THE OHIO STATE UNIVERSITY FISHER COLLEGE OF BUSINESS

Fisher College of Business Working Paper Series

Charles A. Dice Center for Research in Financial Economics

Thriving in the midst of financial distress? An analysis of firms exposed to asbestos litigation

Jérôme Ph. A. Taillard , PhD candidate, Department of Finance, The Ohio State University

Dice Center WP 2008-12
Fisher College of Business WP 2008-03-011

July 2008

Thriving in the midst of financial distress? An analysis of firms exposed to asbestos litigation[†]

Jérôme Ph. A. Taillard[‡]
The Ohio State University

First draft: March, 2008
This draft: July, 2008

Abstract

Asbestos litigation is one of the most important mass tort litigations in the history of the United States. I analyze a comprehensive sample of 270 firms that were exposed to an unprecedented wave of asbestos litigation in the wake of U.S. Supreme Court decisions in *Amchem* (1997) and *Ortiz* (1999). Due to insurance coverage, most firms in the sample have manageable cash outflows and do not suffer materially from the litigation. Because of the long delay between exposure to asbestos and its related illnesses, the remaining firms with substantial cash outflows and liabilities offer a rare natural experiment to study financial distress unrelated to economic distress. When analyzing this sub-sample throughout the distress period, I find little evidence of indirect costs of financial distress. This surprising result can be directly related to the strategic use of Chapter 11 as it provides a safe harbor through the stay in litigation and the "channeling injunction", which allows for a definitive solution for the legal liabilities. There is also evidence of a positive role for the disciplinary effects of financial distress as firms subject to increased bank monitoring and increased legal liabilities actively restructure and refocus on core operations.

JEL classification: G32, G33

Keywords: asbestos litigation; exogenous shock; indirect costs of distress; Chapter 11

[†] I would like to thank Isil Erel, Ruediger Fahlenbrach, Florencio Lopez-de-Silanes, Anil Makhija, Bernadette Minton, René Stulz, Ingrid Werner, Karen Wruck, and participants in the finance seminar at The Ohio State University for their many helpful comments and suggestions. Any remaining errors are my own.
[‡] PhD candidate at The Ohio State University. *E-mail address*: taillard_1@fisher.osu.edu

How do firms react to financial distress? Which actions can they undertake to alleviate the negative impact of a financial crisis? And ultimately, how costly is financial distress to firms? There is no consensus among financial economists on how to answer these questions. A significant empirical challenge is identification: Firms in financial distress are also typically in economic distress, which makes it difficult to isolate costs of financial distress.[1] One of the main contributions of this paper is to analyze firms suffering from financial, but not economic distress due to their exposure to asbestos litigation.

Asbestos litigation is one of the most important mass tort litigations in the U.S. and has been ongoing for more than four decades. However, there was an unexpected surge in litigation activity in 1999 after the U.S. Supreme Court overturned class action settlements in *Amchem* (1997) and *Ortiz* (1999) (e.g., Carroll et al. (2004)).[2] I analyze how defendant firms react to this unexpected legal shock and which actions they undertake to alleviate its financial impact. Due to the very long latency of asbestos-related illnesses, claimants seek purely monetary compensations for injuries resulting from operations that have ceased more than twenty years earlier. This fact leads defendant firms to suffer from cash outflows and additional legal liabilities unrelated to current operations.[3] As such, it provides a unique setting to analyze the impact of financial distress on firms' real activities.

Using accounting disclosure rules that require firms to report any material pending legal proceedings, I find 270 public corporations exposed to asbestos litigation in the U.S. in the aftermath of the U.S. Supreme Court decisions. Exposure to asbestos litigation varies

[1] The lack of consensus stems mostly from the estimation of the indirect costs of distress. Maksimovic and Philips (1998) find no evidence of reduced efficiency in plant productivity of firms during Chapter 11. Andrade and Kaplan (1998) find a neutral effect of distress on firms with pure financial distress due to prior highly leveraged transactions. In contrast, Weiss and Wruck (1998) find massive value destruction in Eastern Airline's case due to "court-sponsored asset stripping" and Pulvino (1999) finds evidence of fire sale in the airline industry; airlines in distress sell planes at a discount that ranges from -14% to -46%. Kalay, Singhal and Tashjian (2007) find significant improvement in the operating performance of firms in bankruptcy concluding that Chapter 11 might yield net gains.

[2] Benston (2003) and Stiglitz, Orszag, and Orszag (2002) offer an analysis of firms hit by asbestos litigation as the crisis was unfolding.

[3] In sharp contrast, tobacco litigation also affects the defendant firms' product market as the tobacco industry still produces the litigious goods (see Dahiya and Yermack (2003)).

considerably within the sample. I determine the direct financial impact of the litigation on defendant firms by relying on their disclosure on the matter in their financial statements. Furthermore, in order to gauge the level of financial constraints imposed by the litigation, I determine the availability of and the demand for funds and any resulting financial restructuring for each of the sample firms similarly to Kaplan and Zingales (1997).[4] After an extensive search of financial statements, press releases, and Moody's credit rating reports, I find that most firms in the sample have not experienced any material financial consequences from the litigation.

An investigation of the mitigating devices available to defendant firms reveals several interesting findings. First, beyond the traditional legal recourse of settling and fighting claims in court, firms are often completely shielded from out-of-pocket costs by their product and premises liability insurance coverage. As firms only bear out-of-pocket costs once liability insurance coverage is depleted, many firms in the sample report little or no *net* litigation liability or outflows. Second, among firms with more significant exposure, Chapter 11 is sometimes used for purely strategic reasons. A firm can file either their asbestos-laden unit or use an affiliated firm's Chapter 11 proceedings in order to obtain an automatic stay in litigation that stops the cash flow drain. But more importantly, a bankruptcy filing offers the only definite release from present and *future* asbestos liability through what is called the "channeling injunction", whereby a bankrupt firm sets up and finances a Trust to compensate claimants and emerges from bankruptcy free of any remaining liability. I uncover a dozen firms which make use of Chapter 11 while not suffering from financial constraints due to the litigation. In particular, there is no evidence of curtailments in the access to their credit facilities and no credit rating downgrades linked specifically to asbestos among that group of firms.

[4] Usually studies on financial distress rely on criteria linked to the firm's inability to meet its interest requirements, such as insufficient interest coverage ratios (e.g. Andrade and Kaplan (1998)). Due to the nature of the distress, these criteria are not directly applicable in this study. Furthermore, as my study focuses on financial distress as opposed to economic distress, I also control for any potential confounding effects due to poor operating performance within the sample of firms.

I find only 15 firms that become financially distressed due to their exposure to asbestos litigation. These firms have positive operating margins during the distress period. The reasons behind the distress are twofold. First, they suffer from an increased net cash outflow and/or liability at the onset of distress. Second, due to the general uncertainty surrounding the litigation environment and the ultimate cost of asbestos legacies, most of the usual financing channels become severely restricted. These two factors combined lead these otherwise healthy firms into financial distress.

Using value-based methods as in Andrade and Kaplan (1998), I estimate the net indirect costs of financial distress for the distressed sample. I find that the indirect costs of financial distress are offset by other factors over the period spanning from pre-distress to resolution of the financial crisis. Industry-adjusted measures show a non-significant median cost of 3.3% (0.9% average cost) of total pre-distress firm value for the 11 firms of the distress sample with traded equity and a resolution date. For the subset of distressed firms that use Chapter 11 (9 cases with a resolution date), the value computations yield a statistically non-significant *gain* of distress of about 11%. This gain becomes significant when applying market-adjusted measures, instead of industry-adjusted. Analyzing returns for existing shareholders, I find that stock prices fall dramatically during the onset of distress year (nominal and industry-adjusted statistically significant mean and median returns of about -70%). However, on average, existing shareholders enjoy a tremendous recovery in the value of their stake at resolution. Indeed, although shareholders lose almost all of their claims in the reorganization process of a third of the distressed Chapter 11 cases, the average industry-adjusted return over all distressed firms is a statistically non-significant gain of 18% (median -0.2%) over the period.

To understand these results, I first analyze how these distressed firms manage to reestablish their sources of financing amid the crisis. Three cases were negotiated in an out-of-court financial reorganization, despite the ongoing uncertainty around the asbestos liability. However, in the 12 other cases, a Chapter 11 filing of at least the asbestos-laden unit becomes the only viable

solution to obtain further financing. Strikingly, all Chapter 11 filings of entire businesses obtain a Debtor-In-Possession (DIP) financing and all partial filings obtain a renewed credit facility.[5] This result highlights another benefit of using Chapter 11 within the context of mass tort litigation.

I also examine both quantitative and qualitative measures of operating performance. After an initial drop, operating performance (as measured by EBITDA to sales) steadily recovers during the crisis period. After the first two years of the crisis period, operating performance is at the pre-distress levels or even higher at the median values, both on a nominal basis and an industry-adjusted basis. About half of the sample firms report an increase in operating performance. This improvement is maintained until resolution, which occurs on average five years after the onset of distress. It is explained in part by better productivity and cost cutting. There is an economically and statistically significant drop in the number of employees per sales over the period of about 25% from pre-distress levels. Looking at patterns in discretionary spending (CAPEX), I find a significant drop one year after the onset followed by a mild recovery in expenditures, hinting at a potential temporary costly curtailment in CAPEX.

These quantitative results are interpreted in light of qualitative evidence collected on these distressed firms. With respect to costs of financial distress, there is some evidence of costly CAPEX curtailments but only in a minority of cases and they tend to be temporary, occurring around the onset of distress or shortly after. Evidence of fire sales is limited. There is no evidence of risk-shifting behavior among the distressed firms. In contrast, I find widespread evidence of potential benefits of financial distress through its disciplinary effects on firms (Wruck (1990)). Almost all firms take the opportunity to shed non-core assets, restructure current operations, often with strong operationally-oriented management at the helm, replacing previous management at the onset of distress in about half of the cases. This evidence is somewhat surprising. One

[5] DIP financing provides financing for firms in bankruptcy. It is usually extended by the banks which provide the firm with its credit facility prior to the filing, as soon as firms file. It also typically enjoys super-priority in Chapter 11 proceedings (see Dahiya, Kose, Puri, and Ramirez (2003) for details on this type of financing).

potential explanation is that the increased monitoring by banks, as lenders of last resort, combined with the higher legal liability and related cash outflows act as strong incentives on the management and board of directors of these firms to avoid any wasteful projects. Because most of the sample firms have the capacity to generate high levels of free cash flow, the effect of the litigation can be viewed similarly to that of the incentive effects caused by a leveraged management buyout (see Kaplan (1989)) or a leveraged recapitalization (Wruck (1994)).

This study contributes to the strand of corporate finance research that examines how financing issues affect real corporate decisions such as investment policies. Several papers have tried to isolate the financing role of internal cash flows by analyzing negative and exogenous cash flow shock events and test whether investments patterns drop accordingly (see Lamont (1997), Lang, Ofek and Stulz (1996) and more recently Rauh (2006), Chava and Roberts (2007) and Bakke and Whited (2007)). These studies generally find that firms have investment policies that are sensitive to the level of internal cash flows, which leads to the conclusion that markets for external financing are not frictionless.[6] Using an intra-firm litigation setting, Cutler and Summers (1988) and Bhagat, Brickley and Coles (1994) hypothesize that combined market value losses in excess of the litigation cost reflect indirect costs of financial distress. Blanchard, Lopez-de-Silanes and Shleifer (1994) also use litigation to identify exogenous cash flow shocks but they look at *positive* cash flow shocks to infer potential managerial agency costs, based on the agency theory of free cash flow (Jensen (1986)). In this study, the *negative* exogenous shock is brought about by an unexpected change in how laws are applied in the context of asbestos mass tort litigation. Among the small sample of firms that suffer from financial distress, most use Chapter 11. The bankruptcy filings allow firms to reorganize their operations in an orderly fashion and to avoid the destruction of valuable assets. This evidence lends support to Haugen and Senbet

[6] Both Rauh (2006) and Bakke and Whited (2007) use defined benefit pension plan underfunding as a setting to capture cash shortfalls unrelated to operations. However, they come to very different conclusions because results are sensitive to the specification of the regression discontinuity used in these studies. I circumvent the issue by using a different research design.

(1978)'s conjecture that only assets of poor quality and the associated risk of liquidation lead to indirect costs of financial distress and that bankruptcy per se does not, as long as stakeholders rationally anticipate the transfer of ownership.

This paper is also naturally related to studies estimating the costs of financial distress. Many papers analyze costs of financial distress using different subsamples of firms in crisis (e.g. Altman (1984), Asquith, Gertner and Scharfstein (1994), Opler and Titman (1994), and, more recently, Maksimovic and Philips (1998) and Kalay, Singhal and Tashjian (2007)). However, these papers usually cannot distinguish financial distress from economic distress. The paper most related to this study is provided by Andrade and Kaplan (1998) who use Highly Leveraged Transactions (HLTs) to detect financial distress, as opposed to economic distress. However, in their study, firms choose a highly leveraged capital structure prior to the distress. Beyond this self-selection issue, the HLTs trigger organizational changes and strong incentive effects of their own and as such provide a potential confounding effect when measuring the impact of financial distress on firm value. Using a very different context to isolate the effects of financial distress, I find results consistent with theirs.

The rest of the paper is organized as follows. Section 1 describes the institutional background of the asbestos crisis. Section 2 presents the data and section 3 estimates the litigation costs for defendant firms. Section 4 analyzes the mitigating devices used to lessen the financial impact of litigation. Section 5 performs a detailed analysis of the performance and behavior of the firms in financial distress due to the litigation. Section 6 concludes.

Section 1. Asbestos mass tort litigation

From the outset, it is important to mention two characteristics of asbestos litigation that set it apart from all other mass tort litigations. First, there is a very long latency period between exposure to asbestos and the potential manifestation of one of its related illnesses. As such, asbestos litigation is usually unrelated to current underlying operations and produces an

exogenous shock to the finances of defendant firms. Second, due to its impressive physical properties and low cost, asbestos was used in a wide range of applications ranging from insulation products to brakes in automobiles. Its use in manufacturing processes was drastically curtailed only as of the mid-'80s due to the health risk and associated legal liability (White (2004)). This fact explains why the pool of defendant firms comes from a large cross-section of different industries, extending well beyond asbestos producers.

Section 1.1 The asbestos litigation crisis after *Amchem* (1997) and *Ortiz* (1999)

Asbestos is the longest-running mass tort litigation in the United States, spanning over more than four decades.[7] The first complaint against asbestos producers was filed in 1966 and the case was ultimately won by defendant firms. As of the first half of the '70s, the courts ruled that plaintiffs could file civil suits against their past employers, which had been protected by workers' compensation up to that point. By the mid-'80s, asbestos litigation had taken massive proportions in state and federal courts (see Hensler et al. (1985)). As most asbestos producers were in bankruptcy by the end of the '80s, the second wave of litigation started aiming at firms with a more tenuous link to past asbestos use.

By the early '90s, plaintiffs' attorneys had clearly defined legal strategies in place. In particular, they bundled cases together and filed claims in plaintiff-friendly state courts against many firms at a time (see Parloff (2002) and White (2002a)). Due to the potentially crippling effect of losing against thousands of claimants in trial, most defendant firms aimed at striking deals with large pools of (mostly unimpaired) plaintiffs, usually in out-of-court settlements. As of the early '90s, asbestos personal injury claims accounted for up to a third of all civil filings for some courts (see Hensler (2002)). Meanwhile, except for the amendments made to the Bankruptcy Code in 1994 that allow a firm to emerge from bankruptcy free of all present and

[7] For a thorough overview on asbestos litigation, refer to the extensive RAND study (Carroll et al. (2004)) and the references therein. See Appendix A for a detailed timeline of asbestos litigation in the U.S.

future asbestos liabilities, no global government-sponsored solution had emerged. Two efforts were made by major defendant firms to find an efficient solution using class action status.[8] However, these class action settlements were contested on legal grounds and were rejected by the U.S. Supreme Court in *Amchem Products v. Windsor* in 1997 and *Ortiz v. Fibreboard Corp.* in 1999.

In the wake of the US Supreme Court rulings, all claims were reinstated in the courts. Combined with an unexpected surge in the number of new filings sparked by heightened media attention, several key defendant firms saw their asbestos liability soar. The only viable option left for some of these firms was to seek protection from bankruptcy courts with Owens Corning's filing being the most notable in October 2000. However, the stay in litigation offered by the bankruptcies effectively took money for compensation off the table, thus plaintiff attorneys aggressively sought out new defendants. This led to an unprecedented level of litigation (see White (2002b), Parloff (2002)). Sometimes called the "fourth wave" in asbestos litigation (e.g. Orszag, Orszag and Stiglitz (2002)), it is the event I study in this paper.[9]

Section 2. Data

The initial sample selection aims at detecting the broadest cross-section of firms suffering from exposure to asbestos litigation in the wake of U.S. Supreme Court decisions in *Amchem* (1997) and *Ortiz* (1999), which dramatically changed the landscape of the mass tort litigation.[10] Accounting disclosure rules require firms to report any material pending legal proceedings. I

[8] In 1993, the Center for Claims Resolution (CCR), set up by 20 co-defendants, settled with most of its current plaintiffs and provided a settlement for all future claims through a class action settlement (known as the "Georgine Settlement"). Fibreboard, another traditional defendant, proposed a class action settlement of its own the same year.

[9] To date there is still no global solution set forth by Congress. However, a slew of state reforms have led to an abatement of the severity of asbestos litigation since 2003 (see Hanlon and Geise (2007)).

[10] The first waves of bankruptcies concerned mostly asbestos producers and as such are not part of our study since the litigation affected both the firms' finances and their operations. For example, Johns Manville filed for bankruptcy in August 1982 but stopped its asbestos-producing operations only in 1983, selling the unit at a loss in 1985 while still in bankruptcy.

perform a key word search regarding exposure to U.S. asbestos litigation within financial statements of U.S. and foreign publicly listed firms over the period from 1996 to 2005.[11]

From this initial sample, I eliminate firms that only report taking a charge linked to the abatement of asbestos in their buildings, including real estate firms. I also discard certain industries, namely: utilities, which are inappropriate due to their regulated nature, asbestos abatement firms due to the potential impact of litigation on their core operations and tobacco firms due to their own litigious products. Financial services firms and, in particular, insurance carriers and reinsurers that covered asbestos liabilities have incurred large cash outflows linked to the litigation. However, providing coverage is part of their core operations and as such, these firms do not fit the research design and are excluded from the sample. The search produces 270 firms citing asbestos litigation concerns during the period under study.[12]

Section 3. Financial impact of litigation on defendant firms

In this section, I analyze defendant firms and categorize them by the intensity of exposure to the litigation. In particular, I quantify the financial impact of the litigation on defendant firms by gauging both the direct legal costs and the indirect financial consequences according to measures of financial constraints.

[11] In more detail: I used the 10-K Wizard® SEC Power Search for a key word search among all 10-K and 20-F SEC filings and hand-checked every firm that was flagged by at least one of the following queries (*: denotes stemming):
1. The word "asbestos" within 500 words of the word "litigation"
2. The word "asbestos" within 20 words of the word "liabilit*"
3. The word "asbestos" in item 3 of part I of 10-Ks (i.e. in Legal Proceedings)
4. The word "asbestos" in the Management's Discussion Section.
5. The word "asbestos" within 500 words of "commitment*" or "contingenc*" in item 8 of Part II (i.e. in Financial Statements and Supplementary Data)
For foreign firms, the search is restricted to those that have exposure to U.S. litigation where the timeline and legal framework are well understood and common to the other firms in the sample. The sample was partially cross-referenced using a comprehensive list of all bankrupt firms where asbestos was mentioned as a reason for Chapter 11 filings in Carroll et al. (2004). It was further compared to all firms mentioned at least once in the WSJ articles containing the word "asbestos" during the period of study.

[12] The small sample size relative to numbers cited by Carroll et al. (2004) is due to my focus on firms with publicly traded debt or equity that do not need to report their exposure if immaterial, the industry screening and the focus on the most recent wave of the litigation.

Section 3.1 Measuring the financial impact of litigation

I rely on financial statements and disclosure concerning litigation over the period 1993-2006 to construct both qualitative and quantitative measures of exposure to the litigation. The qualitative evidence stems from management reporting on the issue. The quantitative evidence is provided by the financial statements when the litigation leads to significant expenditures, liabilities and financial restructurings, including equity dilution in Chapter 11 reorganizations.[13]

I compute measures of exposures both on a gross and *net* of insurance coverage basis. Specifically, I construct an annual time-series of both a flow and a stock measure of exposure to the litigation at the firm level by computing annual (1) gross and *net* cash outflows, i.e. cash outflows to the plaintiffs beyond insurance recoveries in the latter case and (2) gross and *net* legal liabilities, i.e. liabilities related to the litigation minus the insurance receivables from the firm's insurance policies in the latter case. I also infer a "perfect foresight" measure of gross and *net* liability which computes the sum of all gross and *net* expenditures linked to the litigation from each year up to the last year of the sample.[14] This measure represents the "true" liability given with hindsight, which might defer from a firm's estimated liability at the time. These exposure measures are then normalized using accounting measures, such as operating profitability for the flow measures and total liabilities for the stock measures.

To gauge the level of financial constraint among the sample firms, I rely on a detailed analysis of the financing and liquidity situation for each sample firm as in Kaplan and Zingales (1997). Typical criteria of financial distress such as a firm's inability to meet its interest requirements (e.g. Andrade and Kaplan (1998)) are not directly applicable because the financial distress studied in this paper is of a different nature. Financial distress among the sample firms is

[13] SFAS 5 requires pending claims that still have to be settled or tried to be accrued as an expense if certain conditions are met. The conditions being: 1. if it is probable that a liability has been incurred and 2. the amount of such liability incurrence can be reasonably estimated.

[14] To which I add any remaining book gross or *net* liability stated at the end of the sample period in fiscal year 2006. A 5% rate is used to discount these forward-looking flows and liabilities.

caused by the direct legal cash outflows combined with a lack of access to traditional sources of financing due to the surge in litigation activity. Firms are accordingly classified in two categories: The first category ("Distressed sample") highlights firms in financial distress due to the litigation. It includes all the firms that have been cut out of their traditional sources of external capital and are forced to have a financial restructuring because of the litigation, whether outside of Chapter 11 or through a Chapter 11 filing. The second category ("Other") contains firms that do not show any signs of financial distress due to the litigation.[15] As my study focuses on financial distress as opposed to economic distress, I also document any potential confounding effects, such as operating difficulties within the sample of firms. In particular, firms with significant asbestos litigation exposure that have at least one year of negative EBITDA (adjusted for any asbestos-related provisions or gains) during the period of analysis are also considered in economic distress and the analysis is performed with and without them for robustness purposes.[16]

3.2 Litigation exposure and financial distress

Table 1 provides the categorization of sample firms according to their level of exposure measured by the sum of net outflows (dollar value of shares transferred to plaintiffs and net cash outflows) relative to the sum of operating profits over the period 1999-2006.[17] I also classify which sample firms suffer from financial distress due to their exposure to the litigation. From the initial 270 firms, a majority of firms have only immaterial exposure to the litigation. Approximately two thirds of the sample firms mention the litigation in passing, never disclosing any net liabilities, nor any net cash outflows during the sample period (category 1 firms).

[15] This dichotomy in the classification may seem stark at first glance. However, for the purposes of the study, firms that suffer cash outflows or report liabilities due to the litigation yet do not have any curtailment in their external financing and maintain financial slack are not considered financially constrained.

[16] Several bankrupt firms, such as Bethlehem Steel, are commonly associated with asbestos litigation yet are in distress purely for economic reasons. These firms are not included in the sample of financially distressed firms due to asbestos litigation. A detailed list of these firms can be found in appendix B.

[17] For brevity, the classification based on net asbestos liabilities relative to total liabilities is not shown. However, results are qualitatively similar.

Disclosure from these "peripheral" defendants tends to be limited; typically they state being named among dozens, sometimes hundreds of co-defendants without having any of their products being specifically blamed. Caterpillar Inc is such a firm. It turns out that Caterpillar has expended a total of about $25 million on asbestos litigation over the period ranging from the late '80s to 2004 (see Bronte (2007)). This amount can certainly be considered as immaterial for a corporation of its size and explains why it has never disclosed any numbers related to the litigation in its financial statements. In all, only 82 firms report either a net liability and/or net cash outflows related to the litigation over the period 1999-2006 (category 3 to 9), of which more than a third report a net liability but no cash outflows over the period (category 3 firms). Most firms in category 3 have immaterial annual outflows but established a net liability to reflect their obligations in the coming years. This leaves 55 firms reporting dollar amounts of net cash outflows over the period and the great majority of them paying less than 5% of their accumulated operating profits over the period.

Looking at the corresponding indirect effects in terms of financing constraints, the correlation between net financial cost of asbestos litigation and resulting financial distress is high. At low levels of exposure (costs below 5% of accumulated operating profits), most firms do not report any signs of financial constraints. However, as the direct exposure becomes important, most firms suffer from financial distress. Panel B of Table 1 confirms the significant correlation between net exposure to asbestos litigation and resulting financial distress. Non-parametric Spearman correlations are computed on five different measures of net exposure to the litigation; all are significant, ranging from 0.42 to 0.6. This result suggests a threshold effect where firms can cope up to a certain point without any material financial consequences. But beyond this point, their litigation liability leads to indirect effects in particular with regard to their ability to access external capital. Strikingly, only 15 firms report severe financing constraints due to asbestos litigation.

In Table 2, I analyze in more detail the subset of 82 firms reporting a net outflow or liability over the period 1999-2006 (category 3 to 9 of Table 1). More specifically, I separate firms deemed in financial distress due to the litigation from the non-financially distressed firms and compute summary statistics for both subsamples. Several features are common across the two groups. In particular, defendant firms are usually large as measured by total assets at the time of the surge in litigation, with a median value in excess of $3Bn. Furthermore, median operating profits over the period 1999-2006 stand at about 10% of sales for all subgroups. The median leverage (book value of debt relative to total assets) stands at around 30% for all groups. The two groups are not statistically different from each other along those dimensions. Furthermore, the *minimum* interest coverage ratio (EBITDA to interest expense) over the period 1999-2006 is also computed. Its median value is equal to two for the distressed sample and four for the other groups. The difference is statistically significant for the medians. Taken together, these firm characteristics highlight what is known as the "deep pocket" syndrome, whereby plaintiff attorneys tend to sue firms with the ability to pay large settlements or damage awards. This fact also explains why only a handful of defendant firms suffer any distress from the litigation. Indeed, only the most serious of litigation liabilities can harm these large and profitable firms.

When comparing firms from the distressed sample relative to the other firms, several significant differences can be highlighted. First, exposure to litigation as measured by gross and net perfect foresight liability and gross and net outflows related to the litigation are more important for the distressed firms. Second, almost all of the distressed firms are traditional defendants, as defined by firms stating being defendants prior to their 1999 financial statements, or acquiring a firm that was stating it. However, almost three quarters of the non-distressed firms are not traditional defendants in the litigation according to this definition.

Turning to the evidence on financial constraints, all distressed firms with a credit rating in 1999 suffer from severe credit downgrades over the period. In fact, only one firm barely manages

to maintain a credit investment grade.[18] Regarding dividend and share repurchases policies, the entire sample of distressed firms stop their share repurchase programs and all but two cut their dividend payments to zero. Remarkably, none of the firms in the non-distressed group suffer from a credit downgrade due to the litigation specifically. However, 14% are on a credit watch with a negative outlook due to the litigation, with most keeping an investment grade rating.[19] A quarter of the firms cut their dividends in the non-financially distressed group and 60% of them cut their share buyback program.

Section 4. Mitigating devices in litigation

In this section, I investigate the role of liability insurance coverage and strategic Chapter 11 filings in explaining why so few firms are financially constrained by the litigation. Beyond the traditional legal recourse of fighting claims in court or settling them, defendant firms can mitigate the impact of mass tort litigation by using these two defensive devices.

Section 4.1 Role of insurance coverage policies

It is important to realize that legal liabilities impact a firm only once its insurance policies are exhausted. As such, insurance liability coverage is one of the only effective risk management tools against low probability, high-severity mass tort claims (see Beatty et al. (2005)). Asbestos coverage, as part of the product and premises liability coverage of a Comprehensive General Liability (CGL) policy, provides for payments covering the liability incurred by firms due to bodily injuries or property damages up to an aggregate limit. These policies also extend to pay for defense costs with insurers usually deciding on the optimal litigation strategy to adopt.

[18] It is Halliburton and it admits that its access to capital has become more costly and "more volatile". More details on the financing situation of the distressed firms are given in section 5.

[19] Honeywell Inc. is an example of such a firm. Despite the fact that it has a net asbestos liability at almost 10% of its total liabilities and cash outflows in the hundreds of millions in some years, the firm manages to increase dividends and maintain an S&P A rating throughout the sample period. It also has full access to the public bond market and a very large credit facility on which it can draw down if needed.

Furthermore, firms often contract multiple "layers" of insurance. The first layer, offered by the primary insurer, covers all the initial costs related to the liability. Once the primary coverage is exhausted, firms may access their upper layers, called "excess" layers for further coverage.

However, most asbestos defendant firms and their insurance carriers are in litigation with each other to determine the extent of the coverage under the policies contracted. The battleground most often revolves around wording issues in the CGL policies, such as defining exactly the type of events that trigger a policy (see Anderson (1987) and McGuire et al. (2004)). Disputes between insurers and defendant firms can become even more complicated after a Chapter 11 filing and partly explains why the bankruptcy proceedings last for years in many cases. At the heart of the issue is the insurer's right to participate in the bankruptcy negotiations (see Plevin (2003) and Parloff (2004)). This litigation has had an important knock-on effect on how insurance contracts are written (e.g. Priest (1987)). In particular, in the midst of the CGL crisis of 1985 and 1986, the "absolute" pollution exclusion clause was added to the standard policies, which led to the exclusion of asbestos coverage after that date (Abraham (2001)). Because a majority of claims have exposures to asbestos prior to 1986, most firms in the sample have insurance coverage for the litigation. As firms only bear out-of-pocket costs once liability insurance coverage is depleted, it explains why so many firms in the sample report little or no *net* litigation liability or cash outflows and thus do not suffer from any material financial costs. About two thirds of the firms citing exposure to asbestos litigation do not have any net liability or outflows (cf. Category 1 of Table 1). Most of them state having insurance coverage in case the litigation were to become more important in the future.

In Panel A of Table 3, I offer some evidence that net liability as opposed to gross liability is a better determinant of financial distress. As firms tend to disclose gross liabilities only once they have important net liabilities, the correlation between the two measures is high, ranging from 0.68 to 0.89. However, when performing a robust logit regression explaining the probability of financial distress across different measures of gross and net exposure to the litigation, the net

measures almost always come out much more significant than the gross measures. In the next section, I will provide evidence that links directly the onset of distress to the lack of insurance coverage within the sample of financially distressed firms.

Section 4.2 Strategic role of Chapter 11 filings

As many firms voluntarily file for Chapter 11 protection during the period of crisis, it is critical to get a good understanding of the strategic use of Chapter 11 filings within the context of mass tort litigation (see Resnick (2000) for more details).

There are clear advantages for firms to file for bankruptcy in order to settle their mounting asbestos-related claims. First, it is important to note that even if a firm files only its asbestos-laden unit for Chapter 11, the advantages listed below usually extend to all subsidiary and parent companies. Hence, firms where the subsidiary linked to the litigation can be isolated will tend to file only the business unit in question. The first advantage of a filing is that during the bankruptcy process, claimants are not paid as the firm obtains an automatic stay in litigation. The automatic stay stops the cash flow drain. Interestingly, a firm's eligibility for Chapter 11 protection is not dependent on the defendant's insolvency at the time of the filing. Thus, a debtor may file before it defaults on its obligations in order to find a timely solution to the litigation. But the main advantage of the bankruptcy filing is to offer the only definite release from asbestos liability through what is called the "channeling injunction".[20]

The "channeling injunction" allows a firm to emerge from Chapter 11 bankruptcy discharged of all present and *future* liability by setting up a Trust, which needs to be approved by 75% of the asbestos creditor class. Once the Plan is accepted and effective, the debtor receives a "channeling injunction" that bars all claims against the reorganized firm and redirects them to the Trust. The

[20] Also known as the Manville amendment, Congress rendered the "channeling injunction" official through amendments in the Bankruptcy Reform Act of 1994 (see U.S.C. § 524(g)).

Trust serves to compensate all the present and future claimants and is usually funded by a combination of the emerged firm's stock, cash, notes and remaining insurance policies.

The case of PPG Industries is illustrative. PPG filed for Chapter 11 its co-owned subsidiary Pittsburgh Corning (PC) in April 2000, soon after the first case where it was found liable in Jan. 2000. Although the Trust settlement negotiated within the Chapter 11 proceedings leads the firm to report net liabilities of close to $900 million as of fiscal year 2006, its out-of-pocket costs have been immaterial to date. Furthermore, the firm does not suffer from any financing constraints over the period of analysis: It has significant untapped credit lines and generates sufficient cash flow from operations to maintain an S&P credit rating of A, increase dividends per share and retire more debt than it issues throughout the period.

In Table 3 Panel B, I separate the non-financially distressed group of firms reporting net liabilities or net outflows in two categories related to their use of Chapter 11.[21] Remarkably, none of the firms using Chapter 11 suffer from a credit downgrade due to the litigation specifically.[22] Less than 50% of the non-financially constrained group of firms using the Chapter 11 forum is on a credit watch with a negative outlook, with most keeping an investment grade rating. Only two firms cut their dividends in the group of firms using the Chapter 11 forum and less than a third cut their dividend in the other category. These results can be directly related to the fact that these firms manage to shield some or all of their operations by filing only their asbestos-laden subsidiary or by using an affiliated party's Chapter 11.

When comparing the two non-distressed groups of firms, one result regarding the exposure to the litigation clearly stands out. Although the median net liability of the firms using Chapter 11 is statistically significantly higher (about four times higher) than the net liability of the other non-distressed group, the total net outflows relative to operating profits are almost identical and not

[21] Appendix C provides details on the firms that use Chapter 11 strategically and that have not suffered any financial distress as a consequence of the litigation.

[22] However, some of these firms do suffer from credit downgrades for other reasons. For example, Corning Inc. faced restrictions in its financing and downgrades due to the massive downturn among telecommunication equipment providers amid the bursting of the dot.com bubble.

statistically different from each other. This fact highlights the benefits of the automatic stay in litigation obtained within the Chapter 11 forum.[23]

To conclude this section, two striking features are worth underlining. First, many firms have immaterial financial exposure to asbestos litigation. It can be explained by the fact that most defendants have insurance coverage for asbestos liability and tend to be peripheral defendants with only a tenuous link to past asbestos use. Second, among the subset of 82 firms reporting net costs, a dozen use Chapter 11 strategically in order to obtain a stay in litigation and thus avoid a cash flow bleed. As none of them report constrained access to external funds specifically due to the litigation, it highlights the strategic gain of obtaining the stay in litigation within the Chapter 11 forum, in particular when filing for bankruptcy only the asbestos-laden subsidiary. As a consequence of these two facts, I uncover only 15 firms that suffer financial distress due to asbestos litigation. These 15 firms are the focus of the analysis from this point on.

Section 5. Analysis of financially distressed firms due to asbestos litigation

In this section, I perform a thorough analysis of the sample of firms in financial distress due to asbestos litigation. First, I give a description of the firms, in particular with regards to their source of exposure and how the liability is dealt with. Second, I analyze the direct costs of litigation and financial distress. Third, value computations are performed to infer net indirect costs of financial distress. Finally, these value computations are put in the context of firms' operating and financing behavior during the period of distress.

The statistical significance of both the operating performance and the value computations is given by a two-sided Wilcoxon's signed rank test for the medians, and a Student's t-test for the means. T-tests rely on normality assumptions of the data. These assumptions may not be met

[23] The next section will provide further evidence among the sample of financially distressed firms of the benefits of Chapter 11 outlined in this section.

given the small size of the sample being analyzed. However, the non-parametric Wilcoxon tests of medians are less sensitive to outliers.

Section 5.1 Sample of financially distressed firms

Table 4 provides a description of the sample of 15 firms suffering from financial distress due to asbestos litigation. Details are given regarding their current business operations, their source of exposure to the litigation and the timeline from the onset of distress to its resolution. The table is divided into two panels. Panel A lists the majority of firms (12) using Chapter 11 as a forum to get a stay in litigation and eliminate their asbestos liability, and Panel B lists the three firms that rely on an out-of-court financial restructuring to resolve their crisis. Various observations can be made from the table.

First, a third of the distressed firms acquire most of their litigation exposure during the second part the '90s, even as late as 1999. The fact that by then asbestos litigation had been ongoing for more than three decades lends support to the unanticipated nature of the most recent wave in litigation under study.

Second, the industries hit by the litigation can be considered as quite diverse, ranging from oil and gas to power and automation. This fact is a reflection of plaintiff attorneys aggressively pursuing more peripheral defendants after the main producers of asbestos had gone bankrupt. Past heavy users of asbestos such as building materials and refractory firms became the next target, which explains why five out of the 15 firms operate in building materials. Most defendant firms are sued due to successor liability from past operations. For instance, Crown, Cork and Seal, a major packaging firm, is being sued for having owned for three months a small insulating firm which used some asbestos in its products during the '60s.[24]

[24] A detailed account of the source of exposure to the litigation for the final sample of firms can be found in Appendix D.

Third, when a business unit can be singled out as the source of litigation, firms shield the rest of their operations from the threat of litigation. In 10 out of the 15 cases, the firms are sued for successor liability and no specific business operations can be pinpointed as being the asbestos-laden unit. However, out of the five cases where the exposure to the litigation is concentrated within one specific business, four file only the asbestos-laden unit for Chapter 11, shielding to some degree the rest of the firm's assets.[25] In the case of BMCA, its parent G-I Holdings filed for Chapter 11 allowing BMCA to obtain the stay in litigation even though it remains outside of Chapter 11 itself.[26]

The timeline of the analysis goes from the onset of distress to the resolution of distress.[27] The onset of distress is defined as the fiscal year where asbestos litigation causes a lack of access to the traditional sources of capital for the defendant firms. A majority of firms (nine) have the onset of distress during 2000. There is clear evidence that these firms started to face severe restrictions to external financing in the late months of 2000 when almost all firms lost their investment grade rating. Although in some cases it coincides with a Chapter 11 filing, the onset of distress occurs usually (10 out of 12 filings) one year prior to the filing.

Resolution is defined as the end of fiscal year of (1) a firm's Chapter 11 emergence or; (2) of being acquired; or (3) a permanent recovery of access to external capital due to an out-of-court financial restructuring.[28] The time from onset to resolution is six years, on average, for firms using Chapter 11. The time from filing to resolution is slightly more than five years with three filings still ongoing. Even the pre-packaged bankruptcies filings take at least three years from the

[25] RHI deconsolidated its US operations and filed them for Chapter 11, in effect shielding its healthy non-US based refractory operations.
[26] BMCA is the only private firm in the sample, filing financial disclosure due to the public debt it issues. G-I holdings owns 100% of BMCA's equity. BMCA agreed to pay the first $204M in the litigation. In exchange, G-I holdings agreed to indemnify BMCA for any excess liability. At this point, it is unclear who will become the owner of BMCA upon the emergence of G-I holdings.
[27] Resolution and post-resolution are used interchangeably in the paper and have the same meaning.
[28] Chapter 11 filings remain to date the only route to completely eliminate any present and future asbestos liability, so firms in Panel B still have asbestos liability. However, they are deemed to have resolved their financial crisis as they were acquired or have regained a normal access to capital markets. The recent slew of state reforms has also dramatically lessened the litigation threat (see section 1.1).

time they are announced to their execution.[29] Relative to recent studies on Chapter 11 (e.g. Kalay et al. (2007) report an average time in bankruptcy of less than two years), the period of time in bankruptcy within this sample can be characterized as lengthy. It is often attributed to the protracted negotiations within Chapter 11 (e.g. Parloff (2004)). For example, ABB filed only part of their business for Chapter 11 protection and tried to get the channeling injunction extended to the entire corporation in order to minimize the impact of litigation. However, the bankruptcy courts rejected the plan as the solution was not deemed "fair and equitable". These factors tend to slow down the reorganization process considerably.

The three cases resolved outside of Chapter 11 have a time to resolution that is shorter than their Chapter 11 counterparts, less than four years on average. The fact that all but three cases have a resolution date allows for a complete analysis in what follows from the pre-distress year (defined as the fiscal year prior to the onset of distress) up to the resolution year.

Section 5.2 Direct costs of litigation and financial distress

Table 5 shows the direct costs of asbestos exposure in event time, with year 0 being the year of onset of distress. It also provides aggregate measures of net asbestos payouts (over the period 1991-2006), plus direct costs of distress defined as Chapter 11 professional fees in the cases where a filing is made. In terms of aggregate net contributions from individual firms, the amounts paid out for Chapter 11 cases are usually in the billions with a mean payout of $1.6Bn (median $824M). Furthermore, within Chapter 11 cases, most payouts below $1Bn underestimate the final total payout as the equity component is not taken into account.[30] These stock and cash

[29] Pre-packaged bankruptcies or "prepacks" are bankruptcies where the negotiations linked to the reorganization are done prior to filing. This strategy can potentially reduce the time and cost linked to the resolution of the litigation, as the firm enters bankruptcy with a pre-approved reorganization plan (see Tashjian, Lease, and McConnell (1996) and Bris, Welch and Zhu (2006)). Three of the 12 firms using Chapter 11 have used pre-packs.

[30] Not reflected in the numbers, Congoleum's, WR Grace's and Federal Mogul's Trusts will all receive the equivalent of 50.1% of the firms' new equity. RHI numbers do not reflect the equity loss of its US

contributions are net of insurance proceeds. The legal amounts paid out for the three firms outside of Chapter 11 are smaller, in particular for Crown, Cork and Seal and Georgia-Pacific.[31] In terms of payout to plaintiffs, firms staying outside of Chapter 11 do not have stock settlements. Avoiding bankruptcy, and its related uncertainty with regards to potential transfers of ownership, is positive for existing shareholders but it also gives less flexibility in terms of the means used to compensate plaintiffs.

Chapter 11 cases lead to so-called "direct costs of distress", namely all the professional fees related to a bankruptcy filing. Past studies have shown that they tend to be fairly small at about 3% of the pre-filing book value of assets of large firms (e.g. Weiss (1990)). In this study, they stand at 4.4% on average.

In terms of the timeline of payouts, Figure 1 offers a clear picture. Prior to onset, gross cash outflows are moderate as are net cash outflows for the median firm of the sample of 15 distressed firms. These low levels of net payments in the sample are due the insurance coverage provided by insurance policies still in place. However, at the onset of distress, gross cash outflows increase significantly for the average firm in our sample and at the same time its insurance policies get exhausted. Thus, at onset, net cash outflows surge. Most firms in the sample tend to file for Chapter 11 on average one year after the onset. The effects of the stay in litigation is obvious as net cash outflows drop significantly and are almost zero two years after onset. The liability remains and the surge at resolution is clearly linked to the subset of firms in Chapter 11 which pay out the bulk of their dues to the Trust when they emerge from bankruptcy. Figure 2 depicts a similar surge in gross and net legal liabilities relative to total liabilities for the median firm in the run-up to the onset of distress year. However, the liabilities remain beyond the year of onset and

operations which led to an exceptional loss of over half a billion US dollars in 2001. And the parent of BMCA, G-I Holdings, does not disclose its financial statements.

[31] Their financial distress is also due to high prior debt levels which compounded by asbestos cash outflows and general uncertainty regarding the ultimate cost of the asbestos legacy led to the lack of access to capital markets.

go down to zero only at resolution with the setup of the Trust.[32] These numbers defy the conventional wisdom that firms avoid paying out to plaintiffs through the use of Chapter 11 but they do highlight the benefits of the automatic stay in litigation as it allows filing firms to delay payments to plaintiffs.

Section 5.3 Value calculations

This section measures the change in value of the sample firms over the distress period defined as ranging from pre-distress to post-resolution. First, an estimate of indirect costs of distress is computed using changes in the value of the pool of assets for each firm over the distress period. Second, returns for existing shareholders are estimated in order to gauge the ultimate costs of litigation borne by the owners of the firms.

Section 5.3.1 Estimate of indirect costs of distress

I follow Andrade and Kaplan (1998) and use a value-based approach to estimate the indirect costs of financial distress. In particular, the measure compares the total capital at the pre-distress year to the present value of total capital at the post-resolution year, including any payments on capital during the distress period. However, my sample differs in two notable ways from Andrade and Kaplan's sample. First, pre-distress firm value is available and thus does not need to be estimated using industry comparables. Second, beyond direct costs of distress such as professional fees, firms also make cash and stock distributions to asbestos claimants over the period. For the sake of estimating indirect costs of distress, these contributions are added back to the value computations. Lastly, by the nature of this measure, it can only be computed on public firms that resolve their crisis during the sample period, which reduces the sample to 11 firms.

Total capital is defined as the sum of debt, preferred stock and equity. The discounted value of total capital at resolution is the present value of all payments to capital made from distress

[32] The corresponding table is not shown for brevity but can be provided by the author upon request.

onset to resolution, discounted back to the pre-distress year. Payments to capital include cash interest and debt principal repaid, dividends paid, equity repurchased, and total capital at distress resolution, net of proceeds from new equity and debt issues. Direct costs of distress and *net cash outflows to asbestos claimants* are also added back. Two present value measures are computed. First, the market-adjusted value is calculated by discounting payments to capital by the rate of return earned on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks during the distress period. Second, industry-adjusted value is calculated by discounting payments to capital by the rate of return earned on a value-weighted portfolio of stocks in each company's Fama-French 49 industry sector.[33] The upper bound for indirect costs of distress is estimated as the difference between the value of total pre-distress capital and the discounted total capital generated during distress.

Table 6 shows that the indirect costs of distress are only marginal at worst and that there are actually what appear to be net *gains* of distress depending on the measure or sub-sample used. Market-adjusted values lean clearly towards gains to be had from distress, with a statistically significant average (and median) gain of 39% for the 11 firms of the entire sample (similar if one excludes the two economically distressed firms) and an average gain of 66% for the subsample emerging from Chapter 11 during the period. However, these numbers are to be tempered by the fact that the industries in which these firms operate have outperformed the market as a whole during the period under study. That is why the industry-adjusted estimates seem more appropriate. Industry-adjusted measures show a median cost of 3.3% (0.9% average cost) of total pre-distress firm value for the 11 firms of the entire sample. These costs are not statistically significant. On the subset of Chapter 11 cases that emerge, the value computations yield a *gain* of distress of about 11%. But again these results are not statistically significant. Overall, these results suggest that there has not been massive destruction of the value of the firms' assets due to

[33] Using the value-weighted returns on the portfolio of stocks within the same SIC two-digit industry classification yields more volatile but qualitatively similar results and are thus not shown.

the litigation and that the indirect effects of financial distress have been balanced out by other factors.

Section 5.3.2 Returns earned by existing shareholders

This subsection computes the returns earned by existing shareholders from the time prior to the onset of distress (i.e. the pre-distress year) until resolution, or the last year of the sample (2006) for the three firms still in Chapter 11 proceedings. Returns are computed as total equity returns as of the pre-distress year. They are adjusted for any capital payments such as dividends or share repurchases, net of equity issuances if these are subscribed by existing shareholders. The results are reported in Table 7.

Table 7 offers two striking results. The first observation is that stock prices are significantly decreasing during the onset of distress year (year 0). In panel B, the average and median value of returns at onset is a negative 72%, with a standard deviation of 16.4% reflecting the widespread hit on stocks in distress due to asbestos litigation. Different industry adjustments do not change this assessment as markets turn away from any asbestos-related firms during the period of crisis.

The second observation is that the picture is very different when looking at returns beyond the onset of crisis: Most existing shareholders enjoy a tremendous recovery in the value of their stake. Although returns in a third of the Chapter 11 cases go to almost -100% as shareholders lose their claims on the firm in the reorganization process[34], among the six firms enjoying the highest returns over the crisis period, five used the Chapter 11 forum to deal with their litigation and four of them filed only their asbestos-laden unit. Thus, within the Chapter 11 forum, a filing consisting of only the asbestos-laden unit leads to a much better performance on average. Although this result seems relatively natural, the markets did not differentiate among the different scenarios at the onset of distress. Strong underlying industry performance explains partly the recovery in

[34] In the reorganization of Owens Corning and Federal Mogul, past shareholders receive some warrants to acquire shares in the emerging firm. However, the fair value of these warrants implies a dilution of their equity stake of close to 100%.

shareholder value but it is not the whole story. Industry-adjusted values show that the sample of all distressed firms earns, as a group, a higher or equal return that their industry peers, albeit the difference is not statistically significant. I analyze next the reasons behind this surprisingly strong set of results.

Section 5.4 External financing during crisis

Table 8 gives evidence on the type of external financing obtained by distressed firms as of the pre-distress year until resolution. Several key features stand out. First, amid the crisis, public debt and equity markets become prohibitively costly to access for the distressed firms due to the uncertainty related to the ultimate cost of the litigation.[35] Second, amid credit rating downgrades, the access to commercial paper dries out completely. Half of the firms manage to maintain a securitization program (usually related to receivables) but none of the firms filing the entire business for Chapter 11 maintain the program once they enter Chapter 11. Third, all firms rely on their banks to access external funds. A great majority of firms rely, as of the pre-distress year, exclusively on the credit facilities and lines of credit put up by their banks, which become the lenders of last resort. At the onset of crisis, the credit facilities are being drawn down heavily by firms. Usually, part of the facility has a 364-day maturity. Thus, firms have to renegotiate new facilities during the crisis. With mounting asbestos payouts, many banks become wary of

[35] I capture uncertainty by measuring analyst forecast dispersion which is a commonly used proxy for differences of opinion among investors (Diether, Malloy and, Sherbina (2002)): Using the raw forecast data, unadjusted for stock splits from the I/B/E/S U.S. Summary History Dataset, I compute analyst forecast dispersion as the standard deviation of earnings forecasts scaled by the absolute value of the mean earnings forecast. This variable is calculated on the basis of all outstanding forecasts of the third Thursday of each month.

$$\text{Analyst Forecast Dispersion} = \frac{\text{Standard deviation of earnings forecasts}}{|\text{Mean earnings forecast}|}$$

I supplement the measure with a measure of selling pressure (analysts' Net Forecast Revision) defined as:

$$\text{Net Forecast Revision} = \frac{\#\text{upward revisions} - \#\text{downward revisions}}{\#\text{analysts}}$$

I average these measures across all firms not in economic distress with analyst coverage (11 firms) for each year over the five year window around the onset of distress year (see Figure 3 and 4).

extending further credits. The wave of Chapter 11 filings follows naturally. Strikingly, all Chapter 11 filings of entire businesses obtain special financing that is called Debtor-In-Possession (DIP) financing. DIP financing is usually conducted by the banks which provide the firm with its credit facility prior to the filing and is extended as soon as firms file. It also typically enjoys super-priority in Chapter 11 proceedings (see Dahiya et al. (2003)). Once the immediate threat of litigation has been removed through the filing of the entire business, banks open up their lending facilities again in the form of DIP financing.

All seven firms which do not use a DIP financing rely solely on their credit facilities at onset. Five of the seven firms issue private debt, but only a year or more after the onset of distress. Three of the seven entities (ABB, Halliburton and RHI) manage to raise capital through the issuance of convertibles; but only once a solution for the asbestos legacy has been found. ABB and USG are the only two firms issuing equity via a rights issue and again only after a solution to the asbestos legacy has been reached. Thus, most non-bank financing occurs only after a solution to the firm's asbestos legacies has been found.

Amid the general tightening, credit facilities and DIP financing become the main sources of external financing left. In Table 9, I provide further details on the credit facilities and DIP financing conditions. A majority (nine) obtain the extension only after finding a solution to eliminate their asbestos legacy once and for all through the use of a Chapter 11 filing of either the entire business or their asbestos-laden unit.[36] Furthermore, it is clear that banks do not become lenders of last resort without appropriate compensation. A majority of firms report higher costs of debt, all face more covenants in their credit facilities or DIP financing and all renewed facilities obtain a higher priority and are secured with more of the firm's underlying assets or stock of

[36] ABB's consortium of banks required a solution to the asbestos legacy before renewing its credit facility (see Parloff (2004)) and RHI's consortium of banks also rescued the firm at the condition that it focused solely on its non-U.S. refractory operations, leading to the deconsolidation and filing of its U.S. operations. Lastly, Halliburton's massive credit facility, which included a delayed-draw term facility and master letter of credit facility was extended only conditional on the firm being able to settle its asbestos liability within Chapter 11.

capital. Lastly, in about 60% of cases, the maximum amounts to be drawn down under the bank facilities are reduced.

In terms of financing relaxations, all firms do manage to renew their financing, albeit only after filing in many cases. Two thirds obtain waivers under their credit facilities, typically involving amendments to existing facilities, in order to avoid a violation of an existing debt covenant. Lastly, in terms of lending capacity, three firms manage a voluntary reduction of their DIP financing during their Chapter 11 proceedings as the underlying operational cash flows were sufficient to sustain the business. And five firms obtain larger amounts under their renewed credit facility albeit at a higher cost of debt.

Section 5.5 Quantitative evidence of benefits and costs of distress for the firms' operations

In this section, I measure the changes in operating performance and discretionary spending both in absolute terms and relative to their industry peers. Throughout this section, changes in key operating measures are computed as growth rates relative to pre-distress levels (t=-1). The growth in nominal value for a given variable is industry-adjusted by subtracting the growth in the median Fama-French 49 industry variable computed over the same period from the CRSP/Compustat universe of firms, excluding the 15 distressed firms.[37]

Section 5.5.1 Changes in operating performance

I use EBITDA as a proxy for operating cash flows and ultimately the operational performance of the firm (e.g., Andrade and Kaplan (1998) and more recently Kalay et al. (2007)). In my setting, EBITDA numbers need to be adjusted for any asbestos-related provisions or gains

[37] Using an industry classification that relies on the Standard Industry Classification (SIC) at the two-digit level yields qualitatively very similar results and are thus not shown.

that are sometimes recorded in the operating profits, as these are unrelated to the performance of operations per se.[38] EBITDA is then normalized by sales.

Table 10 provides an analysis of changes in operating performance from pre-distress levels. Across the board, operating performance drops during the onset of distress year (t=0). Only three firms report an increase in operating performance out of them. The mean and median drop is of about 20% and in both cases, is statistically significant. Industry-adjusted, the values are only slightly better with the average drop about 3% less severe.

However, as time goes by during the crisis period, average operating performance steadily recovers. As of two years beyond the crisis onset, operating performance is at the pre-distress levels or even higher for the median values, both on a nominal basis and an industry-adjusted basis. About half of the sample firms report an increase in operating performance. The improving performance is maintained up to the period around resolution, which occurs on average five years after the onset of distress. By that time, slightly less than half of the firms have improved relative to the pre-distress period (even on an industry-adjusted), which explains the negative median values. On average, the operating performance is maintained over the period of distress for all subsamples and both the means and medians at post-resolution are not statistically different from their pre-distress levels.

Table 11 provides evidence on the changes in the number of employees both on a nominal and sales-adjusted level. These data provide clues as to how firms in distress manage to maintain operating performance on a par with pre-distress levels.[39] Although the number of employees drop slightly as of the year of distress, the drop relative to pre-distress levels accelerates as of year t=1 and remains until the time of resolution, at a statistically significant 20% lower level

[38] More precisely, adjusted EBITDA removes the effect of asbestos-related numbers and other charges unrelated to underlying operations in the following manner: Adjusted EBITDA = EBITDA – Insurance recoveries + litigation expenses + Other charges, net.

[39] Not shown in the paper, sales drop slightly at onset and continues to drop at year t=1 but recover from then on to be, on average, at par with pre-distress levels by the time of resolution. Among the five firms that have negative sales growth, three divested a number of their operations over the period. COGS to sales increase slightly on average during the distress.

than pre-distress numbers both on an absolute scale (Panel A) and relative to firm size (measured by total sales in Panel B). This result hints at a scaling back of manpower relative to operations which could be viewed as a costly curtailment in operations but as the sales levels are maintained it leads to an improvement in operating performance. The qualitative results below will shed more light on the issue.

Section 5.5.2 Changes in discretionary spending

This subsection provides an analysis of discretionary spending over the period of distress. The literature on financing constraints links the constraints with costly curtailment in discretionary spending (early examples include Fazzari et al. (1988), see Rauh (2006) for a more recent one). Discretionary spending is defined by expenditures on capital (CAPEX), research and development (R&D), and acquisitions (M&A). In what follows, the discretionary spending measures at year t are normalized by average sales over the period [t-1;t].

Table 12 shows the results for CAPEX.[40] There is a drop in CAPEX levels as of the onset year. However, the only year where the growth relative to pre-distress levels is statistically significant and negative across the board both in nominal values (~25% drop) and industry-adjusted terms (~10% drop) is at time t=1, the year after onset. There is a slight improvement over time, especially relative to t=1 values. By the time of resolution, although nominal growth values are still negative on average, they are positive for almost half of the sample, in particular when industry-adjusted. The severe drop one year after the onset followed by a mild recovery in expenditures suggests a potential temporary costly curtailment in CAPEX. Lower levels in CAPEX are also consistent with reduced agency costs and increased efficiency.

[40] The evidence on R&D expenditures is very similar to the evidence on CAPEX and thus is not shown.

Table 13 highlights the evolution of acquisition activity around the onset of distress.[41] A clear pattern emerges. Although there is evidence of acquisition activity prior to onset, in particular in year t=-2, the acquisition activity drops to almost zero after the onset of distress for both the entire sample and the sample using Chapter 11. The median and mean values are both well below 1% of total assets and statistically lower than during the pre-distress years. This is consistent with a refocus on existing operations or costly foregone M&A opportunities. The accounting data on reductions in discretionary spending cannot by itself be interpreted as value increasing or value destroying. The value computations in the previous section and the qualitative evidence presented next suggest however that they are not value destroying.

Section 5.6 Qualitative evidence of benefits and costs of distress at the operational level

In this section, the quantitative evidence shown in the previous section is complemented by qualitative evidence stemming directly from management's discussion in 10-Ks, press releases and Wall Street Journal articles. The evidence on negative and potentially positive effects of financial distress is collected across multiple dimensions as in Andrade and Kaplan (1998). The qualitative costs include (1) costly reduction in capital and R&D expenditures; (2) forgone opportunities in terms of M&A activity; (3) fire sales of assets. Conversely, financial distress can lead to benefits (e.g. Wruck (1990)). The qualitative benefits relate to operating improvements due to (1) the removal of poor management; (2) a restructuring of current operations and (3) a renewed focus on core operations through the sale of poorly performing assets.[42]

[41] Acquisition activity is measured as acquisition expenditures at year t divided by the average sales over the period [t-1,t]. The value is not industry-adjusted as the median industry values are equal to zero for most industry-year observation.

[42] Assets being sold below true value or destroyed in some other way due to pressure from the liability side of the balance sheet can be considered as costly fire sales. But importantly, these impaired assets have to be valuable and viable. If the distress helps to uncover more quickly poorly performing assets, I view it as a benefit of distress. No details were found on the potential loss of customers and suppliers and on potential gains obtained through union bargaining during distress.

Panel A of Table 14 provides summary numbers for the costs of distress along the dimensions outlined above.[43] Regarding CAPEX, management hints at costly cuts in 20% of the sample firms. A further 33% mention costly – but only temporary - reductions, usually during the year of onset and the year after onset. Thus, although in the previous section it was shown that firms curtail investments on average, a majority of firms do not mention it as being costly and when they do, it tends to be only on a temporary basis. Somewhat surprisingly, there seems to be even less evidence of costly cuts in R&D as only four firms have sudden temporary cutbacks in R&D expenditure without explicitly mentioning them as costly. Regarding M&A activity, apart for Georgia-Pacific, which specifically cites asbestos concerns as the key to a failed merger with Williamette Industries, there are no specific signs of forgone opportunities. Lastly, the evidence on costly "desperate" sales is scant. Two firms make costly divestments at the time of onset or during distress but even in those cases the units sold were not at the core of operations. Two more have potentially costly asset sales; however, in one case the unit was at the core but non-profitable (Congoleum) and in the other case, Georgia-Pacific obtained a large tax rebate as it sold its stake in Unisource at a loss.

Panel B of Table 14 gives evidence on the potential gains of distress. Evidence on gains linked to distress is much more widespread than the evidence on costs mentioned above. Indeed, almost all firms which are not already "pure plays" at the time of pre-distress shed non-core activities. In some cases such as ABB, the refocusing is drastic and tends to occur mostly at the onset of distress and during the crisis. Furthermore, 93% of firms report a restructuring leading to an improvement in operational performance. These often include shedding jobs and shutting poorly performing plants. Lastly, about half of the sample firms' top management is replaced, often during the onset year. Kaplan and Minton (2006) show that CEO turnover is on average equal to 16.9% over the same period. They also show that it is significantly related to three types

[43] Details on the qualitative evidence are shown in Appendix E (potential benefits), F and G (potential costs).

of firm performance: firm performance relative to industry, industry performance relative to market performance and overall market performance. The turnover in the sample of distressed firms is higher than the usual turnover. Some of the turnover in our sample occurs naturally (three cases). Some occur also due to poor performance beyond asbestos litigation (such as the two cases defined as being also in economic distress). Incoming management are past CEOs in five cases, three of them from outside the industry. Even though more work needs to be done to determine the exact nature of the above average turnover within the sample, it is interesting to note that when insiders are chosen, they are usually COOs or have a strong operational background. Furthermore, among the firms that do not change top management during the crisis, two (Halliburton and WR Grace) had operationally-oriented newcomers two years prior to onset. This evidence, combined with the active restructuring activities during the crisis, point towards the required skills the board of directors is looking for when facing a crisis.

6. Conclusion

I analyze the cost of financial distress for a sample of firms exposed to asbestos litigation. Due to the long-latency of asbestos-related illnesses, claimants seek purely monetary compensations for actions related to operations that ceased more than twenty years earlier. Thus, the latest wave in asbestos litigation I study provides a unique setup whereby defendant firms suffer from cash outflows and legal liabilities unrelated to current operations. Surprisingly, many firms are not financially constrained by the litigation because they are peripheral defendants with sufficient insurance coverage to avoid any significant direct costs. Even among firms with net liability, most experience no indirect consequences as cash outflows remain small, in part due to the strategic use of Chapter 11.

I uncover 15 defendants that become financially distressed for two reasons. First, insurance depletion combined with the surge in litigation activity lead to a surge in net cash outflows and liabilities. Second, these firms cannot access their traditional sources of external capital because

of the legal uncertainties. Interestingly, I find that the value of the firms' assets is consistently preserved over the distress period. This finding supports Haugen and Senbet's (1978) conjecture that bankruptcy per se does not lead to value destruction in rational markets, but only assets of poor quality and their associated risk of liquidation do. Existing shareholders' returns are more volatile. In four cases, shareholders lose the entire value of their stake amid the reorganization proceedings. But on average, stock price performance is maintained on par with industry performance. These surprising results can be directly related to the strategic use of Chapter 11 as firms obtain a safe harbor provided by the stay in litigation and the promise of a definitive resolution through the "channeling injunction". The Chapter 11 solution allows for a renewed access to external financing, in particular from banks through credit facilities or DIP financing if extended within the context of Chapter 11 (see Dahiya et al. (2003)).

I analyze potential sources of the efficiency gains at the operational level. After an initial drop, operating performance steadily improves during the crisis period. I also find a drop in CAPEX followed by a mild recovery in expenditures, hinting at a potential temporary costly curtailment in CAPEX. Evidence of fire sales is limited. However, benefits are widespread. In particular, almost all firms take the opportunity to shed non-core assets, restructure current operations, usually with new operationally-oriented management at the helm. This evidence also provides support for the strong incentive effects (e.g. Kaplan (1989)) that higher liabilities and the associated increased monitoring can have on firms that generate high free cash flows.

REFERENCES

Abraham, Kenneth S., 2001, The Rise and Fall of Commercial Liability Insurance, *Virginia Law Review*, Vol. 87, No. 1, 85-109.

Altman, Edward I., 1984, A further empirical investigation of the bankruptcy cost question. *Journal of Finance* 39, 1067–1089.

Anderson, Dan R., 1987, Financing Asbestos Claims: Coverage Issues, Manville's Bankruptcy and the Claims Facility, *Journal of Risk and Insurance* 54, 429-451.

Andrade, Gregor, and Steven N. Kaplan, 1998, How costly is financial (not economic) distress? Evidence from highly leveraged transactions that became distressed, *Journal of Finance* 53, 1443–1493.

Asquith, Paul, Robert Gertner, and David Scharfstein, 1994, Anatomy of Financial Distress: An Examination of Junk-Bond Issuers, *The Quarterly Journal of Economics* 109, 625-658.

Bakke, Tor-Erik, and Toni M. Whited, 2007, What Gives? A Study of Firms' Reactions to Cash Shortfalls, Working paper, University of Wisconsin, Madison.

Beatty, Anne, Anne Gron, and Bjorn Jorgenson, 2005, Corporate Risk Management: Evidence from Product Liability, *Journal of Financial Intermediation* 14, 152-178

Benston, George J., 2003, Financial Analysis of Companies That Filed for Chapter 11 Bankruptcy in 2000 and 2001 as a Result of Asbestos Obligations, The Association of Trial Lawyers of America.

Bhagat, Sanjai, Brickley, James A., and Jeffrey L. Coles, 1994, The Wealth Effects of Interfirm Lawsuits, *Journal of Financial Economics* 25, 221-47.

Blanchard, Olivier J., Florencio Lopez-de-Silanes, and Andrei Shleifer, 1994, What do firms do with cash windfalls? *Journal of Financial Economics* 36, 337–360.

Bris Arturo, Ivo Welch, and Ning Zhu, 2006, The Costs of Bankruptcy: Chapter 7 Liquidation versus Chapter 11 Reorganization, *Journal of Finance* 61, 1253-1303.

Carroll, Stephen J., Deborah Hensler, Jennifer Gross, Elizabeth M. Sloss, Matthias Schonlau, Allan Abrahamse, and J. Scott Ashwood, 2004, Asbestos Litigation, *RAND Institute for Civil Justice*, Santa Monica: RAND Corporation, DRR-3280-ICJ.

Chava, Sudheer and Michael R. Roberts, 2007, How Does Financing Impact Investment? The Role of Debt Covenants, *Journal of Finance*, forthcoming.

Cutler, David, and Lawrence Summers, 1988, The Costs of Conflict Resolution and Financial Distress: Evidence from the Texaco-Pennzoil Litigation, *Rand Journal of Economics* 19, 157-72.

Dahiya, Sandeep, Kose John, Manju Puri, and Gabriel Ramirez, 2003, Debtor-in-possession financing and bankruptcy resolution: empirical evidence, *Journal of Financial Economics* 69, 259–280.

Dahiya, Sandeep, and David Yermack, 2003, Litigation Exposure, Capital Structure and Shareholder Value: The Case of Brooke Group, *Journal of Corporate Finance* 9, 271-294.

Diether, Karl, Christopher J. Malloy, and Anna Scherbina, 2002, Differences of Opinion and the Cross Section of Stock Returns, *Journal of Finance* 57, 2113-2141.

Fazzari, Steven M., R. Glenn Hubbard, Bruce C. Petersen, Alan S. Blinder and James M. Poterba, 1988, Financing Constraints and Corporate Investment, *Brookings Papers on Economic Activity* 1988, 141-206.

Hanlon, Patrick M., and Elizabeth Runyan Geise, 2007, Asbestos Reform – Past and Future, *Mealey's Litigation Report: Asbestos*, April 4, 2007.

Haugen, Robert A., and Lemma W. Senbet, 1978, The Insignificance of Bankruptcy Costs to the Theory of Optimal Capital Structure, *Journal of Finance* 33, 383-393.

Hensler, D., W. L. F. Felstiner, M. Selvin, and P. A. Ebener, 1985, Asbestos in the Courts: The Challenge of Mass Toxic Tort Litigation, Santa Monica, Calif.: RAND Corporation, R-3324-ICJ, 1985.

Hensler, Deborah, 2002, As Time Goes By: Asbestos Litigation After Amchem and Ortiz, *Texas Law Review* 80, 2002, 1899–1924.

Jensen, Michael C., 1986, Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers, *The American Economic Review* 76, 323-329.

Kalay, Avner, Rajeev Singhal, and Elizabeth Tashjian, 2007, Is Chapter 11 Costly? *Journal of Financial Economics* 84, 772-796.

Kaplan, Steven N., 1989, The Effects of Management Buyouts on Operating Performance and Value, *Journal of Financial Economics* 24, 217-254.

Kaplan, Steven N., and Bernadette A. Minton, 2006, How has CEO Turnover Changed? Increasingly Performance Sensitive Boards and Increasingly Uneasy CEOs, NBER Working Paper No. W12465.

Kaplan, Steven N., and Luigi Zingales, 1997, Do Investment-Cash Flow Sensitivities Provide Useful Measures of Financing Constraints? *The Quarterly Journal of Economics* 112, 169-215.

Lamont, Owen, 1997, Cash flow and investment: Evidence from internal capital markets, *Journal of Finance* 52, 83–109.

Lang, Larry, Eli Ofek, and René M. Stulz, 1996, Leverage, Investment and Firm Growth, *Journal of Financial Economics* 40, 3-29.

Maksimovic, V., and G. Phillips, 1998, Asset efficiency and reallocation decisions of bankrupt firms, *Journal of Finance* 53, 1495–1532.

McGuire, Charles R., Kathleen A. McCullough, and George B. Flanigan, 2004, Exposure Triggers and Allocation Methods: Learning Lessons From Prior Court Rulings, *Risk Management and Insurance Review* 7, No 1, 73-87.

Opler, Tim C., and Sheridan Titman, 1994, Financial Distress and Corporate Performance, *Journal of Finance* 49, 1015-1040.

Parloff, Roger, 2004, Welcome to the New Asbestos Scandal, Fortune, September 6, 186.

Plevin, Mark D., 2003, Asbestos Bankruptcy Basics and Selected Related Insurance Issues, *Mealey's Asbestos Bankruptcy Conference,* June 3, 2003.

Priest**,** George L., 1987, The Current Insurance Crisis and Modern Tort Law, *The Yale Law Journal* 96, 1521-1590.

Pulvino, Todd, 1999, Effect of bankruptcy court protection on asset sales, *Journal of Financial Economics* 52, 151–186.

Rauh, Joshua D., 2006, Investment and Financing Constraints: Evidence from the Funding of Corporate Pension Plans, *Journal of Finance* 61, 33-71.

Resnick, Alan N., 2000, Bankruptcy as a Vehicle for Resolving Enterprise-Threatening Mass Tort Liability, *University of Pennsylvania Law Review* 148, 2045-2093.

Stiglitz, J. E., J. M. Orszag, and P. R. Orszag, 2002, The Impact of Asbestos Liabilities on Workers in Bankrupt Firms, Washington, D.C.: SEBAGO Associates.

Tashjian Elizabeth, Ronald C. Lease, and John J. McConnell, 1996, Prepacks: An empirical analysis of prepacked bankruptcies, *Journal of Financial Economics* 40, 135–162.

Weiss, Lawrence A., 1990, Bankruptcy resolution, *Journal of Financial Economics* 27, 285–314.

Weiss, Lawrence A. and Karen H. Wruck, 1998, Information Problems, Conflicts of Interest, and Asset Stripping: Chapter 11's Failure in the Case of Eastern Airlines, *Journal of Financial Economics* 48, 55-97.

White, Michelle J., 2002a, Explaining the Flood of Asbestos Litigation: Consolidation, Bifurcation, and Bouquet Trials, NBER Working Paper No. 9362.

White, Michelle J., 2002b, Why the Asbestos Genie Won't Stay in the Bankruptcy Bottle, *University of Cincinnati Law Review* 70, 1319-1340.

White, Michelle J., 2004, Asbestos and the Future of Mass Torts, *Journal of Economic Perspectives* 18, 183-204.

Wruck, Karen H., 1990, Financial Distress, Reorganization, and Organizational Efficiency, *Journal of Financial Economics* 27, 419–444.

Wruck, Karen H., 1994, Financial Policy, Internal Control, and Performance: Sealed Air's Corporation's Leveraged Special Dividend, *Journal of Financial Economics* 36, 157-192.

TABLES AND FIGURES

Table 1

Firms with exposure to asbestos litigation and potential resulting indirect effects in terms of financing constraints. The financial statement search finds 270 publicly-listed firms exposed to asbestos litigation in the U.S. during the period surrounding the Supreme Court decisions in Amchem (1997) and Ortiz (1999). Financial exposure to asbestos litigation is determined by computing annual time-series for (1) net cash outflows defined as annual cash flows expended to cover the cost of litigation minus proceeds from insurance coverage, and for (2) net liability defined as gross legal liability minus insurance assets. The value of stock contributions to plaintiffs is also used to determine the ultimate cost of litigation. The measure of exposure in Panel A is defined as the sum (∑) of all net cash outflows and stock contribution relative to the sum (∑) of all EBITDAs over the period 1999-2006. Simultaneously, firms are classified according to the indirect financial effects of their exposure to asbestos litigation. In particular, firms are categorized relative to their financing constraints similarly to Kaplan and Zingales (1997). A financially distressed firm (final sample) is defined as having the following characteristics: (1) a financial restructuring inside or outside of Chapter 11 and (2) evidence of a more restrictive access to traditional financing channels, for example due to a severe credit downgrade. Firms in the category "Other" do not suffer from financial constraints due to exposure to asbestos litigation. However, some of them do suffer from economic distress unrelated to the litigation (see Appendix B for details). Panel B provides correlation measures between asbestos litigation exposure and financial distress using different measures of exposure. Perfect foresight net asbestos liability is defined as the sum of net cash outflows and stock payments over the period 1999-2006 plus any remaining net liability at the end of the sample, discounted at an annual rate of 5%. The correlation is computed excluding firms from category 1 and 2 of Panel A except firm BMCA (see †). *** denotes significance at the 1% level.

Panel A: Distribution of litigation exposure within the sample and link with financial distress

Direct impact measurements		Indirect impact *due to asbestos litigation*	
Categories from minor to material exposure:	Number of firms	Final sample (Financially distressed)	Other (Not financially distressed)
1. No net outflows; No net liabilities	177	1†	176
2. Acquired or resolved asbestos exposure prior to 1999	9	0	9
3. No net outflows; however net liability	28	0	28
4. 0% < ∑ net outflows < 1% ∑ EBITDA	26	0	26
5. 1% < ∑ net outflows < 5% ∑ EBITDA	11	1	10
6. 5% < ∑ net outflows < 10% ∑ EBITDA	3	2	1
7. 10% < ∑ net outflows < 20% ∑ EBITDA	5	4	1
8. 20% < ∑ net outflows < 50% ∑ EBITDA	3	2	1
9. 50% < ∑ net outflows < 100% ∑ EBITDA	5	5	0
Total	267	15	252

Panel B: Measuring correlation between financial distress and litigation exposure using different measures of exposure

Measures of exposure:	Spearman's correlation (ρ)
1. Sum (∑) of net outflows (cash and equity) relative to the sum (∑) of EBITDA over 1999-2006 period (Panel A measure)	.597***
2. Sum (∑) of net outflows (cash only) relative to the sum (∑) of EBITDA over 1999-2006 period	.594***
3. Net asbestos liability relative to total liability (Max over period 1999-2006)	.417***
4. Net asbestos liability relative to total liability (as of year 1999)	.511***
5. Perfect foresight measure of net asbestos liability relative to total liability (as of year 1999)	.474***

(i) Three firms within the sample suffer direct costs from the litigation but only after delisting hence are not classified in this table.
(ii) In constructing the measures of litigation costs, a firm stating "immaterial" amounts being expended (respectively provisioned) without disclosing dollar values is considered to have zero net cash outflows (respectively net liabilities) for that year.
(iii) †: The firm is BMCA. It is a special case as its parent firm filed for bankruptcy. More details are provided in the study.
(iv) All pair-wise correlations among the different measures of litigation exposure are highly significant and range from 0.45 to 0.88.

Table 2

Summary statistics for firms reporting a net cash outflow or liability over the period 1999-2006 (Category 3 to 9 firms from Panel A Table 1 plus special case BMCA minus three firms that have minor and capped exposure due to special circumstances). The sample is separated in two categories according to levels of financial constraints (distressed vs. non-distressed). Total assets ($MM) are taken as of 1999, the onset of the litigation event studied. Operating profitability is the average EBITDA performance of the period 1999-2006. All EBITDA numbers are adjusted for any asbestos-related provisions or gains. Leverage is book leverage defined as total debt divided by total assets as of 1999. Interest coverage is defined as EBITDA divided by interest expense. The value computed is the minimum interest coverage over the period 1999-2006. Perfect foresight gross (respectively net) asbestos liability is defined as the sum of gross (net) cash outflows and stock payments over the period 1999-2006 plus any remaining gross (net) liability at the end of the sample, discounted at an annual rate of 5%. It is measured relative to total liability as of 1999. Total gross (respectively net) outflows relative to EBITDA are computed as the value of all gross (net) cash outflows and stock contribution relative to the sum of all EBITDAs over the period 1999-2006. The proportion of firms within each subsample having a given characteristic is given below. The characteristics are the following: a credit downgrade (resp. a negative outlook) due at least in part to asbestos; a dividend cut (resp. stock repurchases) over the period 1996-2006. It is only computed for firms that have positive dividends (resp. a share repurchasing program) as of 1999. A traditional defendant is defined as a firm that reported exposure prior to 1999 or that acquired a firm that did. The proportion of firms with more than 15,000 claimants within each subsample is also given. N is the number of firms with valid data. Statistical significance is computed using a t-test for the differences in means and a non-parametric test for the differences in medians.

	Financially distressed firms (Final sample)				Firms not financially distressed				Statistical significance of differences†	
	Mean	Median	Std dev	N	Mean	Median	Std dev	N	In means	In medians
Total assets ($MM)	7,698	4,165	7,796	15	11,593	3,855	35,338	61	No	No
Operating profitability	10.2%	9.7%	3.9%	15	11.4%	10.8%	6.7%	64	No	No
Leverage	33.7%	33.6%	16.4%	15	30.0%	30.4%	12.8%	61	No	No
Interest coverage	2.33	2.06	1.28	13*	4.52	3.73	4.83	63	No	a
Perfect foresight gross asbestos liability	40.5%	26.9%	41.0%	15	12.9%	3.0%	26.6%	45	b	a
Perfect foresight net asbestos liability	29.2%	11.5%	40.6%	15	5.3%	0.9%	12.0%	64	b	a
Total gross outflows relative to EBITDA	85.8%	29.5%	155.0%	15	5.3%	0.7%	14.3%	48	c	a
Total net outflows relative to EBITDA	38.7%	13.4%	40.5%	15	1.1%	0.1%	3.0%	64	a	a
	Proportion	N			Proportion	N				
Credit rating downgrade due to asbestos	100%	14			3%**	64				
Credit rating watch due to asbestos	0%	14			14%	64				
Firms with dividend cut	78%	9			25%	48				
Firms with share repurchase cut	100%	9			59%	39				
Traditional asbestos defendant	93%	15			28%	64				
Firms with > 15,000 claims	100%	15			75%	48				

*: Including the two firms in economic distress lowers considerably the mean of the interest coverage (1.06) as they reported negative EBITDA over the period.

**: It corresponds to two firms in economic distress where asbestos litigation was described in the credit report as a minor compounding effect.

†: a, b, respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

Table 3

Mitigating devices in asbestos litigation. Panel A gives the relative importance of net of insurance exposure relative to gross exposure in explaining financial distress for five different measures of exposure (A to E). Refer to table 1 for a definition of these variables. The computations are restricted to the firms from Category 3 to 9 of Table 1, in addition to firms that provide gross exposure numbers. Non-parametric Spearman correlations between gross and net exposures are computed first. Logit regressions with the dependent variable being the dummy variable equal to 1 if the firm is in financial distress due to asbestos litigation are then performed. The key explanatory variables are the five different net and gross measures of exposure to the litigation. The regressions are performed with and without control variables. The controls include the logarithm of total assets as of 1999, debt leverage as of 1999 and average operating profitability for period 1995-1999. The logit regressions are estimated using robust standard errors and clustering at the Fama-French 49 industry level. Panel B illustrates the use of a strategic Chapter 11 filing among the subsample of non-distressed firms. It separates the non-distressed firms in two categories based on the method used to deal with the litigation exposure (use of Chapter 11 forum or not). Refer to table 2 for a definition of the variables. More details on the non-distressed firms using Chapter 11 can be found in Appendix C. N is the number of firms with valid data. In Panel B, statistical significance is computed using a t-test for the differences in means and a non-parametric test for the differences in medians.

Panel A: Gross vs. Net insurance coverage

	Correlations among gross and net measures of exposure	Spearman's correlation (ρ)	N
A	Gross vs. net liability (as of 1999)	0.683	40
B	Gross vs. net liability (max over 1999-2006)	0.761	71
C	Gross vs. net perfect foresight liability	0.787	61
D	Gross vs. net sum of cash outflows relative to sum of EBITDA over 1999-2006 period	0.896	64
E	Gross vs. net sum of cash and equity outflows relative to sum of EBITDA over 1999-2006	0.893	64

Logit regressions for the probability of being in financial distress due to asbestos litigation

	i. Without controls				ii. With controls			
	Net exposure	Gross exposure	N	Pseudo R-squared	Net exposure	Gross exposure	N	Pseudo R-squared
A	41.5	57.2	40	0.47	90.6	49.0*	40	0.58
B	7.54*	1.15	66	0.23	13.61***	5.84**	65	0.49
C	4.18	0.5	59	0.15	10.33***	2.76	59	0.49
D	48.25***	-2.24	60	0.65	52.67***	-1.28	59	0.76
E	48.22***	-1.22	60	0.62	58.02**	-0.98	59	0.73

Controls include: ln(assets) as of 1999, leverage as of 1999, average operating profitability for period 1995-1999.

***, **, respectively * signify statistical significance at the 1%, 5%, and 10% respectively.

Table 3, Panel B: Among non-distressed firms, use of Chapter 11 or not										
	Firms not financially distressed Using Chapter 11 forum				Firms not financially distressed Not using Chapter 11 forum				Statistical significance of differences†	
	Mean	Median	Std dev	N	Mean	Median	Std dev	N	In means	In medians
Total assets ($MM)	6,297	4,143	5,875	9	12,509	3,156	38,183	52	No	No
Operating profitability	13.2%	13.4%	4.1%	11	11.1%	10.7%	7.1%	53	No	No
Leverage	30.6%	29.3%	6.4%	9	29.9%	30.6%	13.7%	52	No	No
Interest coverage	5.23	4.40	5.90	11	4.37	3.62	4.63	52	No	No
Perfect foresight gross asbestos liability	10.3%	1.9%	15.3%	8	13.5%	3.5%	28.5%	37	No	No
Perfect foresight net asbestos liability	10.5%	2.5%	18.9%	11	4.2%	0.6%	9.9%	53	No	c
Total gross outflows relative to EBITDA	0.9%	0.2%	1.1%	10	6.5%	1.1%	16.0%	38	b	No
Total net outflows relative to EBITDA	0.7%	0.1%	1.1%	11	1.1%	0.1%	3.2%	53	No	No
	Proportion	N			Proportion	N				
Credit rating downgrade due to asbestos	0%	11			4%*	53				
Credit rating watch due to asbestos	36%	11			9%	53				
Firms with dividend cut	29%	7			24%	41				
Firms with share repurchase cut	29%	7			66%	32				
Traditional asbestos defendant	36%	11			26%	53				
Firms with > 15,000 claims	73%	11			76%	37				

†: a, b, respectively c signify statistical significance at the 1%, 5%, and 10% respectively.
*: It corresponds to two firms in economic distress where asbestos litigation was described in the credit report as a minor compounding effect.

Table 4
Description of firms that have suffered from financial distress at least in part due to asbestos litigation (Financially distressed sample defined in Table 1). The table is divided into two panels. Panel A lists firms using Chapter 11's forum and Panel B lists firms remaining outside of Chapter 11. Industry provides the main lines of business of the firms at the distress onset. Unit concerned is the business unit at the source of the exposure. If the asbestos exposure was acquired in the '90s, the date is provided. Distress onset (year t=0) is defined as the fiscal year in which the firm experiences a significant restriction in the access to its traditional sources of financing which leads the firm to perform a financial restructuring. Distress resolution occurs when either (i) a firm obtains the channeling injunction through Chapter 11 reorganization, or (ii) is acquired, or (iii) resolves its financing crisis through an out-of-court financial restructuring (which may not eliminate the asbestos liability per se). In the Chapter 11 cases, the types of filing and key dates within the bankruptcy proceedings are given: prepackaged deal announcement, entering of Chapter 11, submission of Plan and exit of Chapter 11.

Panel A: Major Chapter 11 cases

				Onset year	Distress resolution				
Firm	Industry	Unit concerned	If acquired, when?	Year (t=0)	Type of filing	Prepackaged	Entering	Submission of Plan	Resolution
ABB	Power / Automation / Petrochemical	Combustion Engineering (inactive), Lummus	90	2002	Only unit concerned	01-03	02-03	02-03	04-06
Armstrong	Building materials (roofing)	Entire business (successor liability)	-	2000	Entire business	-	12-00	11-02	10-06
BMCA	Building materials (flooring)	Entire business (successor liability)	-	2000	Parent company (G-I Holdings)	-	01-01	-	Ongoing (Plan not yet filed)
Congoleum	Building materials	Entire business (successor liability)	-	2002	Entire business	04-03	12-03	11-04	Ongoing (Lost exclusivity)
Federal Mogul (FM)	Automotive Supplier	T&N* / Abex and Wagner* / Fel-pro / FM	98*	2000	Entire business	-	10-01	11-06	12-07
Halliburton	Oil and gas / Infrastructure	DII Industries and Kellogg Brown and Root (KBR)	98	2001	Only unit concerned	12-02	12-03	12-03	01-05
Kaiser Aluminum and Chemical	Aluminum conglomerate	Entire business (successor liability)	-	2000	Entire business	-	02-02	09-05	07-06
McDermott	Power Generation Systems and Equipment (B&W) / Marine Construction Services	Babcock & Wilcox (B&W)	-	1999	Only unit concerned	-	02-00	02-01	02-06
Owens Corning	Building materials / Composite materials	Fibreboard* / Past building materials op.	97*	2000	Entire business	-	10-00	01-03	10-06
RHI	Refractory	US operations: NARCO, Harbison-Walker and A.P. Green	95/99	2001	Only unit concerned / Deconsolidated prior to filing (12-01)	-	02-02	12-05	09-07
U.S. Gypsum (USG)	Building materials	Entire business (successor liability)	-	2000	Entire business	-	06-01	04-06	06-06
WR Grace	Specialty chemical	Entire business (successor liability)	-	2000	Entire business	-	04-01	11-04	Ongoing (Lost exclusivity)

Table 4 continued

Panel B: Other type of financial restructuring

Firm	Industry	Unit concerned	If acquired, when?	Distress onset: Date	Distress resolution: Type	Distress resolution: Date	Asbestos litigation
Crown Cork & Seal	Packaging	Entire business (successor liability)	-	2000	Financial restructuring	01-03	Ongoing but abated due to state reforms as of 2003
Georgia-Pacific	Paper / Building materials	Building materials	-	2002	Acquired	11-05	Ongoing as of time of sale
Owens Illinois	Glass and Plastics / Packaging	Entire business (successor liability)	-	2000	Financial restructuring	10-04	Ongoing but abated due to state reforms as of 2003

*: Acquired part of their exposure at that time.

Table 5
Details on the total legal costs for the sample of firms facing financial distress due to asbestos litigation. The legal expenditures are reported both on a gross basis and on a net of insurance recoveries basis (only net basis in Panel A to save space). The timeline of legal costs is given relative to the onset of distress year. Refer to Table 4 for a definition of onset of distress and resolution year. The annual costs over the timeline are normalized by adjusted EBITDA, defined as EBITDA corrected for any asbestos related payments or recoveries. The measures capturing aggregate costs (over the entire period 1991-2006) are given in dollar values. The stock contribution value reported is taken at the time of the distribution. The dollar amount is complemented by the percentage of equity capital it represents. "TBD" stands for "To Be Determined", pending court decisions. Gross and insurance aggregate contributions are not reported as firms disclose insurance payments only once net contributions become material, which in effect understates insurance payments made in prior years. Direct costs of distress include professional and legal fees due to Chapter 11 filing (N/A when not disclosed). The percentage values refer to the direct costs normalized by the pre-filing book value of assets. Panel A gives the results for each firm in the distressed sample. Panel B gives summary numbers for the entire sample, first including all firms and second, excluding those which suffer from economic distress as defined by having at least one negative adjusted EBITDA year over the period. Figure 1 is based on the summary numbers of this table.

Panel A: Details for each firm in the final sample

		Timeline of costs relative to onset of distress							Measures of aggregate cost			
									Direct legal costs			
Firms	Basis	-3	-2	-1	0	1	2	Resolution year	Total contribution	Cash contribution	Stock contribution (% equity)	Direct cost of distress (% book value)
ABB	*Net*	*1.5%*	*4.5%*	*9.0%*	*25.2%*	*29.9%*	*4.1%*	*-4.6%*	*1297.7*	*890.7*	*407 (1.4%)*	*N/A*
Armstrong	*Net*	*8.3%*	*14.1%*	*18.0%*	*46.1%*	*-9.6%*	*0.0%*	*268.4%*	*2705.2*	*1225.2*	*1480 (65.6%)*	*112.1 (2.7%)*
BMCA	*Net*	*3.3%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*N/A*	*204.4*	*204.4*	*TBD*	*N/A*
Congoleum	*Net*	*0.0%*	*0.0%*	*0.0%*	*22.7%*	*159.5%*	*43.9%*	*N/A*	*34*	*34*	*TBD*	*N/A*
Federal Mogul	*Net*	*0.0%*	*11.6%*	*13.9%*	*37.1%*	*35.8%*	*0.3%*	*N/A*	*824.4*	*824.4*	*TBD (50.1%)*	*508.3 (5%)*
Halliburton	*Net*	*0.5%*	*-1.4%*	*1.1%*	*1.4%*	*7.2%*	*22.9%*	*43.6%*	*4866.9*	*1753.9*	*3113 (13.5%)*	*N/A*
Kaiser Aluminum and Chemical	*Net*	*0.0%*	*-0.6%*	*22.6%*	*21.1%*	*-327.1%*	*36.9%*	*11.3%*	*271.5*	*70.8*	*200.7 (22.3%)*	*158.9 (5.8%)*
McDermott	*Net*	*26.6%*	*4.0%*	*14.2%*	*34.5%*	*-1.8%*	*0.0%*	*232.6%*	*1142.8*	*1142.8*	*0*	*68.2 (3.4%)*
Owens Corning	*Net*	*33.0%*	*57.2%*	*95.1%*	*86.3%*	*60.6%*	*-13.1%*	*386.3%*	*5387*	*4594*	*793 (21.6%)*	*446 (6.9%)*
RHI	*Net*	*0.0%*	*0.0%*	*0.0%*	*344.2%*	*-63.1%*	*0.0%*	*0.0%*	*167.6*	*167.6*	*0*	*N/A*
USG	*Net*	*-0.6%*	*2.2%*	*1.7%*	*10.2%*	*47.1%*	*0.0%*	*372.7%*	*4290.4*	*4290.4*	*0*	*61 (1.8%)*
WR Grace	*Net*	*47.8%*	*78.5%*	*17.0%*	*77.0%*	*13.1%*	*1.0%*	*N/A*	*637.1*	*637.1*	*TBD (50.1%)*	*153.6 (5.9%)*
Crown Cork & Seal	*Net*	*0.0%*	*0.0%*	*0.0%*	*9.5%*	*14.5%*	*13.3%*	*9.0%*	*490*	*490*	*0*	*N/A*
GP	*Net*	*0.0%*	*1.2%*	*0.7%*	*5.9%*	*-2.7%*	*5.5%*	*3.1%*	*358*	*358*	*0*	*N/A*
Owens Illinois	*Net*	*6.9%*	*5.2%*	*9.4%*	*12.9%*	*6.3%*	*16.8%*	*15.6%*	*1723.2*	*1723.2*	*0*	*N/A*

Table 5 continued

Panel B: Summary for the final sample

		Timeline of costs relative to onset of distress							Measures of aggregate cost: Legal costs (in 2006 $ value)			
All firms:		-3	-2	-1	0	1	2	Resolution year	Total contribution	Cash contribution	Stock contribution	Direct cost of distress (% book value)
Median	Gross	6.0%	8.4%	12.5%	31.1%	16.7%	0.4%	76.1%				
	Insurance	4.2%	6.0%	7.6%	6.4%	4.1%	0.0%	7.9%				
	Net	*0.5%*	*2.2%*	*9.0%*	*22.7%*	*7.2%*	*1.0%*	*15.6%*	*824*	*824*	*0*	*N/A*
Mean	Gross	38.6%	27.0%	28.8%	78.5%	-57.2%	7.8%	244.4%				
	Insurance	28.7%	13.2%	14.3%	27.5%	-55.2%	-0.9%	128.2%				
	Net	*8.5%*	*11.8%*	*13.5%*	*48.9%*	*-2.0%*	*8.8%*	*121.6%*	*1,627*	*1,227*	*545*	*N/A*
Excluding economic distress cases:*	Timeline	-3	-2	-1	0	1	2	Resolution year				
Median	Gross	5.4%	8.0%	10.5%	25.2%	18.9%	4.1%	15.7%				
	Insurance	2.9%	3.8%	4.7%	2.2%	4.1%	0.0%	0.9%				
	Net	*0.5%*	*2.2%*	*1.7%*	*22.7%*	*13.1%*	*1.0%*	*15.6%*	*824*	*824*	*0*	*N/A*
Mean	Gross	18.3%	26.9%	25.8%	74.1%	39.6%	9.0%	147.1%				
	Insurance	9.0%	10.7%	12.0%	21.7%	16.7%	1.8%	32.2%				
	Net	*7.7%*	*13.3%*	*12.8%*	*52.2%*	*23.0%*	*7.3%*	*121.6%*	*1,768*	*1,323*	*644*	*N/A*
Only firms using Chapter 11 (excluding economic distress cases):	Timeline	-3	-2	-1	0	1	2	Resolution year				
Median	Gross	4.1%	14.2%	12.5%	34.2%	34.4%	0.2%	157.5%				
	Insurance	2.6%	6.0%	8.0%	7.4%	3.9%	0.0%	19.3%				
	Net	*1.0%*	*3.4%*	*5.4%*	*31.2%*	*21.5%*	*0.2%*	*156.0%*	*1,298*	*891*	*600*	*112 (5.0%)*
Mean	Gross	19.2%	32.4%	29.6%	93.2%	47.3%	7.8%	215.9%				
	Insurance	9.7%	13.0%	14.1%	27.9%	19.3%	1.9%	48.2%				
	Net	*9.4%*	*16.7%*	*15.6%*	*65.0%*	*28.1%*	*5.9%*	*177.8%*	*2,041*	*1,462*	*966*	*214 (4.4%)*

*: These include McDermott International and Kaiser Aluminum.

Table 6

Estimated indirect costs of distress for the sample of firms in financial distress due to asbestos litigation. The estimation follows Andrade and Kaplan (1998). However, this sample has two notable differences from theirs. First, firm value at pre-distress is available and thus does not need to be estimated using industry comparables. Second, firms make cash distributions to asbestos claimants over the period. For the sake of estimating indirect costs of distress, these contributions and direct costs of financial distress are added back to the value computations. Pre-distress figures correspond to the last fiscal year before distress onset. Total capital is defined as the sum of the book value of total debt (long-term and short-term), preferred stock, and market value of equity. Value of Total Capital at resolution is the present value of all payments to capital made from distress onset to resolution (inclusive), discounted back to the pre-distress year. Payments to capital include cash interest and debt principal repaid, dividends paid, equity repurchased, and total capital at distress resolution, net of proceeds from new equity and debt issues. Net cash outflows to asbestos claimants are also added to the intermediate payments. Market-Adjusted value is calculated by discounting payments to capital by the rate of return earned on the CRSP value-weighted portfolio of NYSE, AMEX, and Nasdaq stocks during the distress period. Industry-adjusted value is calculated by discounting payments to capital by the rate of return earned on a value-weighted portfolio of stocks in each company's Fama-French 49 industry sector. The upper bound for indirect costs of distress is estimated as the difference between the value of total pre-distress capital and the discounted value of total capital at resolution plus all intermediate payments to capital. Significance levels are based on a two-tailed t-test for the means and on two-tailed Wilcoxon signed rank tests for the medians. a, b, and respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

	Value of Total Capital at pre-distress (t=-1)	Discounted Value of Total Capital at resolution (plus payments during distress)		Market-Adjusted Costs of Financial Distress		Industry-Adjusted Costs of Financial Distress	
Firms	(Firm value (in $M*)	Market-Adjusted ($M**)	Industry-Adjusted ($M**)	Nominal difference	Percentage of Total Capital at t=-1	Nominal difference	Percentage of Total Capital at t=-1
ABB	17,951	32,855	25,242	-14,904	-83.0%	-7,291	-40.6%
Armstrong	2,848	3,957	3,034	-1,109	-38.9%	-185	-6.5%
Halliburton	18,106	30,897	21,184	-12,792	-70.6%	-3,078	-17.0%
Kaiser Aluminum and Chemical	1,583	1,533	1,367	50	3.1%	216	13.7%
McDermott	3,393	5,041	4,035	-1,647	-48.6%	-642	-18.9%
Owens Corning	3,243	5,288	2,988	-2,045	-63.0%	255	7.9%
RHI	1,293	1,461	927	-168	-13.0%	366	28.3%
USG	2,896	6,554	4,080	-3,658	-126.3%	-1,185	-40.9%
Crown Cork & Seal	8,162	5,397	4,156	2,765	33.9%	4,006	49.1%
GP	18,567	18,991	17,956	-424	-2.3%	611	3.3%
Owens Illinois	10,076	12,099	7,584	-2,023	-20.1%	2,492	24.7%
All firms:							
Median	3,393	5,397	4,080	-1,647	-38.9%b	216	3.3%
Mean	8,011	11,279	8,414	-3,269	-39.0%b	-403	0.3%
Standard deviation	7,069	11,346	8,707	5,493	45.5%	2,925	28.4%
Number obs	11	11	11	11	11	11	11
Excl. economic distress cases:*							
Median	8,162	6,554	4,156	-2,023	-38.9%b	255	3.3%
Mean	9,238	13,056	9,683	-3,818	-42.6%b	-445	0.9%
Standard deviation	7,276	11,858	9,185	5,972	48.4%	3,262	30.7%
Number obs	9	9	9	9	9	9	9
Only Chapter 11 cases (excluding econonic distress)							
Median	3,069	5,921	3,557	-2,851	-66.8%b	-685	-11.8%
Mean	7,723	13,502	9,576	-5,779	-65.8%a	-1,853	-11.5%
Standard deviation	8,011	14,346	10,690	6,390	38.7%	2,955	27.3%
Number obs	6	6	6	6	6	6	6

*: These include McDermott International and Kaiser Aluminum.

**: Except for RHI, which is in Euros.

Table 7

Returns earned by existing shareholders from the pre-distress period (t=-1) to the post-resolution year. Post-resolution is defined as the fiscal year end of a Chapter 11 exit, a take-over, an out-of-bankruptcy financial restructuring or the end of fiscal year 2006 for the firms still in Chapter 11 at the end of the sample period. Returns are computed as total equity returns as of the pre-distress period. They are adjusted for any capital payments such as dividends or share repurchase, net of equity issuance, if subscribed by existing shareholders. Panel A provides for the summary statistics for all firms in the final sample and for the subgroup of firms using Chapter 11, again excluding economic distress cases. Panel B provides a similar summary but this time for industry-adjusted (Fama-French 49 industries) value-weighted returns over the crisis period. Firms in economic distress are defined as having a negative EBITDA (adjusted for any asbestos-related numbers) for at least one year during the period from pre-distress to post-resolution. Significance levels are based on a two-tailed t-test for the means and on two-tailed Wilcoxon signed rank tests for the medians. a, b, and respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A: Nominal returns for individual stocks during the crisis period

	From t=-1 to:				
Firms	0	1	2	3	Post-resolution**
ABB	-69.5%	22.9%	36.9%	135.9%	363.7%
Armstrong	-93.8%	-89.6%	-98.9%	-96.7%	-100.0%
Congoleum	-74.5%	-58.8%	234.5%	60.8%	0.8%
Federal Mogul	-88.5%	-95.4%	-98.6%	-98.6%	-96.3%
Halliburton	-63.3%	-47.3%	-26.3%	12.1%	81.9%
Kaiser Aluminum and Chemical	-51.9%	-78.6%	-99.2%	-98.9%	-100.0%
McDermott	-77.8%	-73.3%	-69.0%	-88.5%	130.8%
Owens Corning	-95.7%	-90.1%	-97.8%	-97.8%	-94.3%
RHI	-64.3%	-64.7%	-27.6%	7.0%	85.7%
USG	-57.6%	-89.2%	-84.1%	-69.0%	113.9%
WR Grace	-78.7%	-89.7%	-86.9%	-82.8%	39.2%
Crown Cork & Seal	-65.5%	-88.2%	-53.2%	-44.8%	-44.8%
GP	-36.3%	22.1%	51.6%	107.8%	107.8%
Owens Illinois	-77.6%	-60.2%	-41.6%	-52.2%	-7.1%

Panel B: Summary of nominal returns during the crisis period

	From t=-1 to:				
All firms:	0	1	2	3	Post-resolution**
Median	-72.0%a	-76.0%a	-61.1%b	-60.6%	20.0%
Mean	-71.1%a	-62.9%a	-32.9%	-29.0%	34.4%
Standard deviation	16.4%	39.0%	91.2%	80.8%	128.1%
Number of firms	14	14	14	14	14
Numbers are very similar when excluding economic distress cases.*					
Only Chapter 11 cases (excluding econ. Distress)					
Median	-74.5%a	-89.2%a	-84.1%	-69.0%	39.2%
Mean	-76.2%a	-66.9%a	-27.6%	-25.5%	43.8%
Standard deviation	13.9%	37.8%	108.8%	84.2%	146.5%
Number of firms	9	9	9	9	9

Panel C: Summary of industry-adjusted (F-F 49) returns during the crisis period

	From t=-1 to:				
All firms:	0	1	2	3	Post-resolution**
Median	-70.6%a	-68.0%a	-32.7%b	-50.7%	-0.2%
Mean	-72.7%a	-53.8%a	-26.7%	-27.9%	18.0%
Standard deviation	22.4%	46.6%	81.5%	62.0%	126.0%
Number of firms	14	14	14	14	14
Numbers are very similar when excluding economic distress cases.*					
Only Chapter 11 cases (excluding econ. Distress)					
Median	-84.2%a	-73.6%b	-74.2%	-54.9%	17.1%
Mean	-75.0%a	-59.4%a	-23.7%	-28.9%	21.3%
Standard deviation	20.2%	44.2%	99.4%	68.4%	140.6%
Number of firms	9	9	9	9	9

*: These include McDermott International and Kaiser Aluminum.

**: Post-resolution occurs on average more than five years after onset.

Table 8
Evidence on the type of external financing obtained by distressed firms as of the pre-distress year until resolution. DIP stands for Debtor-In-Possession financing. It is usually conducted by the banks which provide the firm with its credit facility prior to the filing and typically enjoys super-priority in Chapter 11 proceedings (see Dahiya et al. (2003)). Summary proportions (number of firms using the type of financing / Total number of firms) are given at the bottom of the table. "Limited" is counted as a "Yes" in the proportion computations.

	Type of financing								
Firm	DIP financing	Bank (credit facility)	Private debt	Commercial paper	Convertible	Public bond	Equity	Securitization program	Special financing
ABB	No	Yes	No	No	Yes	Yes	Yes	Yes	No
Congoleum	Yes	Yes	No	No	No	No	No	No	No
Armstrong	Yes	Yes	No	No	No	No	No	No	No
BMCA	No	Yes	Limited	No	No	No	No	Limited	No
Federal Mogul	Yes	Yes	No	No	No	No	No	Limited	No
Halliburton	No	Yes	Yes	Limited	Yes	No	No	Yes	No
Kaiser Aluminum and Chemical	Yes	Yes	No	No	No	No	No	No	Yes*
McDermott	Yes	Limited	Yes	No	No	No	No	No	Yes**
Owens Corning	Yes	Yes	No	No	No	No	No	No	No
RHI	No	Yes	No	No	Yes	No	No	No	No
U.S. Gypsum (USG)	Yes	Yes	No	No	No	No	Yes	Limited	No
WR Grace	Yes	Yes	No	No	No	No	No	Limited	No
Crown Cork & Seal	No	Yes	Yes	No	No	No	No	Yes	No
Georgia-Pacific	No	Yes	Yes	No	No	No	No	Yes	No
Owens Illinois	No	Yes	Yes	No	No	No	No	No	No
Overall proportions:	53.3%	100.0%	40.0%	6.7%	20.0%	6.7%	13.3%	53.3%	26.7%

*: Kaiser sold its rights for power at its Californian unit to raise capital.

**: MI could not refinance its debt. It exercised its put option to sell the remaining equity its parent (MII) did not own. This transaction had severe tax consequences.

Table 9
Evidence on the tightening and relaxation of external financing amid the crisis. Tightening dimensions include increased costs, reduction in amounts (credit lines), increase in covenants, increase in collateral and priority. As a general matter, Debtor-In-Possession (DIP) financing has administrative super-seniority within Chapter 11 proceedings. Relaxation dimensions include an extension of a financing facility; increased amounts of borrowing under existing facilities and "Other waiver" typically relates to amendments to existing facilities, usually in order to avoid a violation of an existing debt covenant. "Yes (DIP)" means that the firm obtained an extension of its credit facility only after filing. "Yes (solution)" relates to extension of credit facilities under the condition of a restructuring involving a final solution to the asbestos legacy. Overall proportions are given at the bottom. In the proportions computations, an extension only after a solution has been reached (usually in the form of DIP financing) is considered as a relaxation, as is a voluntary reduction in DIP financing in the column "Increased amounts".

	Tightening					Relaxation		
Firm	Increased cost	Reduction in amounts	Covenants	Collateral	Priority	Extension	Increased amounts	Other waiver
ABB	Yes	Yes	Yes	Yes	Yes	Yes (solution)	No	Yes
Congoleum	No	Yes	Yes	Yes	Yes	Yes (DIP)	No	Yes
Armstrong	Yes	Yes	Yes	Yes	Yes	Yes (DIP)	No	No
BMCA	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Federal Mogul	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Halliburton	Yes	No	Yes	Yes	Yes	Yes (solution)	Yes	Yes
Kaiser Aluminum and Chemical	Yes	Minimal	Yes	Yes	Yes	Yes	Voluntary reduction (DIP)	Yes
McDermott	Yes	Yes	Yes	Yes	Yes	Yes (DIP)	No	Yes
Owens Corning	Yes	Yes	Yes	Yes	Yes	Yes (DIP)	Voluntary reduction (DIP)	No
RHI	No	No	Yes	Yes	Yes	Yes (solution)	Yes	Yes
U.S. Gypsum (USG)	Yes	Yes	Yes	Yes	Yes	Yes (DIP)	Voluntary reduction (DIP)	No
WR Grace	Yes	Yes	Yes	Yes	Yes	Yes (DIP)	No	No
Crown Cork & Seal	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Georgia-Pacific	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
Owens Illinois	Yes	No	Yes	Yes	Yes	Yes	No	Yes
Overall proportions:								
	86.7%	60.0%	100.0%	100.0%	100.0%	100.0%	53.3%	66.7%

Table 10

Summary statistics on growth in operating performance over the period of distress. Operating performance is defined as Adjusted EBITDA normalized by sales. Adjusted EBITDA is defined as EBITDA net of any asbestos-related provisions or gains. Computations include data from B&W, the bankrupt subsidiary of McDermott. Panel A provides nominal values. Year t=0 denotes the fiscal year in which the firm experienced the onset of distress. Pre-resolution is the last full fiscal year before distress resolution. Post-resolution is the first fiscal year after distress resolution. The three firms still in Chapter 11 at the end of the sample period (2006) are not included in the post-resolution computations but their performance up to 2006 are counted in the pre-resolution numbers. Industry-adjusted growth (Panel B) is given by nominal growth less the growth in the median Fama-French 49 industry variable computed over the same period from the CRSP/Compustat universe of firms, excluding the 15 distressed firms. Numbers are reported with and without the cases of economic distress, defined as a firm with at least one year of negative adjusted EBITDA over the period. Significance levels are based on a two-tailed t-test for the means and on two-tailed Wilcoxon signed rank tests for the medians. a, b, and respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A: Nominal growth in operating performance

	From t=-1 to:				
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-20.9%b	-26.9%c	1.2%	-15.7%	3.5%
Mean	-11.9%	-20.1%c	-15.6%	3.3%	23.4%
Standard deviation	36.8%	42.5%	65.9%	51.3%	65.2%
Number of firms	16	16	16	16	12
# positive obs	3	5	8	6	6

*Very similar numbers when excluding economic distress cases (Kaiser and McDermott)

	From t=-1 to:				
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-23.4%b	-28.3%c	7.9%	-15.1%	17.4%
Mean	-13.6%	-23.4%c	-19.7%	4.4%	25.5%
Standard deviation	40.4%	45.8%	71.7%	55.5%	68.1%
Number of firms	13	13	13	13	9
# positive obs	2	3	7	5	5
Excluding economic distress cases:*					
Median	-23.4%a	-25.4%	7.9%	-16.3%	17.4%
Mean	-21.9%a	-14.3%	-5.6%	-9.0%	18.0%
Standard deviation	19.3%	40.2%	46.9%	47.5%	67.0%
Number of firms	11	11	11	11	7
# positive obs	1	3	6	3	4

Panel B: Industry-adjusted

	From t=-1 to:				
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-17.9%b	-13.0%	4.9%	-10.8%	-8.4%
Mean	-10.7%	-8.7%	-3.8%	7.5%	19.6%
Standard deviation	39.0%	41.8%	62.6%	44.3%	59.4%
Number of firms	16	16	16	16	12
# positive obs	3	6	9	6	5

*Very similar numbers when excluding economic distress cases (Kaiser and McDermott)

	From t=-1 to:				
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-20.5%b	-15.8%	1.9%	-10.6%	-11.1%
Mean	-12.9%	-11.3%	-7.6%	7.8%	18.5%
Standard deviation	42.8%	45.1%	68.3%	47.7%	60.3%
Number of firms	13	13	13	13	9
# positive obs	2	4	7	5	4
Excluding economic distress cases:*					
Median	-20.5%a	-10.3%	30.2%	-13.5%	-11.1%
Mean	-20.0%a	-0.7%	8.0%	-2.6%	16.8%
Standard deviation	15.1%	38.4%	45.0%	43.3%	61.9%
Number of firms	11	11	11	11	7
# positive obs	1	4	6	3	3

Table 11
Summary statistics on the growth in the number of employees over the period of distress. The measure is defined as the number of employees reported in annual financial statements in panel A. The measure is normalized by annual sales in Panel B. Growth is measured as of the pre-distress year (t=-1). Year t=0 denotes the fiscal year in which the firm experienced the onset of distress. Pre-resolution is the last full fiscal year before distress resolution. Post-resolution is the first fiscal year after distress resolution. Numbers are reported with and without the cases of economic distress, defined as a firm with at least one year of negative adjusted EBITDA over the period. Significance levels are based on a two-tailed t-test for the means and on two-tailed Wilcoxon signed rank tests for the medians. a, b, and respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A: Nominal growth in Number of employees

	From t=-1 to:				
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-4.8%a	-13.7%a	-15.5%a	-18.6%a	-17.9%b
Mean	-7.6%a	-15.6%a	-18.8%a	-20.5%a	-20.9%b
Standard deviation	9.1%	14.8%	15.8%	19.8%	25.4%
Number of firms	15	15	15	15	10
# positive obs	2	1	1	2	2
Very similar numbers when excluding economic distress cases.*					

	From t=-1 to:				
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-4.6%b	-12.4%a	-14.9%a	-13.2%a	-11.9%c
Mean	-7.1%b	-15.7%a	-18.4%a	-20.1%a	-20.5%c
Standard deviation	9.6%	16.4%	17.6%	22.2%	28.8%
Number of firms	12	12	12	12	8
# positive obs	2	1	1	2	2
Very similar numbers when excluding economic distress cases.*					

Panel B: Growth in Number of employees normalized by Sales

	From t=-1 to:				
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-3.3%	-4.1%	-11.2%b	-24.0%a	-25.5%a
Mean	-3.1%	-2.9%	-8.0%b	-22.5%a	-26.4%a
Standard deviation	9.6%	13.6%	11.2%	14.2%	13.5%
Number of firms	15	15	15	15	10
# positive obs	5	6	5	0	0
Very similar numbers when excluding economic distress cases.*					

	From t=-1 to:				
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-3.0%	-5.1%	-12.0%c	-24.3%a	-25.5%b
Mean	-2.4%	-2.2%	-7.3%c	-24.6%a	-27.9%a
Standard deviation	10.3%	14.6%	12.4%	14.7%	14.1%
Number of firms	12	12	12	12	8
# positive obs	4	5	5	0	0
Very similar numbers when excluding economic distress cases.*					

*: These include McDermott International and Kaiser Aluminum.

Table 12
Summary statistics on growth in capital expenditures (CAPEX) over the period of distress. The measure is defined as capital expenditures normalized by average sales. When available, computations include data from B&W, the bankrupt subsidiary of McDermott. Panel A provides nominal growth values. Year t=0 denotes the fiscal year in which the firm experienced the onset of distress. Pre-resolution is the last full fiscal year before distress resolution. Post-resolution is the first fiscal year after distress resolution. In panel B, industry-adjusted growth is given by nominal growth less the growth in the median Fama-French 49 industry variable computed over the same period from the CRSP/Compustat universe of firms, excluding the 15 final sample firms. Numbers are reported with and without the cases of economic distress, defined as a firm with at least one year of negative adjusted EBITDA over the period. Significance levels are based on a two-tailed t-test for the means and on two-tailed Wilcoxon signed rank tests for the medians. a, b, and respectively c denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A: Nominal growth in CAPEX performance					
		From t=-1 to:			
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-14.0%	-28.4%a	-13.6%b	-34.8%c	-26.7%
Mean	-6.7%	-23.0%a	-20.7%a	-19.5%c	-2.2%
Standard deviation	35.7%	25.7%	26.7%	38.4%	56.8%
Number of firms	16	16	15	15	12
# positive obs	4	4	3	4	4
Similar (slightly lower) numbers when excluding economic distress cases.*					
		From t=-1 to:			
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-14.4%	-32.6%b	-11.3%b	-28.1%	-23.5%
Mean	-5.2%	-24.3%a	-20.2%b	-17.6%	7.8%
Standard deviation	39.4%	27.8%	27.0%	40.7%	62.1%
Number of firms	13	13	12	12	9
# positive obs	4	3	2	3	4
Very similar (slightly lower) numbers when excluding economic distress cases.*					

Panel B: Industry-adjusted					
		From t=-1 to:			
All firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-1.1%	-10.1%	1.6%	-5.3%	-12.5%
Mean	6.1%	-3.5%	-0.2%	1.6%	13.8%
Standard deviation	40.8%	27.7%	30.0%	45.3%	64.0%
Number of firms	16	16	15	15	12
# positive obs	8	4	9	7	5
Excluding economic distress cases:*					
Median	-5.1%	-11.0%b	0.0%	-20.4%	-25.4%
Mean	0.6%	-10.4%c	-3.6%	-10.6%	-4.6%
Standard deviation	37.8%	21.4%	29.7%	28.9%	51.2%
Number of firms	14	14	13	13	10
# positive obs	6	2	7	5	3
		From t=-1 to:			
Chapter 11 firms:	0	1	2	Pre-resolution	Post-resolution
Including economic distress cases:*					
Median	-2.7%	-9.4%	2.9%	2.2%	1.5%
Mean	9.1%	-1.3%	4.1%	7.8%	28.9%
Standard deviation	44.7%	30.1%	29.5%	46.8%	66.6%
Number of firms	13	13	12	12	9
# positive obs	6	4	8	6	5
Excluding economic distress cases:*					
Median	-7.4%	-11.2%c	2.1%	-12.8%	-24.3%
Mean	2.7%	-9.8%	0.5%	-6.8%	6.9%
Standard deviation	42.3%	23.8%	29.8%	28.1%	56.5%
Number of firms	11	11	10	10	7
# positive obs	4	2	6	4	3

*: These include McDermott International and Kaiser Aluminum.

Table 13
Summary of acquisition activity around the onset of distress year for a sample of firms in distress due to asbestos litigation. Acquisition activity is measured as acquisition expenditure at year t divided by the average sales over the period [t-1,t]. Computations include data from B&W, the bankrupt subsidiary of McDermott. Panel A provides the numbers for each firm in the sample. Panel B summarizes the firm-level data for the entire sample and the subsample of firms not suffering from economic distress, defined as a firm with negative adjusted EBITDA over the period. Panel C tests for differences between pre-distress behavior and post-distress behavior in terms of acquisitions. The pre and (respectively post) acquisition numbers are computed as the average acquisition activity over the period [-4;-1], [-3;-1] and [-2;-1] (respectively [1;4], [1,3], [1,2]) for every firm. Significance for the average (respectively median) pre-post differences across all firms and the subset of Chapter 11 firms is given by a two-sided paired t-test (respectively a matched Wilcoxon sign rank test). ***, **, * denote significance at the 1%, 5%, 10% level.

Panel A: Firm-level acquisition activity around onset of distress

Firms	-4	-3	-2	-1	0	1	2	3	4
ABB	1.0%	10.2%	3.8%	2.6%	0.7%	0.3%	0.1%	0.1%	0.0%
Armstrong	0.0%	0.2%	47.6%	0.1%	0.2%	0.2%	0.0%	0.0%	0.0%
BMCA	3.3%	8.6%	12.8%	4.1%	5.2%	2.2%	2.6%	2.9%	4.0%
Congoleum	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Federal Mogul	0.0%	0.0%	134.7%	6.8%	0.0%	0.3%	0.0%	0.0%	0.0%
Halliburton	0.0%	0.5%	2.0%	0.3%	0.1%	0.1%	1.8%	0.0%	0.0%
Kaiser Aluminum and Chemical	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
McDermott	0.7%	0.0%	0.2%	0.0%	18.2%	0.1%	0.0%	0.0%	0.0%
B&W	N/A	0.0%	0.0%	0.0%	0.2%	0.2%	N/A	N/A	N/A
Owens Corning	2.4%	21.6%	0.0%	0.0%	0.1%	0.1%	0.3%	0.5%	1.8%
RHI	3.2%	2.6%	22.3%	0.1%	0.7%	0.0%	0.2%	2.0%	0.5%
USG	1.9%	0.0%	0.0%	2.2%	0.0%	0.0%	0.3%	0.6%	0.1%
WR Grace	0.9%	0.7%	0.0%	0.6%	3.2%	5.1%	1.6%	1.4%	3.1%
Crown Cork & Seal	23.0%	0.1%	0.4%	0.6%	0.1%	0.0%	0.0%	0.0%	0.0%
GP	0.8%	10.6%	30.6%	0.6%	0.0%	0.0%	0.1%	0.0%	N/A
Owens Illinois	11.6%	3.2%	74.3%	0.6%	1.4%	3.4%	0.3%	0.0%	10.3%

Panel B: Summary of acquisition activity around onset of distress

All firms:	-4	-3	-2	-1	0	1	2	3	4
Median	0.9%	0.3%	1.2%	0.4%	0.2%	0.1%	0.1%	0.0%	0.0%
Mean	3.3%	3.6%	20.5%	1.2%	1.9%	0.8%	0.5%	0.5%	1.4%
Standard deviation	6.2%	6.1%	37.2%	1.9%	4.6%	1.5%	0.8%	0.9%	2.9%
# obs	15	16	16	16	16	16	15	15	14
Only firms filing for Chapter 11**									
Median	1.0%	0.5%	2.0%	0.3%	0.2%	0.2%	0.2%	0.3%	0.1%
Mean	1.3%	4.0%	20.3%	1.5%	0.9%	0.8%	0.7%	0.7%	1.0%
Standard deviation	1.3%	6.9%	40.7%	2.2%	1.7%	1.6%	0.9%	1.0%	1.5%
# obs	10	11	11	11	11	11	10	10	10

Panel C: Test of pre and post differences

All firms:	Pre (From -4 to -1)	Post (From 1 to 4)	Pre (From -3 to -1)	Post (From 1 to 3)	Pre (From -2 to -1)	Post (From 1 to 2)
Mean	7.10%	0.74%	8.45%	0.57%	10.85%	0.61%
Median	5.20%	0.16%	3.23%	0.18%	1.13%	0.15%
Paired t-test	2.67**		2.46**		2.12**	
Matched Wilcoxon sign rank test	2.87***		2.83***		2.46**	
Only firms filing for Chapter 11**	From -4 to -1	From 1 to 4	From -3 to -1	From 1 to 3	From -2 to -1	From 1 to 2
Mean	5.73%	0.64%	7.30%	0.60%	9.24%	0.60%
Median	1.03%	0.20%	0.93%	0.20%	1.10%	0.15%
Paired t-test	1.86*		1.84*		1.56	
Matched Wilcoxon sign rank test	2.31**		2.31**		1.82**	

Remark: Almost identical results are obtained when the two economic distress cases (Kaiser and McDermott) are taken out.

Table 14
Qualitative measures of the costs and benefits of financial distress for the sample of firms hit by asbestos litigation. Evidence of costly/beneficial distress stems from financial filings provided by the firm and news reports from sources such as the Wall Street Journal. Figures indicate how many out of a total sample of 15 firms exhibit evidence of costs and/or benefits of distress. The evidence is given according to the timeline linked to the distress. A firm can appear several times on a given dimension (e.g. two management turnovers, one at onset and one during the period from onset to resolution). Potentially costly asset sales are defined as cases involving a loss on sale but with some mitigating factor. Potential evidence of forgone opportunities is defined to be the case when no M&A transactions occur over the period of distress but with no proof that there were missed opportunities. The last column gives the proportion of firms involved along the given dimension, counting each firm only once even if they appear multiple times. "Pre-distress" is the year prior to the onset of distress. Resolution is defined as either the emergence from Chapter 11, the sale of the firm, or the successful resolution of an out-of-court financing restructuring. Investment (R&D) cuts are considered costly if they are deemed as forgoing profitable growth opportunities. R&D cuts are viewed as potentially costly if the drop is sudden and temporary but without an explicit mention of a costly cutback. Asset sales are defined as "desperate" if the company is forced to sell core assets. If the sales are sold at lower than book value then proceeds are deemed to be lower than expected. The benefits of distress include a change in management, a refocusing on core business and evidence of a restructuring leading to an improvement in operations. Details along these different dimensions are shown in Appendix E, F and G.

Panel A: Costs of distress

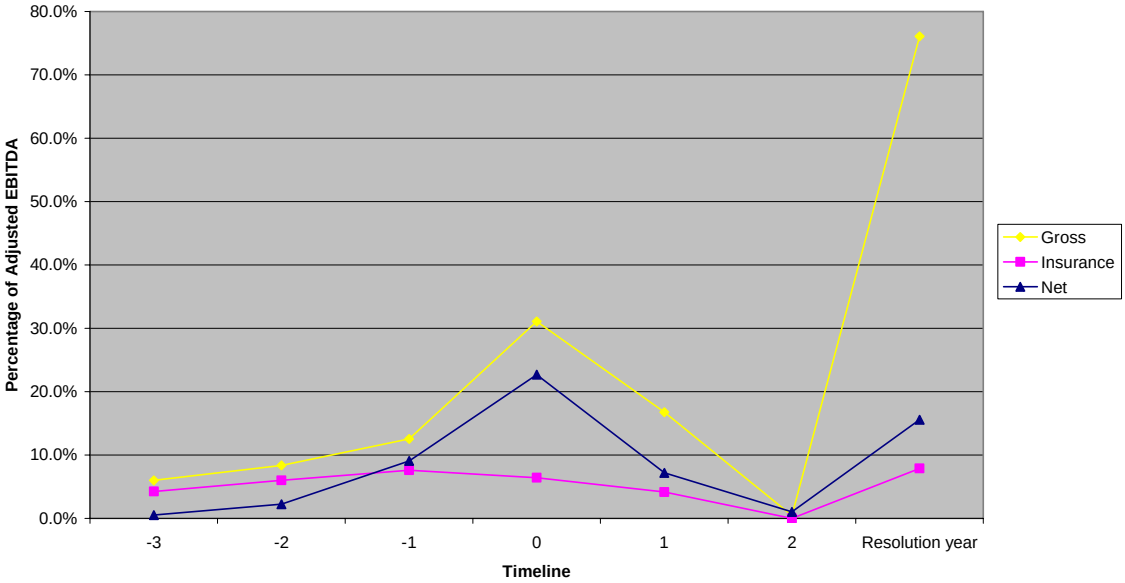
	Timeline				
	Pre-distress	Onset	From onset to resolution	Post-resolution	Proportion of firms involved
Investments (CAPEX):					
Evidence of costly cuts:	0	0	3	0	20%
Evidence of costly temporary cuts:	0	2	4	0	33%
R&D:					
Evidence of potentially costly temporary cuts:	0	2	2	0	27%
Acquisitions:					
Evidence of foregone opportunities	0	1	0	0	7%
Potential evidence of forgone opportunities	0	0	9	0	60%
Asset sales:					
Evidence of costly sales	0	1	1	0	13%
Evidence of potentially costly sales	0	2	0	0	13%

Panel B: Benefits of distress

Refocusing:*	1	9	7	1	92%
Restructuring:	6	8	12	0	93%
Management turnover:	0	7	3	0	60%

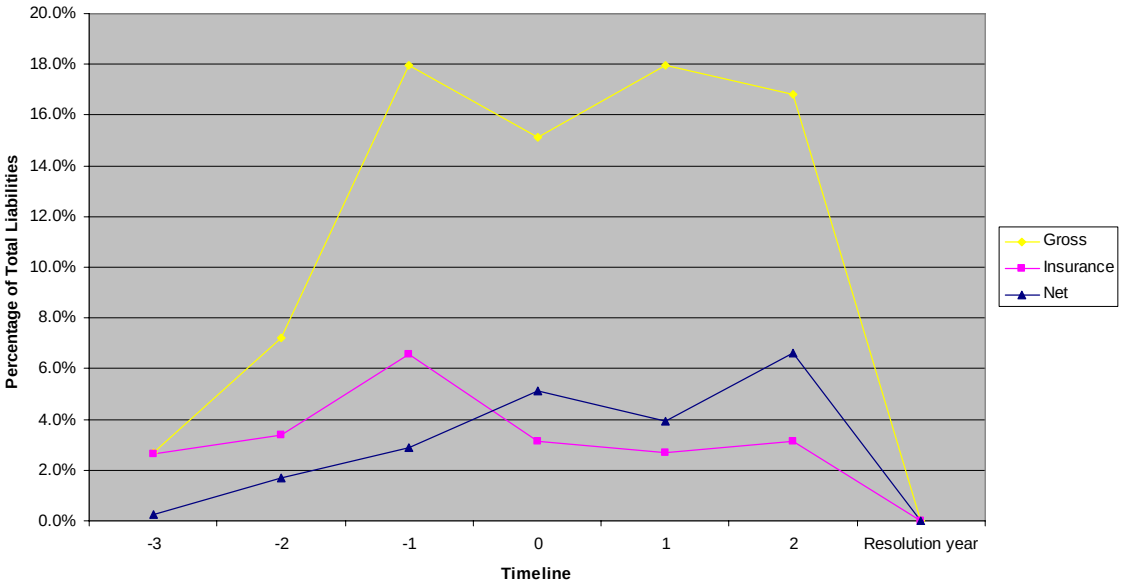
*: Three firms are already "pure plays" prior to the pre-distress period. Accordingly, only 12 firms can "refocus".

Figure 1: Cash outflows linked to asbestos litigation
(Median firm for sample of 15 distressed defendants)



Rem: Time 0 is defined as onset of distress year and resolution year is when a firm exits Chapter 11 or successfully achieves a financial restructuring outside of Chapter 11. Resolution year is on average 5 years after onset.

Figure 2: Liabilities linked to asbestos litigation
(Median firm for sample of 15 distressed defendants)



Rem: Time 0 is defined as onset of distress year and resolution year is when a firm exits Chapter 11 or successfully achieves a financial restructuring outside of Chapter 11. Resolution year is on average 5 years after onset.

Figure 3

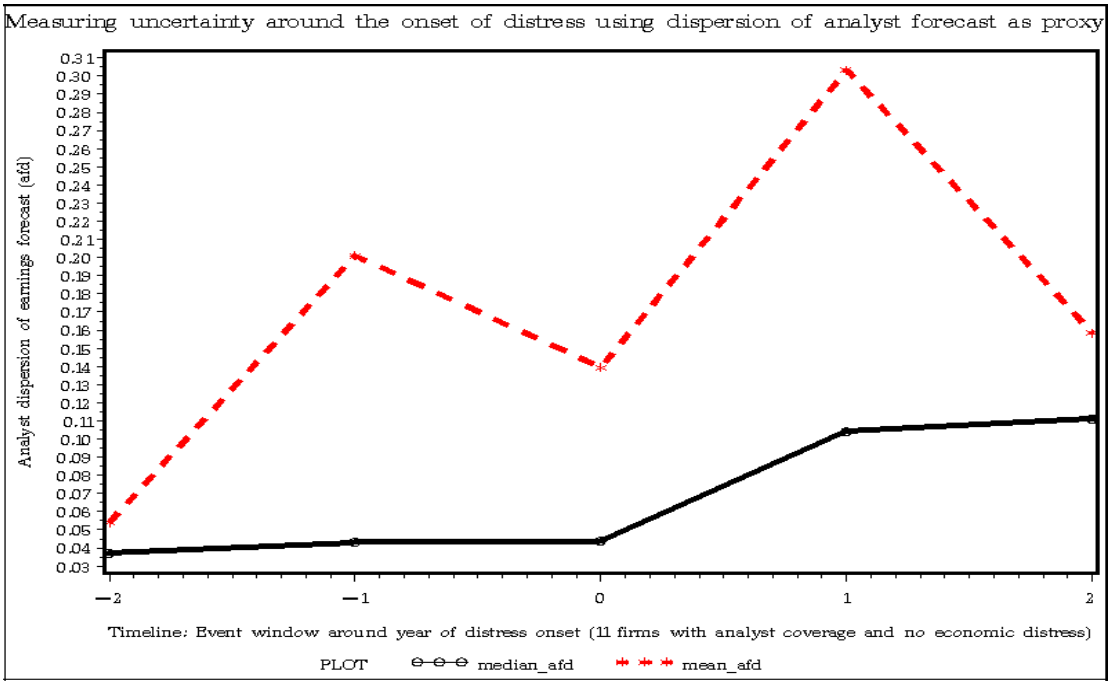
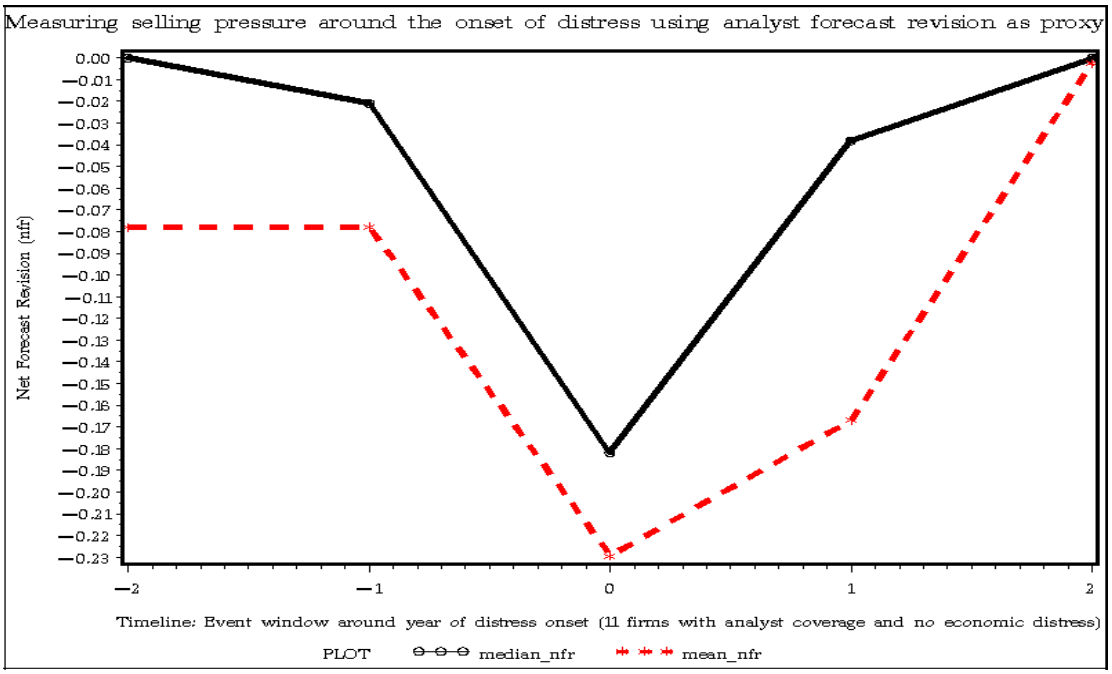


Figure 4



APPENDIX A: Timeline in asbestos litigation

This table provides pivotal legal, legislative and insurance-related events in asbestos litigation over the past forty years. Every event is reported with a date, a small descriptive and whether or not it was positive for defendant firms. The timeline, while not comprehensive, reflects the most important changes in the asbestos litigation landscape. A more detailed timeline can be found on the author's website. For the interested reader, refer to Brodeur (1985) and Hensler et al. (1985) for a focus on the earlier time period, Carroll et al. (2004) for a global overview and Mealey's Report (2007a) for a thorough account of recent state reforms.

Date	Event	Positive for defendant firms?
1966	First lawsuit filed against asbestos producers.	No
Sep-73	Fifth Circuit Court of Appeals rules that asbestos suits can be filed as product liability cases. This decision opens the floodgates for asbestos litigation.	No
1981	Landmark case for "triple trigger" theory in insurance coverage, giving firms the best possible coverage as all policies from first exposure to manifestation of the injury can be used to cover the claim.	Yes
Feb-82	Verdict of $150,000 for a past employer of Johns Manville in civil suit. Marks a "threshold" in asbestos litigation as it led to many more punitive damages being awarded (Brodeur (1985)).	No
Aug-82	First major bankruptcy linked to asbestos litigation of key defendant firm Johns Manville (an asbestos producer).	No
Jun-85	Wellington agreement between main defendants and their insurers, with the purpose of reducing the asbestos litigation costs by streamlining claim payments. It led to the creation of the Asbestos Claims Facility (ultimately dissolved in Oct-88).	Yes
1985-1986	Concurrently to the insurance liability crisis, most insurance policies stop covering asbestos liability, as part of the "absolute" pollution exclusion of the new Commercial General Liability (CGL) policy.	No
Oct-88	20 Traditional defendant setup the Center for Claims resolution (CCR) as a response to the failure of the Asbestos Claims Facility, with a goal of finding an efficient scheme to settle the mass tort.	Yes
1991	Consolidation of all federal cases to Judge Charles Weiner by the Judicial Panel on Multidistrict Litigation (JPMDL) for pre-trial processing. In response, plaintiff attorneys shift claim filings from Federal to State courts.	Yes
Jan-93	Setup of a class settlement between the major defendants and thousands of plaintiffs through CCR (also known as the "Georgine Settlement"), settling in an efficient manner the mass tort litigation. But it was quickly criticized on legal grounds.	Yes
Oct-94	Amendment to Chapter 11 to officially integrate the "channeling injunction" allowing for a discharge of all asbestos liability at the emergence from Chapter 11 if an approved Trust is setup to compensate present and *future* claimants.	Yes
May-96	Maritime cases in Federal Court put on inactive docket. One of several massive dismissals of claims decisions made by Judge Weiner based on claimants being unimpaired.	Yes
May-96	District Court rejected the class settlement status of CCR. In particular on the grounds of the fairness of treatment of "futures" (currently unimpaired) within the class settlement. Decision is appealed the case goes to the Supreme Court.	No
Jul-97	Supreme Court rules on Georgine and affirms the District Court rejection of CCR's class-action settlements status to deal efficiently with the mass litigation. However, it calls on Congress to find a global solution.	No
Jan-99	Supreme Court rejected Fibreboard's class action settlement, definitely blocking the class action route to deal efficiently with asbestos litigation. It calls again on Congress to find a global solution. A surge in asbestos filings across the nation ensues.	No
1999-2000	Failure of the first attempt in several years to have a global solution provided by Congress through the "Fairness in Compensation Act" of 1999.	No
Oct-00	Major bankruptcy filing by traditional defendant Owens Corning Fiberglass (OCF). OCF is the first of a new wave of bankruptcies among traditional defendants. Due to joint and several liability, any filing creates a domino effect by leaving the other defendants with a larger share of the total liability.	No
Nov-01	Pennsylvania enacts legislation limiting the liability of successor firms in asbestos litigation	Yes
Oct-02	Mississippi tort reform to be enacted by year end after special session approves law eliminating "joint and several" liability by making each party responsible only for its share of non-economic damages and curbing compensatory and punitive damages.	Yes
Dec-02	Supreme Court of New York procedural change: Creation of inactive dockets. First of several jurisdictions establishing "inactive dockets" thereby reducing the pressure on defendants to settle "en masse".	Yes
Mar-03	West Virginia law enacted which leads to a limitation in forum shopping practices by limiting out-of-state plaintiffs' opportunity to file in West Virginia.	Yes
Apr-03	U.S. Supreme Court ruling to limit punitive-to-compensatory damages ratio to a maximum of 9, thus curbing excessive punitive damages sometimes awarded by courts.	Yes
Apr-03	Ohio legislation limiting asbestos costs for firms: Limiting liability of firms	Yes
Jun-03	Texas legislation limiting asbestos costs for firms: Limiting liability of firms by addressing the joint and several liability and also by capping the exposure of the litigation for successor liability cases.	Yes
Jul-03	FAIR act for a global solution provided by Congress passes Senate Committee but is not confirmed.	No
Jun-04	Follow-up tort reform in the state of Mississippi limiting forum shopping and further curbing potential damages to be awarded.	Yes
Sep-04	Ohio legislation limiting asbestos costs for firms: Medical criteria restriction	Yes
Dec-04	Court ruling in "CE case" (ABB) reducing the scope of rule 524 (g). It did not allow the channeling injunction to extend to other businesses owned by the parent company which were not part of the Chapter 11 filing.	No
Feb-05	Mass X-ray screening judged as fraudulent: Litigation environment becoming more defendant friendly.	Yes
May-05	Florida enacted legislation limiting asbestos costs for firms: Medical criteria restriction	Yes
Jul-05	Ohio Supreme Court amended state's rule of civil procedure to limit venue for asbestos cases. / "Anti-consolidation" amendment	Yes
Sep-05	Texas legislation change: Medical criteria restriction	Yes
Feb-06	The FAIR act, providing a definite global solution to the litigation with a $140 billion fund provided by defendants and insurers, did not get enough votes at the Senate. Although, overall a global definitive solution would be positive for Corporate America, it is not clear if all firms would benefit from the solution relative to their current litigation environment.	No

Appendix B
List of firms among the sample firms hit by asbestos litigation that have suffered from a bankruptcy commonly known to be associated with the litigation but that are actually due to economic distress.

Firm	Date of filing	Reasons for Chapter 7/11:	Asbestos exposure:	Outcome relative to asbestos:
Bethlehem Steel	10-01	Due to economic reasons: Long-term loss of competitiveness, Excessive labor costs and economic slowdown.	No asbestos liability nor any net cash outflows disclosed. No mention prior to filing. During Chapter 11 proceedings, it states having "numerous" cases against it.	Mittal Steel (India) acquired many of the assets. Bankruptcy court specified assets to be asbestos free.
Dana	03-06	Due to economic reasons: Ongoing difficulties in automotive sector.	Although a traditional asbestos defendant (CCR member), it has almost full insurance coverage throughout the entire period up to its Chapter 11 filing. Minor net liability due to the fallout of the CCR organization and the subsequent domino effect of shared liability. At time of filing, asbestos liability was only 3% of total liability.	Ongoing. Will solve its asbestos liability once and for all using the channeling injunction but no asbestos committee in Chapter 11 proceedings.
Harnischfeger Industries	06-99	Due to economic reasons: Operating performance in pulp and paper business ("Beloit") with major cost overrun and failure to pay from one of its main clients. Reemerged in 2001 as Joy Global (pure mining equipment company).	Did not mention any asbestos litigation prior to emerging from Chapter 11. It can only be thought as minor at the time as no disclosure was made. No net liability or net cash outflows ever mentioned over period of analysis.	Number of cases increasing over period 2003-2006. Currently, 1000 asbestos and silicosis cases. No other disclosure made beyond the fact that management believes they will not materially affect the firm.
Oglebay Norton	02-04	Due to economic reasons: Short term liquidity crunch and poor operating performance.	Asbestos litigation was a contributing factor in one credit downgrade amid poor operating performance prior to the filings but the firm has never suffered out-of-pocket expenses. It gave a first estimate of its gross liability when emerging at $174M (compared to a total liability of $570M). However, it has insurance assets twice the liability over the entire sample period.	Firm did not eliminate its liability in Chapter 11. However, it settled a many cases (about 20,000) using only funds from insurance, approved by the Courts. Settling massively, insurers cover all the costs. However, depletion of insurance policies is expected if trends in filings continue.
Solutia	12-03	Due to poor operating performance, high debt levels and "legacy" litigation (mostly non-asbestos) and pension fund obligations (spin-off from Monsanto in 1997).	Suffers mostly from PCB litigation (Anniston). Mentions asbestos premise litigation only as of 2002, assumed marginal up to that point. The only financial details disclosed is the $6m expenditures related to asbestos during 2002 for which it expects some reimbursements. This compares to the annual "legacy obligations" of approx. $100m stated by management. At the time of bankruptcy (Dec 2003): 570 asbestos actions involving 3,500 to 4,500 plaintiffs.	N/A. Firm obtained approval of its reorganization plan but has still not emerged from bankruptcy as it seeks to obtain adequate financing amid the credit crunch of 2007-2008.
Stone & Webster	06-00	Due to economic reasons: Unanticipated cost overrun on major project and sustained poor operating performance led to a liquidity crisis. Banks required sale of its assets, which was done under the supervision of bankruptcy courts.	In last annual report before its Chapter 11 filing, it states being one of many defendants against numerous claims which have been dismissed for the most part or settled for immaterial amounts.	The Shaw Group purchased all the firm's assets on July 14, 2000. It never reported any asbestos litigation issues related to the purchase.
Todd Shipyards	08-87	Due to economic reasons: major cost overruns, operational losses and lost bids amid major reduction of government orders. It reemerged in 1991.	Asbestos litigation mentioned for the first time in 1997. Had full insurance coverage up to 2001. As of 2002, has a minor liability, its annual net cash outflows have been marginal ever since.	Fighting vigorously but settles when appropriate. Its insurance policies will be depleted around 2009.
Worksafe Industries	01-01	Due to economic reasons: Poor profitability of operations during the '90s plus major accounting fraud: Discrepancies in inventories in 2000, which pushed the firm into losses and made it violate certain covenant on its line of credit.	No net liability reported as it has full insurance coverage. Immaterial annual cash expenditure due to cost-sharing agreement with insurer which covers 80-90% of all costs. Over the period 1981-1999, the firm had spent only $90K. From last 10-K (in 2000): Asbestos still seemed to be almost fully covered by insurance policies.	No details. Financing institution took possession of all assets, all of management resigned. Firm was liquidated.

Remark: Foster Wheeler, Hercules and US Steel are also in economic distress but stayed outside of Chapter 11. As the firms in the table above, the operational turmoil dwarfs their asbestos exposure. They had almost full insurance coverage over the entire period (except for deductibles).

Appendix C

This table outlines firms using Chapter 11's proceedings to eliminate their asbestos liability using the channeling injunction. Panel A lists firms which file part of their business in Chapter 11. Panel B lists firms which use affiliated firm's Chapter 11 proceedings to settle their own liability. Details on the Trust contribution to their subsidiary (Panel A firms) or their related party (Panel B) can be provided by contacting the author.

Panel A: Cases filing for Chapter 11**

Firm	Industry	Unit concerned	Onset of impact	Trigger	Filing date	Resolution tool	Litigation costs	Resolution Date
			Onset of impact					
Corning	Specialty glass and ceramics	Pittsburgh Corning (PC)	2000	First case found liable in Jan. 2000	04- 00	Chapter 11 filing of unit concerned.	Immaterial over period.	Ongoing (2nd Amended Plan)
PPG Industries	Specialty Chemicals	Pittsburgh Corning (PC)	2000	First case found liable in Jan. 2000	04- 00	Chapter 11 filing of unit concerned.	Immaterial over period.	Ongoing (2nd Amended Plan)
Pfizer	Pharmaceutical	Quigley	2004	No clear trigger	09- 04	Chapter 11 filing of unit concerned.	Immaterial over period	Ongoing (4th Amended Plan)
Grupo Mexico	Mining group	Asarco	2004	Insurance depletion issues	08- 05	Chapter 11 filing of unit concerned.	Immaterial over period	Ongoing (no plans filed yet)
Dyncorp*	Contractor to US gov	Fuller-Austin Insulation, Inc.	1995	Surge in claims and primary insurance depletion	09- 98	Chapter 11 filing of unit concerned.	Immaterial over period	12-1998
Tyler Technologies	IT systems provider	Swan Transportation (inactive)	2000	Insurance depletion issues	02- 02	Chapter 11 filing of unit concerned.	Immaterial over period	12-2003
Irex†	Insulation products	Non-operational holding company	2001	Massive negative judgment (Appeal bond too costly)	09- 02	Chapter 11 filing of unit concerned.	Immaterial over period	Ongoing (2nd Amended Plan)
Entrade†	Internet operations	Artra Corp	2000	Insurance depletion issues	N/A	Chapter 11 filing of unit concerned.	Immaterial over period	02-2007

Panel B: Cases using affiliated party's Chapter 11 forum (Filing date is of affiliate's party)

Firm	Industry	Unit concerned	Onset of impact	Trigger	Filing date	Resolution tool	Litigation costs	Resolution Date
Cooper Industries	Electrical products	Entire business (successor liability)	2004	Insurance depletion issues	10- 01	Settled successor liability by contributing to Federal-Mogul's Trust	Immaterial over period.	Ongoing
Pepsiamericas (Pneumo Abex)	Bottling operations	Entire business (successor liability)	2005	Litigation over insurance proceeds with Cooper	10- 01	Settled successor liability by contributing to Federal-Mogul's Trust	Immaterial over period.	Ongoing
Honeywell	Aerospace, automation, construction	Entire business (successor liability)	2001	Insurance depletion and disagreement with NARCO	02- 02	Settled some of its successor liability through NARCO's Chapter 11.	Material but manageable (Exposure also through Bendix unit)	09- 07
Sealed air corp	Packaging	Entire business (fraudulent conveyance)	2000	WR Grace impending Chapter 11 filing	04- 01	Settled the fraudulent conveyance claims by contributing to WR Grace's Trust	Immaterial over period.	11- 02
Fresenius MedCare	Medical conglomerate	Entire business (fraudulent conveyance)	2000	WR Grace impending Chapter 11 filing	04- 01	Settled the fraudulent conveyance claims by contributing to WR Grace's Trust	Immaterial over period.	11- 02

*: Dyncorp is included among the nine firms that resolve there asbestos liability prior to 1999.

†: Firms delisted prior to neither reporting any net cash outflows nor any net liability due to the litigation. These firms are not included in the numbers of Table 1 and 2.

**: Solutia (a spin-off of Monsanto) filed for Chapter 11 mostly for economic and past litigation (PCB mostly) and pension liabilities reasons. Due to the filing it also got a stay in litigation on its asbestos claims. They are included in the numbers of Table 1 and 2 as using Chapter 11 forum but not financially distressed due to asbestos.

Appendix D
Details on the source of exposure for each firm listed in our final sample of firms in distress due to asbestos litigation. The information is obtained from firms' disclosure on the topic in their financial statements.

Panel A: Category 1 firms

Firm	Incriminated unit	Incriminated product
ABB	Combustion Engineering (inactive), Lummus and Basic	Insulation in construction projects and boilers, primarily in the early 70s and before.
Congoleum	Past building materials operations	In tiles (stopped in 1974) and resilient sheet vinyl (stopped in 1983) , asbestos encapsulated.
Armstrong	Past ownership of AC&S (small insulating business sold in 1969)	Asbestos contained in building materials
BMCA	Past building materials operations (Ruberoid Co acquired in 1967)	Asbestos insulation, Calcilite, used during the '60s.
Federal Mogul	T&N / Abex and Wagner / Fel-pro / FM	Brakes containing encapsulated asbestos / Gaskets & packing products / See T&N below
Halliburton	DII Industries and Kellogg Brown and Root (KBR)	Asbestos in products from DII Industries (Refractory materials, gaskets, and packing materials used in pumps and other industrial products) / Asbestos in materials used in the construction and maintenance projects of Kellogg Brown & Root (mainly from former Brown&Root not M. Kellogg (which came from Dresser)) or its subsidiaries
Kaiser Aluminum and Chemical	Past operations	Exposure on premises and due to asbestos in products, stopped in 1980.
McDermott	Babcock & Wilcox (B&W)	Commercial boilers
Owens Corning	Fibreboard* / Past building materials operations	Asbestos products in building materials, stopped in 1972.
RHI	US operations: NARCO, Harbison-Walker and A.P. Green	Once produced refractory products that contained a small amount of asbestos.
U.S. Gypsum (USG)	Past building materials operations	Asbestos products, most stopped in 1972, completely stopped in 1977.
WR Grace	Past building materials operations	Construction products, in particular Zonolite attic fill insulation. Stopped adding asbestos to products in 1973.
Crown Cork & Seal	Mundet Cork Corp (owned for three months during the 60s)	Insulation products
Georgia-Pacific	Building Construction	Joint systems products containing asbestos, manufactured by Bestwall Gypsum Company. The Corporation acquired Bestwall in 1965, and discontinued using asbestos in the manufacture of these products in 1977.
Owens Illinois	Old insulation business (1948-1958)	Insulation products

Appendix E

This table provides qualitative evidence on the potential benefits of financial distress. The analysis is performed along three dimensions: (i) Restructuring of operations as reported by management, (ii) Refocusing on core operations as reported by management and (iii) management turnover. The timing relative to the distress timeline is also given.

	Evidence of potential benefits of distress across three dimensions					
Firm	Timing	Restructuring	Timing	Refocusing	Timing	Management turnover
ABB	Mainly at onset and in the following two years	Initial restructuring program to streamline operations. Followed at onset year, by the "Step Change Program" with a goal of saving $500 million a year as of 2005. Important restructuring charge of about $200M, including $150M related to termination benefits for about 1,500 employees.	Mainly at onset and in the following two years	Major divestment of all non-core assets in particular its structured-finance and insurance arm but also its oil and gas, power plant stakes and many of its smaller operations such as Building systems.	At onset and at pre-resolution	In 2002, Mr. Dormann (CEO of Aventis (pharmaceutical) and board member of ABB since 1998) becomes new CEO by replacing Mr. Centerman (only one year tenure). Amid the crisis, Centerman focuses on cost-cutting. In Jan 2005, Mr Kindle becomes new CEO (CEO of Sulzer (manufacturing conglomerate) prior to appointment). His focus is on growth.
Congoleum	One year prior to onset	Cost-cutting efforts with tangible results occurring rapidly. No other significant restructuring efforts in other businesses.	N/A	No signs of refocusing. It is already a pure play.	N/A	Roger S. Marcus (CEO and chairman) and his family own American Biltrite and run Congoleum since 1994, throughout the period of analysis. The Marcus family owns more than 50% of American Biltrite's stock.
Armstrong	Three years after onset	Cost-reduction initiatives taken in order to stay competitive, including closure of several small production sites and consolidation of several SG&A operations and some outsourcing to Asia. Overall reduction of 1,000 employees over the restructuring year.	At onset	Divestiture of all of its Insulation business unit. Also, intention to get out of textile and sports flooring business in order to focus on core "resilient flooring" operations (sold only after resolution due to lack of buyer).	At onset	George A. Lorch is replaced by Mr Lockhart in August 2000. Lockhart was CEO of General Signal (diversified manufacturer). He is an outsider.
BMCA	N/A	No signs of major restructuring over the period.	N/A	No signs of refocusing. It is already a pure play.	After financing crisis	Robert Tafaro replaced Mr Heyman who was acting Chief Executive from 1994 to April 2006 (owner of G-I Holding, parent of BMCA in Chapter 11). Tafaro was COO of BMCA prior to appointment and as been a director since 2000.
Federal Mogul	At onset, pursued throughout distress period.	It announced "six global initiatives", aimed at better integrating acquisitions; resizing certain segments to current market conditions; controlling working capital; and generally imposing more effective controls company-wide. Cost-cutting efforts (severance, plant closure, etc.) throughout Chapter 11 proceedings. Announced in 2006 another cost-cutting plan with another 10% cut in employee workforce.	At onset	Multiple divestments of non-core businesses, in particular prior to filing for Chapter 11. Since, continued minor divestments within Chapter 11 proceedings. Focus on: Lean manufacturing, optimizing cost, optimizing structure and global presence (penetration of the Asian markets).	At onset	Richard Snell stepped down in September 2000 amid crisis and the firm hired ad-interim Robert Miller a turnaround specialist and he was replaced by Frank Macher (CEO, past CEO of ITT Automotive) and Charles McLure (COO, past CEO of Detroit Diesel Corp) Both from within the industry (focused on operational aspects of business), they implement a major restructuring. Mclure becomes CEO in 2003 and is replaced by José Maria Alapont (also from the industry as past CEO of IVECO) in March 2005.
Halliburton	During pre-resolution year	Restructuring of KBR unit after settlement agreement KBR into two segments, Government and Infrastructure and Energy and Chemicals. Intention to spin-off unit is behind the move.	At onset	Divestment of non-core businesses (minor). As of onset of crisis (early 2002), management decides on separating clearly KBR from its energy services operations. Legally and operationally separated, this decision paves the way to the ultimate IPO of KBR in 2006 once it solved its asbestos issues.	Prior to onset	Mr Lesar replaces Dick Cheney in Aug 2000. His is an insider since 1993 and held the positions of CFO from 1995 to 1997 and COO from 1997 to 2000. Hold to the position throughout crisis.
Kaiser Aluminum and Chemical	At onset, pursued throughout distress period.	Prior to onset, major cost-cutting effort and optimization of the production in order to get to a level of profitability deemed sufficient by the management. New cost-cutting measures taken after onset, includes redundancies.	At onset and onwards	In Chapter 11, major refocus of business from producer of aluminum to a focused "Fabricated Products" business. Selling off most of its cyclical commodity business (kept only one of its commodities interests).	At onset	Jack Hockema was elected President and CEO of Kaiser in October 2001, replacing Raymond Milchovich. Hockema held to the position throughout the crisis. As an insider and VP since 1997, he previously served as Executive Vice President and President of Kaiser Fabricated Products, which is the business the company decided to focus on.

McDermott	During crisis	In 2004, amidst the economic crisis at its maritime division (JRM), it had a major restructuring of the division to eliminate the weak structure of the business, in particular regarding its project management. At emergence, reconsolidated all units in one entity leading to tax and administrative efficiencies, the opportunity to increase the flexibility of our financial structure.	One year after onset	Sold its non-strategic Industrial Business unit to raise funds. Prior to filing, most of its operations where combined in a single consolidated U.S. group. But due to a major M&A operation of its marine division, it had to have it separated. As it was planning on reconsolidating all of its units (after purchasing the remaining equity of JRM in 1998), the asbestos issues related to B&W put a hold on the reconsolidation. It made a conscious effort to avoid selling its strategic units and created a single consolidated group in 2006 once B&W reemerged.	At onset	Roger Tetrault (CEO since 1998, brought in to make a turnaround after decade-long lull) was replaced by Bruce Wilkinson (former CEO of CRSS Inc, firm active in the power and energy plant business) in April 2000. Bruce Wilkinson held his position throughout the crisis.
Owens Corning	Prior to onset and throughout crisis	Prior to distress (1997), major cost-reduction program. At onset, new restructuring in face of pricing pressures and potential asbestos costs. Continued comprehensive strategic review of its businesses in connection with the Chapter 11 proceedings. Leads to aggressive cost cutting, many redundancies at its US and UK operations.	N/A	Minor non-core divestments at onset. It focuses on its two segments (Building Materials Systems and Composite Solutions) throughout the crisis.	Two years after onset	Glen Hiner CEO since 1992 is replaced by two insiders as of April 2002: David Brown (previously COO since 2001) and Mr Thaman (we Chairman of the Board and CFO).
RHI	Prior to onset and at onset	Prior to onset, restructuring measures are taken in reaction to poor underlying markets, in particular after the inclusion of its US operation in its portfolio of refractory assets. Restructuring included rationalizing manufacturing and ordering which led to more than a 1000 layoffs (more than a quarter of the employees in the US). At onset, as part of the financing rescue, it restructures its core operating refractories business Veitsch-Radex.	At onset	Decides (in accordance with the consortium of banks that rescues the firm) to focus on core competence: Refractory business (outside of the US). Insulating and Engineering businesses are sold off during restructuring period.	At onset	Georg Obermeier resigns as CEO amid the crisis, two strong figures enter the executive board and stay throughout the crisis: CEO Helmut Draxler (past CEO of Austrian Railways Oebb) and new CFO Eduard Zehetner. Andreas Meier, Deputy CEO of the Refractory business becomes the new CEO in 2007 (he was interim CEO during the crisis).
U.S. Gypsum (USG)	At onset	At onset, a 5-point Strategy was developed. The plan includes optimizing operating performance by reducing costs and expenses and improving working capital performance. Restructuring occurs mostly at onset and in the two following years, it includes redundancies.	At onset	At onset, a 5-point Strategy was developed: building for growth by adding capacity and lowering production costs, leading in product innovation, expanding its building products distribution business, enhancing customer service and promoting its brand names. The plan includes seeking opportunities for the sale of surplus assets but M&A activity is very low during crisis.	N/A	William C. Foote stays CEO throughout the crisis. CEO since 1997 and COO of the firm previously.
WR Grace	During crisis	During Chapter 11 proceedings, Grace continued to focus on productivity improvements to partially offset adverse market and cost factors. It added plant capacity from improved production processes and reduced costs through efficiency gains and purchasing synergies.	Prior to onset	Complete transformation of the firm from a conglomerate to a focused speciality chemical by selling or spinning-off many business during the '90s. "New Grace" as of one year prior to onset. It is already a pure play. No shift in strategy during crisis.	Prior to onset	Paul Norris became CEO in 1998 as the firm had finished its refocusing on Specialty Chemicals. An outsider, (formerly at an investment fund and at Allied Signal) took over at W.R. Grace and focused on operational efficiency. He stayed until 2005.
Crown Cork & Seal	Prior to onset and during crisis	Prior to onset (during the '90s), it performs several important restructuring efforts with the objective of enhancing operating efficiencies. It continues its restructuring efforts at onset and thereafter. In particular, it includes the closure of many European plants and layoffs at US operations.	One year after onset	Crown decided to focus mainly on food and beverage cans. It shed many non-core assets, including its fragrance-pump, different plastics businesses (including an IPO of Constar) and its European Pharmaceutical packaging business.	At onset	William Avery was replaced by John Conway in Jan 2001. W. Avery served for more than 40 years for the firm. Conway stayed CEO throughout crisis.

Georgia-Pacific	At onset and during crisis	At onset, in the aftermath of Fort James' acquisition. Continued during crisis (2002-2004-2005): closure of certain structural panels mills, lumber mills, industrial wood products mills, and gypsum plants (2002), closed several (high cost) production facilities to optimize production (2003-2004). Major restructuring of North America Consumer Products segment in 2005 (1,100 employees will be cut-off)	Prior to onset, ongoing during crisis	Prior to onset, it decided to refocus on high-end, consumer-oriented product. The divestment of its timber business (1997), the separation of pulp business (2001) and the acquisition of Fort James in 2000 are all part of this strategy. The strategy continues during distress period. It sells a majority stake in Unisource (2002), its building material distribution business and its stand-alone market pulp mills (both in 2004).	N/A	Correll was CEO throughout the crisis (as of 1993). Danny Huff was CFO, also throughout the crisis.
Owens Illinois	At onset and during crisis	At onset, restructuring program to reduce costs, reduce working capital and improve capital efficiency. During distress, restructuring occurs mostly at its European operations (capacity curtailment).	At onset and during crisis	At onset, decision to sell non-core assets, which it does during distress period (sold non-core asset Harbor Capital Advisors and several non-core operations). It put a close to its reorientation by selling its poorly performing blow-molded plastic container unit in 2004.	Three years after onset	Joseph Lemieux was CEO since 1990 (age 71 when replaced). Terry Wilkinson and Thomas Young (two insiders) became co-CEOs in 2003. Steven R. McCracken new CEO in Sept 2004 (outsider from E.I. Dupont de Nemours).

Appendix F

This table provides qualitative evidence on costly curtailments in discretionary spending. Discretionary spending are measured along three different dimensions: Capital Expenditures (CAPEX), Mergers and Acquisitions (M&A) and Research and Development (R&D). The timing is also given, both absolute and relative to the distress timeline. To determine if the curtailment is costly, I rely on management's reporting on the matter in particular how it relates to prior spending and the current business strategy of the firm.

	Evidence of costly reductions/limits in discretionary spending					
Firm	Timing	CAPEX	Timing	M&A	Timing	R&D
ABB	Onset and onwards	Potential and temporary. Natural capex reduction as firm downsizes. Capex targeted at improving productivity at existing production sites (North America and Europe) and at expanding new capacity in emerging markets (Asia). Levels at or above depreciation of assets.	Onset and onwards	Potential. No major acquisition during the distress period, instead focus on divestments. The cross-listing's purpose (two years before onset) was for strategic acquisitions in the US which have not materialized as of yet.	Onset and year after	Yes. Temporary. Although a dip in R&D occurred during distress period. R&D was higher at resolution than prior to distress. R&D a competitive advantage in its business. Focus on "increasingly intelligent connected devices".
Congoleum	Onset and onwards	Yes. Important reduction in capex as of onset year. As of that year, always below its own forecast given a year prior. Limits imposed by covenants but no constraints as a result are mentioned.	N/A	Potential. No acquisition during distress period. But also none prior.	Onset	Potential. Reduction at onset but then healthy increase. R&D focuses on improving products and expanding product line.
Armstrong	Three years after onset	Temporary. Reduction in investments in 2003 to control costs, reversed in 2004 with strong underlying markets, it upgrades its manufacturing operations and improves production efficiencies.	Onset and onwards	Potential. At onset, it acquired a small leading manufacturer and installer of metal ceilings. No other acquisitions during the period. However, still needs to integrate its major acquisitions from 1998.	N/A	No. R&D consists of developing and improving products and manufacturing processes. Relatively constant throughout period of distress.
BMCA	One year after onset	Temporary dip during 2001-2002. Feb 2004: Announced plans to build a new high speed, state−of−the−art shingle manufacturing facility to support our continued premium laminate shingle growth in the Northeast and Canadian markets. Covenant limits on CAPEX but expects to have funding for full expenditure throughout.	One year after onset	Potential. Temporary dip during 2001-2002. May 2004: Acquisition of the Quakertown manufacturing facility. Decides to scrap its investment plans in its planned new manufacturing facility as a result. Major acquisition of ElkCorp in 2007, obtained a new credit facility for the purpose.	N/A	No. R&D consists of developing and improving products and manufacturing processes and testing new materials. Constant to improving throughout period of analysis. Remains minor relative to size of firm.

Federal Mogul	N/A	Maintained at a high level. All time high value one year before onset. It focuses on improving operational efficiencies and thus decreasing costs. Covenant limits on CAPEX but expects to have funding for full expenditure throughout.	Onset and onwards	Potential. Only two minor acquisitions within Chapter 11 proceedings: a leading Polish producer of pistons and other automotive components. WSK employs 2,500 employees at its manufacturing location in Gorzyce, Poland with annual sales of approximately $50 million and a small acquisition of an Indian firm in 2006.	N/A	No. Maintained at a high-level throughout the period. As multiple technical centers around the world to support the firm's advanced research program. All business units work closely with customers to develop custom-made solutions.
Halliburton	Two years after onset	Temporary. It limits capex to essential projects ("those critical to serving our customers"), with a thorough discipline as part of managing cash flows as it raises the funds to file KBR for Chapter 11 in 2003 and 2004.	After onset year	Potential. No major acquisition throughout period. During onset year, it acquired a 3−D visualization and interpretation technology company and PGS Data Management division.	N/A	No. Stable throughout period of distress. It maintains an active R&D program, necessary to meet the needs of its global customers. The program improves existing products and processes, develops new products and processes.
Kaiser Aluminum and Chemical	At onset	Temporary. However, measured increase in capex as of pre-resolution year (2005). In particular, expansion plans at the Spokane facility for new equipment, furnaces and/or services that will enable firm to supply heavy gauge heat treat stretched plate to the aerospace and general engineering markets.	N/A	No. Minor acquisition during onset year. Almost no acquisitions throughout period of analysis (pre and post crisis). No mention of failed acquisitions.	At onset	Potential. R&D expenses went down, albeit from an already low level. R&D not a major use of funds for the firm. It focuses on advanced metallurgical analysis and process technology.
McDermott	After onset and onwards	Yes. Important reduction in capex as of onset year. Drop in capex related to its maritime division as it tries to curtail its delays at key projects. Capex picks up only at preresolution period. Limits imposed by covenants but no constraints as a result are mentioned.	N/A	Potential. No acquisitions throughout distress period. It acquired its remaining stake in JRM in 1998 and awaited B&W's emergence to reconsolidate all of its units. No mention of failed acquisitions.	Two years after onset	Yes. Temporary (in particular 2003-3004 period). Reduction during crisis at JRM. R&D is related to the development and improvement of new and existing products and equipment and conceptual and engineering evaluation. It is executed at the divisional level of its different units.
Owens Corning	N/A	No. Capex remain at levels similar to pre-distress levels. No particular mention of constraints.	After onset year	No. Minor bolt-on acquisitions during crisis. Example: Purchased Vitro−Fibras, S.A. to strengthen its operating position in Mexico, as well as provides a supply of low−cost manufacturing capacity to service the North American market for both fiberglass insulation and reinforcements.	After onset year	Potential. R&D expenses are lower during crisis years. But no mention of a conscious reduction to save costs. It has a Science and Technology Center where it conducts its research and has several research applications around the world. Holds many patents on its innovations.
RHI	N/A	No. Capex steadily increases after restructuring albeit at from a lower base, as it kept only its non-US operations.	Onset and onwards	Potential. After its acquisition spree during '90s (including its asbestos-laden operations) it has no major acquisitions throughout the restructuring period.	N/A	No. Stable throughout period of distress albeit at from a lower base, as it kept only its non-US operations. R&D center in Leoben which constantly develops new products.
U.S. Gypsum (USG)	After onset and onwards	Potential. It completed at onset a major capital expenditure program to replace older, less efficient wallboard manufacturing facilities and expected lower levels going forward. However, the continued restructuring plan did include reducing capital expenditures as part of its cost-cutting efforts.	Onset and onwards	Potential. No acquisitions in the three years after onset. However, almost no acquisitions throughout period of analysis (pre and post crisis). No mention of failed acquisitions.	N/A	No. R&D consists of developing and improving products and manufacturing processes. Mostly done at USG Research and Technology Center in Libertyville, Ill. R&D expenditures constant throughout period of distress.
WR Grace	After onset and onwards	Potential. It mentions "capital avoidance" by maximizing asset utilization after onset. However, the drop in 2004 is explained by the completion of a plant in 2003.	N/A	No. Minor bolt-on acquisitions during the entire period in Chapter 11.	N/A	No. R&D consists of developing and improving products and manufacturing processes. Technology superiority and innovation is crucial in its business. R&D expenditures constant throughout period of distress.

Crown Cork & Seal	After onset and onwards	Potential. Permanently lower levels after onset and limits imposed by covenants. But the annual expenditures match and even beat the forecasts made by management over the period. The expenditures serve both to modernize and expand its operations (such as a new can plant in Spain)	After onset and onwards	Potential. No acquisitions during period of distress. Potential reason: Limits on M&A activity imposed by covenants.	N/A	No. Although a dip occurs after onset, it is continuously expanding and improving its product line for its main customers, in particular within food and beverages containers.
Georgia-Pacific	After onset and onwards	Yes. During crisis, management states it will "limit capital expenditures to essential maintenance, environmental compliance and critical projects" and in order to reduce debt, will "control capital expenditures".	Onset	Yes. Tried and failed to merge with Williamette Industries in part due to the concern of the asbestos risk. Tried to dispose of the unit again in as of May 2002. Sept 2002: Definitely suspended.	N/A	No signs of a reduction. It has three major research centers. Two where it performs research in papermaking and other technology to develop improved consumer products. It also has a research facility where it performs research into wood, paper chemicals and specialty gypsum products.
Owens Illinois	N/A	No. During the four years of crisis, it invested more than $1.0 billion in capital expenditures (excluding acquisitions) and more than $219 million in research, development and engineering to improve labor and machine productivity, increase capacity in growing markets and commercialize technology into new products.	N/A	No. After completing its first financial restructuring, it acquired a Canadian glass container assets and made a major acquisition of BSN in 2004 during the year where it resolved its financing crisis.	N/A	No. R&D levels lower than year prior to onset but that year, R&D expenditures were at a record level. R&D expenditures stable and on average higher than expenditures prior to distress. R&D activities include new products, manufacturing process control, automatic inspection and further automation.

Appendix G

This table provides qualitative evidence on asset (fire) sales. The timing of the sale relative to the distress period is given. To determine if the sale is costly, I rely on (i) management's reporting on the matter, (ii) if the sale was booked at a profit and (iii) the strategic importance of the unit for the firm (core vs. non-core). Details on the size (Major or Minor relative to total assets) and if an accounting profit was recorded (Profit, loss or neutral if around book value) are also given. Lastly, any noticeable details on the transactions are reported.

		Costly?			
Firm	Timing	Core vs non-core	Size	Book profit (loss)	Details
ABB	At onset	non-core	Major and minor	Loss	Costly. At onset, it sold many assets at an aggregate book loss. The loss was mostly due to the sale of its Structured finance arm (at least 10% below book and market value). Many non-core assets (including major ones such as its Oil, Gas and PetroChemical operations) have been sold during the distress period and after. Usually with a neutral impact on profits.
Congoleum	One year after onset	core	Minor	Loss	Potentially costly. Parent firm (American Biltrite) acquired Janus in 2000 as a strategic addition to its flooring product business. Sold due to operating losses and potentially due to its building operations (Congoleum) being in Chapter 11.
Armstrong	At onset and at resolution	non-core	Minor	Neutral	Not costly. Insulation Products segment and its Installation Products Group (at a profit). Decided to exit the Textiles and Sports flooring segment in 2001 but negotiations were terminated in 2001. It finally sold the assets after emerging from Chapter 11 (at a loss).
BMCA	N/A	N/A	N/A	N/A	Not costly. No asset sale over the entire period of analysis (beyond immaterial dispositions).
Federal Mogul	One year after onset	non-core	Minor	Loss	Potentially costly prior to filing. Many minor assets sold to boost cash position, including its aviation business, at an aggregate book loss. In Chapter 11, sold Camshaft operations and signal lighting business, no signs of it being costly.
Halliburton	During distress	non-core	Minor	Profit	Not costly. Many small non-core businesses sold mostly at a book profit.

Kaiser Aluminum and Chemical	At onset and during distress	non-core	Major	Neutral	Not costly. Prior to filing in order to raise cash it sold QAL stake (major alumina refineries) to raise cash but not sufficient to cover impending maturities. Maintained supply contracts with QAL. Sold remaining QAL stake, Alpart, Gramercy and Mead facility and KJBC during Chapter 11 proceedings. All divestments in line with its refocus away from its commodity interests and towards finished products.
McDermott	During distress	non-core	Minor	Profit	Not costly. Industrial operations: McDermott Engineers & Constructors and Hudson Products. Also JRM's Menck Gmbh.
Owens Corning	At onset	non-core	Minor	Neutral	Not costly. Prior to filing for Chapter 11, sold its European Building materials business and its foam insulation operations. Almost no signs of divestments within Chapter 11.
RHI	One year after onset and at resolution	non-core	Minor	Neutral	Not costly. Engineering business was sold. It was already earmarked non-core and for sale prior to the crisis. Insulation business was going to be sold in 2001 but sale was postponed amid the crisis. It was deemed non core as the firm refocused on its refractory operations.
U.S. Gypsum (USG)	N/A	N/A	N/A	N/A	Not costly. No asset sale over the entire period of analysis (beyond immaterial dispositions).
WR Grace	N/A	N/A	N/A	N/A	Not costly. No asset sale over the entire period of distress. In the '90s, WR Grace decided to refocus on its Specialty Chemicals operations. Already a pure play at the time of distress.
Crown Cork & Seal	During distress	non-core	Major	Loss	Costly. Recorded a loss of $213 from the IPO of Constar International / Sold its fragrance pumps business, European Pharmaceutical packaging business and certain businesses in Central and East Africa and India, all at a pre-tax loss.
Georgia-Pacific	Throughout distress	non-core	Major	Loss	Potentially costly. Sold 60% stake in Unisource (office-supply business) at a $300M book loss but received cash refund of $193M the next year from a related tax benefit. Sold Paper and pulp assets at a minor loss, completed the spin-off of The Timber Company and sold various minor assets at a gain. Neutral operations in selling its building material distribution business and its stand-alone market pulp mills.
Owens Illinois	During distress and at resolution	non-core	Major	Profit	Not costly. Labeling unit from Plastic Packaging, mineral business in Australia and Harbor Fund family for a major profit. Served to pay down debt amid crisis. Sold its blow-molded plastic container operations which was earmarked for sale to increase firm value. It was the last step in a series of restructuring and put an end to the financing crisis.

Remark: In all cases, the proceeds were used to pay down existing debt.