Avoiding Corporate Liability Through Strategic Capital Structure

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Abstract

Corporate liability may lead to insolvency. Prosecutors who are concerned with job losses following insolvency may reduce liability in order to limit collateral consequences. In this article I analyze firms' choices of financing and malfeasance when decision makers take collateral consequences into account. I show that in equilibrium, firms will borrow excessively and engage in welfare-decreasing malfeasance, and prosecutors will impose insufficient liability to deter corporations. I show that the first-best can be achieved by mandating the firms pay liability through equity issuances. (*JEL:* K13, K20, K42, G32)

Imposing liability on corporations may lead to unintended collateral consequences such as job losses and insolvency. This article is premised on the idea that decision makers—whether prosecutors, regulators, judges, or juries—routinely reduce liability in order to prevent collateral consequences. This is most famously articulated in a 1999 memorandum on corporate criminal liability by Deputy Attorney General Eric Holder,[1] which states that "[p]rosecutors may consider the collateral consequences of a corporate criminal conviction in determining whether to charge the corporation with a criminal offense." This guidance is now codified in the U.S. Attorney's Manual,[2] where prosecutors are instructed to take into account "harm to shareholders, pension holders, employees, and others not proven personally culpable, as well as [the] impact on the public arising from the prosecution."

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[1] "The Holder Memorandum", Memorandum from Deputy Attorney General Eric H. Holder, Jr. to Heads of Department Components and U.S. Attorneys, Bringing Criminal Charges Against Corporations, June 16, 1999.

[2] The U.S. Attorney's Manual, 9-28.000 – Principles of Federal Prosecution of Business Organizations.

The scope of this inefficiency is potentially vast. Since 2000, over $600 billion in fines have imposed on corporations by the federal government. Atkinson (2020a) shows that over 96% of the monetary value of these fines have been imposed by departments, agencies, and commissions that have policies in place to reduce liability when collateral consequences might occur. Atkinson further shows that criminal fines imposed on firms are frequently reduced because of concerns that the target corporations could not pay those fines.

In this paper, I study the equilibrium effects of prosecutors' concerns about collateral consequences on corporate malfeasance and corporate financing. Fixing the firm's capital structure and choice of malfeasance, I first consider the ex post effects of how the firm will pay liability. Broadly, the firm can raise funds through an equity issuance, a debt issuance, or asset sales. I build on Admati et al. (2018), and show that, with debt in place, asset sales benefit shareholders by transferring value away from existing creditors. By increasing the firm's leverage, asset sales increase the probability of insolvency, thereby harming creditors in the presence of bankruptcy costs. More broadly, financial distress and insolvency can lead to broader collateral consequences for employees, customers, and society more broadly (Matsa, 2018).

However, if officials are concerned about collateral consequences, the level of liability is not exogenous, but instead depends on the official's expectations about the effect of liability on vulnerable populations. In particular, a prosecutor that is concerned with both imposing liability and avoiding collateral consequences may exhibit reticence when imposing liability. Reducing liability can mitigate collateral consequences, but also undermines the goal of deterrence. Prosecutors will trade off these consequences when choosing liability, and will exhibit reticence when doing so can have a meaningful reduction on the probability of insolvency and prospective job losses.

Neither firms' capital structures nor choice of malfeasance are fixed. Anticipating the prosecutor's liability decision, I show that firms will favor debt financing in order to create the conditions for subsequent reticence. In my model, debt is unsecured and there are no covenants, meaning that shareholders have the potential to extract value from creditors by paying liability through asset sales. Critically, I show that the ability of shareholders to exploit creditors ex post creates the conditions for liability to be reduced. I show that, in equilibrium, (1) the firm will borrow excessively, (2) the firm will engage in social-welfare decreasing malfeasance, and (3) the prosecutor will impose liability less than the harm caused. Creditors will break even, and only suffer losses off of the equilibrium path.

Given this undesirable outcome, I consider a policy that was first proposed in the law literature by Coffee (1980) and built upon by Atkinson (2020a): mandating that corporations pay liability by issuing new equity. Mandating equity ensures that the firm can pay liability up to its market capitalization without any collateral consequences to employees. Furthermore because it imposes the full incidence of liability on the firm's principals, it aligns that ex ante incentives of the firm with society more broadly. Moreover, mandatory equity issuances provide optimal incentives to shareholders even when the potential harm is greater than the firm's market capitalization. I show that this policy achieves the first-best, even in the presence of a prosecutor that is concerned about collateral consequences.

This paper builds on a long literature following Becker (1968), who famously showed that optimal public enforcement entails setting the expected liability equal to the expected

harm, thereby inducing law-breakers to internalize their externalities. In this paper I amend the standard model in three important ways in order to better capture real-world frictions related to the corporate liability decision.

First, I consider the question of *how* the corporation pays liability. In standard models of enforcement, the game ends with the imposition of liability. In my model, the target corporation chooses whether to pay liability through issuing new equity, issuing new debt, or selling assets (inclusive of cash on hand). As in the real world, the firm makes this choice under uncertainty about future earnings. In this aspect, this paper relates closely to Admati et al. (2018) who show that indebted firms will resist leverage reductions no matter how much the leverage reduction may increase firm value.

Second, I assume that insolvency carries social costs, and that the prosecutor internalizes some of these costs. These costs may include job losses for employees, antitrust concerns arising from reduced competition, or harm to other third parties. Atkinson (2020a) shows that the vast majority of corporate fines imposed at the federal level are governed by laws that take into account potential collateral consequences, and that officials frequently do take collateral consequences into account.

And finally, I assume that prosecutors cannot ex ante commit to a liability schedule. The literature on optimal public enforcement almost always takes a social-planner approach where the government can commit to a particular liability regime (see e.g., Polinsky and Shavell, 2007). In the presence of commitment, the solution of setting liability equal to harm caused in the present case would achieve the first best. However, in reality, such commitment is not possible. This introduces a time-inconsistency in the prosecutor's objective function. Ex ante, the prosecutor would like to deter corporations from engaging in malfeasance. Ex post, the prosecutor would like to impose liability on the corporation, but is also concerned about the collateral consequences that might result. The firm's preference for asset sales creates a credible threat that shareholders will pay liability in a manner that creates collateral consequences. And while creditors could protect themselves through covenants, doing so does not maximize investors' joint surplus. Depending on the circumstances, the prosecutor may prefer to reduce liability below the level that would be optimal with commitment. Importantly, I show that the prosecutor's optimal ex post choice differs from the optimal ex ante liability schedule.

This paper takes a different approach than most models of corporate wrongdoing. The theoretical literature on corporate liability has focused almost exclusively on structuring liability in the presence of a principal-agent conflict (Sykes, 1983; Newman and Wright, 1990; Polinsky and Shavell, 1993; Arlen, 1994; Shavell, 1997; Garoupa, 2000). While agency conflicts are undoubtedly important, this focus overlooks that the interests of shareholders and managers frequently align, and the true conflict is between the corporation and society more broadly (Atkinson, 2020b). In this paper, I follow the approach of Admati et al. (2018) and assume that corporations are run in the interest of shareholders.

While this paper deals with the interaction of liability and insolvency, it does so in a previously unexplored manner. Shavell (1986) shows that liability may not provide adequate incentives when parties do not have assets sufficient to pay liability. Closely related, Che and Spier (2008) show how corporations can issue senior secured debt and use the proceeds to repurchase equity, thereby artificially creating judgment proofness. This paper

differs from Shavell (1986) and Che and Spier (2008) by showing how a firm that is not inherently judgment proof can still benefit from the future possibility of insolvency and the related collateral consequences.

This paper relates closely to Perotti and Spier (1993) who show how shareholders can adopt high leverage in order to extract value from other stakeholders. In particular, Perotti and Spier (1993) show that firms can alter their capital structures in order to create a debt overhang problem, so that they won't invest, harming workers. In their model, workers then consent to wage reductions in order to preserve their jobs. Like Perotti and Spier (1993), I consider how capital structure can be used to create credible commitment, but I differ by showing the unique interactions with the corporate liability decision. In empirical work, Matsa (2010), Benmelech et al. (2012), and Towner (2016) provide evidence that firms do in fact use debt to strategically improve firms' bargaining power. Finally my results relate to the literature on the effects on employment of leverage (Giroud and Mueller, 2015b, 2018), asset sales (Giroud and Mueller, 2015a), and insolvency (Bernstein et al., 2018). Ofek (1993) shows that higher leverage is associated with asset restructuring and layoffs following financial distress.

The remainder of the article is structured as follows. In the next section I develop a simple model. In Section 2 I specify the social optimum and characterize equilibrium assuming that prosecutors impose standard monetary fines on corporations. I show that standard monetary fines can achieve the first best when prosecutors can commit ex ante to a liability schedule. However, I show that in the absence of commitment, prosecutors will reduce liability below the socially optimal level, and firms will engage in excessive malfeasance. I then show that, even in the absence of commitment, prosecutors can achieve the first best by mandating that firms issue new equity to pay liability. In Section 3, I discuss other possible policy responses. Section 4 concludes.

1 Model

Initial Financing: A firm financed entirely through equity has an investment with returns $x = x_L < 1$ with probability p and $x = x_H > 1$ with probability $(1-p)$, where $px_L + (1-p)x_H = 1$. The firm can adjust its initial capital structure by choosing debt level $D \in [0, x_H)$, and returning any funds raised to shareholders.[3] The debt contract limits any subsequent debt to be junior to existing debt.

If the firm defaults, the firm is liquidated and the liquidation value is paid to creditors. Liquidation leads to bankruptcy costs borne by creditors and broader collateral consequences for the public generally. The value of assets is scaled by $\delta \in (0,1)$ in liquidation. Moreover, insolvency creates collateral consequences for the public $\gamma > 0$.

Malfeasance and Liability: The firm can choose a non-contractible harm $h \in [0,1]$. Malfeasance causes a social harm of h and a private benefit for the firm of $b = \theta h$, for $\theta \in (0,1)$. The prosecutor observes h and imposes liability $L \in [0,h]$ on the firm. This

[3]The restriction that $D < x_H$ means that shareholders must retain some equity so that the firm cannot be entirely financed through debt.

liability leads to a endogenous probability of default, π. The prosecutor's utility is a function of the amount of reticence and the expected collateral consequences and is given by $u = r(h-L) - \gamma\pi$. The term $r(h-L)$ represents the cost the prosecutor incurs for choosing liability less than harm, with $r'(h-L) < 0$ for all $(h-L) > 0$, and $r(0) = r'(0) = 0$. If the prosecutor is indifferent between two levels of liability, she chooses the lower level of liability.

Refinancing: The firm pays liability by refinancing. It can do so through a junior debt issuance of d, an equity issuance equal to a proportion s of the firm's equity, or asset sales a. Assets are perfectly homogenous, so if a firm sells assets and retains a proportion $(1-a)$ of its assets, asset returns are reduced to $(1-a)x_L$ in the low state of the world and $(1-a)x_H$ in the high state of the world.

Overall, the sequence of actions is as follows:

1. **Financing**. Shareholders may retire equity and issue debt with face value D. (The capital market will determine the price.)
2. **Malfeasance**. The firm chooses harm $h \geq 0$, and gains benefit θh.
3. **Liability**. The prosecutor observes harm h and imposes liability L on the firm.
4. **Refinancing**. The firm pays the liability through issuing equity, issuing debt, or selling assets.
5. **Asset returns**. Asset returns are distributed, with the priority ranking (i) initial creditors; (ii) new creditors; (iii) shareholders.

All securities and assets are traded in perfect Walrasian markets. The risk-free interest rate is normalized to zero. The equilibrium concept is subgame-perfect Nash. Throughout the paper I assume that if shareholders are indifferent between methods of financing, they choose asset sales over debt issuances over equity issuances. This assumption eases the exposition, but has no effect on the players' payoffs.

2 Analysis

2.1 Social Optimum

Because malfeasance is always inefficient, $\theta \in (0, 1)$, no malfeasance should occur in the social optimum. Moreover, because insolvency imposes costs on both creditors and the public, yet debt conveys no public benefit, the social optimum involves no insolvency. The social optimum is therefore described by $\{h = 0, D \leq x_L\}$.

2.2 Standard Fines with Commitment

The following result shows that if the prosecutor can commit to a fine schedule, then the social optimum can be achieved with the standard Becker solution, $L = h$.

Proposition 1. *If the prosecutor can commit to $L = h$, the social optimum will be achieved.*

Because the prosecutor will impose liability equal to harm caused, creditors and shareholders will jointly bear the full incidence of liability. However, because malfeasance is always inefficient, any joint gains to investors are outweighed by expected liability payments, $\theta H < L$. Shareholders therefore issue debt $D \leq x_L$, and do not engage in malfeasance.

2.3 Standard Fines with Without Commitment

Prosecutors cannot credibly commit to a liability schedule. The ex post costs of imposing liability may be such that prosecutors prefer to reduce liability below the level that is ex ante optimal. In this section, I show that the social optimum will not be achieved using standard monetary fines in the absence of commitment to a liability schedule. The analysis proceeds by backwards induction.

First, consider the firm's refinancing decision. If liability is imposed, the firm can pay through an equity issuance, debt issuance, or asset sales. The amount that the firm can raise is a function of the means of refinancing. With an equity issuance, the firm can raise $1 - D + b$. With a debt issuance, the firm can issue risk-free debt of $x_L + b - D$, or risky debt of up to $1 - D + b$. With asset sales, the firm can raise the expected value of the assets, $1 + b$. Because the firm makes choices to maximize the value of equity, the firm will always weakly prefer asset sales:

Lemma 1. *The firm will always sell assets to pay liability.*

Low levels of liability do not threaten the firm's solvency, so the firm is indifferent between the means of financing—in any case shareholders will bear the entire incidence of liability. Once liability increases beyond $x_L + b - D$, the firm is no longer able to issue risk-free debt. Issuing debt beyond this level exposes new creditors to default risk and insolvency costs in expectation, so creditors demand a higher interest rate. However, because insolvency creates a deadweight cost that new creditors need to be compensated for, shareholders prefer equity issuances or asset sales to issuing debt.

If liability is sufficiently large, shareholders have a strict preference for asset sales over both debt and equity issuances. This is because asset sales, unlike debt or equity issuances allow the firm to shift some of the cost of liability away from shareholders and onto creditors. Shareholders' preference for (and creditors' preference against) asset sales stems from the uncertain nature of firm earnings. If the firm sells assets to pay liability, asset returns in the low state of the world decrease below the level of debt, which implies that creditors are no longer paid back in full. And because each unit of asset sales reduce the total firm payoff by one and the creditor payoff by a positive amount, asset sales reduce shareholders' payoff by less than one. This is in contrast to equity issuances that decrease shareholder payoff by one, and debt issuances that decrease shareholder payoff by more than one.

This is illustrated in the following numerical example:

> **Numerical Example 1.** Suppose that the value of the firm in the low state of the world is $x_L = 0.6$, and the value in the high state of the world is $x_H = 1.4$, with $p = \frac{1}{2}$. $D = 0.75$ and $b = 0.15$. Let bankruptcy costs be $\delta = 0.1$.

Therefore, in the absence of liability, the market capitalization of the firm is $(\frac{1}{2})(0.6 - (0.75 - 0.15)) + (\frac{1}{2})(1.4 - (0.75 - 0.15)) = 0.4$. Now suppose that the firm has to pay liability of 0.2, and consider the various ways of paying.

If the firm issues equity, new shareholders will need to break even in expectation, and demand a payoff of 0.2. Therefore the value of the initial stock drops to $0.4 - 0.2 = 0.2$.

If the firm issues debt, creditors need to break even in expectation. Because new creditors are junior, they will only be paid in the high state of the world. They therefore demand a face value of $d = 0.4$. This results in a value of equity of $(\frac{1}{2})(0) + (\frac{1}{2})(1.4 - (0.75 - 0.15) - .4) = 0.2$.

In order to raise $L = 0.2$ through asset sales, the firm has to sell 20% of its assets, reducing asset returns to 0.48 in the low state of the world and 1.12 in the high state of the world. The value of equity is therefore: $(\frac{1}{2})(0) + (\frac{1}{2})(1.12 - (0.75 - 0.15)) = 0.26$. The relative gains to shareholders came from creditors no longer being paid back in full in the low state of the world.

This leads to the following corollary to Lemma 1:

Corollary 1. *For low levels of liability, shareholders bear the entire incidence of liability. For high levels of liability, shareholders bear less than the full incidence of liability.*

Shareholders control a firm's actions. But once debt is in place, they no longer bear the full incidence of liability imposed upon the firm. This is because once liability is sufficiently high, the firm will become insolvent in expectation, and shareholders benefit from the default option. This conflict between debt and equity creates the conditions necessary for firms to be able to exploit collateral consequences.

The prosecutor observes the harm h and the firm's capital structure and chooses liabilityanticipating the firm's refinancing decision. Given that the firm is biased towards asset sales, a high level of liability may lead to insolvency and job losses. However a low level of liability will not achieve goals of deterrence and compensation. The prosecutor balances these interests, and the following result characterizes the prosecutor's optimal decision as a function of the harm done and the firm's capital structure.

Lemma 2. *There exists a $D > x_L$ and $h > 0$ such that the prosecutor will not impose any liability, $L = 0$.*

Faced with a firm that is potentially insolvent, the prosecutor bears costs from imposing liability. This can be seen most clearly by considering a knife-edge case of a firm that will have no money to distribute to shareholders after paying creditors in the low state of the world, $x_L + b = D$. In this case, any liability imposed will lead to insolvency in the low state of the world. Therefore, increasing liability from 0 to ϵ, will lead to a discontinuous decrease in the prosecutor's utility. If the level of harm is sufficiently small, this decrease swamps the prosecutor's utility bump from imposing positive liability.

Taken together, the following characterizes the equilibrium of standard monetary fines in the absence of commitment:

Proposition 2. *Without policy intervention:*

(a) The firm will borrow excessively ($D > x_L$).

(b) The firm will engage in malfeasance ($h > 0$).

(c) The liability imposed is less than the harm caused ($L < h$).

In equilibrium firms are able to profit from social-welfare decreasing malfeasance by issuing debt and preserving the flexibility to default on that debt. By exposing creditors to risk, shareholders are able to credibly commit to creating collateral consequences from high levels of liability. This in turn induces reticence on the part of the prosecutor. Taken together, firms can exploit decision makers' desire to limit collateral consequences. The following numerical example shows how corporations can exploit officials' concern for collateral consequences:

> **Numerical Example 2.** Suppose that the value of the firm in the low state of the world is $x_L = 0.6$, and the value in the high state of the world is $x_H = 1.4$, with $p = \frac{1}{2}$. Further assume that $\theta = 0.3$, so the benefit to the firm is 30% of the harm caused. Let the functional form of the regulator's utility be $u = -(h - L)^2 - \gamma\pi$ for $\gamma = 0.5$.
>
> Suppose that the firm has borrowed $D = 0.75$ and engaged in harm $h = 0.5$. Following these choices, the firm's net liabilities are $D - \theta h = 0.6$. This means that the firm is solvent in both states of the world. Now consider the regulator's liability decision. Figure 1 plots the regulator's utility. The horizontal axis represents the corporation's net financial obligations: debt plus liability imposed, minus the benefit from malfeasance. The uppermost concave function shows that the regulator's utility is decreasing in the distance between harm and liability imposed. Putting aside potential collateral consequences, the regulator's utility is maximized at $L = h = 0.5$, which results in total financial obligations of 1.1 for the firm.
>
> However, imposing liability may threaten the firm's solvency, thereby leading to collateral consequences. The three horizontal dashed lines represent the regulator's expected disutility from collateral consequences. If the net financial obligations are less than 0.6, the firm remains solvent, so the regulator does not experience disutility from collateral consequences. If the net financial obligations are in the region $(0.6, 1.4]$, the firm will default when asset values are low, so the regulator experiences disutility $\gamma\pi = (\frac{1}{2})(\frac{1}{2}) = 0.25$. If the net financial obligations are greater than 1.4, the firm will always default, so the regulator experiences disutility $\gamma\pi = (\frac{1}{2})(1) = 0.5$.
>
> The regulator's utility is the sum of the concave disutility from setting liability different from harm, $-(h-L)^2$, and the collateral consequences component, $-\gamma\pi$. The three concave functions in Figure 1 represent the concave function shifted by the collateral consequences component. The solid black line is the regulator's net utility function. The regulator does better by choosing L close to h, except for the jumps at 0.6 and 1.4, which arise from the increased probability of insolvency. In this case, the regulator is indifferent between choosing

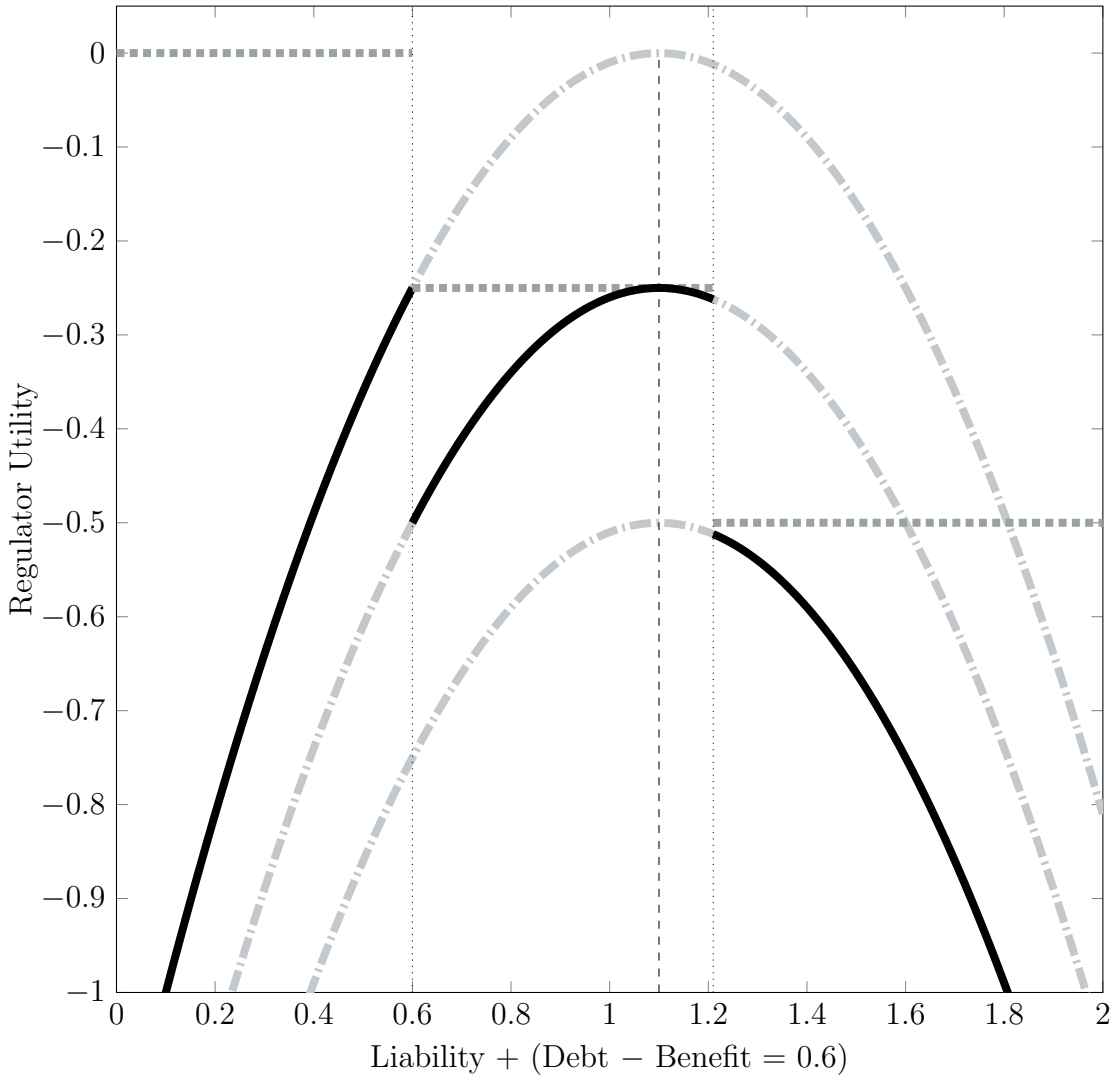

Figure 1: Optimal Liability Choice

$L = 0.5$ ($L + D - b = 1.1$) and $L = 0$ ($L + D - b = 0.6$). If the regulator chooses $L = 0.5$, she suffers no disutility from choosing $L \neq h$, however she suffers disutility from collateral consequences. If the regulator chooses $L = 0$, there are no collateral consequences, but she suffers disutility from choosing $L \neq h$. Resolving indifference in favor of reticence, the regulator will choose $L = 0$.

Because the firm remains solvent, creditors are paid back in full, receiving 0.6 from the asset returns and 0.15 from the benefits of malfeasance. Shareholders' make 0.75 from using debt to repurchase equity, plus the expected value of the assets after paying back creditors, $\frac{1}{2}(0 + 0.8) = 0.4$. Shareholders' net return is therefore 1.15, despite starting with an asset that only returned 1 in expectation. The losers are the victims of malfeasance, who suffered harm $h = 0.5$, yet received no compensation. Net social welfare decreased by $h - b = 0.35$.

By borrowing excessively, shareholders can credibly commit to creating collateral consequences when liability is imposed. Creditors consent to excessive borrowing, because the firm remains solvent on the equilibrium path. Together shareholders and creditors are able to profitably engage in welfare-decreasing malfeasance.

2.4 Mandatory Equity Issuances Without Commitment

When imposing liability, prosecutors are faced with a trade-off between deterrence on the one hand and collateral consequences on the other. Because prosecutors cannot commit to a liability schedule, corporations can exploit prosecutors' time inconsistency to avoid liability. However, by mandating that the firm pay liability by issuing new equity, prosecutors can achieve the first best.

Define the mandatory equity issuance as liability $L_E = \min\{v_E, h\}$, imposed directly on shareholders. That is, the prosecutor sets the mandatory equity issuance equal to the minimum of the firm's market capitalization or the harm imposed by the firm. The following shows that this achieves the first best.

Proposition 3. *Mandating that firms pay liability through equity issuances achieves the first best,* $\{h = 0, D \leq x_L\}$.

To see that this achieves the first best, consider two cases. First, suppose that the harm caused is less than the firm's market capitalization, $h < v_E$. This means that liability will be set equal to $L_E = h$. Because engaging in malfeasance is inefficient, shareholders' potential gains from engaging in malfeasance are capped at θh. However, because shareholders will bear a cost h, their gains from engaging in malfeasance are capped at $\theta h - h = -(1-\theta)h < 0$. So it is never profitable for shareholders to engage in malfeasance when $h < v_E$.

Next consider the case where the harm is greater than or equal to the firm's market capitalization. This means that $L_E = v_E$. So following a mandatory equity issuance, shareholder utility is $v_E - v_E = 0$, and shareholders are completely wiped out following the imposition of liability. Shareholders therefore do not capture any of the benefits from malfeasance, θh, but bear costs from malfeasance. Therefore shareholders will not engage in harm greater than the firm's market capitalization.

The following numerical example illustrates the effectiveness of mandatory equity issuances:

> **Numerical Example 3.** Suppose that the value of the firm in the low state of the world is $x_L = 0.6$, and the value in the high state of the world is $x_H = 1.4$, with $p = \frac{1}{2}$. Further assume that $\theta = 0.3$, so the benefit to the firm is 30% of the harm caused. Let the functional form of the regulator's utility be $u = -(h - L)^2 - \gamma\pi$ for $\gamma = 0.5$.
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> As in the previous numerical example, suppose that the firm has borrowed $D = 0.75$ and consider two cases. First consider engaging in harm $h = 0.5$. Following these choices, the firm's net liabilities are $D - \theta h = 0.6$. This means that the firm is solvent in both states of the world. The ex interim market capitalization of the firm is $v_E = \frac{1}{2}(1.4 - .6) = 0.4$. In this case, the harm caused

is greater than the firm's market capitalization. Therefore a mandatory equity issuance, $L_E = \min\{v_E, h\}$, will be set to the firm's market capitalization, $L_E = v_E = 0.4$. Shareholders lose all of their equity in the firm, and their total payment is equal to 0.75 from the initial share buyback.

Next consider the case where the firm does not engage in malfeasance. The firm's market capitalization is therefore $v_E = \frac{1}{2}(1.4 - .75) = 0.325$. Adding this to the proceeds from the initial share buyback 0.75, shareholders total payoff is 1.075. However, this is not an equilibrium outcome. In this case, creditors are paid back in full in the high state of the world, but not in the low state of the world, $x_L < D < x_H$. Therefore creditors lend 0.75 to the firm, but are paid back less than 0.75 in expectation. Creditors will therefore not lend more than x_L to the firm.

This example illustrates how mandatory equity issuances affect both the firm's malfeasance decision *and* the firm's financing decision. By making malfeasance unprofitable for shareholders, mandatory equity issuances eliminate distortions in the firm's capital structure and lead to socially-optimal financing.

3 Uniqueness and Discussion

Mandatory equity issuances achieve the first best. Moreover, they are simple to implement, and can be implemented under the current law (Atkinson, 2020a). However, mandatory equity issuances are not the only option that officials could use to achieve the first best. In this section, I consider other possible policy responses and discuss why they are generally inferior to mandatory equity issuances.

One solution would be to impose liability directly on shareholders. While this proposal was made by Hansmann and Kraakman (1990), such a policy is legally questionable and could harm the system of limited liability on which modern financial markets are premised. However, while it is unlikely that imposing liability directly on shareholders would ever be a possibility, any solution that deters malfeasance will do so by effectively imposing liability on shareholders. The solutions that I discuss in the rest of this section are effective at deterring malfeasance so far as they effectively impose liability on shareholders. Moreover, mandatory equity issuances perform well off of the equilibrium path, and do not distort firms' financing decisions to the extent of other options. In this section, I review other remedies, and discuss the ways in which they are less operationally viable than mandatory equity issuances.

A simple solution would be a commitment to not reduce liability when collateral consequences may result. The prosecutor would then set liability equal to the harm caused for any malfeasance. Anticipating liability, the firm would not engage in malfeasance. However, it is unlikely that officials could credibly commit to setting liability equal to harm caused. Just as in the case of banking bailouts and forebearance, it is unclear whether officials could ever credibly commit to not considering collateral consequences. Moreover, off of the equilibrium path, such a commitment would lead to substantial collateral consequences. Given that malfeasance may still occur through mistake or negligence, standard

monetary liability would be inferior to mandatory equity issuances in those instances where harm does occur.

Another method to impose liability on shareholders would be to impose capital requirements. In the most extreme version, corporations could be required to be funded through 100% equity, which would mean that shareholders would have no creditors onto whom they could pass costs. Moreover, the lack of debt obligations means that the firm would only become insolvent for very high levels of liability. In the context of this model, firms would not engage in malfeasance if capital requirements restricted $D < x_L$. In this case, the prosecutor could impose liability $L = b$, which would leave the firm solvent and would take away the benefits to malfeasance. However, if harm does occur off of the equilibrium path, the prosecutor may still set liability less than the harm caused, threatening the compensatory goal of liability. Furthermore, capital requirements would be impossible to optimally implement. While there are social costs to debt, there are also potential benefits, and it is impossible to set each firm's optimal capital structure.

In the model, creditors lend excessively to the firm, and thereby enable it to engage in welfare-decreasing malfeasance. Liability could therefore be be imposed on lenders, as studied by Pitchford (1995). Anticipating liability, creditors would demand a higher interest rate ex ante. In the context of the model, this would lead to the firm funding entirely through equity. In a less constrained environment, firms would still borrow to take advantage of the other benefits of debt. This would then exacerbate debt-equity conflicts, and would require creditors to invest much more in monitoring the corporation's behavior.

A final option is to use delayed liability payments. However, a fixed payment schedule will still contribute to the firm's financial distress, meaning that prosecutors could still be affected by concerns about collateral consequences. Instead of a fixed payment schedule, some fines have been tied to firms' profits (Atkinson, 2020a). For example, in a 2009 settlement with the DOJ, Beazer Homes had to pay 4% of its EBITDA annually towards restitution to victims of mortgage fraud. Liability payments tied to profits therefore do not contribute to financial distress. However, such a payment would alter shareholders' risk profile, and would lead to shareholders preferring more risky actions, such as gambling for resurrection. Ultimately, if the firm remains solvent and fully pays the liability, then the costs are effectively borne by shareholders. However, if the firm defaults before paying back liability, the goals of imposing liability have not been met.

Shareholders are corporations' ultimate principles. In order to be effective, a corporate liability regime must impose liability on shareholers. Mandating equity issuances is the simplest and most robust means of doings so.

A mandatory equity issuance raises the question of whether the firm would be able to undo the equity issuance through issuing debt or selling assets and paying dividends or repurchasing shares. The answer is no. Intuitively, this is because at the time of the share repurchase, the firm's *initial* shareholders have already borne the full cost of liability. And because $\theta h < L$, the initial shareholders did not profit from malfeasance. If repurchasing shares is ex post profitable for shareholders, the firm would do better by refraining from malfeasance and simply repurchasing shares. However, because creditors would anticipate this and demand additional covenants, it is not an equilibrium outcome.

Finally it is important to note that privately-implemented covenants are insufficient to

protect society. When formulating debt contracts, shareholders and creditors work to maximize their joint surplus, not society's surplus. In this model, creditors could easily prevent malfeasance by insisting on a covenant that requires shareholders to pay liability through equity issuances. However, such a covenant is not in the joint interests of shareholders and creditors. By giving shareholders the option of exploiting creditors off the equilibrium path, the joint surplus of investors is maximized. To the extent that creditors bear any increased risk, shareholders will prefer to compensate them ex ante through a higher interest rate rather than by introducing covenants that constrain shareholders' actions. Given that prosecutors take collateral consequences into account, society cannot rely on private markets to achieve the socially optimal solution.

4 Conclusion

Decision makers are often concerned with the collateral consequences of corporate liability. Under standard remedies, decision makers generally face the choice between insufficient liability and collateral consequences. Forward-looking firms will anticipate and exploit concerns about collateral consequences, resulting in firms that borrow excessively and engage in welfare-decreasing malfeasance. This article shows that, by mandating the firms pay liability through equity issuances, officials can deter welfare-decreasing malfeasance.

A Proofs

Proof of Lemma 1 (Refinancing). First, consider the utility of shareholders from the three ways of paying liability:

1. **Equity Issuance.** The new shareholders need to capture a portion s of the returns to solve: $L = s(1 - D + b)$. Solving yields: $s = \frac{L}{1-D+b}$. The most that can be raised through an equity issuances is the value of the firm, $1 - D + b$. The value of initial equity form an equity issuance is therefore:

$$\begin{aligned} V_E^E &= (1-s)(1-D+b) \\ &= 1 - D + b - L. \end{aligned}$$

2. **Debt Issuance.** Suppose that the firm issues junior debt d to pay liability. If $L + D \leq x_L + b$, then new creditors face no risk. The firm must issue debt to solve $L = \min\{d, p\delta(x_L + b - D) + (1-p)(d)\}$. Which yields:

$$d = \begin{cases} L & \text{if } L \leq x_L + b - D \\ \frac{L - p\delta(x_L + b - D)}{1-p} & \text{if } L > x_L + b - D \end{cases} \tag{1}$$

The value of equity from a debt issuance is therefore.

$$V_E^D = \begin{cases} 1 - D + b - L & \text{if } L \leq x_L + b - D \\ (1-p)\left(x_H - D + b - \frac{L - p\delta(x_L + b - D)}{1-p}\right) & \text{if if } L > x_L + b - D. \end{cases} \tag{2}$$

3. **Asset Sales.** Suppose that the firm sells assets to pay liability. It first sells the safe asset, b, before selling the remaining assets. Therefore the firm must sell a proportion $(L-b)$ of its assets, leaving it with $(1-L+b)$ of its assets. The firm will remain solvent in both states of the world if $(1-L+b)x_L \geq D$, which implies that the firm remains solvent if $L \leq 1+b-\frac{D}{x_L}$.

   The value of equity from an asset sale is therefore:

$$V_E^A = \begin{cases} 1-D+b-L & \text{if } L \leq 1+b-\frac{D}{x_L} \\ (1-p)\big((1+b-L)x_H - D\big) & \text{if } L > 1+b-\frac{D}{x_L}. \end{cases} \tag{3}$$

   If liability is greater than $1+b-\frac{D}{x_L}$, the firm will be insolvent in the low state of the world. If liability is sufficiently high, the firm will be insolvent in both states of the world. The firm will be insolvent with certainty if $(1-L+b)x_H \geq D$. Therefore the maximum liability that can be imposed without guaranteeing insolvency is $L^{max} \equiv 1+b-\frac{D}{x_H}$.

With the value of equity in place, I can now show the lemma:

1. **Equity preferred to debt.** It follows immediately that equity and debt issuances are equivalent for $L \leq x_L + b - D$. Next see that equity issuances are preferred to debt issuances for $L > x_L + b - D$. This follows from having to compensate new creditors for the bankruptcy costs associated with debt issuances:

$$\begin{aligned} 1-D+b-L &> (1-p)\left(x_H - D + b - \frac{L - p\delta(x_L+b-D)}{1-p}\right) \\ p(x_L - D + b) + (1-p)(x_H - D + b) - L &> (1-p)(x_H - D + b) - L + p\delta(x_L - D + b) \\ p(x_L - D + b) &> p\delta(x_L - D + b) \\ 1 &> \delta. \end{aligned}$$

2. **Asset sales preferred to equity.** It follows immediately that equity issuances and asset sales are equivalent for $L \leq 1+b-\frac{D}{x_L}$. Next see that equity issuances are preferred to asset sales for $L > 1+b-\frac{D}{x_L}$. This follows from asset sales extracting value from existing creditors:

$$\begin{aligned} L &> 1+b-\frac{D}{x_L} \\ L &> \frac{px_L(1+b)-pD}{px_L} \\ Lpx_L &> px_L + bpx_L - pD \\ L(1-(1-p)x_H) &> 1 - pD - (1-p)x_H + b - (1-p)x_H b \qquad (4) \\ (1-p)((1+b-L)x_H - D) &> 1 - D + b - L \\ V_E^A &> V_E^E, \end{aligned}$$

   where (4) follows from $x_H = \frac{1-px_L}{1-p}$.

□

Proof of Lemma 2 (Malfeasance and Liability). First observe that if $D < x_L$, the prosecutor can costlessly impose liability of $x_L - D + b > 0$. Given that the firm is going to engage in harm with a benefit of b, the firm maximizes its benefit with $D = x_L + b$. This ensures that any liability will lead to insolvency with positive probability.

The prosecutor will anticipate that the firm will sell assets to pay liability. Therefore the firm will remain solvent so long as $L \leq 1 + b - \frac{D}{x_L}$. Because $r'(h - L) < 0$, $\frac{\partial u}{\partial L} > 0$ for $L \in (0, L^{max}) \cup (L^{max}, h]$. Therefore the prosecutor's utility will be maximized at either $L = 0$, $L = L^{max}$, or $L = h$.

Suppose that the firm chooses a level of harm such that the prosecutor chooses $L \geq L^{max}$. If $L \geq L^{max}$, $V_E^A(L = L^{max}) = 0$. In the absence of harm, $V_E > 0$ for any $D \in [0, x_H)$. Therefore the firm will never choose a harm that results in $L \geq L^{max}$. Therefore in equilibrium, it must be the case that the firm will choose a harm h that will result in liability $L \in [0, L^{max})$. From shareholders' perspective, there is no difference between $L = h$ and $L = L^{max}$ for $h > L^{max}$. Therefore assume with loss of generality that the prosecutor will either impose liability $L = h$ or $L = 0$.

Shareholders will never engage in harm if $L = h$. [Show this!]

Therefore, shareholders will only engage in harm if the prosecutor will impose liability of 0.

Now I show that there exists $D > x_L$ and $h > 0$ such that the prosecutor will not impose any liability, $L = 0$

Consider $h = \frac{\frac{D}{x_L} - 1}{\theta}$. This implies that the benefit from malfeasance is $b = \frac{D}{x_L} - 1$. Therefore, the firm will remain solvent if $L \leq 1 + \left(\frac{D}{x_L} - 1\right) - \frac{D}{x_L} = 0$.

The prosecutor's utility is therefore either $u(L = 0) = r(h)$ or $u(L = h) = -\gamma p$. The gain in utility from choosing $L = 0$ over $L = h$ is therefore: $u(L = 0) - u(L = h) = r(h) + \gamma p$. And by $r'(0) = 0$, for any $\gamma p > 0$, there exists an h such that $r(h) + \gamma p > 0$.

Therefore the firm can profit from malfeasance.

□

Proof of Proposition 3 (Mandatory Equity Issuance). 1. Suppose that $D \leq x_L + b$. Then the value of equity is $1 - D + b$. So the firm can pay liability up to this amount through an equity issuance.

2. Suppose that $D \in (x_L + b, x_H + b)$. This means that the firm is insolvent in the low state of the world. The value of equity is therefore $(1 - p)(x_H + b - D)$. So the maximum liability that can be paid through an equity issuance is this amount. Therefore the firm will not engage in malfeasance in this region.

3. Suppose that $D \geq x_H + b$. Equity is valueless. Can't raise equity to pay liability. However, given that harm leaves with 0 value, shareholders will always do at least as well by not engaging in malfeasance.

□

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