# No-fault Default, Chapter 11 Bankruptcy, and Financial Institutions*

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**Abstract**

This paper analyzes the costs and benefits of a no-fault-default debt structure as an alternative to the typical bankruptcy process. We show that the deadweight costs of bankruptcy can be avoided or substantially reduced through no-fault-default debt, which permits a relatively seamless transfer of ownership from shareholders to bondholders in certain states of the world. We show that potential costs introduced by this scheme due to risk shifting can be attenuated via convertible debt, and we discuss the relationship of this to bail-in debt and contingent convertible (CoCo) debt for financial institutions. We then explore how, despite the advantages of no-fault-default debt, there may still be a functional role for the bankruptcy process to efficiently allow the renegotiation of labor contracts in certain cases. In sharp contrast to the human-capital-based theories of optimal capital structure in which the renegotiation of labor contract in bankruptcy is a cost associated with leverage, we show that it is a benefit. The normative implication of our analysis is that no-fault-default debt, when combined with specific features of the bankruptcy process, may reduce the deadweight costs associated with bankruptcy. We discuss how an orderly process for transfer of control and a predetermined admissibility of renegotiation of labor contracts can be a useful tool for resolving financial institution failure without harming financial stability.

**Keywords:** Bankruptcy, Default, Chapter 11, Capital Structure, Labor Contracts, Human Capital, Financial Institutions

**JEL Classification:** D21, G21, G23, G32, G33, G38, K12, L22

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# 1 Introduction

Chapter 11 bankruptcy is a costly process for firms. On average, it is time-consuming and dissipates a significant fraction of firm value.[1] Moreover, a significant fraction of firms that enter Chapter 11 experience such a significant impairment to their value that they end up liquidating eventually (see Morrison (2007), for example). This means that the purported benefits of corporate leverage in reducing agency costs (e.g. Hart and Moore (1995), Jensen (1986), and John and Senbet (1988)) and generating tax shield benefits carry with them significant private and social costs.[2] These costs are potentially even more significant for financial institutions and have ramifications for financial stability. For example, the collapse of Lehman Brothers and its bankruptcy in 2008 sent shock waves through global financial markets (see, e.g., Brunnermeier (2009)). These costs are observed for financial and non-financial firms despite the fact that, although higher leverage elevates the probability of default, there is no *a priori* reason for defaults by themselves to impose any social costs.[3]

Absent a resource-consuming process like Chapter 11, default would—in principle—simply transfer control of the firm from shareholders to bondholders (see Merton (1990, 1992)). However, numerous real-world complications make the transfer of control in bankruptcies not as seamless. In part due to violation of the absolute priority rule (APR) and other "me-first" rules (e.g. Franks and Torous (1989) and Weiss (1990)) and in part due to coordination problems among creditors with heterogeneous preferences over restructuring plans, there is considerable room for bargaining among different stakeholders. Such bargaining and

[1] Franks and Torous (1999) document that the average bankruptcy takes 2.7 years, whereas Weiss (1996) estimates it to be 2.5 years. Bris, Welch, and Zhu (2006) examine smaller firms and find that the average Chapter 11 proceeding takes 2.3 years. Bharath, Panchapegesan, and Werner (2014) show that the average time for Chapter 11 bankruptcy proceedings declined to 16 months during 2000-2005. Estimates of value dissipation leading up to and during bankruptcy proceedings also vary. Branch (2002) estimates it at 25-30% of firm value. Altman (1984) estimates that the combined direct and indirect costs of bankruptcy are on average 17% of firm value. Andrade and Kaplan (1998) estimate that the net costs of financial distress range from 10% to 20% of firm value. See Hotchkiss et al. (2008) for a review.

[2] This assumes that some firms that liquidate mainly because of the value impairment in Chapter 11 would have viably created socially valuable goods like output and employment had they not suffered this impairment.

[3] Bankruptcies and liquidations also impose social costs through adverse spillover effects on other firms in the geographical vicinity of the failing firms. See Bernstein et al. (2019) for empirical evidence.

the possibly inefficient outcomes that result from it generate a variety of deadweight losses.[4]

Merton (1990, 1992) proposed the idea of "no-fault default" on debt as a possible way to achieve the benefits of high leverage without the deadweight costs of bankruptcy. The proposal was in the form of an example. The goals of this paper are threefold. First, we formalize the no-fault default debt idea in a simple model to highlight the conditions under which the proposed solution works. We also add an agency problem between shareholders and bondholders and show that the no-fault default debt solution without bankruptcy still works if a convertible feature is added to the debt. We connect this feature to existing practices and proposals for dealing with distressed financial institutions. Second, we ask: under what conditions might Chapter 11 bankruptcy still serve a useful economic role? Third, we discuss the overall implications of our analysis for financial institutions, regulation and financial stability.

In terms of the first goal, we develop a simple model in which we use the analogy of a covered call option to show how bankruptcy costs can be avoided with no-fault-default debt. This model is based on Merton (1992), and is then extended to show how risk-shifting moral hazard associated with debt (e.g. Jensen and Meckling (1976)) can be attenuated by adding a convertible feature as in Green (1984). We then discuss how this solution can be used in the context of bail-in debt and contingent convertible (CoCo) bonds for financial institutions.[5] The basic idea is that while CoCos convert to equity only when the financial institution is distressed, the convertible option for bondholders in our model also kicks in when the institution is doing well. This serves the dual purpose of attenuating risk-shifting moral hazard and infusing equity in a distressed financial institution in some states as with CoCos.

[4]See Wruck (1990), Gilson, John, and Lang (1990), and Gertner and Scharfstein (1991) for a discussion of these disruptions.

[5]See Lewrick, Serena-Garralda, and Turner (2019) for empirical evidence on the pricing effect of bail-in debt. In a banking context, bail-in debt gives regulators the power to impose losses on creditors during times of stress, so as to reduce the taxpayer losses associated with bailouts. A related concept is that of securities called contingent convertibles (CoCos). This is convertible debt that converts to equity at predetermined terms when the bank is in distress. See, for example, Fiordelisi, Pennacchi, and Ricci (2020) for evidence on how CoCos impact downside risk measures.

In terms of the second goal, to address the question of the conditions under which Chapter 11 serves a useful role, we use a feature of Chapter 11 that is not directly related to ex post bargaining among financiers or violations of APR. This feature permits the invalidation of previously-negotiated labor contracts in bankruptcy.[6] We provide sufficient conditions under which it is ex post efficient to renegotiate the manager's contract to provide better incentives in the state of nature the firm finds itself in. However, the manager may prefer to not renegotiate, even though the new contract satisfies the manager's participation constraint and leads to higher firm value. Thus, if the contract cannot be legally invalidated, the firm is stuck with an inefficiency. Chapter 11 provides a way out—it allows the financiers who are in control to invalidate the previous contract and offer the manager a new one that leads to higher firm value.

While this shows that there are conditions under which Chapter 11 can serve a useful role even with no-fault-default debt, it also shows that the deadweight costs of bankruptcy in Chapter 11 are unnecessary. Rather, having a simple feature that transfers control from shareholders to bondholders always invalidates or permits renegotiation of labor contracts, with none of the other features of Chapter 11, would deliver the efficiency we highlight. That is, while our analysis has the positive flavor of justifying an institutional feature of Chapter 11, it also has the normative message that the main benefit of Chapter 11 highlighted by our analysis can be had without the bankruptcy costs of leverage associated with the other features of Chapter 11 (as practiced).

Finally, in terms of our third goal, we discuss the implications of our analysis for financial institution regulation and financial stability. The issues of convertible debt and labor contract renegotiability are relevant not only for bankruptcy redesign for financial institutions in

[6]Indeed, this feature can even be used strategically by firms as a way to reduce labor costs (e.g. Jaggia and Thakor (1994)). For bankruptcy purposes, employment contracts become part of the property that is the bankruptcy estate. Once the firm files for bankruptcy, the trustee (the debtor in possession in Chapter 11) gains control of the bankruptcy estate and may either assume or reject the firm's previously-negotiated bankruptcy contracts via "ipso facto" clauses. While there is some legal dispute over how labor contracts can be invalidated, a recent court ruling reaffirmed that the Bankruptcy Code permits an employer to escape collective bargaining agreements under some circumstances. See Dietrich (2016).

general, but also for the resolution of failed deposit-insured banks by the FDIC and the design of deposit insurance pricing schemes.

Our paper is related to the literature on the costs and benefits of bankruptcy. Many papers view restructuring and bankruptcy as synonymous (e.g. Asquith, Gertner, and Scharfstein (1994) and Becker and Josephson (2016)), some papers view these as distinct and complementary (e.g. Donaldson et al. (2020)). Other papers posit improving the design of the corporate bankruptcy process by altering priority rules (e.g. Ayotte and Ellias (2020), Bebchuk and Fried (1996), and Casey (2011)).

In our paper, disagreement over restructuring plans and coordination failures among multiple creditors are absent. Moreover, rather than focusing on how to improve Chapter 11 in terms of altering priority rules pertaining to restructuring plans and investments, we highlight an *alternative* to Chapter 11 that uses one specific feature of Chapter 11 that could simply be incorporated into all contracts and then used in conjunction with no-fault-default debt to avoid the deadweight costs of bankruptcy.

Our paper provides a novel perspective on the role of labor contract renegotiability in bankruptcy. In the literature on human capital concerns in optimal capital structure theory, the fact that labor contracts can be invalidated in bankruptcy is a *cost* of leverage that is traded off against some benefit of leverage like debt tax shields to arrive at an optimal capital structure. See Jaggia and Thakor (1994) and Berk, Stanton, and Zechner (2010). The basic idea in Jaggia and Thakor (1994), for example, is that firms are attempting to incentivize managers to not only work hard but also allocate their total effort across marketable human capital development and firm-specific human capital development in a particular way. Managers have an incentive to underinvest in firm-specific human capital because it can be lost at a future date if the manager is fired for a low output that reveals low ability. To counter this, the firm writes long-term contracts that protect managers against firing and provide downward-rigid wages. However, the bondholders' (or the firm's) ability to invalidate these contracts in bankruptcy weakens the value of a long-term contract to the manager, and thus lowers investment in firm-specific human capital. The consequent reduction in firm value is a cost of leverage. What we show is that this contract renegotiability feature of Chapter 11 also has a benefit in terms of achieving a better ex post realignment of managerial incentives when control transfers from shareholders to bondholders. This does not negate the ex ante cost of leverage modeled in the human-capital-based capital structure theories. Rather, it highlights a previously-unrecognized but potentially offsetting ex post benefit.

Our paper is also related to the issue of the role of contingent convertible debt and resolution of failing financial institutions. See, for example, Fiordelisi, Pennacchi, and Ricci (2020), Kim (2020), and Lewrick, Serena-Garralda and Turner (2019). It is also related to deposit insurance pricing and moral hazard (e.g. Merton (1977)).

The rest of this paper is structured as follows. In Section 2, we present a simple example of no-fault-default debt with a highly stylized model to show how bankruptcy can be avoided. This section also includes an analysis of convertible debt and a discussion of bail-in debt and CoCos. In Section 3, we add a further complication to the model which leads to an efficiency need for labor contract renegotiation and circumstances under which the manager may refuse. This provides an economic rationale for the labor contract renegotiability feature of Chapter 11. Section 4 discusses the implications of the analysis for financial stability and financial institution regulation. Section 5 concludes.

## 2 A Simple Model of No-fault-default Debt

This section has three parts. In the first part, we present a modified version of an example from Merton (1992) to motivate the idea of no-fault-default debt. In the second part, we add moral hazard and explain how convertible no-fault-default debt—which provides options to both shareholders and bondholders—can resolve this moral hazard. In the third part, we discuss the connection of our proposed scheme to bail-in debt and CoCos for banks.

## 2.1 No-fault-default Debt: An Example

The purpose of the no-fault default structure is to provide the tax and corporate-control advantages of high-leverage financing while minimizing the cost of financial distress to the operating company.

Rather than analyze general debt structures, we focus here on the specific case of a firm that has equity and a single class of zero-coupon debt. As is well known (e.g. Merton (1974)), in a frictionless, perfect market with perfect me-first rules, the equity of the firm is isomorphic to a call option on the assets of the levered firm. Default corresponds to allowing the (equity) call option to expire unexercised at the "expiration" date, which is the maturity date of the debt. This isomorphic relation points to how default could occur without affecting the firm's operations. That is, exchange-traded options routinely expire unexercised, with no disruptions in the operations of the firms. This suggests the possibility of debt and equity contracts that permit default to occur with a similar minimal impact on the business operations of the firm.

The following example illustrates how such securities can be structured to present the tax-treatment of the debt under U.S. tax laws. At $t = 0$, company $Sub$ is an operating company with assets that have random value $\tilde{A}$ at $t = T$ and a single share of stock and no debt. It is wholly owned by a parent company, call it company $Hold$. The only real asset in company $Hold$ is its ownership of the equity in $Sub$. $Hold$ issues two classes of securities, debt and equity (that consists of one share of stock).

The firm has a single bond that is entitled at maturity ($t = T$) to either a payment of $D_R$ or one share of $Hold$. That is, when the bondholder demands payment at maturity, $Hold$ can choose to satisfy the demand by a payment of $D_R$ or by surrendering its equity in $Sub$. The bondholder's demand is applicable only on the maturity date, unless $Hold$ defaults or otherwise seeks Chapter 11 bankruptcy, in which case, the payment of $D_R$ becomes due. It may be useful to impose other covenant restrictions that could also trigger bondholder's payment demand early, such as large dividend or asset distributions to shareholders of $Hold$.

This provision, plus shortening of debt maturity, can provide substantial protections to bondholders. Indeed, with this, it may be possible to extend debt maturities without increasing agency costs. The bond is callable at $D_R$ at any time at the option of the management of $Hold$. Refunding to call the debt is permitted. In a later part of the analysis, we will deal explicitly with unobservable risk-shifting moral hazard that, unlike large dividends or asset distributions, may be too subtle and hence difficult to prevent through covenant restrictions.

One share of $Hold$ is issued, where the share is entitled to elect directors of $Hold$. Furthermore, just before date $T$, the share is entitled to choose either: 1) to exchange the share plus $D_R$ for one share of $Sub$, or 2) to exchange the share plus 1 bond of $Hold$ for one share of $Sub$.

Let $P$ denote the (implied) market value of one share of $Sub$; $E$ denote the price of one $Hold$ share; and $D$ denote the price of the bond of $Hold$. If on (or near) the maturity date, $P > D_R$, then the shareholders of $Hold$ will surely choose to pay $D_R$ to $Hold$ to enable it to pay the bondholders of $Hold$ their promised repayment $D_R$. If $D < D_R$ (which will happen when $P < D_R$), the shareholder of $Hold$ can buy the bond for $D$ and then receive equity ownership in $Sub$ by turning in this bond. The former gives $Hold$ the necessary cash to call outstanding bonds. The latter extinguishes the bonds without requiring a cash payment by $Hold$. Thus, on the maturity of the debt,

$$\text{for } \tilde{A} = P > D_R \tag{1}$$

$$E \geq P - D_R, \tag{2}$$

$$D = D_R. \tag{3}$$

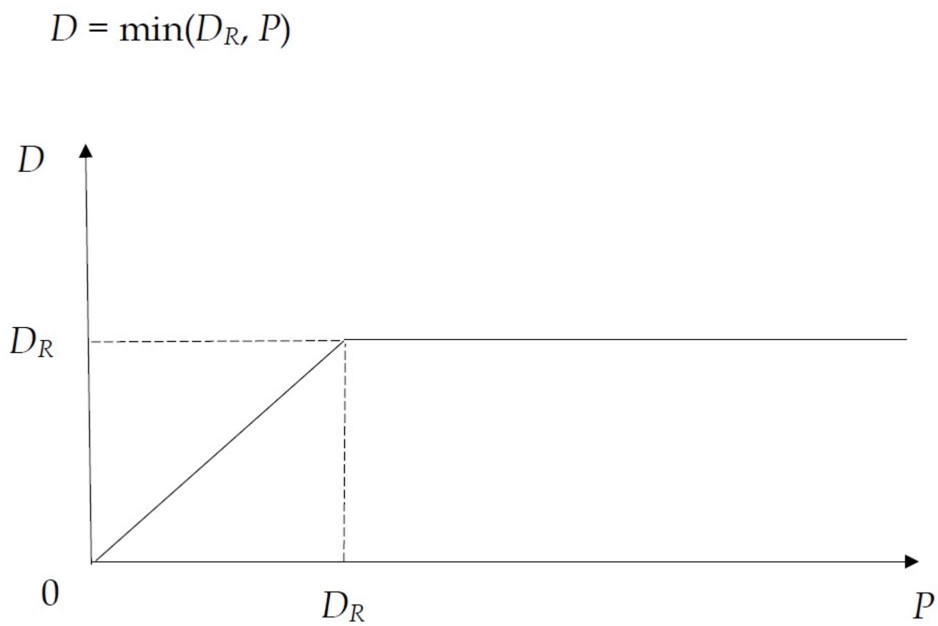
In practice, $Hold$ should be able to just "roll over" the debt to whatever target level is chosen with a new $T$-year maturity date. As long as solvency is assured, $E \geq P - D_R$. Indeed, the structure is designed to minimize basis risk between the values of $Hold$ and $Sub$. That is, at all times, we expect that $E + D \geq P$.

If, on (or near) the maturity date, $P$ is less than $D_R$, then the shareholders of $Hold$ surely will not exercise their right to pay $D_R$ for a share of $Sub$. Consequently, $Hold$ will be unable to pay $D_R$ to the bondholder. The bondholder could go to bankruptcy, but it is more efficient to simply convert the bond to receive the share in $Sub$ (a transaction not requiring bankruptcy). Thus, $D = P$ and $E = 0$ (since there are no other assets in $Hold$). Of course, if $D$ sells for (less than or equal to) $P$, then the equityholders in $Hold$ would have an incentive to buy the debt and exercise their option to acquire a share of $Sub$.

Again, in practice, $Hold$ would issue new $T$-year debt and equity shares in exchange for old debt. The correspondence with options is that the covered-options writer just sells a new call option against the underlying stock (instead of liquidating the stock) after the old option expires. If the optionholders want to renew/continue their position, then they buy the new options. Similarly, if the current shareholders want to maintain corporate control, they need only put up the additional cash needed to buy the new equity. No formal bankruptcy proceedings are required. The trade (and other high-grade) debt of the operating company is not jeopardized by the leverage of the holding company. That is, this holding company structure was stipulated precisely to illustrate how financial restructuring can proceed *without* interfering with business operations. Even if corporate control of the holding company were to change (as a result of conversion), this change is no different in impact on the operating company than a change in owners if it were all-equity financed. The event of "default" (in the economic-payoff sense) need not disrupt the operating business, and therefore does not increase the likelihood of liquidation.

*Figure 1* illustrates how the payoffs to these structures are like writing and buying covered call options.

**Figure 1: Payoffs to Structures**




## 2.2 Stylized Model with Moral Hazard

### 2.2.1 Model Setup

To simplify, think of a firm with two dates: $t = 0$ and $t = T$, with no events occurring between the dates, and $t = T$ corresponding to the maturity date of the firm's debt. The firm's only asset is a (good) project that will pay off $\tilde{A}$ at $t = T$, and the firm has zero-coupon debt worth $D_t$ at $t$ and equity worth $E_t$ at $t$. The debt specifies a bullet payment of $D_R$ at $t = T$. Since we do not focus on trading between $t = 0$ and $t = T$, we can set $D_t = D$ and $E_t = E$ without confusion for all $t < T$.

The sequence of events is that the firm issues securities and then makes a project choice. Project choice by the firm cannot be observed or contracted upon with financiers. The terminal payoff is observable by all. The firm makes decisions to maximize shareholders value. All agents are risk neutral.[7] If the bondholders are indifferent between converting their debt into equity and receiving $D_R$ on their debt, they will not convert. That is,

[7] The assumption can be easily relaxed.

conversion will occur only when bondholders strictly prefer to convert.

For concreteness, we now specify the probability distribution of $\tilde{A}$. Let $\tilde{A} = A_h$ with probability $p \in (0,1)$ and $\tilde{A} = A_l$ with probability $1-p$, where $A_h > D_R$ and $A_l < D_R$. This means that debt is "risky". If $\tilde{A} = A_h$, $D_T = D_R$. If $\tilde{A} = A_l$, $D_T = A_l$. In the context of the previous example, the firm is *Hold* and $\tilde{A}$ corresponds to the value of its wholly-owned subsidiary *Sub*.

Now suppose the manager of this firm (*Hold*) has an opportunity to unobservably switch from the good project to a risky, lower-valued project that will change the terminal distribution of firm value from $\tilde{A}$ to $\tilde{B}$, where $\tilde{B} = \hat{A}_h > A_h$ with probability $q \in (0,1)$ and $\tilde{B} = A_l$ with probability $1-q$, such that $q < p$ and

$$q\hat{A}_h + [1-q]A_l < pA_h + [1-p]A_l. \tag{4}$$

By doing this, the manager reduces the value of the debt to

$$\begin{aligned} \hat{D} &= qD_R + [1-q]A_l \\ &< pD_R + [1-p]A_l \\ &= D. \end{aligned} \tag{5}$$

The value of the equity changes to:

$$\hat{E} = q\left[\hat{A}_h - D_R\right]. \tag{6}$$

Suppose we assume that

$$[p-q]D_R > pA_h - q\hat{A}_h. \tag{7}$$

The left-hand side (LHS) of (7) is the wealth transfer from bondholders to shareholders due to risk shifting. The right-hand side (RHS) is the loss of (total) firm value due to risk shifting. Thus, (7) says that shareholders benefit more from ex post risk shifting for a given debt repayment $D_R$ than what they lose due to a lower total firm value. Combining (4) and (7) yields:

$$[p-q]A_l < pA_h - q\hat{A}_h < [p-q]D_R. \tag{8}$$

For (8) to hold, $D_R$ must be high enough, i.e. the firm is relatively highly leveraged.

### 2.2.2 Summary of Assumptions

The firm makes decisions to maximize shareholder value. All agents are risk neutral.[8] Project choice by the firm cannot be observed or contracted upon with financiers. The terminal payoff is observable by all. If the bondholders are indifferent between converting their debt into equity and receiving $D_R$ for their debt, they will not convert. That is, conversion will occur only when bondholders strictly prefer to convert.

### 2.2.3 Results

We now have the following result.

***Lemma 1:*** *Suppose $D_R$ satisfies (8) and that the firm's decisions seek to maximize shareholder value. Then after issuing debt and equity, the firm will choose the risky project with the $\tilde{B}$ payoff.*

Since this risk shifting leads to lower total firm value, the shareholders suffer the cost of engaging in it ex ante through the pricing of debt. That is, although we have not explicitly introduced taxes, if the motivation for leverage is the debt tax shield, then this risk shifting lowers the value of this tax shield to shareholders due to rational anticipation of it by bondholders.

To prevent this well-known problem—which is difficult to prevent through covenant restrictions due to lack of observability and contractable verifiability—the firm can credibly

[8] This assumption can be easily relaxed.

pre-commit to not do risk shifting by adding a convertible feature to the debt. The feature allows bondholders to exchange their promised debt repayment $D_R$ for a share $\kappa \in [0, 1]$ of the firm's total equity. Bondholders can force this exchange even if shareholders are willing and able to pay $D_R$. We now have:

***Proposition 1:*** *Suppose the firm sets $\kappa = D_R/A_h$. Then there will be no risk shifting and the firm will always select the (higher-valued) good project with the $\tilde{A}$ terminal payoff. Moreover, bondholders will not convert their debt into equity.*

The reason why the bondholders do not convert is that the terms of conversion are set to make them indifferent when the firm's payoff is $\tilde{A} = A_h$. Recall that when $\tilde{A} = A_l$, the shareholders do not exercise their option to repay the bondholders and let them take over the firm. The reason why there is no risk shifting is that if the firm chooses the project with the $\tilde{B}$ payoff, then the bondholders strictly prefer to convert when $B = \hat{A}_h$, since $\kappa\hat{A}_h > \kappa A_h = D_R$. Given this, the benefit to the shareholders from risk shifting disappears. This analysis is in the spirit of Green (1984).

#### 2.2.4 Market Segmentation and No-fault-default Debt

An issue worth addressing is whether the bank's cost of debt may go up under our scheme. One reason for this may be potential investor segmentation in the market such that a subset of investors prefer to hold debt in firms and a subset prefer to hold equity.[9] Thus, creating a situation in which those who hold debt have a higher probability of ending up with an equity claim could cause them to demand a higher interest rate ex ante. Note, however, that even under Chapter 11, if pre-bankruptcy negotiations between shareholders and bondholders fail, the bondholders end up owing the (bankrupt) firm anyway so they become *de facto* shareholders. The difference is that with Chapter 11 this happens in conjunction with the

[9] See Coval and Thakor (2005) for a financial intermediation model in which this occurs in a general equilibrium due to differences in beliefs.

firm incurring the deadweight costs of bankruptcy, which are avoided with our proposal. So *total* firm value will always be higher with our proposal, even if bondholders demand a higher interest rate up-front.

We show below that the deadweight costs of bankruptcy can cause bondholders to actually prefer no-fault-default debt to traditional debt. To show this, suppose that Chapter 11 bankruptcy involves a random bankruptcy cost of $\tilde{\beta}$ of which a deterministic fraction $f \in (0, 1)$ is borne by bondholders and fraction $1 - f$ by shareholders. We view $\tilde{\beta}$ as the incremental cost involved in a transfer of control under no-fault debt relative to under traditional debt with Chapter 11. Let $J$ be the distribution function associated with $\tilde{\beta}$, $j$ the density function, and let the support of $j$ be $[0, \beta_1]$, where $\beta_1 < A_l$.

Now assume that the condition of Proposition 1 is satisfied, and consider a firm that wishes to raise $D$ in financing. To capture the market segmentation argument discussed above (i.e. bondholders have a strict preference for debt over equity), suppose the bondholders suffer a cost $C < 0$ when they end up with an equity claim. Then, a firm that wishes to raise $D$ in debt financing will need to promise a repayment of $D_R$ with no-fault-default debt, where

$$D = p\overline{D}_R + [1 - p]\,[A_l - C]\,. \tag{9}$$

Note that when ownership transfers to the bondholders (probability $1 - p$), the bondholders have an equity claim and suffer $C$. With traditional debt, to raise $D$, the firm will need to promise a repayment of $\overline{\overline{D}}_R$, where

$$D = p\overline{\overline{D}}_R + [1 - p] \int_0^{\beta_1} \left[A_l - f\tilde{\beta} - C\right] \, dJ\left(\tilde{\beta}\right). \tag{10}$$

The key to both (9) and (10) is that if the conversion price is set as in Proposition 1, the conversion of debt into equity (in good states) by the bondholders is off the equilibrium path.

We now have:

***Corollary 1:*** *With no-fault-default debt, the firm can set its repayment obligation on debt at $\overline{D}_R + \varepsilon$, where*

$$\varepsilon \in \left(0, \frac{[1-p]}{p} \int_0^{\beta_1} f\tilde{\beta}\, dJ\left(\tilde{\beta}\right)\right), \tag{11}$$

*to simultaneously make bondholders strictly prefer no-fault-default debt over traditional debt and have higher shareholder value with no-fault default debt.*

There are two parts to the intuition. First, even though the no-fault-default debt comes with an option for bondholders to convert to equity in the good state, the debt does not convert to equity in all states because the bondholders' strike price for their option to convert is set in Proposition 1 to ensure that the bondholders never convert in a Nash equilibrium. That is, if the firm follows its equilibrium project-choice strategy, then conversion by bondholders remains an off-the-equilibrium-path threat that never occurs along the path of play. Second, as a consequence of this, debt converts to equity (with positive probability) precisely in the states in which it does so with traditional debt and Chapter 11, with the difference being that no-fault-default debt avoids the deadweight costs of bankruptcy. This allows the firm to make both shareholders and bondholders strictly better off with no-fault-default debt.

With a more general specification, payoff distributions may be such that it is possible that bondholders will exercise their option to convert to equity with positive probability (in equilibrium), with the probability of such conversion minimized (but not eliminated) by the setting of the strike price of the bondholders' option to convert. Thus, even though the convertibility feature of the debt eliminates asset-substitution moral hazard, it still makes it optimal for bondholders to exercise their conversion option in some states. This means that the probability of debt eventually converting to equity will be higher with our proposed debt contract than with traditional debt. However, even in this case, trading will ensure that no-fault-default debt strictly dominates traditional debt with Chapter 11 bankruptcy. The reason is that, apart from the savings on the deadweight costs of bankruptcy highlighted in

Corollary 1 above, bondholders who have a strict preference for debt will find it profitable to sell their claims to investors who prefer equity as the probability that debt will convert to equity becomes high enough. Trade will occur because the investors who prefer equity will create a net surplus by buying the debt and avoiding the unnecessary uncertainty of both the terms of resolution of the debt and the timing of that resolution. From an equilibrium point of view, this is a more efficient contract. The anticipation of such future trading opportunities will therefore improve the ex ante price of no-fault-default debt by eliminating the premium debtholders may otherwise demand for conversion of debt into equity.

## 2.3 Safety Nets, Bailouts, and CoCos

A well-known feature of financial institutions is that they are protected by both explicit safety nets like deposit insurance, as well as implicit safety nets if they are non-depository institutions whose failure is deemed to be harmful to financial stability. Merton and Thakor (2019) provide a theoretical rationale for such safety nets based on the argument that many of these institutions raise a significant amount of their financing from customers—depositors in banks are an example—and these customers do not wish to be exposed to the (idiosyncratic) credit risk of the institution. In this sense, they are different from "pure" financiers like shareholders and bondholders who are willing to bear risk in exchange for an adequate return. Thus, it is welfare enhancing for the government to provide deposit insurance even if the probability of a bank run is zero.

However, we also know from Merton (1977) that deposit insurance creates moral hazard, inducing banks to keep too little capital and take too much risk. This then leads to bank failures that require bailouts that are costly to the taxpayers.

Merton (1978) had suggested an insurance-based solution that would work even for institutions that are not funded by government-insured deposits, like shadow banks. The idea is that the bank can pay up front for insuring deposits (or short-term debt) for a substantial term (even a perpetuity in the limit) in exchange for a premium. Moral hazard is ameliorated via random auditing by the insurer. The benefit to the bank is that as long as it is solvent when randomly audited, it retains the insurance and can borrow money cheaper than market prices of uninsured borrowing due to the insurance guarantee. If the bank is insolvent when audited, it loses the guarantee. Thus, staying solvent is beneficial to the bank and this deters moral hazard.

While effective auditing by the liability insurer can reduce the moral hazard that comes with the elevation of (idiosyncratic) risk associated with risk shifting, it comes with two caveats. One is that random auditing may lack sufficient efficacy. The other is that banks may still fail due to the adverse realization of systemic risk, as during a major financial crisis. Taxpayers are thus exposed to the risk of costly bailouts of failing institutions, *both* those with explicit deposit insurance (i.e. depositories) and those with implicit insurance (like large shadow banks).

Despite the costs of bailouts, it is recognized that ex post efficiency considerations during crises—such as the desire to thaw frozen credit markets and avoid fire sales of assets or prevent contagious liquidations of institutions by uninsured creditors—can compel governments to inject taxpayer funding to bail out failing institutions. See Philippon and Skreta (2012) and Tirole (2012) for theoretical analyses of government assistance to unfreeze credit markets, and Acharya and Thakor (2016) for an analysis of how bailouts can minimize contagious liquidations of banks. The bailouts in these theories typically involve costs for taxpayers.

Since the financial crisis, there have been many proposals for reducing the burden on taxpayers in resolving bank failures. One such proposal is bail-in debt, wherein losses are imposed on the bank's creditors rather than taxpayers when the bank is in financial distress. This is done by requiring bail-in debt to absorb losses during resolution. Lewrick, Serena-Garralda, and Turner (2019) study the pricing of senior bail-in bonds and conclude that the holders of bail-in bonds price the additional risk they bear and also exert market discipline on these banks. Investors demand a higher premium for holding bail-in bonds issued by riskier banks.

Another proposal is CoCos. These are debt instruments that either convert to new equity or are written down prior to failure while the bank is a going-concern. Fiordelisi, Pennachi, and Ricci (2020) examine CoCos issued by European banks during 2011-2017 and find that equity-conversion CoCos reduce stock return variance and other measures of downside risk.

Our proposal of convertible debt that gives bondholders the option to convert to equity differs from both proposals in that, if bondholders convert (which may happen with more general payoff distributions than assumed in our formal model, as discussed earlier), then the conversion occurs in the *good* states of the world when the bank's equity is highly valued. Thus, the purpose of this conversion is not to infuse equity in the bank at a time of need, but rather to attenuate risk-shifting moral hazard. In the bad state, when the bank is in distress and equityholders choose not to exercise their option to "purchase" the bank from the bondholders by giving them a repayment equal to the option strike price, bondholders will be sole owners (shareholders) and this is functionally equivalent to a "full equity-conversion" CoCo. That is, once the bondholders own the bank, all the non-deposit debt becomes equity, and the FDIC must cover the claims of the depositors if the value of the bank is below the total amount of deposits. Thus, our proposal does not involve eliminating public deposit insurance, but rather works in concert with it, as we recognize the many advantages of deposit insurance noted in the earlier literature (e.g. Bryant (1980), Diamond and Dybvig (1983), and Merton and Thakor (2019)). If the value of the bank exceeds its deposit obligations, then the new owners (bondholders) can cover the depositors' claims without involving the FDIC. As a practical matter, given the statutory authority of the FDIC—under current law—to take over a bank when its book equity hits a low of 2% of its assets, if all non-deposit debt is converted to equity, the bank's value will exceed its deposit liabilities.[10]

This approach appears to us to be superior to (taxpayer-funded) bailouts, since theory has shown that bailouts generate potentially significant distortions.[11] Moreover, empirical

[10]This assumes that the bank's assets have been appropriately marked to market.

[11]For example, the earlier-mentioned Acharya and Thakor (2016) paper develops a theory in which gov-

evidence that bailouts are also associated with stigma for the institutions receiving this assistance. See, for example, Kim (2020). What we propose can be implemented for banks by the FDIC without any resource-dissipating bankruptcy process like Chapter 11. We believe there should be transparency about the details of such a resolution process, so that all investors can price the bank's securities without an "opacity premium". The simplicity of this arrangement can also enable regulators to use fewer regulatory instruments, thereby reducing regulatory arbitrage (see Boyer and Kempf (2020) for a theoretical analysis of constraints on the capacity of regulators to use multiple regulatory instruments).

It is possible, of course, that the implementation of our proposed scheme will not eliminate all bailouts since the transfer of operating control from shareholders to bondholders (whose claims consequently become equity) may not be as seamless as in our model. To the extent that this creates even temporary disruptions with associated negative externalities, the government may wish to selectively assist very large and systemically important institutions during the time a transfer of control is taking place. Thus, there may be a limited role for bailouts in some cases, but an important point of our analysis is that this role will be substantially diminished with our proposed scheme.

We argued earlier that bondholders (the bank's uninsured creditors) could always be made to prefer no-fault-default debt over traditional debt. In the context of banks, one instance in which this may not hold is if there is a positive probability of ex post bailouts of uninsured creditors that leads to these creditors lowering (ex ante) the price of credit they provide. To the extent that uninsured creditors can no longer rely on such implicit government guarantees that reduce the haircuts they would otherwise suffer, the cost of credit for banks may go up under our scheme and lead to higher prices for the credit banks supply. But we believe that in general it is better for the government to create transparency and *explicitly* price its bailout support *ex ante*, so banks—rather than taxpayers—can pay for it. Once this is done, our proposal will not involve higher credit costs.

ernment bailouts can prevent contagious creditor-initiated liquidations of banks but can destroy any market discipline of debt and present informational challenges to the lender-of-last-resort about when to intervene.

In fact, to the extent that transparency by the government increases the clarity of treatment in financial distress (versus the current regime of uncertainty about whether there will be a bailout), one can in principle reduce the "deadweight loss" associated with an unnecessary zero-sum uncertainty that is faced by each of the parties to the debt contract. Such uncertainty is akin to attaching a random gamble with no economic purpose to a contract, making the contract less valuable to both parties. Our proposed scheme can eliminate this kind of welfare loss as well. Moreover, the empirical evidence indicates that, although the removal of implicit bailout guarantees leads to the price of uninsured credit reflecting the additional risk that these creditors bear, it also improves market discipline; see the Lewrick, Serrana-Garralda and Turner (2019) paper discussed earlier.

# 3 An Economic Rationale for Some Aspects of Chapter 11

The above analysis indicates that no-fault default convertible debt can achieve a transfer of control without the deadweight costs of Chapter 11, and also avoid value-reducing risk shifting at the expense of the bondholders. Moreover, it may be useful in thinking about better ways to resolve the failures of financial institutions. While these insights may be intuitive, they raise an important unanswered question: why then do so many companies suffer the value dissipation of Chapter 11 bankruptcy?

## 3.1 Extension of No-Default Debt Analysis to Multiple Classes of Debt

Some of the existing answers to this question take Chapter 11 as a given and then explain the value dissipation on the basis of coordination problems among multiple creditors with heterogeneous restructuring preferences, violations of the Absolute Priority Rule, and so on.[12] However, these explanations do *not* apply to the case we analyzed in Section 2.2.

In particular, if there are multiple classes of bondholders, say, $1, 2, \ldots, n$, then it is possible to proceed in a manner similar to how we proceeded in Section 2.2 and solve for conversion ratios $\kappa_i$, $i \in \{1, \ldots, n\}$, such that: (i) there will be no risk shifting by shareholders; (ii) shareholders will exercise the option to keep ownership of the firm when the value of the firm is $A_h$ and pay off all the bondholders their promised amounts $D_R^i$, $i \in \{1, \ldots, n\}$, with none of the bondholders choosing to convert their debt to equity; (iii) shareholders will choose to let their option expire unexercised when firm value is $A_l$ and all debt converts to equity at pre-determined conversion rates $\kappa_i^l$, with the contract design flexibility to set the $\kappa_i^l$ in this case as being different from the $\kappa_i$ when firm value is $A_h$. Note that $\kappa_i^l$ has no impact on the firm's risk-shifting incentives. Moreover, when all debt converts to equity, coordination problems among multiple classes of bondholders also vanish.

While we do not provide the formal details of the analysis that leads to the observations above, it follows the same structure as the analysis of the simpler case in Section 2.2. The upshot of this is that we are still left with a puzzle: why do we have a costly Chapter 11 bankruptcy process when, in principle, a far less costly alternative is available?

## 3.2 A Model to Develop a Rationale for Chapter 11 Labor Re-contracting

We will now extend the model to show that there are circumstances in which it is efficient to redo labor contracts—in the case of our model, the contract between the manager and the firm—but at least one party to the contract has an incentive to refuse. This can block efficient re-contracting. Thus, having the legal ability to invalidate previously-negotiated contracts in some states of the world may be valuable.

So far, we have not had to deal with a contract between the firm and the manager because we assumed that all decisions were made in the shareholders' interests. To have a meaningful

[12]See, for example, Donaldson et al. (2020) and Greenbaum, Thakor, and Boot (2019).

role for a managerial contract, we now introduce a potential divergence of interests between the manager and the shareholders.

We modify the model to introduce privately-costly and unobservable managerial effort as well as an interim point in time between dates $t = 0$ and $t = T$. We also assume that the manager maximizes her own expected utility over effort and compensation.

## 3.3 Sequence of Events

At $t = 0$, the firm has debt and equity outstanding, with the (zero-coupon) debt promising a bullet payment of $D_R$ at $t = T$. Also at $t = 0$, a wage contract is offered to the manager and it is accepted by the manager if it yields an expected utility equal to the manager's reservation utility, which is normalized to be zero. The firm is solvent at $t = 0$, so the contract is offered by the shareholders and presumed binding on both sides as long as shareholders are in control.

The manager chooses effort $a^t$ at two dates: $t = 0$ and $t = 1$. The firm's payoff distribution at $t = T$ depends on the manager's effort choice. We will say more about the manager's effort choice shortly.

The firm's payoff at $t = T$ depends on managerial effort as well as the realization of an exogenous state of nature $\theta \in \{\theta_l, \theta_h\}$. The manager's effort choice has two dimensions: level and "type". The level of effort refers to whether $a^t$ is 0 or 1, with manager's effort disutility being $\psi a^t$, where $\psi > 0$ is a scalar. That is, $a^t \in \{0, 1\} \; \forall \, t \in \{0, 1\}$. The "type" of the effort has to do with whether the effort is suitable for enhancing the payoff in the $\theta = \theta_h$ state or the $\theta = \theta_l$ state. A shorthand way to think about these states is that $\theta_h$ is a "prosperity" state in which the firm enjoys a high payoff distribution, and $\theta_l$ is a "downturn" state in which the firm experiences a low payoff distribution. Thus, the manager can either work hard to enhance the payoff in the prosperity state by choosing "state-matched" effort $a_h^t$ or to minimize losses in the downturn state by choosing "state-matched" effort $a_l^t$, but she cannot do both. Viewed at $t = 0$, the probability of $\theta_h$ is $g_0 \in (0, 1)$ and the probability of

$\theta_l$ is $1 - g_0$.

Conditional on $\theta = \theta_h$, the distribution of the firm's payoff at $t = T$ is:

$$\tilde{A}_h = \begin{cases} a_h^0 a_h^1 \overline{A}_h + e_h \left[a_h^0 + a_h^1\right] \pi_h & \text{with probability } p \in (0,1) \\ 0 & \text{with probability } 1-p \end{cases} \tag{12}$$

where $e_h \in (0,1)$ is a probability, and $a_h^t$ is the type of effort that enhances the firm's payoff when $\theta = \theta_h$. Here $a_h^t \in \{0,1\}$ for $t \in \{0,1\}$, and $\pi_h > 0$ is a scalar.

Conditional on $\theta = \theta_l$, the distribution of the firm's payoff at $t = T$ is:

$$\tilde{A}_l = \begin{cases} a_l^0 a_l^1 \overline{A}_l + e_l \left[a_l^0 + a_l^1\right] \pi_l & \text{with probability } p \in (0,1) \\ 0 & \text{with probability } 1-p \end{cases} \tag{13}$$

where $a_l^t \in \{0,1\}$ for $t \in \{0,1\}$, $e_l \in (0,1)$ is a probability, and $\pi_l > 0$ is a scalar. So $a_l^t$ is the type of effort that is suitable for minimizing losses in the downturn state. The positive payoff when $\theta = \theta_h$ exceeds the positive payoff when $\theta = \theta_l$, as the parametric restrictions discussed next make clear.

## 3.4 Parametric Restrictions

We make the following parametric restrictions:

$$\min\left\{\overline{A}_h, e_h \pi_h\right\} > \max\left\{D_R, 2\psi\right\}, \tag{14}$$

$$\overline{A}_h + 2e_l \pi_l < D_R, \tag{15}$$

$$p e_l \pi_l > \psi. \tag{16}$$

Restriction (14) says that when $\theta = \theta_h$, the firm's payoff in the successful state is high enough to pay off the debt, so shareholders will exercise their option to pay the bondholders

$D_R$ and keep the firm. Moreover, this payoff is high enough to make it worthwhile having the manager choose $a_h^0 = a_h^1 = 1$. Restriction (15) says that when $\theta = \theta_l$, the firm's maximum possible payoff falls short of the promised repayment on debt, $D_R$, so shareholders will let their call option on the firm's assets expire unexercised and let the bondholders take the firm. Restriction (16) simply says that even when $\theta = \theta_l$, it is (socially) productive for the manager to choose $a_l^1 = 1$ at $t = 1$.

Now, at $t = 1$, a signal $s$ is observed that is informative about the realization of $\theta$ at $t = T$. The probability distribution of $s$ is:

$$\Pr\left(s = \theta_h \mid \theta_h\right) = \Pr\left(s = \theta_l \mid \theta_l\right) = \xi \in (0.5, 1). \tag{17}$$

We will assume that this $s$ signal is noisy but very informative, i.e., $\xi$ is very close to 1. We can think of this signal as some financial performance indicator that is informative about the firm's terminal payoff. It is publicly observed, as is the terminal payoff $\tilde{A}_j$, $j \in \{h, l\}$ at $t = T$. Since $s$ is publicly observed, this can be contracted upon between the shareholders and the bondholders. For example, $s$ may imply a covenant violation that triggers bankruptcy.

### 3.5 Manager's Utility

The manager maximizes:

$$U\left(w, a_i^t\right) = w - a_i^t \psi \text{ for } i \in \{h, l\} \tag{18}$$

where $w$ is wealth and $\psi > 0$ the manager's effort disutility. The manager's wage is constrained to be non-negative.

Note that, given a wage contract at $t = 0$, the manager makes two effort choices, one at $t = 0$ and one at $t = 1$. The effort choice at $t = 1$ is made after observing $s$ (but before knowing $\theta$).

### 3.6 Observability Assumptions

The manager's effort choices—both the type of effort and the level—are privately observed only by the manager. The financiers in control of the firm write the wage contract, but they cannot observe the manager's choice

It is useful to consider the timeline in this model that summarizes the sequence of events.

### 3.7 Analysis of Extended Model

We begin by noting that the shareholder will always design the wage contract to induce the manager to choose $a_h^t\ \forall\, t$, since the value of equity is zero even under the best of circumstances with $a_l^t$. As usual, we will solve the model backward starting with $t = 1$, the last decision point in time. The posterior beliefs after observing $s$ are:

$$\Pr(\theta = \theta_h \mid s = \theta_h) \equiv g_1^h = \frac{\xi g_0}{\xi g_0 + [1-\xi]\,[1-g_0]} \tag{19}$$

$$\Pr(\theta = \theta_h \mid s = \theta_l) \equiv g_1^l = \frac{[1-\xi] g_0}{[1-\xi] g_0 + \xi\,[1-g_0]} \tag{20}$$

Given $\xi$ close to 1, $g_1^h$ will be close to 1 and $g_1^l$ will be close to zero.

Now, to motivate the manager to choose the type of effort they like ($h$) and to also work hard ($a_h^t = 1$), the shareholders will find it optimal to offer the manager a share of the firm's equity. This will align the manager's interests more closely with those of the shareholders than if the manager was paid a fixed wage or some fraction of total firm value. Let $\phi \in (0, 1)$ be the fraction of equity given to the manager. It is clear that paying the risk neutral manager a fixed wage is inefficient with effort-aversion moral hazard. The manager cannot trade his equity ownership until $t = T$, when she is paid.[13]

[13]This is a standard assumption in principal-agent contracting models.

Figure 2: Timeline of Events in Model

| $t = 0$ | $t = 1$ | $t = 2$ |
|---|---|---|
| • Firm has equity worth $E$ and debt worth $D$ that promises a bullet payment of $D_R$ at $t = T$.<br>• Manager is offered a wage contract by shareholders, who control the firm.<br>• Manager chooses effort type ($h$ or $l$) and level (0 or 1), i.e. manager chooses $a_i^0$, $i \in \{h, l\}$<br>• The manager can choose either $a_h^t$ or $a_l^t$ at each $t$, but not both. Given the choice of $h$ or $l$, the manager chooses $a_i^t = 1$ or $a_i^t = 0$, $i \in \{h, l\}$ | • Signal $s$ is observed.<br>• Control may transfer from the shareholders to the bondholders.<br>• Manager chooses $a_i^1$, $i \in \{h, l\}$. | • Either $\tilde{A}_h$ or $\tilde{A}_l$ is observed.<br>• Manager, shareholders, and bondholders collect their payments. |

***Proposition 2:*** *At $t = 0$ the shareholders offer the manager a contract that gives the manager a fraction $\phi$ of equity, where*

$$\phi = \frac{\psi}{pg_1^h \left[\overline{A}_h + e_h \pi_h\right]} \tag{21}$$

*Given this contract, the manager chooses effort of type $h$ at $t = 0$, i.e. $a_h^0 = 1$. The manager chooses $a_h^1 = 1$ if $s = \theta_h$ and $a_h^1 = 0$ if $s = \theta_l$. If there is no provision for transfer of control from shareholders to bondholders, then, given $\xi$ high enough, shareholders will continue with this contract at $t = 1$ regardless of $s$. The manager earns a rent with this contract.*

The intuition is as follows. Since the value of equity is always zero if the shareholders design a contract to induce the manager to choose $a_l^t$, they always prefer the manager to choose $a_h^t$. By giving the manager a fraction of equity, they achieve this. It is clear that at $t = 0$, the shareholders want the manager to choose $a_h^0 = 1$ since $a_h^0$ ensures that $\overline{A}_h$ will be lost regardless of $\alpha_h^1$; the cost of incentivizing $a_h^0 = 1$ is $\psi$, which is less than $\overline{A}_h$. At $t = 1$, if $s = \theta_h$, then the $\phi$ in (21) satisfies the manager's incentive compatibility condition to choose $a_h^1 = 1$. However, if $s = \theta_l$, then the $\phi$ in (21) will cause the manager to choose $a_h^1 = 0$. The shareholders are willing to accept this since the probability of $\theta = \theta_h$ is very low in this case with a sufficiently high $\xi$. Hence, it is too costly to incentivize the manager to choose $a_h^1 = 1$.

The manager earns a rent because the manager had already chosen $a_h^0 = 1$ at $t = 0$, and this assures the manager of receiving an expected payoff of $g_1^h p \phi e_h \pi_h$ when $s = h$ even if she chooses $a_h^1 = 0$. Thus, a rent must be offered to induce a choice of $a_h^1 = 1$. Because of the zero lower bound on the manager's wage, this rent cannot be offset through a negative payment in the state in which equity is worthless. As we will see next, this rent plays a role in the analysis.

***Proposition 3:*** *It is socially optimal (firm value maximizing) for the manager to choose $a_l^1 = 1$ if $s = \theta_l$ is observed at $t = 1$. However, if there is no provision that explicitly permits an invalidation of the manager's wage contract at $t = 1$ in some (prespecified) state of nature, the manager will refuse to give up her existing contract and will choose $a_h^1 = 0 = a_l^1$. If there is a provision that transfers control from the shareholders to the bondholders at $t = 1$ conditional upon $s = \theta_l$, then the bondholders will invalidate the manager's previous contract and offer her a new contract that pays*

$$w = \frac{\psi}{[1 - g_l^1]\, pe_l}, \tag{22}$$

*if the firm's payoff at $t = T$ is $\pi_l$ and 0 otherwise. This contract induces the manager to choose $a_l^1 = 1$ and satisfies her participation constraint, but gives her no rent.*

The intuition is that when $s = \theta_l$, it is highly likely that $\theta = \theta_l$, so having the manager choose $a_l^1 = 1$ is better than having her choose $a_h^1 = 0 = a_l^1$ from the standpoint of total firm value. However, because shareholders designed the manager's contract at $t = 0$, the manager was incentivized to choose $a_h^0 = 1$, i.e., $a_l^0 = 0$. This means $a_l^0 a_l^1 \overline{A}_l = 0$ regardless of $a_l^1$, implying that the manager's contract can now be designed by bondholders to induce a choice of $a_l^1 = 1$ without surrendering any rent to the manager. On the other hand, the contract originally offered to the manager by the shareholders gives her a rent.

Thus, the manager never voluntarily wants to give up the existing contract, and the only way to replace that contract is to have an explicit provision permitting that. This is exactly what Chapter 11 bankruptcy allows, as discussed in the Introduction. Thus, this analysis provides an economic rationale for invalidating existing labor contracts to permit them to be renegotiated when the firm enters Chapter 11.

Our analysis implies the possible (constrained) efficiency of preserving Chapter 11 for operations contracts with non-investors (labor contracts with employees, suppliers trade credit, pre-paid service contracts with customers) in the operating company. But for investor-held debt, the no-fault-default approach still facilitates considerable pure financial leverage in the holding company without the dysfunctional bankruptcy costs documented with the existing system.

As discussed in the Introduction, our analysis provides a new perspective on the *benefit* of being able to invalidate labor contracts in bankruptcy. This is in contrast to optimal capital structure theories based on contracting over inalienable human capital development. In these theories, most notably Jaggia and Thakor (1994) and Berk, Stanton, and Zechner (2010), this feature of Chapter 11 is a *cost* associated with leverage.

Our result that labor contract renegotiation in bankruptcy lowers the manager's rent is consistent with the empirical evidence in Gilson and Vetsuypens (1993) that managerial compensation declines in firms that file for bankruptcy.

While the analysis above has not modeled risk shifting by the shareholders, it can be easily added to the model along the same lines as Section 2. Convertible debt that enables the bondholders to convert their debt to equity when $\theta = \theta_h$ and the high payoff on the risky project is observed can then prevent the risk shifting.[14]

A key assumption in our analysis is that, ourside of Chapter 11 bankruptcy, it is not possible for shareholders to renegotiate the CEO's contract to achieve greater efficiency unless the CEO agrees. The empirical evidence suggests that renegotiating CEO contracts outside of formal bankruptcy or change-in-control transactions is not a simple matter. CEO employment contracts involve legal counsel representation on both sides and cover numerous contingencies in the final legal document. Schwab and Thomas (2006) provide evidence that about 87% of CEO contracts are for a definite term of years (typically 3 to 5 years), in contrast to other workers who are generally "at-will" employees without such contracts, and contain terms that protect the CEO against firm-initiated renegotiation and dismissal by sharply stipulating CEO conduct that could justify it.[15] Gillan, Hartzell, and Parrino

[14]We left this feature out of the analysis in this section to avoid cluttering the model with a component that would add no insight beyond the analysis in Section 2.

[15]Many contracts (about 42%) include a clause that requires arbitration rather than litigation to settle disputes. See also Hill, Masulis, and Thomas (2011).

(2009) provide evidence that CEOs protect themselves against reneging behavior by firms by having more explicit employment agreements when the firm has a weaker reputation for honoring contracts and the required investment in firm-specific human capital by the CEO is higher. Moreover, they find that the factors that are associated with an increased likelihood of explicit contracts are also associated with *longer-lasting* explicit agreements.

The overall message of this empirical evidence is that CEOs often negotiate legally-binding, long-term employment contracts with considerable details in them. This implies that these contracts are difficult and costly to renegotiate. While we could replace our assumption that these contracts cannot be renegotiated (without mutual consent) outside of bankruptcy with the assumption that doing so is very costly but not impossible, our analysis would not be qualitatively affected.

# 4 Implications for Bank Regulation and Financial Stability

As we discussed in Section 2, the no-fault default structure, in combination with convertible debt and invalidation of labor contracts when shareholders lose control, can be used for both non-depository and depository financial institutions as effective tools for improving ex ante incentives as well as achieving efficient ex post resolutions of failing institutions. Here we take up two related issues. One is the pricing of deposit insurance and the other is financial stability.

On deposit insurance pricing, our analysis has a provocative implication. Since the risk-shifting moral hazard issue for deposit insurance is qualitatively similar to the risk-shifting moral hazard issue with risky debt (e.g. Merton (1977)), our analysis implies that the FDIC should also have a call option on the bank's stock; this will be feasible for banks with traded equity. Thus, if the bank takes excessive risk to exploit the deposit insurance put option and its stock price rises, the FDIC can exercise its call option just the way the holders of convertible debt can exercise their option to convert debt into equity. This will not only enable the deposit insurance premium to be lowered, but also attenuate the risk-shifting moral hazard of deposit insurance first highlighted by Merton (1977). Such an arrangement can be made a part of microprudential regulation. To the extent that the deposit insurance premium reflects the value of the FDIC's call option, the arrangement is tantamount to *risk-sensitive* deposit insurance pricing, but its main goal would be to attenuate risk-shifting moral hazard.

This proposal also has implications for financial stability. Thakor (2014) argues that financial stability can be enhanced by increasing capital ratios in banks and that implementing higher capital requirements will not impose high private costs on banks or high social costs. To some extent, this view is reflected in the Basel III minimum capital ratio requirements. The goal of these capital requirements is to increase capital ratios in banks, both in terms of capital as a percentage of risk-weighted assets and equity as a percentage of total assets (leverage ratio).[16] Our proposal complements higher capital requirements in that it reduces the likelihood that the bank's shareholders will choose to let control transfer to the uninsured creditors.

It is well recognized that, despite the social welfare implications of higher capital requirements, bankers are resistant to them (see Thakor (2014), for example). Moreover, during times of distress, bankers point out that raising equity to recapitalize the bank is prohibitively expensive. The problem is exacerbated by the practical issue that bail-in debt and CoCos have not been adopted very widely.[17] Our analysis points to an alternative—with our proposal, risk-shifting moral hazard is attenuated, so it may be possible to allow banks to operate with lower levels of capital without sacrificing financial stability. Future research

[16]There are also related proposals to achieve a reduction in the probability of bank failures by building up more equity capital in banks through new types of equity contracts. Acharya, Mehran, and Thakor (2016) put forth such a proposal in which this is achieved through a "special capital account" that increases the bank's capital ratio without diluting the market discipline of uninsured debt.

[17]The use of CoCos by banks has been mainly in Europe, not in the U.S. One potential reason for the lack of widespread acceptance of CoCos is that it has been suggested that CoCos can cause debt overhang, thereby amplifying the leverage ratchet effect. See Goncharenko, Ongena, and Rauf (forthcoming) for supporting empirical evidence.

could theoretically model this conjecture.

We can also view no-fault-default debt as a substitute for CoCos. Merton and Thakor (2019) argue that customer-supplied debt (e.g. bank deposits) should be insulated from the bank's credit risk, whereas financier-supplied debt (e.g. subordinated debt in a bank) should be exposed to that risk. Our proposed scheme achieves the desired bifurcation between investor-held debt that is exposed to default risk with minimal transactions costs—since it is no-fault-default debt—and customer/supplier debt that is essentially default-free (due to insurance, for example).[18]

It has been suggested that another way to improve financial stability is to increase bank charter values by erecting entry barriers that increase bank profitability (e.g. Keeley (1990)). However, Martynova, Ratnovski, and Vlahu (2020) have recently developed a model in which this actually *encourages* bank risk taking. The paper shows that the predictions of the model are consistent with cross-sectional patterns of bank risk taking in the run-up to the 2008-09 crisis. No-fault-default debt can resolve risk-taking problems without affecting the competitive structure of banking.

The implication of our proposed scheme that financially-distressed banks can be infused with equity without a government bailout when a transfer of control from the shareholders to the uninsured creditors occurs has important ramifications for microprudential regulation. Our discussion in this section indicates that this can be achieved without necessarily asking banks to hold more equity upfront or using CoCos or altering the competitive structure of banking. The overall effect is lower risk at the individual bank level. However, Farhi and Tirole (2012) highlighted the propensity of banks to engage in correlated asset portfolio choices in anticipation of government bailouts when many banks fail together—this clearly increases ex ante systemic risk. By eliminating bailouts, our scheme also minimizes incentives for correlated asset portfolio choices across banks. This matters for macroprudential regulation

[18] And the moral hazard generated by this insurance is dealt with through auditing by the insurer as in Merton (1978) and call option for the insurer, as discussed above. See also Merton (1997), who proposes a model of contract guarantees for credit-sensitive and opaque financial intermediaries, that also serves to mitigate moral hazard.

because it lowers systemic risk.

## 5 Discussion and Conclusion

This paper has analyzed risky no-fault-default debt in an options framework, and showed that the deadweight costs of bankruptcy can be avoided or at least substantially reduced by permitting a relatively seamless transfer of ownership from shareholders to bondholders in states of the world in which shareholders do not wish to exercise their call option on the assets of the levered firm. Although this option generates a cost due to risk shifting emanating from moral hazard, convertible debt can attenuate this problem. This raises the question of why so many firms incur the substantial costs of Chapter 11 bankruptcy.

We have shown that an economic rationale for Chapter 11 can be retrieved by emphasizing a feature of bankruptcy, namely the ability to invalidate and renegotiate labor contracts. In our model, as long as shareholders are in control, they design managerial contracts to incentivize the manager to maximize shareholder value, even when this is no longer ex post efficient from a firm-value-maximization standpoint. Moreover, even if bondholders take control, the manager will refuse to renegotiate her contract because the contract negotiated with shareholders gives the manager a rent, whereas the bondholders are able to offer a contract with no managerial rents. Firm value is increased when bondholders have the ability to invalidate the previous contract, and offer a no-rent contract to the manager that satisfies her participation constraint. This is what Chapter 11 permits.

While this analysis can provide a rationale for Chapter 11, it also raise the possibility of only taking this specific feature of Chapter 11 without the other costly features. That is, a normative implication of our analysis is that whenever there is a transfer of control from shareholders to bondholders, the new financiers in charge should have the ability to suspend all labor contracts and renegotiate them, *without* have to go through a formal bankruptcy proceeding. This would be a marriage of our no-fault-default debt approach with the beneficial aspects of Chapter 11, without the costly baggage associated with the other aspects of bankruptcy.

We have also used our analysis to discuss how it could be used to reduce risk-shifting moral hazard in financial institutions, providing additional tools to the FDIC for resolving bank failures, and improving financial stability.

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# Appendix

**Proof of Lemma 1:** If the firm invests in the good project at $t = 0$, shareholders will exercise their call option to "buy" the firm from the bondholders for $D_R$ and the value of equity at that time is:

$$p\left[A_h - D_R\right], \tag{A.1}$$

since in the state in which $\tilde{A} = A_l$, shareholders will choose to let their option expire unexercised and the value of equity is 0. Similarly, if the firm chooses the risky project, the value of its equity is:

$$q\left[\hat{A}_h - D_R\right]. \tag{A.2}$$

Given (8), it follows that the expression in (A.2) exceeds that in (A.1). ■

**Proof of Proposition 1:** If the firm chooses the good project, then, as argued in the text, bondholders will not convert in any state and the value of equity is given by (A.1). If the firm chooses the risky project, the bondholders convert when $\tilde{B} = \hat{A}_h$ and the value of equity is:

$$q[1-\kappa]\hat{A}_h = q\left[1 - \frac{D_R}{A_h}\right]\hat{A}_h. \tag{A.3}$$

Comparing (A.1) and (A.3), we see that

$$p\left[A_h - D_R\right] > q\left[1 - \frac{D_R}{A_h}\right]\hat{A}_h, \tag{A.4}$$

since $A_h > D_R$. Thus, there will be no risk shifting. ■

**Proof of Corollary 1:** Given the bondholders' conversion strike price in Proposition 1, they never force conversion in equilibrium. Thus, we can rewrite (10) as:

$$D = p\overline{\overline{D}}_R - p\overline{D}_R + p\overline{D}_R[1-p]\,[A_l - k] - [1-p]\int_0^{\beta_1} f\tilde{\beta}\,dJ\left(\tilde{\beta}\right)$$
$$= p\overline{\overline{D}}_R - p\overline{D}_R + D - [1-p]\int_0^{\beta_1} f\tilde{\beta}\,dJ\left(\tilde{\beta}\right) \tag{A.5}$$

which means

$$p\overline{\overline{D}}_R = p\overline{D}_R + [1-p]\int_0^{\beta_1} f\tilde{\beta}\,dJ\left(\tilde{\beta}\right) > p\left[\overline{D}_R + \varepsilon\right] \tag{A.6}$$

if

$$0 < \varepsilon < \frac{[1-p]}{p}\int_0^{\beta_1} f\tilde{\beta}\,dJ\left(\tilde{\beta}\right) \tag{A.7}$$

Thus, setting the repayment obligation at $\overline{D}_R + \varepsilon$, where $\varepsilon$ satisfies (11), and using no-fault-default debt makes the bondholders strictly better off and also makes the shareholders better off. ■

**Proof of Proposition 2:** Consider first what happens at $t = 1$ when $s = \theta_h$ is observed. The incentive compatibility (IC) constraint for the manager to choose $a_h^1 = 1$, conditional on $a_h^0 = 1$ having been chosen at $t = 0$, is

$$g_1^h p\phi\left[\overline{A}_h + 2e_h\pi_h - D_R\right] - \psi \geq g_1^h p\phi\left[e_h\pi_h - D_R\right]. \tag{A.8}$$

In equilibrium, this IC constraint is binding, so treating it as an equality yields (21). The manager's expected utility is:

$$\frac{[e_h\pi_h - D_R]\,\psi}{\overline{A}_h + e_h\pi_h}, \tag{A.9}$$

which is positive, given (14). This proves the manager earns a rent. Now, if $s = \theta_l$, then in (A.8) we would replace $g_1^h$ with $g_1^l$. Since $g_1^l < g_1^h$, it is clear that the IC constraint will be violated.

Next we show that the shareholders would prefer the manager chooe $a_h^1 = 0$ when $s = \theta_l$. If the manager chooses $a_h^1 = 0$ with the contract in (21), the value of shareholders' equity after paying the manager is

$$g_1^l p[1-\phi]\left[e_h\pi_h - D_R\right], \tag{A.10}$$

which is positive. If shareholders change the contract to incentivize the manager to choose $a_h^1 = 1$ when $\theta = \theta_l$, then let $\tilde{\phi}$ be the equity ownership fraction they give the manager. It is straightforward to verify that

$$\tilde{\phi} = \frac{\psi}{pg_1^l\left[\overline{A}_h + e_h\pi_h\right]}, \tag{A.11}$$

and the value of shareholders' equity after paying the manager is:

$$g_1^l p[1-\tilde{\phi}]\left[\overline{A}_h + 2e_h\pi_h - D_R\right]. \tag{A.12}$$

Substituting for $\phi$ and $\tilde{\phi}$, we see that the expression in (A.10) exceeds that in (A.12) if

$$\psi\left\{\frac{\left[e_h\pi_h - D_R\right]}{\left[\overline{A}_h + e_h\pi_h\right]}\left\{\frac{1}{g_l^1} - \frac{1}{g_h^1}\right\} + 1\right\} > p\left[\overline{A}_h + e_h\pi_h\right], \tag{A.13}$$

which obviously holds for $g_l^1$ close enough to 0, or equivalently for $\xi$ high enough. Thus, shareholders will not change the contract from $\phi$ to $\tilde{\phi}$.

Now if bondholders take control and want to offer a contract that induces a choice $a_l^1 = 1$ after they observe $s = \theta_l$, they will design a contract that pays a wage $w > 0$ if the firm's payoff at $t = T$ is $\pi_l$ and nothing otherwise. The $w$ that satisfies the IC constraint is:

$$\left[1 - g_l^1\right] pe_l w - \psi \geq 0. \tag{A.14}$$

Solving this as an equality yields $w$. It is clear that this contract yields the manager no rent.

Finally, we prove that with the $\phi$ contract, the manager will choose $a_h^0 = 1$. The IC constraint is:

$$g_0\xi\left[\phi p\left[\overline{A}_h+2e_h\pi_h-D_R\right]-\psi\right]\geq g_0\xi\left\{\phi p\left[e_h\pi_h-D_R\right]\right\}, \tag{A.15}$$

which means we need

$$\phi p\left[\overline{A}_h+e_h\pi_h-D_R\right]\geq\psi. \tag{A.16}$$

Now using (21), we see that to satisfy (A.16), we need

$$\phi p\left[\overline{A}_h+e_h\pi_h\right]\geq g_h^1\phi p\left[\overline{A}_h+e_h\pi_h\right], \tag{A.17}$$

which is clearly true. ■

**Proof of Proposition 3:** Solving (A.14) as an equality yields (22). It is clear that it satisfies the manager's participation constraint and yields the manager no rent. Thus, the manager strictly prefers the existing positive-rent contract in place.

Now, the value of the firm with the transfer of control to the bondholders when $s=\theta_l$ (and the manager chooses $a_l^1=1$) is

$$p\left[1-g_l^1\right]e_l\pi_l-\psi. \tag{A.18}$$

The value of the firm if shareholders retain control after $s=\theta_l$ is observed (and thus the manager chooses $a_h^1=a_l^1=0$) is:

$$g_l^1 p e_h\pi_h. \tag{A.19}$$

It is clear that for $g_l^1$ small enough, the expression in (A.18) exceeds that in (A.19) as long as $pe_l\pi_l>\psi$, which is guaranteed by (15). ■