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Bankruptcy risk, costs and corporate diversification

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ABSTRACT

This paper studies the impact of diversification on firms that file for Chapter 11 bankruptcy. Prior research suggests that diversification affects both the probability and costs of distress. Treating bankruptcy as a special case of distress, we find that diversification reduces the likelihood of bankruptcy and liquidation in Chapter 11, which is consistent with the coinsurance hypothesis. However, we observe higher bankruptcy costs as measured by time spent in Chapter 11 and inefficient segment investment for diversified firms. Our evidence is consistent with the idea that diversification provides benefits to managers in terms of job security rather than to firms. Our findings may help firms to make diversification decisions and creditors determine lending policies toward different forms of organizations.

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1. Introduction

The expected costs of financial distress are relevant for many financial decisions. These costs can be decomposed into the risk and costs of distress. The finance literature suggests that corporate diversification affects both the probability and costs of distress for firms. While other effects of corporate diversification have been extensively studied in the literature, the impact of diversification on the risk and the costs of distress has received relatively less empirical attention. Further, the theoretical research in the area disagrees over whether corporate diversification reduces or increases the risk and costs of distress. Using a sample of distressed firms, we provide evidence of the impact of diversification on expected distress costs by studying *both* the changes in probability and the costs of distress. Our findings contribute to the growing body of literature about the effect of corporate diversification on firms.

In this paper, our measure of diversification is the number of business segments (BUSSEG) as reported by Compustat. We define the onset of distress as a Chapter 11 filing by a firm and test the impact of diversification on the risk and costs of bankruptcy. We argue that a sample of bankrupt firms is likely to consist of firms that are at least as distressed as firms restructuring privately and that it is more accurate to identify the beginning and the end of the Chapter 11 process than the distress process. First, we study the issue of bankruptcy probability. The coinsurance effect argu-

ment suggests that corporate diversification helps to reduce the risk of distress if there is an imperfect correlation among the segment cash flows of a multi-segment firm (e.g., Lewellen, 1971; Mansi and Reeb, 2002; Leland, 2007). By contrast, Scott (1977) and Furfine and Rosen (2011) raise the interesting possibility that diversification may not reduce the risk of distress. Our result is consistent with the prediction of the coinsurance hypothesis—focused firms have a higher probability of filing for Chapter 11 than comparable diversified firms. Further, once in Chapter 11, the focused firms in our sample liquidate more often than diversified firms.

By focusing on the risk of distress alone, the aforementioned papers implicitly assume that the costs of distress are similar for diversified and focused firms. While we cannot identify any empirical research, several theoretical studies on the impact of diversification on the costs of distress indicate that diversification may increase or reduce these costs (e.g., Rajan et al., 2000; Scharfstein and Stein, 2000; Khanna and Tice, 2001; Matsusaka, 2001). In this paper, we empirically examine the impact of corporate diversification on the costs of distress. We note that the costs include those incurred by firms both when they are distressed outside of formal bankruptcy (financial distress costs) and when they are operating in Chapter 11 (bankruptcy costs). We measure the costs of distress by examining the costs incurred by bankrupt firms during the Chapter 11 process.¹

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E-mail addresses: singhal@oakland.edu (R. Singhal), zhu2@oakland.edu (Y. Zhu).¹ Most large firms prefer the Chapter 11 bankruptcy process (see Bris et al., 2006). Therefore, bankruptcy refers to the Chapter 11 bankruptcy process in this paper.

We employ two techniques to estimate the effect of diversification on bankruptcy costs. Lawless and Ferris (2000) find that each additional year in Chapter 11 results in direct bankruptcy costs of about 2.2% of the total distribution in a bankruptcy case. Further, Thorburn (2000) and Bris et al. (2006) argue that time spent in Chapter 11 is a proxy for indirect bankruptcy costs because the negative effects of bankruptcy on a firm's position in the product and capital markets are likely to increase with the time the firm spends in the bankruptcy process. For example, a bankrupt firm may find it difficult to retain customers and employees, raise funds, and make much needed investments the longer it spends in the bankruptcy process. Therefore, we seek to determine whether diversification has an impact on the time that our sample firms spent in the bankruptcy process. Another reason diversification may increase costs for firms in Chapter 11 is that diversified firms may have investment inefficiencies because efficient segments of diversified firms may cross-subsidize inefficient ones (e.g., Berger and Ofek, 1995; Shin and Stulz, 1998; Scharfstein and Stein, 2000; Rajan et al., 2000; Gertner et al., 2002). Therefore, we further investigate whether there is evidence of inefficient segment investment by diversified firms.

Our empirical results show that, on average, diversified firms stay in Chapter 11 three months longer before they are reorganized, liquidated, or acquired, which implies that these firms have higher direct and indirect costs than focused firms in Chapter 11. Next, we examine the investment patterns of our sample firms and find evidence of inefficient segment investment by diversified firms that reorganize. Furthermore, diversified firms tend to divest segments with larger sales and assets during the Chapter 11 process, which may be costly if divestitures take place at fire sale prices.

We recognize the possibility that our findings regarding the impact of diversification on the risk and costs of distress may arise from the endogeneity of the diversification decision. Following Campa and Kedia (2002), we attempt to alleviate the endogeneity problem by employing a two-stage instrumental variable (IV) approach. The instrumental variables used to model the propensity to diversify include two variables that capture the overall attractiveness of a given industry to diversify and two additional variables for merger waves in a given year. The variables capturing industry attractiveness are the fraction of all firms in the industry, which are conglomerates (*PNDIV*), and the fraction of sales by firms in the industry accounted for by diversified firms (*PSDIV*). The two merger trend variables are the natural log of the number of merger/acquisition announcements in a given year (*LNMMNUM*) and the natural log of the annual value of announced mergers/acquisitions in billions of dollars (*LNVALUEB*). We believe these instruments affect the probability of diversification but do not have a direct theoretical relationship with the probability of bankruptcy. Although the results using this method are qualitatively similar to those reported earlier, we concede that our efforts to control for the endogeneity problem may be less than adequate. Consequently, our results may in part be driven by endogeneity. Moreover, it is likely that our measures of diversification are correlated with size and that our results are driven by size, not diversification. Various specifications of our models show that our regression results are robust with respect to size. We believe that these alternative specifications confirm that size is not the driver of our results.

To summarize, we provide evidence that focused firms are more likely to file for bankruptcy and liquidate once in bankruptcy but that the bankruptcy costs for diversified firms are larger than those for focused firms. This paper's findings may help firms to make potentially important diversification decisions. This paper also has implications for the lending policies of creditors towards different organizational forms. Our results also suggest that

diversification benefits managers, in terms of increased job security, as diversified firms are less likely to go bankrupt or liquidate once in bankruptcy. Therefore, we believe our results provide support for the agency explanation for diversification: managers are willing to undertake value-destroying diversification to derive private benefits.

The rest of this paper is organized as follows. Section 2 presents a literature review. Section 3 describes the sample selection and descriptive statistics. Section 4 discusses the empirical results and provides robustness checks. Section 5 offers our conclusions.

2. Related literature and testable hypotheses

Our paper relates to several strands of the financial literature – the coinsurance effect of corporate diversification, financial distress and bankruptcy costs, and the impact of corporate diversification on distressed and bankrupt firms.

2.1. Coinsurance effect of corporate diversification

Traditional wisdom suggests that corporate diversification helps to reduce the risk of distress if there is imperfect correlation among the segment cash flows of a multi-segment firm; this is known as the coinsurance effect. In an early paper on coinsurance, Lewellen (1971) argues that in the presence of capital market imperfections, diversified firms have a lower probability of bankruptcy. Leland (2007) presents a model showing that combining firms may result in a reduced probability of financial distress and that a diversified firm may have higher value due to greater optimal leverage and tax savings. Consistent with the hypothesis that corporate diversification reduces the risk of distress, Mansi and Reeb (2002) find that the book value of debt for a diversified firm has a downward bias when used as a proxy for the market value of debt.

Several papers provide support for the coinsurance effect by examining the impact of cash flow and stock return volatility on the probability of bankruptcy. A diversified firm with imperfectly correlated segment cash flows should observe a reduction in cash flow volatility, which should in turn lead to lower volatility of stock returns. In an early work, Aharony et al. (1980) find significant differences in unsystematic risk between bankrupt and non-bankrupt firms. Shumway (2001) finds that firms with lower idiosyncratic stock return volatility are less likely to go bankrupt than firms with higher volatility.

If the coinsurance effect reduces the probability of distress for a diversified firm, there may be an agency explanation for diversification. Some authors find that managers face significant personal costs if their firms become financially distressed or bankrupt (see, e.g., Betker, 1995; Thorburn, 2000). Further, Henderson (2007) argues that in Chapter 11 creditors wield significant influence over issues important to managers such as executive compensation. Personal costs will likely be higher for managers of firms that become bankrupt and liquidate. Therefore, managers have the incentive to diversify to reduce the likelihood of their firms going into bankruptcy, and they may be willing to make potentially value-destroying diversification decisions to derive and preserve private benefits. These benefits include enhanced status, high perquisites, future employment prospects, and reduced employment risk (see, e.g., Jensen, 1986; Shleifer and Vishny, 1989; Morck et al., 1990; Aggarwal and Samwick, 2003). By contrast, managers may choose not to diversify if diversification reduces the volatility of a firm's cash flows. Higher cash flow volatility leads to greater variance in stock returns. Therefore, diversifying and reducing the volatility of cash flows may result in reduced equity-based compensation for managers.

In contrast to the predictions of the coinsurance hypothesis, Scott (1977) reasons that if a bad firm is likely to pull a good firm into bankruptcy, then a merger may increase the bankruptcy cost and reduce firm value. Furfine and Rosen (2011) find that mergers may increase the default risk of the acquiring firm because of managerial actions that affect default risk enough to outweigh the benefits of asset diversification in a typical merger. These studies raise an interesting possibility: the widely held assumption that diversification reduces the risk of default may not be appropriate.

As discussed previously, our measure of diversification is the number of business segments (BUSSEG), as reported by Compustat, and we define the onset of distress as a Chapter 11 filing by a firm. Accordingly, we test the impact of diversification on the risk and costs of bankruptcy by arguing that a sample of bankrupt firms is likely to consist of firms that are at least as distressed as those restructuring privately, and it is more accurate to identify the beginning and the end of the Chapter 11 process than those of the distress process.

2.2. Costs of distress

The costs of distress include those incurred by firms when they are distressed outside of formal bankruptcy (costs of financial distress) and when they are operating in Chapter 11 (bankruptcy costs). Because we define distress as a Chapter 11 filing by a firm, our measures of the costs of distress are the costs incurred by bankrupt firms during the Chapter 11 process.

Bankruptcy costs are broadly categorized into direct and indirect costs (Kalay et al., 2007). Direct costs include filing, legal, and professional fees and have been estimated to be approximately 3% of the market value of the pre-filing assets for large firms (see Bris et al. (2006) for literature on direct costs). Indirect bankruptcy costs are defined as the lost profits of foregone sales, the costs of asset fire sales, and the costs of distortions to a firm's investment and financing policies during the period of distress (see, among others, Kaplan, 1994; Pulvino, 1999; Bris et al., 2006). Researchers generally assume that ex ante indirect bankruptcy costs are significant and direct bankruptcy costs are small.

2.3. The impact of corporate diversification on distressed and bankrupt firms

While prior research has not empirically examined the effect of diversification on bankruptcy costs, several papers suggest that corporate diversification may affect the investment and financing decisions of distressed and bankrupt firms. Some of these papers conclude that corporate diversification is beneficial for distressed firms; others reach the opposite conclusion. Among the papers arguing that diversification is beneficial, Stein (1997) shows that the reduced risk provided by diversification makes it easier for a firm to raise funds from capital markets, thereby reducing capital rationing and increasing value. Matsusaka (2001) hypothesizes that firms should diversify into new lines of business during an industry sales decline to find a good match between their competencies and a line of business. Diversified firms may also have the ability to transfer resources away from troubled divisions (Khanna and Tice, 2001).

By contrast, Scharfstein and Stein (2000) posit that in divisions that lack investment opportunities, the opportunity cost of the managers' time is low, so they engage in lobbying, which creates costs for the firm as a whole. To reduce the costs of lobbying, top management overinvests in divisions with poor growth opportunities. Rajan et al. (2000) find that resources can flow toward the most inefficient division when the diversity of resources and opportunities among divisions increases. This leads to more inefficient investment and less valuable firms. Furthermore, several

studies show that conglomerates may invest less efficiently than single segment firms, and efficient segments may cross-subsidize inefficient ones (see, among others, Berger and Ofek, 1995; Shin and Stulz, 1998). Taken together, the various arguments presented in the literature suggest that the overall impact of diversification on investment and financing decisions remains a subject of debate.

We build on the theories and empirical studies discussed above and test the following specific hypotheses:

H1a. Corporate diversification reduces corporate bankruptcy risk.

H1b. Corporate diversification increases corporate bankruptcy risk.

H2a. Corporate diversification reduces bankruptcy cost.

H2b. Corporate diversification increases bankruptcy cost.

Using these hypotheses, we attempt to measure the impact of corporate diversification on bankruptcy risk and costs.

3. Sample selection and descriptive statistics

We construct our initial sample from the list of Chapter 11 bankruptcy filings between January 1, 1991 and December 31, 2007 compiled by bankruptcydata.com. This database includes Chapter 11 filings by all firms with at least one public security and \$50 million in assets. We identify 1516 bankruptcy filings over our sample period. We delete 530 inactive firms with no data on Compustat, 53 firms with missing segment data, and 20 firms that had their Chapter 11 cases dismissed by a bankruptcy court. Consistent with prior research, we further exclude 56 financial firms (SIC Code between 6000 and 6999) and utilities (SIC code between 4900 and 4999) and 88 firms for which the sum of the segment assets is not within 10% of the firms' total assets. These exclusions result in a final sample of 769 bankruptcy filings. Our analyses require variables derived from financial, market, segment, and ownership data, which are missing for some of our sample firms, leading to a varying number of observations in our empirical tests.

Our measure of diversification is the number of unique, 4-digit SIC business segments (BUSSEG) as reported by Compustat.² We exclude intersegment eliminations (SID = 99) in deriving our diversification measure. There are some potential problems with our measure of diversification. First, reporting standards have changed during our sample period and these reporting changes may lead to a comparability problem for our diversification measure over time. Specifically, Statement of Financial Accounting Standards (SFAS) No. 131 became effective for fiscal years after December 15, 1997 and requires firms to define business segments that correspond to the way the business is managed. We control for changes in the reporting requirement in our tests and conduct robustness tests that are reported in Section 4.4. The change in reporting requirements does not appear to be a significant problem in our analyses. We acknowledge that there may be other problems with our diversification measure. Companies may also choose to diversify in other ways, for example, geographically. Therefore, our definition of diversification may not capture the full extent of a firm's diversification. Finally, by placing equal weight on all reported segments, our measure also may not take into account the relative importance of different segments (see Martin and Sayrak (2003) for a discussion of the problems with various diversification measures).

² We repeat all of our tests by defining diversification as unrelated business segments based on 2-digit SIC codes. The results are similar to those reported in the paper.

Table 1 provides information about the distribution of bankruptcies by calendar year and number of segments, the outcome of the bankruptcy process, and time spent in bankruptcy. Panel A shows that except for the recessionary periods of the early 1990s and 2000s and the relatively benign period between 2004 and 2007, the distribution of Chapter 11 filings is relatively uniform.

Eighty-one percent (622) of the sample firms have one segment, and the remaining 19% (147) have more than one segment.

Panel B presents the outcome of the bankruptcy process. Following Kalay et al. (2007), we assign the firms in our sample to five outcomes based on the information contained in the documents filed with bankruptcy courts and the Securities and Exchange

Table 1
Description of bankruptcy data.

Filing year	Focused firms		Diversified firms						Total	
	(N)	(%)	Two segments		Three segments		≥ Four segments		(N)	(%)
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
<i>Panel A: distribution of bankruptcies by calendar year</i>										
1991	58	7.5	4	0.5	0	0.0	0	0.0	62	8.1
1992	43	5.6	3	0.4	3	0.4	1	0.1	50	6.5
1993	34	4.4	4	0.5	2	0.3	2	0.3	42	5.5
1994	17	2.2	1	0.1	0	0.0	0	0.0	18	2.3
1995	30	3.9	2	0.3	1	0.1	0	0.0	33	4.3
1996	35	4.6	1	0.1	0	0.0	0	0.0	36	4.7
1997	24	3.1	3	0.4	1	0.1	0	0.0	28	3.6
1998	33	4.3	2	0.3	0	0.0	0	0.0	35	4.6
1999	46	6.0	4	0.5	0	0.0	0	0.0	50	6.5
2000	48	6.2	6	0.8	9	1.2	3	0.4	66	8.6
2001	88	11.4	3	0.4	14	1.8	9	1.2	114	14.8
2002	62	8.1	2	0.3	13	1.7	12	1.6	89	11.6
2003	41	5.3	4	0.5	10	1.3	6	0.8	61	7.9
2004	23	3.0	3	0.4	2	0.3	2	0.3	30	3.9
2005	16	2.1	2	0.3	2	0.3	3	0.4	23	3.0
2006	11	1.4	1	0.1	2	0.3	1	0.1	15	2.0
2007	13	1.7	0	0.0	3	0.4	1	0.1	17	2.2
Total	622	80.9	45	5.9	62	8.1	40	5.2	769	100.0
<i>Outcome</i>										
<i>Panel B: distribution of the outcomes of the Chapter 11 process</i>										
Reorganized	246	32.0	19	2.5	31	4.0	21	2.7	317	41.2
Liquidated	172	22.4	9	1.2	16	2.1	10	1.3	207	26.9
Acquired	106	13.8	8	1.0	10	1.3	7	0.9	131	17.0
Still in Chapter 11	2	0.3	0	0.0	1	0.1	0	0.0	3	0.4
Unknown	96	12.5	9	1.2	4	0.5	2	0.3	111	14.4
Total	622	81.0	45	5.9	62	8.0	40	5.2	769	100
<i>Outcome</i>										
Outcome	Focused firms				Diversified firms					
	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)	(N)	(%)
<i>Panel C: Chapter 11 outcomes of focused and diversified firms</i>										
Reorganized	246		47.0		71		54.2			
Liquidated	172		32.8		35		26.7			
Acquired	106		20.2		25		19.1			
Total	524		100.0		131		100.0			
<i>Outcome</i>										
Outcome	Focused			Diversified						
	N	Mean years	Median years	N	Mean years	Median years				
<i>Panel D: time spent in the Chapter 11 process by outcomes</i>										
Reorganized	229	0.97	0.78	71	1.15	0.82				
Liquidated	87	1.34	1.09	18	1.75	1.48				
Acquired	54	1.16	1.08	15	1.15	0.84				
All Outcomes	370	1.09	0.94	104	1.25	0.94				

This table provides information about the distribution of bankruptcies by calendar year and number of segments, the outcome of the bankruptcy process, and the time spent in bankruptcy. We construct the sample based on a list of Chapter 11 bankruptcies compiled by bankruptcydata.com between January 1, 1991 and December 31, 2007. The data include Chapter 11 filings by all firms with at least one public security and at least \$50 million in assets. We identify 1516 bankruptcy filings over the sample period. Excluded are 530 inactive firms with no data on Compustat, 20 firms that had their Chapter 11 cases dismissed by the bankruptcy court, and 53 firms with missing segment data. Furthermore, we exclude 56 firms belonging to the financial and utility industries. We also impose the restriction that the sum of segment assets must be within 10% of the total assets of the company. This requirement results in the exclusion of 88 firms. The final sample consists of 769 bankruptcies spread over 17 years. A firm is focused if its number of business segments equal one or diversified if its number of business segments is greater than one. We categorize a firm as a reorganization if the firm reorganizes and emerges from Chapter 11, as a liquidation if the firm's assets are sold to more than one buyer or if the Chapter 11 case is converted to Chapter 7, as an acquisition or merger if either substantially all of the firm's assets are acquired by one buyer or if the firm merges with another firm, as still in Chapter 11 if the firm continues in Chapter 11, or as an unknown outcome if we are unable to obtain information about the outcome. Panel A shows the distribution of bankruptcies by calendar year. Panel B presents the outcomes of the bankruptcy process. Panel C provides univariate results to examine whether diversified firms reorganize more often than focused firms. Panel D describes the time spent by the sample firms in the bankruptcy process for those firms for which the outcome can be determined.

Commission. We also perform searches on the Internet using company names. We categorize a firm as a reorganization if the firm reorganizes and emerges from Chapter 11, as a liquidation if the firm's assets are sold to more than one buyer or if the Chapter 11 case is converted to Chapter 7, as an acquisition or merger if nearly all of the firm's assets are acquired by one buyer or if the firm merges with another firm, as still in Chapter 11 if the firm continues to operate in Chapter 11 without resolution at the time of data collection, and as an unknown outcome if we are unable to obtain any information about the outcome. Forty-one percent of our sample firms reorganize, 27% of firms liquidate, 17% are acquired, 14% have unknown outcomes, and three firms had still not emerged from Chapter 11 at the time of data collection.

In Panel C, we provide the results of a univariate analysis that examines whether diversified firms reorganize more often than focused firms. We divide our sample based on whether a firm has one (focused) or more than one (diversified) business segment. Because we are interested in definite outcomes, we only include Chapter 11 cases resulting in reorganizations, liquidations, or acquisitions. We find that of the firms for which we can determine the outcome, 47% of the focused firms and 54% of the diversified firms reorganize. The incidence of liquidation is higher for focused (33%) than for diversified firms (27%), and 20% of focused firms and 19% of diversified firms are acquired in the bankruptcy process. We find diversified firms have a 7% (6%) higher (lower) reorganization (liquidation) frequency than focused firms. Regarding mergers and acquisitions, diversified firms have a slightly lower frequency (one percent) than focused firms. Using a test for proportions, diversified firms have a significantly higher frequency of reorganization than liquidation or acquisition compared to focused firms.

Panel D describes the time spent by our sample firms in the bankruptcy process for the firms about which we can determine the outcome and the confirmation date of the reorganization plan. We measure time as the number of days between the Chapter 11 filing date and the confirmation date of the reorganization plan divided by 365. On average, a focused firm spends 13 months and a diversified firm spends 15 months in bankruptcy, and the difference is significant. When we examine time spent in the Chapter 11 process by outcome, we find that the average time spent in Chapter 11 is longer (at the 10% level) for all reorganized and liquidated diversified firms. The average time spent in Chapter 11 may be higher for diversified firms, as these firms are likely to be larger and may have a more complex bankruptcy process than focused firms.

Table 2 presents descriptive statistics of our sample firms at the end of the fiscal year immediately preceding the Chapter 11 filing. Appendix A describes the variables used in our analysis. We use the Compustat Industry Segment (CIS) database for information on the segments. Data regarding the characteristics of the sample firms are obtained from Compustat and CRSP data files, and fraud data is compiled from the Stanford Securities Class Action Clearinghouse (<http://securities.stanford.edu>). Information on the number of debt classes is collected from Moody's Bond Record, Mergent Online, Moody's/Mergent Industrial Manual, and Moody's/Mergent OTC Industrial Manual.

As expected, focused firms are significantly smaller in size, as measured by the natural log of total assets (*LNTA*). Furthermore, mean and median *INTANGASSETS* values indicate that although the mean intangible assets are not significantly different for the two groups, the median intangible assets are significantly higher for diversified firms. In terms of leverage, interest-bearing debt (*INTERESTDEBT*) is higher for the diversified group. The average total debt-to-assets ratio (*TDTA*) is not significantly different for focused and diversified firms, but the median ratio is higher for diversified firms. Profitability, as measured by net income to total assets ratio (*NITA*), is lower for focused bankrupt firms than for

Table 2
Descriptive sample statistics of focused and diversified firms.

Variable	Focused			Diversified		
	N	Mean	Median	N	Mean	Median
<i>LNTA</i>	622	4.38	4.49	147	5.54***	5.58***
<i>INTANGASSETS</i>	535	0.31	0.01	130	0.23	0.08***
<i>INTERESTDEBT</i>	619	0.55	0.61	146	0.62***	0.67**
<i>SECDEBT</i>	546	0.36	0.24	133	0.32	0.22
<i>TDTA</i>	619	0.75	0.55	146	0.70	0.61*
<i>NITA</i>	620	-0.79	-0.25	147	-0.37***	-0.16***
<i>CFTA</i>	617	-0.28	-0.04	146	-0.05***	0.02***
<i>Z-SCORE</i>	537	-5.64	-0.08	125	-0.78***	0.43*
<i>MB</i>	558	1.30	0.60	127	0.58***	0.49**
<i>AGE</i>	571	2.16	2.14	131	2.43***	2.33**
<i>LOSS</i>	620	0.92	1	147	0.89	1
<i>TIME</i>	373	1.09	0.94	105	1.26	0.94
<i>IDISTRESS</i>	622	0.42	0	147	0.40	0
<i>NUMDEBT</i>	562	4.32	4	133	5.27**	4**
<i>FRAUD</i>	622	0.06	0	147	0.03	0
<i>HERFINDAHL</i>	622	0.26	0.20	147	0.26	0.21
<i>NUMSEG</i>	622	1	1	147	2.97***	3***
<i>PREPACK</i>	622	0.15	0	147	0.18	0
<i>DIP</i>	607	0.49	0	143	0.63***	1
<i>INSIDERS</i>	620	0.62	1	147	0.56	1

This table presents descriptive statistics for our sample of firms at the end of the fiscal year immediately preceding the Chapter 11 filing. We describe the variables in Appendix A. Most of the data are from the Compustat, CRSP, and Compustat Industry Segment databases. The fraud data are from the Stanford Securities Class Action Clearinghouse (<http://securities.stanford.edu>). Debt class information is from Moody's Bond Record, Mergent Online, Moody's/Mergent Industrial Manual and Moody's/Mergent OTC Industrial Manual. We measure the stock variables at the end of and flow variables over the fiscal year immediately prior to bankruptcy. *LNTA* is the natural log of total assets in millions of dollars. *INTANGASSETS* is intangible assets divided by sales. *INTERESTDEBT* is the ratio of interest bearing debt to total liabilities. *SECDEBT* is secured interest bearing debt divided by liabilities. *TDTA* is the ratio of total debt to total assets. *NITA* is the ratio of net income to total assets. *CFTA* is earnings before interest, taxes, and depreciation, scaled by total assets. *Z-SCORE* represents the Altman's z-score. *MB* represents the market to book ratio for the firms. *AGE* is the natural log of the number of years the firm has been listed on an exchange plus one. *LOSS* takes a value of one if a firm suffers a net loss during the fiscal year ending immediately prior to the bankruptcy filing. *TIME* is the years between filing for Chapter 11 and the confirmation of the plan. *IDISTRESS* is an indicator variable representing a distressed industry. *NUMDEBT* is the number of debt classes. *FRAUD* is an indicator variable that represents whether a class action suit is filed against a firm due to material management misrepresentation. *HERFINDAHL* is the asset based Herfindahl–Hirschman index. *NUMSEG* is the number of business segments. *PREPACK* equals one if a firm files for prepackaged bankruptcy, zero otherwise. *DIP* equals one if a firm receives debtor-in-possession financing, zero otherwise. *INSIDERS* is an indicator variable equal to one if the officers of a company together own more than five percent of the firm as reported in the proxy filing, zero otherwise. We indicate the significance level of difference tests between focused and diversified firms in the last two columns.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

diversified bankrupt firms. We find similar results when we measure profitability by earnings before interest, taxes, and depreciation-to-total-assets ratio (*CFTA*). The mean and median Altman's z-scores for the focused group are lower than those for the diversified group. We observe a significantly higher market-to-book ratio (*MB*) for focused than for diversified firms, which indicates that diversified firms may have lower investment opportunities than focused firms before filing for bankruptcy.

The average (median) diversified firm has been listed on an exchange (*AGE*) longer than the average (median) focused firm. The mean (median) number of classes of debt (*NUMDEBT*) is higher for diversified than for focused firms. On average, a greater number of diversified firms receive debtor-in-possession (*DIP*) financing. Finally, a diversified firm has on average three business segments (*NUMSEG*) compared to a single-segment focused firm. There are no significant differences between the focused and the diversified samples for other variables.

Table 3
Logistic regression for prediction of bankruptcy.

Variable	(1)	(2)	(3)		(4)	
	Bankruptcy vs. non-bankruptcy		First stage LNNUMSEG	Second stage Bankruptcy vs. non-bankruptcy	First stage FOCUS	Second stage Bankruptcy vs. non-bankruptcy
<i>Panel A: logistic regressions and two-stage IV regression with matched sample</i>						
INTERCEPT	−1.682*** (0.000)	−2.815*** (0.000)	1.543** (0.013)	−1.016* (0.082)	−1.218 (0.697)	−2.686*** (0.000)
LNNUMSEG (INDEX)	−0.760*** (0.002)			−1.615** (0.036)		
FOCUS (INDEX)		0.625*** (0.000)				0.385** (0.044)
CFTA	−1.510*** (0.000)	−1.495*** (0.000)	0.019 (0.363)	−1.590*** (0.001)	−0.299* (0.067)	−1.506*** (0.002)
LOSS	1.805*** (0.000)	1.802*** (0.000)	−0.037* (0.072)	1.608*** (0.000)	0.169 (0.113)	1.603*** (0.000)
TDTA	2.238*** (0.000)	2.228*** (0.000)	−0.027 (0.269)	2.323*** (0.000)	0.174 (0.200)	2.299*** (0.000)
INTERESTDEBT	−0.023 (0.959)	0.000 (1.000)	0.100** (0.018)	0.065 (0.908)	−0.553** (0.014)	0.113 (0.840)
AGE	0.087 (0.352)	0.091 (0.328)	0.059*** (0.000)	0.167 (0.157)	−0.258*** (0.000)	0.170 (0.160)
Z-SCORE	−0.003 (0.574)	−0.003 (0.580)	0.001 (0.264)	−0.002 (0.878)	−0.004 (0.381)	−0.002 (0.910)
MB	−0.357*** (0.000)	−0.357*** (0.000)	−0.008** (0.049)	−0.367*** (0.000)	0.079** (0.026)	−0.383*** (0.000)
FRAUD	1.446*** (0.003)	1.444*** (0.003)	−0.008 (0.870)	1.434** (0.011)	0.126 (0.599)	1.399** (0.013)
HERFINDAHL	0.825** (0.043)	0.811** (0.047)	−0.030 (0.529)	0.775* (0.089)	0.192 (0.427)	0.754* (0.098)
PNDIV			0.599** (0.000)		−2.394*** (0.000)	
PSDIV			−0.044 (0.327)		0.057 (0.804)	
LNNUM			−0.154* (0.083)		0.511 (0.250)	
LNVALUEB			0.064** (0.042)		−0.215 (0.168)	
NOBS	1202	1202	1114	1114	1114	1114
F value/ χ^2	529.4	532.3	16.43	318.0	170.9	318.2
Adj. R ² /pseudo R ²	0.318	0.319	0.163	0.308	0.136	0.307

Bankruptcy vs. non-bankruptcy

	(1)	(2)	(3)	(4)	(5)
<i>Panel B: logistic regression with unmatched sample</i>					
INTERCEPT	−12.802*** (0.000)	−13.981*** (0.000)	−12.457*** (0.000)	−13.555*** (0.000)	−12.638*** (0.000)
LNNUMSEG	−1.058*** (0.000)		−0.956*** (0.000)		
FOCUS		1.219*** (0.000)		1.116*** (0.000)	
LNTA	0.112*** (0.000)	0.106*** (0.000)			0.055** (0.011)
CFTA	−0.048*** (0.000)	−0.047*** (0.000)	−0.049*** (0.000)	−0.049*** (0.000)	−0.047*** (0.000)
LOSS	2.847*** (0.000)	2.845*** (0.000)	2.717*** (0.000)	2.721*** (0.000)	2.813*** (0.000)
TDTA	0.025*** (0.003)	0.024*** (0.002)	0.028*** (0.005)	0.027*** (0.004)	0.024*** (0.005)
INTERESTDEBT	1.733*** (0.000)	1.751*** (0.000)	1.833*** (0.000)	1.845*** (0.000)	1.756*** (0.000)
AGE	0.182*** (0.001)	0.177*** (0.001)	0.219*** (0.000)	0.214*** (0.000)	0.092* (0.073)
Z-SCORE	−0.000 (0.722)	−0.000 (0.700)	0.000 (0.855)	0.000 (0.907)	−0.000 (0.822)
MB	−0.266*** (0.000)	−0.267*** (0.000)	−0.282*** (0.000)	−0.283*** (0.000)	−0.259*** (0.000)
FRAUD	0.921*** (0.000)	0.921*** (0.000)	1.081*** (0.000)	1.075*** (0.000)	0.946*** (0.000)
HERFINDAHL	0.471** (0.037)	0.470** (0.038)	0.368 (0.103)	0.375* (0.096)	0.379* (0.093)
AFTER97	0.978** (0.011)	0.972** (0.011)	0.945** (0.013)	0.942** (0.014)	1.016*** (0.008)

Table 3 (continued)

	Bankruptcy vs. non-bankruptcy				
	(1)	(2)	(3)	(4)	(5)
NOBS	85,219	85,219	85,219	85,219	85,219
Log likelihood χ^2	1664	1669	1640	1647	1542
Pseudo R^2	0.226	0.227	0.223	0.224	0.210

This table presents the results of logistic regressions predicting a Chapter 11 filing. The dependent variable is the bankruptcy dummy, which is equal to one if a firm files for Chapter 11 in the subsequent year and zero otherwise. The regression predicts the probability of filing for Chapter 11. *LNNUMSEG* is the natural log of the number of business segments. *FOCUS* is an indicator variable equal to one if a firm operates in more than one line of business, zero otherwise. *AFTER97* equals one if the fiscal year begins after December 15, 1997, zero otherwise. All other control variables are defined in Table 2. Panel A shows the logistic regression results by matching each of the bankrupt firms to a non-bankrupt firm in the same fiscal year and industry (2-digit SIC code) that has assets that are the closest to those of the sample firm. The data requirements for the sample and the matched firms results in matches for 601 sample firms. Models 1 and 2 present the regular logistic regression results. Models 3 and 4 present the results of a two-stage instrumental variable (IV) approach (see Campa and Kedia, 2002). The first stage regressions in Columns 3 and 5 are the ordinary least square regressions (OLS) of *LNNUMSEG* and *FOCUS* on all of the control variables used in Models 1 and 2, plus four instrumental variables. The second stage regressions in Columns 4 and 6 are the logistic regressions of a bankruptcy dummy on the predicted values of *LNNUMSEG* and *FOCUS* from the first stage regressions (*LNNUMSEG INDEX* and *FOCUS INDEX*) and all control variables. We calculate the standard errors of the two-stage IV estimation method using non-parametric bootstrapping. The four instrumental variables are *PNDIV*, *PSDIV*, *LNMNUM*, and *LNVALUEB*. *PNDIV* is the fraction of all firms in the industry that are conglomerates. The fraction of sales by firms in the industry that are accounted for by diversified firms is represented by *PSDIV*. *LNMNUM* is the natural log of the number of merger/acquisition announcement in a given year. *LNVALUEB* is the natural log of the annual value of announced mergers/acquisitions. Panel B presents the results when we include all of the available firms during the sample period without matching fiscal year, industry, or size. Year dummies and 11 industry dummies are included in the regression but not shown in the table due to space constraints. Following Whisenant et al. (2003), an industry is classified as Mining and Construction, if the 4-digit SIC code is between 1000 and 1299 or 1400 and 1999; Food, if the 4-digit SIC code is between 2000 and 2111; Textile, if the 4-digit SIC code is between 2200 and 2799; Chemical, if the 4-digit SIC code is between 2800 and 2824 or 2840 and 2899; Pharmaceutical, if the 4-digit SIC code is between 2830 and 2836; Extraction, if the 4-digit SIC code is between 2900 and 2999 or 1300 and 1399; Manufacturing, if the 4-digit SIC code takes any of the following values – 3000–3499, 3510, 3530, 3531, 3532, 3533, 3537, 3540, 3550, 3555, 3559, 3560, 3567, 3569, 3580–3669, and 3680–3999; Transportation, if the 4-digit SIC code is between 4000 and 4899; Retail, if the 4-digit SIC code is between 5000 and 5999; Services, if the 4-digit SIC code is between 7000 and 7369 or 7380 and 8999; and Computers, if the 4-digit SIC code is between 7370 and 7379 or 3570 and 3579 or 3670 and 3679. *p*-values are in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

4. Empirical results

In this section, we provide empirical results for the impact of corporate diversification on bankruptcy risk, bankruptcy costs, investment efficiency, and robustness.

4.1. The impact of corporate diversification on bankruptcy risk

We first test whether corporate diversification reduces bankruptcy risk. Table 3 presents the results of various specifications of logistic regressions predicting a Chapter 11 filing. The dependent variable is a dummy that equals zero if a firm does not file and one if the firm files for Chapter 11 in the subsequent year. The regressions model the probability of filing for bankruptcy. In addition to our main variables of interest, the natural log of the number of business segments (*LNNUMSEG*) and a focus dummy (*FOCUS*), the regressions include a number of control variables defined in Appendix A. We measure stock variables at the end of the fiscal year and flow variables over the course of the fiscal year immediately prior to bankruptcy. A number of studies have shown that cash flow from operations is significant in predicting bankruptcies. We include *CFTA*, defined as earnings before interest, taxes, and depreciation scaled by total assets, as a proxy for cash flows in our regression. We also include an indicator variable, *LOSS*, which takes a value of one if a firm suffers a net loss during the fiscal year ending immediately prior to the bankruptcy filing. *TDTA*, the ratio of total debt to total assets, provides the extent of indebtedness, while *INTERESTDEBT*, the ratio of interest bearing debt to total liabilities, provides the debt service burden on a firm. As firm survival may depend on the age of a firm, the regressions include *AGE*, which is the natural log of the number of years a firm has been listed on an exchange plus one. *Z-SCORE* represents the likelihood of bankruptcy, and *MB* represents the market-to-book ratio for a firm. *FRAUD*, an indicator variable, captures whether a class action suit was filed against a firm due to material management misrepresentation. Finally, *HERFINDAHL*, the asset based Herfindahl–Hirschman index, quantifies the competitive pressures faced by a firm in its industry.

Panel A shows the logistic regression results by matching each bankrupt firm to a non-bankrupt firm in the same fiscal year and industry (2-digit SIC code) that has assets closest to that of the sample firm. The data requirements for sample and matched firms result in a match for 601 sample firms. Models 1 and 2 present the regular logistic regression results. In Model 1, we include *LNNUMSEG*, the natural log of the number of segments, as our independent variable. In Model 2, we include *FOCUS* as our independent variable. The pseudo R^2 of the regressions of both Models 1 and 2 is 0.32. The coefficient of *LNNUMSEG* is negative, and the coefficient of the *FOCUS* dummy is positive. Both coefficients are significant at a less than one percent level. The odds ratio of *FOCUS* is 1.87, which means that the probability of a focused firm filing Chapter 11 is almost double the probability of not filing for Chapter 11. Similarly, a probit regression (not shown) demonstrates that, controlling for other factors, the likelihood of filing for Chapter 11 decreases by 15% when the number of segments increases from one segment to multiple segments. Further, the likelihood of filing for Chapter 11 is greater among firms with a higher incidence of losses (*LOSS*), higher leverage (*TDTA*), higher number of fraud allegations (*FRAUD*), and higher industry concentration as measured by the asset-based Herfindahl index (*HERFINDAHL*). Conversely, firms with higher profitability (*CFTA*) and firms with greater investment opportunities (*MB*) are less likely to go bankrupt.³ Surprisingly, *Z-SCORE* is not significant in any of our regressions. Analysis of the data reveals that *Z-SCORE* is highly correlated with leverage (*TDTA*) and becomes significant if we exclude leverage from our regressions. Overall, the results are consistent with Lewellen (1971) that firms with a higher number of business segments are less likely to enter Chapter 11 bankruptcy.

It is possible that our empirical results in Models 1 and 2 are affected by the endogeneity of the diversification decision. Firms with higher bankruptcy costs may choose to diversify to minimize

³ In unreported analyses, we replace our measure of leverage (*TDTA*) with excess leverage (see Ahn et al., 2006), defined as the firm's leverage minus the weighted average (by sales) leverage of the median focused firm in the same three-digit SIC industries in which the segments of the diversified firms operate. Our main result reported in Table 3 remains unchanged.

the likelihood that default will occur.⁴ Campa and Kedia (2002), for example, report that controlling for the endogeneity of diversification, multi-segment firms do not trade at a discount. To mitigate the effect of endogeneity, we use a two-stage instrumental variable (IV) approach in Models 3 and 4, as used in Campa and Kedia (2002). The first stage regressions are the ordinary least square regressions (OLS) of *LNNUMSEG* and *FOCUS* on all of the control variables used in Models 1 and 2, plus four instrumental variables. The second stage regressions are the logistic regressions of the bankruptcy dummy on the predicted values of *LNNUMSEG* and *FOCUS* from the first stage regressions (*LNNUMSEG INDEX* and *FOCUS INDEX*) and all of the control variables. We calculate the standard errors of the two-stage IV estimation method using a non-parametric bootstrap.

Controlling for the endogeneity of the diversification decision requires identifying instrumental variables that affect the probability of diversification while having no direct theoretical relationship with the probability of bankruptcy. Following Campa and Kedia (2002), the instrumental variables used in the first stage regressions for a number of segments and a focus dummy include industry attractiveness and merger trend variables.⁵ Maksimovic and Phillips (2002) argue that industry characteristics affect a firm's decision to diversify. Accordingly, our proxies for industry attractiveness are the fraction of all diversified firms in the industry (*PNDIV*) and the fraction of sales by firms in the industry made by diversified firms (*PSDIV*). We use two-digit SIC codes for industry classification. We believe that the industry's tendency to produce conglomerates does not affect the individual firm's bankruptcy risk directly. Campa and Kedia (2002) argue that the more active the market for mergers/acquisitions, the higher the probability that a firm will diversify. We use the natural log of the number of merger/acquisition announcements in a given year (*LNMNUM*) and the natural log of the annual value of announced mergers/acquisitions in billions of dollars (*LNVALUEB*) as our merger trend variables. Similar to industry attractiveness, we believe that merger/acquisition trends should have no direct impact on the individual firm's bankruptcy risk.

Columns 3 and 5 present the results of the first stage regressions, which are the ordinary least square regressions (OLS) of *LNNUMSEG* and *FOCUS* on all of the control variables used in Models 1 and 2, plus the four instrumental variables described in the previous paragraph. We find that *PNDIV* and *LNVALUEB* are significantly and positively related to the number of segments, which means that the higher the fraction of diversified firms in an industry and/or the more active the merger/acquisition market, the more likely a firm is to diversify. The coefficients of *PSDIV* and *LNMNUM* have wrong signs, which is similar to the findings in Campa and Kedia (2002), perhaps because *PSDIV* is highly correlated with *PNDIV* and *LNMNUM* is highly correlated with *LNVALUEB*. We follow Campa and Kedia (2002) and retain all four variables to increase the explanatory power of the regression.⁶ The *F*-test results of these four instrumental variables in the first stage regressions in Columns 3 and 5 are 26.3 and 65.8, which are significant at the 1% level. These results suggest that our instrumental variables have strong explanatory power for the decision to diversify.

Columns 4 and 6 show the results of the second-stage regressions, which are the logistic regressions of a bankruptcy dummy on the predicted values of *LNNUMSEG* and *FOCUS* from the first-stage regressions (*LNNUMSEG INDEX* and *FOCUS INDEX*) and all of the control variables. We find that our main variables of interest, *LNNUMSEG INDEX* and *FOCUS INDEX*, continue to be significant with the expected signs. Firms that have a higher number of business segments are less likely to enter Chapter 11 bankruptcy. All other variables retain the same signs and significance. Therefore, endogeneity does not appear to drive our results.

When we match a bankrupt firm with a non-bankrupt firm by size, year, and industry, the regressions in Panel A do not contain controls for size, year, and industry. Hence, the results may be driven by size, because diversified firms are significantly larger on average, as shown in Table 2. Other biases may be caused by industry and year: firms in some industries may tend to diversify their operations, and diversification may be more likely for firms in certain years. In Panel B of Table 3, we present the results when we include all available firms during the sample period without matching size, industry, and year. We control for size by including the natural log of total assets (*LNTA*). We also include controls for 17 years and 11 industries following Whisenant et al. (2003).⁷ We define industry more broadly in these regressions because our sample firms represent more than 150 four-digit SIC codes.⁸ We include a dummy variable equal to 1 for post-December 1997 and 0 for pre-December 1997 (*AFTER97*) in the regressions to control for changes in reporting requirements.

Model 1 includes both *LNNUMSEG* and size (*LNTA*); in Model 3, we drop size from our specification. Models 2 and 4 are similar to Models 1 and 2, the difference being that we use *FOCUS* as our measure of diversification. Model 5 does not contain any of our diversification measures. The pseudo-*R*² of all five models ranges from 21% to 23%. Further, we find that the coefficients of *LNNUMSEG*, *FOCUS*, and *SIZE* are stable, indicating that it is diversification, not size, that drives our result. The coefficients of *LNNUMSEG* and *FOCUS* are consistent with those presented in Panel A. Focused firms have a higher probability of filing for Chapter 11 bankruptcy than diversified firms. Interestingly, the coefficient on size is positive, which may be explained by the facts that smaller firms tend to file for Chapter 7 instead of Chapter 11 bankruptcy and that our sample bankrupt firms have assets greater than \$50 million. These results provide further support that size is not the driver of our results in Panel A. We also find that firms with a greater proportion of interest-bearing debt (*INTERESTDEBT*), older firms (*AGE*), and firms in the post-December 1997 period (*AFTER97*) have a significantly higher probability of filing for Chapter 11 bankruptcy.

Next, in Table 4, we examine the effect of diversification on outcomes of the Chapter 11 process. The first two columns of Panel A present results of the multinomial logit regressions comparing firms that are either reorganized or acquired with firms that are liquidated. The pseudo *R*² of the regression is 0.136. When we compare reorganizing firms with firms that liquidate, *LNNUMSEG* is significant at the 10% level, which indicates that firms with a greater

⁷ Due to space constraints, we do not report industry and year controls in the tables. They are available upon request.

⁸ We define an industry as Mining and Construction, if the 4-digit SIC code is between 1000 and 1299 or 1400 and 1999; Food, if the 4-digit SIC code is between 2000 and 2111; Textile, if the 4-digit SIC code is between 2200 and 2799; Chemical, if the 4-digit SIC code is between 2800 and 2824 or 2840 and 2899; Pharmaceutical, if the 4-digit SIC code is between 2830 and 2836; Extraction, if the 4-digit SIC code is between 2900 and 2999 or 1300 and 1399; Manufacturing, if the 4-digit SIC code takes any of the following values – 3000–3499, 3510, 3530, 3531, 3532, 3533, 3537, 3540, 3550, 3555, 3559, 3560, 3567, 3569, 3580–3669, and 3680–3999; Transportation, if the 4-digit SIC code is between 4000 and 4899; Retail, if the 4-digit SIC code is between 5000 and 5999; Services, if the 4-digit SIC code is between 7000 and 7369 or 7380 and 8999; and Computers, if the 4-digit SIC code is between 7370 and 7379 or 3570 and 3579 or 3670 and 3679.

⁴ Smaller firms are more likely to file for Chapter 7 bankruptcy, while larger firms tend to file for Chapter 11. Diversified firms tend to be larger in size. This may present a potential endogeneity problem related to the choice between Chapter 11 and Chapter 7 bankruptcy.

⁵ Campa and Kedia (2002) also include GDP, lagged GDP, the number of recession months in the calendar year and its lagged value, major exchange dummy, and foreign incorporation dummy in the instrument pool. We believe these variables may relate to the firm's bankruptcy risk directly; therefore, we do not use them as instrumental variables.

⁶ As a robustness check, we have run regressions using only *PSDIV* and *LNVALUEB* as instrumental variables. The results are statistically similar to those presented in this paper.

Table 4
Logistic regressions predicting outcomes of the bankruptcy process.

Variable	(1)		(2)		(3)	
	Reorganization vs. liquidation	Acquisition vs. liquidation	Reorganization vs. liquidation	Acquisition vs. liquidation	Reorganization vs. liquidation	Acquisition vs. liquidation
<i>Panel A: multinomial logit regression</i>						
INTERCEPT	-1.451** (0.018)	-0.076 (0.915)	-1.233** (0.024)	-1.132* (0.066)	-0.997* (0.074)	0.494 (0.443)
LNNUMSEG	0.812* (0.066)	0.987** (0.046)	0.885** (0.041)	0.746 (0.123)		
LNTA	0.073 (0.416)	-0.312*** (0.003)			0.102 (0.243)	-0.279*** (0.006)
NITA	-0.014 (0.766)	0.310** (0.032)	-0.003 (0.952)	0.148 (0.230)	-0.018 (0.718)	0.300** (0.037)
INTANGASSETS	-0.186 (0.382)	0.232 (0.254)	-0.175 (0.401)	0.157 (0.403)	-0.193 (0.364)	0.216 (0.287)
INTERESTDEBT	0.884 (0.116)	0.331 (0.602)	0.970* (0.080)	0.146 (0.814)	0.911 (0.104)	0.354 (0.574)
SECDEBT	0.184 (0.607)	0.828** (0.035)	0.198 (0.577)	0.760** (0.049)	0.123 (0.728)	0.758* (0.051)
FRAUD	-0.762 (0.159)	0.036 (0.953)	-0.700 (0.189)	-0.313 (0.590)	-0.820 (0.127)	-0.033 (0.955)
NUMDEBT	0.069 (0.119)	0.042 (0.422)	0.078* (0.065)	0.004 (0.935)	0.069 (0.117)	0.043 (0.396)
HERFINDAHL	-0.661 (0.311)	-1.347* (0.082)	-0.732 (0.258)	-0.982 (0.192)	-0.551 (0.394)	-1.215 (0.113)
PREPACK	3.199*** (0.000)	1.612** (0.027)	3.213*** (0.000)	1.477** (0.042)	3.150*** (0.000)	1.558** (0.032)
MB	0.337** (0.012)	0.206 (0.163)	0.316** (0.016)	0.290** (0.044)	0.323** (0.015)	0.185 (0.205)
AFTER97	-0.799*** (0.004)	-0.265 (0.408)	-0.766*** (0.005)	-0.401 (0.202)	-0.681** (0.011)	-0.122 (0.694)
NOBS	435		435		435	
Log likelihood χ^2	124.4		109.3		119.3	
Pseudo R ²	0.136		0.120		0.130	
Reorganization and acquisition vs. liquidation						
	(1)		(2)		(3)	
<i>Panel B: logistic regression</i>						
INTERCEPT		-0.359 (0.507)		-0.531 (0.275)		0.143 (0.769)
LNNUMSEG		0.875** (0.030)		0.826** (0.037)		
LNTA		-0.058 (0.464)				-0.028 (0.717)
NITA		0.019 (0.609)		0.011 (0.760)		0.016 (0.668)
INTANGASSETS		-0.023 (0.890)		-0.024 (0.883)		-0.033 (0.842)
INTERESTDEBT		0.728 (0.145)		0.666 (0.175)		0.751 (0.131)
SECDEBT		0.495 (0.118)		0.470 (0.135)		0.431 (0.170)
FRAUD		-0.493 (0.311)		-0.549 (0.252)		-0.554 (0.250)
NUMDEBT		0.056 (0.166)		0.049 (0.212)		0.057 (0.160)
HERFINDAHL		-0.886 (0.131)		-0.836 (0.151)		-0.770 (0.186)
PREPACK		2.848*** (0.000)		2.820*** (0.000)		2.794*** (0.000)
MB		0.275** (0.029)		0.294** (0.017)		0.259** (0.039)
AFTER97		-0.616** (0.015)		-0.635** (0.011)		-0.487** (0.046)
NOBS		435		435		435
Log likelihood χ^2		69.09		68.56		64.12
Pseudo R ²		0.126		0.125		0.117

This table contains the results from the logit regressions of the three outcomes: reorganization, liquidation, and acquisition. Panel A presents the multinomial logit regression results with liquidation as the base outcome. Columns 1, 3, and 5 predict the probability of reorganization vs. liquidation. Columns 2, 4, and 6 predict the probability of acquisition vs. liquidation. Panel B presents the results from a logit regression when we combine firms that either reorganize or are acquired into one group. All variables are defined in Tables 2 and 3. *p*-values are in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

number of segments are more likely to reorganize. The coefficient of *LNNUMSEG* is 0.812, which means that for each one unit increase in *LNNUMSEG*, the ratio of the two probabilities, the probability of reorganization/probability of liquidation increases by 2.25. Therefore, the more diversified a firm becomes, the more likely it is to reorganize vs. liquidating during Chapter 11. Furthermore, firms with a pre-packaged plan (*PREPACK*), with more investment opportunity (*MB*), and those that are in the pre-December 1997 period (*AFTER97*) are more likely to reorganize. The second column of Panel A contains results from the multinomial logit for acquisitions compared to liquidations. The coefficient of *LNNUMSEG* is 0.987. Therefore, the more diversified a firm becomes, the more likely it is to be acquired vs. liquidated during Chapter 11. Furthermore, firms with higher profitability (*NITA*), firms that have a larger proportion of secured debt (*SECDEBT*), and firms with a pre-packaged plan (*PREPACK*) are more prone to acquisition. Larger firms and firms in less competitive industries (*HERFINDAHL*) are more likely to be liquidated than acquired. In the 3rd and the 4th columns of Panel A, when we drop *LNTA*, our diversification measure continues to be significant for the reorganization vs. liquidation outcome but becomes insignificant for the acquisition vs. liquidation outcome. Finally, in Columns 5 and 6, we exclude our measures of diversification and find that the coefficients on *LNTA* in the two models remain relatively unchanged.

In Column 1, Panel B of Table 4, we present the results from a logit regression in which we combine firms that either reorganize or are acquired into one group. Consistent with the results presented in Panel A, *LNNUMSEG* is significant at the five percent level. Furthermore, prepackaged bankruptcies (*PREPACK*) and firms with higher market-to-book ratios (*MB*) have a greater likelihood of reorganization and acquisition outcomes. Firms that file for Chapter 11 after December 1997 are more likely to liquidate. In Column 2, when we drop size, *LNNUMSEG* continues to be significant. Finally, in Column 3, we only include size and drop the diversification measure. The coefficient on *LNTA* is similar to that in the specification that includes the diversification measure. We conclude that the impact of corporate diversification on the Chapter 11 outcome shown in Table 4 is not driven by size.

The results presented in the table indicate that diversification reduces the likelihood of liquidation. If managers personally consider liquidation to be a bad outcome because of the greater likelihood that they will lose their jobs, diversification can be a means to reduce this possibility. Conversely, if asset liquidation inside Chapter 11 is costly (see, among others, Kaplan, 1994; Pulvino, 1999; Bris et al., 2006), these results show that diversified firms may benefit by avoiding the discounts associated with asset liquidation in Chapter 11.

To summarize, the results presented in this section show that diversified firms are less likely to go bankrupt and liquidate once they are in Chapter 11. These results are consistent with hypothesis H1a that corporate diversification reduces the risk of bankruptcy.

4.2. The impact of corporate diversification on bankruptcy costs

So far, we have established that diversification may be beneficial to the extent that diversified firms are less likely to go bankrupt and that, once they are in Chapter 11, they liquidate less often than focused firms. We now turn our attention to the costs of Chapter 11 for our sample firms. Lawless and Ferris (2000) find that each additional year in Chapter 11 results in direct bankruptcy costs of approximately 2.2% of the total distribution in the case. Furthermore, Thorburn (2000) and Bris et al. (2006) argue that time spent in Chapter 11 is a proxy for indirect bankruptcy costs because the negative effects of bankruptcy on a firm's position in the product and capital markets are likely to increase with the time the firm spends in the bankruptcy process. For example, a bankrupt

firm may find it difficult to retain customers and employees, raise funds, and make much needed investments the longer it spends in the bankruptcy process. Empirically, Maksimovic and Phillips (1998) find that the productivity of plants in high-growth industries declines only for those firms that either exit quickly or spend more than 3 years inside Chapter 11. Accordingly, we use the time spent in Chapter 11 as a proxy for bankruptcy costs and examine whether the level of diversification has any impact on this variable.

Table 5 contains the results from a regression of the time spent in the Chapter 11 process (*TIME*). In the univariate analysis in Panel D of Table 1, we observe that average time spent in Chapter 11 is higher for diversified firms than for focused firms. We now analyze whether diversified firms spend more time in Chapter 11 than focused firms, controlling for firm characteristics. *Z-SCORE* controls for the extent of financial distress and *MB* values growth opportunities. *IDISTRESS* is included to control for the possibility that firms in distressed industries may exit relatively quickly. We include *TDTA*, *INTERESTDEBT*, and *LNTA* to quantify the complexity of the bankruptcy case because a large firm with high debt may see more contentious negotiations among the various claimants. Because an instance of fraud may expose a firm to a protracted legal process, *FRAUD* is included. As insiders with greater ownership of a firm may have incentives to hold up the bankruptcy process unless a reorganization plan is drawn to the management's satisfaction, *INSIDERS5* signifies whether the management owns significant equity in a company. *PREPACK* recognizes that prepackaged

Table 5
Regressions for time spent in the bankruptcy process.

Variables	<i>TIME</i>		
	(1)	(2)	(3)
<i>INTERCEPT</i>	0.291 (0.646)	0.789 (0.211)	0.412 (0.514)
<i>LNNUMSEG</i>	0.319** (0.038)	0.470*** (0.002)	
<i>LNTA</i>	0.127*** (0.000)		0.144*** (0.000)
<i>Z-SCORE</i>	-0.002 (0.701)	0.005 (0.396)	-0.002 (0.698)
<i>MB</i>	0.031 (0.412)	0.006 (0.879)	0.026 (0.491)
<i>IDISTRESS</i>	0.065 (0.471)	0.082 (0.376)	0.070 (0.438)
<i>TDTA</i>	0.040* (0.072)	0.025 (0.265)	0.043* (0.053)
<i>INTERESTDEBT</i>	-0.491** (0.015)	-0.400* (0.050)	-0.475** (0.019)
<i>FRAUD</i>	0.032 (0.853)	0.146 (0.395)	0.015 (0.932)
<i>INSIDERS5</i>	-0.028 (0.754)	-0.045 (0.623)	-0.041 (0.648)
<i>PREPACK</i>	-0.723*** (0.000)	-0.666*** (0.000)	-0.751*** (0.000)
<i>DIP</i>	0.208** (0.030)	0.332** (0.000)	0.197** (0.040)
<i>REORG</i>	-0.125 (0.177)	-0.126 (0.182)	-0.116 (0.212)
<i>AFTER97</i>	-0.281*** (0.004)	-0.209** (0.032)	-0.238** (0.013)
<i>NOBS</i>	400	400	400
Adj. <i>R</i> ²	0.219	0.189	0.212
<i>F</i> value	5.466	4.883	5.466

This table contains the results from regressions of time spent in the Chapter 11 process (*TIME*) on firm characteristics. *REORG* is an indicator variable equal to one if a firm reorganized in Chapter 11, zero otherwise. All other variables are defined in Tables 2 and 3. The regressions include controls for 11 industries as defined in Table 3. *p*-values are in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

bankruptcies are resolved in much less time than traditional Chapter 11 cases, *DIP* indicates whether a firm receives debtor-in-possession financing, and *REORG* indicates whether a firm successfully reorganizes and emerges from Chapter 11. We include *AFTER97* to control for reporting regime changes. Our regressions control for industry specific effects by including dummy variables for 11 industries, as described earlier.

We present three specifications including and not including size to control for the potential bias caused by size. The significantly positive coefficients of *LNNUMSEG* in Columns 1 and 2 indicate that diversified firms take more time to resolve distress inside Chapter 11.⁹ The regression is significant, with an Adjusted R^2 of 0.22. Firms with higher interest-bearing debt (*INTERESTDEBT*), firms filing for Chapter 11 after December 1997 (*AFTER97*), and firms that file pre-packaged bankruptcies (*PREPACK*) spend less time in Chapter 11. Chapter 11 is lengthier for larger firms (*LNTA*), firms that have higher leverage (*TDTA*), and firms that receive DIP financing (*DIP*). In Columns 2 and 3 of the table, we drop size and *LNNUMSEG*, respectively. The results are substantially similar to those in Column 1 of the table. The evidence suggests that because diversified firms spend more time than focused firms in Chapter 11, they may experience declines in operating performance (Maksimovic and Phillips, 1998) and incur higher direct bankruptcy costs (Lawless and Ferris, 2000).

4.3. Investment efficiency during Chapter 11

One explanation for why diversification may increase costs for firms in Chapter 11 is that diversified firms may have lower investment efficiency than focused firms because efficient segments of diversified firms may cross-subsidize inefficient ones. Berger and Ofek (1995) find the greatest discount in the diversified firms with the most inefficient segment investments. Scharfstein and Stein (2000) present a model in which the internal capital markets allocate too much funding to the weakest divisions. Shin and Stulz (1998) find that the segment investments of diversified firms are less sensitive to their cash flows than the investments of focused firms. They also find insensitivity of segment investments to segment investment opportunities. Rajan et al. (2000) find that diversified firms allocate relatively more than their focused counterparts to segments with fewer investment opportunities and relatively less to segments with more investment opportunities. By examining the same division before and after it is spun off from a conglomerate, Gertner et al. (2002) find that investment is less sensitive to investment opportunity when a division is inside a diversified firm.

We perform multivariate tests of investment at the segment level on segment characteristics and present the results in Table 6. The dependent variable (*EXSEGINVEST*) is the industry-adjusted segment investment, defined as the ratio of net capital expenditures to assets for each segment minus the median of the same ratio for focused firms operating in the same industry. To capture segment investment opportunity, we include the segment sales growth rate (*SEGG*) and the segment Tobin's q (*SEGQ*) in the regressions, following Shin and Stulz (1998). We calculate *SEGG* as the lagged growth rate of segment sales. We expect segments with higher sales growth rates to invest more. Because we do not have the market values of the segments, *SEGQ* is the median q -ratio of all focused firms in the same industry as the segment. We compute Q -ratio by taking the ratio of focused firm value (defined as the value of equity plus the book value of total assets minus the book value of equity) to total assets. Segment profitability is

controlled by the industry-adjusted segment cash flow (*EXSEGCASH*), which is the difference between the ratio of the segment operating profit to segment assets and the median of that ratio for all focused firms operating in the same industry. Because leverage is an important factor in determining the investment level, we use industry-adjusted leverage (*EXLEV*) to control the firm leverage, which is the difference between the firm's ratio of total debt to the book value of total assets and the firm's imputed leverage, following Berger and Ofek (1995). For focused firms, we calculate variables at the firm level because there is only one segment. To capture the difference between focused and diversified firms, we include the focus dummy (*FOCUS*) and four interaction terms of the focus dummy: *SEGG*, *SEGQ*, *EXSEGCASH*, and *EXLEV*. We also include the post-December 1997 dummy (*AFTER97*) to control for segment reporting changes. We estimate regression models for all fiscal years that the reorganized firms in our sample spend between the fiscal year immediately after the Chapter 11 filing and the fiscal year immediately before emerging from Chapter 11.¹⁰ Random effects regressions are used to accommodate firm-specific components. We obtain similar results when we use a fixed effects regression technique.

Table 6 presents the results of our regressions. The negative coefficients of the dummy variables for focused firms indicate that focused firms invest significantly less than diversified firms, which is consistent with the findings in Rajan et al. (2000) and Shin and Stulz (1998). These studies find that among firms with low cash flows, focused firms invest less than diversified firms. This may imply that the internal capital market allows divisions of diversified firms to invest when focused firms cannot. We also find evidence of inefficient segment investment in diversified firms. In Columns 1 and 2, the coefficients of the two interaction terms, *FOCUS * SEGG* and *FOCUS * SEGQ*, are significant at the 5% and 10% levels. These results show that for focused firms, investment increases with the sales growth rate and q ratio. By contrast, for a diversified firm, the segment sales growth rate (*SEGG*) and segment q ratio (*SEGQ*) have no significant impact on segment investment, and the coefficients become negative when we include the two interaction terms, *FOCUS * SEGG* and *FOCUS * SEGQ*. Consistent with Shin and Stulz (1998), our results show that investment opportunity is an important factor in focused firms' investment decisions during Chapter 11; however, this is not the case for the diversified firms. We also find that investment by firms in Chapter 11 does not depend on cash flows. The coefficients of cash flows are not significant for either diversified or focused firms. We believe that this insensitivity is due to the naturally low cash flow levels of these firms because Kaplan and Zingales (1997) find that the sensitivity of investment to cash flow decreases as a firm becomes more financially constrained. Last, for diversified and focused firms, the coefficients of leverage are both significant but have opposite signs. Column 4 shows that diversified firms with greater leverage have significantly lower levels of investment, while focused firms with more leverage invest significantly more. Overall, the evidence from our sample for inefficient segment investment by bankrupt diversified firms is strong.

To further understand the segment investments of bankrupt diversified firms, we investigate reorganized firms' segment changes from the end of the fiscal year prior to filing for Chapter 11 to the end of the fiscal year after emergence, shown in Table 7. If a diversified firm makes efficient investment decisions, it should retain the main segments and divest the less important ones (Maksimovic and Phillips, 2002). Panel A lists the changes in the total number of segments. Of the 38 diversified firms, 24%

⁹ As robustness checks, we also test a *FOCUS* dummy in all subsequent regressions in the paper. The results remain qualitatively unchanged. To limit the length of the paper, we do not report results with *FOCUS* in the remainder of the paper. The results are available upon request.

¹⁰ The fiscal year-end after the Chapter 11 filing and the fiscal year-end before emergence fall, on average, within 6 months of the Chapter 11 filing date and emergence date.

Table 6
Random effects regressions of excess segment investments.

Variables	EXSEGINVEST				
	(1)	(2)	(3)	(4)	(5)
SEGG	-0.021 (0.227)	0.014* (0.064)	0.014* (0.058)	0.015* (0.052)	-0.020 (0.246)
SEGQ	0.010 (0.136)	-0.004 (0.731)	0.010 (0.128)	0.010 (0.127)	0.003 (0.807)
EXSEGCASH	0.003 (0.827)	0.005 (0.670)	-0.009 (0.613)	0.006 (0.604)	-0.011 (0.538)
EXLEV	-0.003 (0.826)	-0.007 (0.606)	-0.005 (0.697)	-0.040* (0.069)	-0.022 (0.375)
FOCUS	-0.024** (0.030)	-0.012 (0.308)	-0.019* (0.075)	-0.031*** (0.009)	-0.022 (0.155)
FOCUS * SEGG	0.044** (0.022)				0.043** (0.026)
FOCUS * SEGQ		0.021* (0.074)			0.010 (0.467)
FOCUS * EXSEGCASH			0.024 (0.289)		0.027 (0.250)
FOCUS * EXLEV				0.047** (0.049)	0.025 (0.401)
AFTER97	-0.014 (0.101)	-0.013 (0.124)	-0.013 (0.124)	-0.013 (0.147)	-0.014 (0.104)
INTERCEPT	-0.017 (0.189)	-0.024* (0.069)	-0.018 (0.144)	-0.010 (0.432)	-0.017 (0.255)
NOBS	380	380	380	380	380
NGROUPS	178	178	178	178	178
WALD χ^2	16.81	14.59	12.00	15.13	21.72

This table shows the random effects regressions of excess investment at the segment level on other segment characteristics. For focused firms, the variables are at the firm level. The dependent variable (*EXSEGINVEST*) is industry-adjusted investment, which is the difference between the ratio of net capital expenditures to assets for the segment and that for the median focused firm operating in the same industry. *SEGG* is the lagged growth rate of segment sales. *SEGQ* is the segment Tobin's *Q*, which is the industry median of Tobin's *Q*. *EXSEGCASH* is industry-adjusted cash flow, which is the difference between the ratio of the segment cash flow to segment assets and that for the median focused firm operating in the same industry. *EXLEV* is the difference between the firm's ratio of total debt to the book value of total assets and the firm's imputed leverage. All regression models are estimated for reorganized firms from the fiscal year after the Chapter 11 filing date to the fiscal year before the reorganizing date. *p*-values are in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

reduce the number of segments, 71% experience no change, and 5% increase the number of segments. These results show that less than a quarter of the sample reduces the number of segments. Most bankrupt diversified firms do not decrease the number of their segments. Of the 143 focused firms, 96% have no change in the number of segments and 4% increase the number of segments and become diversified.

Panel B summarizes the characteristics of divested and retained pre-bankruptcy segments. We find that for diversified firms, the mean and median of sales, capital expenditure, assets, investment level, and cash flow of divested segments are all larger than those of retained segments. The results show that diversified firms tend to divest larger segments during the Chapter 11 process. Our results on the segments that are dropped by diversified firms are the opposite of those reported by Maksimovic and Phillips (2002), who find that the operations of peripheral units of conglomerates are much more severely cut back during recessions than their main units. In our sample, when resources are severely reduced, diversified firms tend to use some segments, particularly larger ones, for extra cash. For focused firms, the divested segments have lower median levels of sales, capital expenditure, assets, investment levels, and cash flow than those of retained segments. The results, along with those presented in Table 6, further confirm that diversification may decrease the investment efficiency of firms in Chapter 11.

The results presented in Sections 4.2 and 4.3 indicate that diversified firms spend a longer time in Chapter 11. There is also evidence of inefficient segment investment during Chapter 11. Taken together, these results provide support for hypothesis H2b that corporate diversification is costly for bankrupt firms.

4.4. Robustness check

Statement of Financial Accounting Standards (SFAS) No. 131 became effective for the fiscal years beginning after December 15, 1997. This law requires firms to define business segments in a manner that corresponds to the way the business is managed. As a result, the number of reported segments increases for a significant portion of the sample. Studies suggest that the new reporting regime provides more reliable segment and disaggregated segment data that enable analysts better to predict future earnings (Street et al., 2000; Ettredge et al., 2005). To control for segment reporting differences before and after the adoption of SFAS 131, we utilize two different methods in addition to including a dummy variable equal to 1 for post-December 1997 and 0 for pre-December 1997 (*AFTER97*) in our regressions, as presented in Tables 3–6. Due to space constraints, we only present the robustness check results for Table 3 in Appendix B. The robustness check results for the other tables are available upon request. First, we separate the samples into two subsamples based on whether the fiscal year ends before or after December 1997. For all tables except Table 6, we find that the results remain qualitatively unchanged in the post-December 1997 period when firms adopt the new segment definition under SFAS 131. The pre-December 1997 results have the correct signs but are insignificant in a few cases. The results in Table 6 lose some significance in both the pre- and post-December 1997 periods. Second, we identify a list of firms that changed their reporting strategies after December 1997 by reading the firms' 10-K reports. We then drop those firms that entered bankruptcy before December 1997 and changed their reporting strategies under the new reporting regime (8 in number). The results

Table 7
Segment changes during the Chapter 11 process.

		Changes in # of segments		# of firms	Percentage		
<i>Panel A: changes in the number of segments</i>							
Diversified firms		Decrease		9		23.68	
		No change		27		71.05	
		Increase		2		5.26	
		Total		38		100.00	
Focused firms		No change		137		95.80	
		Increase		6		4.20	
		Total		143		100.00	
Variable		Divested segments			Retained segments before reorganization		
		Obs.	Median	Mean	Obs.	Median	Mean
<i>Panel B: characteristics of divested and retained segments (\$ millions)</i>							
Diversified firms	SALES	23	242.494	625.348	91	102.157	284.857
	CAPITAL EXPENDITURE	21	4.000	101.524	86	2.922	29.952
	ASSETS	23	261.085	776.278	90	117.499	357.916
	SEGINVEST	18	0.020	0.080	66	0.016	0.055
	SEGCASH	17	0.046	0.057	54	0.029	-0.006
	SEGSALESGROWTH	11	-0.008	1.659	34	-0.002	0.016
	SEGQ	20	0.845	1.081	64	0.909	1.037
Focused firms	SALES	10	36.481	1697.748	133	237.922	1050.262
	CAPITAL EXPENDITURE	10	0.337	191.585	131	11.142	62.695
	ASSETS	10	28.683	2647.160	133	214.850	873.024
	SEGINVEST	8	0.016	0.034	125	0.035	0.093
	SEGCASH	8	-0.098	-0.095	126	0.030	-1.027
	SEGSALESGROWTH	7	0.122	0.194	114	0.034	0.430
	SEGQ	8	1.014	1.111	125	0.997	1.087

This table investigates the segment changes of reorganized firms from the fiscal year end before a Chapter 11 filing to the fiscal year end after emerging. Panel A lists the changes in the number of segments. Panel B summarizes the characteristics of divested and retained segments.

are statistically similar to those presented in Tables 3–7. Finally, we argue that if firms were misclassified before SFAS 131, any resulting bias works against our empirical analyses, and our results would likely be stronger absent such misclassification.

5. Conclusion

We examine the impact of diversification in the context of Chapter 11 bankruptcy. Diversification may be beneficial for both a firm and its self-interested managers. For firms, a benefit of diversification may be reduced bankruptcy risk leading to lower expected bankruptcy costs. Managers, however, benefit from the safety provided by diversification. Our results suggest that while diversified firms have a lower likelihood of bankruptcy and liquidation, they also underperform focused firms on various measures; they spend more time in bankruptcy and have a greater incidence of inefficient segment investment. Our evidence is consistent with the idea that diversification may provide benefits to managers, in terms of job security, rather than to firms.

It is important to note that this research does not address the benefits and costs associated with a firm's decision to diversify outside the context of Chapter 11 bankruptcy. We also do not examine asset sales inside Chapter 11. Future research may explore these issues. Finally, although we employ alternative approaches designed to alleviate the endogeneity of the diversification decision, our results may still in part be driven by endogeneity.

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Appendix A. Description of variables

Unless otherwise stated, all variables are measured at the fiscal year end immediately prior to the bankruptcy filing.

A.1. Firm level variables

<i>LNNUMSEG</i>	Natural log of the number of business segments reported in Compustat's business segment file, excluding intra company transfers (segment ID = 99)
<i>FOCUS</i>	An indicator variable equal to one if a firm operates in more than one line of business, zero otherwise
<i>CFTA</i>	Earnings before interest, taxes, depreciation, and amortization, scaled by total assets
<i>LOSS</i>	An indicator variable equal to one if the firm reports a net loss, zero otherwise
<i>TDTA</i>	Total debt to total assets
<i>INTERESTDEBT</i>	Interest-bearing debt divided by total liabilities
<i>AGE</i>	Natural log of the years since the firm was first listed on an exchange plus one
<i>Z-SCORE</i>	Altman's z-score for the likelihood of bankruptcy
<i>MB</i>	Market-to-book ratio
<i>FRAUD</i>	An indicator variable equal to one if a class action lawsuit is filed against the firm regarding management material

(continued on next page)

misbehavior, zero otherwise. We do not include class action lawsuits to block mergers and acquisitions, new issues of equity, and sale of the firm

<i>HERFINDAHL</i>	Asset based Herfindahl–Hirschman index of industry concentration
<i>IDISTRESS</i>	An indicator variable equal to one if the firm belongs to an industry in which the median firm suffered a decline in operating income in the preceding 2 years, zero otherwise
<i>NITA</i>	Net income divided by total assets
<i>LNTA</i>	The natural log of total assets in millions of dollars
<i>INTANGASSETS</i>	Intangible assets divided by sales
<i>SECDEBT</i>	Secured interest bearing debt divided by liabilities
<i>NUMDEBT</i>	Number of classes of debt reported in Moody's Bond Record, Mergent Online, Moody's/Mergent Industrial Manual and Moody's/Mergent OTC Industrial Manual

A.2. Chapter 11 related variables

<i>INSIDERS</i>	An indicator variable to one if the officers of a company together own more than five percent of the firm as reported in the proxy filing, zero otherwise
<i>PREPACK</i>	An indicator variable equal to one if a firm files for prepackaged bankruptcy, zero otherwise
<i>DIP</i>	An indicator variable equal to one if a firm receives debtor-in-possession financing, zero otherwise
<i>REORG</i>	An indicator variable equal to one if a firm reorganizes in Chapter 11, zero otherwise
<i>TIME</i>	Time in years between filing for Chapter 11 and the confirmation of the plan

A.3. Segment level variables

<i>EXSEGINVEST</i>	Industry-adjusted investment, which is the ratio of net capital expenditure to assets for each segment, minus the median of the same ratio for the focused firms operating in the same industry
<i>SEGG</i>	The lagged growth rate of segment sales
<i>SEGQ</i>	The median <i>q</i> -ratio of all focused firms in the same industry as the segment; the <i>q</i> -ratio is computed as the ratio of firm value (defined as the value of equity plus the book value of total assets minus the book value of equity) to total assets
<i>EXSEGCASH</i>	Industry-adjusted segment cash flow, which is the difference between segment operating profit to segment assets and the median of that ratio for focused firms operating in the same industry
<i>EXLEV</i>	Industry-adjusted firm leverage, which is the difference between the firm's ratio of total debt to the book value of total assets and the firm's imputed leverage, following the Berger and Ofek (1995) methodology

Table B1

Robustness check of the logistic regressions for predictions of bankruptcy.

Variable	Bankruptcy vs. non-bankruptcy		
	Pre-1997	Post-1997	Drop Pre-1997 firms with segment report changes after 1997
<i>INTERCEPT</i>	0.114 (0.884)	-1.986*** (0.000)	-1.744*** (0.000)
<i>LNNUMSEG</i>	-1.755** (0.017)	-0.527* (0.054)	-0.715*** (0.004)
<i>CFTA</i>	-1.407* (0.062)	-1.488*** (0.000)	-1.522*** (0.000)
<i>LOSS</i>	1.733*** (0.000)	1.731*** (0.000)	1.797*** (0.000)
<i>TDTA</i>	1.848** (0.020)	2.223*** (0.000)	2.229*** (0.000)
<i>INTERESTDEBT</i>	-0.283 (0.736)	0.082 (0.878)	-0.017 (0.970)
<i>AGE</i>	-0.104 (0.530)	0.193 (0.105)	0.096 (0.305)
<i>Z-SCORE</i>	-0.147** (0.022)	-0.003 (0.623)	-0.003 (0.585)
<i>MB</i>	-0.500*** (0.000)	-0.403*** (0.000)	-0.352*** (0.000)
<i>FRAUD</i>		0.553 (0.281)	1.451*** (0.003)
<i>HERFINDAHL</i>	1.522** (0.035)	0.247 (0.633)	0.815** (0.048)
<i>NOBS</i>	436	750	1188
<i>F value/χ²</i>	0.377	0.301	0.316
<i>Adj. R²/pseudo R²</i>	227.6	312.6	520.5

This table presents the results of the robustness check of the logistic regressions that predict a Chapter 11 filing. The model specification is the same as the first column of Table 3, Panel A. The dependent variable is the bankruptcy dummy, which is equal to one if a firm files for Chapter 11 in the subsequent year and zero otherwise. The regression predicts the probability of filing for Chapter 11. All variables are defined in earlier tables. We use the sample with fiscal years ending before December 1997 in the first column and the sample with fiscal years ending during or after December 1997 in the second column. In the third column, we drop firms bankrupt before 1997 that have changed their reporting strategies since December 1997. *p*-values are in parentheses.

* Significantly different from zero at the 10% level.

** Significantly different from zero at the 5% level.

*** Significantly different from zero at the 1% level.

A.4. Instrumental variables

<i>PNDIV</i>	The fraction of all firms in the industry that are conglomerates
<i>PSDIV</i>	The fraction of sales by firms in the industry accounted for by diversified firms
<i>LNMNUM</i>	The number of merger/acquisition announcements in a given year
<i>LNVALUEB</i>	The annual value of announced mergers/acquisitions, in billions of US dollars

Appendix B. Robustness check results

Due to space constraints, we only present the robustness check results for Table 3 in Table B1. The robustness check results for the other tables are available upon request.

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