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Bankruptcy Decisionmaking: An Empirical Study of Continuation Bias in Small-Business Bankruptcies

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BANKRUPTCY DECISIONMAKING: AN EMPIRICAL STUDY OF CONTINUATION BIAS IN SMALL BUSINESS BANKRUPTCIES

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Abstract

Over half of all small businesses reorganizing under Chapter 11 of the U.S. Bankruptcy Code are ultimately liquidated. Little is known about this shutdown decision and about the factors that increase or reduce the amount of time a firm spends in bankruptcy. It is widely suspected, however, that the Chapter 11 process exhibits a "continuation bias," allowing non-viable firms to linger under the protection of the court. This paper tests for the presence of continuation bias in the docket of a typical bankruptcy court over the course of a calendar year. A variety of tests are employed, including the extent to which entrenched managers dominate the bankruptcy process, the accuracy and speed with which viable and nonviable firms are distinguished, and the extent to which the hazard of shutdown is consistent with the implications of a simple, formal model of the optimal Chapter 11 process. Contrary to conventional wisdom, the paper finds that continuation bias is either absent or empirically unimportant.

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1 Introduction

Chapter 11 of the U.S. Bankruptcy Code is commonly thought inefficient. The Code gives managers of distressed corporations a nonwaivable right to file a bankruptcy petition and thereby halt all creditor collection efforts for months (or years) as they draft and then negotiate a plan of reorganization. The process of drafting and negotiating a plan is costly. It generates direct administrative costs ranging from two to ten percent of firm value.[1] More importantly, it generates indirect costs.[2] Firms that should be liquidated are allowed to linger on indefinitely. Chapter 11 prevents or retards the reallocation of the assets even when a failing firm's assets may have greater value in the hands of another owner.[3] Rent-seeking competition among secured and unsecured creditors[4] dominates a process overseen by civil servants (judges) who lack business training and are biased in favor of preserving firms that should be liquidated.[5] These ex post inefficiencies—which characterize both large firm[6] and small firm[7]

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[1] Arturo Bris, Ivo Welch, & Ning Zhu, *The Costs of Bankruptcy: Chapter 7 Liquidation vs. Chapter 11 Reorganization*, J. Fin. (forthcoming 2006) (estimates based on administrative costs in both small and large firm bankruptcies).

[2] Tim C. Opler and Sheridan Titman, *Financial Distress and Corporate Performance*, 49 J. Fin. 1015 (1994).

[3] Edith S. Hotchkiss, *Postbankruptcy Performance and Management Turnover*, 50 J. Fin. 3 (1995).

[4] Arturo Bris, Ivo Welch, & Alan Schwartz, *Who Should Pay for Bankruptcy Costs?*, J. Legal Stud. (forthcoming); Lucien Arye Bebchuk and Howard F. Chang, *Bargaining and the Division of Value in Corporate Reorganization*, 8 J. L., Econ. & Org. 253 (1992); Douglas G. Baird, *The Uneasy Case for Corporate Reorganization*, 15 J. Legal Stud. 127 (1986).

[5] George Triantis, *Financial Slack Policy and the Law of Secured Transactions*, 29 J. Legal Stud 35, 67 (2000); David A. Skeel, Jr., *The Law and Finance of Bank and Insurance Insolvency Regulation*, 76 Tex. L. Rev. 723, 780 n.5 (1998); Thomas H. Jackson, *The Logic and Limits of Bankruptcy Law* 220-21 (1986).

[6] Lawrence A. Weiss and Karen Wruck, *Information Problems, Conflicts of Interest, and Asset-Stripping: Chapter 11's Failure in the Case of Eastern Airlines*, 48 J. Fin. Econ. 55 (1998).

cases—increase the cost of capital ex ante.[8]

This paper challenges this traditional view as it applies to small business Chapter 11s.[9] Using a sample of all corporate Chapter 11 filings in Chicago during 1998,[10] this paper suggests that the costs, both direct and indirect, of small business Chapter 11s are quite small. Nearly sixty percent of these firms were shut down (they were liquidated under Chapter 7 or had their petitions dismissed, allowing liquidation under state law). Half the firms that failed to emerge intact were shut down within three months of filing. Seventy percent were shut down in five months. For the firms that failed, the Chapter 11 process was remarkably short. As a general matter, it took no more time than rival procedures.[11]

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[7] Lynn M. LoPucki, *The Debtor in Full Control—Systems Failure Under Chapter 11 of the Bankruptcy Code?*, 57 Am. Bankr. L. J. 99 & 247, 272-73 (1983). See also Philippe Aghion, Oliver Hart, and John Moore, *Improving Bankruptcy Procedure*, 72 Wash. U. Law Quart. 849, 871 (1994) (explaining that their proposal for bankruptcy reform may "have a role to play in the case of small companies").

[8] Alan Schwartz, *Contracting About Bankruptcy*, 13 J. Law, Econ, & Org. 127 (1997).

[9] Small businesses make up the vast majority of the filings. Other recent empirical work, although not focusing on small business Chapter 11s, reinforces the view that the costs of reorganization are not as large as usually thought. See, e.g., Vojislav Maksimovic and Gordon Phillips, *Asset Efficiency and Reallocation Decisions of Bankrupt Firms*, 53 J. Fin. 1495 (1998); Gregor Andrade and Steven N. Kaplan, *How Costly is Financial (Not Economic) Distress? Evidence from Highly Leveraged Transactions That Became Distressed*, 53 J. Fin. 1443 (1998); Stuart C. Gilson, *Transaction Costs and Capital Structure Choice: Evidence from Financially Distressed Firms*, 52 J. Fin. 161 (1997).

[10] The filings were lodged in the Bankruptcy Court for the Northern District of Illinois, Eastern Division, whose jurisdiction encompasses Chicago and outlying areas.

[11] A mandatory auction regime would likely take between two and six months. See Bob Adams, *Small-Business Start Up* (1996). See also Karin Thorburn, *Bankruptcy Auctions: Costs, Debt Recovery, and Firm Survival*, 58 J. Fin. Econ. 337 (2000) (evidence that Swedish auctions take between 1.5 months (median firm) and 2.4 months (mean)). Other commonly proposed alternatives to Chapter 11 similarly contemplate a process that takes several months to run. See, e.g., Philippe Aghion Oliver Hart and John Moore, *The Economics of Bankruptcy Reform,* 8 J.L. Econ. &

Moreover, again contrary to conventional accounts, the Chapter 11 process sorts effectively between firms that are viable and those that are not. Sources of bias commonly ascribed to the system are largely absent. Neither debtors (managers or equity-holders) nor creditors dominate the bankruptcy process. Instead, bankruptcy judges play a major role in filtering failing firms from viable ones, and they appear to be able to do this job well. The firms that are quickly liquidated exhibit characteristics of economic distress (e.g., being unable to pay ongoing expenses even after obtaining bankruptcy protection); reorganized firms display characteristics of financial distress (e.g., overexpansion). Finally, the patterns characterizing the duration to shutdown—non-monotonicity of the hazard rate and an inverse correlation between the hazard rate and the volatility of earnings—are consistent with an economic model of optimal decisionmaking.[12] Taken together, these findings suggest that the Chapter 11 process in small-business cases has significantly lower cost and displays significantly less bias than commonly thought.

The paper's findings are based on data from small business bankruptcy filings, which prevents generalizability to cases involving large corporations, such as Conseco, Kmart, and United Airlines.[13] The data, however, are well-suited to studying the costs of and potential bias in the Chapter 11 process. Small businesses have relatively simple operations and capital structures and the probability of shutdown in bankruptcy

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Org. 523 (1992) (contemplating a process that takes 4 months).

[12] This model was described by Douglas G. Baird and Edward R. Morrison, *Bankruptcy Decision-Making*, 17 J. L., Econ., & Org. 356 (2001) and developed more formally in Edward R. Morrison, *Bankruptcy Decision-Making: An Empirical Study of Small-Business Bankruptcies*, Unpublished Dissertation, Univ. Chicago (2003); Douglas G. Baird and Edward R. Morrison, *Optimal Timing and Legal Decision-Making: The Case of the Liquidation Decision in Bankruptcy*, John M. Olin Law & Economics Working Paper No. 86 (Univ. Chicago 1999).

[13] These cases, like those studied in this paper, were filed in the Northern District of Illinois.

exceeds 50 percent (shutdown is a rare event in large corporate bankruptcies). Additionally, small businesses make up at least 85 percent of all Chapter 11 filings.[14] The findings presented here, then, shed light on the bankruptcy process in the vast majority of cases.

The paper is organized as follows. Section 2 describes the dataset and presents summary statistics. Section 3 shows that the data are inconsistent with conventional accounts of continuation bias. Section 4 examines the same data again with a formal model of the shutdown decision in Chapter 11 cases and again finds little evidence of bias. Section 5 concludes.

2 Data Sources

The data used in this paper were drawn from the case files of the Northern District of Illinois, Eastern Division ("Northern District") and from the records of the Secretary of State of Illinois. The Northern District was chosen because of its size, its similarity to other jurisdictions, and the availability of data. The Northern District's jurisdiction encompasses Chicago, Cook County, and outlying areas—a primarily metropolitan area similar to the Northern and Central Districts of California (covering Los Angeles and San Francisco), the Northern and Southern Districts of Texas (covering Dallas and Houston), and the District of New Jersey and Eastern District of Pennsylvania (covering Atlantic City and Philadelphia).[15] Like these jurisdictions, the Northern District of Illinois employed judges with nearly ten years of experience, on average, and received Chapter 11 filings from predominantly small businesses. During

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[14] National Bankruptcy Review Commission, *Bankruptcy: The Next Twenty Years* 631 (1997) (defining "small business" as one with $5 million or less in debt), available at http://govinfo.library.unt.edu/nbrc/report/15smalbu.pdf.

[15] As of July 1999, these jurisdictions covered the largest Metropolitan Statistical Areas in the United States. See eire.census.gov/popest/archives/ metro/ma99-04.txt.

the 1990s, filings by large, publicly-traded corporations were generally filed in the District of Delaware and Southern District of New York.[16]

The Northern District gave me access to a database (PACER)[17] containing images of every filing and judicial order in cases commencing after January 1, 1998. I supplemented this database with another (ILREC), available on Lexis-Nexis, which identifies the founders, founding dates, and (where applicable) termination dates of most firms in the PACER database.

This study focuses on outcomes in cases filed during 1998, the first year of available data. For each case, I used PACER to obtain information about the firm's finances (assets, debt, cash flow, etc.), history (including events that led to the bankruptcy petition), and experience in bankruptcy (time in bankruptcy, types of motions filed by the debtor and its creditors, types of court orders, etc.). The ILREC database was used to obtain information about the dates of firm founding and termination. When ILREC was incomplete, I obtained this information by contacting the firm's managers, newspaper reporters, and other sources.

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[16] See, e.g., Kenneth M. Ayotte and David A. Skeel, Jr., *Why Do Distressed Companies Choose Delaware? Venue Choice and Court Experience in Bankruptcy*, Working Paper (Columbia Business School Sep. 5, 2002); Robert K. Rasmussen and Randall S. Thomas, *Timing Matters: Promoting Forum Shopping by Insolvent Corporations*, 94 Nw. U. L. Rev. 1357 (2000). Matters changed substantially last year, however. Three of the largest corporate bankruptcies of all time (Conseco, Inc., UAL Corp., and Kmart Corp.) were filed in the Northern District of Illinois during 2002. See www.ilnb.uscourts.gov/chapter11/ megacase.htm; www.bankruptcydata.com/Research/ 15_Largest.htm.

[17] The database, Public Access to Court Electronic Records (PACER), is available for a fee at pacer.uscourts.gov. The Northern District waived the fee in my case.

2.1 Sample Selection

According to Northern District records,[18] 184 Chapter 11 petitions were filed during 1998 by corporations and individual debtors. Not all filings are relevant to the analysis here. This paper is concerned with the effect of Chapter 11 on the reallocation of assets, especially the decision whether to reorganize or liquidate a distressed firm. Chapter 11 filings by *corporations* outside the *real estate* sector present the simplest context in which to study this decision. Individuals may file Chapter 11 petitions, but their filings involve two separate issues—a fresh start for the individual and, sometimes, the continuation of a business. Only a fraction of all individual filings involve businesses. Some are submitted by individuals who want to avoid liquidation of assets (something inevitable under Chapter 7), but fail the eligibility requirements of Chapter 13 (which allows debtors with sufficiently small debts to keep assets[19]). Even among Chapter 11 filings in which an individual seeks to preserve a sole proprietorship, it is difficult to study the effect of the Code on reallocation of assets. An individual's right to a fresh start may prevent liquidation of assets that would be sold-off in a wealth-maximizing process.[20]

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[18] This figure is based on a report prepared at my request by the staff of the Northern District. The original report included 185 filings, but one was actually a 1997 filing, which was dropped. For this report, I am especially grateful to Steve Horvath, Jean Dalicandro, and David Dusenberry.

[19] 11 U.S.C. §109(e).

[20] To be sure, many corporations are privately-held and the owner-manager has personally guaranteed the firm's debt. The outcome of the corporate Chapter 11 case therefore affects the owner's personal wealth. The effect, however, is indirect. Because there is no "fresh start" policy at issue here, it is meaningful to think about "shutting down" a firm by liquidating its assets.

Corporations operating in the real estate sector are excluded because, like individuals, their Chapter 11 filings are subject to special legal provisions.[21] Additionally, asset reallocation decisions are often not at issue in cases involving real estate firms. The owner of a piece of real estate (often an office building) will use Chapter 11 to renegotiate debt owed to a single creditor, a mortgagee. Whether the negotiations are successful or not, the use of the real estate will not change (land dedicated to an office building will typically land dedicated to an office building).

As Table 1 shows, 42 filings by individuals and 22 filings by real estate ventures were excluded from the sample. Additionally, the sample omits eight filings by firms that entered Chapter 11 with the sole purpose of shutting down, selling off assets, or resolving a dispute with a particular creditor. In each case, the fate of the firm was largely determined before it entered bankruptcy. In one case, for example, a steakhouse entered bankruptcy after sexual and racial discrimination lawsuits were filed by two former employees. When the firm proposed a plan of reorganization in which the employees would receive only a small fraction of their claims, they agreed to settle. The settlement in turn prompted the firm to move to dismiss the case.

The sample also excludes from the sample filings by five firms that had shut down before filing their Chapter 11 petitions, two firms about which insufficient information was available, and one involuntary petition that was filed days before the debtor filed its voluntary petition (the petitions were consolidated by the bankruptcy court). The sample also consolidates filings by sister companies (the Court did so as well), which reduced the number of filings by 7.[22] After making these exclusions, the

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[21] See, e.g., Kenneth Klee, *One Size Fits Some: Single Asset Real Estate Bankruptcy Cases*, 87 Cornell L. Rev. 1285, 1296-1302 (2002).

[22] For example, the three outlets of a family-run fur retailer (Andriana Furs) filed separate Chapter 11 petitions. The Court consolidated these petitions; so will this study.

sample consists almost entirely of small, privately-held businesses (descriptive statistics are provided below). To preserve the homogeneity of the sample, filings by two, large publicly-traded firms were excluded as well. The final sample, then, consists of 95 filings by 91 firms (three firms filed multiple petitions during 1998; although each petition was counted separately,[23] the analysis below would not change in a meaningful way if the repeat filings were dropped).

2.2 Summary Statistics

The sample firms are generally quite small, as Table 2 shows. Whereas the Small Business Administration defines a "small business" as a firm with fewer than 500 employees,[24] 81 percent of the firms in this study had fewer than 20 employees and 96 percent had fewer than 100 employees. In terms of capital structure, the firms were similarly small. Nearly 50 percent of the firms had less than $100,000 in assets; 75 percent had less than $1 million. Perhaps unsurprisingly for these types of firms, most were young (63 percent were less than ten years old) and owned and managed by a family or small group of investors (86 percent of firms fell within this category). The firms represented a broad cross-section of industries.

Although quite small, the firms in this sample are not markedly different from small firms generally. Table 2 compares the sample firms to firms surveyed in the Federal Reserve Board's 1998 Survey of Small Business Finance (SSBF), a nationally representative sample of businesses with 500 or fewer employees.[25] Both in the SSBF

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[23] Although counted separately, these petitions were treated as potentially correlated cases in the statistical analysis below. More formally, the analysis computes robust standard errors, allowing for correlation across petitions filed by the same firm.

[24] See *The State of Small Business: A Report of the President*, 1999-2000, 18 n. 1.

[25] For an introduction to the SSBF, see Marianne P. Bitler, Alicia M. Robb, and John D. Wolken, *Financial Services Used by Small Businesses: Evidence from the 1998 Survey of Small Business Finances*, 87 Fed. Res. Bull. 183 (April 2001).

sample and in the sample used here, over 80 percent of firms have fewer than 20 employees. The industrial composition of both samples is also roughly comparable, the only noticeable differences being a smaller number of eating and drinking places and a larger number of wholesale trade establishments in the SSBF. These differences undoubtedly reflect the relatively high failure rates in some industries, such as restaurants. They may also reflect the small size of the sample studied here (95 filings by 91 firms); a larger sample might produce a larger proportion of wholesalers. Other important differences include age (the median SSBF firms is twice as old), asset size (sample firms are half as large) and leverage (five times as large in sample firms). These differences reflect, in part, the distressed condition of the sample firms. Most small firms fail within the first four to six years of existence,[26] and their assets (especially cash) diminish and debt burdens mount as they descend into bankruptcy.

The characteristics of the sample firms are typical of small business bankruptcies throughout the country. Table 3 compares the sample employed here ("N.D. IL") to firms in two recent surveys—Warren and Westbrook's 1999 study of bankruptcy filings in the most and least active court in every judicial circuit,[27] and the Administrative Office of the U.S. Courts (AO) survey of all Chapter 11 cases closed during 1998.[28] Debt, asset, and employment levels are similar across all surveys. For example, 68.4 percent of firms in N.D. IL had less than $1 million in debt; the percentages for Warren &

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[26] Amy E. Knaup, Survival and Longevity in the Business Employment Dynamics Data, Monthly Lab. Rev., May 2005, at 50, 51, 52 chart 1, available at http://www.bls.gov/opub/mlr/2005/05/ressum.pdf; Timothy Bates and Alfred Nucci, *An Analysis of Small Business Size and the Rate of Discontinuance*, 27 J. Small. Bus. Mgt. 1 (1989).

[27] Elizabeth Warren and Jay Lawrence Westbrook, *Financial Characteristics of Businesses in Bankruptcy*, 73 Am. Bankr. L. J. 499, 542 (1999).

[28] Inter-University Consortium for Political and Social Research (ICPSR), Study Nos. 4086, 4088.

Westbrook and AO are 65.7 percent and 73.4 percent, respectively. Industry demographics are somewhat comparable across the surveys as well. Instead of the SIC classification system, Table 3 uses the industry classifications listed on the "face sheet" of the bankruptcy petition.[29] After sample selection (described in Table 1), Table 3 shows that the sample employed here is roughly comparable—with a few important exceptions[30]—to those in previous empirical studies.

2.3 Outcomes of Chapter 11 Cases

Thirty-six corporations—38 percent of the sample—emerged from bankruptcy intact ("continuations"), either through a debt restructuring or a going-concern sale. As Panel A of Table 4 illustrates, 27 firms achieved a capital restructuring, either through a formal plan reorganization or an informal renegotiation with key creditors. In the latter case, the Chapter 11 petition was dismissed after the parties reached a compromise. Another nine firms were sold-off as going concerns. Some sales were accomplished in the context of a plan of reorganization. Others were consummated under § 363 of the Bankruptcy Code, which allows sales of all or substantially all of a firm's assets, and the debtor sought dismissal or conversion to Chapter 7 when the sale was complete.

In the remaining 59 cases—62 percent of the sample—the firm was shut down or forced to exit Chapter 11 without a new capital structure, which in most cases resulted in the corporation's liquidation. As Table 4 shows, in 29 cases the debtor corporation was shut down and its assets were distributed to creditors, either in a Chapter 7

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[29] This classification is seriously flawed, both because it is quite crude and because debtors are frequently unsure about the appropriate classification for their firms. Nevertheless, the vast majority of studies use it. See, e.g., Warren & Westbrook, *supra*, at 529-30. It is thus the only benchmark available.

[30] As Table 3 shows, the N.D. IL survey contains fewer transportation and real estate firms and more professional and unclassified firms than both the Warren & Westbrook and AO surveys.

proceeding (19 cases) or in state-law proceedings after the case was dismissed (10 cases).

In the remaining 30 cases, the bankruptcy judge dismissed the corporation's bankruptcy petition and thereby exposed it to potential liquidation under state law. The judge dismissed these cases for a variety of reasons, including the debtor firm's failure to file financial schedules, pay fees, hire an attorney, or show that it had a reasonable chance of reorganizing successfully. In each case, the firm exited without a new capital structure and was vulnerable to suit by creditors in state courts. The probability of shutdown was very high after dismissal. Table 5 computes the number of years each firm survived after exiting bankruptcy. These statistics are based on annual reports filed with the Illinois Secretary of State. Annual reports are mandatory under state law;[31] filing dates are documented in the LEXIS ILREC database. For each of the 30 corporations that exited bankruptcy without a new capital structure, Table 5 assumes that the firm was active during the 6 months prior to and following the date of its annual reports. Under this metric, 18 firms shut down immediately or within six months of exiting Chapter 11; another five shut down within one year of exiting. These numbers suggest that, if a debtor is forced to exit Chapter 11 without a new capital structure, the probability of shutdown within the following six months is nearly 60%; the probability of shutdown within the following year is nearly 75%.

Thus, for the majority of firms, dismissal of a Chapter 11 petition is accompanied by a high probability of liquidation, much like a conversion to Chapter 7. A judge will often dismiss a case, instead of converting it to Chapter 7, if the debtor has no assets

[31] See 805 Ill. Comp. Stat. 5/14.05, 5/14.10.

unencumbered by liens; with no assets available to unsecured creditors, there is no benefit to a Chapter 7 proceeding, which generates administrative costs.[32]

The legal outcomes observed here—reorganization, dismissal, and conversion to Chapter 7—can be compared to the outcomes observed in the AO surveys of cases closed during fiscal years 1998 and 1999. Panel B of Table 4 offers this comparison and shows that the likelihood of reorganization in the Northern District does not differ substantially from the national average for small businesses: about 30 percent of all small business cases result in reorganization; the percentage in the Northern District is 28.4 percent.[33]

2.4 Duration of Chapter 11 Cases

It takes time for the Chapter 11 process to identify firms that should be continued and those that should be shut down. Among firms that are ultimately continued, Chapter 11 generates direct administrative costs, i.e., the legal costs of administering the process. Among firms that are ultimately shut down, Chapter 11 generates not only direct administrative costs but also the indirect resource allocation costs. While a case is pending, the firm's assets could have generated greater value elsewhere. Both direct and indirect costs increase with the duration of a bankruptcy case.[34]

Case duration is remarkably short in the Northern District, as Figure 1 and Panel A of Table 6 illustrate. Among the 36 firms that were continued, nearly two-thirds (23

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[32] Interview with Chief Judge Eugene R. Wedoff, United States Bankruptcy Court for the Northern District of Illinois (Dec. 3, 2002).

[33] Relative rates of dismissal or conversion do differ significantly, however, with the Northern District dismissing more cases and converting fewer.

[34] Direct costs could be assessed more directly, by gathering data on fees incurred by professionals. I look only at case duration in this paper because fee data is generally unavailable or highly incomplete in cases that result in dismissal (42% of the sample) or conversion to Chapter 7 (20%).

firms) exited in less than one year. More surprisingly, the Chapter 11 process identified over 70 percent of non-viable firms (42 of 59 cases) within six months; 44 percent (26 cases) were identified within three months. Only 8.5 percent of cases involving non-viable firms (5 cases) are still ongoing after one year. Relative to any reasonable benchmark, a process that determines the fate of a business within five months is quick. Various business brokerages, for example, report that between four and nine months is typically needed to sell a business.[35] Auctions in other contexts, such as FCC spectrum auctions, typically require a similar amount of time.[36]

The Northern District's speed may be atypical among bankruptcy courts generally. Panel B of Table 6 compares duration to *case closure* in the Northern District to the average duration across all jurisdictions. The key events in a Chapter 11 case—confirmation, dismissal, and conversion to Chapter 7—typically occur months or even years before the case is finally closed. The delay is caused by efforts to determine the claims and relative priority of creditors (especially in cases resulting in confirmation), sell assets, and recover preferential transfers. These efforts may be an important part of determining how the value of the firm is divided among claimants, but they have no bearing on the key economic decision about how the firm's assets are deployed. That decision is made, at least formally, when the court confirms, dismisses, or converts the case.

Nonetheless, no comprehensive studies have looked closely at the duration to these events. They have instead looked at the duration to case closure. Using data on

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[35] See, e.g., the websites of The Quincy Parker Group, quincyparkergroup.com (general broker, reporting 6 to 9 months); Brookmoor Adams Advisors, brookmooradams.com (general broker, also reporting 6 to 9 months); Control Marketing Corp, controlmarketing.com (specializing in sale of copying and printing businesses; reporting 4 to 6 months).

[36] Roger C. Cramton, *The FCC Spectrum Auctions: An Early Assessment*, 6 J. Econ. & Mgt. Strategy 431 (1997).

duration to case closure from the 1998 and 1999 AO surveys,[37] Panel B of Table 6 shows that, among cases resulting in confirmation, the median duration in the Northern District was significantly (at the 1 percent level) faster than the median duration nationally. The opposite, however, is true for cases resulting in dismissal. In contrast to both of these figures, the median duration to conversion does not differ significantly between the Northern District and the rest of the nation. Taken together with the statistics on outcomes in Panel B of Table 4, these observations suggest that, relative to other jurisdictions, the Northern District reorganizes about as many firms but does so more quickly, dismisses more firms but does so more slowly, and converts fewer cases but does so in about the same amount of time. Overall, decisionmaking in the Northern District is faster than in other jurisdictions. The analysis that follows should be viewed with these differences in mind.[38]

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[37] It was not possible to compare case durations in the AO data to the durations observed in the sample gathered for this paper because of coding problems in the AO data.

38 Among the possible reasons for faster decisionmaking in the Northern District, the most likely seems to be its motion practice, which is different from other courts. The Northern District permits the parties to a case to schedule motions (e.g., a debtor's motion to use cash collateral, a creditor's motion to lift the automatic stay). Additionally, motions are presented orally to the judge, who typically renders a decision by the end of the hearing. Interview with Chief Bankruptcy Judge Eugene R. Wedoff, supra. See also Judge John Q. Squires' description of the practice at www.dcba.org/ brief/judpractice/0698.htm. Because only two days notice is required for most motions, a party can file a motion and receive a decision in days. U.S. Bankruptcy Court for the Northern District of Illinois, Local Rules 9013-1–9013-9 (adopted June 1, 2003) (notice period is enlarged to 20 days for motions proposing the sale of assets outside the ordinary course, conversion to Chapter 7 or dismissal, and other significant events; see Fed. R. Bankr. P. 2002 (2003)). Opposing counsel need not draft a response; he or she may present argument orally to the judge. As a result, the judge's decision will be based not only on the paper record, but also on open-ended discussion with the parties. Judges can respond quickly to news that a firm is failing. By contrast, in other jurisdictions motions are filed with the court clerk, opportunity is given for opposing counsel to draft a response, and the judge often renders a decision without conducting a hearing. Weeks or months may pass before a motion is considered.

3 Continuation Bias in Chapter 11 Cases

Conventional accounts of Chapter 11 hypothesize that continuation bias arises from the control incumbent managers exercise over the bankruptcy process.[39] Managerial control pushes the process in the direction of saving non-viable firms. The bias could, of course, arise from creditor control and run in the opposite direction. Seeking immediate payment, creditors could push the process toward liquidation of viable businesses.

Data from the Northern District offer several methods for testing these hypotheses. One is based on *procedural history*: if managers exercise significant control over the Chapter 11 process, creditors should have little success in terminating a case—through dismissal, conversion to Chapter 7, or lifting the automatic stay—without incumbent managers' consent. Alternatively, creditor control should manifest itself in frequent, successful motions to terminate a case. An alternative test is based on the *post-bankruptcy history* of reorganized firms: if a substantial number fail and subsequently reenter bankruptcy, managers may have sufficient control over the process to prevent liquidation of non-viable firms.[40] Still another test is based on the *distinguishing financial characteristics* of firms that are shut down in bankruptcy versus those that leave intact: if these firms are indistinguishable, the bankruptcy process may be catering to creditors (who force shutdown of viable firms) or debtors (who force continuation of non-viable

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[39] See, e.g., LoPucki, *supra*.

[40] Hotchkiss, *supra*. See also Lynn M. LoPucki and Sara D. Kalin, *The Failure of Public Company Bankruptcies in Delaware and New York: Empirical Evidence of a "Race to the Bottom,"* 54 Vand. L. Rev. 231 (2001). An even better measure is one that tracks the assets of troubled firms (including firms that do not resort to Chapter 11) and evaluates their productivity before and after the distress is resolved(either in or outside of a bankruptcy proceeding). See Maksimovic & Phillips, *supra*. Data limitations make it impossible to implement this test here.

firms). As applied to the Northern District data, none of these tests points to the presence of significant continuation bias.

Continuation bias might be inferred from one party's dominance of the process. LoPucki, for example, found in his 1981 study of Chapter 11 cases filed in St. Louis that the debtor was "in full control" because bankruptcy judges were passive and prevented creditors from exercising any meaningful influence over the process.[41] There is no evidence of similar control—either by debtors or creditors—in the Northern District data. As Table 7 illustrates, a party other than the debtor was responsible for nearly 68 percent of all shutdowns (40 of 59 cases). Here, a "shutdown motion" is defined is defined narrowly as a motion to dismiss or convert a case to Chapter 7. Under this definition, about 32 percent of all shutdowns (19 cases) are voluntary decisions by the debtor, who moved to dismiss or convert its own Chapter 11 filing. But this number is an over-estimate, because it ignores 15.3 percent of shutdowns (9 cases) in which a debtor moved to dismiss or convert because the court had already granted creditor motions to lift the automatic stay and seize core assets of the business. For these debtors, there was no meaningful choice other than to file a motion to convert or dismiss their petitions. These motions, then, arguably reflect creditor control over the bankruptcy process. If we add them to the motions actually filed by creditors and trustees, we find that a party other than the debtor was actually or effectively responsible for 83 percent of all shutdowns (49 cases). Debtors, then, did not dominate the process.

Nor did creditors or the U.S. Trustee dominate the bankruptcy process. Courts frequently denied creditors' motions to lift the automatic stay, dismiss or convert a case to Chapter 7, or achieve other relief that would lead to shutdown. While creditors filed

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[41] LoPucki, *Debtor in Full Control*, *supra*.

these motions in nearly 68 percent of all shutdowns (40 cases; see Panel B of Table 7), judges granted them in only 42 percent of the cases (25 cases; see Panel A). More strikingly, creditors filed at least one shutdown motion in about 58 percent of *continuations* (21 cases), i.e., cases in which the firm *exited intact*. All of these motions, obviously, were denied. The U.S. Trustee filed similar, unsuccessful motions in about 22 percent of continuations (8 cases). These statistics suggest strongly that no party with a predictable bias—debtors or creditors—completely dominates the bankruptcy process; to the contrary, bankruptcy judges appear to play an important role in determining when a firm should be shut down.

A bias might be present if the Chapter 11 process either preserved firms that failed soon after exiting bankruptcy or shut down firms that were clearly worth saving. Table 8 addresses the first possibility and presents data on the post-bankruptcy experience of the 27 firms that exited Chapter 11 as independent entities with new capital structures (going-concern sales are excluded). The first two columns are based exclusively on the dates of the firms' annual reports, as documented in the ILREC database. Again, I assume that a firm was in operation during the six months preceding and following the date of each annual report. The final two columns recomputed the firm's post-bankruptcy experience after correcting for potential errors in ILREC.[42] Between 3 and 6 firms failed within one year of exiting (11 to 22 percent of the 27 firms); 8 and 10 firm failed within two years (30 to 37 percent). These figures may seem large, but they are fairly typical of small businesses. The annual hazard of discontinuing a

[42] In three cases, annual reports indicated that the debtor had shut down soon after exiting bankruptcy, but other evidence suggested otherwise. In one case, the firm filed a Chapter 7 petition 17 months after exiting bankruptcy the first time. In two cases, I called the firms and verified that they were in operation more than 2 years after exiting.

business is around 20 percent even for firms over 10 years old.[43] Thus, nothing in the (admittedly small) sample here offers compelling evidence that the Chapter 11 process erroneously preserved any of these firms.

Table 9 addresses the second possibility, that the Chapter 11 process liquidates firms that should be preserved.[44] A firm should be preserved if it suffers financial, not economic, distress. Because financial and economic distress are hard to distinguish empirically, Panel A reports the frequency with which *obvious* markers of economic distress were observed in the sample firms. A firm in economic distress cannot rescue its business in Chapter 11; the legal process is, at most, an effort to delay liquidation, either to extract concessions from creditors or to gamble on the firm's resurrection.[45] Thus, a firm in economic distress will ignore procedural requirements, suspend payment for ongoing expenses, and try to divert value to insiders. I call these "obvious" markers of economic distress. Panel A reports the frequency with which firms were sanctioned (through dismissal or conversion to Chapter 7) for such behavior. Among firms that were shut down, nearly 80 percent (44 cases) exhibited obvious markers of economic distress. It appears, then, that the Chapter 11 process is generally liquidating firms that merit liquidation.

A similar story is told by Panel B, which reports the frequency with which common markers of *financial distress* were observed in the sample firms. A firm

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[43] Thomas J. Holmes and James A. Schmitz, *On the Turnover of Business Firms and Business Managers*, 103 J. Pol. Econ. 1005 (1995).

[44] Here, the sample is limited to the 91 unique firms in the sample; of these, 56 were shut down.

[45] See Douglas G. Baird and Edward R. Morrison, *Serial Entrepreneurs and Small Business Bankruptcies*, 105 Colum. L. Rev. 2310, 2349-65 (2005). There the authors present additional detail on the methodology for coding the cases.

suffering financial, not economic, distress would be profitable but for its debt burden, which it shoulders as a result of unexpected shocks (e.g., cash shortages arising from the bankruptcy of a major customer) or past mistakes (e.g., overexpansion and cost overruns, malfeasance of former managers, torts). Among firms that exited bankruptcy intact, 71 percent (25 cases) reported these indicators of financial distress in disclosure statements, motions to use cash collateral, or other documents submitted to the court. Forty percent were recovering from overexpansion (14 cases); about 9 percent suffered temporary cash shortages from the loss of customers, who had gone bankrupt or breached significant contracts (3 cases); another 9 percent suffered cash shortages because they had underestimated the costs of reconfiguring assets (e.g., converting a restaurant to a lounge). These indicators of financial distress were also reported by 27 percent of firms that were shut down (15 cases).[46] But most of these firms exhibited both financial and economic distress. Only 11 percent of shutdowns (6 cases) exhibited markers of financial distress but no *obvious* markers of economic distress. Together, these figures suggest that the Chapter 11 process in the Northern District did not systematically preserve non-viable firms or liquidate viable ones.

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[46] This probably understates the frequency with which shutdowns exhibited markers of financial distress. Case files are much less extensive for firms that are shutdown than for firms that exit intact. The document with the most detailed information about the firm—the disclosure statement—is filed only when the debtor has assembled a plan of reorganization, but a plan of reorganization is rarely assembled in cases that result in shutdown. In these cases, markers of financial distress must instead be inferred from motions filed by the debtor (e.g., motions to use cash collateral). If such motions were not filed, or if they do not contain adequate information about the firm's financial history, it is impossible to determine whether the firm exhibited markers of financial distress. For these reasons, Panel B of Table 9 may understate the percentage of shutdowns that exhibited markers of financial distress. It is unclear, however, whether the understatement is significant. It could be argued, for example, that a firm in financial (not economic) distress generally will announce this fact to the court and its creditors, in an effort to prevent shutdown. Thus, if none of a debtor's motions point to markers of financial distress, it is plausible that the firm suffered economic (not financial) distress.

4 A formal test of continuation bias

A basic task of the Chapter 11 process is to distinguish—or "filter"[47]—viable firms worth reorganizing from non-viable firms that should be shut down. As Table 4 illustrates, only 36 of the 95 Chapter 11 petitions filed in the Northern District—less than 40 percent—concluded with the debtor firm exiting intact. The bankruptcy process therefore filters the bulk of filings into liquidation. Filtering is typically accomplished by granting the motion of a creditor or the U.S. Trustee to lift the automatic stay and allow seizure of core assets, to dismiss the case and allow creditors to resort to their state-law remedies, or to convert the case to Chapter 7 and commence liquidation. As Table 7 illustrates, these motions are made repeatedly during a Chapter 11 case before a judge finally grants one. In this section, I develop a model of optimal filtering (in section 4.1) and use its implications as a benchmark for evaluating outcomes in the Northern District (in sections 4.2 and 4.3).

4.1 A simple model of the shutdown decision

The process of filtering is analogous to a matching problem: the goal of the bankruptcy system is to identify "good" and "bad" matches between firms and the opportunity to reorganize offered by Chapter 11 of the Bankruptcy Code. Good (bad) matches involve firms with (without) significant going-concern surplus. Information about firm quality is uncertain when a bankruptcy petition is filed; better information is retrieved over the course of the case. As judges, creditors, the U.S. Trustee, and the debtor update their beliefs regarding the expected quality of a firm, they must decide whether reorganization efforts should continue or be terminated. If termination is most attractive, creditors and the U.S. Trustee will file motions to dismiss the case, to convert it to Chapter 7, or to lift the automatic stay to permit seizure of core assets. A debtor too

[47] See Michelle J. White, *Corporate Bankruptcy as a Filtering Device: Chapter 11 Reorganizations and Out-of-Court Debt Restructurings*, 10 J. Law, Econ. & Org. 268 (1994).

may realize that its prospects are poor (perhaps because creditors will not offer additional financing or have denied access to cash collateral) and seek dismissal or conversion. A judge will generally grant a debtor's motion (under the Code, a debtor can initiate or terminate a case at will, with some exceptions); a creditor's motion will be granted only after the judge independently assesses firm quality.

This process can be studied formally using a simple "matching model,"[48] drawn from the optimal stopping and job search literatures[49] and set out in an appendix. This model allows us to identify characteristics of an ideal bankruptcy process that optimally filters good from bad "matches" as information about firm quality is updated over time. For analytic convenience, the model assumes that a wealth-maximizing planner (called, for convenience, "the judge") runs the process. In reality, of course, the outcomes of the bankruptcy process are determined by negotiation and bargaining among debtors, creditors, trustees, and judges. The model merely provides a theoretical benchmark against which we can evaluate actually bankruptcy outcomes and test for the presence of continuation bias.

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[48] The process could also be analyzed using a "real options" model. The implications are roughly the same. See Baird and Morrison, *Optimal Timing and Legal Decision-Making*, *supra*. Chen and Sundaresan develop a more general model of the shutdown decision and extend it to consider debtor-in-possession financing. See Nan Chen and Suresh Sundaresan, *The Optimal Bankruptcy Resolution and the Role of Debtor in Possession Financing*, Working Paper (Columbia Business School 2003).

[49] This literature studies the optimal time to terminate an ongoing process, and has been used to analyze a firm's decision to abandon a troubled project, a worker's decision to discontinue job search, and a counterparty's decision to repudiate an ongoing contract. See, e.g., Avinash K. Dixit and Robert S. Pindyck, *Investment Under Uncertainty* ch. 1-2, 7 (Princeton 1994); Thomas J. Sargent, *Dynamic Macroeconomic Theory* (Harvard 1987); Boyan Jovanovic, *Job Matching and the Theory of Turnover*, 87 J. Pol. Econ. 972 (1979); Alexander J. Triantis and George G. Triantis, *Timing Problems in Contract Breach Decisions*, 41 J. Law & Econ. 163 (1998).

Two important implications emerge from this model. First, if a firm's estimated going-concern value at filing (G) is not significantly above or below its liquidation value, the outcome of its Chapter 11 case should be correlated with the degree of uncertainty (U) surrounding that estimate. The greater the uncertainty surrounding estimated firm value, the longer the bankruptcy process should wait before exercising the shutdown option. This is an "options effect" and reflects the asymmetric effect of uncertainty in this context. The greater the uncertainty, the greater the probability that the firm will prove to be a good match tomorrow. There is, of course, a higher probability that the firm will prove to be an unprofitable bad match, but the firm's assets (L) can be sold if this happens. The firm's liquidation value offers a hedge against the downside risk from waiting to liquidate the firm.[50] As a result, the greater the uncertainty surrounding firm value, the longer a firm should spend in Chapter 11.

This options effect, however, will be absent in cases in which the firm's going concern value G is significantly above or below its liquidation value L. If it is significantly above liquidation value, it is virtually certain that the firm will be reorganized or restructured in bankruptcy. The probability of shutdown will be zero or close to it. Conversely, if a firm's going-concern value is significantly below the liquidation value of its assets, it will be shut down immediately.

The second implication of the model is that the probability (or hazard rate) of exercising the shutdown option should be hump shaped over time—low initially, then

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[50] This implication can be reversed under certain conditions, see Luigi Guiso and Giuseppe Parigi, *Investment and Demand Uncertainty*, 114 Q. J. Econ. 185 (1999), but has been confirmed in several recent studies. See Alberto Moel and Peter Tufano, *When are Real Options Exercised? An Empirical Study of Mine Closings*, 15 Rev. Fin. Stud. 35 (2002); Vivek Ghosal and Prakash Loungani, *The Differential Impact of Uncertainty on Investment in Small and Large Businesses*, 82 Rev. Econ. Stat. 338 (2000); Guiso and Parigi, *supra*.

rising, and ultimately declining.[51] The probability should be low when a firm first enters the bankruptcy process because uncertainty is high. As information is obtained and uncertainty resolved, the parties (debtor, creditors, judge) should have stronger incentives to exercise the option. The probability of shutdown will therefore rise as ventures with no viability are discovered and abandoned. Once the shutdown option is exercised in these cases, however, the only remaining ventures will be those with relatively high profitability (put differently, the shutdown option is "out of the money") or those with highly uncertain profitability. Some of these firms will never be shut down; others will be shut down only after a delay, during which the decision-maker gathers information about the firms' viability. Thus, the probability of shutdown should fall gradually over time. This is the "selection effect." This effect has been empirically verified in work applying matching models to labor markets.[52]

These two implications—the options effect and selection effect—provide simple yet theoretically coherent benchmarks for evaluating existing practice in bankruptcy courts.

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[51] Technically, the "hump shape" will characterize the probability (or hazard) of shutdown only if the value of the venture ("going-concern value") is at least as great as its liquidation value when the decision-maker first consider whether to exercise the shutdown option. Alternatively, if we observe multiple decisions by the decision-maker, a "hump shape" pattern will emerge if most of the ventures begin with going-concern value in excess of liquidation value. In the context of Chapter 11, this means that a hump-shaped pattern will be observed if most firms file petitions only when their value as going concerns is at least as great as their liquidation values (i.e., few firms file petitions when they are destined to be shut down immediately by the bankruptcy judge).

[52] See Boyan Jovanovic, *Job Matching and the Theory of Turnover*, 87 J. Pol. Econ. 972 (1979), for theory and Julia Lane and Michael Parkin, *Turnover in an Accounting Firm*, 16 J. Labor Econ. 702 (1998), for an empirical test.

4.2 Evidence of the selection effect

The "selection" effect is evident in Figure 1, which shows a hump-shaped probability of shutdown. The likelihood of shutdown (displayed in black bars) increases during the first three months of a bankruptcy petition, reaches a maximum around 3 months, and then falls. Figure 2 plots the monthly hazard rate of shutdown, which is computed as the ratio of the number of firms shut down to the number of firms not yet shut down in each month.[53] Using a normal approximation to the binomial,[54] the increase from month 1 to month 3 is significant at the 97.5 percent confidence level, while the decrease from month 3 to month 9 is significant at the 96.1 percent confidence level. The hump remains statistically significant.[55]

The hump-shaped pattern suggests an absence of continuation bias. This evidence must, of course, be seen in conjunction with the rest. By itself, the hump-shape pattern is not conclusive as other processes can produce it as well. For example, if bankruptcy judges in the Northern District flipped coins to determine a firm's fate and if, for some reason, most judges flipped a coin when the case reached the three-month mark, but some flipped it earlier and some later, we would see a similar pattern. Here it is not the humped-shaped pattern, but rather the evidence that judges sort effectively between viable and nonviable firms that allows us to reject such an account of bankruptcy decisionmaking.

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[53] I code a firm as "not yet shut down" even if it has left the sample because it has been reorganized. I am implicitly assuming that such a firm, which was "cured" of its financial distress, would not have been shut down even if it remained in bankruptcy for an extended period.

[54] The same test is employed by Kenneth S. Chapman and Lawrence Southwick, Jr., *Testing the Matching Hypothesis: The Case of Major League Baseball*, 81 Am. Econ. Rev. 1352, 1359 (1991).

[55] Applying a normal approximation to the binomial distribution, the increase from month 1 to month 3 is significant at the 98.4% confidence level, while the decrease from month 3 to month 9 is significant at the 92.5% level.

4.3 Evidence of the options effect

Three variables drive the options effect: a firm's estimated going-concern value (G), the uncertainty surrounding that estimate (U), and the liquidation value of the firm's assets (L). If the difference between G and L is not large, an increase in U should increase the amount of time that a firm spends in Chapter 11. It could also increase the probability that a firm exits bankruptcy intact, but only if the firm is reorganized or sold-off at a point when significant uncertainty about its viability remains. This might occur, for example, if the parties to the bankruptcy process believe that it is cheaper to monitor the firm's viability outside of Chapter 11.

4.3.1. Proxies for Key Variables

Although L can be estimated using a debtor firm's financial schedules (which offer rough estimates of the market value of assets), we can develop only rough proxies for G and U for the privately-held firms in this study because the bankruptcy filings provide only cursory information about pre-petition financial performance. Proxies for U can be derived from the observed volatility surrounding earnings of firms in the same industry. One such proxy is the standard deviation of monthly returns on a portfolio of publicly traded firms in the industry.[56] This variable ("Volatility, stockmarket data") is a proxy of the uncertainty driving the "options effect" in the optimal stopping model, assuming a weak correlation between the volatility surrounding the earnings of publicly-traded firms and those of privately-held firms in the same industry.

Another proxy is the cross-sectional variation in profitability among small businesses located in metropolitan areas and operating in the same industry, which can

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[56] The proxy is computed using data from 1995-1997, the three years prior to the bankruptcy filings in this study (a three-year window appears to be a standard time-frame for assessing volatility). The stock-return data was taken from the 48 Industry Portfolios maintained by Eugene Fama and Kenneth R. French. See mba.tuck.dartmouth.edu/pages/ faculty/ ken.french/data_library.html.

be derived from 1998 SSBF data. Because it uses data on small businesses—the focus of this paper—this measure ("Volatility, SSBF data") has advantages relative to the former measure, "Volatility, stock." On the other hand, the former measure is theoretically more attractive because it is based on variation in profitability *within* firms over time, not profitability *across* firms at a single point in time (namely calendar year 1998).

A final proxy for U is the proportion of small businesses within a particular industry that "die" each year ("Firm Attrition Rate"). The U.S. Census Bureau offers dynamic data tracking the births and deaths of small businesses over time. Deaths are defined as closures, which could result from liquidation or merger with another firm. From this data we can derive an average probability (over the period 1995-97) that a firm within particular industry will "die" over the course of a year. This measure is a useful proxy for U because it offers a rough measure of the relative risk of shutdown across industries.

Proxies for going-concern value (G) are more difficult to find. If we assume that a firm's going-concern value is correlated with industry conditions, one proxy for a firm's G is the average growth rate of earnings, employment, or firms in the same industry. If an industry is growing relatively fast, firms in that industry may have relatively high going concern value. A more refined, firm-based proxy is whether the firm entered bankruptcy as a result of overexpansion; such a firm is likely suffering financial distress and may have going concern surplus if it scales back its operations.

Another firm-based proxy is whether the firm, upon entering bankruptcy, files a motion to use cash collateral. Many firms have given lenders security interests in cash and accounts receivable. To access these sources of liquidity, the firms must either obtain permission from the lenders or the court. In practice, courts rarely grant permission over the objection of lenders. Knowing this, debtor firms rarely file motions to use cash collateral without first obtaining the lenders' permission. The filing of a

petition, therefore, offers some evidence that both the debtor and its primary creditors believe that the firm has value as a going concern. The difficulty with both of these firm-based proxies is that not all firms with significant going-concern surplus (high G) will be suffering overexpansion problems or need to file motions to use cash collateral (they may, for example, have not given security interests in their cash). Thus, these proxies identify only some of the firms with relatively high G.

These variables—L, G, and U—are not the only plausible factors affecting the likelihood of shut down in bankruptcy. Other variables include the firm's liquidity (as measured by cash holdings) at the beginning of the case; firms with greater cash holdings are less dependant upon outside sources of liquidity and may be able to survive longer in Chapter 11. Creditor control may also affect the amount of time a firm spends in bankruptcy. I measure the degree of creditor control based on a firm's leverage (debt divided by assets), the extent to which its assets are encumbered by security interests, and whether an owner of the firm has personally guaranteed the firm's debts. Other factors that may affect the shutdown decision are firm characteristics (e.g., age, whether the firm has entered bankruptcy before) and whether the firm complies with bankruptcy procedures (by, e.g., filing required schedules).

4.3.2 Univariate Tests

An initial look at these variables is set out in Tables 9 and 10. Table 9 compares firms that exited before and after the median case duration. About 50 percent of shutdowns occurred within 4 months ("quick shutdowns"); 50 percent of all terminations occurred within 9 months ("quick exits"). Table 10 compares firms that exited intact against those that were shut down. Two of the proxies for U—Volatility, stockmarket data and Volatility, SSBF data—are larger on average in cases where shutdown or exit occurred later in time ("slow" shutdowns and exits). This is consistent with the options effect, but the results are only marginal significant. Among shutdowns, the other proxy for U—Firm Attrition Rate— is larger on average among slow shutdowns, consistent with the options effect. But among cases where exit occurred for any reason, it is larger on average among quick exits, suggesting that Firm Attrition Rate was relatively high among firms that were reorganized or sold off quickly.

The proxies for G are similarly mixed. Firm Growth Rate—the average annual increase in the number of firms, by industry, during 1995-97—does not vary significantly between quick and slow shutdowns or between quick and slow exits, but it is significantly larger among shutdowns than among continuations (see Table 10). The same pattern emerges when we analyze the average annual increase in employment, by industry, for the same period. This may suggest that Firm Growth Rate is a poor proxy for G, or it may reflect the possibility that industries with high growth rates also have high earnings volatility (the correlation with Volatility, stockmarket is .35). The other proxies for G—Overexpansion and Motion to Use Cash Collateral—exhibit patterns more consistent with the matching model: they are larger on average in cases that resulted in slow shutdown, slow exit, and continuation.

The remaining summary statistics in Tables 9 and 10 exhibit other interesting patterns. Firms that were shutdown quickly were relatively young, had smaller cash holdings, and had larger secured debt levels, and were more likely to have violated court rules (by not filing financial schedules or by proceeding without a lawyer) than firms that were shutdown more slowly. Similar differences characterize quick versus slow exits (Table 9) and shutdowns versus continuations (Table 10).

4.3.3 Multivariate tests

Simple summary statistics offer some evidence supporting the existence of an options effect. Multivariate analysis, displayed in Table 11, allows us to test this effect more carefully.

Columns I through VII of Table 11 analyze the duration of cases resulting in shutdown. Columns I and II present a simple Cox model of the hazard rate, defined as the probability of shutdown at time t conditional upon avoiding shutdown at least until t. Formally, the hazard rate $h(t, X)$ is defined as $h(t, X) = h(0)e^{x\beta}$, where X is a vector of regressors and β a vector of estimated coefficients. A negative coefficient implies that a regressor reduces the hazard of shutdown or, equivalently, increases the duration until shutdown. The Cox model is attractive largely because it makes no assumption about the shape of *h(0)*, the "baseline" hazard rate. Column I presents the results of a simple model in which the only covariates are proxies for U, G, and L. Consistent with the univariate analysis in Table 9, the coefficients on the proxies for uncertainty are uniformly negative, implying that an increase in uncertainty is correlated with longer case duration. The negative coefficient is marginally significant for Industry Volatility, Stock Data and for Industry Attrition Rate. The third proxy—Industry Volatility, SSBF Data—appears to have no predictive value. Column II shows that little or nothing changes in the model when this variable is dropped (it is dropped in the remaining analysis as well). On net, then, shutdown occurs later in time for firms with relatively

high indexes of U. Columns I and II show also that various measures of going-concern surplus reduce the hazard rate, again consistent with the theoretical model.

Column III augments the Cox model by adding other variables that may affect the hazard of shutdown. The proxies for uncertainty remain negative but increase in significance. Among the newly added variables, cash holdings and leverage are strongly correlated with reductions in the hazard rate; on the other hand, an increase in the hazard rate is likely when a firm proceeds without a lawyer or has filed a bankruptcy petition in the preceding six years. These observations are unchanged when we eliminate repeat filings by the same firm during the sample period (Column III).

Columns V through VII of Table 11 show that the results of the Cox model are similar to those obtained from duration models in which the baseline hazard rate *h(0)* is assumed to have a particular distribution, such as the Weibull (Column V), Lognormal (VI), and Exponential (VII) distributions. The models applying the Weibull and Exponential distributions are models of the hazard rate, so a *negative* coefficient implies that an increase in the regressor reduces the hazard rate and increases case length. In contrast, the model applying the lognormal distribution is a model of case length itself, so a *positive* coefficient implies a longer case length. Thus, the positive coefficients on the proxies for uncertainty in Column VI are consistent with the negative coefficients in the other columns.

It should be noted that the results in Columns I through VII are based entirely on the subset of cases involving shutdowns (n=59). The models suggest that, *among these cases*, the greater the uncertainty surrounding firm viability, the longer the firm is allowed to continue operations in Chapter 11. These models, of course, ignore information in the subset of cases in which the firm exited bankruptcy intact ("continuations"). Column VIII accounts for this information using a specialized

duration model known as a "cure" or "split population" model,[57] which assumes that all firms that entered the bankruptcy system—even those that ultimately exited intact—were at risk of shutdown. Firms that exited intact—via a plan of reorganization or a going-concern sale—might have been shut down had they lingered in Chapter 11. The "cure" model simultaneously estimates (1) the probability that a firm would have been shut down in bankruptcy and, assuming it would have been shut down, (2) the amount of time that would have elapsed before shutdown occurred.

Formally, the likelihood function for the cure model is assembled as follows. Following Schmidt and Witte,[58] let *S* be an unobservable variable indicating whether a firm would be shut down in bankruptcy if the bankruptcy judge were given sufficient time to gather information about the firm. Let *S* equal one if a firm would be shutdown and zero otherwise. Assume that the probability that *S* equals 1 is δ: $\Pr(S=1)=\delta$ and $\Pr(S=0)=1-\delta$. Next, let *t* measure the amount of time a firm spends in bankruptcy before being shut down. Assume that *t* is distributed according to some cumulative distribution function *G*. Thus, the density of firms that are shut down after *t* months in bankruptcy is $g(t|S=1)$. Finally, let *C* be a dummy variable indicating whether information about a firm is "censored," i.e., we know that the firm exited bankruptcy but do not know whether it would have been shut down had it stayed. Let *C* equal zero if a firm is shut down in bankruptcy and one if it exits. If a firm exits bankruptcy

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[57] See Joseph Berkson and Robert P. Gage, *Survival Curve for Patients Following Treatment*, J. Am. Statistical Assoc. 501 (1952) for early analysis of this model. For econometric applications, see Peter Schmidt and Ann Dryden Witte, *Predicting Recidivism Using "Split Population" Survival Time Models*, 40 J. Econometrics 141; Arindam Bandopadhyaya and Sanjiv Jaggia, *An Analysis of Second Time Around Bankruptcies Using a Split-Population Duration Model*, 8 J. Empirical Fin. 201 (2001).

[58] *Supra*, at 148-49.

without being shut down, let T measure the amount of time the firm spent in bankruptcy.

With these definitions in hand, we can write the contribution to the likelihood function by firms (indexed by i) that are shut down in bankruptcy as

$$\Pr(S=1)g(t_i|S=1)=\delta g(t_i|S=1).$$

For firms that exit bankruptcy intact (indexed by j), the contribution to the likelihood function is

$$\Pr(C=1)=\Pr(S=0)+\Pr(S=1)\Pr(t>T_j|S=1)=(1-\delta)+\delta\left[1-G(T_j|S=1)\right].$$

Therefore, the likelihood function is

$$L=\sum_i\left[\delta g(t_i|S=1)\right]+\sum_j\left\{(1-\delta)+\delta\left[1-G(T_j|S=1)\right]\right\}$$

where $\sum_i$ sums over firms shut down in bankruptcy (C=0) and $\sum_j$ sums over firms that exited bankruptcy intact (C=1). Estimates reported in Column VIII assume that G is a lognormal distribution, a standard assumption in settings where the hazard rate is non-monotonic, as it is here. The model also assumes, for simplicity, that δ is a scalar with logistic distribution.[59]

Column VIII shows that the estimates derived from this cure model are roughly identical to those generated by a simple duration model in which the baseline hazard is assumed to be lognormal. Combined with the results in Columns I through VII, these results offer suggestive evidence in favor of the options effect.

Instead of studying the *duration* to shutdown, Column IX analyzes the *probability* of shutdown using a standard logit model. Here, the subset of cases resulting in shutdown are compared to the subset resulting in continuation. The coefficients in Column IX indicate the effect of changes in the control variables on the probability of shutdown. The dependent (dummy) variable equals one if a case resulted in shutdown

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[59] This simple model is estimated using Mario Cleve's "lncure" program for STATA, available at http://www.stata.com/users/mcleves/lncure/.

and zero otherwise. Interestingly, only one of the proxies for uncertainty—Industry Volatility, Stock Data—has the predicted negative effect. The other proxy has a positive, but insignificant, coefficient. As in the tabular analysis, the proxies for going-concern surplus also have mixed coefficients. An increase in Industry Growth Rate is strongly correlated with an increase in the probability of shutdown. The opposite is true for the other proxies, Overexpansion Problems and Cash Collateral Motion. The logit model, then, offers only mixed support for the options effect. This may not be surprising, because the theory offers its strongest implications for firms that are actually shut down.

These results using the formal model are again generally consistent with what we would observe if a rational market actor were charged with sorting between viable and nonviable firms. The hazard of shutdown is hump-shaped, a firm is more likely to exit bankruptcy intact if it has significant going concern value, and a firms is more likely to be shut down quickly if there is relatively little uncertainty about its value as a going concern.

5. Policy Implications and Conclusions

Evidence gathered from the Northern District of Illinois supports the hypothesis that current practice in the bankruptcy courts exhibits no systematic bias in favor of saving non-viable firms. The debtor's managers are not in control and firms destined to fail are identified quickly. Viewed through the lens of a formal matching model of the bankruptcy process, the data again suggest that bias commonly ascribed to the Chapter 11 process is either absent or empirically unimportant. Thus, the costs of small business Chapter 11 cases are much smaller than commonly thought. Whether the benefits of

Chapter 11 are even enough to justify these costs, however, is far from self-evident. A careful examination of the potential benefits of Chapter 11 is needed too.[60]

[60] In another paper, I use data from the Northern District to address this question as well. See Baird and Morrison, *Serial Entrepreneurs and Small Business Bankruptcies*, *supra*. There we argue that the benefits of small business Chapter 11s, like the costs, are quite low, even when the business survives as a going concern.

Appendix

A Matching Model of Chapter 11

Consider an idealized bankruptcy court that receives Chapter 11 petitions by a continuum of firms every period. Some are worth reorganizing; they appear with probability *p*. The rest should be liquidated and appear with probability 1-*p*. When a particular firm files a petition, no one knows whether it is a high-value firm (*H*) worth reorganizing or a low-value (*L*) firm that should be liquidated. Information about firm type, however, is revealed over the course of the bankruptcy case. During the first period of the case (period 1), the court will receive a signal *s* of firm type. The signal is either good (*g*) or bad (*b*). Good signals occur with probability π_g and bad with probability π_b. Additionally, good signals are more likely to arise from *H* firms than from *L* firms: $\pi_{g|H} > \pi_{g|L}$. Similarly, bad signals are more likely to arise from *L* firms than *H* firms: $\pi_{b|L} > \pi_{b|H}$. Note that $\pi_{g|H} + \pi_{b|H} = 1$ and that $\pi_{g|L} + \pi_{b|L} = 1$.

After receiving the first-period signal, the judge can either shut the firm down or allow it to continue. If the firm is shut down, the return to creditors is *R*. If it is allowed to continue, the judge will receive an additional signal of firm quality in the second period of the case (period 2). Again, the signal is either *g* or *b* with probabilities $\left\{\pi_{g|H}, \pi_{b|H}\right\}$ and $\left\{\pi_{g|L}, \pi_{b|L}\right\}$, respectively. And, again, at the end of period 2 the judge

can choose either to liquidate the firm or allow it to continue. If the judge allows the firm to continue to the third period (period 3), full information about firm type will be revealed at the end of the period. That is, the firm will be revealed to be either *H* or *L* at the end of period 3. If the firm is revealed to be type *H*, the firm is worth *H* to creditors. If it is revealed to be type *L*, it is worth only *L*<*R*. There is a cost to waiting, however. The judge applies a discount factor $\beta = 1/(1+r)$ to future payoffs (the judge discounts the future at rate *r* because creditors do).

In this three-period model, the judge has an opportunity to exercise the shutdown option at the end of each period. When is the optimal time to exercise the option? We can characterize the optimal decision by working backwards. At the end of period 3, the decision is trivial. A firm will be liquidated if it is type *L* and kept intact if it is type *H*; the payoff to liquidation (*R*) exceeds the going-concern value of type-*L* firms but falls short of the value of type-*H* firms. More formally, the judge's problem is $\max\{H, R\} = H$ if the firm is type *H* and $\max\{L, R\} = R$ if the firm is type *L*.

Given the judge's decision rules at the end of period 3, we can characterize the rules at the end of period 2. Here the judge's decision will depend on a firm's history of signals, *s*. If the firm's history was $s = \{g, g\}$, meaning that good signals were received in periods 1 and 2, then the firm's expected value as a going concern will be

$$E(V|gg) = \Pr(H|gg)H + \Pr(L|gg)R,$$

where

$$\Pr(H|gg) = \frac{\pi_{g|H}\pi_{g|H}p}{\pi_{g|H}\pi_{g|H}p + \pi_{g|L}\pi_{g|L}(1-p)}$$

according to Bayes' Rule. Note that $E(V|gg)$ incorporates the period 3 decision rules—type *H* firms will be kept intact (with payoff *H*) and type *L* firms will be liquidated (with payoff *R*). The judge's problem is

$$\max\{\beta E(V|gg), R\}.$$

A firm will be kept intact only if the discounted expected value of the firm is at least as great as the return to creditors from immediate liquidation: $\beta E(V|gg) \geq R$. Simplifying this expression, we can show that the firm is worth liquidating only if the return to creditors is at least equal to R^*_{gg}, such that

$$R^*_{gg} = \frac{\Pr(H|gg)}{(1+r)-(1-\Pr(H|gg))}H = \frac{\left(\pi_{g|H}\right)^2 p}{\left(\pi_{g|H}\right)^2 p(1+r) + \left(\pi_{g|L}\right)^2 (1-p)r}H.$$

Analogous expressions[61] characterize the threshold return to creditors—R^*_{gb}, R^*_{bg}, and R^*_{bb}—when the judge has received different signals of firm quality in periods 1 and 2.

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[61] These expressions are $R^*_{gb} = R^*_{bg} = \frac{\Pr(H|gb)}{(1+r)-(1-\Pr(H|gb))}H$ and $R^*_{bb} = \frac{\Pr(H|bb)}{(1+r)-(1-\Pr(H|bb))}H$.

These thresholds have important characteristics. First, the thresholds are higher for firms with better histories: $R^*_{gg} > R^*_{gb} = R^*_{bg} > R^*_{gg}$, which follows from

$$\Pr(H|gg) > \Pr(H|bg) = \Pr(H|gb) > \Pr(H|bb).^{62}$$

This simply means that judges are less willing to terminate firms that have generated better signals of quality. More importantly, all of these thresholds are increasing in the variance of firm quality, $\sigma^2 = p(1-p)(H-L)^2$. Holding average quality—$pH + (1-p)L$—constant, variance in firm quality increases as the difference between H and L increases. Consider an increase in H and decrease in L that raises variance but holds average quality constant. Since R^*_{gg} and all other thresholds are increasing in H, all thresholds will rise. This property reflects the "option value" of liquidation. Although increases in variance reduce the value of type-L firms, a judge can always avoid the downside risk by liquidating the firm (for payoff $R>L$). Thanks to this

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[62] To see this, note that the expression $\Pr(H|gg) > \Pr(H|bb)$ is equivalent to $\frac{\left(\pi_{g|H}\right)^2 p}{\left(\pi_{g|H}\right)^2 p(1+r) + \left(\pi_{g|L}\right)^2 (1-p)} > \frac{\left(\pi_{b|H}\right)^2 p}{\left(\pi_{b|H}\right)^2 p + \left(\pi_{bg|L}\right)^2 (1-p)}$, which is equivalent to $\left(\frac{\pi_{b|l}}{\pi_{b|H}}\right)^2 > \left(\frac{\pi_{g|L}}{\pi_{g|H}}\right)^2$. The last inequality is true because $\pi_{g|H} > \pi_{g|L}$ and $\pi_{b|H} < \pi_{b|L}$. Similar calculations show that $\Pr(H|gg) > \Pr(H|gb)$ and $\Pr(H|gb) > \Pr(H|bb)$.

"insurance," an increase in variance can only increase the potential payoff to creditors and the debtor.

Turn now to the judge's problem at the end of period 1, given the decision rules at the end of periods 2 and 3. The judge's decision here will depend on the relationship between the firm's liquidation value (R) and the period-2 thresholds, R^*_{gg}, R^*_{gb}, and R^*_{bb}. The analysis must therefore be divided into the different cases. Although four cases are possible, only two ($R^*_{gb} < R < R^*_{gg}$ and $R^*_{bb} < R < R^*_{gb}$) are interesting. If $R > R^*_{gg}$, a judge will always liquidate the firm at the end of period of period 2; the history of signals is irrelevant in light of the large payoff from liquidation. If a firm will always be liquidated at the end of period 2, it makes no sense to avoid liquidation in period 1. Hence, the firm will always be liquidated at the end of period 1. Conversely, if $R < R^*_{bb}$, a judge will always keep a firm intact at the end of period 2, regardless of the history of signals, because the payoff to creditors is so low. It may still make sense to liquidate the firm at the end of period 1 (*e.g.*, the interest rate may be sufficiently high to make liquidation profitable in period 1 but not in period 2),[63] but this situation seems fairly unusual.

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[63] To see this, note that if the first-period signal was g, the judge solves $\max\left\{\beta^2 E(V|g), R\right\}$ at the end of period 1. The firm will be kept intact if the return to creditor is

Thus, consider Case 1: $R^*_{gg} > R > R^*_{gb}$, which implies that a firm will be kept intact at the end of period 2 only if its history of signals was $\{g, g\}$. Knowing this, the judge will shut down any firm with a bad first-period signal. For these firms, the threshold return to creditors is $R^*_{b1} = 0$. For firms with good first-period signals, on the other hand, the judge's problem is

$$\max\{\beta[\Pr(g \mid g)\beta E(V|gg) + \Pr(b \mid g)R], R\}$$

where $\Pr(g \mid g)$ and $\Pr(b \mid g)$ are the probabilities of good and bad signals in period 2, given a good signal in period 1. For these firms, continuation is superior unless the return to creditors (R) exceeds the threshold R^*_{g1} defined by

$$R^*_{g1} = \frac{\Pr(H|gg)}{(1+r)(1+\Pr(g)r) - (1-\Pr(H|gg))} H .$$

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below the following threshold:

$$R^*_g = \frac{\Pr(H|g)}{(1+r)^2 - (1-\Pr(H|g))} H .$$

Alternatively, if the first-period signal was b, the judge solves $\max\{\beta^2 E(V|b), R\}$ and the threshold is

$$R^*_b = \frac{\Pr(H|b)}{(1+r)^2 - (1-\Pr(H|b))} H .$$

In either case, then, there exists a positive threshold above which liquidation is preferable, even though liquidation will never be preferable in the future.

For R^*_{g1} to lie between R^*_{gb} and R^*_{gg}, the interest rate *r* must be sufficiently low[64] (if the interest rate is high, it pays to liquidate early and invest the proceeds in the marketplace).

Now consider Case 2: $R^*_{bb} < R < R^*_{gb}$, which implies that a firm will be kept intact at the end of period 2 if its history of signals is $\{g,g\}$, $\{g,b\}$, or $\{b,g\}$. If the first-period signal was *g*, the judge's problem is

$$\max\left\{\beta^2 E(V|g), R\right\}$$

and the firm will be kept intact so long as *R* is less than the threshold R^*_{g2}, defined by

$$R^*_{g2} = \frac{\Pr(H|g)}{(1+r)^2 - (1-\Pr(H|g))} H .^{65}$$

Similarly, if the first-period signal was bad, the judge must solve $\max\left\{\beta^2 E(V|b), R\right\}$ and the firm will be kept intact only if the return to creditors is below the threshold R^*_{b2} defined by[66]

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[64] The interest rate must satisfy the inequality $1+r \le \left(\frac{\Pr(H|gg)}{\Pr(H|gb)} - 1\right)\frac{1}{\Pr(g)}$.

[65] Again, this threshold imposes limits on the size *r*, which must satisfy the inequality $\frac{\Pr(H|g)}{\Pr(H|gb)} \le 2 + r \le \frac{\Pr(H|g)}{\Pr(H|bb)}$ to ensure that $R^*_{bb} < R^*_{g2} < R^*_{gb}$.

[66] The interest rate must satisfy the inequality $1+r \le \left(\frac{\Pr(H|gb)}{\Pr(H|bb)} - 1\right)\frac{1}{\Pr(b)}$.

$$R_{b2}^{*} = \frac{\Pr(H|gb)}{(1+r)(1+\Pr(b)r)-(1-\Pr(H|gb))}H\,.$$

Given these thresholds, $\left\{R_{bb}^{*}, R_{b2}^{*}, R_{g2}^{*}, R_{gb}^{*}, R_{b1}^{*}, R_{g1}^{*}, R_{gg}^{*}\right\}$, we can determine how the probability of liquidation varies over the course of a case. Assume that the going-concern value of a firm seeking Chapter 11 protection is at least equal to its liquidation value (R^0). That is, $\beta^3 E(V) \geq R^0$, or

$$R^0 \leq \frac{p}{(1+r)^3-(1-p)}H\,,$$

which implies that the probability of liquidation is zero at the beginning of period 1. This assumption also implies that $R^0 < R_{g1}^{*} < R_{gg}^{*}$ because $p < \Pr(H|gg)$, that $R^0 < R_{g2}^{*}$ because $p < \Pr(H|g)$, and that $R^0 > R_{bb}^{*}$ because $p > \Pr(H|bb)$. It is unclear, however, whether the liquidation value R^0 is greater or less than the threshold R_{gb}^{*} because p may be greater or less than $\Pr(H|gb)$.

Suppose first that $R^0 > R_{gb}^{*}$. Given that $R^0 < R_{g1}^{*} < R_{gg}^{*}$, a firm will be shut down at the end of period 1 only if the judge received a bad signal, which will occur with probability $\Pr(b) = \pi_{b|H}\,p + \pi_{b|L}(1-p)$. Liquidation will occur at the end of period 2 only if the judge receives a good first-period signal followed by a bad second-period signal. Given that a firm was not liquidated at the end of period 1, the probability that it will

broadcast a bad signal in period 2 is

$$\Pr(b|g) = \pi_{b|H} \Pr(H|g) + \pi_{b|L}\left(1 - \Pr(H|g)\right),$$

which is smaller than $\Pr(b)$ because $\Pr(H|g) > p$ and $\pi_{b|H} < \pi_{b|L}$. A similar argument shows that the probability of liquidation at the end of period three, $\Pr(b|gg)$, is less than both $\Pr(b)$ and $\Pr(b|g)$. Hence the probability of liquidation rises during the first period and falls thereafter.

Now suppose $R^0 < R^*_{gb}$. We know that $R^*_{bb} < R^0 < R^*_{g2}$, but R^0 may be greater or less than R^*_{b2}. Assume first that $R^0 > R^*_{b2}$. This means that firms with bad first-period signals will be liquidated. Firms with good-period signals will be kept intact at the end of the first period and all subsequent periods. In this case, the probability of liquidation is $\Pr(b)$ at the end of period 1 and zero thereafter. Thus the hazard of liquidation is hump-shaped, rising in the first period and falling thereafter.

Now suppose that $R^0 < R^*_{b2}$, implying that firms with bad first-period signals will be kept intact. No firm will be liquidated at the end of period 1; all liquidations will occur at the end of the second and third periods. The probability of liquidation at the end of the second period is $\Pr(b|b) = \pi_{b|H} \Pr(H|b) + \pi_{b|L}\left(1 - \Pr(H|b)\right)$. For firms that survive past the second period, the probability of liquidation is $\Pr(L|E)$, where

$E = gg \cup gb \cup bg$. In this case, it is unclear whether $\Pr(L|E)$ is greater or less than $\Pr(b|b)$. The hazard of shutdown, then, may not be hump-shaped for firms with very low liquidation values. For these firms, there is a strong incentive to wait until full information is available.

FIGURES

Figure 1
Months to Exit: Shutdowns and Continuations

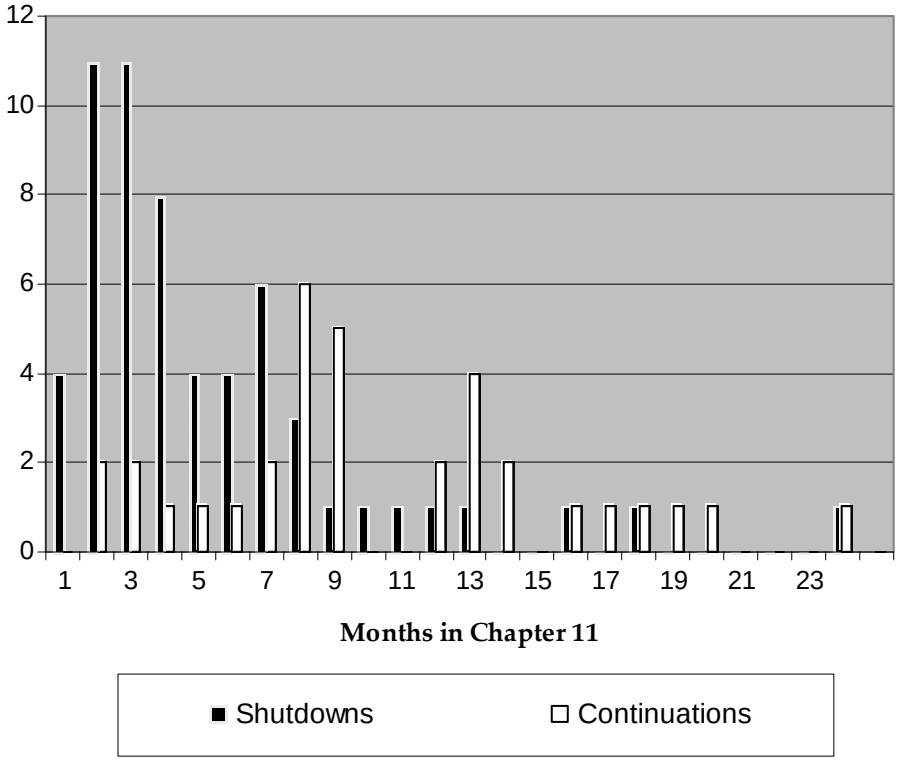
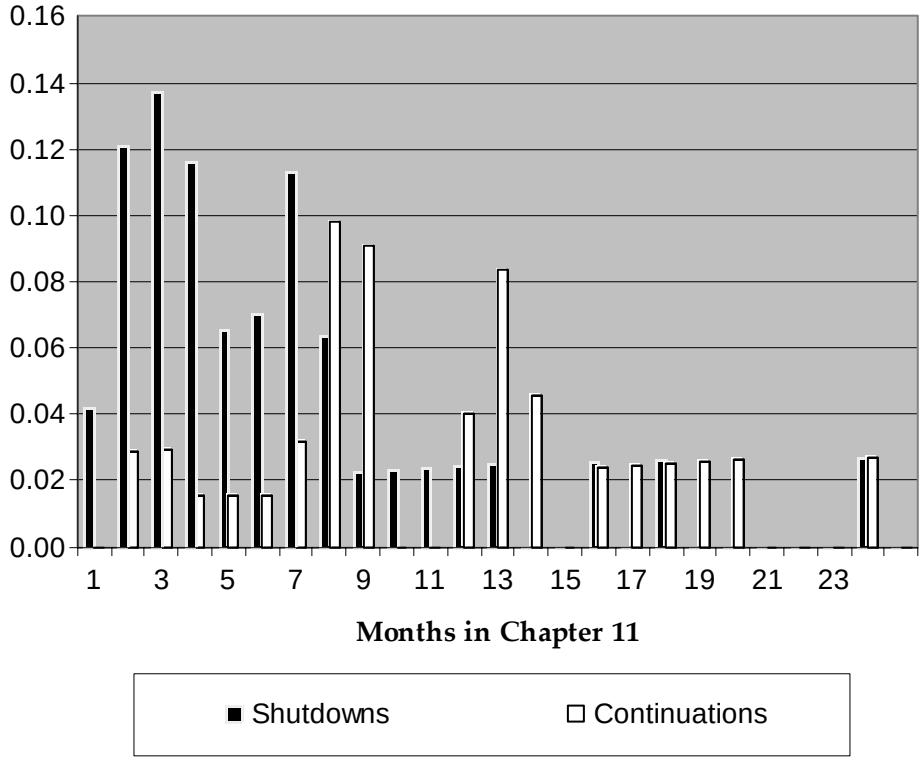


Figure 2

Monthly Hazard Rate: Shutdowns and Continuations



TABLES

Table 1
Sample Selection

	Petitions	Firms
Initial sample	184	
Deletions or consolidations:		
Business filings by individual debtors	30	
Single asset real estate cases	22	
Non-business filings by individuals	12	
Firms using Ch. 11 to sell assets or settle a dispute	8	
Sister companies	7	
Firms dead on arrival	5	
Publicly traded companies	2	
Insufficient information	2	
Simultaneous involuntary petition	1	
Final sample	95	91

Table 2

Firm Characteristics: Sample *versus* Corporations in 1998 Survey of Small Business Finance (SSBF), excluding farming, mining, and real estate

Category	N.D. IL	SSBF
Fewer than 20 employees, %	83.9	83.1
Age in years, median (mean)	6.9	13.0
	(12.6)	(13.7)
Assets $, median (mean)	114,160	320,971
	(664,540)	(713,1023)
Debt $, median (mean)	511,752	191,660
	(2,429,858)	(462,848)
Leverage (Debt/Assets)	3.37	.59
	(16.82)	(.65)
Standard Industrial Classification (SIC), %		
Construction (15-17)	12.6	11.2
Primary Manufacturing (20-39)	10.5	11.7
Transportation (40-46, 48)	4.2	3.3
Wholesale Trade (4813, 50-51)	3.2	11.3
Retail Trade (52-59)	11.6	15.2
Eating and Drinking Places (58)	16.8	3.6
Insurance Agents and Real Estate (60-69)	3.1	2.7
Business Services (47, 49, 70-79)	21.1	23.9
Professional Services (80-89)	16.8	17.1

Note: reported means for the SSBF sample are estimates of population averages and were computed using survey weights. Reported medians are the 50th percentile of the raw, unweighted data.

Table 3
Industry Demographics Across Select Studies,

Business category marked on face sheet	N.D. IL (%)	N.D. IL, before sample selection (%)	Warren & Westbrook (%)	1998-99 AO Data (%)
Debt under $1 million	68.4		65.7	67.1
Assets under $1 million	81.1		80.0	71.4
Less than 20 employees	83.9		88.2	84.1
Farming	.	.	1.6	1.7
Professional	5.3	3.5	3.7	3.6
Retail/Wholesale	20.0	12.8	15.6	18.4
Railroad	.	.	.03	
Transportation	1.1	1.2	2.3	2.7
Manufacturing/Mining	4.2	2.3	2.5	6.5
Stockbroker	.	.	.07	.2
Commodity Broker	.	.	.2	.
Construction	7.4	5.2	7.5	5.6
Real Estate	.	9.3	7.3	13.7
Other or unspecified	62.1	65.7	59.2	47.7
Jurisdictions studied	N.D. Ill.	N.D. Ill.	23 Districts	All districts
Types of cases	Corp. Ch. 11	Business Ch. 11	Business Ch. 11 (assets/debt); business Ch. 7, 11, or 13 (other)	Corp. Ch. 11
Number of cases	103	173	Varies (787 to 2981)	23,671
Study year	1998	1998	1996	1998

Table 4
Case Dispositions

Panel A: Legal and Economic Outcomes (frequencies)

	Legal Outcomes			
Economic Outcomes	**Reorganization**	**Dismissal**	**Conversion to Chapter 7**	**Totals**
Continuations:				
Exited with new capital structure	23	4		27
Going-concern sale	4	4	1	9
Totals	27	8	1	36
Shutdowns:				
Shutdown before exiting bankruptcy		9	19	28
Exited without new capital structure		31		31
Totals	0	40	19	59

Panel B: Legal outcomes across jurisdictions, using AO Data (%)

Sample	**Reorganization**	**Dismissal**	**Conversion to Chapter 7**
N.D. IL cases, 1998-99 (n=470)	33.2	43.6	23.2
All jurisdictions, 1998-99 (n=13,457)	30.7	29.9	39.4

Note: Panel B statistics are derived from data on voluntary Chapter 11 cases that terminated in 1998 and involved corporations that had assets worth less than $10 million and were not classified as farming, real estate, or stockbroker. The data were gathered by the Administrative Office of the U.S. Courts.

Table 5
Post-Bankruptcy Experience of Firms that Exited Without a New Capital Structure (n=31)

Date of shutdown	Frequency	Cumulative %
Before exiting bankruptcy	10	32.3
Within 6 months of exiting	8	58.1
Within 1 year of exiting	5	74.2
Within 2 years of exiting	1	77.4
More than 2 years after exiting	7	100.0

Table 6
Duration of Chapter 11 Cases

Panel A

Duration to confirmation, conversion, or dismissal	% all cases (N=95)	% continuations (N=36)	% shutdowns (N=59)[1]
1 month or less	4.2	0.0	6.8
3 months or less	31.6	11.1	44.1
6 months or less	51.6	19.4	71.2
9 months or less	76.8	58.3	88.1
12 months or less	81.1	63.9	91.5
Median duration (months)	5.7	8.3	3.4

Panel B

Duration to case closure (months)	All cases	Reorganizations	Dismissals	Conversions
N.D. IL cases closed during FY 1998-99:				
Median duration	18.9	21.4	12.0	51.1
% of 1998-99 filings closed within 12 months	31.1%			
% of 1998 filings closed within 24 months	57.9%			
All cases closed during FY 1998-99:				
Median duration	27.6	29.4	9.4	49.7
% 1998-99 filings closed within 12 months	23.4%			
% 1998 filings closed within 24 months	45.1%			

Note: Panel B statistics are derived from data on voluntary Chapter 11 cases that terminated in 1998 and involved corporations that had assets worth less than $10 million and were not classified as farming, real estate, or stockbroker. The data were gathered by the Administrative Office of the U.S. Courts.

Table 7
Party Responsible for Shutdown Motions

Panel A: Party filing final, successful shutdown motion	**% Shutdowns (n=59)**	
Debtor		
Filed after court granted creditor's lift-stay motion	15.3	
Other cases	17.0	
Total		32.3
U.S. Trustee		
Filed after court granted creditor's lift-stay motion	20.3	
Other cases	40.7	
Total		61.0
Creditors		
Filed successful shutdown motion	6.8	
Filed lift-stay motion, inducing another party's shutdown motion	35.6	
Total		42.4
U.S. Trustee or Creditor, including cases in which debtor acted in response to successful lift-stay motion		83.1

Panel B: Total number of motions filed in a case	**1**	**2 or more**	**At least 1**
By trustee			
% shutdowns (n=59)	55.9	5.1	61.0
% continuations (n=36)	16.7	5.6	22.3
% all cases (n=95)	41.0	5.3	46.3
By creditors			
% shutdowns (n=59)	32.2	35.5	67.7
% continuations (n=36)	33.3	25.1	58.4
% all cases (n=95)	32.3	31.6	63.9

Table 8

Post-Bankruptcy Experience of Firms that Exited with New Capital Structure (n=27)

	Based on Annual Reports		Based on Annual Reports and Other Sources	
	Number	**Cumulative %**	**Number**	**Cumulative %**
Failed within 1 year	6	22.2	3	11.1
Failed within 2 years	10	37.0	8	29.6
Failed within 3 years	13	48.2	12	44.4
Survived more than 3 years	14	100.0	15	100.0

Table 9
Reasons for Filing Chapter 11 Petitions

	Shutdowns (n=56) % (freq)	
Panel A: Evidence of Economic Distress		
Ignored procedural requirements	62.5 (35)	
Failed to pay ongoing expenses	26.8 (15)	
Using Ch. 11 to favor insider-creditors	1.8 (1)	
Any Evidence of economic distress	78.6 (44)	
	Shutdowns	**Continuations**
Panel B: Evidence of Financial Distress	**% (freq)**	**% (freq)**
Overexpansion	8.9 (5)	40.0 (14)
Prepetition fraud or malfeasance	3.6 (2)	8.6 (3)
Cash shortages from loss of customers	10.7 (6)	8.6 (3)
Cost overruns from reconfiguring business	3.6 (2)	11.4 (4)
Asbestos liability	0.0 (0)	2.9 (1)
Any evidence of financial distress	26.8 (15)	71.4 (25)
Any evidence of financial distress, excluding cases exhibiting economic distress	10.7 (6)	71.4 (25)

Table 10

Differences between cases terminating before and after median case duration

Category	Shutdowns		All Cases	
	Within 4 Months	**Over 4 Months**	**Within 6 Months**	**Over 6 Months**
Volatility, stockmarket data (U)	4.124 (.085)	4.248 (.121)	4.213 (.102)	4.289 (.093)
Volatility, SSBF data (U)	.177 (.003)	.180 (.003)	.177 (.002)	.183 (.003)^
Firm Attrition Rate, by Industry (U)	10.042 (.260)	10.524 (.244)#	10.123 (.212)	10.094 (.236)
Firm Growth Rate, by Industry (G)	1.328 (.201)	1.480 (.214)	1.211 (.171)	.975 (.180)
Overexpansion problems (G)	.118 (.056)	.24 (.087)**	.224 (.060)	.478 (.074)***
Motion to use cash collateral (G)	.235 (.074)	.640 (.098)***	.285 (.065)	.761 (.064)***
Log asset value (L)	11.079 (.311)	11.928 (.333)***	11.117 (.244)	12.491 (.271)***
Log cash holdings	6.206 (.608)	7.636 (.669)^	6.560 (.492)	8.183 (.488)**
Leverage (log debt/log assets)	1.166 (.026)	1.143 (.027)^	1.169 (.026)	1.118 (.017)
Secured debt ≥ 75% of asset value	.618 (.085)	.560 (.101)*	.673 (.068)	.304 (.069)***
Any debt personally guaranteed	.903 (.054)	.96 (.040)	.933 (.038)	.848 (.054)#
Under 5 years old	.529 (.087)	.240 (.054)**	.490 (.072)	.174 (.057)***
Proceeding without lawyer	.088 (.049)	0.0 (0.0)^	.061 (.035)	.022 (.022)
Prior bankruptcy within 6 years	.176 (.066)	.160 (.075)	.163 (.053)	.130 (.050)
Prior bankruptcy during 1998	.059 (.041)	.040 (.040)	.062 (.035)	.022 (.022)
Incomplete financial schedules	.206 (.070)	0.0 (0.0)**	.163 (.053)	0.0 (0.0)***

Notes: Parentheses contain p-values. The symbols ***, **, *, and ^ indicate that the differences are significant at the 1%, 5%, 10%, and 15% levels, respectively, using 2-tailed *t*-tests. The symbols ## and # indicate differences that are significant at the 5% and 10% levels, respectively, using 1-tailed *t*-tests.

Table 11

Differences between shutdowns and continuations

	All Cases	
Category	**Shutdowns**	**Continuations**
Volatility, stockmarket data (U)	4.177 (.070)	4.369 (.140)#
Volatility, SSBF data (U)	.178 (.002)	.182 (.003)
Firm Attrition Rate, by Industry (U)	10.246 (.183)	9.885 (.286)
Firm Growth Rate, by Industry (G)	1.393 (.146)	.611 (.201)***
Overexpansion/adjustment problems (G)	.119 (.042)	.472 (.084)***
Motion to use cash collateral (G)	.407 (.065)	.694 (.078)***
Log asset value (L)	11.458 (.232)	12.341 (.387)**
Log cash holdings	6.819 (.457)	8.187 (.542)*
Leverage (log debt/log assets)	1.155 (.019)	1.126 (.027)
Secured debt ≥ 75% of asset value	.593 (.065)	.333 (.080)**
Any debt personally guaranteed	.929 (.035)	.829 (.065)^
Under 5 years old	.407 (.065)	.222 (.070)*
Proceeding without lawyer (pro se)	.051 (.029)	.028 (.028)
Prior bankruptcy within preceding 6 years	.169 (.049)	.111 (.053)
Prior bankruptcy during 1998	.051 (.029)	.028 (.028)
Incomplete financial schedules	.102 (.040)	0.0 (0.0)**

Notes: Parentheses contain standard errors. The symbols ***, **, *, and ^ indicate that the differences are significant at the 1%, 5%, 10%, and 15% levels, respectively, using 2-tailed *t*-tests. The symbols ## and # indicate differences that are significant at the 5% and 10% levels, respectively, using 1-tailed *t*-tests.

Table 12

Models of the Shutdown Decision in Chapter 11

	I	II	III	IV	V	VI	VII	VIII	IX
Industry volatility, stock data (U)	-0.332	-0.359^	-0.514*	-0.565*	-0.229^	-0.435^	0.300*	0.380**	-1.797**
	(0.170)	(0.129)	(0.099)	(0.067)	(0.102)	(0.101)	(0.087)	(0.017)	(0.028)
Industry volatility, SSBF data (U)	-4.574								
	(0.647)								
Industry attrition rate (U)	-0.191*	-0.174**	-0.384***	-0.354***	-0.142***	-0.389***	0.115**	0.095*	0.285
	(0.056)	(0.046)	(0.001)	(0.002)	(0.002)	(0.001)	(0.038)	(0.092)	(0.284)
Industry growth rate (G)	-0.034	-0.038	-0.182	-0.168	-0.095	-0.232	0.084	0.020	1.472***
	(0.809)	(0.787)	(0.395)	(0.433)	(0.286)	(0.241)	(0.381)	(0.844)	(0.000)
Overexpansion problems (G)	-0.409	-0.469	-0.589	-0.629	-0.316	-0.528	0.392*	0.525**	-2.095***
	(0.292)	(0.240)	(0.239)	(0.200)	(0.133)	(0.283)	(0.070)	(0.020)	(0.008)
Cash collateral motions (G)	-0.847**	-0.838**	-0.745*	-0.556	-0.344*	-0.608	0.413**	0.502**	-2.644***
	(0.024)	(0.024)	(0.086)	(0.169)	(0.078)	(0.149)	(0.028)	(0.011)	(0.003)
Log assets (L)	-0.162	-0.157	-0.425	-0.460*	-0.147	-0.442*	0.119	0.117	0.024
	(0.168)	(0.175)	(0.125)	(0.099)	(0.131)	(0.051)	(0.208)	(0.233)	(0.935)
Log cash holdings			-0.155**	-0.145**	-0.071**	-0.148**	0.076***	0.078***	-0.107
			(0.021)	(0.024)	(0.012)	(0.028)	(0.006)	(0.009)	(0.403)
Log leverage			-4.586**	-4.801**	-1.498	-4.456**	1.006	1.061	-5.216*
			(0.031)	(0.023)	(0.118)	(0.019)	(0.349)	(0.320)	(0.062)
Secured debt ≥ 75% of assets			0.625	0.509	0.294	0.603	-0.283	-0.379*	1.860**
			(0.224)	(0.299)	(0.166)	(0.227)	(0.180)	(0.071)	(0.019)
Debt personally guaranteed			-0.070	-0.008	-0.084	-0.222	0.021	0.035	1.297
			(0.937)	(0.993)	(0.806)	(0.788)	(0.948)	(0.919)	(0.269)
Under 5 years old			0.735	0.688	0.267	0.579	-0.276	-0.290	0.334
			(0.101)	(0.120)	(0.164)	(0.132)	(0.198)	(0.200)	(0.689)
Without lawyer (pro se)			2.342*	2.574	1.042***	2.427**	-1.075***	-1.097***	-2.458
			(0.064)	(0.107)	(0.007)	(0.023)	(0.002)	(0.003)	(0.160)
Prior bankruptcy			0.988**	0.927**	0.432*	1.078***	-0.489	-0.471	-1.124
			(0.015)	(0.027)	(0.060)	(0.004)	(0.145)	(0.189)	(0.185)
Prior bankruptcy in 1998			0.838		0.359	0.770	-0.251	-0.191	0.597
			(0.276)		(0.316)	(0.306)	(0.534)	(0.645)	(0.672)
Incomplete schedules			0.352	0.451	0.027	0.116	-0.000	-0.032	
			(0.661)	(0.624)	(0.936)	(0.897)	(1.000)	(0.927)	

Table 12, continued
Models of the Shutdown Decision in Chapter 11

	I	II	III	IV	V	VI	VII	VIII	IX
Including repeat filings?	Y	Y	Y	Y	Y	Y	N	Y	Y
N	59	59	54	51	54	54	54	89	86
Model	Hazard	Hazard	Hazard	Hazard	Hazard	Hazard	Duration	Duration-Cure	Logit
Distribution	Cox	Cox	Cox	Cox	Exponential	Weibull	Lognormal	Lognormal	

Notes: Parentheses contain robust *p*-values, clustering on firm identity. The symbols ***, **, *, and ^ indicate that the differences are significant at the 1%, 5%, 10%, and 15% levels, respectively.