Conflicts of Interest and Market Illiquidity in Bankruptcy Auctions: Theory and Tests

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ABSTRACT

I develop and estimate a model of cash auction bankruptcy using data on 205 Swedish firms. The results challenge arguments that cash auctions, as compared to reorganizations, are immune to conflicts of interest between claimholders but lead to inefficient liquidations. I show that a sale of the assets back to incumbent management is a common bankruptcy outcome. Sale-backs are more likely when they favor the bank at the expense of other creditors. On the other hand, inefficient liquidations are frequently avoided through sale-backs when markets are illiquid, that is, when industry indebtedness is high and the firm has few nonspecific assets.

THE PROBLEM OF DESIGNING an efficient bankruptcy law has received considerable attention in the last decade. Much of the debate has centered around the optimality of two different stylized bankruptcy procedures: cash auctions, such as the U.S. Chapter 7 code, and structured bargaining, represented by the U.S. Chapter 11 reorganization code. Recently, several European countries (including France, Germany, and Great Britain) have changed their bankruptcy regulation by introducing reorganization procedures similar to Chapter 11. At the same time, the Chapter 11 code has been criticized by academics, including Baird (1986), emphasizing that the bargaining procedure frequently results in long and wasteful negotiations. These critics argue that Chapter 11 should instead be replaced with a mandatory auction procedure. Other researchers, such as Aghion, Hart, and Moore (1992) and Shleifer and Vishny (1992), have pointed out that a cash auction is likely to suffer from considerable inefficiencies arising from transaction costs and market illiquidity. The nature and costs of the Chapter 11 procedure are

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fairly well documented. In contrast, the degree to which the inefficiencies of the cash auction are economically important is still an unresolved empirical question.

This paper tries to fill this gap by developing a model of cash auction bankruptcy and estimating it using data from Swedish bankruptcies. Thanks to a unique data set and the simplicity of the Swedish institutional environment, the cash auction bankruptcy resolution can be modeled and estimated in a consistent manner. As a result, the economic impact of both market liquidity and conflicts of interests between claimholders in the cash auction procedure can be assessed.

Most previous bankruptcy studies analyze structured bargaining codes like Chapter 11. In a structured bargaining procedure, the firm does not cease to exist upon entering bankruptcy. Instead, the firm continues to operate, subject to rules regarding asset sales, new financing, creditor protection, and so forth. Meanwhile, the firm's equity and debtholders negotiate on whether the operations should be continued or liquidated, and on the design of the firm's new capital structure. The bargaining process follows predetermined rules dictated by law and is supervised by a court. If an agreement cannot be reached within a certain time limit, the firm is liquidated in an auction procedure.

This paper provides one of the first studies of a cash auction bankruptcy code.[1] In a cash auction procedure, the firm immediately ceases to exist as a legal entity upon entering bankruptcy. The control of the assets of the firm is transferred to a trustee or receiver, whose task is to sell the assets for as high a price as possible, either piecemeal or as a going concern. The proceeds from the asset sales are then distributed to the claimants of the firm according to the absolute priority of their claims.

The critics of structured bargaining codes claim that because the disparate objectives of different claimholders are allowed to affect the bankruptcy outcome, the procedure leads to complicated and costly negotiations. This leads to assets being wasted, firms being inefficiently continued, and the absolute priority of the financial claims being violated, which increases the firms' ex ante cost of capital.[2] Empirical studies indicate that absolute priority violations occur frequently in Chapter 11, whereas the evidence on

[1] The few empirical studies on cash auction bankruptcy codes include Sundgren (1995), Strömberg and Thorburn (1996), and Thorburn (2000).

[2] The most notable criticisms of Chapter 11 can be found in Baird (1986), Bradley and Rosenzweig (1992), and Jensen (1991). Brown (1989), Bergman and Callen (1991), Bebchuk and Chang (1992), and Gertner and Scharfstein (1991) provide theoretical arguments for excessive continuation and deviations from absolute priority in Chapter 11. Berkovitch and Israel (1999) and Berkovitch, Israel, and Zender (1998) have supplied arguments supporting deviations from absolute priority as a way of inducing managers to behave optimally ex ante. Bebchuk (1988) and Aghion et al. (1992) have suggested improved reorganization procedures that would avoid some of the inefficiencies of Chapter 11.

costly delay and excessive continuation is more mixed.[3] Cash auctions, on the other hand, are believed to avoid such problems altogether because they separate the decision of how assets should be used from the problem of how the proceeds should be distributed (see, e.g., Baird (1993) and Bebchuk (1998)).

Proponents of structured bargaining codes argue that allowing firms to reorganize, rather than forcing them to liquidate all assets immediately, potentially avoids inefficient liquidations. When the markets for the firms' assets are illiquid, bankruptcy auctions can result in assets not ending up at their highest value use and being sold for less than their fundamental value. Along the lines of Williamson (1988), this problem should increase the more specific the assets are to the particular firm or industry. Shleifer and Vishny (1992) show that such inefficiencies are likely to be exacerbated because of the correlation of financial distress within industries. When a firm enters financial distress, the timing often coincides with an industry-wide downturn, where industry firms are liquidity constrained. Hence, the industry insiders may not be able to bid for the bankrupt firm. As a result, the assets are likely to end up in control of outside, lower-value users. There has been some empirical evidence (in particular Pulvino (1998, 1999)) from the United States supporting this effect of market illiquidity on asset sales of financially distressed and bankrupt firms.

To address these arguments I develop a theoretical model of the cash auction bankruptcy procedure that incorporates conflicts of interest between claimholders and the effect of illiquidity in the market for the firm's assets. The model distinguishes between two different bankruptcy outcomes. First, the operations can be liquidated, defined as the assets of the firm being sold to new owners, either piecemeal or as a going concern. Second, the operations can be sold back to the prebankruptcy manager, who is assumed to own all the equity of the bankrupt firm. Because the prebankruptcy owner-manager in general lacks any funds of her own, the sale-back involves a renegotiation of the existing bank loan to finance the acquisition. Thus, whether the firm will be sold back or liquidated depends on whether or not it is optimal for the bank to finance a sale-back. The model predicts that when the market for the firm's assets is less liquid, sale-backs should be relatively more common. In these cases, sale-backs can be optimal even in cases when the incumbent owner-manager is of inferior quality, because they avoid fire-sale liquidations at depressed prices. Moreover, the seniority of the bank debt relative to that of the other creditors of the bankrupt firm also affects this choice by determining the surplus the bank must share with other passive creditors. The bank is typically senior and bears most of the

[3] See, for example Betker (1995), Eberhart, Moore, and Roenfeldt (1990), Franks and Torous (1994) and Weiss (1990) for evidence on deviations from absolute priority. The findings of Altman (1984), Hotchkiss (1995), and Weiss and Wruck (1998) support the existence of important indirect costs of bankruptcy in Chapter 11, while Andrade and Kaplan (1998), Alderson and Betker (1995), Gilson (1997), and Maksimovic and Phillips (1998) find evidence of low indirect costs and largely efficient bankruptcy outcomes.

loss from an unsuccessful liquidation, whereas most of the gain from a successful liquidation goes to junior creditors. When financing a sale-back to the incumbent manager, however, the bank can capture the upside gain as well, through its new claim on the continued firm. As a result, the bank tends to be biased towards excessive sale-backs.

In the empirical implementation, I estimate the model using a unique data set of 205 Swedish cash auction bankruptcies involving small and medium sized, closely held, owner-managed firms. The results support the model's predictions. The probability of a sale-back is shown to be significantly positively related to variables measuring the quality of incumbent management, such as the relative prebankruptcy performance of the firm. In addition, the sale-back probability is significantly negatively related to asset market liquidity variables such as the financial health of the industry and the degree to which the firm's assets are nonspecific and redeployable. I also show that if the firm is indeed liquidated rather than sold back, the expected cost from a fire sale to industry outsiders is negatively related to these liquidity variables. For the average firm, the expected loss in liquidation value from having to sell assets to an industry outsider is estimated to be between 23 and 39 percent. Because I find that sale-backs are particularly common for firms facing illiquid asset markets, this suggests that fire-sale liquidations are frequently avoided in cash auctions. Instead, the operations are sold back to incumbent management in a way which is very similar to a debt restructuring.[4] Due to their higher expected fire-sale costs, firms whose operations are sold back have expected liquidation values that are on average 7 to 8 percent lower than firms that actually end up in liquidation, after controlling for differences in manager quality and capital structure.

In addition, the seniority structure of the firm's debt affects the sale-back probability, in a nonlinear manner, consistent with the predictions of the model. The sale-back probability is shown to be highest when the bank bears a disproportionate amount of downside risk from a liquidation. This will be the case when the bank is the most senior creditor and when the expected value of the firm's assets in a liquidation is just sufficient to cover the bank's claim. Hence, this paper provides empirical evidence that individual claimholder interests affect the asset restructuring decisions in cash auction procedures as well.[5] The empirical results strongly suggest that the bank's private

[4] Anecdotal evidence from the United Kingdom receivership bankruptcies (quoted in Franks, Nyborg, and Torous (1996)) indicates that the practice of selling the operations back to prebankruptcy management is common in the United Kingdom as well.

[5] In independent theoretical work, Bhattacharyya and Singh (1999) show how conflicts of interest between claimholders with different seniority in a bankruptcy auction can lead to similar types of inefficiencies. Recently, Burkart (1995) and Bulow, Huang, and Klemperer (1999) have shown that bankruptcy auctions can lead to inefficient overbidding. Hotchkiss and Mooradian (1999) develop this argument and show that a creditor-management coalition have an incentive to bid too high in an auction since they already have a stake in the bankrupt company, hence deterring competing bids. My argument is different from theirs and relies on the risk of losses in asset value from keeping the firm in bankruptcy while searching for alternative bidders.

incentives can distort the bankruptcy outcome at the expense of other passive creditors. These distortions are very similar in nature to the underinvestment problem of Myers (1977).

Moreover, in a sale-back, the owner-manager and the bank will be able to capture some surplus in the cases when the sale-back price is lower than the value of the continued firm. This violates the priority of the outstanding claims, because any additional value should first have been distributed to the junior creditors. Hence, this is analogous to the deviations from absolute priority that are common in Chapter 11 reorganizations. As the earlier results suggest, such deviations will be particularly common when the quality of the manager is high and when the firm faces illiquid asset markets. This implies, in principle, that deviations from absolute priority can occur even in a cash auction code, where the bankruptcy procedure formally follows strict seniority.

The organization of the paper is as follows. Section I summarizes Swedish bankruptcy law. Section II provides the theoretical model. Section III describes the data and variables used in estimation. Section IV presents the empirical results. Finally, Section V concludes. Proofs and more detailed descriptions of the data set and estimation approach are provided in the appendices.

I. The Swedish Cash Auction Code

In this section, I describe the Swedish cash auction mechanism, the institutional setting of this paper. The Swedish bankruptcy code shares most relevant features with the cash auction codes of other countries, including Finland, Germany, the United States (Chapter 7), and the United Kingdom (receivership).

The Swedish bankruptcy law that was in place during my sample period consisted of two provisions, the Bankruptcy Liquidation Chapter ("Konkurslagen") and the Composition Chapter ("Ackordslagen"). The Composition Chapter allowed for a reorganization of the financially distressed firm without liquidation. Because the Composition Chapter was very rarely used, however, the Liquidation Chapter was by far the dominant bankruptcy mechanism for Swedish firms.[6]

[6] This structure corresponds closely to the bankruptcy codes of Germany and Finland that were in place at the time. Both codes consisted of a Liquidation Chapter, which provided the dominant resolution mechanism, and a Composition Chapter that was rarely used. Both countries, like Sweden, subsequently introduced new reorganization procedures in 1995–1996. For Sweden, between 1988 and 1991, the number of composition filings was less than one percent of the number of liquidation filings. There were several reasons for compositions being avoided by financially distressed firms. First, there was a minimum repayment floor, requiring that senior and secured creditors had to be offered full repayment and junior creditors 25 percent of their claims for the court to accept the agreement. Second, similar to a liquidation, it was not possible for the firm to obtain new financing senior to existing claims, which impaired the firm's ability to operate during the composition negotiations. Third, the wage guarantee act (discussed later in the text) only applied in liquidation bankruptcy and not in compositions. The problems with the Composition Chapter led Swedish legislators to introduce a new reorganization law in 1996.

The Liquidation Chapter of the Swedish bankruptcy law corresponds closely to the textbook cash auction bankruptcy procedure. When a firm enters bankruptcy, control of the firm's assets is transferred to a court-appointed trustee ("konkursförvaltare"). The trustee's task is to sell off the firm's assets for as high a price as possible and then distribute the proceeds to the claimants according to the seniority of their claims. Thus, in contrast with the U.S. Chapter 11 reorganization code, but similar to Chapter 7 in the United States, the absolute priority rule is always followed. It should be stressed that despite its name, firms are not necessarily "liquidated" in the Liquidation Chapter. The trustee can choose either to sell the bankrupt firm's operations as a going concern or to liquidate and sell the assets piecemeal, depending on what is most beneficial to claimholders.

For a bankruptcy petition to be approved by court, a firm has to be insolvent, which is defined as an nontemporary inability of a firm to pay its debts.[7] If the firm files for bankruptcy, insolvency is always presumed and the bankruptcy petition is always approved by the court. If a creditor files, insolvency has to be proven before the firm can enter bankruptcy, which often takes several weeks. As a result, the preferred way for a creditor (e.g., the bank) to put a firm into bankruptcy is to try to force management to file, and the vast majority of bankruptcies are debtor initiated.[8]

If the bankruptcy petition is approved, the trustee takes immediate control of the firm's operations and assets. The trustee is always a lawyer who must be certified by the court. Initially, the trustee is chosen by the filing party, but eventually must be approved by the firm's creditors. The trustee is required to dispose of the firm's assets in a way that is the swiftest and most beneficial to the bankrupt firm's claimants as a whole. The only modification to this rule is that the trustee should take special care in "promoting employment," if this can be done "without appreciable loss" to the claimants of the firm.[9] Interestingly, in Sweden (in contrast with other cash auction codes) the trustee is compensated for the number of hours spent on the bankruptcy case and incurred expenses rather than as a function of realized proceeds. Presumably, this could lead to an incentive problem of the trustee not putting in enough effort to maximize proceeds. The trustee's compensation and performance is reviewed by a special government agency (Tillsynsmyndigheten i Konkurs (TSM)), however, and misbehaving trustees run a major

[7] The formal insolvency requirements differ somewhat between cash auction codes of different countries. In the United Kingdom, for example, the only prerequisite is that the firm has defaulted on a debt covenant (see Franks et al. (1996)).

[8] In Strömberg and Thorburn's (1996) sample, consisting of the largest bankruptcies in Sweden from 1988 to 1991, about 90 percent of the filings were debtor-initiated. The average time between filing and bankruptcy was 2.2 days for debtor-initiated bankruptcies, versus 54.4 days for creditor-initiated ones. Many of the debtor filings were actually forced, as a result of the bank having canceled the firm's credit lines.

[9] See The Swedish Bankruptcy Code, Chapter 7, Section 8. Similar modifications to the rule of maximizing proceeds are common and present in, for example, the French, U.K., German, and Finnish liquidation codes.

risk of losing future bankruptcy allocations. Also, according to practitioners, reputation concerns towards creditors are very important in this context. In the model, I abstract from any incentive problems of the trustee.

Employment concerns also play a potential role through the so-called wage guarantee, according to which certain unpaid wage claims in bankruptcy are guaranteed by the government. Government-provided wage guarantees in bankruptcy are standard throughout Europe. To the extent that the bankruptcy proceeds do not suffice to cover wage claims in bankruptcy, the government will pay the remainder up to a maximum amount per employee. In Sweden, the guarantee is applicable to unpaid salaries for up to six months before the bankruptcy, as well as wages for a period after bankruptcy that varies depending on the employees' length of service. From 1988 to 1991 the maximum wage guarantee payout was capped at Swedish Kronor (SEK) 386,400 per employee (approximately $55,000). As a result, when a firm's operations are sold as a going concern, part of the employees' initial wages can in some cases be covered by the wage guarantee. It has been argued that in this way the government is in effect subsidizing going concern sales over piecemeal liquidations (see, e.g., the Government Report on Insolvency Practice, Insolvensutredningen, 1992).

Given the requirement to maximize proceeds, the trustee still has a great deal of discretion in the way assets are disposed (Konkurslagen, Ch. 8, Sec. 6–7). Even if the trustee in principle has the right to conduct an auction, this turns out to be the exception rather than the rule. In fact, practically the only instances when auctions tend to occur are when the firm's assets are liquidated piecemeal. In the majority of cases, however, the assets of the firm are sold in private negotiations with one or more bidders. In the cases where the trustee manages to sell the firm's operations as a going concern, the sale is usually made within a month or two after entering bankruptcy, and there are generally no rival bidders for the assets.[10]

One explanation for this is the difficulty in maintaining the firm's operations while in bankruptcy under this procedure.[11] First, unlike Chapter 11 in the United States, the firm cannot obtain new senior financing in bankruptcy. Hence, unless the operations generate sufficient positive cash flow, the only way that the firm can obtain sufficient working capital to keep the operations running is by selling off assets. Second, there are a number of

[10] In Strömberg and Thorburn's (1996) sample, 75 percent of the bankruptcy sales lack a rival bidder for the assets of the firm. For the cases where the firm's operations were sold as a going concern, the average (mean) time between initiation of bankruptcy and sale of the operations was 2.3 (1.0) months. Similarly, for the U.K. receivership, Franks et al. (1996) report that most going-concern sales are made shortly after bankruptcy and usually to incumbent management, rather than in an auction with rival bidders participating. For Finland, practically all going-concern sales are private negotiations rather than auctions (Sundgren (1995)).

[11] This has been acknowledged as a problem in other countries' cash auction codes as well. For anecdotal evidence on Germany, see the *Economist* (May 21, 1994, pp. 88–91), White (1996), and Franks et al. (1996). The latter article also provides similar evidence from the United Kingdom.

factors that make trustees unwilling to run the firm's operations for any longer period of time. For example, the trustee, who in general is involved in several bankruptcy proceedings concurrently, is responsible for making all major business decisions if the operations are continued (see Insolvensutredningen, pp. 135–136). Finally, the bankruptcy law states that the firm's assets must be sold as soon as possible. According to Swedish bankruptcy law, running the firm's operations for more than one year is not allowed, except under extraordinary circumstances and only if the court approves.[12] This imposes important limits on the trustee's options to dispose of the firm's assets. If the operations have to be shut down, this considerably lowers the chances of being able to sell the firm as a going concern, as key employees will leave, market share will be lost, and so forth. Hence, if the firm's assets are to be sold as a going concern, this decision has to be made relatively soon after the bankruptcy filing.

The model presented in the following section tries to incorporate the relevant institutional features of the Swedish bankruptcy law. In particular, the model intends to capture the difficulties facing the trustee in disposing the firm's assets and the way this affects the bankruptcy outcome.

II. Model

In this section, I model the bankruptcy outcome for a firm that has just entered a cash auction bankruptcy procedure. The analysis focuses on the bank's decision whether or not to finance a sale-back of the firm's operations to the incumbent owner-manager. The model is similar in spirit to Bulow and Shoven (1978) and Gertner and Scharfstein (1991), who also study the effect of seniority and debt structure on the investment decisions for a firm in financial distress.

A. Agents

The model has three decision-making agents, the bankruptcy trustee, the firm's incumbent owner-manager, and the firm's bank. In addition, the firm is assumed to have a large number of small, dispersed creditors.

The owner-manager was running the firm before bankruptcy and owns all the equity of the firm. The manager is assumed to be risk-neutral and has no outside personal wealth. I make a simple assumption about the manager's preferences, namely that the manager's sole objective is to continue to operate the firm rather than to have the assets sold to new owners. This is

[12] See Konkurslagen, Chapter 8, Sections 1–2. In Strömberg and Thorburn's (1996) sample, 70 percent of the firms that had ongoing operations when entering bankruptcy continued their operations. In general, the operations were only continued for a very short period of time, however, on average 2.1 months (median 1.6 months).

a natural assumption, as the payoff to equity in a bankruptcy auction is likely to be very small, given that the firm is in bankruptcy and thus heavily indebted.[13] Moreover, to the extent that the manager derives some private benefits of control from running the firm, this will also bias her towards continuation.

The bank has a debt claim of B on the firm's assets. The bank is assumed to be a risk-neutral, expected cash-flow maximizer, and has unlimited funds to lend. The bankrupt firm also owes debt to other (possibly several different) creditors, consisting of an amount S that is senior to the bank, and an amount J that is junior to the bank (but senior to equity). The critical assumption is that the holders of the senior debt S and (in particular) the junior debt J are completely passive. These non-bank creditors should be thought of as trade creditors and other minor claimants, each of which represents only a small fraction of the total debt of the firm. Because these creditors are small and dispersed, and because many of them might be liquidity-constrained themselves, it is assumed that it is too costly and difficult to coordinate and negotiate with them.[14]

Initially, the firm has just entered bankruptcy and is in the control of a court-appointed trustee. The objective of the trustee is to maximize the revenue from selling all assets of the firm and then distribute the proceeds to the firm's claimholders according to the absolute priority of their claims, that is, by first paying off S, then B, and finally J. Any residual funds go to the owner-manager.

B. Sequence of Events

There are three time periods, 0, 1, and 2. The sequence of events is shown in Figure 1.

The trustee can dispose of the firm's assets in one of two ways, either by selling the assets to a new owner ("liquidation") or by selling the assets back to the owner-manager ("sale-back"). In period 0, the manager can borrow funds from the bank and submit a bid for the assets, which the trustee then either accepts or rejects. If the trustee accepts the bid, the firm will be sold back to the owner-manager. If the trustee rejects the bid, or if no managerial bid is submitted, the assets will be liquidated in period 1. Liquidation is simply defined as selling the assets to someone else other than the incumbent manager, either piecemeal or as a going concern. To simplify the analy-

[13] In fact, among the bankruptcies investigated in this paper, there is not a single case where equity ends up with any residual proceeds in bankruptcy.

[14] This is similar to the assumption made regarding public debtholders in the literature, for example, in Bulow and Shoven (1978). Gertner and Scharfstein (1991) formalize this argument by showing that each public debtholder has an incentive to hold out in debt renegotiations. Moreover, this problem has been acknowledged by Swedish bankruptcy practitioners (see, e.g., Leijon (1996)).

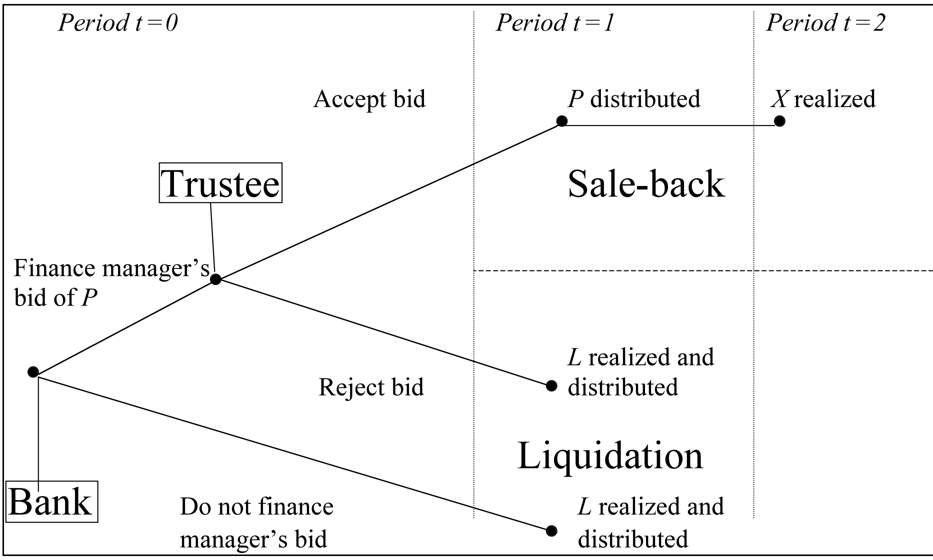

Figure 1. Sequence of events. This figure describes the timing of the decisions of the bank and the trustee and the subsequent bankruptcy outcomes in the cash auction model. P is the bid price that the owner-manager offers to the trustee for the assets of the firm. L is the value realized if the assets are not sold back to the owner-manager and instead liquidated. X is the final value of the firm if the assets are sold back and the owner-manager continues operating the firm.

sis, I assume that if the trustee rejects the initial bid from the incumbent manager and decides to liquidate, the option to sell the assets to the manager at a later time is lost.[15]

If the firm's assets are sold back to the incumbent owner-manager, the proceeds paid by the manager, P, are immediately distributed to claimholders in order of seniority. The firm is then continued under the incumbent manager, and the assets will generate a random payoff of $\tilde{X}$ at time 2. Part or all of this payoff will be used to pay back the bank loan that financed the sale-back. The bank and the manager have identical information about the distribution of $\tilde{X}$. Assuming a zero interest rate for simplicity, the net present value of the assets if the owner-manager continues is equal to $E(\tilde{X}) \equiv \mu_m$.

[15] This assumption is most natural in the cases when liquidation is equivalent to piecemeal liquidation rather than a sale of the operations as a going concern. After the trustee has shut down the operations and started to sell off vital assets in a piecemeal fashion, selling the operations as a going concern is often impossible. Moreover, if we allowed the trustee to keep the option to sell the firm to incumbent management once the liquidation value had been realized, but instead added a fixed search cost, the qualitative predictions of the model would very similar. The difference would be that liquidation would now be relatively more desirable because of the added option value to sell back later instead of immediately. Because of this, the trustee would demand a higher P to accept an immediate sale-back bid. The empirical predictions with respect to the debt structure would be virtually unchanged, however.

If a sale-back does not occur, the assets will be liquidated by the trustee, in which case a random liquidation value $\tilde{L}$ will be realized at time 1. At time 0, all agents know the expected value of $\tilde{L}$, denoted μ_l, and its density function $f(L)$. I assume that the expected liquidation value is less than the face value of the outstanding debt, that is, $S + B + J > \mu_l$. When liquidation value L has been realized in period 1, the trustee distributes L to the claimholders similar to the procedure in a sale-back.

The assumption that the liquidation value is random at the time the trustee decides whether to liquidate is intended to capture the uncertainty inherent in any real-world liquidation process. When a firm has gone bankrupt, there are typically no outside bidders readily available. Rather than being an outright auction, liquidation is a process that involves a search for bidders and a possibly gradual liquidation of the firm's assets. The final liquidation value of the assets will be unknown at the beginning of the search.

C. The Sale-Back Decision

Consider the *trustee's choice* at time 0. Because his objective is simply to maximize the total expected proceeds distributed to all claimholders, the trustee will sell the assets back to the incumbent manager for any price above the expected liquidation value, that is, for any $P \geq \mu_l$. If $P < \mu_l$ the trustee will liquidate the firm.

As mentioned above, the *manager* always prefers continuation to liquidation. Because she has no funds of her own, her ability to successfully bid for the assets will depend on whether she can obtain funding for such a bid. I assume here that the manager can only borrow from the firm's current bank, but as I show below, this assumption is not critical. Also, it can be motivated by arguing that the current bank has superior knowledge about the firm's future prospects and the quality of the incumbent manager, which puts it at an advantage in providing finance compared to other investors.[16]

We can now characterize the *bank's choice*. The firm will be sold back if and only if it is optimal for the bank to finance a sufficiently high bid. The bank will prefer a sale-back to a liquidation if the expected payoff to the bank in a sale-back, Π_m, is higher than the expected payoff in a liquidation, Π_l. In a sale-back, the bank lends the manager $P \geq \mu_l$ in exchange for a debt contract that is a claim on the future cash flow $\tilde{X}$ of the continued operations. Because the manager always prefers continuation to liquidation, she will potentially be willing to give up the whole future cash flow $\tilde{X}$ to the bank for obtaining financing for a sale-back.[17] This implies that the only

[16] Petersen and Rajan (1994) provide empirical evidence that previous bank relations increase the availability of financing for small firms and that adding new lenders reduces these benefits.

[17] Note that I am ignoring any agency problems between the bank and the manager after bankruptcy regarding the continued firm. Also, even though Swedish banks are not in general allowed to take equity in nonfinancial firms, by giving the bank a debt contract with a sufficiently high face value, the bank can be promised an arbitrarily large fraction of the continuation value of the firm.

time liquidation will occur is when giving the bank the whole continuation value of the firm μ_m is not sufficient to persuade the bank to finance a bid.[18] Hence, we can analyze the choice problem as if the bank captures all surplus in the sale-back. The maximum expected payout to the bank in a sale-back will then be equal to (1) the continuation value of the firm plus (2) the payoff on the bank's original loan in a sale-back, minus (3) the new funds lent to finance the sale-back, that is,

$$\Pi_m = \mu_m + \max(\min(B, P - S), 0) - P. \tag{1}$$

Because the bank's payoff is decreasing in the amount lent, P, the price will be set as low as possible conditional on the bid being accepted by the trustee, that is, to the expected liquidation value, $P = \mu_l$.[19] Hence,

$$\Pi_m = \mu_m + \max(\min(B, \mu_l - S), 0) - \mu_l. \tag{2}$$

The bank's payoff in liquidation is simply equal to the expected payoff on the bank's original loan,

$$\Pi_l = E[\max(\min(B, \tilde{L} - S), 0)]. \tag{3}$$

The condition for a sale-back to occur, $\Pi_m > \Pi_l$ can be rewritten

$$\mu_m \geq \mu_l + \eta(B, S, \tilde{L}), \tag{4}$$

where

$$\begin{aligned} \eta(B, S, \tilde{L}) &= \text{(exp. payoff on bank loan in liq.)} \\ &\quad - \text{(payoff on bank loan in sale-back)} \qquad (5) \\ &= E[\max(\min(B, \tilde{L} - S), 0)] - \max(\min(B, \mu_l - S), 0). \qquad (6) \end{aligned}$$

As seen from this expression, the bankruptcy auction outcome will be affected not only by the value of the assets under continuation versus liquidation (μ_m and μ_l). It will also depend on the bankrupt firm's debt structure through the variable $\eta(B, S, \tilde{L})$, which is the difference between the expected

[18] This does not imply that the bank always has to appropriate the whole continuation value in a sale-back. As long as the bank's stake in the continued firm is sufficiently large to make its payoff higher than in a liquidation, the bank will agree to financing a sale-back. Hence, the model is consistent with the manager retaining an equity stake in the continued firm. I elaborate on this point in the following subsection.

[19] Note that we have ignored that the manager might be willing to give the bankruptcy proceeds accruing to equity-holders to the bank as well. Because we have assumed that the firm is insolvent ($\mu_l < S + B + J$), however, and because $P = \mu_l$, there will never be any proceeds left for equity in a sale-back. Also, for the cases when $\mu_l > S$, the price could actually be set as high as $P = \max(B + S, \mu_l)$ without affecting the bank's payoff. This is somewhat related to the overbidding phenomenon of Burkart (1995) resulting from one bidder having an existing stake in the auctioned asset.

payoff on the bank loan in liquidation compared to a sale-back. Because the bank already has a stake in the bankrupt firm through the existing loan, it will bias its decision whether to let the manager buy back the operations. A positive η indicates an inefficient bias towards liquidating the operations rather than selling them back, whereas with a negative η, the bank is biased towards a sale-back. Next, I show that when the bank is most senior ($S = 0$), the payoff on the original bank loan is always worth more in a sale-back than in a liquidation ($\eta < 0$), and the bank will be biased towards selling the firm back.

PROPOSITION 1: *Suppose $S = 0$. Then $\eta \leq 0$, that is, there will be cases when the assets are sold back to the incumbent manager even though $\mu_m < \mu_l$. Also, $\eta(B,\tilde{L})$ will achieve its minimum with respect to B when $B = \mu_l$.*

The tendency for the bank to prefer a sale-back in cases when the liquidation is expected to yield a higher value is similar to the underinvestment problem of Myers (1977). If the search for new buyers is unsuccessful, the realized liquidation value might turn out to be very low. In this case the bank will bear most of the loss, being the most senior creditor. If the search is successful, on the other hand, part of the upside will be captured by the junior creditors. By allowing a liquidation, the bank is in effect granting the junior creditors a valuable call option on the liquidation proceeds. A sale-back avoids this problem by giving the bank the entire upside of the future firm value (because the manager is willing to give up everything to avoid liquidation). By fixing the sale-back price at $P = \mu_l$, the bank destroys the junior creditors' call option on the bankruptcy proceeds. Consistent with this option analogy, $-\eta$ is equivalent to the time value of a European call option on $\tilde{L}$ with strike price B.[20] This time value reaches its maximum when the option is at the money, that is, when $\mu_l = B$.

Introducing senior creditors may change the bank's behavior in the opposite direction, however.

PROPOSITION 2: *Suppose that $S > 0$. Define $q = S/(S + B)$ and $\psi \equiv S + B$. Then*

(1) $\eta(B,S,\tilde{L})$ can be both positive or negative.
(2) $\partial\eta/\partial q > 0$ if $\mu_l > S$, $\quad \partial\eta/\partial q < 0$ if $\mu_l < S$.
(3) $\partial\eta/\partial\psi < 0$ if $\mu_l > \psi$, $\quad \partial\eta/\partial\psi > 0$ if $S < \mu_l < \psi$,

$\partial\eta/\partial\psi$ can be both positive and negative if $S < \mu_l$.

Now the incentive to avoid liquidation when surplus has to be shared with the junior creditors is countered by an incentive to choose liquidation to exploit the senior creditors. A liquidation might now actually benefit the

[20] This is more easily seen by rewriting $-\eta$ as

$$-\eta = -(E[\min(B,\tilde{L})] - \min(B,E[\tilde{L}]))$$
$$= -(E[\tilde{L}] - E[\max(\tilde{L} - B,0)] - E[\tilde{L}] + \max(E[\tilde{L}] - B,0))$$
$$= E[\max(\tilde{L} - B,0)] - \max(E[\tilde{L}] - B,0).$$

bank, because by increasing the "risk" in asset value, there might be a greater likelihood that there are proceeds left for the bank after the senior debt has been paid off. In other words, in addition to being short the call option to the junior creditors (with strike price $B + S$), the bank is now long a call option with strike price S. The bank's objective is now to maximize the value of this "bull spread" in calls. A sale-back will have the benefit of destroying the junior creditor's call option, but at the cost of killing the bank's own call option. The time value of the option given up to junior creditors in a liquidation will be the greatest (i.e., the short call option will be at the money) when $\mu_l = S + B$. At this point, the sale-back bias will be the highest because the bank's long call option is deep in the money and its time value will be much lower than the short call option to junior creditors.

D. Deviations From Absolute Priority

Note that in a sale-back, the owner–bank coalition will receive the continuation value of the firm. To derive the sale-back condition above, it is assumed that the bank gets the whole continuation value. In general, however, the bank will agree to financing a sale-back as long as its expected payoff is higher than in a liquidation, and whatever value that is left above this threshold will be split between the bank and the owner-manager. In other words, the bank will be willing to finance a sale-back as long as it receives a sufficiently high share ω of the continuation value such that

$$\omega\mu_m + \max(\min(B, \mu_l - S), 0) - \mu_l > E[\max(\min(B, \tilde{L} - S), 0)] \tag{7}$$

or

$$\omega\mu_m > \mu_l + \eta(B, S, \tilde{L}). \tag{8}$$

Hence, if the owner-manager has any bargaining power at all in negotiating with the bank, she will be left with a stake worth $(1 - \omega)\mu_m$ in the continued firm. This is analogous to a deviation from absolute priority in favor of equityholders (and the bank), because if absolute priority had been strictly followed the residual value $\mu_m - (S + B)$ should first have been distributed to the junior creditors to cover their claims J. Hence, similar to a Chapter 11 restructuring in the United States, deviations from the absolute priority rule can occur under a cash auction code as well.

E. The Role of Bank Financing and Creditor Passivity

As shown earlier, due to the private incentives of the bank, the bankruptcy outcome need not necessarily be efficient. The existence of these inefficiencies rely on two model assumptions, namely (1) that the manager can only borrow from the bank, and (2) that the senior and junior debtholders are completely passive.

The assumption of no outside financing will be important in the case when $\eta > 0$. In this case the bank might refuse to finance a sale-back even when the continuation value is higher than the expected liquidation value ($\mu_m > \mu_l$). If the manager could obtain outside financing, she could borrow from outsiders to finance a bid $P = \mu_l$ by promising the new financier a claim on the continuation value μ_m. For $\eta < 0$, however, the manager would gain nothing by borrowing from outsiders, because only the existing bank is able to profit from financing a sale-back when $\mu_m < \mu_l$. The comparative statics of the model will still be very similar.

PROPOSITION 3: *Suppose that outside financing is possible. Then the firm will be sold back whenever*

$$\mu_m \geq \mu_l + \eta^*(B,S,\tilde{L}), \tag{9}$$

where

$$\eta^*(B,S,\tilde{L}) = \min(\eta(B,S,\tilde{L}),0). \tag{10}$$

Also, the following results hold:

(1) $\eta^*(B,S,\tilde{L}) = \eta(B,S,\tilde{L}) < 0$ *if* $S = 0$.
(2) $\eta^*(B,S,\tilde{L}) < 0$ *if* $\mu_l > \psi$, $\eta^*(B,S,\tilde{L}) = 0$ *if* $\mu_l < S$.
(3) $\partial\eta^*/\partial q > 0$ *if* $\eta^* < 0$, $\partial\eta^*/\partial q = 0$ *if* $\eta^* = 0$.
(4) $\partial\eta^*/\partial\psi < 0$ *if* $\mu_l > \psi$, $\partial\eta^*/\partial\psi > 0$ *if* $\mu_l < \psi$ *and* $\eta^* < 0$, $\partial\eta^*/\partial\psi = 0$ *if* $\eta^* = 0$.

Hence, outside financing does not eliminate all inefficiencies and several of the comparative statics results still hold. For example, without any senior debt, outside financing will not matter because there is never any bias towards liquidation.

The more critical assumption, however, is that senior and junior creditors are passive. If the bank could negotiate with the other debtholders, there would be some gains to be made by avoiding inefficient liquidation decisions. These gains could be split by the bank and the other claimholders. In other words, the Coase theorem would apply and all inefficiencies would be avoided. The passivity of the non-bank debtholders is critical for explaining why bankruptcy occurs in the first place, however. If the Coase theorem holds, the firm and its creditors should resolve the financial distress in private negotiations out-of-court, thus avoiding any deadweight bankruptcy costs (such as lawyers' and trustee's fees and other expenses). The failure of out-of-court restructurings is elaborated upon in the following subsection.

F. Bankruptcy versus Out-of-Court Restructuring

To the extent that there are any deadweight costs of entering bankruptcy, the fact that the firm did go bankrupt is inconsistent with the Coase theorem.[21] As Haugen and Senbet (1978) show, the firm and its creditors should be able to resolve the financial distress in private negotiations outside of bankruptcy, thus avoiding such deadweight costs. Hence, for bankruptcy ever to occur, there have to be some impediments to efficient negotiations between the firm's claimholders. In this model, the critical assumptions are that (1) the manager always prefers continuation to liquidation, and (2) creditors (and in particular junior creditors) are passive. Given these assumptions, bankruptcy will always dominate private negotiations as long as bankruptcy costs are not too high.

PROPOSITION 4: *If bankruptcy costs are small enough, financial distress will never be resolved outside of bankruptcy.*

In an out-of-court restructuring, the passive junior debtholders keep the full value of their claim to the continuation value. In a sale-back, however, junior claimholders will only get their share of the sale-back proceeds P, which never suffices to pay off all the junior debt because $P = \mu_l < S + B + J$. Hence, in the absence of bankruptcy costs, the bank will always prefer bankruptcy to an out-of-court restructuring, because less is given up to passive junior claimants. With bankruptcy costs, the gain of being able to "write off" the junior debt overhang has to be weighed against the deadweight loss. If bankruptcy costs are low enough compared to the junior debt overhang, bankruptcy will still be optimal for the bank. Accordingly, the firms that are expected to end up in bankruptcy are (1) firms for which the bank is unwilling to finance a sale-back (because the manager will never agree to a liquidation out-of-court), (2) firms with low bankruptcy costs, and (3) firms with a large junior debt overhang relative to the firm's liquidation value and where negotiation problems with the junior debtholders are severe.

G. Market Liquidity and Management Characteristics

The expected continuation and liquidation values μ_m and μ_l have so far been taken as completely exogenous. To derive additional empirical predictions I now model the value of the firm's assets in more detail.

I assume that there are a limited number of managers in the economy with the specific industry knowledge required to generate the full value from the firm's assets. The price an industry manager is willing to pay is assumed to be equal to V, which I call the fundamental value of the assets. There are also an unlimited number of potential users outside of the industry, who only value the assets at a fraction $(1 - \Theta)$ of the fundamental value.

[21] Strömberg and Thorburn (1996) estimate the direct costs of bankruptcy in the Swedish cash auction procedure to be on average 19.4 percent (median 12.4 percent) of the total bankruptcy proceeds.

The parameter Θ can interpreted as the degree to which the assets are industry specific. In a liquidation, the trustee conducts a search for buyers who might be willing to acquire the assets. With probability $(1 - p)$ the trustee will find an industry insider willing to buy the assets for V. With probability p the trustee is unable to find an insider and will have to sell the assets to an industry outsider for $(1 - \Theta)V$. Hence, the expected proceeds from a liquidation, before any search has been undertaken, is equal to

$$\mu_l = (1-p)V + p(1-\Theta)V = (1-p\Theta)V. \tag{11}$$

The expected liquidation value is decreasing in Θ, the fraction of the fundamental value that is lost if the assets are sold to an outsider, and p, the likelihood that no insider can be found. To the incumbent owner-manager, the expected net present value of the assets given that the operations are sold back is assumed to be $\mu_m \equiv QV$, where Q represents the quality of the incumbent manager and is assumed to be common knowledge. Substituting the expressions for μ_l and μ_m into equations (4) and (5) the operations will be sold back whenever

$$QV \geq (1-p\Theta)V + \eta(B,S,p,\Theta,V,\tilde{I}) \tag{12}$$

$$\begin{aligned}\eta(B,S,p,\Theta,V,\tilde{I}) = {} & E[\max(\min(B,(1-\Theta)^{\tilde{I}}V - S),0)] \\ & - \max(\min(B,(1-p\Theta)V - S),0)\end{aligned} \tag{13}$$

$$\tilde{I} = \begin{cases} 0 & \text{if the assets are sold to an outsider (probability } p) \\ 1 & \text{if the assets are sold to an insider (probability } p). \end{cases} \tag{14}$$

H. Empirical Predictions

The main empirical predictions of the model come from the sale-back condition, given by equation (12). Henceforth, I will assume that $S < \mu_l$, which is reasonable given that the bank provided the main senior financing to the firm before bankruptcy. Also, according to Proposition 3, the empirical predictions would be virtually the same if the assumption of no outside financing was relaxed. The following corollaries summarize the empirical predictions of the model.

COROLLARY 1: *Assume $\mu_l > S$. Then,*

(1) the probability of a sale-back will be decreasing in $q = S/(S + B)$, the proportion of senior to non-junior debt in the bankrupt firm's capital structure.

(2) *η will achieve its minimum (i.e., the sale-back bias will be the largest) with respect to $\psi = S + B$ when $\psi = \mu_l$. Moreover, the probability of a sale-back will be increasing in ψ when $\psi < \mu_l$ and decreasing in ψ when $\psi > \mu_l$.*

COROLLARY 2: *The probability of a sale-back will be*

(1) *increasing in the quality of the incumbent manager, Q;*
(2) *increasing in the probability that a liquidation will involve a sale to an industry outsider, p;*
(3) *increasing in the specificity of assets, Θ.*

III. Data and Variables

This section describes the data set and the state variables used in the empirical analysis.

A. Sampling Procedure

Data is taken from a database of Swedish bankruptcies described in Strömberg and Thorburn (1996). Their data is gathered from two main sources. First, information on 263 Swedish bankruptcies was manually collected by the authors from the bankruptcy filings kept by the Supervisory Authority for Bankruptcies (Tillsynsmyndigheten i konkurser). The sample consists of bankruptcies occurring between 1988 and 1991 involving firms with more than 20 employees located in the four largest counties (län) in Sweden. Appendix A includes a more detailed account of the sampling procedure. Second, detailed information on financial and other variables for all Swedish firms with more than 20 employees was obtained from Upplysningscentralen (UC), a Swedish credit bureau. This information was used both to match the bankruptcy data with corresponding financial data for each firm, and for calculating comparative industry financial statistics.

A subsample of the 263 bankruptcies was then selected to meet some additional criteria. First, 30 bankruptcies were excluded because it was not known whether the operations had been liquidated or sold back to the old owners. Second, all firms had to have complete financial statements, eliminating another four firms. Third, 24 bankruptcies were excluded because the assets of the firm had already been sold sometime before the bankruptcy filing.[22] The final sample thus consists of 205 Swedish bankrupt corporations that filed for bankruptcy between 1988 and 1991.

[22] Twenty-one firms sold their complete operations to a new firm prior to the bankruptcy filing, leaving the filing firms as empty shells with debt claims but no assets or employees. One firm, for instance, sold its assets as a going concern 426 days prior to bankruptcy. Such transactions can be carried through if approved by the bank that, as a floating charge holder, has a secured claim against the operations of the firm. In addition, three firms had liquidated their operations piecemeal before bankruptcy.

B. Description of Sample

Table I shows the distribution of the sample bankruptcies over time. The sample is clustered towards the end of the period, coinciding with the beginning of a four-year recession in Sweden. In particular, more than 30 percent of the bankruptcies in the sample occur in the last six months of the three-and-a-half-year sample period. Thus, some of the results in the paper may be sensitive to the particular time period studied. Also, there is some evidence of a selection bias towards the shorter, simpler bankruptcy cases, as, in order to be included, the bankruptcy proceeding had to be completed by June 30, 1995. As a result, the average time spent in bankruptcy is much shorter for the observations occurring later in the sample.

Table II displays the size and industry distribution of the sample firms over six major industry groups, according to the last financial statement before bankruptcy. Manufacturing firms account for approximately one-third of the sample. The industries differ significantly with respect to average firm size, with corporations in the service and hotel/restaurant sectors being much smaller than the sample average. As a whole, the sample consists of relatively small firms, with a mean number of employees of 42 and sales averaging around $5.5 million (39 million SEK). It should be emphasized, though, that these firms represent the largest bankruptcies in Sweden during the period studied. The mean asset, sales, and employment values are considerably larger than the corresponding medians, indicating the presence of large outliers.

C. Selection Biases and Representativeness of the Sample

Because the sample only includes firms that ended up in cash auction bankruptcy, the sample is potentially subject to selection biases.

First, some financially distressed firms might reorganize out of court in a private workout. As mentioned earlier, these are more likely to be firms (1) with fewer obstacles towards negotiation, for example, less complicated debt structures, and (2) with less junior debt overhang, relative to the liquidation value of the firm. Our sample could be biased towards firms that are more insolvent and have more complicated capital structures. Unfortunately, there is no public information available on whether a private workout has taken place or how common workouts are in the overall population. Among the 263 sample bankruptcies in the Strömberg and Thorburn (1996) data set, a private workout attempt preceded bankruptcy in 75 cases. Out of these cases, 21 were successful in the sense that all assets are sold off before bankruptcy and the proceeds used to pay off most outstanding debt. These firms eventually also filed for bankruptcy (and hence ended up in the Strömberg and Thorburn data set) but had essentially no assets left and were excluded from the sample. Second, the existence of a Composition Chapter that allows firms to reorganize their debt outside of bankruptcy could potentially bias the results in a way similar to the exclusion of private workouts. As mentioned in Section I, compositions were

Table I

Distribution of Sample Bankruptcies over Time

This table describes the distribution over time and the length of the bankruptcy proceedings for a sample of 205 Swedish cash auction bankruptcies occurring between 1988 and 1991. The length of the proceedings is measured as the number of months between the date of the bankruptcy filing and the date that the bankruptcy court officially closed the case.

Year Entering Bankruptcy	July 1988–June 1989	July 1989–June 1990	July 1990–June 1991	July 1991–December 1991	Total
Number of bankruptcies in sample	15	21	101	63	205
Mean (median) proceedings, months	25.8 (23.5)	20.6 (24.0)	14.2 (14.5)	10.4 (11.0)	14.8 (13.5)

Table II

Distribution of Sample Firms across Major Industries

This table describes the industry distribution of a sample of 205 Swedish bankruptcies occurring between 1988 and 1991. All values are book values as reported in the last financial statement prior to bankruptcy, deflated to 1991 prices, and denominated in millions of Swedish Kronor (SEK). During the sample period, 7 SEK ≈ $1.

		Number of Employees		Assets (MSEK)		Sales (MSEK)	
Industry	Number of Firms	Mean	Median	Mean	Median	Mean	Median
Construction	26	55.500	29.000	12.246	6.059	44.733	20.390
Hotels and restaurants	22	30.222	25.000	7.167	4.795	18.353	14.831
Manufacturing	65	41.483	28.000	16.061	9.380	34.943	19.714
Services	32	31.629	26.000	10.819	5.063	16.867	12.686
Trade	35	40.800	30.000	25.361	18.980	76.729	51.631
Transports	25	54.291	39.000	10.642	7.662	32.222	23.871
All sample firms	205	41.795	29.000	14.427	7.839	39.393	20.067

Table III

Selection Biases and Representativeness of Sample

This table compares the sample of 205 observations of Swedish cash auction bankruptcies occurring between 1988 and 1991 used in the estimation ("Sample Bankruptcies") to those of (1) firms from the Strömberg and Thorburn (1996) data set that were excluded because their assets had been sold before bankruptcy in a private workout ("Presales"), and (2) all compositions involving firms with more than 20 employees included in the UC data set occurring between 1988 and 1991 ("Compositions"). All values are calculated using the last financial statement before bankruptcy and expressed in 1991 prices. Industry-adjusted values are calculated by subtracting the corresponding value of the median firm in the same four-digit industry. Gross margin is EBITDA/Sales. Industry distress is the fraction of firms in the industry that either had an interest coverage ratio < 1 or filed for bankruptcy within one year of the sample firm's bankruptcy date. Interest coverage is (EBITDA + interest income)/(interest expense). Start-ups are defined as firms less than two years old. During the sample period, 7 SEK $\approx$ \$1.

	Sample Bankruptcies		Pre-sales		Compositions	
	Mean	Median	Mean	Median	Mean	Median
Book Assets (MSEK)	17.3	8.9	12.4	6.4	24.5	19.1***
Sales (MSEK)	35.5	18.3	31.6	16.5	28.9	17.1
Employees	45.3	30.0	47.0	27.0	39.7	27.0**
Gross margin (%)	0.76	2.27	−0.76	0.49	−2.33	0.59
Gross margin, Ind. adj. (%)	−5.02	−3.64	−6.10	−4.32	−8.20	−5.44
Industry distress	20.0	19.0	21.0	23.0	18.9	18.5
Fixed assets (%)	29.2	19.6	27.7	22.1	35.9	37.0
Start-ups (%)	13.6	—	9.52	—	20.5	—
Interest coverage	0.62	1.06	−0.73	0.43**	−0.05	0.41
Debt/assets (%)	92.3	92.6	84.6	92.4	88.7	89.7
Debt/assets, Ind. adj. (%)	10.68	9.73	2.11	7.67	7.53	10.54
Trade credit/debt (%)	22.5	19.2	24.7	23.8	22.1	19.2
Long-term debt (%)	36.6	37.8	28.9	32.6	40.1	35.9
N	205		21		39	

*, **, and *** denote significant differences from the Sample Bankruptcies at the 10, 5, and 1 percent levels, respectively, using a Mann-Whitney U test.

very rare because of institutional constraints. Between 1988 and 1991 the UC database only included 39 compositions involving firms with more than 20 employees, as compared to 1,402 bankruptcies.

Table III compares my sample with (1) the observations from the Strömberg and Thorburn (1996) data set that were excluded because assets were sold off in a workout, and (2) the sample of compositions in the UC database. Surprisingly, there are no statistically significant differences in debt structure or profitability between the sample and the presale workouts or the compositions. The only exception is that workout firms have significantly lower interest coverage ratios, indicating that, if anything, these are more distressed rather than less. Compared to compositions, the sample firms are smaller in terms of assets, but, on the other hand, have more employees and sales. I conclude that the sample seems largely free of the type of selection biases outlined above.

D. Choice of State Variables Determining the Sale-Back Choice

The main model prediction is the bank's sale-back condition, equation (12). This is a highly nonlinear expression that is very difficult to take to the data directly. To develop a tractable empirical specification I have to make some simplifying assumptions. The details of the model parametrization are described in Appendix B. Given these parametric assumptions, the sale-back condition and the liquidation value can be expressed as tractable functions of state variables determining p, Θ, Q, and η.

To estimate the sale-back decision, we then need to classify the observations as either sale-backs or liquidations. We also have to specify state variables for market liquidity (p and Θ), sale-back bias (η), and management quality (Q).

D.1. Classification of Liquidations and Sale-Backs

From the bankruptcy files, it was possible to identify whether the firm had been sold as a going concern or liquidated piecemeal, and, in the case of a going concern sale, the identity of the acquirer of the operations. A sale-back was defined as a case where a prebankruptcy owner acquires the operations of the firm in the bankruptcy auction and the operations are sold as a going concern. All other observations were classified as liquidations. This latter group includes cases when the operations of the firm are sold as a going concern, as well as cases when the operations are sold piecemeal to several buyers. Of the 203 bankruptcies in the sample, 70 were sale-backs and the remaining 133 were liquidations.

D.2. Manager Quality

To control for differences in ability between owner-managers, we need a set of state variables X_Q that are informative of manager quality.

The performance of the bankrupt firm relative to its industry peers is one natural measure of manager quality. I measure this by the variable "Firm profitability," equal to the difference in the prebankruptcy gross margin (EBITDA/Sales) between the firm and its industry. I calculate industry profits, as well as other industry statistics, at the four-digit SCB classification code level. The SCB code is the industry classification used by Statistics Sweden, the official Swedish statistical office, and corresponds fairly closely to the U.S. SIC industry codes. According to this definition, the 207 sample firms are divided into 57 different industries.[23] For the calculations, the prebankruptcy financial statement closest to 18 months before bankruptcy is used.

[23] For the industry statistics to be informative, the industry must be sufficiently large. The mean (median) number of firms with more than 20 employees in the 57 industries containing at least one of our sample bankruptcies in the UC data base is 299 (273). Moreover, all but 3 of our bankruptcies are in industries containing at least 20 firms with more than 20 employees. For these three firms, three-digit industry statistics are used instead.

If the bank has private information about the quality of the manager, this might affect the bank's actions when the firm enters financial distress. To control for this I form a dummy variable, "Bank-initiated filing," taking a value of one if the bank forced the firm into bankruptcy. This variable might indicate that the bank is more likely to have negative information about the quality of the manager, and hence be less willing to finance a sale-back. I consider the bank to have forced the firm into bankruptcy if it either put the firm into financial distress by cancelling existing credit lines (17 cases) or if the bank was the party that filed for bankruptcy (10 cases).

Finally, a significant number of the bankruptcies in the sample involve very young firms that defaulted only a few years after starting their operations. The value of keeping the present entrepreneur in these start-ups might be different compared to older firms. To control for such effects, I let the firm's quality be a function of a dummy variable, "Start-up," taking a value of one if the firm is less than two years old, and zero otherwise. The expected sign of Start-up is ambiguous. On the one hand, a firm is likely to be more reliant on the original entrepreneur in the start-up phase. On the other hand, if bank relationships become more valuable over time (as argued, e.g., by Petersen and Rajan (1994)), the value to the bank of keeping the firm alive might be lower for start-up firms.

D.3. Market Liquidity

As Williamson (1988), Shleifer and Vishny (1991), and Aghion et al. (1992) argue, the main problem with bankruptcy auctions are the inefficient liquidations that result from industry-specific assets being sold to outside, lower-value users. Moreover, Shleifer and Vishny (1992) show that such inefficiencies are exacerbated when the bankrupt firm's industry is also in financial distress. To capture this effect, we need to identify a set of market liquidity variables, $X_{p\Theta}$, proxying for the probability of having to sell the assets to an outside user, p, as well as the value of the assets to an outside user, Θ.

The value of the assets of a bankrupt firm to an outside user should depend on the degree to which the assets are firm and industry specific. Similar to Berger, Ofek, and Swary (1996) I classify the firm's assets into three groups depending on specificity: specific assets (machinery and equipment), nonspecific assets (current assets, land and commercial real estate), and intermediate assets (i.e., the rest of the firm's assets). I then include the fractions of specific and nonspecific assets as state variables determining liquidity. "Specific assets" is equal to the book value of machinery and equipment according to the financial statement closest to bankruptcy, normalized by total assets. "Nonspecific assets" is the sum of cash and marketable securities in bankruptcy and nonindustrial real estate (valued at book value from the financial statement preceding bankruptcy), divided by total assets. The total asset measure is equal to the total prebankruptcy book asset value minus prebankruptcy current assets plus in-bankruptcy current assets.

The probability of finding industry insider buyers should be lower when industry firms are financially constrained. I calculate the variable "Industry distress" as the fraction of the firms in the industry either having an interest coverage ratio less than one or going bankrupt within one year after the firm's date of bankruptcy. I use this definition rather than one measured using interest coverage ratio alone because firms that go bankrupt do not report any financial statements for the period immediately preceding bankruptcy.

The probability of finding an insider might also increase with the number of firms in the industry. Hence, I also include the number of corporations with more than 20 employees in the bankrupt firm's four-digit industry ("Number firms in ind").

D.4. Sale-back Bias

If the bank's private incentives are important for the bankruptcy outcome, the seniority structure of the firm's debt should affect the sale-back probability according to the model predictions. I now need to identify a set of state variables X_η capturing the bank's sale-back bias as a function of the firm's capital structure.

I calculate S, B, and J using detailed data on the firm's debt structure from the bankruptcy filing. Debt senior to the bank, S, is calculated as the sum of senior rent claims, debt secured by specific senior collateral, and floating charge and real-estate mortgage claims that are senior to the bank. Identifying the main bank is straightforward in most cases. In 33 cases, however, the bankrupt firm has liabilities to more than one bank. To identify the main bank, I require that the main bank holds a senior claim to the firm's operating assets (typically a floating charge), and not just real estate mortgages or junior unsecured debt. This eliminates 17 of the problematic firms. For the remaining 16 firms with more than one bank, I define the main bank as the bank with the largest debt claim.

The model predicts that the sale-back bias should depend on $q = S/(S + B)$, the proportion of senior to senior-plus-bank debt, and ψ/μ_l, the proportion of senior-plus-bank debt to the expected liquidation value. I include q in $X_{\eta,n}$, and predict a positive relation to the probability of liquidation, according to Corollary 1. Similarly, ψ/μ_l should be related to the liquidation probability in a nonlinear way. Because μ_l is unobservable and endogenous, however, ψ/μ_l cannot be used as a state variable in the estimation. To get around this problem, I use additional information from the bankruptcy filing. In every bankruptcy, the first task of the trustee, before starting to sell the firm's assets, is to provide a market valuation of the firm's assets. Using this estimated value, μ_l^{est}, as a proxy for μ_l, I calculate the variable ψ/μ_l^{est}, the proportion of senior plus bank to the administrator's estimated liquidation value at the beginning of bankruptcy. I then include ψ/μ_l^{est} and $\psi/\mu_l^{est} * I$ in $X_{\eta,n}$, where I is a dummy variable indicating that $\psi/\mu_l^{est} > 1$. Corollary 1 predicts that the liquidation probability should be negatively related to ψ/μ_l^{est}

and positively related to $\psi/\mu_l^{est} * I$. Moreover, to ensure that the liquidation probability is actually increasing in the region where $\psi/\mu_l^{est} > 1$, the coefficient on ψ/μ_l^{est} should be larger than the absolute value of the coefficient on $\psi/\mu_l^{est} * I$.

In six of the sample observations, the firm had no bank debt outstanding in bankruptcy. In the absence of an existing bank, the owner-manager will have to rely on outside financing in a sale-back. As mentioned earlier, an outside financier will only agree to finance a sale-back bid if $\mu_m > P = \mu_l$, and there is no longer an existing bank willing to finance if $\mu_m < \mu_l$. As a result, there should be no sale-back bias ($\eta \equiv 0$) and the sale-back choice should not depend on the bankrupt firm's existing capital structure. I therefore let $q = \psi/\mu_l^{est} = 0$ for these observations.

One potential concern is that the trustee might have an incentive to bias the estimated liquidation values μ_l^{est} downwards, for example, to look better ex post. The median ratio of liquidation values to trustee estimates in my sample is 1.037, indicating a small bias. Because the estimated liquidation values enter in a nonlinear way, however, the presence of such a bias might decrease the explanatory power of the regressions, but is unlikely to give rise to any spurious relationships.

D.5. Robustness

I also analyze the robustness of some of the key model assumptions that might be violated in the data.

In the theoretical model, one central assumption is that all creditors except the main bank are completely passive. As mentioned above, a few of the firms in the sample owe debt to a second bank. When this bank is junior to the main bank, it has an incentive to stop inefficient sale-backs to the incumbent manager, hence increasing the probability of a liquidation. To examine whether the presence of a second, junior bank affects the result, I include a dummy variable, "Secondary junior bank," taking a value of one if the firm owes debt to a secondary bank that is junior to its main bank. In my definition of banks, I exclude mortgage banks and mortgage bank subsidiaries of commercial banks.

Also, the owner-manager is assumed to have no private wealth in the model. If the manager has some wealth, she would be willing to offer to pay the bank out of her own pocket to help finance a sale-back, decreasing the probability of liquidation. In Sweden, information on the taxable wealth of the manager is publicly available from the tax authorities and reported in the UC data. During the sample period, personal wealth was taxable if it exceeded SEK 400,000 (approximately \$55,000).[24] I form a dummy variable,

[24] Taxable wealth is calculated according to a formula, where different classes of assets are valued differently. For example, shares in private nontraded companies are valued very conservatively (to the nominal par value of the shares).

"Manager wealthy," which takes a value of one if the taxable wealth of the manager was larger than this threshold value, and zero otherwise. Possibly, this variable could also be correlated with manager quality.

Finally, there might be reason to believe that the trustee can be biased towards keeping the firm alive because of employment concerns. Also, the wage guarantee act might be introducing further bias towards continuation. If this is the case, the larger the number of employees of the firm, the more likely a sale-back should be. Hence, I also examine if the results are robust to including the number of employees of the firm at the beginning of bankruptcy ("Employees").

E. Choice of State Variables Determining the Liquidation Outcome

One model implication is that the incentive to finance a sale-back should depend on the expected liquidation value, which in turn should depend on the liquidity of the firm's assets. To shed more light on this issue, I also examine the liquidation outcomes in more detail in the empirical tests. In particular, if industry distress and asset specificity truly proxy for illiquid asset markets, these variables should also affect the probability of finding a new industry buyer as well as the difference in liquidation values when assets are sold to industry insider versus outsider buyers.

In the previous subsection, state variables determining the probability of an outsider sale (p) and the loss in value from an outsider sale (Θ) were specified. To analyze the liquidation outcome, I also need to classify liquidations as sales to an industry insider versus an industry outsider (i.e., the dummy variable $\tilde{I}_n$) and specify variables controlling for the fundamental value of the assets (V).

E.1. Classification of Insider and Outsider Sales

The classification of industry insider and outsider liquidation sales is not entirely obvious. I classify as insider sales (1) cases where the assets were sold as a going concern to competitors or other firms in the same three-digit industry as the bankrupt firm (27 cases), and (2) cases when the assets are sold as a going concern to members of management (other than the owner) or to employees (13 cases). In the group of outsider sales I include (1) all other going-concern sales (32 cases), and (2) all piecemeal liquidations (54 cases). The outsider going-concern sales include two cases where the firm was bought by a venture capital company, four cases where the buyer was one of the firm's suppliers, eight cases where the firm was bought by another firm (or individual) outside of the three-digit industry, and 10 cases where the industry identity of the buyer was unknown.

The classification of piecemeal liquidations as outsider sales is admittedly somewhat arbitrary. The problem is that, for these bankruptcies, the identity of the buyer (or buyers, as is most often the case) is unknown. To check the robustness of this assumption I exclude the piecemeal liquidations in one of the specifications.

E.2. Determinants of the Fundamental Value

To isolate the impact of market liquidity on liquidation values, it is important to control for the fundamental value of the firm, V, defined as the value of the assets to a typical industry buyer. Unfortunately, properly modeling the fundamental value is a formidable task. One important advantage of looking at the liquidation/sale-back choice is that this choice should be unaffected by the fundamental value, at least as long as the model is correct. In contrast, the regressions on liquidation value are vulnerable to misspecification of V.

Theoretically, the fundamental value of the firm's operations should be equal to the expected future cash flows generated by the assets, discounted at an appropriate discount rate. I let the fundamental value be a function of the two-year average prebankruptcy industry gross margin ("Industry profitability") and the instantaneous change in industry gross margins during the six-month period when the bankruptcy occurs ("Change industry profitability"). I measure industry profits as industry median gross margin (earnings before interest, depreciation, and taxes divided by sales).

To account for industry-specific discount rates and other industry heterogeneity, I also let the fundamental value be a function of industry dummies for the six main industry groups (construction, hotels and restaurants, manufacturing, services, trade, and transports).

I also allow for the possibility that the value of the assets has deteriorated due to indirect costs of financial distress. I let the fundamental value be a function of the variable "Prebankruptcy distress," equal to the number of months between the onset of financial distress and the time the firm enters bankruptcy. As the date of onset of financial distress, I use the bankruptcy trustee's estimate of the date when the firm became insolvent for the 174 cases where it is available. In the remaining 31 cases, I measure the onset of distress as the date of the last financial statement when the firm had an interest coverage ratio above one.

IV. Results

This section outlines the empirical results from estimating the sale-back decision and the liquidation outcome.

A. Descriptive Statistics

Table IV displays means and medians for the variables used in the estimation. Statistics are provided for the full sample as well as for the sale-backs, insider liquidations, and outsider liquidations separately.

The next to last column shows Z-values from a Mann-Whitney test of difference in medians between the sale-backs and the liquidations (both insider and outsider sales). Only a few of the variables are statistically significantly different using this univariate test, although the signs of the differences are consistent with the model. The subsample of firms that were sold back include firms with a significantly higher fraction of industry firms in distress, a smaller fraction of nonspecific assets, and a smaller presence of secondary junior banks. One striking observation from the table is the high proportion of distressed companies in the bankrupt firms' industries, almost 30 percent. This is probably indicative of the rather unusual market conditions during the sample period.

The last column tests for differences between the two types of liquidations, asset sales to buyers inside the industry versus outside buyers. Insider liquidations have significantly higher liquidation values, higher industry profitability, lower firm profitability relative to the industry, lower industry distress, higher fraction of nonspecific assets, and less non-junior debt relative to expected liquidation value (probably a result of their higher expected liquidation values).

B. Analysis of the Sale-Back Decision

This subsection presents the results from estimating the sale-back condition given by equation (12). As described in Appendix B, given some separability assumptions the sale-back condition will be linear in the state variables and can be estimated in a standard probit. The estimated probit coefficients for seven different specifications are displayed in Table V.

Model 1 shows the results from estimating the basic specification of the model. Most of the theoretical predictions are confirmed in the data. The liquidation probability decreases in the state variables for managerial quality. Firm profitability, capturing the prebankruptcy firm profits relative to the industry, is shown to increase the probability of a sale-back and is significant at the 5 percent level. The liquidation probability is also significantly higher for the cases when the bank forced the firm into bankruptcy. This is indicative of the important role the bank is playing in providing prebankruptcy monitoring of the firm. Start-up firms are significantly more likely to be sold back to their owner-entrepreneurs. This is consistent with the entrepreneur being more crucial to the operations at the early stages of the firm's life.

The results also support the importance of market liquidity in determining whether a sale-back will take place. In particular, the liquidation probability is shown to decrease significantly with industry distress. This result yields support for the Shleifer and Vishny (1992) argument that industry indebtedness decreases asset market liquidity. Also, consistent with this finding, the probability of liquidation increases with the proportion of nonspecific assets of the bankrupt firm (significant at the 10 percent level). The proportion of specific assets also shows a negative relation with the probability of liquidation, although the effect is statistically very weak. Possible explanations for this are that specific assets are inappropriately defined, or that most of the effect is picked up by the Nonspecific assets variable. Likewise, the number of firms in the industry does not add any explanatory

Table IV

Summary Statistics for Variables Used in the Estimation

This table provides descriptive statistics for the variables used in the estimation, using a sample of 205 Swedish bankruptcies occurring between 1988 and 1991. Liquidation/Sale-back value is the gross proceeds paid out to all claimants in the bankruptcy. Firm size is book value of fixed assets plus book inventory and accounts receivable plus beginning-of-bankruptcy liquid assets. Industry profitability is industry median gross margin, averaged over the three years preceding bankruptcy. Change industry profitability is the contemporaneous change in industry median gross margin during the year of bankruptcy. Firm profitability is prebankruptcy firm gross margin minus industry median gross margin, truncated at −0.5 and +0.5. Prebankruptcy distress is the number of months between onset of financial distress and bankruptcy. Bank-initiated filing is a dummy taking the value of one if the bank forced the firm into bankruptcy by canceling funding or filing for bankruptcy. Start-up is a dummy taking the value of one if the firm was less than two years old at the time of filing. Industry distress is the fraction of firms in the industry that either had an interest coverage ratio less than one or filed for bankruptcy within one year of the sample firm's bankruptcy date. Specific assets is book value of machinery and equipment divided by firm size. Nonspecific assets is the sum of beginning-of-bankruptcy liquid assets and book value of nonindustrial real estate divided by firm size. Number of firms in industry is the number of corporations with more than 20 employees in the bankrupt firm's four-digit industry. $(S + B)/\mu_l^{est}$ is the value of senior plus bank debt divided by the trustee's estimated liquidation value. $S/(S + B)$ is senior debt divided by the sum of senior and bank debt. Manager wealthy is a dummy variable taking the value of one if the firm's manager had taxable wealth above 0.4 MSEK the year of bankruptcy. Secondary junior bank is a dummy variable taking the value of one if the firm owes money to another bank junior to the main bank. Employees is the number of employees at the time of filing. The next to last column displays Z-values for a Mann-Whitney test for difference in distribution between the sale-back (SB) and liquidation (IL + OL) subsamples, and the last column displays similar results testing differences between the insider liquidation (IL) and outsider liquidation (OL) subsamples. Details on how to calculate this test statistic can be found in DeGroot (1986). All values are in million Swedish Kronor (SEK), deflated to 1991 prices. During the sample period, 7 SEK ≈ $1.

	Full Sample		Sale-backs (SB)		Insider Liquidations (IL)		Outsider Liquidations (OL)		SB vs. IL+OL	IL vs. OL
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	*Z*-value	*Z*-value
ln(Liquidation/Sale-back value)	14.94	15.03	14.90	14.98	15.42	15.38	14.76	14.88	−0.51	2.53**
State variables determining fundamental value, V										
ln(Firm size)	15.89	15.87	15.85	15.88	16.11	15.98	15.82	15.79	−0.27	0.98
Industry profitability	5.25	5.00	4.88	4.56	6.75	5.50	4.89	4.50	−0.94	2.07**
Change industry profitability	−0.22	0.00	−0.19	0.00	−0.20	0.00	−0.26	0.00	−0.37	−1.11
Prebankruptcy distress	6.19	4.00	6.16	4.00	5.12	3.50	6.71	5.00	−0.13	−1.14
State variables determining manager quality, Q										
Firm profitability	−3.62	−2.85	−1.46	−2.16	−7.34	−5.38	−3.88	−2.72	1.58	−1.68*
Bank-initiated filing	0.10	0.00	0.06	0.00	0.15	0.00	0.12	0.00	−1.46	0.52
Start-up	0.10	0.00	0.14	0.00	0.05	0.00	0.08	0.00	1.58	−0.63
State variables determining asset market liquidity, p, Θ										
Industry distress	0.291	0.28	0.31	0.30	0.24	0.23	0.30	0.27	1.89*	−1.95*
Specific assets	0.184	0.13	0.20	0.15	0.15	0.13	0.18	0.12	0.87	−0.43
Nonspecific assets	0.024	0.07	0.01	0.00	0.05	0.02	0.02	0.01	−2.46**	2.54**
Number of firms in industry	319.3	309.0	328.5	310.0	274.3	268.0	331.7	310.0	−0.55	−1.21
State variables determining sale-back bias, η										
$(S+B)/\mu_l^{est}$	1.72	1.19	1.55	1.04	1.32	1.10	2.06	1.38	−1.65	−2.40**
$S/(S+B)$	0.12	0.05	0.09	0.03	0.17	0.08	0.13	0.05	−1.43	0.65
Robustness test variables										
Manager wealthy	0.21	0.00	0.26	0.00	0.15	0.00	0.20	0.00	1.41	−0.64
Employees	41.80	29.00	36.58	28.00	57.12	32.00	39.45	28.00	−0.40	1.19
Secondary junior bank	0.09	0.00	0.04	0.00	0.08	0.00	0.15	0.00	−2.13**	−1.19
Number of observations	205		79		40		86			

*, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively, using a Mann-Whitney U test.

Table V

Probit Estimation of the Probability of Liquidation

This table shows the results from probit regressions of the probability that a bankrupt firm is liquidated rather than sold back to its previous owner. The sample consists of 205 observations of Swedish cash auction bankruptcies occurring between 1988 and 1991. The dependent variable takes the value of one for the 126 liquidations and zero for the 79 sale-backs in the sample. The plus and minus signs next to the independent variables indicate signs predicted by the model. Firm profitability is prebankruptcy firm gross margin minus industry median gross margin, truncated at −0.5 and +0.5. Bank-initiated filing is a dummy taking the value of one if the bank forced the firm into bankruptcy by canceling funding or filing for bankruptcy. Start-up is a dummy taking the value of one if the firm was less than two years old at the time of filing. Industry distress is the fraction of firms in the industry that either had an interest coverage ratio less than one or filed for bankruptcy within one year of the sample firm's bankruptcy date. Specific assets is book value of machinery and equipment divided by firm size. Nonspecific assets is the sum of beginning-of-bankruptcy liquid assets and book value of nonindustrial real estate divided by firm size. Number of firms in industry is the number of corporations with more than 20 employees in the bankrupt firm's four-digit industry. $((S+B)/\mu_l^{est}-1)| \leq 1$ is the value of senior plus bank debt divided by the trustee's estimated liquidation value if less than one, and zero otherwise. $((S+B)/\mu_l^{est}-1)| \geq 1$ is the value of senior plus bank debt divided by the trustee's estimated liquidation value if greater than one, and zero otherwise. $S/(S+B)$ is senior debt divided by the sum of senior and bank debt. Manager wealthy is a dummy variable taking the value of one if the firm's manager had taxable wealth above 0.4 MSEK the year of bankruptcy. Secondary junior bank is a dummy variable taking the value of one if the firm has loans from another bank which is junior to the main bank. Employees is the number of employees at the time of filing. Pseudo-R^2 is calculated as one minus {model log-likelihood divided by the log-likelihood when all slope coefficients are equal to zero}. Goodness of fit χ^2 is the χ^2-statistic for a test of the null hypothesis that all slope coefficients are equal to zero. For some specifications, the table also displays the results from likelihood ratio test of the particular model specification versus the specification in Model 2.

Panel A: Basic Model Specifications

	Model 1		Model 2		Model 3		Model 4	
Variable	Coef.	*t*-value	Coef.	*t*-value	Coef.	*t*-value	Coef.	*t*-value
Constant	0.577	1.57	0.463	1.48	0.430	1.65		
Q state variables								
Firm profitability (−)	−0.022	−2.14**	−0.022	−2.11**	−0.019	−2.03**	−0.021	−1.92*
Bank-initiated filing (+)	0.619	1.83*	0.610	1.81*	0.570	1.69*	0.586	1.69*
Start-up (?)	−0.631	−1.98**	−0.620	−1.95*	−0.554	−1.79*	−0.615	−1.91*
p, Θ state variables								
Industry distress (−)	−1.876	−2.17**	−1.899	−2.29**	−1.524	−1.95*	−2.999	−2.54**
Specific assets (−)	−0.429	−0.81						
Nonspecific assets (+)	6.229	2.07**	6.351	2.12**	4.797	1.85*	6.312	1.94**
Number firms in industry (+)	−0.000	−0.51						

η state variables								
$S/(S+B)$ (+)	1.527	2.53**	1.516	2.51**	1.308	2.27**	1.646	2.61**
$(S+B)/\mu_l^{est}$	−0.526	−1.47	−0.588	−1.67*			−0.641	−1.75*
$(S+B)/\mu_l^{est} * I(>1)$ (+)	0.645	2.05**	0.697	2.25**			0.715	2.21**
Industry and time dummies								
Manufacturing							0.642	1.26
Construction							0.331	0.49
Transportation							0.818	1.43
Hotels and restaurants							1.406	1.87*
Trade and retail							0.833	1.52
Services							0.572	1.10
July 1988–June 1989							0.006	0.01
July 1989–June 1990							0.354	0.96
July 1990–June 1991							0.173	0.73
LR tests vs. Model 2					$\chi^2 = 12.6$	$p < 0.005$	$\chi^2 = 7.8$	$p < 0.5$
Pseudo-R^2	0.141		0.138		0.091		0.166	
Goodness-of-fit χ^2	38.59		37.67		25.03		45.48	

Panel B: Robustness Tests

	Model 5		Model 6		Model 7	
Variable	Coef.	t-value	Coef.	t-value	Coef.	t-value
Constant	0.47763	1.52	0.36930	1.12	0.47844	1.50
Q state variables						
Firm profitability (−)	−0.02176	−2.13**	−0.02151	−2.11**	−0.02208	−2.16**
Bank-initiated filing (+)	0.64233	1.89*	0.62142	1.82*	0.61762	1.80*
Start-up (?)	−0.63756	−1.99**	−0.64539	−2.03**	−0.69197	−2.14**
p, Θ state variables						
Industry distress (−)	−1.86449	−2.25**	−1.91985	−2.33**	−1.99802	−2.40**
Nonspecific assets (+)	6.23947	2.07**	6.10545	2.10**	6.15821	2.13**
η state variables						
$S/(S+B)$ (+)	1.63655	2.66*	1.49653	2.45**	1.48756	2.38**
$(S+B)/\mu_l^{est}$ (−)	−0.51833	−1.45	−0.59939	−1.71*	−0.57752	−1.64
$(S+B)/\mu_l^{est} * I(>1)$ (+)	0.63620	2.02**	0.71390	2.32**	0.66435	2.15**
Robustness checks						
Manager wealthy (−)	−0.31253	−1.32				
Employees (−)			0.00267	1.04		
Secondary junior bank (+)					0.73342	1.85*
Pseudo-R^2	0.144		0.142		0.152	
Goodness-of-fit χ^2	39.41		38.86		41.48	

* and ** denote significance at the 10 and 5 percent levels, respectively.

power. Hence, I drop these two latter variables from further specifications (Model 2 and onwards), which does not change the magnitude or statistical significance of the other variables in any major way.

Finally, the estimates document that even under a cash auction bankruptcy code, the structure of the financial claims affect the bankruptcy outcome in a significant way. The more senior the bank debt is relative to other creditors, the more likely it is that a sale-back takes place. The variable $q = S/(S + B)$ has the predicted positive sign and is consistently significant at least at the 5 percent level. Moreover, the predicted nonlinear relationship with the amount of non-junior debt ($\psi = B + S$) relative to expected liquidation value also is confirmed in the data. In the region where the bank debt is likely to be paid off in full in a liquidation (i.e., when $\psi/\mu_l^{est} < 1$), the liquidation probability is decreasing as ψ increases. The opposite relationship holds in the region when the liquidation value is too low for the bank to expect to be fully covered in a liquidation (i.e., when $\psi/\mu_l^{est} > 1$). The relationship is statistically the strongest in the region where $\psi/\mu_l^{est} > 1$ (5 percent level significance), whereas it is only marginally negatively significant in the region where $\psi/\mu_l^{est} < 1$ (10 percent level of significance for most specifications). On the other hand, as can be seen from Model 3, dropping both of these variables dramatically decreases the explanatory power of the regression. A likelihood ratio (LR) test of the joint hypotheses of $(S + B)/\mu_l^{est}$ and $(S + B)/\mu_l^{est} * I(> 1)$ both having zero coefficients is strongly rejected.

Model 4 investigates the robustness of these results with respect to industry and time heterogeneity. I do this by including six dummy variables for each of the main industry groups and three yearly time dummies. Neither set of dummy variables seems to add any explanatory power to the model. LR tests cannot reject the null hypothesis that the dummy variables all have the same coefficients.[25] Adding industry and time dummies increases the estimated impact and significance of industry distress considerably, however.

Finally, Panel B addresses the robustness of the results to some central model assumptions. First, the number of employees of the firm is positive and insignificant. Hence, there is no indication that employment concerns bias the bankruptcy outcome towards sale-backs.[26] Second, the managerial wealth variable is negative, consistent with wealthier managers increasing the probability that a sale-back takes place. The coefficient is not statistically significant, however. Third, and most interestingly, the junior bank dummy is positive and significant at the 10 percent level. This indicates that the assumption of passive debtholders is not valid when another bank

[25] Model 4 tests the joint significance of both the industry and the time dummies. I have also run specifications including only time or only industry dummies. The results are very similar and the dummies are jointly insignificant in both specifications.

[26] Using alternative variables, such as the number of employees divided by sales or assets or a dummy whether the wage guarantee was used, yields the same results.

is present. The presence of a second, junior bank increases the probability of liquidation, presumably because of the incentives of such a bank to block inefficient sale-backs.

C. Analysis of the Liquidation Outcomes

So far, the empirical results have shown that (1) the liquidation probability depends on the capital structure in a way consistent with the bank's incentives biasing the outcome, and (2) liquidations occur less often when the risk of fire sales is high, that is, when the industry is more distressed and the fraction of nonspecific assets is low. To shed more light on the second result, I now examine the liquidations in more detail. In particular, if industry distress and asset specificity truly proxy for illiquid asset markets, these variables should also affect the probability of finding an alternative industry buyer as well as the realized liquidation values.

In Appendix B it is shown that the analysis of the liquidation outcome reduces to two estimation steps. I first estimate β_p using a simple probit. I then estimate β'_V and β'_Θ in a linear instrumental variables regression, using the fitted value $\hat{\beta}'_p X_{pn}$ as an instrument for the outsider sale dummy ($\tilde{I}_n$), because this dummy is endogenous. Because liquidations are only observed when sale-backs are not chosen, both of these regressions suffer from possible truncation bias. To correct for this, I use the coefficients from the sale-back estimation to construct Mill's ratios that I include in both the probit and in the IV regressions, similar to a standard Heckman (1979) procedure.

C.1. The Probability of an Outsider Sale

According to the model, the probability of a liquidation sale to a party outside of the industry should depend on how hard it is to find an industry insider willing to bid for the assets. This should in turn depend on whether the industry firms are financially constrained.

Table VI displays the results from estimating the determinants of outsider liquidation sales. Among the proxies for asset market liquidity, industry distress shows up most strongly in the data. When the industry is more distressed, the likelihood of having to sell the assets to someone outside of the firm's industry is significantly higher. This is consistent with the Shleifer and Vishny (1992) argument that in an industry downturn, when the industry firms are more financially constrained, the likelihood of a fire sale to an outsider is higher. Similar to the sale-back estimation, the number of firms in the industry is not significant, however.

Although theoretically the degree of asset specificity should affect the liquidation *value* to an outsider, it is less obvious that it should affect the *probability* of finding an industry insider. Interestingly, the amount of nonspecific assets actually decreases the probability of an outsider liquidation, although the relationship is not statistically very strong when truncation bias is accounted for. One possible explanation for this negative coefficient is that nonspecific assets, such as real estate or marketable securities, can be

Table VI

Probit Estimation of the Probability of a Liquidation Sale to an Industry Outsider

This table shows the results from probit estimations of the probability that a liquidation of bankrupt firm results in a sale of the assets to a buyer outside the firm's industry. The analysis is performed for five different specifications, Model I through Model V. The sample consists of 126 observations of Swedish cash auction bankruptcies occurring between 1988 and 1991, where the assets were liquidated rather than sold back to the previous owner. The dependent variable takes the value of zero for the 40 sales to buyers inside the industry and the value of one for the 86 sales to buyers outside the industry in the sample. Model V excludes 54 observations where the firm's operations were liquidated piecemeal rather than sold as a going concern. The plus and minus signs next to the independent variables indicate signs predicted by the model. Industry distress is the fraction of firms in the industry that either had an interest coverage ratio less than one or filed for bankruptcy within one year of the sample firm's bankruptcy date. Specific assets is book value of machinery and equipment divided by firm size. Nonspecific assets is the sum of beginning-of-bankruptcy liquid assets and book value of nonindustrial real estate divided by firm size. Number of firms in industry is the number of corporations with more than 20 employees in the bankrupt firm's four-digit industry. Inverse Mill's ratio is calculated as $[\phi(\hat{\gamma}'Z_n)]/[\mathbf{\Phi}(\hat{\gamma}'Z_n)]$, where Z_n is the vector of independent variables for firm n in the corresponding model of the liquidation probability (Model 1 and Model 7, from Table V) and $\hat{\gamma}$ is the corresponding vector of estimated coefficients from that model, $\phi(\cdot)$ is the standard normal density function, and $\Phi(\cdot)$ is the standard normal cumulative distribution function. The t-statistics for the specifications where the Mill's ratio is included are boostrap standard errors, taking into account the additional estimation error from the truncation adjustment. Pseudo-R^2 is calculated as one minus {model log-likelihood divided by the log-likelihood when all slope coefficients are equal to zero}. Goodness of fit χ^2 is the χ^2-statistic for a test of the null hypothesis that all slope coefficients are equal to zero.

	Model I		Model II		Model III		Model IV		Model V—Piecemeal Liquidations Excluded	
	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
Constant	−0.834	−1.56	−0.429	−0.97	−0.127	−0.41			−1.478	−2.42**
p state variables										
Industry distress (+)	2.803	2.20**	2.506	2.20**	2.797	2.56**	2.743	2.26**	3.489	2.26**
Specific assets (?)	0.440	0.59								
Nonspecific assets (?)	−2.719	−1.24	−2.937	−1.50	−4.450	−2.22**	−2.978	−1.57	−6.919	−1.95*
Number firms in industry (+)	0.001	1.37								
Time dummy variables										
July 1988–June 1989							−0.497	−0.67		
July 1989–June 1990							−0.455	−0.91		
July 1990–June 1991							−0.282	−0.43		
July 1991–December 1991							−0.940	−1.57		
Truncation adjustment										
Inverse Mill's ratio	−0.685	−0.80	−0.659	−1.00			−0.685	−0.96	−0.816	−1.10
Truncation model (from Table V):	Model 1		Model 7		—		Model 7		Model 7	
Number of observations	126		126		126		126		72	
Pseudo-R^2	0.100		0.080		0.069		0.111		0.169	
Goodness-of-fit χ^2	15.759		12.561		10.908		17.54		16.70	

* and ** denote significance at the 10 and 5 percent levels, respectively.

sold by the firm in bankruptcy to finance ongoing operations. This makes it easier to keep the firm's operations running for a longer period of time, during which the trustee can search for potential industry buyers. Similar to before, the fraction of specific assets is never statistically significant.

The Mill's ratio is not significant in any of the specifications, indicating that truncation bias might not be present. The results without the truncation adjustment are stronger, in particular for the nonspecific assets variable.

The fourth specification controls for macroeconomic shocks by including time dummies. The coefficient for industry distress hardly changes and is significant at the 5 percent level.

Given the potential problems with classifying piecemeal liquidations as outsider sales, the fifth specification examines the robustness of the results by only including going-concern sales. As seen from the table, results are very similar, or even stronger, when piecemeal liquidations are excluded.[27]

C.2. The Effect of Outsider Sales on Liquidation Values

The previous section showed that liquidations are more likely to result in sales to parties outside of the bankrupt firm's industry when more industry insider firms are financially distressed. The next question, however, is whether such sales to industry outsiders are truly to be considered fire sales that result in lower liquidation values. Table VII displays the results from the regressions determining realized liquidation values. The table shows the results using three different estimation methods: plain OLS estimates, IV estimates where the outsider sale dummy is instrumented using the estimates from the outsider sale regression, and IV estimates that are also corrected for possible truncation bias. The standard errors reported for the IV and truncation-adjusted IV estimates are bootstrap standard errors, valid for small samples. Qualitatively the results are similar, but estimates using both IV and correcting for truncation leads have very high standard errors. On the other hand, the fact that the Mill's ratio is insignificant both here and in the previous outsider sale regressions indicates that truncation bias is not a serious problem. I therefore focus mainly on the IV results without the truncation bias adjustment.

Beginning with the state variables determining the fundamental value, they all have the predicted signs. Firm size is strongly significant, which is not surprising given that the liquidation value is measured in absolute rather than relative terms. Of the industry profit variables, only the change in profits (Change industry profitability) is statistically significant for the IV and OLS specifications, whereas the absolute level of profits (Industry prof-

[27] One potential criticism of the results just discussed is that industry distress could proxy for low profitability rather than financial constraints. The positive correlation with outsider sales could then be that the industry is reducing excess capacity rather than fire sales due to asset illiquidity. The fact that the results still hold when piecemeal liquidations are excluded is one argument against this alternative explanation.

itability) is never significant. This is a bit troublesome, as we want to be sure that expected industry profits are adequately controlled for when interpreting the coefficients for the outsider sale variables. In other words, we want to be sure that a negative sign on the outsider sale variable is not simply due to the fact that such sales might happen when *fundamental* value is low. The coefficient for prebankruptcy distress is strongly significant both in the IV and OLS specifications. This is an indication that there exist significant indirect costs of financial distress for these firms. The earlier the firm resolves its financial distress by entering bankruptcy, the less the value of the firm is allowed to deteriorate.

Having controlled for the fundamental value of the assets, we can now turn to the effect of outsider liquidation sales. To capture this effect I include a dummy for outsider liquidations as well as an interaction between this dummy and the fraction of nonspecific assets. The coefficient for the outsider dummy is negative for all specifications, and the IV and OLS coefficients are statistically significant at the 10 percent level or higher. In addition, the interaction with nonspecific assets is significantly positive for these specifications. This supports the hypothesis that asset sales to industry outsiders actually yields lower values, and that this effect is strongest when assets are more specific, consistent with the Shleifer and Vishny (1992) argument.[28]

I also report estimation results where time dummies are included to control for macroeconomic shocks affecting liquidation values. The results are essentially unchanged.

D. Economic Significance of the Results

So far the results indicate that, conditional on liquidation, sales to industry outsiders are more likely when the industry is more distressed. Moreover, sales to outsiders yield lower liquidation values, especially when the bankrupt firm has fewer nonspecific assets. Together with the earlier finding that sale-backs are a more likely alternative to liquidation when industry distress is high and the amount of nonspecific assets are low, this supports the notion that bankruptcy sale-backs to incumbent management are used to avoid inefficient liquidations.

The next issue is whether the results are economically significant. Table VIII displays point estimates of the probability of an outsider sale conditional on liquidation, p, and the fire-sale discount for outsider sales, Θ, using the specifications from Model III (in Table VI) and Model A (in Table VII). The estimates of Θ differ quite substantially depending on estimation technique, and I display values using both IV and OLS coefficient estimates.[29]

[28] I have also run specifications including the fraction of nonspecific assets without interacting it with the outsider dummy. In these cases, the coefficient was not significant.

[29] I choose not to use the estimates with the truncation adjustment, because the null hypothesis of no truncation bias could not be rejected. The truncated IV estimates would have predicted even higher fire-sale costs, however.

Table VII

Estimation of the Liquidation Value

This table displays the results from regressions of fundamental value and liquidity state variables on the dependent variable log(Liquidation value) using the subsample of 126 bankruptcies that ended up in liquidation. Two different specifications are presented, Model A (without time dummies) and Model B (with time dummies). β^{IVt} refers to coefficient estimates from a combined Heckman (1979) and linear instrumental variables (IV) regression, where the dummy for outsider sale is instrumented using the estimated probability of an outsider sale using Model II (from Table V), and corrected for self-selectivity bias using the estimates from Model 7 (from Table VI). β^{IV} refers to coefficient estimates from an ordinary IV regression, where the dummy for outsider sale is instrumented using the estimated probability of an outsider sale using Model II. β^{ols} refers to coefficient estimates from a standard OLS regression. The plus and minus signs next to the independent variables indicate signs predicted by the model. Liquidation value is the gross proceeds paid out to all claimants in the bankruptcy. Firm size is book value of fixed assets plus book inventory and accounts receivable plus beginning-of-bankruptcy liquid assets. Industry profitability is industry median gross margin, averaged over the three years preceding bankruptcy. Change industry profitability is the contemporaneous change in industry median gross margin during the year of bankruptcy. Prebankruptcy distress is number of months between onset of financial distress and bankruptcy. Outsider is a dummy variable taking the value of one if the assets were sold to a buyer outside the bankrupt firms industry. Outsider * Nonspecific assets is the interaction between Outsider and the sum of beginning-of-bankruptcy liquid assets and book value of nonindustrial real estate divided by firm size. Inverse Mill's ratio is calculated as $[\phi(\hat{\gamma}'Z_n)]/[\Phi(\hat{\gamma}'Z_n)]$, where Z_n is the vector of independent variables for firm n in the Model 7 probit specification in Table V, $\hat{\gamma}$ is the corresponding vector of the estimated coefficients from that probit, $\phi(\cdot)$ is the standard normal density function, and $\Phi(\cdot)$ is the standard normal cumulative distribution function. The t-values for β^{IVt} and β^{IV} are calculated using bootstrapped standard errors corrected for the additional estimation error induced by the inverse Mill's ratio and the instrumental variables estimation.

Variable	Model A						Model B					
	β^{IVt}	t^{IVt}	β^{IV}	t^{IV}	β^{ols}	t^{ols}	β^{IVt}	t^{IVt}	β^{IV}	t^{IV}	β^{ols}	t^{ols}
V state variables												
Log of firm size (+)	0.70	2.34**	0.70	4.00***	0.73	10.16***	0.71	2.52**	0.72	3.60***	0.73	10.22***
Industry profitability (+)	0.00	0.39	0.01	0.42	0.03	1.02	0.01	0.43	0.01	0.42	0.02	0.79
Change industry profitability (+)	0.26	1.25	0.25	1.45	0.23	2.06**	0.27	1.42	0.26	1.53	0.24	2.12**
Time in distress (−)	−0.04	−1.48	−0.04	−1.92*	−0.04	−3.83***	−0.04	−1.63	−0.04	−2.06**	−0.04	−3.85***
Θ state variables												
Outsider (−)	−1.48	−1.18	−1.02	−1.73*	−0.52	−2.88***	−1.09	−1.18	−0.86	−1.65*	−0.52	−2.87***
Outsider * nonspecific assets (−)	8.55	1.44	7.19	2.26**	5.04	2.81***	7.55	1.61	6.93	2.41**	5.14	2.89***
Industry and time dummies												
Construction	4.96	1.65*	4.70	2.15**	3.96	3.40***	4.48	1.83*	4.41	2.33**	3.95	3.37***
Hotels and restaurants	5.01	1.73*	4.77	2.41**	4.05	3.59***	4.55	1.89*	4.49	2.34**	4.06	3.58***
Manufacturing	5.11	1.71*	4.86	1.98**	4.10	3.44***	4.62	1.83*	4.56	2.26**	4.08	3.42***
Services	4.40	1.76*	4.27	2.15**	3.67	3.18***	3.99	1.92*	3.98	2.15**	3.61	3.11***
Trade	4.60	1.73*	4.44	2.06**	3.78	3.15***	4.12	1.86*	4.10	2.02**	3.70	3.05***
Transports	4.59	1.67*	4.31	1.98**	3.58	3.06***	4.05	1.78*	3.96	2.06**	3.50	2.99***
July 88–June 89							0.25	0.70	0.21	0.70	0.15	0.48
July 89–June 90							0.35	1.03	0.32	1.08	0.28	1.15
July 90–June 91							−0.00	−0.09	−0.04	−0.00	−0.08	−0.41
Truncation adj.												
Inverse Mill's ratio	−0.32	−0.21					−0.17	−0.10				
IV model from Table VI	Model II		Model III		—		Model II		Model III		—	
Adjusted R^2	0.4715		0.4045		0.3743		0.3621		0.3621		0.3470	

*, **, and *** denote significance at the 10, 5, and 1 percent levels, respectively.

Table VIII

Expected Fire-sale Costs for Sale-backs and Liquidations

The table displays point estimates of expected fire-sale costs using fitted values obtained using the coefficient estimates from Model III (in Table VI) and Model A (in Table VII). The sample consists of 205 Swedish bankruptcies occurring between 1988 and 1991, out of which 79 are sale-backs and 126 are liquidations. $\hat{p}$ is the estimated probability of a liquidation resulting in a fire-sale to industry outsiders, and is calculated as $\hat{p} = \Phi(\hat{\beta}_p' X_{pn})$, where $\hat{\beta}_p'$ is the estimated coefficient vector from Model III in Table VI, X_{pn} is the corresponding vector of state-variables from that regression model, and $\Phi(\cdot)$ is the standard normal cumulative distribution function. $\hat{\Theta}^{IV}$ and $\hat{\Theta}^{ols}$ are estimates of the fraction of the asset value lost when the assets are sold to industry outsiders rather than industry insiders in a liquidation, using IV and OLS estimates, respectively, from Model A in Table VII. In particular $\hat{\Theta}^{IV} = \exp(\hat{\beta}_\Theta^{IV\prime} X_{\Theta n})$ and $\hat{\Theta}^{ols} = \exp(\hat{\beta}_\Theta^{ols\prime} X_{\Theta n})$, where $\hat{\beta}_\Theta^{IV}$ and $\hat{\beta}_\Theta^{ols}$ are the estimated regression coefficients from Model A in Table VII, and $X_{\Theta n}$ is the corresponding vector of independent variables from those regressions.

Variable	All Bankruptcies	Sale-backs	Liquidations
Number of observations	205	79	126
$\hat{p}$	0.7049	0.7403	0.6827
$\hat{\Theta}^{IV}$	0.5222	0.5970	0.4753
$\hat{p} * \hat{\Theta}^{IV}$	0.3950	0.4474	0.3621
$\hat{\Theta}^{ols}$	0.2996	0.3617	0.2607
$\hat{p} * \hat{\Theta}^{ols}$	0.2330	0.2730	0.2079

The probability of a liquidation resulting in an outsider sale (p) is on average 70 percent, but is 6 percent higher for the subsample that was actually sold back to incumbent management compared to the liquidations (74 percent vs. 68 percent). This is due to the fact that the sale-backs involved firms that were, on average, from more distressed industries and had fewer nonspecific assets.

The percentage loss in value from having to sell to an industry outsider (Θ) for the average bankruptcy ranges from 29 percent for the OLS estimates to 52 percent for the IV estimates. Even if we believe the lower range of the OLS estimates, these losses seem highly economically significant. Since the firms that were actually sold back rather than liquidated have fewer nonspecific assets, the difference in value between an industry insider and an outsider is even higher for these firms (36–60 percent) than for the ones that were liquidated (26–48 percent).

Combining the estimates of the probability and the cost of a fire sale we obtain estimated expected fire sale liquidation costs ($p * \Theta$) for the sample, conditional on a liquidation. Depending on the estimation technique, the expected liquidation costs range from 23 to 39 percent of firm value for the overall sample.[30] The expected liquidation costs are approximately 7–8 per-

[30] Interestingly, these estimates are comparable with Alderson and Betker's (1995) point estimate of 34.7 percent for a sample of large U.S. Chapter 11 bankruptcies.

cent higher for the sale-backs compared to the liquidations. This is a measure of the efficiency gain from being able to avoid fire-sale liquidations by selling the firm back to the incumbent owner-manager.

It should be emphasized, however, that the cost estimates are highly reliant on the assumption that the fundamental value of the assets has been properly modeled. For example, to the extent that expected future industry profits have not been properly controlled for, the loss in value from having to sell to an industry outsider might be overstated.

V. Conclusion

In this study I present evidence on the bankruptcy resolution in a cash auction code. A sale of the assets back to incumbent management is shown to be relatively more likely when the bank benefits more from a sale-back than a liquidation at the expense of other creditors. Also, the indebtedness of the firm's industry and the degree to which assets are specific (1) increase the probability of a sale-back and (2) decrease the expected liquidation value conditional on liquidation, along the lines of Shleifer and Vishny (1992). The main implication for bankruptcy law design is that many of the proposed advantages and disadvantages of reorganization procedures are shared with real-world cash auctions as well. In fact, when cash auction codes are implemented in practice, they bear a much closer resemblance to reorganization procedures than to the bankruptcy auction envisioned by Baird (1986) and others. Even in cash auctions, fire-sale liquidations are frequently avoided in a sale-back procedure that is very similar to the kind of debt restructuring that takes place in Chapter 11. Moreover, cash auctions do not guarantee a separation between distribution and investment decisions either. Conflicts of interest between the bank and the other creditors of the firm can lead to inefficient continuation decisions being taken about the firms operations. Finally, whenever a sale-back transaction occurs, there will, in principle, be a deviation from absolute priority, even though the APR is upheld in a formal sense, because the bank and the owner-manager often share some going-concern surplus of the continued firm at the expense of the junior creditors.

Hence, the crucial finding of this study is that, even when the law looks like a textbook cash auction procedure, the practical implementation ends up looking more like a reorganization procedure. Still, two important differences remain. First, a formal reorganization code contains provisions such as debtor-in-possession financing, allowing the firm to keep operating longer in bankruptcy. This might decrease the costs of delaying the bankruptcy resolution, which will facilitate the ability of alternative bidders to participate in the auction. In terms of the present model, the relative riskiness of a "liquidation" (i.e., searching for alternative buyers) will be lower, which will encourage the bank to take more efficient decisions. Second, in a cash auction, the negotiations between the claimants take place outside of the realms of the bankruptcy law, which leaves some parties (such as the junior creditors) without much power to affect the bankruptcy outcome. In a reorganization code, on the other hand, the bargaining is subject to rules dictated by the law, which will alter the bargaining power between the claimants. In Chapter 11, the required approval of each class of claimants to implement a reorganization plan might increase the bargaining power of junior creditors relative to a cash auction code. Whether or not imposing such alterations of the bargaining power between the claimants in bankruptcy is desirable (as is argued in, e.g., Berkovitch, Israel, and Zender (1998)) is a question left for future research.

Appendix A: The Strömberg and Thorburn Data Set

Using the database of Upplysningscentralen AB (UC), which contains the entire population of firms and individuals in Sweden, Strömberg and Thorburn (1996) identified all corporations registered in the Swedish corporation directory of Patent och Registreringsverket (PRV) on December 31, 1991, including any pending bankruptcy cases. From these corporations they selected all corporations with over 20 employees during at least one of the years 1988 through 1991. In total, some 16,000 firms were selected. For a subset of firms filing for bankruptcy, information was collected manually from the individual bankruptcy files kept by the supervisory authority, Tillsynsmyndigheten i Konkurs (TSM), in each county. The subset resulting from identifying all firms among the selected corporations that filed for bankruptcy during 1988 through 1991 totals 1,153 firms. These firms represent 93 percent of the corporations with more than 20 employees that filed for bankruptcy in Sweden during that period. The sample was then narrowed down by some additional criteria. First, as a geographical screen, firms were removed that were not located in one of the four largest of the 24 counties: Stockholm's län, Göteborg/Bohus' län, Malmöhus' län and Uppland's län. This resulted in 577 remaining firms. Second, the bankruptcy case had to be closed before June 30, 1995, excluding 145 of the firms. Third, if the firm lacked ongoing operations at the time of the bankruptcy filing, the firm was required to be in financial distress before the operations were closed down. This criterion eliminated 59 "shell corporations" (skalbolag), whose operations had been sold as a going concern before entering bankruptcy as part of a tax-planning transaction. Finally, another 110 corporations were excluded (1) that had been transferred to TSM in another county, (2) for which the bankruptcy file was not accessible or the information incomplete, or (3) that lacked ongoing operations within 18 months prior to the bankruptcy filing. Altogether, these criteria resulted in a sample of 263 corporations, of which 9 firms filed for bankruptcy in 1988, 27 in 1989, 71 in 1990, and 155 in 1991.

Appendix B: Estimation Procedure

This appendix outlines the estimation procedure and the parametric specification of the model.

Parametric Specification of the Sale-Back Condition

To test the model, the sale-back condition has to be taken to the data. The main problem in doing this is that the right hand side of this condition,

$$\begin{aligned}\Gamma(B,S,p,\Theta,V,\tilde{I}) \\ &= (1-p\Theta)V + E[\max(\min(B,(1-\Theta)^{\tilde{I}}V - S),0)] \\ &\quad - \max(\min(B,(1-p\Theta)V - S),0),\end{aligned} \tag{B1}$$

is a complex nonlinear expression that does not have continuous first partial derivatives. This relationship is too intractable to use explicitly in the estimation. Because of this, I assume that $\Gamma(B,S,p,\Theta,V,\tilde{I})$ is separable in the expected liquidation value so that I can rewrite the expression as $\Gamma(B,S,p,\Theta,V,\tilde{I}) = \eta(\mathbf{X}_\eta,\boldsymbol{\beta}_\eta)(1-p\Theta)V$. I let $\eta(\mathbf{X}_\eta,\boldsymbol{\beta}_\eta)$ be some tractable function of a vector of state variables $\mathbf{X}_\eta$, including the capital structure variables $q = S/(S+B)$ and $\psi = S+B$, and a coefficient vector $\boldsymbol{\beta}_\eta$ to be estimated. I can then examine whether the estimated relationship with respect to the parameters q and ψ are consistent with the empirical predictions in Corollary 1.

The sale-back condition can now be rewritten as

$$QV > \eta(\mathbf{X}_\eta,\boldsymbol{\beta}_\eta)(1-p\Theta)V, \tag{B2}$$

or

$$\ln Q > \ln \eta(\mathbf{X}_\eta,\boldsymbol{\beta}_\eta) + \ln(1-p\Theta). \tag{B3}$$

If p and Θ are small, this will be approximately equal to $\ln Q > \ln \eta(\mathbf{X}_\eta,\boldsymbol{\beta}_\eta) - p\Theta$. Next, I specify the functional forms for $\ln Q$, $\ln \eta$, p, and Θ in the following manner:

$$p\Theta = -\boldsymbol{\beta}'_{p\Theta}\mathbf{X}_{p\Theta,n} + \tilde{\epsilon}_{p\Theta,n} \tag{B4}$$

$$\ln \eta_n = \boldsymbol{\beta}'_{\eta n}\mathbf{X}_{\eta n} + \tilde{\epsilon}_{\eta n} \tag{B5}$$

$$\ln Q_n = -\boldsymbol{\beta}'_{Qn}\mathbf{X}_{Qn} + \tilde{\epsilon}_{Qn}, \tag{B6}$$

where $\mathbf{X}_{in}$ are vectors of explanatory variables for firm n. The error terms $\tilde{\epsilon}_{p\Theta,n}$, $\tilde{\epsilon}_{\eta n}$, and $\tilde{\epsilon}_{Qn}$ are all assumed to be independently normally distributed and uncorrelated with each other as well as with the $\mathbf{X}_{in}$ variables. Let y_n be an indicator variable that is equal to one if the firm is liquidated and zero if the firm is sold back to its old owner-manager. Then the sale-back condition can be easily estimated in a probit, by

$$y_n = \begin{cases} 1 & \text{if} \quad \boldsymbol{\beta}'_\eta \mathbf{X}_{\eta n} + \boldsymbol{\beta}'_{p\Theta} \mathbf{X}_{p\Theta,n} + \boldsymbol{\beta}'_Q \mathbf{X}_{Qn} + \tilde{\epsilon}_n > 0 \\ 0 & \text{if} \quad \boldsymbol{\beta}'_\eta \mathbf{X}_{\eta n} + \boldsymbol{\beta}'_{p\Theta} \mathbf{X}_{p\Theta,n} + \boldsymbol{\beta}'_Q \mathbf{X}_{Qn} + \tilde{\epsilon}_n < 0, \end{cases} \tag{B7}$$

where $\tilde{\epsilon}_n = \tilde{\epsilon}_{p\Theta,n} + \tilde{\epsilon}_{\eta n} + \tilde{\epsilon}_{Qn}$.

Parametric Specification of the Liquidation Value

The liquidation value is in the model equal to

$$\tilde{L} = (1-\Theta)^{\tilde{I}} V, \tag{B8}$$

or equivalently

$$\ln \tilde{L} = \tilde{I} \ln(1-\Theta) + \ln V, \tag{B9}$$

which is approximately equal to

$$\ln \tilde{L} = \ln V - \tilde{I}\Theta, \tag{B10}$$

where

$$\tilde{I} = \begin{cases} 0 & \text{if the assets are sold to an insider} \\ 1 & \text{if the assets are sold to an outsider.} \end{cases} \tag{B11}$$

As earlier, I assume that $\ln V$ and Θ are linear functions of state variables $\mathbf{X}_V$ and $\mathbf{X}_\Theta$. Also, let the probability of finding an industry insider in liquidation be a function of some state variables $\mathbf{X}_p$. Note that for our previous specification of $\ln p\Theta$ in the sale-back condition to be consistent, it has to be the case that the state variables $\mathbf{X}_{p\Theta}$ also have to be the ones determining the probability p and the liquidation cost Θ, that is, $\mathbf{X}_{p\Theta} = \{\mathbf{X}_p, \mathbf{X}_\Theta\}$. I end up with the following empirical specification for the liquidation value and the probability of finding an industry insider:

$$L_n^* = \begin{cases} \ln \tilde{L} = \boldsymbol{\beta}'_V \mathbf{X}_{Vn} + \tilde{I}_n \boldsymbol{\beta}'_\Theta \mathbf{X}_{\Theta n} + \tilde{\epsilon}_{Vn} & \text{if} \quad y_n = 1 \\ \text{unobserved} & \text{if} \quad y_n = 0 \end{cases} \tag{B12}$$

$$\tilde{I}_n = \begin{cases} 1 & \text{if } \boldsymbol{\beta}'_p \mathbf{X}_{pn} + \tilde{\epsilon}_{pn} > 0 \\ 0 & \text{if } \boldsymbol{\beta}'_p \mathbf{X}_{pn} + \tilde{\epsilon}_{pn} < 0 \end{cases} \tag{B13}$$

$$\tilde{I}_n^* = \begin{cases} \tilde{I} & \text{if } y_n = 1 \\ \text{unobserved} & \text{if } y_n = 0 \end{cases}. \tag{B14}$$

Econometrically, I have to deal with two issues. First, the liquidation outcomes are only observed when the firm is not sold back to the owner-manager (i.e., only when $y_n = 1$). Second, the outsider sale dummy $\tilde{I}_n$ is endogenous, and as a result the errors $\tilde{\epsilon}_{pn}$ and $\tilde{\epsilon}_{Vn}$ might be correlated. To deal with these problems I estimate the system in the following way. To deal with the second problem, I first estimate $\boldsymbol{\beta}_p'$ using a simple probit. I then estimate $\boldsymbol{\beta}_V$ and $\boldsymbol{\beta}_\Theta$ in a linear instrumental variables regression, using the fitted value $\hat{\boldsymbol{\beta}}_p'\mathbf{X}_{pn}$ as an instrument for $\tilde{I}_n$. To address the first truncation problem, I use the estimates of $\boldsymbol{\beta}_\eta$, $\boldsymbol{\beta}_Q$, and $\boldsymbol{\beta}_{p\Theta}$ from the sale-back probit to construct Mill's ratios that I include in both the outsider probit and in the liquidation value IV regressions, similar to a standard Heckman (1979) procedure. Because the Mill's ratio suffers from estimation error, the standard errors of the coefficients will be higher than in a normal two-stage least squares procedure, and I report bootstrapped standard errors of $\boldsymbol{\beta}_V$, $\boldsymbol{\beta}_\Theta$, and $\boldsymbol{\beta}_p$. The bootstrapping procedure resamples (with replacement) the original sample 500 times and estimates the coefficients for each sample drawn. The standard errors are then obtained from the empirical distribution of the estimated coefficients.

Appendix C: Proofs

Proof of Proposition 1: If $S = 0$, then $\eta(B, S = 0, \tilde{L}) = E[\min(B, \tilde{L})] - \min(B, \mu_l)$. Showing that η is nonpositive is a straightforward application of Jensen's inequality, because the min-function is concave. To show that η is minimized at $B = \mu_l$, I express $\eta(B, \tilde{L})$in terms of the density function $f(\tilde{L})$, obtaining

$$\eta(B, \tilde{L}) = \int_0^B \tilde{L} f(\tilde{L})\, d\tilde{L} + B(1 - F(B)) - \min(B, \mu_l). \tag{C1}$$

If $B < \mu_l$, then

$$\eta(B, \tilde{L}) = \int_0^B \tilde{L} f(\tilde{L})\, d\tilde{L} - BF(B) \tag{C2}$$

$$= \int_0^B (\tilde{L} - B) f(\tilde{L})\, d\tilde{L} < 0, \tag{C3}$$

and $\partial\eta/\partial B = -F(B) < 0$. If $B \geq \mu_l$, on the other hand, then

$$\eta(B, \tilde{L}) = \int_0^B \tilde{L} f(\tilde{L})\, d\tilde{L} + B(1 - F(B)) - \mu_l \tag{C4}$$

$$= -\int_B^{\bar{L}} (\tilde{L} - B) f(\tilde{L})\, d\tilde{L} < 0 \tag{C5}$$

and $\partial\eta/\partial B = 1 - F(B) > 0$. Hence, $\eta(B,\tilde{L}) < 0$. Also, since $\eta(B,\tilde{L})$ is continuous and nonpositive, and decreasing with respect to B until the point $B = \mu_l$ and increasing thereafter, it must reach a minimum with respect to B at $B = \mu_l$. Q.E.D.

Proof of Proposition 2: To prove the first claim, recall that

$$\eta \equiv E[\max(\min(B,\tilde{L} - S),0)] - \max(\min(B,\mu_l - S),0) \tag{C6}$$

$$= \int_S^{S+B} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} + B(1 - F(S+B)) - \max(\min(B,\mu_l - S),0). \tag{C7}$$

First consider the case when $\mu_l \geq S + B$. Then

$$\eta = \int_S^{S+B} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} + B(1 - F(S+B)) - B \tag{C8}$$

$$= \int_S^{S+B} (\tilde{L} - S - B) f(\tilde{L})\, d\tilde{L} - BF(S) < 0. \tag{C9}$$

Second, if $S < \mu_l < S + B$

$$\eta = \int_S^{S+B} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} + B(1 - F(S+B)) - (\mu_l - S) \tag{C10}$$

$$= -\int_0^{S} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} - \int_{S+B}^{\bar{L}} (\tilde{L} - S - B) f(\tilde{L})\, d\tilde{L}. \tag{C11}$$

Because $-\int_0^S (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} > 0$ whereas $-\int_{S+B}^{\bar{L}} (\tilde{L} - S - B) f(\tilde{L})\, d\tilde{L} < 0$, the sign is ambiguous. If, for example, $S = \mu_l$, then $\eta = \int_S^{S+B} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} + B(1 - F(S+B)) > 0$, whereas for $\mu_l = S + B$, we have that $\eta = \int_S^{S+B} (\tilde{L} - S - B) f(\tilde{L})\, d\tilde{L} - BF(S) < 0$.

Finally, if $\mu_l < S$

$$\eta = \int_S^{S+B} (\tilde{L} - S) f(\tilde{L})\, d\tilde{L} + B(1 - F(S+B)) > 0. \tag{C12}$$

To prove the second claim, recall that

$$\eta \equiv E[\max(\min(B,\tilde{L} - S),0)] - \max(\min(B,\mu_l - S),0) \tag{C13}$$

$$\begin{aligned} &= \int_S^{S+B} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + (1 - q)\psi(1 - F(\psi)) \\ &\quad - \max(\min((1 - q)\psi, \mu_l - q\psi),0). \end{aligned} \tag{C14}$$

First consider the case when $\mu_l \geq S + B$. Then

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} - (1-q)\psi F(\psi) \tag{C15}$$

$$\Rightarrow \frac{\partial \eta}{\partial q} = \psi F(q\psi) > 0. \tag{C16}$$

Second, if $S < \mu_l < S + B$,

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + (1-q)\psi(1 - F(\psi)) - (\mu_l - q\psi) \tag{C17}$$

$$= \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + \psi(1 - F(\psi)) + qF(\psi) - \mu_l \tag{C18}$$

$$\Rightarrow \frac{\partial \eta}{\partial q} = \psi F(q\psi) > 0. \tag{C19}$$

Finally, if $\mu_l < S$,

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + (1-q)\psi(1 - F(\psi)) \tag{C20}$$

$$\Rightarrow \frac{\partial \eta}{\partial q} = -\psi(1 - F(q\psi)) < 0. \tag{C21}$$

Finally, to prove the third claim, first consider the case when $\mu_l \geq S + B$. Then

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} - (1-q)\psi F(\psi) \tag{C22}$$

$$\frac{\partial \eta}{\partial \psi} = -\, q(F(\psi) - F(q\psi)) - (1-q)F(\psi) < 0. \tag{C23}$$

Second, if $S < \mu_l < S + B$,

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + (1-q)\psi(1 - F(\psi)) - (\mu_l - q\psi) \tag{C24}$$

$$\Rightarrow \frac{\partial \eta}{\partial \psi} = qF(q\psi) + (1 - F(\psi)) > 0. \tag{C25}$$

Finally, if $\mu_l < S$,

$$\eta = \int_{q\psi}^{\psi} (\tilde{L} - q\psi) f(\tilde{L})\, d\tilde{L} + (1 - q)\psi(1 - F(\psi)) \tag{C26}$$

$$\Rightarrow \frac{\partial \eta}{\partial \psi} = -q(1 - F(q\psi)) + (1 - F(\psi)). \tag{C27}$$

The sign is ambiguous. As q goes to zero, it becomes $(1 - F(\psi)) > 0$. As q goes to one, it becomes equal to zero. At $\psi = 0$, it is equal to zero. At $\psi = \bar{L}$, it is equal to $-q(1 - F(q\bar{L})) < 0$. Q.E.D.

Proof of Proposition 3: From the discussion in the text, it is clear that outside financing will eliminate any bias to liquidate in cases when $\mu_m > \mu_l$ and the new sale-back condition follows. Result number one follows from Proposition 2. The second result follows from the lemma of the proof to Proposition 3. Combining this result with the comparative statics from Proposition 3, the third and fourth results follow. Q.E.D.

Proof of Proposition 4: First, consider the case of a financially distressed firm, where the sale-back condition is not met, so that the bank would have the firm liquidated in bankruptcy. In this case, because the manager will never voluntarily agree to a liquidation, the only option for the bank to liquidate the firm is by first filing for bankruptcy.

Second, consider the alternative case, where the bank would optimally choose to finance a sale-back in bankruptcy. With no bankruptcy costs, the payoff to the bank in a sale-back is equal to

$$\Pi_m = \mu_m + \max(\min(B, P - S), 0) - P. \tag{C28}$$

Continuing the firm without filing for bankruptcy would give the bank a maximum payoff of

$$\Pi_0 = \mu_m - S - J = \mu_m + B - D, \tag{C29}$$

where $D = S + B + J$. This is exactly equal to the payoff in a sale-back where the sale-back price is equal to $P = D$, because

$$\mu_m + \max(\min(B, D - S), 0) - D \tag{C30}$$

$$= \mu_m + B - D. \tag{C31}$$

Given the assumption that the firm is in financial distress, and hence $D > \mu_l = P$, and that Π_m is decreasing in P, we will always have that $\Pi_m > \Pi_0$. With bankruptcy costs of C, the result will still hold as long as $C < \Pi_m - \Pi_0$. Q.E.D.

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