Asset-Backed Securities: Costs and Benefits of "Bankruptcy Remoteness"

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Abstract

Once a tool used almost exclusively by banks, asset-backed securities (ABS) are increasingly becoming an important part of the capital structure decisions of both financial and non-financial firms. Yet, little formal analysis exists on this unique financial innovation from a corporate finance perspective. In this paper, we focus on a key property of these contracts; namely, that ABS are designed to achieve "bankruptcy remoteness" of the securitized assets from the borrowing firm. This provides lenders with protection from dilution in bankruptcy that is not available with other contractual forms, such as secured debt. Rather than simply shifting value from other creditors, as some scholars have suggested, ABS can have real effects in allowing firms to commit to more efficient investment decisions in bankruptcy. We show that securitization of *replaceable* assets, such as accounts receivable, is particularly valuable in preventing inefficient continuation in bankruptcy. With respect to *necessary* assets, however, ABS gives creditors hold-up power that can lead to inefficient liquidations. In these circumstances, secured debt and/or leases can be preferred because they provide efficiency-enhancing limits on creditor rights. Our model compares and contrasts these instruments and generates empirical predictions about their usage based on their respective treatment in Chapter 11. Our results are also relevant to the existing debate regarding regulatory treatment of securitization.

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1 Introduction

Theories of debt finance, ranging from the costly state verification literature (Townsend (1979), Gale and Hellwig (1985)) to the literature of incomplete financial contracts (Bolton and Scharfstein (1990, 1996), Hart and Moore (1994)) focus on the disciplinary role of debt in financial contracting. The distinguishing feature of debt in these models is the collection rights given to the lender following a default by the borrowing firm. In essence, these models assume that, once the borrower defaults, the lender can take possession of whatever assets remain in the firm and dispose of them as the lender pleases. Bankruptcy law is often referenced as the mechanism by which this transfer of control rights takes place.

While these theories capture the main feature that distinguishes debt from equity, they are less able to distinguish between several "debt-like" contracts, all of which give packages of priority and control rights to lenders, but vary in the strength of these rights in bankruptcy. In particular, existing law provides for very different treatment of unsecured and secured debt, leasing contracts, and the focus of this paper, a newer form of financing known as asset-backed securities (ABS). To the extent that capital structure affects investment decisions, the choice among these instruments can have important effects on firm value.

ABS is now used by many large corporations in the U.S. as a principal financing method. While the use of securitization has been traditionally associated with financial institutions, in fact, many non-financial firms are also employing the technique. In Tables 1 and 2, we document the fraction of securitization undertaken by financial and non-financial firms, by number of firms and by dollar volume. In Table 3, we report securitization volume by industry, as reported in Gaon (2004). The data indicate clearly that securitization is not purely a financial firm phenomenon, and is not confined to any particular industry. We will argue, instead, that the benefits and costs of securitization depend more on the type of asset being securitized, rather than the type of the borrowing firm. In order to do so, we must first gain an understanding of what makes ABS unique as a financing tool.

In terms of its design, ABS most resemble secured debt. Like in a traditional secured loan, the firm uses its existing assets (such as accounts receivable) to back a loan.[1] As a

[1] A securitizing firm is often referred to as "originator."

consequence, investors in ABS need be concerned primarily with the quality of the assets backing the loan rather than the firm's assets as a whole. Unlike secured debt, however, securitization involves the transfer of ownership of these assets to a separate legal entity (a special purpose vehicle, or SPV) which then sells claims on the assets to outside investors in exchange for liquid funds.[2]

Understanding the value of the SPV as an intermediate issuance vehicle between the firm and the investors is critical to understanding what makes ABS valuable. The transfer of ownership of the underlying assets to a separate legal entity allows the firm to establish the *bankruptcy remoteness* of the SPV and the transferred assets. Herein lies the effective difference between secured debt and ABS. When the borrowing firm files for bankruptcy, assets that serve as a collateral for the debtor's secured loan are considered part of the bankruptcy estate. Contrary to the common assumption in the contracting literature that the creditor can seize the collateral on demand, these assets are subject to an automatic stay which restricts the lender's collection rights. The collateral can then be used to support the firm's reorganization, provided the secured lender is given "adequate protection", a standard determined by the bankruptcy court. In contrast, assets that were transferred in a "true sale" to the SPV are not considered part of the debtor's bankruptcy estate, but instead, continue to be used for the benefit of the SPV investors.

The additional control rights provided by this bankruptcy avoidance mechanism has significant impact on the transaction: rating agencies assess the credit quality of ABS based on the likelihood that courts will consider the transaction a true sale instead of a secured loan, and significant legal effort is made to ensure that the collateral will indeed be kept separate from a bankrupt borrower.[3] In light of this special feature of ABS, it is apparent that in order to analyze its use as a distinct financing tool, we need to create a framework that

[2] One may also argue that a second key difference between ABS and secured debt is the secured creditor's recourse to the firm's other, non-collateralized assets. In practice, however, this difference is not as clear as it may seem because the SPV is often "overcollateralized" with the firm retaining an equity interest in the SPV. This will be discussed in section 3.

[3] See for example, Standard & Poor's "Legal Criteria for Structured Finance Transactions," April 2002. For an account of the response of rating agencies to a key court decision that shed cloud over the likelihood of ever achieving true sale see Weber and MacCallum (1993). In this paper, we will assume that contracting parties can costlessly create a "true sale" if they so choose, which will be upheld in court. We discuss this issue later in the paper.

explicitly models the difference between ABS and other "debt-like" securities in bankruptcy.[4] This will allow us to generate testable predictions about the types of firms that use these securities and the circumstances in which they will be issued. The model also sheds light on debates concerning the appropriate treatment of ABS and whether such securities can indeed generate efficiency gains in addition to the existing body of financial contracts.

The model begins with an owner-manager who raises capital in a competitive credit market. The owner-manager chooses a capital structure at date zero to minimize his overall financing cost, thus maximizing his payoff if the firm succeeds. The equilibrium cost of outside funds will depend on the expected outcome should the firm be forced into bankruptcy at date one. Whether the firm is able to reorganize or liquidate in bankruptcy will depend on its ability to obtain new financing, which depends on both the quality of its ongoing projects, and its initial capital structure decision. Because existing claims are costly to renegotiate, and managers have a bias toward continuation of the firm, two possible sources of inefficiency may arise: the firm may continue inefficiently if it can obtain the necessary financing despite having negative-NPV projects, or it may liquidate inefficiently if it cannot obtain financing despite having positive NPV projects.

We attempt to model, as closely and as parsimoniously as possible, current practices in Chapter 11 bankruptcy with respect to the control rights and priorities afforded to the various classes of claims when a firm is insolvent. In particular, we follow the law in allowing the bankrupt firm to raise debtor-in-possession (DIP) financing which is senior to existing *unsecured* creditors. As in prior work, (Gertner and Scharfstein (1991), Triantis (1993), White (1989)) we find that this can lead to overinvestment and inefficient continuations.[5] Because of our setup, the model applies most directly to both financial and non-financial firms that are eligible for Chapter 11, which constitute a substantial proportion of the securitization volume in the U.S. The model also applies, though less directly, to both financial institutions

[4]To our knowlege, we are the first to explicitly model the differences between such securities based on their treatment in bankruptcy. Acharya et al. (2004) contrasts the U.S. and U.K. bankruptcy codes but focuses only on the debt/equity decision. Frank and Goyal (2004) discuss the prevailing capital structure theories, which mostly concentrate on the effects of taxes, agency problems and bankruptcy costs but not the explicit bankruptcy procedure. The contingent claims valuation literature has been more attentive to particular features of the bankruptcy process. See for example, Francois and Morellec (2004).

[5]Empirical research (Dahiya et al. (2003), Carapeto (2003)) also finds a positive relationship between DIP financing and the likelihood of reorganization.

that are subject to FDIC receivership, and most firms that are subject to bankruptcy outside the U.S., since in these cases creditors' collection rights are also constrained by the insolvency procedure.

The special priority status of securitization explains why ABS offers value to the firm. When the firm chooses ex-ante to securitize rather than to use unsecured debt, it is effectively left with fewer assets on its balance sheet and would require a commensurately larger infusion of cash in order to avoid liquidation. Effectively, since the assets backing the claims of the ABS investors are not part of the bankruptcy estate of the firm, DIP financing cannot prime them. All else equal, this reduces the incentives of the DIP lender to provide new funds, which can mitigate the excess continuation problem inherent in the bankruptcy law.

Of course, this feature by itself does not create a unique role for ABS in the capital structure, since secured debt also enjoys some[6] protection from dilution by the DIP lender. Following practice, we model the difference between ABS and secured debt by the different control rights given to the lender when the firm goes bankrupt. With ABS, the SPV, run in the interests of its investors, owns the underlying assets and cannot be forced to surrender them to the firm. On the other hand, the court's ability to limit the secured creditor's control rights may leave the secured creditor with less protection than a comparable ABS investor would receive.

The main results of the model are as follows. First, we find that ABS is most valuable when the underlying assets are *replaceable* assets such as accounts receivable or other non-specific inputs; i.e. assets that the firm can easily obtain from outside sources at a competitive price. In such circumstances, ABS provides maximal protection to creditors and subjects the bankrupt firm to a more stringent market test in order to receive new funds. When more of the existing assets-in-place are sold, the DIP lender's investment decision depends more on the quality of the firm's ongoing projects and less on his ability to dilute the claims of existing creditors. With respect to *necessary assets*, such as fixed assets, inventory, or intangibles, we find that ABS can produce significant ex-post inefficiencies which raise the firm's overall cost of capital. When the securitized assets are essential to the firm's ongoing

[6]Section 364(d) of the Bankruptcy Code allows the DIP lender to obtain a priming lien over existing secured creditors if necessary. Since this provision is rarely used in practice, we will not assume this is always available to the firm.

operations, the ABS investors have significant hold-up power over the firm. The attempt to exploit this power can lead to inefficient liquidations if a bargaining breakdown occurs. In this respect, our model closely matches the facts of the LTV bankruptcy, in which a securitization of inventory led to a breakdown in bargaining and a legal battle over rights to the securitized assets.

In the case of necessary assets, we show that secured debt and/or leases can be preferred to ABS, because the investors' holdup power is reduced. With secured debt, the creditor's rights are determined during the bankruptcy process and vary with the liquidation value of the collateral at bankruptcy. The benefit to financing with secured debt is its flexibility. Since the value of secured creditors' claims in reorganization varies with the value they would receive in liquidation, the investment decision in bankruptcy is less subject to distortions caused by fluctuations in the liquidation value of the assets. Thus, secured debt is particularly valuable as a financing tool when the underlying value of the collateral is more uncertain. Given existing bankruptcy practice, however, secured creditors may receive less in reorganization than they would in liquidation. This potential dilution effect can lead to inefficient continuations.

In the case of leases, the firm is given an option to keep the underlying assets by assuming the lease, if it maintains the payments specified in the initial contract. Because the bankruptcy court does not determine the lessor's rights, lessors are more protected from dilution in bankruptcy than secured creditors. On the other hand, leases do not have the same inherent flexibility as secured debt contracts. As a result, our model predicts that leases will be preferred to secured debt when the liquidation value of the underlying assets is less variable, since contract flexibility is less valuable in those circumstances. Leases will also be preferred to secured debt when the protection of secured creditors in bankruptcy is weaker, and when the expected liquidation value of the assets is high.

The rest of the paper is organized as follows. In the next section we present a simple two-period model and examine the effects of bankruptcy law on investment incentives. We show that the possibility of priming existing creditors may result in inefficient over-investment. In section 3 we show how securitization works to mitigate this inefficiency. In section 4 we contrast ABS with the external financing instruments that most resemble it - secured debt

and leases. In section 5 we outline the implications of our results for the regulatory policy towards securitization. Section 6 concludes.

2 Model Setup

We consider a two-period model where a wealthless owner-manager owns an investment project which requires an initial fixed cash outlay of I_0 at period 0 from outside investors. The outside investor(s), which operate in perfectly competitive markets, are given claims on the project which require a total repayment of F at period one. The outside claims can be of several types, which we summarize below. The project produces a random cash flow at period 1 of either $X_1^h > 0$ (with probability p_1) or 0 (with probability $1 - p_1$).

To focus on issues surrounding bankruptcy, we assume that if X_1^h is realized, the firm repays its creditors, no assets remain in the firm, and the game ends at that point. If the bad outcome is realized, the firm is illiquid and thus files for bankruptcy. When the bad outcome is realized, the firm may still have assets-in-place, and a new project that requires investment of new funds.

When the firm files for bankruptcy protection it can either be liquidated (the new project is cancelled and the assets are sold to pay creditors) or be given a chance to reorganize (the new project is funded). The piecemeal liquidation value of the firm's assets-in-place, denoted L, consists of two components: the assets that are *necessary* for the firm's reorganization, whose (possibly random) value is denoted by L_n^j, and those that are *replaceable*, with (possibly random) value L_r^j, so that $L = L_n^j + L_r^j$. The liquidation values of the necessary and replaceable assets are independent and have a binary distribution, with $L_n^j \in \{L_n^l, L_n^h\}$, where $L_n^h > L_n^l$ and $\Pr(L_n = L_n^h) = \lambda$, and $L_r^j \in \{L_r^l, L_r^h\}$ where $L_r^h > L_r^l$ and $\Pr(L_r^j = L_r^h) = \gamma$. Replaceable assets are assets such as accounts receivable and other cash-equivalents, which may be essential to keep the firm running, but need not be provided by a specific source. We assume that replaceable assets can always be bought in a competitive marketplace at their liquidation value. Necessary assets are assets such as unique production facilities, equipment, or inventory stocks, which are critical to the firm's ongoing business but can not be replaced easily without substantial cost or delay. For example, if the inability to ship inventory to a

customer in a timely fashion damages a firm's reputation substantially, it may result in an eventual liquidation. In such circumstances, even if the inventory is not a unique product, it may be necessary for the firm to have immediate access to it in order to reorganize successfully. Unlike replaceable assets, we assume the necessary assets must be in the firm's control if it seeks to reorganize. We assume that it is prohibitively difficult to write a contract that conditions creditors' rights on L_n^j or L_r^j, since these values will not be realized if the firm continues; this makes them imperfectly observable by a court. We assume, however, that L_n^j and L_r^j will be observable to all contracting parties at period one.

Continuation requires a fixed additional investment of cash and the necessary assets. We assume the firm's existing creditors are passive creditors; thus, their claims cannot be renegotiated and the required continuation investment must come from an outside debtor-in-possession (DIP) lender, who operates in a competitive lending market.[7] We assume that managers have a bias toward continuing the firm's operations, so the firm will always reorganize if it can find the required funds. If the firm reorganizes in bankruptcy, it pursues the new project which yields a random cash flow at period 2 of X_2^h with probability p_2 or $X_2^l < X_2^h$ with probability $1 - p_2$. The parameter p_2 summarizes the going-concern value of the firm; only the distribution of this variable is known as of period zero, which for simplicity is distributed uniform over the interval $[p_2^l, p_2^h]$. As with the liquidation values, we assume that contracts cannot be written on p_2, which is observed by only the manager and the DIP lender at period one.[8]

The required additional cash investment is denoted by K, so that when the firm has replaceable assets (cash and receivables) in the bankruptcy estate worth L_r^j, it needs to obtain $K - L_r^j$ from outside investors and have control of the necessary assets in order to continue.[9] For simplicity, we assume that $K - L_r^j > 0$, so that the firm always requires

[7] In order for the model to work, we require only that the DIP lender is not the only pre-petition lender so that he does not internalize the entire value of the existing debt; this will be sufficient to generate excess continuations.

[8] Assuming that the DIP lender has better information than other creditors is motivated by patterns in practice; DIP lenders are usually active creditors such as banks that often have prior relationships with the firm.

[9] We assume that all assets are either perfectly replaceable (can be bought with cash in a competitive marketplace) or necessary (can be obtained from another source only at a very costly price). In reality, of course, the distinction between necessary and replaceable assets is not as polar as we present it here.

outside cash to continue. Figure 1 illustrates the timeline of the model.

We restrict attention (without loss of generality) to outside finance that has priority over the owner-manager in the event of default; thus the manager will not receive any cash if the first period project fails, regardless of whether the firm reorganizes.[10] Even though the creditors will bear the losses from inefficient investment ex-post, they will anticipate this and demand ex-ante compensation through higher F. In equilibrium, the manager will bear the costs of inefficiency. Given these assumptions, the owner-manager's maximization problem in period zero is simply to minimize F, the total amount owed to creditors following a success, since the manager's payoff is $p_1(X_1^h - F)$. This is accomplished by choosing capital structure in a way that minimizes the expected losses from inefficient investment decisions in bankruptcy.[11]

2.1 Financing Instruments

We will consider four types of fixed income instruments the firm can issue to creditors in exchange for cash: unsecured debt, secured debt, leases, and asset-backed securities. We describe the properties of each of these instruments in turn, focusing on their respective rights in bankruptcy.[12]

Equity is junior to all other claims in bankruptcy. For simplicity, we assume that only the manager holds equity, which will always receive nothing in any bankruptcy outcome and will only be paid if the first period project succeeds.[13]

Unsecured debt is senior to equity but junior to secured debt. Unsecured debt is also junior to the DIP lender. Unsecured creditors are subject to the automatic stay; thus, they cannot force the firm to liquidate if it can obtain DIP financing.

[10] Even though such contracts are not *uniquely* optimal here, they are optimal in most settings.

[11] We should note that we do not explicitly include a managerial private benefit of continuation, as in many models of capital structure. Introducing such private benefits would affect the problem only slightly; while the capital structure decision would similarly seek to guarantee ex-post efficiency, this might result in more continuations being efficient since the efficiency of continuation would also take into account the managerial private benefits.

[12] Given that the main goal of the paper is to compare ABS to other securities based on their treatment in bankruptcy, we cannot adopt a mechanism design approach and solve for optimal contracts. Thus, we necessarily restrict our analysis to existing contracts whose treatment in bankruptcy can be realistically characterized.

[13] While deviations from absolute priority in favor of equity are well-documented in bankruptcy, they are becoming increasingly rare (Baird and Rasmussen (2004)).

Secured debt is senior to unsecured debt and is (partially) senior to the DIP lender up to the liquidation value of the collateral. If the face value of the secured claim exceeds the value of the collateral, the remainder is treated as unsecured debt. Because secured creditors are also subject to the automatic stay, they can not seize their collateral if the court determines that they receive *adequate protection*; this standard is subject to court discretion. As we will discuss in detail in Section 4, this may result in secured creditors receiving less than the value of their collateral.

Leases provide the firm with a call option on the underlying asset. If the firm assumes the lease, it must make the contractually specified repayment F^L in full. Thus, leases are senior to DIP lenders and unsecured creditors. If the repayment is made, the lessor cannot seize the underlying asset. If the firm rejects the lease, the lessor seizes the underlying asset and thus receives its liquidation value. Any difference between the face value F^L and the realized liquidation value is treated as unsecured debt.

Asset-backed securities (ABS) involve a sale of the underlying assets to an SPV in exchange for cash. The SPV's outside investors have debt and equity claims on the SPV, but not on the firm.[14] We assume the SPV is always run in the interests of its outside investors (i.e. it is independent from the firm). Since the underlying assets are sold, they are not subject to the automatic stay. Thus, the SPV investors control the assets and are senior to all other claims on the firm up to the value of the assets. When the firm defaults, the SPV may sell the assets back to the firm at a price which maximizes the returns of the SPV investors. We assume these investors are arms-length investors, so they do not observe the firm's going-concern value at period two, but do observe the liquidation value of the collateral.

We will now focus on the second period problem, when the firm enters bankruptcy. In order to understand the features of each of the securities above and to understand their effects on investment incentives in bankruptcy, we introduce each of them separately in the following sections. We then proceed to a discussion of optimal capital structure, in which

[14] In practice, the firm may choose to *overcollateralize* the SPV. The firm retains a residual claim on the sold assets, so that after the SPV's debt investors are paid in full, the firm receives the remainder. This equity tranche serves as a cushion to absorb any shortfalls in the cash flows the assets generate. We do not model this explicitly because overcollateralization is not optimal in our model. We discuss the reasons for this in section 3.

multiple securities can be issued, in Section 4.3.

2.2 Unsecured Debt Only: The Second Period Problem

To generate some intuition about the impact of debtor-in-possession financing on investment, we start with the case where the firm finances itself entirely with unsecured debt. As we will see, this capital structure will be strictly sub-optimal, because it results in excessive continuations. This occurs because the ability to dilute unsecured creditors by issuing senior claims makes investment relatively attractive to the DIP lender/manager coalition.

Recall that when the firm enters bankruptcy, it can either be liquidated or reorganized. If it is liquidated, the assets in the estate are worth $L = L_r^j + L_n^j$. If the firm reorganizes, it requires an additional cash input of $K - L_r^j$. Thus, the going concern value of the firm is $p_2 X_2^h + (1-p_2)X_2^l - (K - L_r^j)$. We define the difference between the going-concern and liquidation values of the firm to be the *going concern surplus.* Continuation will be efficient if and only if the going concern surplus is positive (we will refer to this inequality as the "*efficiency condition*").

$$p_2 X_2^h + (1-p_2)X_2^l - K - L_n^j \geq 0 \tag{1}$$

To make the problem interesting, we assume that for some p_2, continuation is always efficient ($p_2^h X_2^h + (1-p_2^h)X_2^l - K - L_n^h > 0$) and for some p_2, liquidation is always efficient ($p_2^l X_2^h + (1-p_2^l)X_2^l - K - L_n^l < 0$). When the DIP lender is willing to participate, he lends $K - L_r^j$ and takes a debt claim with face value F^D. Following the rules of Chapter 11, the bankruptcy court allows the DIP lender to be senior to the existing unsecured creditors.

The unsecured creditors' payoff in continuation is therefore $max\{X_2^j - F^D, 0\}$ and the DIP lender's payoff is $min\{F^D, X_2^j\}$, where $j \in \{l, h\}$.

In this scenario, the DIP lender's participation constraint (which we refer to as the "*continuation condition*" since it determines whether or not the firm is able to reorganize) is given by

$$p_2 X_2^h + (1-p_2)X_2^l - (K - L_r^j) \geq 0 \tag{2}$$

since the firm can offer the DIP lender a face value as high as $F^D = X_2^h$.[15]

In comparing the efficiency and continuation conditions, it is straightforward to verify that continuation will always occur when it is efficient. On the other hand, inefficient continuations may occur if (2) is satisfied but (1) is not. This is the familiar overinvestment problem captured in Gertner and Scharfstein (1991) and White (1989), that results from senior financing in bankruptcy. In such a situation, continuation occurs despite being inefficient, because the DIP lender is able to transfer sufficient wealth from existing unsecured creditors through dilution of their claims. Inefficient overinvestment is more likely to occur when $L_r^j = L_r^h$, since the DIP lender's required investment is smaller. In essence, the DIP lender uses more of the firm's existing assets (which would otherwise be paid out to unsecured creditors) to support the reorganization. Inefficiency is also more likely to occur when $L_n^j = L_n^h$; in this case, liquidation of the necessary assets yields a higher payoff, which the DIP lender does not internalize. Since the DIP lender always earns zero profit in equilibrium, the unsecured creditors' ex-post gain/loss relative to liquidation is the going concern surplus $p_2 X_2^h + (1 - p_2) X_2^l - K - L_n^j$.

We now turn to the effects of securitization, which can limit the excess continuations problem by guaranteeing the seniority of existing creditors.

3 The Effect of Securitization

When the firm undertakes securitization at period zero, assets are sold to an SPV in exchange for cash provided by outside investors who receive in return ABS issued by the SPV. Securitization is commonly referred to as a left-hand-side balance sheet financing method. Instead of increasing both sides of its balance sheet when debt is issued, the firm obtains the required cash by selling existing assets on its balance sheet for cash. While the accounting for these transactions is not relevant for our model per se, the legal ownership of the securitized assets will be crucial because it will affect the ability of the firm to obtain DIP financing. Securitization affects the size of the bankruptcy estate at period 1 in case the first project

[15] In practice, of course, the court can limit the interest rate the firm offers the DIP lender if it is excessive. This is of no consequence here, however, since competition limits the profits earned by the DIP lender to zero.

fails, and by extension, the funds the firm must raise in order to continue.[16]

We now proceed to analyze the effect of securitization on ex-post efficiency at bankruptcy. The effect of securitizing will depend greatly on whether the assets are replaceable or necessary.

3.1 Securitization of Replaceable Assets

We begin by analyzing a firm that has only replaceable assets ($L_n^j = 0, \lambda = 0$). When the firm securitizes part of its assets, the required outside investment at bankruptcy, as noted above, also depends on the level of securitization. Assume the firm securitizes a fraction φ of its asset base. In order to continue at bankruptcy, the firm will then need to raise $K - (1-\varphi)L_r^j$ to continue. The continuation condition becomes

$$p_2 X_2^h + (1-p_2)X_2^l - (K - (1-\varphi)L_r^j) \geq 0 \tag{3}$$

Recall that in choosing the capital structure at date zero, the owner-manager seeks to guarantee ex-post efficient outcomes if possible, since this minimizes his repayment conditional on success. With no necessary assets, the efficiency condition is

$$p_2 X_2^h + (1-p_2)X_2^l - K \geq 0 \tag{4}$$

It is easy to verify that the two conditions are equal if and only if $\varphi = 1$. In other words, when the firm securitizes all its assets-in-place, continuation occurs if and only if it is efficient. This is stated formally in the following proposition:

Proposition 1 *When the firm has no necessary assets, it is optimal to securitize all assets-in-place (i.e. securitized assets equal L_r^j), and bankruptcy outcomes are always ex-post effi-*

[16] In the Appendix, we demonstrate the effect of securitization on the firm's balance sheet using a simple numerical example. The example shows that when the first project fails the (negative) net working capital of the firm at period 1 is insensitive to whether or not the firm securitized, but the value of the firm's available assets is lower for the ABS issuance case compared to the debt issuance case. When the firm undertakes securitization, as opposed to debt issuance at period 0, it effectively breaks down its balance sheet into two separate balance sheets - one that will be part of an eventual bankruptcy estate and another which will be insulated from a bankruptcy procedure. When true sale is achieved, the firm cannot use the assets on the SPV's balance sheet in order to pursue the second project since those assets are not considered part of the bankruptcy estate.

cient.

Proof. See Appendix. ■

As proposition 1 affirms, setting the level of the assets sold to the SPV equal to L_r^j (which amounts to securitizing all the firm's assets-in-place)[17] guarantees efficient outcomes ex-post. In essence, the transaction allows the firm to separate its growth option from its existing asset base, which guarantees that the decision to adopt the new project is not subject to investment distortions created by the priority rules in bankruptcy. When the firm securitizes all its assets-in-place, outside investors must provide the entire required investment K to continue, and they can be promised all the proceeds. This gives the firm and the DIP lender the proper incentives with respect to the continuation decision.[18]

While securitizing all of the firm's existing assets might seem to be a non-conventional idea, this phenomenon has been growing in importance. Whole Business Securitization (WBS) involves the transfer of the entire assets of the firm, or the rights to the future cash flows generated by these assets, to a separate legal entity which in turn issues claims for outside investors backed by the assets. An example of WBS[19] is a deal executed by Triarc Companies, a holding company that, through its subsidiaries, is the franchisor of Arby's restaurants. Every Arby's restaurant is owned and operated by an independent franchisee that pays both franchise fees and royalties. Triarc structured a transaction where the rights for all the future cash flows stemming from the franchise fees and royalties paid by Arby's franchisees were transferred into a separate legal entity that financed such transactions with funds raised from various institutional investors.

In comparing the result in Proposition 1 to securitization patterns in practice, one additional feature is worthy of mention. ABS issuances are often over-collateralized, such that the firm actually retains the equity position in the SPV. One reason for this structure is

[17] Note that the assumption of no necessary assets in this section refers to physical assets only. This does not rule out that firm may have necessary intangible assets such as human capital, reputation, etc. that can result in the firm having a growth option despite having no tangible assets on its balance sheet.

[18] In terms of the first period problem, the assumption of competition pins down the solution. If I_0 is greater than the ABS investors' expected payoff, the ABS investors contribute initial capital such that they break even, and we assume the remainder is contributed by unsecured creditors. Second, if I_0 is less than this expected payoff to ABS investors, they will contribute more than I_0, and the manager will pay himself a dividend equal to the excess.

[19] In the U.S. such transactions are sometimes referred to as "operating company securitizations."

to eliminate adverse selection problems that arise when the firm has superior information about the quality of the sold assets (Leland and Pyle (1977)). An equity stake in the SPV may also alleviate a moral hazard problem that arises if the firm is required to monitor and service assets it does not own (see Pennacchi (1988), Riddiough (1997)).

Because our goal is to focus on the impact of bankruptcy remoteness in ABS transactions, we do not explicitly include these moral hazard and adverse selection problems that may occur in practice. Proposition 1 is relevant to the issue, however, since it demonstrates that retention of an equity position to solve these problems can come with a cost; namely, that ex-post efficiency at bankruptcy can suffer. When the firm is entitled to the residual funds from the SPV's assets, the firm might use them to support a reorganization, to the detriment of ex-post efficiency.[20] We expect, then, that the firm will trade-off these inefficiencies, or look for alternatives to overcollateralization to solve adverse selection and moral hazard problems. This underscores the importance of credit rating agencies in evaluating the backing assets and estimating their payment capability. Since rating agencies can alleviate adverse selection problems by generating higher quality information about the underlying assets, there is less need for the firm to retain the SPV's equity position and capital structure can be used to better alleviate the continuation bias inherent in the bankruptcy law.

This intuition can also help explain a trend over time in securitization practice toward lower levels of overcollateralization. As the securitization market has developed, and longer histories of performance of securitized assets are available, the costs of asymmetric information in securitization issues are plausibly decreasing over time. This implies that the firm can focus less on issuing safe outside claims, and more on the commitment role of ABS in preventing inefficient bankruptcy outcomes. Our model suggests that this is achieved by securitizing more of the firm's replaceable assets.

[20] In such a case, assuming the firm securitized all its assets-in-place, the continuation condition becomes $p_2 X_h^2 + (1-p_2)X_l^2 - K + \theta \geq 0$, where θ is any residual funds from the SPV, and inefficient continuations might occur similar to the situation discussed in section 2.2.

3.2 Securitization of Necessary Assets

Proposition 1 shows that to achieve ex-post efficiency in bankruptcy, the firm should securitize all its assets when the assets are entirely replaceable. This allows the firm to commit to investing in bankruptcy if and only if it is efficient. We now show that the situation is quite different when the firm has also necessary assets. Since the firm can easily recover for the loss of its replaceable assets with outside financing, and leaving excess assets in the firm creates ex-post inefficiencies, the firm will continue to securitize all its replaceable assets, therefore requiring a minimum of K dollars of DIP financing in case of bankruptcy. In contrast, securitizing of necessary assets forces the firm to find a way to gain access to those particular assets at bankruptcy, rather than simply seek outside financing commensurate with their value.

Recall that we define necessary assets as those the firm needs in order to pursue its ongoing projects, and are too costly to replace with substitutes. Since securitization is effectively a sale of an asset, the SPV obtains ownership rights to the asset. This implies that in bankruptcy, the SPV has legal rights of control; if the firm needs these assets to reorganize, it must repurchase them from the SPV, which seeks to maximize the returns of its lenders. This may lead to inefficient outcomes if the resulting bargaining is subject to asymmetric information. We model this inefficiency below.[21]

We assume that the SPV (or the trustee that acts on behalf of its investors) is not informed about p_2, and hence has incomplete information about the firm's going concern value. Knowing that the firm requires the necessary securitized assets, the SPV makes a take-it-or-leave-it offer to the firm that maximizes its expected surplus. If the firm rejects the offer, it proceeds to liquidation.

Since the SPV investors attempt to capture some of the (expected) going concern surplus, the firm will be asked to repurchase the necessary asset at a price that is higher than its liquidation value.

The timeline of the bargaining process is as follows:

[21] In addition to ex-post inefficiencies due to asymmetric information in bargaining, the familiar problem of ex-post holdup reducing ex-ante firm-specific investments (Grossman and Hart (1986)) may also be relevant here. We focus on the bargaining breakdown because it was a salient problem in the LTV bankruptcy.

1. SPV makes an offer to sell the necessary asset back to the firm for M^j dollars where $j \in \{l, h\}$. This will depend on the liquidation value of the necessary assets.

2. The DIP lender decides whether to lend $K + M^j$ to the firm in exchange for a debt claim F^D. If not, the firm liquidates.

The SPV investors choose M^j optimally to maximize their expected surplus. Recall that p_2 is distributed $U[p_2^l, p_2^h]$.

The SPV's problem is the following:

$$\max_{M^j} \frac{p_2(M^j) - p_2^l}{p_2^h - p_2^l} L_n^j + \frac{p_2^h - p_2(M^j)}{p_2^h - p_2^l} M^j \tag{5}$$

where $p_2(M^j)$ solves $p_2 X_2^h + (1 - p_2) X_2^l = M^j + K$.

Solving this problem yields the SPV investors' optimal offer price to the firm:

$$M^{j*} = \frac{1}{2}(p_2^h X_2^h + (1 - p_2^h) X_2^l - K) + \frac{1}{2} L_n^j$$

Since the going concern surplus is always positive when $p_2 = p_2^h$, $M^{j*} > L_n^j$. Analyzing this offer we can see that M^j is increasing in p_2^h but not p_2^l. Thus, for a given expected continuation value, a higher variance due to greater uncertainty increases the offer price of the SPV. As the next proposition shows, this will result in excessive liquidations.

Proposition 2 *If the firm securitizes necessary assets, there exist* $p_2 \in [p_2^l, p_2^h]$ *such that* $p_2 X_2^h + (1 - p_2) X_2^l - K - L_n^j > 0$ *and* $p_2 X_2^h + (1 - p_2) X_2^l - K - M^{j*} < 0$; *the firm liquidates despite continuation being efficient.*

Proof. See Appendix. ■

Inefficient liquidations occur because it is too costly for the firm to continue without its necessary asset, and in an attempt to extract maximum surplus for its investors, the SPV offers too high a price.

The bankruptcy of the steel company LTV illustrates the predicament a firm may face when it securitizes necessary assets, in this case the firm's inventory. Prior to filing for bankruptcy, LTV had two securitization structures in place. Its accounts receivable were sold to an SPV which was financed primarily by Abbey National Bank, and its inventory was

sold to an SPV financed primarily by Chase Manhattan Bank. As LTV moved closer to the bankruptcy filing, it began negotiations with these banks, but the negotiations subsequently broke down. Needing control over its working capital, LTV filed for Chapter 11 in December, 2000 and asked the bankruptcy court for permission to include the securitized assets inside the bankruptcy estate. Their argument was predicated on the notion that LTV could not continue operating without the assets, and that granting the SPV control over them would result in a costly liquidation.[22] The bankruptcy court, siding with LTV, issued an interim cash collateral order that allowed the firm to use the receivables and inventory to support its ongoing operations.

In our model, we do not explicitly include legal uncertainty about the court's treatment of securitization, in order to focus on the incentive effects of securitization according to the intent of the ABS contract; we discuss legal implications in Section 5. Nevertheless, the LTV example illustrates several of the features captured in our model. First, the time inconsistency of managerial behavior is apparent. LTV securitized its working capital to take advantage of the lower cost of financing that follows from bankruptcy remoteness, but later tried to undermine the securitization in order to continue operating. Second, unlike a more traditional securitization of receivables only, LTV required consent from its securitization lenders, who would have legal control over both receivables and inventory in the event of bankruptcy. Bargaining was not able to produce a speedy resolution prior to its Chapter 11 filing, and the breakdown forced LTV to seek help from the bankruptcy court.

LTV is not the only example of a securitization of necessary assets that faced potential trouble in bankruptcy. Days Inn, a hotel chain, filed for Chapter 11 in the late 1980s. In a WBS transaction, Days Inn had securitized its franchise fees (replaceable assets in our model) but along with it, also sold its trademarks (necessary assets) to the SPV. In bankruptcy, Days Inn found a willing buyer, whose willingness to purchase the company was conditional on owning the company trademarks. In this case, the company was able to reach a settlement with the trustee of the SPV that enabled the bankruptcy sale to take place, but the market has apparently taken notice of the problems associated with securitizing

[22] In a brief to the bankruptcy court, LTV claimed that the SPV investors "have attempted to 'opt-out' of the United States Bankruptcy Code to capture the most valuable assets of the Debtors to dispose of as they see fit, at a painful cost to the Debtors' employees, unsecured creditors and shareholders."

necessary assets.[23]

With these results in hand, we expect that other existing securities may be preferred when ex-post holdups are possible due to the existence of necessary assets. In the following section we consider two other securities which limit the control rights of the lender in bankruptcy: secured debt, which substitutes court control for creditor control, and leases, which give the firm an option to keep the necessary asset at a pre-determined price. We compare these securities to ABS and each other, and generate comparative statics that can predict their usage.

4 Substitutes for ABS: Secured Debt and Leases

4.1 Secured Debt

As we noted at the outset, some similarities exist between ABS and secured debt. In some sense, because outside investors are given unrestricted rights to the underlying assets in bankruptcy, ABS most resemble the traditional view of debt in classic models such as Hart and Moore (1994). As we saw in the previous section, however, the unchecked power of the ABS investor can result in inefficient liquidations when control of the underlying assets is necessary for the firm's ongoing projects. Secured debt, on the other hand, restricts the lender's control rights in bankruptcy by substituting court-determined protection for creditor control. While this protection, through the automatic stay, is unlikely to improve upon outcomes when the underlying assets are replaceable (since ABS is optimal), we might expect that this can have some benefits in preventing creditor holdup when assets are necessary.

While it is difficult to completely characterize the treatment of secured creditors in bankruptcy, several features are crucial for our analysis. First, seniority for a secured creditor is based on the value of the collateral, not the face value of their claim. When a secured creditor's claim exceeds the value of the collateral, the remainder of the claim is considered unsecured and can thus be primed by a DIP loan.[24] Second, given existing practice in Chap-

[23] See The Committee on Bankruptcy and Corporate Reorganization of the Association of the Bar of the City of New York, 1995, Structured Financing Techniques, 50, *The Business Lawyer*, 527, 563.

[24] 11 U.S.C. §361. See also U.S. Bankruptcy Judge (S.D.N.Y) Robert D. Drain, A Short Summary of Chapter 11 of the United States Bankruptcy Code (2003).

ter 11, secured creditors are not guaranteed the same payoff as they would receive if they were allowed to claim their collateral. While secured creditors are allowed compensation for the depreciation of the collateral (through adequate protection payments), they are not fully compensated for the time value of money lost during the reorganization.[25] In this sense, secured creditors' claims are diluted by the time delay inherent in confirming a plan of reorganization.[26] The law also allows for the possibility of "priming liens" that would allow a DIP lender to trump the secured creditor's priority, though this is not used often in practice.

Taken in full, existing rules and practice in Chapter 11 suggest that the guaranteed seniority of secured creditors is less than the liquidation value of their collateral on the bankruptcy date. To model this simply, we assume that (if all the assets are secured) in order to continue the secured creditors must receive a claim with expected value $(1-\delta)\left(L_n^j + L_r^j\right)$, the realization of the liquidation value scaled down by a dilution parameter $\delta \geq 0$. Given that secured creditors lose protection based on the time value of money, it is sensible to assume that the amount of dilution suffered by the secured creditors, $\delta\left(L_n^j + L_r^j\right)$, is proportional to the liquidation value. Under these assumptions, the continuation condition is as follows when all assets-in-place are secured[27]:

$$\begin{aligned} & p_2 X_2^h + (1-p_2) X_2^l - (1-\delta)\left(L_n^j + L_r^j\right) - \left(K - L_r^j\right) \\ & = p_2 X_2^h + (1-p_2) X_2^l - K - L_n^j + \delta(L_n^j + L_r^j) \geq 0 \end{aligned}$$

Note that when $\delta = 0$, the continuation condition is once again identical to the efficiency condition and ex-post efficiency is obtained. If δ is positive, then financing with secured debt

[25] Oversecured creditors are entitled to post-petition interest, but this does not increase the overall "supply" of seniority; these payments would be made only up to the value of the collateral. Thus, the overall value that is protected from dilution by the DIP lender is thus bounded above by the value of the collateral. See Ayer and Bernstein (2002).

[26] Ayotte and Skeel (2004) find empirical evidence that secured creditors are important drivers of venue choice in bankruptcy, and exhibit a strong preference for Delaware, which produces significantly faster reorganizations.

[27] If only unsecured and secured debt are allowed, securing all assets-in-place, rather than leaving some assets unsecured, would be optimal.

leads to excess continuations, which is greater when the liquidation value of the assets is high. On the other hand, we can see the potential benefit of secured debt relative to ABS, namely its ability to prevent inefficient creditor holdups. If the court-based valuation can exactly match the secured creditor's claim to the liquidation value of the collateral (i.e. $\delta = 0$), then ex-post efficiency can always be achieved. Since the secured creditor does equally well under liquidation and continuation, the DIP lender can not be persuaded to invest by using the dilution proceeds from existing creditors. As the value of δ increases, the corresponding benefits of secured debt are commensurately reduced. Note also that the costs/benefits of secured debt do not depend on whether the assets are necessary or replaceable.

The comparison of ABS and secured debt reveals that secured debt has the potential to alleviate the problems introduced by securitization when the assets are necessary, but such potential crucially depends on the bankruptcy treatment of secured debt. However, secured debt is not the only senior financing instrument that can be used to substitute for ABS. In the next section we consider the bankruptcy treatment of leasing contracts and their effects on investment incentives.

4.2 Leases

While secured debt is usually perceived as the highest priority claim in bankruptcy, lessors implicitly receive a higher level of protection. A leased asset is not automatically excluded from the bankruptcy estate if the debtor/lessee convinces the court that the asset is necessary for the continued operation of the firm. In this sense, the bankruptcy treatment is similar to that of collateral backing a secured claim. However, if the debtor keeps the leased asset in the bankruptcy estate, thereby "affirming" the lease, unlike the case of secured debt, it must pay the lessor the contractual payments during and after the bankruptcy case. Alternatively,if the debtor "rejects" the lease, the lessor can foreclose on the asset. In other words, the law protects lessors from adjustments in their contractual rights without their approval.[28]

Recall our assumption that $L_n^j \in \{L_n^l, L_n^h\}$, where $L_n^h > L_n^l$ and $\Pr(L_n = L_n^h) = \lambda$ and

[28]The bankruptcy code grants the debtor a (potentially extendable) 60-day period to make a decision about whether to assume or reject the lease, and contains subtle differences in the treatment of personal property leases and real property leases (see 11 U.S.C. §365(d)(3) and §365(d)(10)). These subtleties are unlikely to be consequential for the general treatment of leases illustrated in our model.

$L_r^j \in \{L_r^l, L_r^h\}$ where $L_r^h > L_r^l$ and $\Pr(L_r = L_r^h) = \gamma$. The efficiency condition, as before, is given by

$$p_2 X_2^h + (1 - p_2) X_2^l - K - L_n^j > 0 \tag{6}$$

where $j \in \{l, h\}$.

If the firm uses a lease to finance its assets, it must make the contractually specified payment F_i^L $i \in \{r, n\}$ in order to be able to continue using the assets. If the firm rejects the lease, the lessor repossesses the collateral. If the collateral is a necessary asset, this leads to liquidation of the firm, since by definition the firm must have control of the necessary assets to take advantage of its investment opportunity.[29] Rejection of a lease on replaceable assets does not necessarily lead to liquidation, but increases the amount of cash required from outside investors. The continuation condition under leasing therefore becomes

$$p_2 X_2^h + (1 - p_2) X_2^l - (K + F_n^L) + \left(L_r^j - F_r^L\right)^+ \geq 0 \tag{7}$$

The DIP lender can receive up to the entire cash flow from the project $p_2 X_2^h + (1-p_2) X_2^l$, but must contribute an additional K and assume the lease on the necessary asset at a cost of F_n^L. If the value of the replaceable assets makes assumption of the lease optimal (which occurs when $L_r^j - F_r^L$ is positive), then the required cash contribution is commensurately less. Comparing the efficiency and continuation conditions under lease financing, we observe that inefficient continuations (liquidations) can occur when $F_n^L - \left(L_r^j - F_r^L\right)^+$ is less than (greater than) L_n^j.

Given that all the assets-in-place are financed by leases, we can ask what the optimal contracts $\{F_r^L, F_n^L\}$ would look like. This is summarized in the next lemma.

Lemma 3 *The optimal lease policy sets the lease payment on the necessary assets, F_n^L, equal to the expected liquidation value $E(L_n)$. The lease payment on the replaceable assets, F_r^L, is set such that the lease is always rejected; i.e. the optimal F_r^L is any value such that $F_r^L \geq L_r^h$.*

[29] For simplicity of exposition, we do not model renegotiation of leases. Under any reasonable specification of a renegotiation game, we expect that the main results concerning leases will hold, namely that: a) leases offer more protection to the firm than ABS, due to the call option, and b) leases provide more creditor protection but less flexibility than secured debt, because the bankruptcy court is not involved.

Proof. See Appendix. ■

The intuition for the result is as follows. In setting the lease payments, the firm would like to commit to a policy that guarantees efficient investment, which requires setting $F_n^L - \left(L_r^j - F_r^L\right)^+$ as close to L_n^j as possible in expected terms. Since the liquidation values $\{L_r^j, L_n^j\}$ are not known when the contract is written, randomness in the liquidation values leads to greater investment inefficiency. Setting $F_r^L \geq L_r^h$ is optimal because it eliminates any noise caused by randomness in the replaceable assets. Note that a lease that is never assumed in equilibrium is equivalent to securitization, since the firm has no remaining rights to the asset.

With this result in hand, the lease payment on the necessary assets is set so that the expected loss from inefficient continuations and liquidations is minimized. This is accomplished by setting F_n^L between the two possible liquidation values of the necessary assets. When the high liquidation value is realized, inefficient continuations can occur, and when the low liquidation value is realized, inefficient liquidations may occur.

Comparing with our earlier analysis, leases have an advantage over secured debt and ABS in the ability to commit to an efficient balance between creditor and firm rights in bankruptcy. The value of secured creditors' claims is affected by the bankruptcy procedure to the detriment of creditors (provided that $\delta > 0$), which leads to inefficient continuations. The value of ABS is determined by ex-post bargaining, to the detriment of the firm, which leads to inefficient liquidations. With necessary assets, the ability to commit to preventing ex-post opportunism makes leasing valuable. This commitment comes at a cost, however, since the required repayment does not adjust to new information about the liquidation values realized after the contract is written. This inflexibility can also result in ex-post inefficient outcomes. In this sense, leases are inferior to secured debt, which uses the discretion of the bankruptcy judge to match the secured creditor's claims to the realized liquidation value of the assets.

With respect to replaceable assets, our analysis confirms that leases can do no better than ABS, since there is no cost to providing maximal creditor protection for these assets. Giving the firm a valuable option to purchase assets at a pre-determined price is never optimal, since replaceable assets will always be available at a price that reflects their opportunity

cost. Adding this option would merely add noise to the continuation decision which an optimal contract seeks to avoid.

4.3 Optimal Capital Structure

In this section, we briefly summarize the costs and benefits of the securities we have analyzed, and then provide some comparative statics on optimal capital structure.

Asset-backed securities

Benefit: Maximal creditor protection. The bankruptcy remoteness of the securitized assets gives creditors control rights that prevent dilution in bankruptcy. ABS is most valuable for *replaceable assets*, where there are no costs to full creditor control.

Cost: Bargaining failure. When assets are *necessary*, giving creditors control rights leads to bilateral bargaining which can be inefficient under asymmetric information. The attempt by creditors to extract more surplus from the firm leads to inefficient liquidations.

Secured debt

Benefit: Flexibility. The judicially-supervised bargaining process under Chapter 11 rules allows the secured creditor's seniority to depend on the realized liquidation value of the assets. This flexibility can improve the efficiency of investment in bankruptcy.

Cost: Dilution. Under current law, secured creditors are not entitled to the same protection in reorganization as in liquidation; this distortion leads to inefficient continuations.

Leases

Benefit: Dilution protection and balance. Like ABS, lease contracts are not adjusted by the bankruptcy process, which protects creditors. Unlike ABS, the firm is given a call option on the assets, which limits creditor hold-up power.

Cost: Inflexibility. Unlike secured debt, the contract does not adjust to the realized liquidation value, which can produce inefficient over- and under-investment in equilibrium.

Having analyzed each of the components of the firm's capital structure separately to generate intuition, we will now allow the firm to issue multiple securities in order to generate some comparative statics regarding optimal capital structure. We simplify the problem slightly by assuming that each asset type must be financed by one security. The next

proposition summarizes our results.

Proposition 4 *For the given parameter values, the following capital structures are optimal:*

a) When $L_n^j = 0$, $\lambda = 1$, *the optimal capital structure is to securitize all existing assets.*

b) As $\delta \to 0$, *the optimal capital structure is to securitize all replaceable assets and issue secured debt backed by the necessary assets, with face value of at least* L_n^h*;*

c) As $Var(L_n) \to 0$, *the optimal capital structure is to securitize all replaceable assets and lease necessary assets with an option to assume the lease at a price* $E(L_n)$.

Proof. See Appendix. ■

Part (a) of the proposition is a restatement of Proposition 1. Parts (b) and (c) point out the main costs and benefits of secured debt relative to leases. As the expected dilution of secured creditors falls, the flexibility benefit of secured debt dominates the commitment value of leases. As the variance of the liquidation value of the necessary assets falls, the cost of leasing disappears and contracts can be optimally set to produce efficient investment without the bankruptcy process. In all cases, it is optimal to securitize the replaceable assets, for which maximal creditor protection is optimal.

5 Discussion and Policy Implications

Having analyzed and compared the specific bankruptcy treatment of the financing instruments we consider in this paper, we are now ready to discuss the implications of our results for regulatory policy. Since the most novel financial technique we consider is securitization, which is also the focus of our model, we concentrate on discussing the prevailing and desired regulatory treatment of securitization in the context of bankruptcy.

We show in our model that when the underlying assets are replaceable, securitization can increase firm value by allocating cash flow and control rights in a way that cannot be replicated by other financing instruments. The distinction between ABS and secured debt, for example, depends crucially on complete separation of the securitized assets from the firm and their exclusion from the bankruptcy estate. As we noted above, such exclusion could be maintained only if a "true sale" is achieved and the bankruptcy court does not re-characterize

the transaction as secured financing, resulting in the consolidation of the SPV's assets into the firm's bankruptcy estate.

Existing legal disputes and court decisions with respect to securitization focus heavily on the distinction we make in the model, but not all have allowed for the protection of ABS investors that the original contracts have intended. This has led to counter-proposals and legislation which seek to preserve the "bankruptcy remoteness" features that make ABS unique. Several bankruptcy court decisions in the past decade indicated that bankruptcy courts may not favorably view securitization transactions. The Tenth Circuit bankruptcy court decision in the Ocatgon case[30], determined that property sold by a debtor prior to its bankruptcy was includable in debtor's bankruptcy estate, a decision that effectively rejected the view that a sale of asset, even if "perfected" (i.e. achieved true sale) removes it from the transferor's bankruptcy estate. The court based its decision on analysis of Article 9 of the Uniform Commercial Code (UCC), the law governing the creation, perfection and enforcement of security interests. That Article essentially contains tests aimed to determine whether a transfer of asset from one party to another constitutes a sale or merely establishment of security interest. Analyzing various provisions of the Article, the court determined that any buyer of an asset under Article 9 is treated as a secured creditor and the asset sold is treated as collateral and therefore included in the bankruptcy estate. The decision was widely criticized and led to the revision of Article 9, explicitly overruling the court's view.

Few years later though, another important bankruptcy case raised some new doubts about the prospects of ever achieving complete bankruptcy insulation. The Kingston Square case from 1997[31] is viewed as an important case since it was decided by the chief judge of the bankruptcy court in Manhattan, where many securitization transactions are likely to be handled (see Cohn (1998)). Analyzing a mortgage-backed securities (MBS) transaction, the court circumvented the transaction's explicit bankruptcy remoteness provisions aimed at insulating MBS investors from the bankruptcy of the originator. Similar approach was echoed in 2001 in the case of LTV Steel[32] where the court's decision appeared to hold there

[30] Octagon Gas Systems Inc. vs. Rimmer, 995 F.2d 948 (10th Cir. 1993). See also note 3 above.

[31] In re Kingston Square Associates, 214 B.R. 713 (Bankr. S.D.N.Y, 1997).

[32] In re LTV Steel Co. 274 B.R. 278 (Bankr. N.D. Ohio, 2002). See also the extensive discussion in section 3.2.

could never be a true sale of firm's assets since the firm always maintains at least "equitable interest" in the transferred assets, and that interest is part of the bankruptcy estate. The court's decision indicates that it had a particular difficult time accepting the notion that the inventory a firm produces is not owned by it as a result of a securitization transaction.[33] Following the LTV case, the general view was that securitizing inventory might present more formidable legal challenges compared to securitizing other assets such as accounts receivable.[34]

Addressing the concerns raised by the market in light of the court decisions, the Congress considered adopting across-the-board "safe harbor" for structured finance transactions, by amending the federal bankruptcy code. The proposed amendment would have changed the definition of a bankruptcy estate to exclude all securitized assets, notwithstanding the fulfillment of state-level tests to determine the sale/secured loan characterization. Such "safe harbor" would also have prevented bankruptcy judges from re-characterizing a structured finance transaction as secured debt. The proposed amendments were brought before the Congress in 2001 but were rescinded a year later following the revelation of fraud at Enron, much of which involved SPVs (see Schwarcz (2003)). The current legal situation is thus still unclear. ABS investors cannot rely upon clear-cut federal regulation guaranteeing their insulation from the originator's bankruptcy but rather have to navigate through a complicated and sometimes murky state regulation and case decisions.[35] The prospects of securitized assets being forced to be a part of a bankruptcy estate, thus effectively losing the efficiencies we have identified, are therefore not trivial.

One of the common objections expressed towards securitization is that it might hurt the firm's existing creditors. It has been argued in several papers that securitization essentially allows the firm to "judgement-proof" itself by removing assets from the supervision of the

[33]It is instructive to quote the court's decision: "*Debtor's business requires it to purchase, melt, mold and cast various metal products. To suggest that Debtor lacks some ownership interest in products that it creates with its own labor, as well as the proceeds to be derived from that labor, is difficult to accept.*"

[34]See Moody's Investors Service report, 2001, "True Sale Assailed: Implications of In re LTV Steel for Structured Transactions," and Colin Final, 2001, Testing the waters of US ABS, *Corporate Finance*.

[35]It should be noted that several prominent states such as Delaware and Texas, have recently adopted state-level 'safe harbors' for securitization transactions. Such safe harbors will be effective as long as federal regulation will not supersede them. See Kaye Scholer LLP, 2002, "Will New Delaware Law Facilitate Securitization?"

bankruptcy court thereby leaving fewer assets for the existing creditors.[36] While it should be emphasized that securitization merely replaces one asset with another and does not by itself depletes the assets available for the existing creditors, it has been suggested that securitization might be the most efficient tool to transfer assets between claimholders. A firm might securitize some of its assets and distribute the cash proceeds to its shareholders (or invest in negative-NPV projects) at the expense of unsuspecting creditors.

In our model, rational creditors anticipate these effects when their claims are initially priced. If securitization might adversely affect unsecured debt, creditors would demand a higher compensation for their investment such that the lower financing costs of securitization would be completely offset by the higher financing costs of the unsecured debt.[37] While this classic Modigliani and Miller (1958) logic helps achieve an understanding about why securitization is not purely expropriation, it leaves open the question of whether this new financing tool can potentially affect firm value. In our model, securitization can create value because we assume contracts are incomplete in two ways. First, borrowers and lenders cannot write a complete contract that perfectly identifies the states in which a firm is optimally liquidated/continued ex-ante, and contracts are costly to renegotiate in bankruptcy. Second, while bankruptcy law can assist in the renegotiation process (in our model, by preventing secured creditors from holding up the firm and adjusting their claims to the liquidation value of the assets), the code has an inherent bias toward continuation (in allowing for secured creditors to be diluted by DIP lenders). When it is efficient to do so, securitization can create value by "contracting around bankruptcy" when maximal protection of lenders is warranted to prevent inefficient continuation. It is worth noting that this efficiency gain may actually benefit unsecured creditors ex-post, since they are less likely to be diluted by a DIP lender in bankruptcy.

Securitization can therefore be viewed as another form of private contracting innovation market participants use to minimize the costs imposed by a formal, court-supervised, bankruptcy procedure. While such procedure is believed to be necessary to deal with market

[36] Such argument was chiefly used by the opponents to the proposed federal safe harbor. See a letter dated January 23, 2002, sent by 35 law professors to the Congress committees which contemplated the revisions to the bankruptcy code. See also LoPucki (1996) and Lupica (1998) (these are different authors!)

[37] This argument is of course not unique to securitization; Schwartz (1981) makes a similar argument with respect to secured debt.

inefficiencies precluding efficient recontracting of distressed firms, it introduces various costs borne by market participants. Similar to the way pre-packaged bankruptcy filings and out-of-court restructuring are used to minimize the costs imposed by Chapter 11, securitization emerges as another private contracting innovation aimed to enhance the efficiency of financial distress resolution mechanism when Chapter 11 is not the ideal avenue to pursue.

6 Conclusion

Absent an explicit description of the rights different types of contracts are afforded under bankruptcy law, it is difficult to distinguish among various "debt-like" instruments the firm may use in its capital structure, all of which have priority over equity and acquire additional control rights in the event of default. In this paper, we focus primarily on a recent financial innovation known as asset-backed securities, and compare it to the space of previously-existing financial contracts based on their treatment in bankruptcy. While our model is not intended to supplant existing theories of capital structure, we believe it complements existing theories by considering a richer body of contracts that is difficult to distinguish without an understanding of bankruptcy law and the incentives it creates.

Based on the contractual features of several "bankruptcy-relevant" contracts (ABS, unsecured and secured debt, and leases), we explicitly account for the differential control rights and cash flow rights various classes of lenders receive at bankruptcy. These capital structure choices matter because they affect the eventual use of the assets when a firm goes bankrupt. We model the inefficiencies commonly associated with the bankruptcy process, namely that inefficient liquidations and inefficient continuations may occur; the optimal capital structure will be chosen in equilibrium to minimize the expected efficiency losses from these outcomes.

Two relevant features of Chapter 11, senior DIP financing and the time-value dilution of secured creditors, lead to an inherent bias toward continuation when unsecured and secured debt are the only instruments available and renegotiation is imperfect outside of bankruptcy. Securitization steps in to fill this void. Since securitization involves a "true sale" of the underlying assets, thus isolating them from the bankruptcy estate, ABS investors can achieve a level of seniority that is not guaranteed for secured or unsecured creditors in Chapter 11.

This, in turn, helps alleviate the inefficient continuation problem. The value provided by ABS, however, depends heavily on the nature of assets being securitized. When the backing assets are replaceable, our model predicts that ABS is the most efficient financial instrument. When the securitized assets are necessary for reorganization, however, and the firm cannot easily replace them by resorting to outside markets, securitization can lead to inefficient holdups, and existing instruments such as secured debt and leases are likely to be more efficient.

>From a policy perspective, our model demonstrates that the efficiency of securitization crucially depends on the robustness of the bankruptcy-remoteness of the securitized assets, which is determined based on the legal framework regulating such transactions. Our model suggests efficiency benefits from a regulatory treatment that provides a higher degree of certainty to the securitization market, especially with respect to "replaceable assets" such as accounts receivable. Interestingly, the assets for which our model suggests the likely benefits are smallest (necessary assets such as inventory or fixed assets) were not included in the proposed federal safe-harbor for securitization, which would have applied only to certain types of financial assets such as consumer or trade receivables.[38] With respect to necessary assets, our model suggests that the uncertainty created by the LTV bankruptcy has limited real effects, since secured debt and leases are likely to be preferable methods of financing such assets.

While we focus the discussion and the model on U.S. bankruptcy law, our model may also be of particular relevance for explaining cross-country patterns in securitization given the obvious interactions between security design and bankruptcy codes. As been argued in previous literature, countries differ in their bankruptcy regimes and in particular in the extent inefficient continuations are likely to occur. For instance, Acharya et al. (2004) argues that since the U.S. has debtor-friendly bankruptcy regime and the U.K. has a creditor-friendly regime, the former is more likely to be characterized with inefficient continuations whereas the latter with inefficient liquidations. Since securitization can minimize continuations in

[38] Only "eligible assets" as defined in the proposed regulation would have enjoyed the safe-harbor. The definition of eligible assets, though somewhat broad, listed several examples of financial assets but conspicuously did not mention inventory or fixed assets. See Bankruptcy Reform Act of 2001, S. 220, 107th Cong. §912 (2001); H.R. 333, 107th Cong. §912 (2001).

bankruptcy it may be especially valuable for firms operating in bankruptcy regimes subject to excess continuations. Extension of our model to incorporate the differences in bankruptcy regimes across countries seems a promising future research avenue.

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A The Effect of Securitization - Numerical Example

We use a numerical example to demonstrate the effect of securitization on the required investment for continuation at period 1. The example shows how available assets on the firm's balance sheet (which constitutes the bankruptcy estate) are higher when the firm does not securitize.[39]

Assume the firm needs to raise \$400 in order to pursue the first project. We demonstrate the effects of securitization on the firm's balance sheet when the first project fails generating no cash flow.

Period 0: Before ABS or Debt issuance

Assets		Liabilities + Equity	
Cash	0	Debt	0
Receivables	200	Equity	300
PPE	100		
Total	300		300

Period 0: Before the first project is pursued

Financing Alternative 1: ABS Issuance (50%)				Financing Alternative 2: Debt Issuance			
Firm				Firm			
Assets		Liabilities + Equity		Assets		Liabilities + Equity	
Cash	400	Debt	200	Cash	400	Debt	400
Receivables	0	Equity	300	Receivables	200	Equity	300
PPE	100			PPE	100		
Total	500	Total	500	Total	700	Total	700
SPV							
Assets		Liabilities + Equity					
Receivables	200	Debt (ABS)	200				
Firm + SPV							
Total	700	Total	700				

[39] In this example we do not incorporate variation in the firm's liquidation value, which is composed of the fixed assets in the case of ABS issuance and the sum of the fixed assets and existing receivables in the case of debt issuance. Variation in the value of the receivables for instance, would affect the assets available to the firm at default, and by extension, the amount required from outside investors in order to continue. See the discussion in section 3.1.

Period 1: After the first project failed

Financing Alternative 1: ABS Issuance (50%)				Financing Alternative 2: Debt Issuance			
Firm				Firm			
Assets		Liabilities + Equity		Assets		Liabilities + Equity	
Cash	0	Debt	200	Cash	0	Debt	400
Receivables	0	Equity	-100	Receivables	200	Equity	-100
PPE	100			PPE	100		
Total	100	Total	100	Total	300	Total	300
Net Working Capital: -200				Net Working Capital: -200			
Available assets: 100				Available assets: 300			
SPV							
Assets		Liabilities + Equity					
Receivables	200	Debt (ABS)	200				
Firm + SPV							
Total	300	Total	300				

Note that the (negative) net working capital of the firm at period 1 is the same under both cases but the value of the firm's available assets is lower for the ABS issuance case compared to the debt issuance case. Since the funds required for continuation are assumed to be fixed, for instance, \$400, the same amount that was required to pursue the first project, the firm needs to obtain only additional \$100 in case it issued debt to finance the first project. The firm can use its existing assets (for example by selling its receivables in the market) to finance part of the continuation. In contrast, if the firm used securitization to finance the first project, it needs to obtain almost the entire amount from outside investors.

B Proofs of Propositions and Lemmas

Proposition 1 *When the firm has no necessary assets, it is optimal to securitize all assets-in-place (i.e. securitized assets equal L_r), and bankruptcy outcomes are always ex-post efficient.*

Proof. When L_r is sold to the SPV, the participation condition for the DIP investor is $p_2 X_2^h + (1-p_2)X_2^l \geq K$. Since this is identical to the efficiency condition when $L_n = 0$, continuation will occur if and only if it is efficient. ■

Proposition 2 *If the firm securitizes necessary assets, there exist $p_2 \in [p_2^l, p_2^h]$ such that $p_2 X_2^h + (1-p_2)X_2^l - K - L_n^j > 0$ and $p_2 X_2^h + (1-p_2)X_2^l - K - M^{j*} < 0$; the firm liquidates despite continuation being efficient.*

Proof. The continuation condition is given by

$p_2X_2^h + (1-p_2)X_2^l - K - M^{j*}$ where $M^{j*} = \frac{1}{2}L_n^j + \frac{1}{2}(p_2^hX_2^h + (1-p_2^h)X_2^l - K)$.

Given our assumption that $p_2^hX_2^h + (1-p_2^h)X_2^l - K - L_n^j > 0$, it is evident from inspection of M^{j*} that it can be rewritten as

$M^{j*} = L_n^j + \varepsilon$ where $\varepsilon > 0$. Then the continuation condition can be rewritten as

$p_2X_2^h + (1-p_2)X_2^l - K - L_n^j - \varepsilon \geq 0$

and the efficiency condition is given by

$p_2X_2^h + (1-p_2)X_2^l - K - L_n^j \geq 0$

thus, liquidation will occur despite continuation being efficient whenever $p_2X_2^h + (1-p_2)X_2^l - K - L_n \geq 0 > p_2X_2^h + (1-p_2)X_2^l - K - L_n^j - \varepsilon$

or equivalently, $p_2 \in [\frac{K+L_n^j-X_2^l}{X_2^h-X_2^l}, \frac{K+L_n^j-X_2^l+\varepsilon}{X_2^h-X_2^l}]$ which is non-empty since $\varepsilon > 0$, and $p_2^h > \frac{K+L_n^j-X_2^l}{X_2^h-X_2^l} > p_2^l$ by assumption. ■

Lemma 3 *The optimal lease policy sets the lease payment on the necessary assets, F_n^L, equal to the expected liquidation value $E(L_n)$. The lease payment on the replaceable assets, F_r^L, is set such that the lease is always rejected; i.e. the optimal F_r^L is any value such that $F_r^L \geq L_r^h$.*

Proof. Start by solving the efficiency loss from using leases to find the optimal F_n^L. A simplified representation of the efficiency loss is given by the expression below (this assumes that $L_r^h - F_r^L < F_n^L - L_n^l$, which will be true in equilibrium):

$$(1-\gamma)(1-\lambda)\int_{\frac{K+L_n^l-X_2^l}{X_2^h-X_2^l}}^{\frac{K+F_n^L-X_2^l}{X_2^h-X_2^l}}\{p_2X_2^h+(1-p_2)X_2^l-K-L_n^l\}f(p_2)dp_2+ \tag{8}$$

$$(1-\gamma)\lambda\int_{\frac{K+F_n^L-X_2^l}{X_2^h-X_2^l}}^{\frac{K+L_n^h-X_2^l}{X_2^h-X_2^l}}\{L_n^h-(p_2X_2^h+(1-p_2)X_2^l-K)\}f(p_2)dp_2$$

$$\gamma(1-\lambda)\int_{\frac{K+L_n^l-X_2^l}{X_2^h-X_2^l}}^{\frac{K+F_n^L-X_2^l-\left(L_r^h-F_r^L\right)}{X_2^h-X_2^l}}\{p_2X_2^h+(1-p_2)X_2^l-K-L_n^l\}f(p_2)dp_2+$$

$$\gamma\lambda\int_{\frac{K+F_n^L-X_2^l-\left(L_r^h-F_r^L\right)}{X_2^h-X_2^l}}^{\frac{K+L_n^h-X_2^l}{X_2^h-X_2^l}}\{L_n^h-(p_2X_2^h+(1-p_2)X_2^l-K)\}f(p_2)dp_2$$

We choose F_n^L, F_r^L to minimize the above expression. We solve first for F_n^L given F_r^L. Applying the Leibniz rule, the first-order condition reduces to:

$\frac{(1-\gamma)(1-\lambda)}{X_2^h-X_2^l}\left[F_n^L-L_n^l\right]+\frac{(1-\gamma)\lambda}{X_2^h-X_2^l}\left[F_n^L-L_n^h\right]$

$+\frac{\gamma(1-\lambda)}{X_2^h-X_2^l}\left[F_n^L-\left(L_r^h-F_r^L\right)-L_n^l\right]$

$+\frac{\gamma\lambda}{X_2^h-X_2^l}\left[F_n^L-\left(L_r^h-F_r^L\right)-L_n^h\right]=0$

solving that we obtain

$F_n^L-E(L_n)-\gamma(L_r^h-F_r^L)=0$

And the lease contract for the necessary assets is

$F_n^{L*}=E(L_n)+\gamma(L_r^h-F_r^L)$

Now solve for optimal F_r^L given F_n^{L*}:

the first-order condition is given by:

$\frac{(1-\gamma)(1-\lambda)}{X_2^h-X_2^l}\left[F_n^{L*}-L_n^l\right]+\frac{(1-\gamma)\lambda}{X_2^h-X_2^l}\left[F_n^{L*}-L_n^h\right]+\frac{\gamma(1-\lambda)}{X_2^h-X_2^l}\left[F_n^{L*}-\left(L_r^h-F_r^L\right)-L_n^l\right]$

$+\frac{\gamma\lambda}{X_2^h-X_2^l}\left[F_n^{L*}-\left(L_r^h-F_r^L\right)-L_n^h\right]=0$

The expression reduces to

$\gamma(L_r^h-F_r^L)$ which is clearly minimized by setting $F_r^L=L_r^h$. Since the lease will never be accepted for $F_r^L>L_r^h$, any lease payment such that $F_r^L\geq L_r^h$ is equivalent. ■

Proposition 4 *For the given parameter values, the following capital structures are optimal:*

a) When $L_n^j = 0$, $\lambda = 1$, *the optimal capital structure is to securitize all existing assets.*

b) As $\delta \to 0$, *the optimal capital structure is to securitize all replaceable assets and issue secured debt backed by the necessary assets, with face value of at least* L_n^h*;*

c) As $Var(L_n) \to 0$, *the optimal capital structure is to securitize all replaceable assets and lease necessary assets with an option to assume the lease at a price* $E(L_n)$.

Proof. Part a) of the proposition follows immediately from Proposition 1.

Part b) The efficiency loss from inefficient investment decisions under this capital structure is given by:

$$\lambda \int_{\frac{K+\delta L_n^h - X_l^2}{X_2^h - X_2^l}}^{\frac{K+L_n^h - X_2^l}{X_2^h - X_2^l}} \{L_n^h - (p_2 X_2^h + (1-p_2)X_2^l - K)\} f(p)dp$$

$$+ (1-\lambda) \int_{\frac{K+\delta L_n^l - X_2^l}{X_2^h - X_2^l}}^{\frac{K+L_n^l - X_2^l}{X_2^h - X_2^l}} \{L_n^l - (p_2 X_2^h + (1-p_2)X_2^l - K)\} f(p)dp$$

Integrating and simplifying yields the efficiency loss for secured debt:

$Loss(Secured) = \frac{\delta^2 [E(L_n)]^2}{2(X_2^h - X_2^l)(p_2^h - p_2^l)}$

Integrating and simplifying (8), using the optimal leasing policy from the proof of Lemma 3 above gives

$Loss(lease) = \lambda(1-\lambda)\left[\frac{(L_n^h - L_n^l)^2}{2(p_2^h - p_2^l)(X_2^h - X_2^l)}\right] = \frac{1}{2(X_2^h - X_2^l)(p_2^h - p_2^l)} Var(L_n)$

To prove part (b) of the proposition, note first that the efficiency of loss goes to zero as $\delta \to 0$. If $Var(L_n)$ is bounded away from zero, leasing or securitizing the necessary assets will necessarily lead to an efficiency loss strictly greater than zero. To see this, suppose first that the necessary assets are leased with an exercise price of F_n^L. Then the efficiency loss will approach zero if and only if the replaceable assets are financed with a state-contingent lease with exercise price arbitrarily close to $L_r^j - (F_n^L - L_n^j)$ for each possible realization of the liquidation values. By assumption, this is not feasible since the liquidation values are non-contractible. Similarly, if the firm securitizes the necessary assets, a state-contingent lease on the replaceable assets with exercise price $L_r^j - (M^{j*} - L_n^j)$ would be required which is similarly not feasible.

Given that the necessary assets are financed with secured debt, the optimal (infeasible) contract on the replaceable assets is one that requires the firm to buy the replaceable assets at a price above its liquidation value, $L_r^j + (1-\delta)L_n^j$. This will never occur in equilibrium since the firm can always borrow in a competitive capital market. Given this, the firm

can do no better than securitizing the replaceable assets, which forces it to pay the highest feasible price L_r^j.

To prove part (c), note from the expression $Loss(lease)$ above that the efficiency loss goes to zero as $Var(L_n) \to 0$. Using similar arguments as in part (b), it is straightforward to verify that the necessary assets are optimally financed with leases if δ is bounded away from zero. Given that this is true, Lemma 3 shows that the optimal treatment of the replaceable assets is to set the exercise price at any level greater than or equal to L_r^h. This is equivalent to securitization. It remains only to show that the replaceable assets should not be financed with secured debt. Similar to the argument in part (b), conditional on financing the replaceable assets with secured debt, efficiency loss would approach zero if and only if the lease on the necessary assets were state-contingent with a exercise price equal to $E(L_n) + (1 - \delta)L_r^j$. ■

Figure 1: Model Time-line

T = 0

- Wealthless owner-manger seeks I_0 to finance a project using one (or more) of the following instruments:
  - Unsecured debt
  - Secured debt
  - Lease
  - ABS

T = 1

- Repayment to investors is due.
- The project yields X_1^h or *0* with prob. p_1 and $1\text{-}p_1$, respectively.
- X_1^h: Debt is paid off. Game ends.
- *0*: Firm defaults. Bankruptcy protection.
  - *$K* and any necessary assets are required for continuation.
  - Continuation occurs if DIP financing is obtained to meet the required investment for continuation. Liquidation otherwise.
  - Liquidation value *L* is composed of two components: replaceable assets (L_r) and necessary assets (L_n)

T = 2

- Conditional on continuation, the payoff is X_2^h or X_2^l with prob. p_2 and $1\text{-}p_2$, respectively.
- DIP lender and other creditors are paid based on seniority under bankruptcy law.

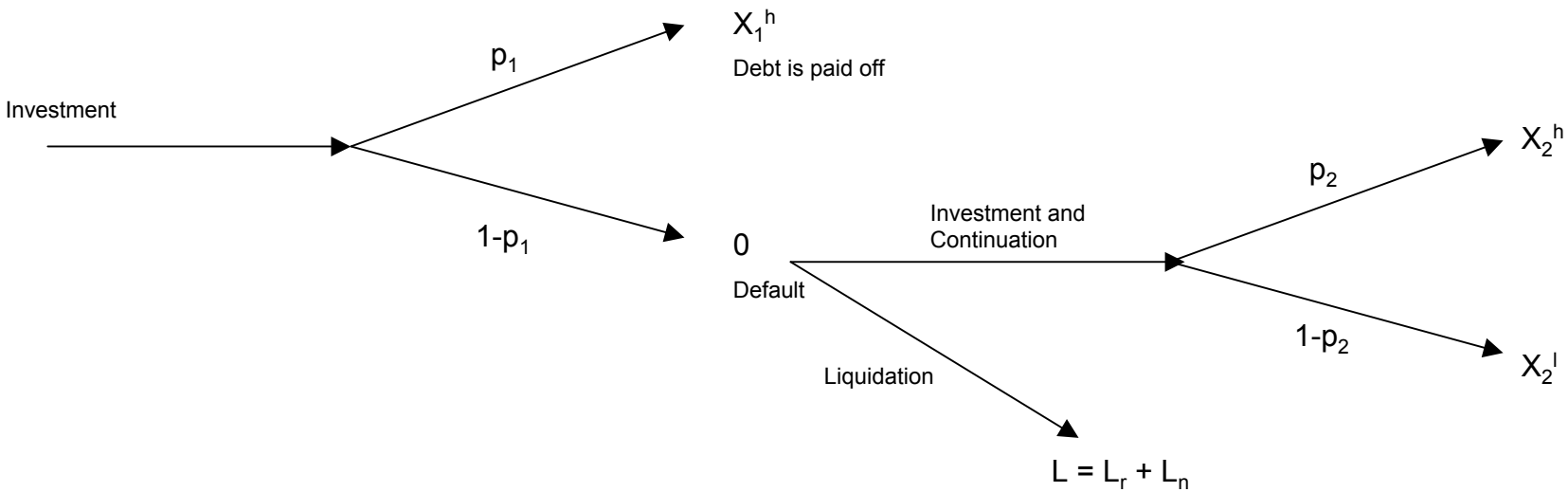

Table I: the table reports the number of publicly issued securitizion transactions executed by financial and non-financial firms in each year for the period 1990-2002. Financial Securitizers are those firms with first-digit SIC code equal to 6 and Non-financial Securitizers are all other firms. Mortgage-backed securities (MBS) transactions are excluded. To be included in this table, a securitization transaction must have been rated by at least one major rating agency, was under the control of a trustee and collateralized by assets of some kind. For a full description of the dataset, as well as additional selection criteria imposed, see Gaon (2004).

Year	Financial Securitizers	Non-financial Securitizers	Total Securitizers	Percentage of Non-financial Securitizers
1990	12	8	20	40.0%
1991	12	8	20	40.0%
1992	13	14	27	51.9%
1993	21	10	31	32.3%
1994	27	16	43	37.2%
1995	36	24	60	40.0%
1996	49	20	69	29.0%
1997	49	29	78	37.2%
1998	53	31	84	36.9%
1999	55	31	86	36.0%
2000	45	31	76	40.8%
2001	39	33	72	45.8%
2002	39	28	67	41.8%
Total	450	283	733	38.6%

Table II: the table reports the total public issuance volume (in $MM) of ABS for financial and non-financial securitizers in each year for the period 1990-2002. Financial securitizers are those firms with first-digit SIC code equal to 6 and Non-financial securitizers are all other firms. Mortgage-backed securities (MBS) transactions are excluded. To be included in this table, a securitization transaction must have been rated by at least one major rating agency, was under the control of a trustee and collateralized by assets of some kind. For a full description of the dataset, as well as additional selection criteria imposed, see Gaon (2004).

Year	Financial Firms Securitization	Non-financial Securitization	Total Securitization	Percentage of Non-financial Securitization
1990	21,068	14,600	35,667	40.9%
1991	21,232	18,452	39,684	46.5%
1992	16,966	27,383	44,350	61.7%
1993	24,223	24,656	48,878	50.4%
1994	43,168	20,540	63,708	32.2%
1995	68,364	29,256	97,620	30.0%
1996	96,039	32,086	128,125	25.0%
1997	118,345	32,610	150,955	21.6%
1998	128,599	47,908	176,507	27.1%
1999	115,809	67,434	183,243	36.8%
2000	115,336	79,473	194,808	40.8%
2001	141,099	91,835	232,933	39.4%
2002	177,476	98,871	276,347	35.8%
Total	1,087,723	585,102	1,672,825	35.0%

Table III: Number of securitizers and extent of securitization by industry: the table reports the number of different firms in each industry that executed a securitization transaction at least once during the period 1990-2002. The Annual Securitization columns report the annual mean, median and standard deviation of the securitization volume for firms that securitized during the sample period. The Ratio columns report the mean and standard deviation of the securitization volume to total assets ratio, conditional on securitization taking place in that year. Mortgage-backed securities (MBS) transactions are excluded. To be included in this table, a securitization transaction must have been rated by at least one major rating agency, was under the control of a trustee and collateralized by assets of some kind. For a full description of the dataset, as well as additional selection criteria imposed, see Gaon (2004).

				Annual Securitization ($MM)			Ratio of securitization to firm's assets	
SIC Code Major Groups (2-Digit)		Number of Securitizers	Percent of Total Securitizers	Mean	Median	Std. Deviation	Mean	Std. Dev.
15-17	Construction Industries	1	0.8%	547.9	0.0	771.3	0.10	0.14
20-39	Manufacturing	20	16.3%	1693.6	298.1	3917.0	0.11	0.24
41-49	Transportation, Communication, and Utilities	20	16.3%	190.1	0.0	622.4	0.02	0.05
50-51	Wholesale Trade	1	0.8%	293.4	0.0	502.3	0.05	0.09
52-59	Retail Trade	10	8.1%	348.6	0.0	756.5	0.04	0.09
60-67	Finance, Insurance, and Real Estate	65	52.8%	1287.2	145.0	2530.2	0.73	1.79
70-89	Service Industries	3	2.4%	766.0	0.0	2063.2	0.29	0.59
91-97	Public Administration	3	2.4%	236.5	0.0	352.5	0.03	0.06
Total		123	100%	1046.2	205.6	2523.8	0.37	1.26