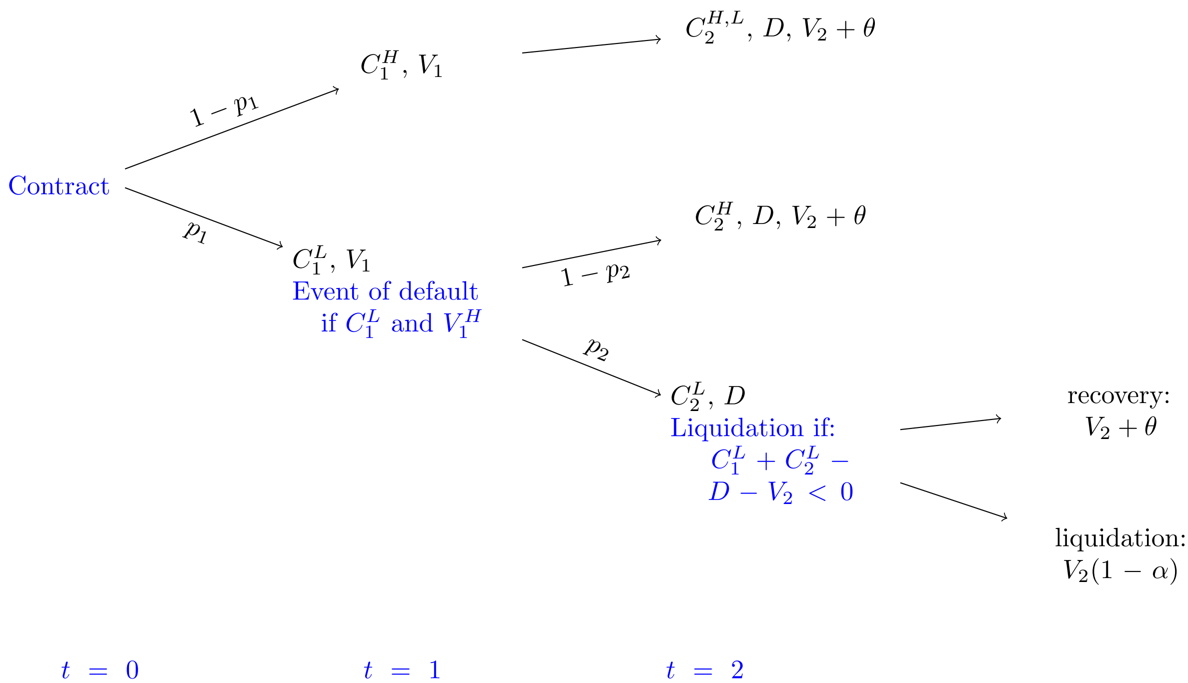
Figure 1. Model Diagram

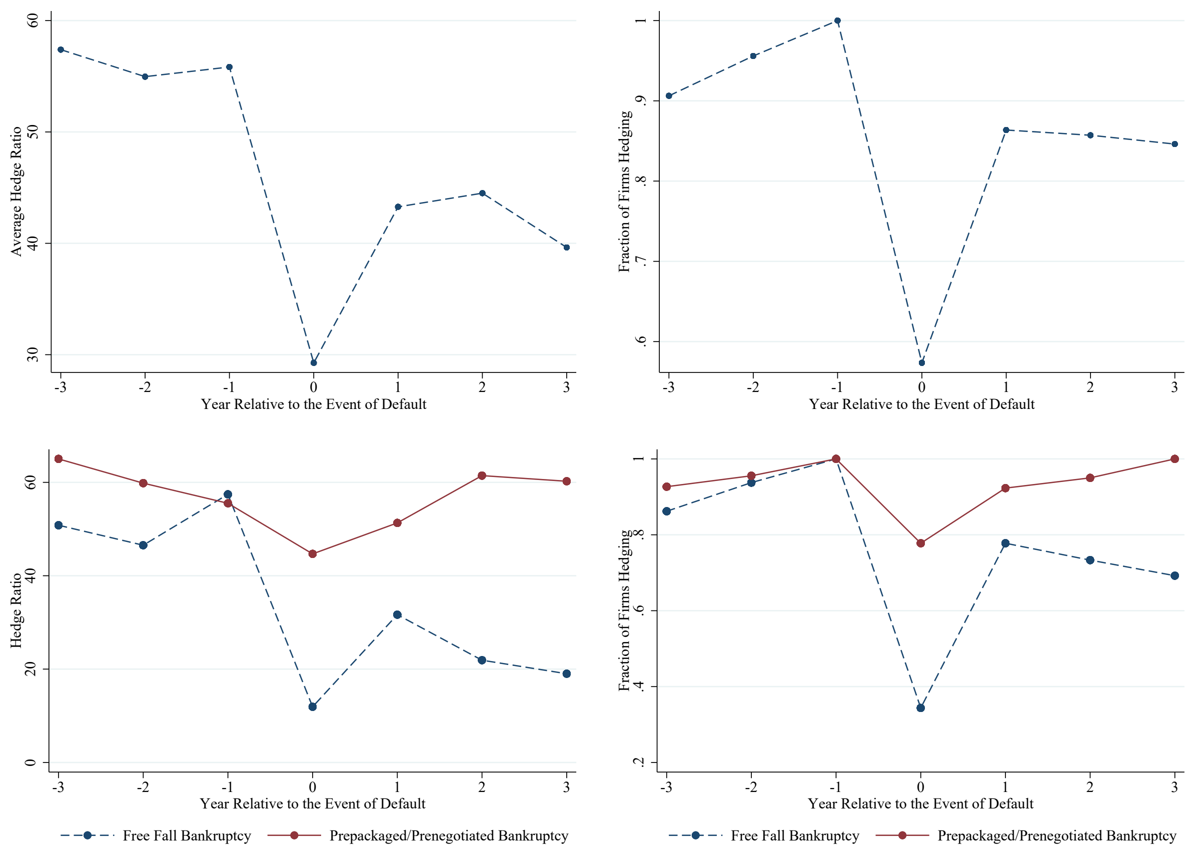
The figure illustrates the evolution of a firm's cash flows and liabilities over time $t \in (0, 1, 2)$, where C_t denotes cash flows, D denotes fixed liabilities, and V_t denotes the value of the derivative portfolio to the firm's counterparty. The probabilities of low cash flow in the first and second 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.



Alt Text: The figure illustrates the dynamics of cash flows and derivative payments in periods 0, 1, and 2, as described in the text, and depicts contingencies that trigger an event of default and liquidation in the model.

Figure 2. Events of Default and Risk Management

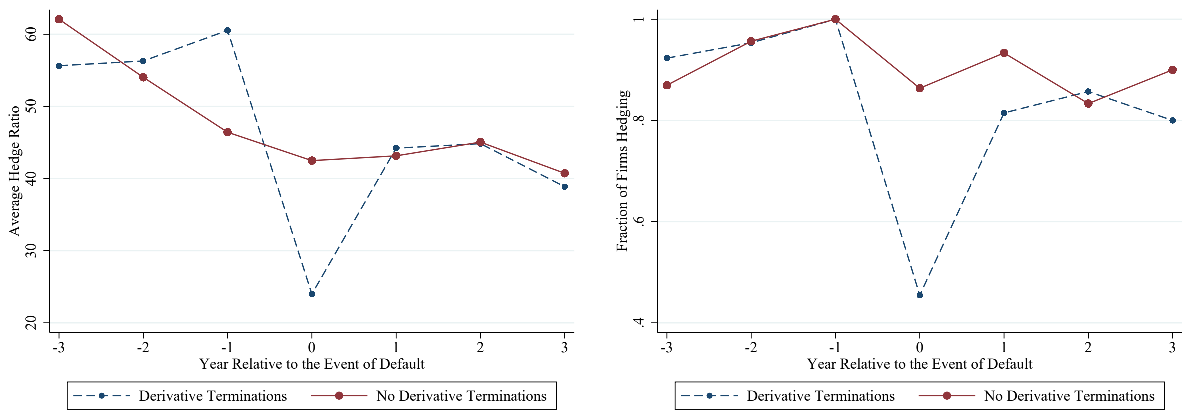
The figure shows the evolution of the average hedge ratios and the fraction of firms hedging the commodity prices around the event of defaults. The top panels show the results for the full sample, and the bottom panels separately show the results for firms that experience a prenegotiated or prepackaged 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.



Alt Text: The figure illustrates the evolution of average hedge ratios and the fraction of firms hedging commodity prices around events of default. The top panels reveal that both the hedge ratio and the fraction of firms hedging decline in the year of the event of default and partially recover in the following year. The bottom panels indicate that these declines are more pronounced for firms undergoing a "free-fall" bankruptcy compared to those experiencing a prenegotiated or prepackaged bankruptcy.

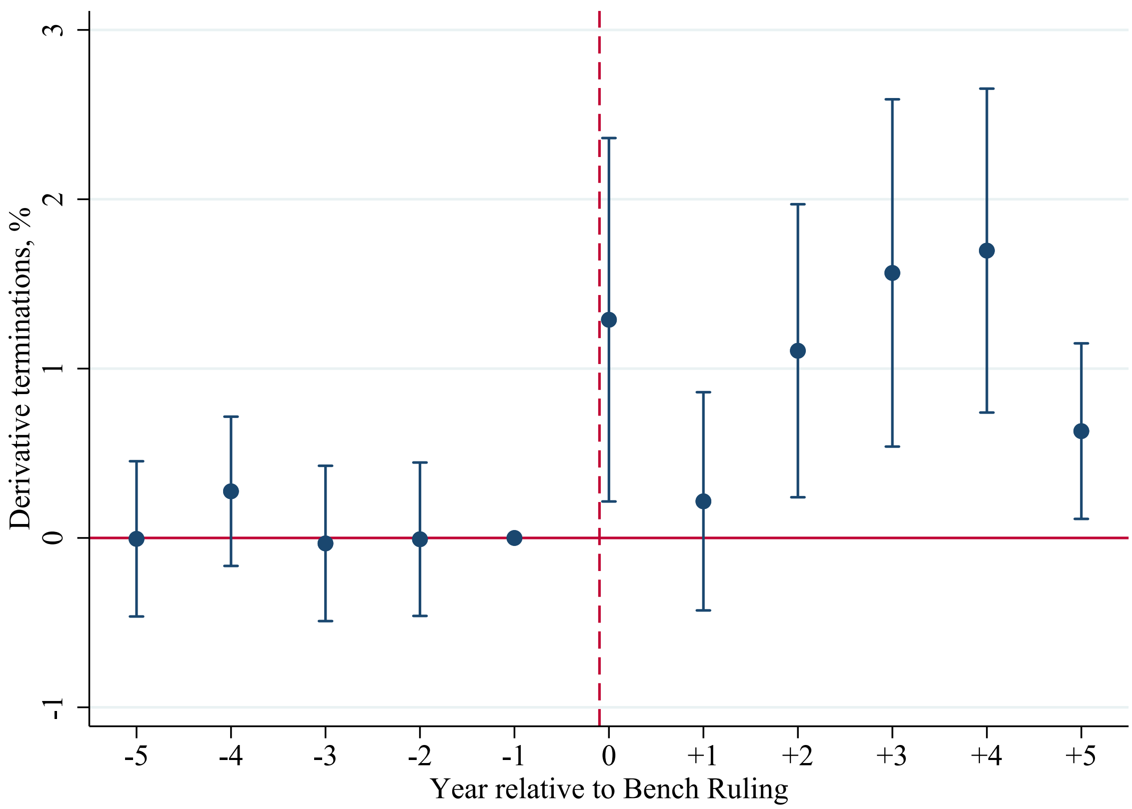
Figure 3. Derivative Terminations and Risk Management

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.



Alt Text: The figure shows that the drops in the hedge ratio and the fraction of firms hedging in the year of the event of default are more pronounced for firms with confirmed derivative terminations.

Figure 3. Figure 4. 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: $Derivative\ Terminations_{it} = \alpha_i + \nu_t + \sum_{k=-5}^{k+5} \beta_k \times NY_{it} \times D_k + \varepsilon_{it}$, 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).



Alt Text: The figure presents a difference-in-differences graph for derivative terminations around the Metavante v. Lehman Brothers court ruling (the "Bench Ruling"), showing that there are no differential trends between firms with New York court jurisdictions and those with non-New York court jurisdictions prior to the Bench Ruling.

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)

6. 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")

7. *"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)

8. *"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)

9. *"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)

10. *"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)

11. *"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)

Appendix B. Proofs

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

$$\begin{aligned} E_H &= (1-p_2)\left(C_1^L + C_2^H - V_1^H - \rho\delta_H - (1-\rho)\,\delta_L - D\right) \\ &\quad + p_2\rho\left(C_1^L + C_2^L - V_1^H - \delta_L - D\right). \end{aligned} \tag{25}$$

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

$$E_T = (1-p_2)\left(C_1^L + C_2^H - V_1^H - D\right), \tag{26}$$

Taking the difference between E_T and E_H yields expression (11) in the proposition. Similar steps for the debt value at date 1 produce the following expressions

$$\mathcal{D}_H = (1-p_2+p_2\rho)\,D + p_2\,(1-\rho)\,(1-\alpha)\left(C_1^L + C_2^L - V_1^H - \delta_H\right), \tag{27}$$

$$\mathcal{D}_T = (1-p_2)\,D + p_2\,(1-\alpha)\left(C_1^L + C_2^L - V_1^H\right). \tag{28}$$

Taking the difference between $\mathcal{D}_T$ and $\mathcal{D}_H$ yields expression (10) in the proposition. Summing up changes in debt (10) and equity (11) gives (12). □

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

$$BC_H = \alpha p_1 p_2 (C_1^L + C_2^L)((1-\rho)^2 + \rho(1-\rho)) = \alpha p_1 p_2 (1-\rho)(C_1^L + C_2^L). \tag{29}$$

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

$$BC_T = \alpha p_1 p_2 (1-\rho)(C_1^L + C_2^L - V_1^H) + \alpha p_1 p_2 \rho (1-\rho)(C_1^L + C_2^L). \tag{30}$$

Taking the difference between BC_T and BC_H produces the first term in (14). Further, the right reduces the ex ante relationship value to the counterparty by

$$p_1(1-\rho)\theta(1-p_2+p_2\rho). \tag{31}$$

By combining the above expression with the change in the bankruptcy costs, we obtain the ex ante firm value change (14). □

Proof of Corollary 1. Take as a benchmark the expected bankruptcy costs of an unhedged firm which is liquidated after cash flows C_1^L and C_2^L

$$BC_U = p_1 p_2 \alpha (C_1^L + C_2^L). \tag{32}$$

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

$$BC_U - BC_H = \alpha p_1 p_2 \rho (C_1^L + C_2^L), \tag{33}$$

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

$$BC_U - BC_T = \alpha p_1 p_2 \left(\rho^2 (C_1^L + C_2^L) + (1-\rho) V_1^H \right), \tag{34}$$

From Assumption 1, it follows $BC_T > BC_H$, 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 include 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. Suppose a firm posts collateral C_0, and the hedging contract has no termination right. The firm is liquidated in two states: (V_1^H, δ_H) and (V_1^L, δ_H). In the first state, the payment to the counterparty exceeds the collateral, while in the second state, it may be above or below the collateral. This implies that the expected bankruptcy costs are

$$\tilde{BC}_H = \alpha p_1 p_2 ((1-\rho)^2 (C_1^L + C_2^L - C_0) + \rho(1-\rho)(C_1^L + C_2^L - \min(C_0, V_1^L + \delta_H))), \tag{35}$$

Suppose the hedging contract has a termination right. The right is exercised at V_1^H and abandoned at V_1^L, so that the expected bankruptcy costs are

$$\tilde{BC}_T = \alpha p_1 p_2 ((1-\rho)(C_1^L + C_2^L - V_1^H) + \rho(1-\rho)(C_1^L + C_2^L - \min(C_0, V_1^L + \delta_H)), \tag{36}$$

Taking the difference between (36) and (35) produces the first term in (19). The second term is derived the same way as in Proposition 2. □

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

$$\begin{aligned} V_1^H + \kappa \Delta \mathcal{D}_1 \quad &> (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta\right) + p_2\rho\left(V_1^H + \delta_L + \theta\right) \\ &+ p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha). \end{aligned} \tag{37}$$

where $\Delta\mathcal{D}_1$ is the change to the debt value given in (10). By simplifying the equation above, we obtain (20). Setting (20) to equality gives the critical value κ^* in (21).
To see that this critical value is interior, set $\kappa = 1$ (derivative counterparty holds *all* debt) in condition (20) and use (13) to show that the right will not be exercised. Formally, the exercise of the right changes the derivative value by

$$\Delta Y_1 = \alpha p_2 (1-\rho)\left(V_1^H + \delta_H\right) - \theta(1 - p_2 + \rho p_2), \text{ so that} \tag{38}$$

$$\Delta E_1 + \Delta\mathcal{D}_1 + \Delta Y_1 = -\alpha p_2 \left(\rho\left(C_1^L + C_2^L\right) - V_1^H\right) - \theta(1 - p_2 + \rho p_2) < 0. \tag{39}$$

Condition (13) implies $\Delta E_1 > 0$, and it follows from above that $\Delta\mathcal{D}_1 + \Delta Y_1 < 0$. □

Proof of Proposition 5. Suppose counterparty A exercises the right at V_1^H. Then, counterparty B follows by exercising if

$$\begin{aligned} V_1^H \;\; &> (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta_B\right) + p_2\rho\left(V_1^H + \delta_L\right) \\ &\quad + p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha). \end{aligned} \tag{40}$$

Note that the fraction of the portfolio owned $1-\gamma$ does not appear above because all terms are proportional to it. Using (3), the condition above simplifies to the one in the proposition. □

Proof of Proposition 6. If both counterparties exercise, then each receives payoff V_1^H per unit of portfolio held. If only one counterparty exercises, then the payoff to that counterparty is V_1^H and payoff to the other counterparty is

$$\begin{aligned} P &= (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta\right) + p_2\rho\left(V_1^H + \delta_L\right) + p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha) \\ &= V_1^H + \alpha p_2(\widehat{V}(\theta) - V_1^H), \end{aligned} \tag{41}$$

where $\widehat{V}(\theta)$ is given in (24). If $V_1^H > \widehat{V}(\theta)$, then from (41) we have $V_1^H > P$. The payoff G to each counterparty if both decide to continue the contracts is given by the RHS of (6) or

$$G = V_1^H + \alpha p_2(1-\rho)\left(V^*(\theta) - V_1^H\right) > V_1^H. \tag{42}$$

The resulting payoffs per unit of derivative portfolio held are given below.

	Exercise (Party A)	Continue (Party A)
Exercise (Party B)	$\underline{V_1^H}, \underline{V_1^H}$	P, V_1^H
Continue (Party B)	V_1^H, P	$\underline{G}, \underline{G}$

This game has two equilibria: one where both parties exercise and obtain payoffs (V_1^H, V_1^H) and another where both parties continue the contract and obtain larger payoffs (G, G). □

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").
Commodity hedger	An indicator variable equal to one if the firm hedges commodity prices during the year (detailed sample).
Hedge ratio	Oil and gas: The sum of the outstanding amounts of oil and gas derivatives for the next year, divided by the next year production measured in the universal MMcfe energy units (%). Airlines: the percentage of fuel expenses hedged. Coal: 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.
Restatement (fraud-related)	An indicator variable equal to one if there is an accounting restatement during the fiscal year and it is either due to fraud or there is an associated SEC investigation (Audit Analytics).
Covenant violation	An indicator variable equal to one if the firm is not in compliance with its covenants in a given year (see Dyreng, Ferracuti, Hills, and Kubic (2022)).
Event of default	An indicator variable equal to one if *Bankruptcy*, *Credit downgrade*, or *Covenant violation* is equal to one.
Firm size	The logarithm of the book value of assets.
Market-to-book	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 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. Variables are defined in Appendix C.

Panel A: Compustat/SEC Sample	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Derivative user	110,264	0.245	0.430	0	0	0
Asset tangibility	158,374	0.299	0.275	0.071	0.201	0.477
Firm size	158,374	5.334	2.529	3.557	5.253	7.083
Market-to-book ratio	158,374	2.258	5.569	0.801	1.226	2.159
Firm ROA	158,374	0.009	0.237	-0.055	0.080	0.145
Book leverage	158,374	0.256	0.404	0.012	0.179	0.366
Bankruptcy	158,374	0.004	0.066	0	0	0
High-cost bankruptcy (free fall)	158,374	0.003	0.051	0	0	0
Low-cost bankruptcy (prepackaged)	158,374	0.002	0.042	0	0	0
Credit downgrade	132,514	0.020	0.141	0	0	0
Restatement (fraud-related)	158,374	0.004	0.063	0	0	0
Covenant violation	103,020	0.018	0.133	0	0	0
Event of default	158,374	0.032	0.175	0	0	0
Default-related words frequency. %	95,794	0.046	0.075	0	0.017	0.049
Derivative terminations, %	158,374	0.428	6.529	0	0	0
Use of exchange-traded futures	95,794	0.119	0.323	0	0	0
NY jurisdiction	139,631	0.072	0.259	0	0	0

Panel B: Reasons for Disclosed Derivative Terminations	*N*	*%*
Merger	54	4.82
Firm bankruptcy	53	4.73
Default, cross-default	14	1.25
Credit rating, covenant violation	9	0.80
Contract breach, misrepresentation	4	0.36
Unspecified	987	87.47
Total	1,121	100.00

Panel C: Detailed Sample	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Commodity hedger	3,219	0.597	0.490	0	1	1
Hedge ratio, %	3,219	31.964	43.220	0	17.000	55.308
Hedge maturity, months	3,252	15.575	18.421	0	12	24
Log hedge maturity	3,252	1.870	1.598	0	2.565	3.219
Bankruptcy	3,252	0.028	0.165	0	0	0
High-cost bankruptcy (free fall)	3,252	0.016	0.125	0	0	0
Low-cost bankruptcy (prepackaged)	3,252	0.012	0.109	0	0	0
Asset tangibility	3,252	0.719	0.218	0.626	0.791	0.879
Firm size	3,252	6.166	2.437	4.450	6.293	7.927
Market-to-book ratio	3,252	1.455	2.705	0.737	1.036	1.525
Firm ROA	3,252	0.062	0.209	-0.001	0.106	0.181
Book leverage	3,252	0.335	0.324	0.135	0.298	0.456
Fuel expense/oper. expenses (airlines)	403	20.222	9.870	13.000	18.695	27.646
Hedge ratio based on supply agreements (coal producers), %	221	74.48	34.42	70.00	89.09	97.00

Panel D: Detailed Sample: Bankruptcies	*N*	*Mean*	*SD*	*p25*	*p50*	*p75*
Derivative terminations	96	0.594	0.494	0	1	1
Hedge ratio, %	95	53.337	47.950	23.446	46.473	69.549
Hedge maturity (months)	95	23.116	14.899	12	24	36
Derivative fair value, $M	95	56.679	204.210	-2.300	5.900	38.000
Counterparties are lenders	64	0.779	0.352	0.500	1	1
Number of counterparties	46	4.957	4.585	1	3	8
May be required to post collateral	81	0.222	0.418	0	0	0
Positive derivative fair value	95	0.684	0.467	0	1	1
High-cost bankruptcy (free fall)	96	0.458	0.501	0	0	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 search of firm's filings, and is equal to zero otherwise. 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)	(7)	(8)
Dep. Variable:	*Derivative Terminations, %*							
Bankruptcy	5.611***	5.595***	6.004***	6.025***				
	[5.01]	[5.00]	[4.51]	[4.54]				
Credit downgrade	0.718***	0.675**	0.455	0.399				
	[2.59]	[2.48]	[1.45]	[1.30]				
Restatement	0.835*	0.876*	0.620	0.665				
(fraud-related)	[1.68]	[1.76]	[1.27]	[1.37]				
Covenant			1.015**	0.983**				
violation			[2.52]	[2.46]				
Firm size	0.140***	0.162***	0.109***	0.133***	0.121***	0.137***	0.187***	0.201***
	[4.58]	[5.23]	[2.91]	[3.43]	[4.69]	[5.25]	[4.02]	[4.42]
Market-to-book	-0.000	-0.001	-0.001	-0.002	-0.001	-0.001	0.000	-0.002
	[-0.18]	[-0.31]	[-0.69]	[-1.02]	[-0.87]	[-0.89]	[0.08]	[-0.63]
Asset tangibility	0.100	0.180	0.074	0.167	0.034	0.094	0.116	0.321
	[0.63]	[1.09]	[0.38]	[0.83]	[0.25]	[0.68]	[0.37]	[0.98]
Firm ROA	-0.274***	-0.309***	-0.283**	-0.320***	-0.228***	-0.269***	-0.313**	-0.336**
	[-2.83]	[-3.23]	[-2.43]	[-2.78]	[-2.73]	[-3.27]	[-2.22]	[-2.43]
Book leverage	0.217***	0.222***	0.175**	0.196**	0.190***	0.200***	0.149	0.139
	[3.03]	[3.11]	[2.15]	[2.40]	[3.27]	[3.43]	[1.61]	[1.48]
High-cost					6.300***	6.232***		
bankruptcy					[4.41]	[4.36]		
Low-cost					5.005***	5.117***		
bankruptcy					[3.42]	[3.50]		
Default-related							4.019***	3.877***
words frequency							[5.98]	[5.90]
Observations	130,788	130,743	101,274	101,230	155,975	155,926	93,623	93,539
R-squared	0.119	0.130	0.131	0.143	0.110	0.121	0.123	0.140
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry*Year FE	No	Yes	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. 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)	-0.447***	-0.350***	-0.588***	
	[-2.93]	[-2.90]	[-4.03]	
High-cost bankruptcy (free fall)	0.292***	0.315***	0.221**	0.217**
	[2.96]	[3.07]	[2.13]	[2.09]
Counterparties are lenders		-0.280**		
		[-2.39]		
Negative derivative fair value				0.261**
				[2.38]
Hedge ratio			0.002*	0.001
			[1.96]	[1.64]
Firm size			0.050	0.047
			[1.29]	[1.13]
Market-to-book ratio			0.491**	0.382
			[2.32]	[1.65]
Asset tangibility			-0.383	-0.307
			[-0.78]	[-0.60]
Book leverage			-0.385*	-0.313
			[-1.67]	[-1.28]
Firm's ROA			0.089	0.072
			[0.93]	[0.82]
Observations	95	64	90	90
R-squared	0.161	0.221	0.198	0.198
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. In each panel, the dependent variable in columns 1-2 is the hedge ratio (%); in columns 3-4 it 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 in columns 5-6 it 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. In Panel B and C, controls all controls from Panel A are included but not shown. 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	-7.538***	-8.090***	-0.190**	-0.238***	-0.047*	-0.066**
	[-2.94]	[-3.14]	[-2.16]	[-2.76]	[-1.74]	[-2.51]
Firm size	6.632***	6.759***	0.268***	0.289***	0.075***	0.081***
	[3.83]	[3.88]	[5.54]	[6.04]	[5.26]	[5.80]
Market-to-book ratio	0.184	0.250	0.000	0.003	-0.000	0.001
	[0.85]	[1.11]	[0.04]	[0.46]	[-0.06]	[0.37]
Asset tangibility	2.517	2.836	0.370	0.380	0.086	0.096
	[0.25]	[0.27]	[1.42]	[1.47]	[0.99]	[1.10]
Firm ROA	-13.238***	-15.055***	-0.132	-0.162	-0.020	-0.018
	[-2.62]	[-2.77]	[-1.05]	[-1.31]	[-0.52]	[-0.48]
Book leverage	-2.690	-2.824	0.136	0.137	0.061**	0.063**
	[-0.93]	[-0.96]	[1.46]	[1.45]	[2.06]	[2.11]
Observations	3,204	3,201	3,237	3,234	3,204	3,201
R-squared	0.537	0.542	0.744	0.753	0.708	0.719
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*	
Bankruptcy	-16.811***	-19.629***	-0.535***	-0.656***	-0.161***	-0.203***
	[-3.11]	[-3.48]	[-2.96]	[-3.55]	[-2.87]	[-3.50]
Observations	3,204	3,201	3,237	3,234	3,204	3,201
R-squared	0.538	0.544	0.746	0.755	0.709	0.721
Controls	Yes	Yes	Yes	Yes	Yes	Yes
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 C.	(1)	(2)	(3)	(4)	(5)	(6)
Dependent Variable:	*Hedge Ratio*		*Hedge Maturity*		*Commodity Hedger*	
High-cost bankruptcy	-19.822**	-23.400***	-0.707***	-0.861***	-0.209***	-0.260***
(free fall)	[-2.51]	[-2.68]	[-2.80]	[-3.23]	[-2.68]	[-3.06]
Low-cost bankruptcy	-13.042*	-15.233**	-0.327	-0.426*	-0.100	-0.136*
(prepackaged)	[-1.86]	[-2.28]	[-1.36]	[-1.83]	[-1.35]	[-1.90]
Observations	3,204	3,201	3,237	3,234	3,204	3,201
R-squared	0.538	0.544	0.746	0.755	0.710	0.721
Controls	Yes	Yes	Yes	Yes	Yes	Yes
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 columns 1 and 2 is the hedge ratio (%); the dependent variable in columns 3 and 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 and 6 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. 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*	
Bankruptcy with	-31.817***	-35.724***	-1.315***	-1.484***	-0.458***	-0.510***
derivative terminations (a)	[-3.99]	[-4.43]	[-4.04]	[-4.49]	[-4.83]	[-5.25]
Bankruptcy without	-9.617*	-11.841**	-0.170	-0.266	-0.018	-0.054
derivative terminations (b)	[-1.71]	[-2.05]	[-0.90]	[-1.40]	[-0.30]	[-0.89]
Firm size	6.403***	6.550***	0.263***	0.285***	0.074***	0.080***
	[3.56]	[3.62]	[5.23]	[5.72]	[4.96]	[5.47]
Market-to-book ratio	0.171	0.240	-0.000	0.003	-0.000	0.001
	[0.78]	[1.04]	[-0.06]	[0.40]	[-0.18]	[0.28]
Asset tangibility	2.524	3.063	0.380	0.397	0.091	0.103
	[0.25]	[0.29]	[1.45]	[1.54]	[1.04]	[1.18]
Firm ROA	-12.709**	-14.828***	-0.122	-0.155	-0.018	-0.017
	[-2.54]	[-2.74]	[-0.98]	[-1.26]	[-0.48]	[-0.46]
Book leverage	-3.768	-4.144	0.107	0.098	0.053**	0.052*
	[-1.27]	[-1.36]	[1.23]	[1.12]	[1.98]	[1.92]
Observations	3,204	3,201	3,237	3,234	3,204	3,201
R-squared	0.540	0.546	0.748	0.758	0.714	0.725
t-stat for (a) − (b)	-2.28**	-2.41**	-3.04***	-3.19***	-3.92***	-3.98***
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. 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*	*Hedge Ratio*	*Hedge Maturity*	*Commodity Hedger*
Bankruptcy 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]
Bankruptcy 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)	(5)
Dependent Variable:	*Use of Exchange-Traded Futures*				
Event of default	0.010*				
	[1.75]				
Bankruptcy		0.047**			
		[2.42]			
Default-related words frequency			0.351***		
			[18.89]		
Bankruptcy with derivative terminations				0.127***	
				[2.61]	
Bankruptcy with no derivative terminations				0.036*	
				[1.79]	
Event of default with derivative terminations					0.046**
					[2.27]
Event of default with no derivative terminations					0.007
					[1.18]
Firm size	0.015***	0.015***	0.016***	0.015***	0.015***
	[6.58]	[6.71]	[7.05]	[6.69]	[6.57]
Market-to-book ratio	0.000	0.000	0.001**	0.000	0.000
	[1.55]	[1.56]	[1.98]	[1.56]	[1.55]
Asset tangibility	-0.008	-0.008	-0.011	-0.008	-0.008
	[-0.51]	[-0.50]	[-0.70]	[-0.51]	[-0.51]
Firm ROA	-0.017***	-0.017***	-0.014**	-0.017***	-0.017***
	[-2.65]	[-2.70]	[-2.13]	[-2.69]	[-2.63]
Book leverage	0.005	0.006	0.002	0.006	0.005
	[1.30]	[1.50]	[0.37]	[1.49]	[1.29]
Observations	93,623	93,623	93,623	93,623	93,623
R-squared	0.598	0.598	0.602	0.598	0.598
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	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	0.752***	0.643***	0.739***	0.010	0.009	0.008
	[3.89]	[3.42]	[3.14]	[0.98]	[0.87]	[0.70]
NY×Post Metavante	1.030***	0.998***	1.318***	0.000	-0.005	0.007
	[3.81]	[3.56]	[3.82]	[0.03]	[-0.31]	[0.41]
Bankruptcy				-0.080	-0.090*	-0.096*
				[-1.57]	[-1.77]	[-1.65]
Bankruptcy				0.009	0.020	0.042
×Post Metavante				[0.14]	[0.32]	[0.58]
Bankruptcy×NY				0.224**	0.236**	0.232**
				[2.17]	[2.17]	[2.09]
Bankruptcy×NY				-0.328**	-0.351**	-0.402**
×Post Metavante				[-2.37]	[-2.31]	[-2.51]
Firm size			0.241**			0.051***
			[2.45]			[10.48]
Market-to-book ratio			-0.004			0.000
			[-0.88]			[0.84]
Asset tangibility			0.044			0.034
			[0.07]			[1.37]
Firm ROA			-0.498*			-0.019*
			[-1.87]			[-1.78]
Book leverage			0.152			0.043***
			[0.81]			[7.38]
Observations	54,287	54,255	41,198	51,185	51,151	40,431
R-squared	0.143	0.158	0.168	0.759	0.767	0.773
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

The Internet Appendix presents additional theoretical and empirical results, as explained in the main text.

IA.I. Partial Termination of Hedging Portfolio

Suppose the counterparty has multiple contracts under the master agreement and can choose to terminate a fraction λ of them. Due to the linearity of the problem, there are three potential optima to consider: no contract terminations, termination of all outstanding contracts, or termination of a fraction λ_c of the portfolio, leaving just enough of the hedging portfolio for the firm to avoid liquidation in the critical state, (V_1^H, δ_L). The condition for λ_c follows from the liquidation policy outlined in the text:

$$C_1^L + C_2^L - D - (1-\lambda_c)(V_1^H + \delta_L) = 0. \tag{43}$$

Case 1: Partial Termination Proportionally Reduces Relationship Value. We first consider the scenario when terminating fraction λ of the portfolio reduces relationship value proportionally by $\lambda\theta$. The condition for all-or-nothing exercise, given in the main text, is

$$\begin{aligned} V_1^H > Y_1 \equiv & (1-p_2)\left(V_1^H + \rho\delta_H + (1-\rho)\delta_L + \theta\right) \\ & + p_2\rho\left(V_1^H + \delta_L + \theta\right) + p_2(1-\rho)\left(V_1^H + \delta_H\right)(1-\alpha). \end{aligned} \tag{44}$$

When the counterparty instead considers to terminate a smaller fraction $\lambda \leq \lambda_c$ of contracts, without affecting the firm's liquidation probability, it chooses λ to maximize

$$\max_{\lambda\in[0,\lambda_c]} \lambda V_1^H + (1-\lambda)Y_1. \tag{45}$$

Because the problem is linear, it is optimal to set λ as high as possible, i.e., $\lambda^* = \lambda_c$. However, it is even better for the counterparty to terminate the whole portfolio because $V_1^H > \lambda_c V_1^H + (1-\lambda_c)Y_1$. Thus, partial portfolio termination is suboptimal in this case.

Case 2: Partial Termination Preserves Full Relationship Value. We now consider an alternative scenario when the counterparty captures the full relationship value θ as long as some contracts remain with the firm. For $\lambda < \lambda_c$, the counterparty's value increases linearly in λ due to decreasing bankruptcy costs, implying $\lambda^* = \lambda_c$. For $\lambda > \lambda_c$, the counterparty maximizes

$$\max_{\lambda \in (\lambda^*, 1]} V_1^H + (1 - p_2)\theta - (1 - \lambda)\alpha p_2 \left(V_1^H + \rho\delta_L + (1 - \rho)\delta_H \right), \tag{46}$$

which yields an optimal solution $\lambda^* = 1 - \epsilon$, where ϵ is arbitrarily small. Finally, the partial portfolio termination is preferred by the counterparty to the termination of all contracts if

$$V_1^H \quad < \quad V_1^H + (1 - p_2 + p_2\rho)\theta - (1 - \lambda_c)\,\alpha p_2(1 - \rho)\,(V_1 + \delta_H)\,, \tag{47}$$

which simplifies to

$$V_1^H \quad < \quad \frac{V^* + \lambda_c \delta_H}{1 - \lambda_c}. \tag{48}$$

The condition above can be satisfied even if $V_1^H > V^*$, which implies that partial portfolio termination can be optimal.

IA.II. Lower Bankruptcy Costs for Derivative Counterparties

In this extension, we consider a scenario in which the bankruptcy costs faced by the firm's derivative counterparties are lower than those faced by other claimholders. Specifically, we assume that in the event of firm liquidation, the value of the derivative payable to the counterparty, V_2, is subject to proportional costs $\alpha_h < \alpha$, where α represents the bankruptcy costs imposed on other asset holders. Empirically, the costs α_h and α tend to be positively correlated and we incorporate this correlation later. The counterparty terminates the contract following a default at date 1 if

$$V_1^H > \frac{\theta(1 - p_2 + \rho p_2)}{\alpha_h p_2(1 - \rho)} - \delta_H. \tag{49}$$

Lower bankruptcy costs imposed on derivative counterparties, α_h, reduce the incentive to exercise the right. We next consider how results in key propositions in the main text are modified. The total bankruptcy costs without the termination right are

$$\begin{aligned} BC_H = {} & \alpha_h p_1 p_2 (V_1^H + \delta_H)(1 - \rho)^2 + \alpha p_1 p_2 (C_1^L + C_2^L - V_1^H - \delta_H)(1 - \rho)^2 \\ & + \alpha p_1 p_2 (C_1^L + C_2^L - V_1^L - \delta_H)\rho(1 - \rho) + \alpha_h p_1 p_2 (V_1^L + \delta_H)\rho(1 - \rho). \end{aligned} \tag{50}$$

When the right is included and exercised in default, the total bankruptcy costs are

$$BC_T = \alpha p_1 p_2 (1-\rho)(C_1^L + C_2^L - V_1^H) \\ + \alpha p_1 p_2 (C_1^L + C_2^L - V_1^L - \delta_H)\rho(1-\rho) + \alpha_h p_1 p_2 (V_1^L + \delta_H)\rho(1-\rho). \quad (51)$$

Then the results in Proposition 2 will be modified as follows. The inclusion of the termination right increases the expected bankruptcy costs,

$$\Delta BC_0 = \alpha p_1 p_2 (1-\rho)\left(\rho(C_1^L + C_2^L) - V_1^H\right) + (\alpha - \alpha_h) p_1 p_2 (V_1^H + \delta_H)(1-\rho)^2 > 0. \quad (52)$$

The first term is positive because $\rho(C_1^L + C_2^L) > V_1^H$ and the second term is positive because $\alpha > \alpha_h$. Termination right decreases the ex ante firm value

$$\Delta \mathcal{V}_0 = -\Delta BC_0 - \theta p_1 (1-\rho)(1 - p_2 + p_2 \rho) < 0. \quad (53)$$

To examine how the results in Corollary 1 change with the differential bankruptcy costs, we assume that costs are proportional, $\alpha_h = \beta\alpha$, with $\beta < 1$. Suppose the threshold bankruptcy cost for the exercise is α^*. With the termination right, the firm's expected benefits of hedging are given by

$$H_0 = p_1 p_2 \alpha \rho (C_1^L + C_2^L) + \alpha(1-\beta) p_1 p_2 (1-\rho)\left(\delta_H + (1-\rho)V_1^H + \rho V_1^L\right) \\ + \theta(1 - p_1 p_2 (1-\rho)), \text{if } \alpha \leq \alpha^*, \quad (54)$$

$$H_0 = p_1 p_2 \alpha \left(\rho^2 (C_1^L + C_2^L) + (1-\rho)V_1^H\right) + \alpha(1-\beta) p_1 p_2 (V_1^L + \delta_H)\rho(1-\rho) \\ + \theta(1 - p_1(1-\rho)(1 + p_2\rho)), \text{if } \alpha > \alpha^*, \quad (55)$$

where H_0 has a downward jump at $\alpha = \alpha^*$.

Proof. The first terms of (54) and (55) are derived as the change in expected bankruptcy costs relative to that of unhedged firm. Specifically, when $\alpha \leq \alpha^*$, bankruptcy costs are lowered by $BC_U - BC_H$, where BC_H is given in (50), and when $\alpha > \alpha^*$, bankruptcy costs are lowered by $BC_U - BC_T$, where BC_T is given in (51). In (52) we show that activation of the right increases expected bankruptcy costs $BC_T > BC_H$ and we can apply this result here. The firm's benefit from hedging decreases when the bankruptcy costs parameter α increases from below to above the threshold α^*. Additionally, the relationship value equals $\theta(1-p_1p_2(1-\rho))$ when $\alpha \leq \alpha^*$, and $\theta(1-p_1(1-\rho)(1+p_2\rho))$ when $\alpha > \alpha^*$, resulting in the additional loss of value with the termination.

In sum, when lower bankruptcy costs are imposed on derivative counterparties, the termination right is less likely to be exercised than in the base model, it still decreases firm value if exercised, and higher bankruptcy costs can lower a firm's incentive to hedge. $\square$

IA.III. Asymmetric Information

Here we demonstrate that contract termination rights can, under certain conditions, mitigate the adverse selection problem. Specifically, we show that while low-risk firms may be unable to hedge without contract termination rights due to the prohibitively high cost of hedging contracts, they would be able to do so if such rights are in place. There are two types of firms: low-bankruptcy-cost firms, $\alpha = \underline{\alpha}$, and high-bankruptcy-cost firms, $\alpha = \overline{\alpha}$. Firm type is private information at date 0 and becomes public at date 1. The counterparty assigns equal prior probabilities to both firm types.

The value of the hedging contract will depend on the type of the firm. If there is no termination right, then the value to the counterparty at date 0 is

$$Y_H = \theta - p_1p_2(1-\rho)\left(\theta + \alpha\left(\delta_H + \rho V_1^L + (1-\rho)\, V_1^H\right)\right). \tag{56}$$

Similarly, the value to the counterparty of the contracts with the termination right is

$$Y_T = \theta - p_1(1-\rho)\left(\alpha p_2 \rho \left(V_1^L + \delta_H\right) + \theta\left(1 + p_2\rho\right)\right). \tag{57}$$

Next, we fix α and derive the value of hedging to the firm, measured as the reduction in expected bankruptcy costs, net of costs of entering hedging contract, $-Y_0$. If the contract has no termination right, then hedging decreases bankruptcy costs to debtholders by

$$B_H = \alpha p_1 p_2 \left[\rho(C_1^L + C_2^L) + (1-\rho)(\delta_H + \rho V_1^L + (1-\rho)V_1^H)\right]. \tag{58}$$

Using similar steps, we show that, for the contract that includes a termination right

$$B_T = \alpha p_1 p_2 \left[\rho^2 \left(C_1^L + C_2^L\right) + (1-\rho)V_1^H + \rho(1-\rho)(V_1^L + \delta_H)\right]. \tag{59}$$

Next, we consider a low-bankruptcy cost firm, $\alpha = \underline{\alpha}$, and identify conditions, under which this firm would not want to hedge without the termination right (i.e., the pooling equilibrium is not sustained), but would hedge with the termination right. Using the linearity of $Y(\alpha)$, we write these conditions as:

$$B_H(\underline{\alpha}) + Y_H\left(\left(\underline{\alpha} + \overline{\alpha}\right)/2\right) < 0, \tag{60}$$

$$B_T(\underline{\alpha}) + Y_T\left(\left(\underline{\alpha} + \overline{\alpha}\right)/2\right) > 0. \tag{61}$$

We are interested in the existence of a space of variables where conditions above are not mutually exclusive. Denoting by $p_L \equiv p_1 p_2(1-\rho)$ the probability of liquidation, we have

$$\theta(1-p_L) + \underline{\alpha}\rho p_1 p_2 (C_1^L + C_2^L) < p_L \frac{\overline{\alpha} - \underline{\alpha}}{2}\left(\delta_H + \rho V_1^L + (1-\rho)V_1^H\right), \tag{62}$$

$$\theta - \theta p_1(1-\rho)(1+p_2\rho) + \underline{\alpha} p_1 p_2 \rho^2 \left(C_1^L + C_2^L\right) + \underline{\alpha} p_L V_1^H > p_L \frac{\overline{\alpha} - \underline{\alpha}}{2}\rho\left(V_1^L + \delta_H\right) \tag{63}$$

Consider the differences between the left- and right-hand sides of the above expressions:

$$\Delta RHS = p_1 p_2 (1-\rho)^2 \left(V_1^H + \delta_H\right)\frac{\overline{\alpha} - \underline{\alpha}}{2} > 0, \tag{64}$$

$$\Delta LHS = \theta p_1 p_2 \rho (1-\rho) + \underline{\alpha} p_1 p_2 (1-\rho)\left[\rho(C_1^L + C_2^L) - V_1^H\right] > 0, \tag{65}$$

The ΔRHS can be independently varied using the difference $(\overline{\alpha} - \underline{\alpha})$, while ΔLHS can be independently varied using θ and $C_1^L + C_2^L$. We conclude that there is a space of parameters where (62) is simultaneously satisfied. In sum, it is possible to have an example of a pooling equilibrium that is only sustainable when the contract includes a termination right.

Table IA.1. Events of Default with Derivative Terminations and Without (Detailed Sample)

The table reports the estimates of the OLS regressions. The dependent variable in columns 1 and 2 is the hedge ratio (%); the dependent variable in columns 3 and 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 and 6 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. 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	-25.540***	-28.659***	-0.971***	-1.114***	-0.298***	-0.346***
derivative terminations (a)	[-4.02]	[-4.47]	[-4.47]	[-5.01]	[-4.43]	[-4.91]
Event of default with no	-3.220	-3.267	-0.006	-0.036	0.013	-0.000
derivative terminations (b)	[-1.28]	[-1.35]	[-0.07]	[-0.41]	[0.47]	[-0.01]
Firm size	6.661***	6.822***	0.269***	0.292***	0.076***	0.082***
	[3.79]	[3.84]	[5.51]	[6.01]	[5.21]	[5.74]
Market-to-book ratio	0.181	0.250	0.000	0.003	-0.000	0.001
	[0.83]	[1.09]	[0.02]	[0.45]	[-0.07]	[0.35]
Asset tangibility	2.556	2.961	0.371	0.386	0.086	0.098
	[0.25]	[0.28]	[1.41]	[1.48]	[0.99]	[1.11]
Firm ROA	-12.723**	-14.648***	-0.108	-0.142	-0.013	-0.013
	[-2.50]	[-2.68]	[-0.87]	[-1.15]	[-0.34]	[-0.34]
Book leverage	-2.541	-2.646	0.143	0.145	0.063**	0.065**
	[-0.89]	[-0.91]	[1.56]	[1.56]	[2.15]	[2.19]
Observations	3,204	3,201	3,237	3,234	3,204	3,201
R-squared	0.540	0.545	0.748	0.758	0.712	0.724
t-stat for $(a) - (b)$	-3.27***	-3.71***	-4.13***	-4.51***	-4.28***	-4.91***
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 IA.2. Placebo Test: Hedging with Derivatives and Hedging with Supply Agreements (Robustness)

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. 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	-23.866***	-0.663	-0.269**	-0.407	-0.104	-0.008
derivative terminations (a)	[-3.35]	[-1.30]	[-2.13]	[-0.14]	[-0.56]	[-0.46]
Event of default with no	3.901	0.279	-0.000	-2.579	-0.252	-0.052
derivative terminations (b)	[0.81]	[1.34]	[-0.00]	[-0.70]	[-1.02]	[-0.99]
Firm size	7.999	-0.025	0.035	-3.164	0.061	-0.008
	[1.28]	[-0.08]	[0.38]	[-1.56]	[0.47]	[-0.94]
Market-to-book ratio	-0.033	-0.003	-0.000	-0.057	0.000	-0.000
	[-0.44]	[-0.67]	[-0.26]	[-0.82]	[0.24]	[-0.09]
Asset tangibility	17.180	1.077	0.215	-1.850	-0.224	-0.019
	[0.99]	[1.32]	[1.00]	[-0.20]	[-0.66]	[-0.52]
Firm ROA	-9.441	0.833	0.102	4.378	-0.042	-0.027
	[-0.95]	[1.09]	[0.39]	[0.68]	[-0.15]	[-0.95]
Book leverage	15.782	1.308**	0.318	3.196	0.137	0.016
	[1.61]	[2.59]	[1.58]	[0.51]	[0.39]	[0.63]
Observations	209	229	209	217	204	217
R-squared	0.730	0.711	0.743	0.932	0.939	0.949
t-stat for $(a) - (b)$	-3.23***	-1.71*	-2.13***	0.46	0.48	0.80
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Hedging type		Diesel Derivatives			Coal Supply Agreements	

Table IA.3. 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	0.246	0.267	0.360
Derivative terminations	0.276	0.866	0.055*
Firm size	5.218	5.324	0.455
Market-to-book ratio	1.233	1.335	0.383
Firm ROA	0.018	0.015	0.800
Book leverage	0.266	0.253	0.605
Asset tangibility	0.184	0.319	0.000***

Table IA.4. 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	35.30
Asset sale or spin off	82	2.94
Purchase agreement, transaction, securitization	43	1.54
Exchange rates or interest rates dynamics	36	1.29
Hedge ineffectiveness	23	0.83
Accounting or regulation	15	0.54
Lender requirements	8	0.29
Liquidity reasons	6	0.22
Other reasons	81	2.90
Unspecified	1,508	54.15
Total	2,785	100.00

IA.5. 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. 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	-0.004	-0.004	-0.004
	[-0.75]	[-0.67]	[-0.56]
NY×Post Metavante	0.002	0.001	0.003
	[0.40]	[0.21]	[0.58]
Firm size			0.003**
			[2.18]
Market-to-book ratio			0.000
			[0.40]
Asset tangibility			0.007
			[0.87]
Firm ROA			-0.003
			[-0.79]
Book leverage			0.004**
			[2.52]
Observations	54,262	54,230	41,178
R-squared	0.190	0.207	0.219
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry*Year FE	No	Yes	Yes

Table IA.6. 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. 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	-37.135***	-0.897***	-0.271***
oil return	[-3.76]	[-3.63]	[-3.64]
Bankruptcy×Negative 1-month	-9.046	-0.472	-0.141
oil return	[-0.90]	[-1.24]	[-1.35]
Firm size	6.430***	0.279***	0.077***
	[3.43]	[5.45]	[5.21]
Market-to-book ratio	0.314	0.003	0.000
	[0.90]	[0.23]	[0.05]
Asset tangibility	3.266	0.538*	0.142
	[0.28]	[1.90]	[1.52]
Firm ROA	-15.368***	-0.228*	-0.023
	[-2.66]	[-1.77]	[-0.59]
Book leverage	-5.307	0.070	0.048*
	[-1.59]	[0.77]	[1.72]
Observations	2,557	2,570	2,557
R-squared	0.518	0.748	0.720
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes