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THE ROLE OF WARRANTS IN CORPORATE REORGANIZATIONS

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Abstract

That a firm's initial equityholders often emerge from Chapter 11 bankruptcy proceedings with more value than the absolute priority rule would suggest is now a generally accepted fact. The form in which this value is distributed, however, is less well understood. In particular, why do the original shareholders of some firms emerge from Chapter 11 bankruptcy with stock in the reorganized firm, while others receive warrants? This essay proposes that informational asymmetries provide the answer to this question. By proposing a reorganization plan in which they receive warrants, the original stockholders of a firm with good future prospects can signal their superior information to the creditors in a way that firms with poor prospects will not wish to mimic.

1. Introduction

That a firm's initial equityholders often emerge from Chapter 11 bankruptcy proceedings with more value than the absolute priority rule (APR) would suggest is now a generally accepted fact.[1] The form in which this value is distributed, however, is less well understood. Betker (1991) notes that securities issued to firms' original shareholders during reorganizations are virtually always in the form of new equity or warrants.[2] In fact, Franks and Torous (1994) show that warrants account for, on average, 30 percent of the total payments made during a Chapter 11 reorganization to the bankrupt firm's original preferred stockholders.[3] The purpose of this essay is to answer the question posed by this fact: Why do the original shareholders of some firms emerge from Chapter 11 bankruptcy with stock in the reorganized firm, while others receive warrants?

Chapter 11 bankruptcy law exists to facilitate the reorganization of the firm as an ongoing concern, as opposed to liquidating its assets in a piecemeal fashion.[4] Because the firm's future value is uncertain, its equityholders would like to delay the reorganization as long as possible; if, in the intervening period, the firm's prospects improve, it will be able to pay off its debts and the equityholders will retain the residual value of the firm. This is the well-known "option to

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[1] See, for example, Betker (1995), Eberhart, Moore, and Roenfeldt (1990), Franks and Torous (1991), and LoPucki and Whitford (1990).

[2] This paper was later revised in Betker (1994).

[3] The breakdown of the payments to common stockholders is not presented.

[4] This justification seems well ingrained in the folklore of the Bankruptcy Code; see, for example, Jackson (1986) and White (1990). Whether it stands up to critical analysis, however, is a different question.

delay" inherent in Chapter 11 bankruptcy.[5] One reason APR violations occur is to compensate the firm's equityholders for giving up this delay option so that they will allow the reorganization to proceed.

The insiders of a firm are likely to have superior information about its future prospects, compared to other participants in the bankruptcy process. If this information is favorable, the firm's shareholders would like to credibly convey it to their creditors — the larger the future revenues of the firm are likely to be, the more valuable their delay option. Conversely, shareholders of a firm with poor prospects would like to hide this information. By proposing a reorganization plan in which they receive warrants, the original stockholders of a firm with good future prospects can signal their superior information to the creditors in a way that firms with poor prospects will not wish to mimic.

Key to our analysis is the fact that the firm's initial stockholders use the reorganization process to extract surplus from their creditors. Brown (1989) models the reorganization game implicit in Chapter 11 and shows that APR violations are driven by the borrower's first-mover advantage (the exclusivity period given to the debtor for proposing a plan of reorganization); by being able to offer the first plan of reorganization (which is accepted), equity reaps all the gains from avoiding further delay. Bebchuk and Chang (1992) carry this idea one step further by allowing the firm to continue running during the reorganization process. Since there is a chance that the firm's ongoing revenues might be sufficient to pay off its debt obligations, an extended renegotiation process provides the above-mentioned option value to the initial stockholders. In this model, APR violations occur not only because of the delay costs avoided in a quick

[5] See, for example, Franks and Torous (1989, 1994) and Bebchuk and Chang (1992).

reorganization, but also because equity must be compensated for giving up this option value.

One by-product of our analysis is to show how the "clean slate" of bankruptcy can be used to look at the firm's capital structure decision (in this case, the choice between equity and warrants). It is well understood that tax rules, informational asymmetries, and agency conflicts among stockholders, managers, and bondholders are all important factors in determining how a firm chooses to finance its investments. But a firm cannot ordinarily fully adjust its capital structure as these incentives change over time. In order to optimize in the present, a firm may need to undo a decision made in the past (for instance, by buying back old debt or equity it has issued). While this may be feasible in some cases, in others it can be quite costly, and as a result, the firm may end up with a hodgepodge capital structure that does not accurately reflect its incentives at the moment. Chapter 11 bankruptcy, however, allows the firm to wipe away all its old debts and stock and issue wholly new securities. Alderson and Betker (1994) take advantage of this idea and show that firms with high liquidation costs choose post-reorganization capital structures that are typically low in debt and that have less restrictive covenant terms.

In the next section, we outline our basic model. Following the analysis of Bebchuk and Chang (1992), we derive the amount of the firm's value that Chapter 11 negotiations will allocate to its original shareholder (called the entrepreneur) and its creditors. In section 3, we discuss how the specific securities chosen to distribute this value can affect the payoff to each class of claimants. Section 4 concludes.

2. A Model of Bankruptcy Resolution

Consider a two-period world in which an entrepreneur/manager is the sole stockholder of a firm. This firm has cash valued at x_1 and debt outstanding with a face value of δ, owed to a single lender. Assume that $x_1 < \delta$ so that the firm is in financial distress. One can think of x_1 as the realized period-one profits from an investment project the entrepreneur selected in period zero, and δ as the payment required to ensure that the lender earned zero expected profits on a loan extended in period zero. Assume, furthermore, that the firm's investment project will produce a random return $\tilde{x}_2$ in period two.

While the distribution of $\tilde{x}_2$ is assumed to be independent of x_1, in period one the entrepreneur learns private information regarding the distribution of $\tilde{x}_2$. In particular, the firm's period-two return may have one of two distributions, $G(x_2)$ or $B(x_2)$, where G is first-order stochastic dominant over B so that $G(y) \leq B(y)$, $\forall y$, with strict inequality for a set of values of y with positive probability. In other words, for any constant y, it is always more likely that the realized value of $\tilde{x}_2$ will be less than y under distribution B than it is under distribution G.[6] One implication of this assumption is that the expected value of $\tilde{x}_2$ is larger under G than under B. For ease of exposition, we will refer to the firm with distribution G as the "good firm" and to the other as the "bad firm."[7] Using standard notation, let $g(x_2)$ and $b(x_2)$ denote the respective density functions of the two types of firms. Finally, let ρ be the proportion of firms in the population that have distribution G; this proportion is known by the lender, so absent any

[6] For an introduction to first-order stochastic dominance, see Milgrom (1981) and Laffont (1989).

[7] Similarly, we will refer to the "good entrepreneur" and the "bad entrepreneur."

further information, it assumes the distribution of $\tilde{x}_2$ is its ex ante expected value, $\Pi(x_2) = \rho G(x_2) + (1-\rho)B(x_2)$. It is easy to show that G is first-order stochastic dominant over Π, which is first-order stochastic dominant over B.

Since the firm is in financial distress, it must renegotiate with its creditors. Our model of the Chapter 11 renegotiation process is a simplification of that developed by Bebchuk and Chang (1992), the general structure of which can be described as follows. A plan of reorganization specifies the proportion of the firm's existing cash and expected future revenues to be distributed to each class of claimants; a plan is adopted only if every class of claimants accepts it. It is common knowledge that the firm will be allowed to continue in reorganization for n periods, after which, if no plan is accepted, it will be liquidated and the proceeds will be distributed according to the APR. Default costs of c are incurred in each period, meaning a quick reorganization is more efficient than one that is drawn out. In the first e periods, the debtor is granted an exclusivity period in which to propose a plan of reorganization. For the remaining $n-e$ periods, each class of claimants has an equal chance of being allowed to propose a plan, with only one plan being offered each period. During this process, the firm continues to operate and receive revenues; none of these revenues, however, may be distributed to any of the claimants until a final plan of reorganization is agreed upon. The equilibrium is found recursively by solving the model for the final period and working backward.

In our model, there are only two classes of claimants — equity and debt — and we assume that $n = 2$ and $e = 1$. If no agreement is reached by the end of period two, the bankruptcy court imposes the liquidation outcome. At this point, the firm will have $x_1 + x_2$ in cash, minus the $2c$ in default costs incurred during periods one and two. Let V_e^L and V_d^L denote

the payoffs to the entrepreneur and the lender, respectively, when no agreement is reached:

$$V_e^L = \max\{0, x_1 + x_2 - \delta - 2c\}, \qquad V_d^L = \min\{\delta, x_1 + x_2 - 2c\}. \tag{1}$$

Clearly, each of these payoffs is simply a direct application of the APR.

Knowing this guaranteed minimum outcome, in period two neither the entrepreneur nor the lender will accept any plan of reorganization promising less. Since costs are incurred and no uncertainty is resolved between period two and the court-mandated liquidation, the only plan of reorganization either class may propose that will be accepted gives V_e^L to the entrepreneur and V_d^L to the lender.[8] Although the entrepreneur and the lender are equally likely to be allowed to propose a plan in this period, our structure implies that the choice is irrelevant — both classes will offer the same plan, which will be accepted.[9]

Moving back to period one, the entrepreneur's exclusivity period, the lender must decide whether to accept or reject the entrepreneur's proposed plan of reorganization. His expected return from rejecting the plan and continuing the process into period two is

$$V_d^* = \int_{\underline{x}}^{\lambda} (x_2 + x_1 - 2c)\, dF(x_2) + \int_{\lambda}^{\bar{x}} \delta\, dF(x_2), \tag{2}$$

where $\lambda = \delta + 2c - x_1$, and F is the distribution function of the random variable $\tilde{x}_2$, depending on whether the lender knows the firm is good or bad (in which case $F = G$ or $F = B$,

[8] Note that this is the outcome that would occur if the firm were simply allowed to pay off its debts at any point during the reorganization process in which it was able. Thus, there is no loss of generality in assuming that the firm, once in reorganization, must stay in reorganization until it is liquidated or a plan is confirmed.

[9] In a model with more periods, the method in which plan proponents are selected will have an impact on the outcome of the process. See Bebchuk and Chang (1992).

respectively) or does not know the firm's type (in which case $F = \Pi$). The lender will accept any reorganization plan that offers him an expected return at least this large. Therefore, the entrepreneur will propose a plan that offers V_d^* to the lender, leaving the remaining expected revenue for himself:

$$\begin{aligned} V_e^* &= \int_{\underline{x}}^{\bar{x}} (x_1 + x_2 - c)\, dF(x_2) - \int_{\underline{x}}^{\lambda} (x_2 + x_1 - 2c)\, dF(x_2) - \int_{\lambda}^{\bar{x}} \delta\, dF(x_2) \\ &= c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dF(x_2)\,. \end{aligned} \tag{3}$$

As in Bebchuk and Chang, the (unique) equilibrium of this model is for the entrepreneur to propose a plan of reorganization that gives V_d^* to the lender and V_e^* to himself, and for the lender to accept the plan. Although the structure of our model is somewhat different from theirs, the entrepreneur's payoff (V_e^*) is analogous to Bebchuk and Chang's expression (13). The first term is the delay cost avoided by early resolution of the bankruptcy process, which accrues to the entrepreneur because of his first-mover advantage. The second term is the option value he receives because the firm is allowed to continue. This value derives from the fact that the firm's future revenues might exceed its current debts.

Expression (3) makes it clear that the value the entrepreneur receives from the reorganization process depends on the lender's beliefs about the firm's type, i.e., the distribution of $\tilde{x}_2$. Since the good entrepreneur's option is more likely to end up "in the money," he is in a stronger bargaining position than he would be if his firm were bad. To take advantage of this position, however, he must credibly convince the lender that his firm is, in fact, good. In other words, the good entrepreneur would like to separate. Unfortunately, the entrepreneur with the

bad firm would like to pool with the good firm, keeping the lender from differentiating the two. These ideas are formalized in the following proposition.

PROPOSITION 1.1: *The entrepreneur of the good firm can negotiate a higher expected return when his firm separates than he can when it pools with the bad firm. In contrast, the entrepreneur of the bad firm receives a lower expected return when separation occurs.*

Proof: We will show that the difference between the good entrepreneur's expected return from pooling and his expected return from separating is negative:

$$
\begin{aligned}
& c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, d\Pi(x_2) \;-\; c - \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dG(x_2) \\
&= -\lambda \{ 1 - \Pi(\lambda) - [1 - G(\lambda)] \} + \int_{\lambda}^{\bar{x}} x_2 [\pi(x_2) - g(x_2)]\, dx_2 \\
&= \lambda [\Pi(\lambda) - G(\lambda)] - \lambda [\Pi(\lambda) - G(\lambda)] - \int_{\lambda} [\Pi(x_2) - G(x_2)]\, dx_2 \\
&= \int_{\lambda}^{\bar{x}} [G(x_2) - \Pi(x_2)]\, dx_2 \;<\; 0,
\end{aligned}
\tag{4}
$$

where this final step follows from the fact that G is first-order stochastic dominant over Π. An identical argument shows that the entrepreneur of the bad firm receives a lower expected payoff from pooling. ♠

The next logical question, then, is how the good entrepreneur might convince the lender of his true type. This issue is addressed in the next section.

3. The Form of Payoffs

The reorganization payoffs to the entrepreneur and the lender, as defined in (2) and (3) above, merely specify the expected value each class of claimants will receive from any equilibrium plan of reorganization. They do not, however, specify the *form* in which these payments are distributed. As will be seen below, the good entrepreneur can use the form of these payments to signal his firm's type, allowing him to receive a different expected return than the entrepreneur of the bad firm.

One common structure for reorganization payments is for the firm to cancel its existing debt and stock and issue new equity to the claimants. We will call this kind of reorganization a *stock reorganization.* The entrepreneur's expected return from a stock reorganization is

$$\sigma \int_{\underline{x}}^{\bar{x}} (x_1 + x_2 - c)\, dF(x_2)\,, \tag{5}$$

while the lender's expected return is

$$(1-\sigma) \int_{\underline{x}}^{\bar{x}} (x_1 + x_2 - c)\, dF(x_2)\,, \tag{6}$$

where σ is the share of the reorganized firm controlled by the entrepreneur, and F is again the appropriate distribution function of $\tilde{x}_2$ given the *lender's* beliefs about the firm's type (which in equilibrium must equal the true distribution of $\tilde{x}_2$). By the discussion in the previous section, we know that these payoffs must equal the expected returns defined in (3) and (2), respectively. We can use this fact to determine the fraction of the new stock given to the entrepreneur in an equilibrium plan of reorganization:

$$\sigma = \frac{c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dF(x_2)}{\int_{\underline{x}}^{\bar{x}} (x_1 + x_2 - c)\, dF(x_2)}. \tag{7}$$

It is a straightforward exercise to show that this σ also ensures that the lender receives his minimum expected return, as defined in (2).

The share of the reorganized firm's equity to be given to the entrepreneur clearly depends on the lender's beliefs about the firm's type. If the firm were good and the entrepreneur could convince the lender of this fact, he could bargain for more of the reorganized firm's stock and, hence, earn a higher expected return. Nevertheless, a separating equilibrium does not exist in which the good firm offers stock to its creditors.

PROPOSITION 1.2: *The unique equilibrium of the reorganization game using only stock distributions is a pooling equilibrium; a separating equilibrium does not exist.*

Proof: Suppose the good firm were to separate and distribute stock to its creditors; let σ_G be the proportion of the firm's new stock going to the entrepreneur when the firm is known to be good. By definition, this value ensures that the entrepreneur receives an expected return of $c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dG(x_2)$, as long as the lender believes the firm is good. But the entrepreneur of the bad firm will receive a higher expected return by mimicking this offer than by separating (by Proposition 1.1). As a result, the creditor will demand at least $(1 - \sigma_\Pi)$ of the firm's stock, where σ_Π is the share of the firm going to the entrepreneur when pooling is known to occur. ♠

The intuition here is straightforward. Since the bad entrepreneur can mimic any offer made by the good one and receives a higher expected return from doing so, pooling will always occur. The lender anticipates this, and the good entrepreneur is unable to reap any of the benefits of his superior return distribution.

How then might the good entrepreneur signal his firm's true nature? One alternative is to offer his creditor a different bundle of securities that, while still giving the same expected return to both the lender and the entrepreneur, provides for some state dependence. Warrants have just these characteristics.

Suppose the firm's entrepreneur offered the lender all of the reorganized firm, but retained for himself the right to buy, by paying P, a block of stock from the firm that would give him the right to a fraction of the firm's revenues, ω. More concisely stated, the entrepreneur gives himself warrants with strike price P which, if exercised, would give him ω of the firm. To ensure that these warrants will be exercised when and only when the value of the firm exceeds the debt due the creditor (i.e., $x_1 + x_2 - c \geq \delta$), set $P = \delta \frac{\omega}{1-\omega}$.

The expected return to the entrepreneur is then

$$\int_{\varphi}^{\bar{x}} [\omega(x_1 + x_2 + P - c) - P]\, dF(x_2) \;=\; \int_{\varphi}^{\bar{x}} \omega(x_2 - \varphi)\, dF(x_2), \tag{8}$$

where $\varphi = \delta + c - x_1$. To guarantee the entrepreneur the proper expected return, ω must be set to make this expression equal to (3):

$$\omega_F = \frac{c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dF(x_2)}{\int_{\varphi}^{\bar{x}} (x_2 - \varphi)\, dF(x_2)}. \tag{9}$$

The lender's expected return from this reorganization plan is

$$\int_{\underline{x}}^{\varphi} (x_1 + x_2 - c)\, dF(x_2) + \int_{\varphi}^{\bar{x}} (1 - \omega)(x_1 + x_2 + \delta \frac{\omega}{1-\omega} - c)\, dF(x_2). \tag{10}$$

It is again straightforward to show that this expected return, along with the above definition for ω, guarantees the lender his minimum expected return, as defined by (2).

We now show that warrants allow for a separating equilibrium; moreover, when warrants and stock are the only two securities available in reorganization, this separation is a unique equilibrium:

PROPOSITION 1.3: *The unique equilibrium of the reorganization game is for the good entrepreneur to offer a plan that gives the entire firm to the lender while retaining for himself warrants entitling him to buy ω_G of the firm for a price $P = \delta\,\omega_G/(1-\omega_G)$, and for the bad entrepreneur to offer a stock reorganization in which he retains a fraction σ_B of the firm.*

Proof: First we will show existence. Consider the action of the good firm's original shareholders. By offering warrants, they expect to receive $c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dG(x_2)$, whereas by Proposition 1.2, they would receive $c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, d\Pi(x_2)$ if they offered stock. By Proposition 1.1, the original shareholders receive a higher expected return from warrants.

Next, consider the action of the bad firm's shareholders by comparing their expected return from issuing stock, $c + \int_{\lambda}^{\bar{x}} (x_2 - \lambda)\, dB(x_2)$, with what they would expect to receive if they

mimicked the good firm and issued warrants, $\omega_G \int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2)$; we will show that the difference between the return from stock and the return from warrants is positive. After substituting for ω_G, this difference has the same sign as

$$\frac{\int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dB(x_2) + c}{\int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2)} - \frac{\int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dG(x_2) + c}{\int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dG(x_2)}. \tag{11}$$

This difference is minimized when G has no weight in the interval $[\varphi,\lambda]$, so we will impose this restriction on G for the rest of the proof. Thus, (11) is equal to

$$\frac{\int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dB(x_2) + c}{\int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2)} - \frac{\int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dG(x_2) + c}{\int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2)}. \tag{12}$$

Now, expression (12) has the same sign as

$$\left[c + \int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dB(x_2) \right] \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) - \left[c + \int_{\lambda}^{\bar{x}} (x_2-\lambda)\, dG(x_2) \right] \int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2), \tag{13}$$

which (since $\lambda = \varphi + c$) is equal to

$$\begin{aligned} &\left[c\, B(\lambda) + \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dB(x_2) \right] \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \\ &\quad - \left[c\, G(\lambda) + \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \right] \left[\int_{\varphi}^{\lambda} (x_2-\varphi)\, dB(x_2) + \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dB(x_2) \right]. \end{aligned} \tag{14}$$

Some simple algebra shows this is equal to

$$\int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \left[c\,B(\lambda) - \int_{\varphi}^{\lambda} (x_2-\varphi)\, dB(x_2) \right] - c\,G(\lambda) \int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2)\,. \tag{15}$$

Because G is first-order stochastic dominant over B,

$$\int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \geq \int_{\varphi}^{\bar{x}} (x_2-\varphi)\, dB(x_2)\,. \tag{16}$$

This implies that expression (15) is weakly larger than

$$\begin{aligned} & \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \left[c\,B(\lambda) - c\,G(\lambda) - \int_{\varphi}^{\lambda} (x_2-\varphi)\, dB(x_2) \right] \\ \geq & \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2) \left[c\,B(\lambda) - c\,G(\lambda) - \int_{\varphi}^{\lambda} (\lambda-\varphi)\, dB(x_2) \right] \qquad (17) \\ = & \int_{\lambda}^{\bar{x}} (x_2-\varphi)\, dG(x_2)\; c\,\left[B(\varphi) - G(\lambda)\right], \end{aligned}$$

where this last step follows from the fact that $\lambda = \varphi + c$. Since $G(\lambda) = G(\varphi) \leq B(\varphi)$, this expression must be non-negative, implying that expression (11) is non-negative — i.e., the entrepreneur of the bad firm will not wish to mimic the good firm's warrant offer.

Finally, consider the actions of the lender. Since full separation is occurring, it is an equilibrium action for him to accept the offers of both the good firm and the bad firm, and to believe that the good firm is offering warrants while the bad firm is offering stock.

The only other possible equilibrium is for the bad entrepreneur to separate by offering warrants. But this cannot be an equilibrium, since the good entrepreneur would wish to mimic this offer (this follows from the fact that $\omega_B > \omega_G$, i.e., that expression [11] is positive). This

proves uniqueness. ♠

Why does the entrepreneur of the bad firm mimic stock offers but not warrants? Since the good firm is more likely to have high period-two profits, its entrepreneur needs a smaller percentage of the firm to earn his minimum expected return than does the entrepreneur of the bad firm. This also explains why the good entrepreneur would mimic a warrant offer made by the bad firm: If he could get a larger fraction of the firm he would take it, even though he doesn't need it to earn his minimum expected return.

4. Conclusions

In this paper, we have shown that firms with good future prospects will propose reorganization plans in which any value given to the firm's original shareholders will be distributed in the form of warrants. This is because the state-dependent nature of the payoff from warrants allows these firms to credibly signal their true type.

In this model, separation of good and bad firms occurs because the payoff from warrants is state dependent. Given this, it is reasonable to wonder whether direct call options, with their more simple structure, might provide a better signal of the firm's type. In particular, one might imagine a plan of reorganization that allocates all of the firm's stock to its creditors, but gives the original shareholders the option to buy this stock from the creditors at some future date (as opposed to warrants, where the new stock is issued by the firm). This type of reorganization plan would look much like the bankruptcy processes proposed by Bebchuk (1988) and Aghion, Hart, and Moore (1992).

If, however, the firm's original creditors must exert effort to run the firm once they take control, and if this effort affects the firm's future profitability, a pure stock option would give them little incentive to increase the value of the firm. Working hard would increase the chance that the firm's original stockholders could exercise their option. In contrast, warrants allow the firm's original creditors to share in the upside gain during high-profitability states, no matter how large it is.

Of course, there are several important caveats to this analysis. First, it assumes that the managers of the firm are perfect representatives of its original shareholders. Betker (1995) argues that the reorganization process can sometimes cause the firm's managers to have an incentive to work in the interests of the firm's creditors (who will become its owners after the reorganization is completed). Nevertheless, he does find that when a large portion of the CEO's compensation is in the form of stock, his or her interests are, in fact, closely aligned with those of the shareholders.

This paper also has nothing to say about the relative efficiency of the outcomes presented. From an ex-ante standpoint (that is, when the firm initially incurs its debts and invests in a project), the expected magnitude of any anticipated APR deviation in bankruptcy is unaffected by the form this deviation might take.

The results developed here offer some easily testable empirical implications. Future work will look at the stock prices of firms that have emerged from Chapter 11 reorganization. The model in this paper suggests that the stock prices of firms whose reorganization plans issued warrants to their original shareholders should be higher than those of firms whose reorganization plans used only stock or cash.

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