Assessing the Merits of Reallocation under Joint and Several Liability, With an Application to Asbestos Litigation

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Abstract

If two defendants share a joint and several liability and the first becomes insolvent, his unpaid liabilities are reallocated to the second. The upside is that the plaintiff is insured against the insolvency of the first defendant. The downside is that, if the second defendant’s assets cannot cover the first defendant’s liabilities, the second defendant may also go bankrupt. We quantify this insurance and externality in the context of asbestos-related torts. We choose this example because 61 companies with major asbestos liabilities have gone bankrupt since 1982. Using data from 10-K forms and asbestos trials, we estimate more than half of liability payments by currently solvent defendants can be attributed to the reallocation of liabilities owed by bankrupt defendants. Moreover, we estimate that each additional dollar of compensation that reallocation provides to plaintiffs costs 23 to 66 cents in bankruptcy-related expenses. We conclude that the insurance provided by reallocation is too expensive and discuss alternatives to joint and several liability, including superpriority for tort claimants.

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According to the Restatement (3d) of Torts, "if the independent tortious conduct of two or more persons is a legal cause of an indivisible injury," a state may hold all responsible persons jointly and severally liable for the injury. A central implication of joint and several liability is that, if any responsible person becomes insolvent, his unpaid liabilities are reallocated to the remaining, solvent responsible persons. This reallocation of liability is thought to serve two purposes. It insures compensation to plaintiffs by shifting the risk of a given defendant’s insolvency from the plaintiff to co-defendants. Moreover, it reduces the level of tortious activity by encouraging co-defendants to police one another.

The most important test case for reallocation is asbestos litigation. Liability for asbestos is joint and several in all but 14 states. It is estimated that 27 to 100 million American have been exposed to asbestos [26]. As a result, nearly 700,000 plaintiffs had sued a total of 8,000 companies for asbestos exposure by the end of 2003 [6, 37]. It is projected that 1.1 to 3 million people will ultimately file asbestos claims and that the total liability bill will range from $200 to $265 billion [37, p. 42]. (To put this in perspective, this is roughly equal to all medical malpractice liability costs for the last 25 years [32, Appendix 5].) This redistribution of funds from injurers to victims is far from orderly. As illustrated by the line-plot in Figure 1, the average payment by individual defendants to individual plaintiffs nearly tripled from 1990 - 2002. Moreover, a growing number of defendant companies are filing for bankruptcy. The bar-chart in Figure 1 shows 61 companies have filed since 1982 — 28 of them since 2000 [16, p. 52]. Because asbestos manufacturers such as the Johns-Manville Corporation have already declared bankruptcy, many of the companies now being sued, such as Pfizer and Viacom, have rather tenuous connections to asbestos victims.

These trends suggest that it would be useful to know the empirical validity of the rationale for reallocation of joint and several liabilities. In particular:

1. To what extent does reallocation improve recovery by plaintiffs?

2. Does reallocation promote the optimal deterrence of tortious activities?

In addition, it would be helpful to know of any harmful side-effects of reallocation of unpaid liabilities from one defendant to co-defendants. In particular:

3. Does reallocation cause co-defendants to also file for bankruptcy?
This is an important negative externality because bankruptcy has both direct costs such as professional fees [25, 5, 38, 24] and indirect costs such as lost productivity in the period before and during reorganization [2]. A recent survey of the literature estimates that the costs of bankruptcy range from 12 to 20 percent of a firm’s pre-distressed value [5].

Joint and several liability with reallocation is not the only tool for improving plaintiff recovery and for discouraging excessive tortious activity when defendants are at risk for insolvency. Alternatives include elimination of limited liability for torts [12], requiring defendants purchase insurance against default [8], and prohibiting the discharge of tort liabilities in bankruptcy [4]. The most popular reform proposal, however, is raising the priority of tort claimants in bankruptcy [30]. In its stronger form, this proposal calls for "superpriority" of tort claimants before even secured creditors [33, 29]. Therefore, when evaluating the merits of joint and several liability, it would also be useful to know how joint and several liability compares to alternative remedies, in particular superpriority.

This paper provides data on one of the two benefits of reallocation – higher victim compensation – and the negative externality reallocation has on co-defendants’ solvency in the case of asbestos liabilities. Specifically, we employ data from 10-K filings of asbestos defendants and data on the universe of judgments in asbestos trials to estimate the relative amount of liability that has been reassigned from insolvent defendants to solvent co-defendants. We find that asbestos claim values against individual defendant companies grew an additional 5 – 10 percent annually – or 56 to 157 percent total – during 1990 - 2002 due to the bankruptcy of jointly liable defendants. As a result, as much as 60 percent of current payments by companies can be attributed to reallocated liabilities from companies that went bankrupt during this period. The actual amount is even greater once the effect of bankruptcies prior to 1990 are taken into account. These findings

1In the case of asbestos liabilities, it is difficult to assert any serious benefits due to deterrence or monitoring. Most asbestos liabilities were incurred four decades before liability was imposed. Tort law has become far more liberal in permitting recovery and this change may not have been anticipated. A good share – perhaps one-half – of asbestos liabilities are covered by insurance policies that have been interpreted to cover far more than insurers anticipated. Finally, The U.S. government, specifically the Navy, required the use of asbestos by manufacturers of its military hardware, making it hard for the latter to refuse to use asbestos. Therefore, little is lost by focusing on the insurance benefits of reallocation in this context.

Outside the asbestos context, the deterrence benefits of reallocation are proportional to the extent of insurance provided by reallocation. The greater the amount reallocation, the greater not just the insurance provided to plaintiffs, but also the incentive of co-defendants to monitor defendants. Moreover, because deterrence is mainly accomplished through ex ante monitoring and monitoring is a public good, it is prone to being under-supplied.

2Identification of the bankruptcy-induced growth in claim values against individual companies relies on data from 10-K filings, which reveal average payments by individual defendants to plaintiffs. Growth in these payments is the product of "natural" growth in the value of tort claims and growth due to the reallocation of liabilities owed by bankrupt companies. (Natural growth is due, e.g., to changes in legal rules, discovery of new evidence, or growth
suggest that reallocation provides plaintiffs a significant amount of insurance against insolvency of defendants, at least when compared to the liabilities owed by solvent companies. Moreover, the amount of liability that is being reallocated raises serious concerns that the bankruptcy of asbestos companies may have a domino effect and cause the bankruptcy of co-defendant companies. This concern is illustrated by the coincidence, in Figure 1, of growth in the average company’s payment on individual claims and growth in the bankruptcies of companies with asbestos liabilities.³

The paper uses these findings to compare the merits of joint and several liability with reallocation to those of the two most important, competing doctrines. The first of these is joint and several without reallocation. This narrow examination of the marginal value of reallocation to the joint and several liability doctrine employs a reasonable hypothetical to compare the costs – in terms of inefficiencies from domino bankruptcies – of the additional compensation reallocation provides to plaintiffs.⁴ We find that the cost is 23 - 66 cents per dollar of compensation, which leads us to conclude that reallocation is a rather costly mechanism for providing insurance. (Of course this analysis assumes little benefits from deterrence, which is proportional to the extent of reallocation.)

The second, serious alternative to joint and several liability with reallocation is superpriority of tort claimants in bankruptcy. Joint and several liability with reallocation shifts the onus of monitoring and risk-bearing, when a primary defendant becomes insolvent, from plaintiffs to co-defendants. In contrast, superpriority shifts these burdens to the primary defendant’s secured creditors. It is likely that creditors, holding a more diversified portfolio of investments, are more efficient bearers of the risk of a defendant’s insolvency. Co-defendants, however, are likely better

³ Our findings also suggest that a significant portion of the growth in claim values against individual defendants depicted in Figure 1 is due to the reallocation of liabilities from bankrupt co-defendants. It is not all due to growth in the total recovery of individual plaintiffs.

⁴ There were two waves of asbestos bankruptcy in the 1990s. We assume that the first wave caused the second. We estimate cost Our estimate of the amount of additional compensation provided to victims during the period after the first wave $6.5 - 11 billion. The direct and indirect costs of the second wave bankruptcies is $2.5 - 4.3 billion.
at policing the tortious activities of a defendant because they are from the same industry. This makes the choice between joint and several liability and superpriority a choice between better deterrence and better insurance, respectively. If, as in the case of asbestos, deterrence is not feasible, our analysis suggests that superpriority is a better policy than joint and several liability with reallocation.

This paper belongs most directly to the law and economics literature on joint and several liability. That literature focuses on the incentives that the doctrine provides for the ex ante tortious behavior [21, 36] and for the ex post litigation strategy of defendants [22, 20, 19, 28, 10, 13]. Our contribution, however, is to provide data on the ex post insurance against defendant insolvency that the doctrine provides to plaintiffs and on the negative externality that insolvent defendants have on solvent co-defendants as a result of the doctrine. The paper also relates to the literature on the intersection of tort law and bankruptcy. That literature examines a number of different methods [30, 35, 4, 12, 8, 33, 29] of improving compensation for tort claimants when defendants are judgment proof. Omitted from this discussion, for the most part, is joint and several liability. The reason is likely that joint and several liability does not apply to all torts and that reallocation is not the only effect of joint and several liability. Our contribution is to compare the merits of reforms proposed in this literature with the merits of joint and several liability.

Finally, this paper belongs to the public policy literature on the costs of asbestos litigation. The most closely related paper is Stiglitz et al. (2003), which attempts to quantify the direct and indirect costs associated with asbestos-related bankruptcies. Its analysis, however, is confined to the period after a company has gone bankrupt and to costs for the bankrupt company and its employees only. In contrast, we study the externality that one company’s insolvency has on other solvent companies during the period before the latter themselves become insolvent. Although we are not the first paper to hypothesize that this externality may trigger financial distress at co-defendant companies [41, 18], we are the first to attempt to quantify the magnitude of this distress.

The remainder of this paper may be outlined as follows. Section 1 describes the doctrine of joint and several liability and its interaction with bankruptcy law. Section 2 describes the methodology

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5 Even the literature that examines the interaction of joint and several liability and insolvency focuses on ex post litigation strategy, in particular the incentive to settle [23, 36].
employed to estimate the growth rate of tort recoveries due to joint and several liability. Section 3 presents our data, some technical details regarding our estimation strategy, and the results of our analysis. Section 4 examines the effect joint and several liability has on the solvency of co-defendants. Section 5 weighs the compensation benefits and bankruptcy costs of reallocation. Section 6 compares joint and several liability with reallocation to bankruptcy law alternatives, specifically superpriority for tort claimants.

1 Legal implications of joint and several liability given insolvency

This section sets forth the basic doctrine of joint and several liability, indicates which states apply the doctrine to asbestos-related injuries, and describes the interaction between the doctrine and bankruptcy. Suppose that two defendants, $D_1$ and $D_2$, engage in "independent tortious conduct that is a legal cause of an indivisible injury" to plaintiff $P$ valued at $L$. Moreover, according to principles of comparative fault, $D_1$ is responsible for portion $L_1$ and $D_2$ for portion $L_2$ of the plaintiff’s total loss. The Restatement (3d) of Torts §17 says that the defendants may be severally liable or jointly and severally liable for that loss, depending on the law of the applicable jurisdiction.

If liability is merely several, to recover $L_1$ the plaintiff must sue $D_1$. To recover $L_2$ she must sue $D_2$. In contrast, if liability is joint and several, $P$ may sue either $D_1$ or $D_2$ for the entire injury $L$.

Table 1 indicates whether defendants are currently liable severally or jointly and severally for asbestos poisoning in each of the 50 states and D.C. Among jurisdictions with joint and several liability, one can find four distinct flavors of this doctrine. One imposes joint and several liability so long as the plaintiff has no comparative responsibility for her injury. Otherwise the defendants are merely severally liable. A second imposes joint and several liability only on defendants with comparative responsibility greater than some threshold, typically 50 percent. A third imposes joint and several liability only for a certain type — economic or noneconomic — of damages or for damages below some ceiling. The final rule imposes joint and several liability without any

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6 The remaining details may be found in the appendix.
7 The sum of these portions and the portion $L_P$ for which the plaintiff is herself responsible equals the total injury to the plaintiff: $L_1 + L_2 + L_P = L$. 

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conditions whatsoever. This last variant of the doctrine is labelled a pure joint and several rule. At opposite ends of the spectrum, one finds 14 states with several liability and 18 states with pure joint and several liability.

1.1 The case of solvent defendants

Suppose liability is joint and several and $P$ sues $D_1$ for the entire loss and does not sue $D_2$ at all. It is then the responsibility of $D_1$ to seek compensation from $D_2$. $D_1$ can do this in two ways. First, when $P$ sues $D_1$, $D_1$ can compel $D_2$ to join the suit. Whether joinder is permitted depends on state procedural rules.8 If joinder is permitted, $P$ may recover $L_1$ from $D_1$ and $L_2$ from $D_2$ all in one legal action. Second, if $D_1$ fails to join $D_2$ and $P$ obtains a judgment for $L$ against $D_1$, $D_1$ can — again, state law permitting — file a separate suit for contribution from $D_2$.9 The size of the contribution depends on whether state law permits $D_1$ to recover from $D_2$ a pro rata portion ($L/2$) of the total loss or the portion ($L_2$) dictated by comparative fault. Table 2 summarizes the interaction between contribution and settlement.

1.2 The case of insolvent defendants

Of greater relevance to this paper is what happens if liability is joint and several, reallocation to a co-defendant is permitted, and one of the defendants, say $D_1$, has insufficient assets $A_1$ to cover his portion $L_1$ of the liability to $P$. $D_1$ may declare bankruptcy. (Of the 37 jurisdictions with some form of joint and several liability, 24 states and D.C. permit reallocation of asbestos liabilities to solvent defendants.10) If $P$ has already obtained a judgment against $D_1$, then she must file a claim against $D_1$’s estate. She has the same priority as an unsecured creditor. If $P$ has been injured by $D_1$ and has filed suit but not obtained a judgment against $D_1$, the bankruptcy court must estimate the size of $D_1$’s liability to $P$ and permit a claim of that value against the bankruptcy estate with the same priority as a claim by an unsecured creditor.

If there is a class of plaintiffs with pending suits or there is a class of people that has been

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9Failure to join the defendant from whom contribution is sought in the original action by the plaintiff is not generally a defense to a contribution action. There is a risk, however, that the contribution action will yield an inconsistent verdict on the same set of evidence [31, p. 951].

10See Table 1. It should be noted that this number has fallen in recent years because a number of states have only recently — in 1986-1987 or in the late 1990s — reformed their tort law to eliminate pure joint and several liability.
injured by $D_1$ and has not filed suit, but is very likely to do so in the future, then the bankruptcy court is to estimate the size of $D_1$’s liabilities to such present and future plaintiffs, create — under §524(g) of the U.S. Bankruptcy Act of 1978 — a trust to cover these liabilities, and finance this trust with certain of $D_1$’s assets. The assets the court can allocate to the trust are those left over after first paying secured creditors the full value of their secured claims and then giving unsecured ordinary creditors a portion of the remaining assets equal to their share of the total claims by unsecured ordinary creditors and tort claimants against $D_1$. That said, there are certain assets that are most valuable in the hands of the trust and therefore find their way there. These include insurance policies to cover $D_1$’s tort liabilities and contribution claims that $D_1$ may have against jointly liable defendants. Other generic assets — cash or equipment — also find their way into the trust. Because tort claimants have less priority than secured creditors, the trust is also likely to contain $D_1$’s equity. Hence the plaintiffs are likely to own the firm after bankruptcy, though they are permitted to sell their shares at any time.

What happens to the unpaid portion of $D_1$’s liability, $L_1 - A_1$? In a jurisdiction with several liability, the loss is borne by the plaintiff. $D_2$ can only be held responsible for $L_2$. In joint and several jurisdictions, however, some of the loss may be reassigned to $D_2$. The fraction of $L_1 - A_1$ for which $D_2$ can be held liable depends on whether the state in which $P$ brings her suit has a pure joint and several rule or a reallocation statute. If the state has a pure joint and several rule, $D_2$ can be held liable for all of $L_1 - A_1$ [1, §10 cmt. b]. If the state has a reallocation rule that permits an insolvent defendant’s liability to be assigned solely to solvent defendants, $D_2$ can again be held liable for all of $L_1 - A_1$. If the reallocation statute permits an insolvent defendant’s liability to be assigned to both solvent defendants and the plaintiff, $D_2$ can only be held liable for a fraction of $D_1$’s unpaid liability. This fraction is $L_2/(L_2 + L_P)$, which is equal to his comparative fault relative to that of the plaintiff. The plaintiff bears the remaining share of $D_1$’s unpaid liability [1, §17]. Table 2 summarizes reallocation rules and their interaction with settlement.11

11 As a technical matter, neither the pure joint and several rule nor reallocation statutes specify whether $L_1$ or $L_1 - A_1$ is to be reassigned to $D_2$ and, perhaps, $P$. In practice, however, it appears that $L_1$ is reassigned and $D_2$ and $P$ are permitted to seek contribution out of $A_1$ from $D_1$’s estate. This assessment is based on cases, such as Hosley v. Armstrong Cork Co. (Minn. 1986) [39], which interpret reallocation statutes, and on trust distribution plans for defendants who file for bankruptcy due to asbestos liabilities. Reallocation statutes are silent with regard to the amount to be reallocated and the few courts that have addressed the issue reassign $L_1$ rather than $L_1 - A_1$. Moreover, trust distribution plans appear to contain provisions whereby defendants jointly liable with a bankrupt defendant may seek contribution from the latter’s estate [9, 14, §5.6]. That said, we have spoken to trustees of tort victim trusts of such bankrupt entities as UNR and found that few if any contribution claims have been made, let
To summarize, if one defendant has insufficient assets to cover his share of a joint and several liability to a plaintiff, that defendant’s liabilities may be reallocated to a jointly liable but solvent defendant. If the second defendant ends up paying more than his equitable share of the liability, he can seek contribution from the bankruptcy estate of the first defendant, though in practice such actions are rare. If, however, the second defendant does not have sufficient assets to cover both his own share of the joint liability and the reassigned portion of the first defendant’s share of that liability, the second defendant may also end up bankrupt.

2 Empirical strategy for identifying reallocation

2.1 Empirical model

This section provides an overview of the empirical strategy employed to quantify the effect of the bankruptcy of one defendant on tort payments by solvent, jointly liable defendants. The strategy can be illustrated by means of a simple two period model. Suppose there are three defendants (\(D_1, D_2, D_3\)) and two plaintiffs (\(P_1, P_2\)). Each plaintiff has suffered the same injury, say mesothelioma from exposure to asbestos. All three defendants are jointly liable for the injury to each plaintiff. Moreover, for simplicity, assume the share of each defendant’s liability to \(P_1\) is identical to the share of that defendant’s liability to \(P_2\). These shares are \((S_1, S_2, S_3)\). The only difference between the two plaintiffs is that \(P_1\) sues in period \(t\), and \(P_2\) in period \(t+1\). The only change in the defendants across the two periods is that \(D_1\) goes bankrupt between the two periods.

The total liability of the three defendants to \(P_1\) is \(L_t\), where the subscript indicates that \(P_1\) sues on this liability in period \(t\). The total liability to \(P_2\) is \(L_{t+1}\). Because both plaintiffs suffer the same injury, we define the natural growth rate of tort claim values to be \(NG = L_{t+1}/L_t\). This growth may be due to discovery of new evidence that suggests the defendants are more culpable alone paid out, by these trusts.

Suppose \(D_1\) goes bankrupt because it has fewer assets than its share of liabilities, \(D_1\)’s liabilities are reallocated to \(D_2\), but \(D_2\) does not have enough assets to cover its own liability plus \(D_1\)’s, i.e., \(L_2 < A_2 < L_1 + L_2\). \(D_2\) may also declare bankruptcy. A natural question is: can \(D_2\)’s estate, having perhaps established a trust with assets to cover not just \(L_2\) but also some of \(L_1\), seek contribution against the estate of \(D_1\)? As far as we know, this question has not been answered by any court. (We see no reason, however, if \(D_2\)’s trust has assets greater than \(D_2\)’s equitable share of liability plus the unpaid portion of \(D_1\)’s liabilities, why \(D_2\) should not be able to seek contribution from \(D_1\)’s estate.) Whatever the answer turns out to be, however, \(D_2\) will still have been forced into bankruptcy and will not be able to obtain more than \(A_2 < L_1\) in contribution. These rules concerning the interaction between reallocation, on the one hand, and contribution and insolvency, on the other, are reproduced in Table 2.
than previously thought, to changes in liability rules that makes it easier for a plaintiff to prove her case, to a change in damages rules that makes a greater share of a plaintiff’s injury compensable by the defendants, to changes in litigation strategy by the plaintiff that exploits these rules, or to growth in the wages or savings of injured plaintiffs [15].

Assume that the parties are in a jurisdiction with joint and several liability for asbestos poisoning and with a reallocation rule that permits reassignment of all of an insolvent defendant’s liabilities to solvent defendants (but not plaintiffs). Moreover, assume no contribution claims are possible against bankrupt entities. The total liability of a solvent defendant, say $D_2$, is $L_{2,t} = S_2 L_t$ in period $t$. His liability in period $t+1$ is

$$L_{2,t+1} = \left\{ S_2 + \frac{S_2}{S_2 + S_3} S_1 \right\} L_{t+1} = S_2 \left\{ 1 + \frac{S_1}{S_2 + S_3} \right\} L_{t+1}. \tag{1}$$

The second term in each of the brackets reflects the fact that $D_1$ has gone bankrupt. Due to the reallocation rule, his share of the liability to $P_2$ is reassigned to $D_2$ in proportion to his share of liability to $P_2$ relative to other solvent defendants, here just $D_3$. We will define the growth rate of tort claim liability of $D_2$ due to the bankruptcy of $D_1$ to be $BG = S_1 / (S_2 + S_3)$ because had $D_1$ not become insolvent, $D_2$’s liability would simply be $S_2 L_{t+1}$. (The bankruptcy-induced growth rate of tort claim values against $D_3$ is the same.)

Suppose that one only observes the tort payment history of solvent defendants, i.e., $\{L_{1,t}\}$, $\{L_{2,t}, L_{2,t+1}\}$ and $\{L_{3,t}, L_{3,t+1}\}$. This is due to the fact that there are far more plaintiffs than defendants. Through the end of 2003, there were 700,000 plaintiffs compared with 8,000 defendants [6, 37]. (Although judgments in court cases provide information on individual plaintiffs’ overall recovery, they are a nonrandom subset of all asbestos claims.) As for insolvent defendants, they may enter bankruptcy when their expected liabilities exceed their expected ability to pay into the future. It may not be clear for some time, however, how large their actual unpaid liabilities are. In addition, for any plaintiff-insolvent defendant pair, it is unclear who exactly are the jointly liable but solvent defendants. This is not to say data on the tort payment history of solvent defendants is easy to obtain, an issue we will address below, but those data are easier to gather and more informative than other payment data.

The goal of our analysis is to estimate the bankruptcy-induced growth rate of tort claim values
for solvent defendants given the tort payment histories of the solvent defendants. This is accomplished using only solvent defendant’s tort payments data in two steps. First, we estimate the growth rate of any given solvent defendant’s tort payments: \( G_2 = \frac{L_{2,t+1}}{L_{2,t}} \). This growth rate can, as demonstrated in the following equation, be decomposed into the product of the natural growth rate of tort claims values and the growth rate of the value of tort claims against solvent defendants due to the insolvency of jointly liable defendants:

\[
G_2 = \frac{L_{2,t+1}}{L_{2,t}} = S_2 \left( 1 + \frac{S_1}{S_2 + S_3} \right) \frac{L_{t+1}}{L_t} = \{1 + BG\} \times NG
\]

(2)

(The same is true of the growth rate of \( D_3 \)’s tort payments.) Thus one can estimate the bankruptcy-induced growth rate of tort claims by \( BG = (G_2/NG) - 1 \), where \( NG \) is the natural growth rate of tort claims.

Second, we determine the natural growth rate in one of two ways. One takes advantage of a basic but important feature of joint and several liability. Although the doctrine may raise the tort liabilities of a solvent defendant once a jointly liable defendant becomes insolvent, it theoretically does not raise the total tort recovery of any given plaintiff from all solvent defendants. Thus \( L_{2,t+1} + L_{3,t+1} = L_{t+1} \). Therefore, we can estimate the natural growth rate with

\[
NG = \frac{L_{t+1}}{L_t} = \frac{L_{2,t+1} + L_{3,t+1}}{L_{1,t} + L_{2,t} + L_{3,t}}.
\]

(3)

Another way to estimate the natural growth rate is to find a period during which no firms are going bankrupt. During this period the natural growth rate is equal to the total growth rate \( G_2 \) because there is no bankrupt-induced growth. If the natural growth rate is constant over time, then our estimate of the natural growth rate is valid even for periods when firms are going bankrupt.

2.2 Complications

A number of issues may arise that complicate the calculations from the previous section. For example, what happens if one of the defendants, say \( D_2 \), is in a joint and several jurisdiction but the other is in a several jurisdiction? Where one defendant, say \( D_2 \), in a several liability state, \( D_3 \) may be held solely liable for the insolvent defendant’s share of the liability. The bankruptcy-induced
growth rate in his claim values would be \( G_3 = S_1 / S_3 \). There would be no bankruptcy-induced growth in \( D_2 \)'s claim values. Where we calculate the bankruptcy-induced growth rate separately for each solvent defendant, this is not a concern. Where we provide the average bankruptcy-induced growth rate across solvent defendants, however, there will be some error in our estimates. Nevertheless, the greater the number of claims subject to several liability, the lower will be our estimate of this average growth rate. Moreover, any error should be slight because most asbestos injuries occurred before 1979, the year asbestos stopped being manufactured in the U.S., and only three states (Kansas, Vermont, and Wyoming) had deviated from the rule of pure joint and several liability by that point.\(^{12}\)

A second complication is that some courts may interpret their state’s reallocation rule to only allow reassignment of unpaid (as opposed to all) liabilities of the insolvent defendant or may permit solvent defendants to seek contribution from an insolvent defendant’s estate — in the case of asbestos liabilities its §524(g) asbestos trust. In that case, the sum of tort payments by solvent defendants is less than the total receipts by the plaintiff: \( L_{2,t+1} + L_{3,t+1} < L_{t+1} = A_1 + L_{2,t+1} + L_{3,t+1} \), where \( A_1 \) is the insolvent defendant’s assets available to \( P_2 \). In order to estimate total receipts by the plaintiff, and thus the natural growth rate of tort claim values, one must include payments by insolvent defendants. This is made difficult by the fact that payments by insolvent defendants may be delayed by many years due to the automatic stay in bankruptcy and that it is difficult to match the date of a payment by solvent defendants with a date of payments by insolvent defendants to the same plaintiff. One factor that limits the impact of this shortcoming in our analysis is that we have found no evidence either of courts permitting only the reassignment of unpaid liabilities of insolvent defendants or of solvent defendants seeking contribution from insolvent defendants.\(^{13}\)

A third complication is that there may be a mismatch between the number of claims filed against

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\(^{12}\)Two other issues are analogous in effect to the growth of several liability jurisdictions. First, some states do not authorize reallocation of an insolvent defendants liabilities to solvent defendants and, second, defendants who settle for less than their equitable share of liability after reallocation are protected in most states from contribution claims. The existence of joint and several states without reallocation is also subject to the caveat that most asbestos liabilities arising from exposure before 1979 and that most state tort reform statutes that abandon reallocation are adopted in 1986-1987 or the late 1990s. Ultimately, these two issues, like that in the previous paragraph, will appropriately be reflected in a lower estimate of the mean bankruptcy-induced growth rate of claim values.

\(^{13}\)A related issue is that some states permit reallocation of an insolvent defendant’s liability to the plaintiff as well as solvent defendants. This limits the pressure that one defendant’s bankruptcy has on the financial status of other defendants. Therefore, it lowers the bankruptcy-induced growth rate of claim values: \( BG = S_1 / (S_2 + S_3 + S_P) \), where \( S_P \) is the plaintiff’s share of liability. This reduction should be reflected in our estimates of this growth rate.
insolvent defendants and solvent defendant. One reason is that the cost of filing a compensation claim against an asbestos trust formed with an insolvent defendant’s assets are lower than the cost of filing a legal claim against a solvent defendant. This may raise the number of claims against an insolvent defendant relative to the number of claims against a jointly liable, solvent defendant. This is widely thought to be the reason, for example, that the Mansville Personal Injury Trust was forced to lower the amount it paid on each dollar of liabilities from, e.g., $200,000 in 1988 to $20,000 in 1995 on mesothelioma claims [3, 41, pp. 1323-1325]. A second reason for the mismatch is that, whereas §524(g) trusts tend to have high medical standards that must be met before any claim for compensation is paid, solvent defendants do not apply very high standards for certain types of legal claims filed against it. The explanation is that the cost to the defendant of enforcing these standards for certain — generally non-malignant — injuries is greater than the cost of settling the legal claims. This encourages the filing of questionable if not baseless suits against solvent defendants [41, pp. 1330-1332].

We do not have the data to determine which effect dominates and therefore which type of defendant attracts more suits. Our concern, however, is the marginal effect that insolvency of one defendant has on the value of claims against remaining, solvent defendants. Therefore, the growth in the number of claims against asbestos trusts does not concern us. Moreover, baseless filings against a solvent defendant should be unaffected by the bankruptcy of a small number of jointly liable defendants. The cost of enforcing medical standards and product identification limits the gain from such filings. Therefore, baseless claims should experience substantially less bankruptcy-induced growth in claim values than well-substantiated claims. Thus, our estimate of average bankruptcy-induced growth should understate the true bankruptcy-induced growth experienced by

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14 The actuarial firm Tillinghast-Towers Perrin estimates that 94 percent of the 52,900 claims filed in 2000 were by nonmalignant claimants. Of the $54 billion that RAND estimates has been spent on asbestos litigation through 2001, about 65 percent of the funds — after excluding transactions costs — went to nonmalignant claimants [37, p. vii].

Moreover, a number of studies have found that between two-thirds and 90 percent of claimants are unimpaired. For example, in 1991 a federal judge had medical evidence in 65 asbestos cases filed in the Southern District of Ohio validated by court-selected experts. He found that 64 percent of claimants were free from any actionable condition. Of the remaining claimants, 85 percent had pleural plaque rather than asbestosis [7, p. 39]. A separate study asked an independent panel of three radiologists to examine x-rays of 439 tire workers who had filed for compensation due to asbestos exposure. They found that only 11 to 16 x-rays — a mere 3.6 percent — suggested evidence consistent with exposure to asbestos [34]. Finally, a recent study asked six independent radiologists and pulmonologists to interpret 492 x-rays initially screened by plaintiff lawyers. Whereas the plaintiffs’ experts had found that 95.9% of x-rays demonstrated exposure to asbestos, the independent experts found only 4.5% of cases were positive for exposure [17].
well-substantiated claims, such as mesothelioma claims, and overstate the true bankruptcy-induced growth experienced by baseless claims.

A fourth complication is that courts may make errors in reallocation. For example, they may under- or overestimate the share of liability owed by insolvent defendants. This is not a serious problem because our goal is not to determine the pressure that joint and several liability theoretically imposes upon a solvent defendant after a jointly-liable defendant goes bankrupt, but to determine the effect that it actually has. This effect includes court errors in reallocation.

3 Estimates of the extent of reallocation

This section describes our data, provides technical details on how we estimate the natural growth in claim values, and reports our estimates of the bankruptcy-induced growth rate. The two most important implications are, first, that, although our data are not sufficient to generate precise point-estimates of the natural growth rate, they are sufficient to place bounds on this rate. Second, these bounds imply that the bankruptcy-induced growth rate averaged between 5 and 10 percent per annum or between 56 and 157 percent during the 1990-2002 period.

3.1 Data

We utilize two primary data sources for our analysis — annual corporate 10-K filings and the RAND asbestos judgment database.\textsuperscript{15} 10-K filings of companies with substantial asbestos liability include their aggregate asbestos-related loses (typically indemnity and defense are reported as a single number) and the number of asbestos personal-injury claims they have resolved. Since companies only report this information once their asbestos liabilities have become sizeable, we only have these data for large and relatively mature asbestos defendants. Moreover, most of the companies in our 10-K data set were members of the Asbestos Claims Facility (ACF), which included most large, large,

\textsuperscript{15}The analysis in this paper focuses on average claim values unconditional on the disease — mesothelioma, asbestosis, lung cancer or pleural plaque. First, although claim values vary substantially across these disease categories, Table 3 illustrates that the distribution of claims against solvent defendants in the Center for Claims Resolution (CCR) across the four major disease categories — mesothelioma, lung cancer, other cancer, and non-malignant — has remained stable between 1990 and 2000. Second, most of the defendants in our 10-K sample were members of the ACF, which was succeeded by the CCR. While CCR included some smaller members, there was significant overlap in membership for defendants that remained solvent. Finally, we believe that the bankruptcy-induced growth rate in claims values is independent of disease category. This is reasonable because, for example, the disease distribution of claims against the Manville Personal Injury Trust is not dissimilar to the disease distribution in Table 3 [3, p. 10].
mature defendants while it was in operations from 1985-1988. The 17 companies on which we have 10-K data report about $15 billion in asbestos-related payments to over 3.9 million plaintiffs between 1990 and 2002. We believe that, overall, these companies account for about 30-50 percent of the universe of solvent asbestos defendants by dollar of liabilities.

Our second data source is judgments awarded in 689 litigated asbestos personal-injury cases between 1994 and 1998. RAND gathered these data and recorded the judgment date, jurisdiction filed, and the plaintiff’s disease. A problem with judgments is that they only reveal the value of a small, nonrandom subset of claims. The nature of case selection implies average judgment values overestimate the average value of all claims. Growth in judgments, however, may be a valid estimate of the total growth in claim values. Nevertheless, we only use these data to validate our estimates from 10-K data.

### 3.2 Estimators for the natural growth rate

The appendix provides a precise accounting of how we estimate the total growth rate in claim values. Here we provide technical detail on the two methods we employ to estimate the natural growth rate of claim values, which is defined as the total liability owed by all defendants to the average plaintiff in period $t+1$ divided by the same value for period $t$: $\bar{L}_{t+1}/\bar{L}_t$. Note that, due to the limitations of our data, the two methods only permit estimation of bounds on the natural growth rate.

The first method employs as an estimator of $\bar{L}_t$ proxies for the total payment received by an average asbestos plaintiff in year $t$. One proxy is the total amount a plaintiff received from all defendants in our 10-K sample, assuming that the plaintiff named each defendant in the sample and got the average per-claim payment from each defendant:

$$\tilde{\bar{L}}^{(1a)}_{10\text{-K},t} = \sum_{j=10\text{-K}} \frac{\hat{T}_{j,t}}{\hat{N}_{Pj,t}}$$

where $\hat{T}_{j,t}$ is the total payment by company $j$ from the 10-K sample in year $t$ and $\hat{N}_{Pj,t}$ is the number of different plaintiffs that settled claims against this company that year. The summation is over all companies in our 10-K sample that were solvent in year $t$. Because this estimator holds constant the number of companies named by the average plaintiff and as naming rises the number of
plaintiffs that file claims against each company rises, the estimator underestimates the true growth in the natural growth rate.

An alternative proxy for total payment received by the average plaintiff in year \( t \) is the mean payment by a defendant to a plaintiff:

\[
\bar{L}_{10-K,t}^{(1b)} = \frac{\sum_{j \in 10-K} \hat{T}_{j,t}}{\sum_{j \in 10-K} N_{P_{j,t}}} 
\]

(5)

This differs from (4) in that it accounts for changes in patterns of naming within our sample of 10-K companies. Because it holds constant naming growth outside the 10-K sample, it will continue to underestimate the true natural growth rate.\(^{16}\) Therefore, we treat this estimator and the last as lower bounds on the natural growth rate and thus upper bounds on the bankruptcy-induced growth rate. Note that these estimators for \( \bar{L} \) permit us to calculate the average natural growth rate for the entire sample period.

Our second method for estimating the natural growth rate takes advantage of a “natural” experiment. Asbestos bankruptcies occurred in two waves in the 1990s. Seven asbestos defendants declared bankruptcy between 1990 and 1993 — which we label "bankruptcy wave I." Another 28 asbestos defendants declared bankruptcy between 2000 and 2002 — "bankruptcy wave II."\(^{17}\) Table 4 lists major asbestos defendants that declared bankruptcy during each of these waves. Between 1994 and 1997 no significant asbestos defendants declared bankruptcy. Only three asbestos defendants — Lykes Brothers Steamship, Rock Wool Manufacturing, and Rutland Fire Clay — declared bankruptcy between the two waves and they were minor players. All other things being equal (which we admit is questionable), the bankruptcy-induced growth rate during the period

\(^{16}\)Because the the number of defendants in our 10-K sample grows over time, however, (5) will yield a lower estimate of the growth than (4).

\(^{17}\)We take the bankruptcy wave II to start in 2000 rather than in 1998 because few companies go bankrupt in 1998 and 1999. We do not, however, extend the natural experiment period to 2000 because there are still enough bankruptcies in 1998 and 1999 to elevate the total growth rate during those years above the natural growth rate.
1994 to 1997, which we define as the experiment period, should be zero. Therefore, an estimate of the overall growth in claim values during the experiment period provides an estimate of the natural growth rate during the entire 1990-2002 period, assuming this natural growth rate is the same during the experiment and non-experiment period.

There is one hitch in our analysis. Although there were no major asbestos bankruptcies, the *Georgine* class action case unfolded during the natural experiment period. The *Georgine* class action was certified in 1993 and dissolved in 1997 by *Amchem Products v. Windsor*. The uncertainty created by *Georgine* impacted all asbestos defendants. For example, the Center for Claims Resolution (CCR) settled about five times as many claims in both 1993 and 1998 than it settled in any year in between. More importantly, most asbestos defendants experienced a transitory spike in claim values after *Georgine* was dissolved. Because we define the natural experiment period to end by 1998, the spike in 1997 and 1998 claim values following the dissolution of *Georgine* inflates the growth in claim values during the experiment period. Therefore, the natural experiment estimator resembles an upper bound on the natural growth rate, which translates into a lower bound on the bankruptcy-induced growth rate.¹⁸

We calculate the mean overall growth rate during the experimental period primarily using data from 10-K filings. We validate these estimates using data on median court judgments in asbestos cases from joint and several jurisdictions. Judgment data yield an appropriate estimate of the natural growth rate because defendants in court cases from joint and several liability jurisdictions are assigned the aggregate liability owed by all defendants to any plaintiff.¹⁹

### 3.3 Estimates

Table 5 presents our estimates of the natural growth rate. The second column presents the growth rate in nominal dollars, while the third presents the growth rate in real dollars. The two proxies for the total payment received by the average plaintiff, which are lower bounds, suggest a natural growth rate of 2.9 and zero percent, respectively, in nominal terms. The natural experiment estimator,¹⁸

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¹⁸ It is not precisely an upper bound because, although there may not have been any bankruptcy-induced growth in claim values during the natural experiment period, there was likely a reduction in claim values as the number of named defendants rose. This tends to depress overall growth and thus our estimates of natural growth. We believe, however, based on time-series of claim values, that the bias from including the *Georgine* class action during the natural experiment period dwarfs the effect from naming.

¹⁹ In several liability jurisdictions, defendants are only assigned their proportionate share, which reflects the natural growth rate so long as defendants equitable shares or defendant composition does not change over time.
which provides an upper bound, suggests a natural growth rate of 8.5 percent in nominal terms. In real terms, estimates of the natural growth rate fall between minus three percent and six percent.\(^{20}\)

The final three columns of Table 5 present the bankruptcy-induced growth rates from bankruptcy wave I, bankruptcy wave II, and the combined impact of both bankruptcy waves. These estimates employ a weighted average of the growth in payments by companies listed in Table 6 to individual plaintiffs, where the weights are the size of each company’s mean payments and the payments are extracted from 10-Ks for each company.\(^{21}\) Allowing for the highest estimated natural nominal growth rate of 8.5 percent annually, the two bankruptcy waves combined to increase claim values 56 percent. With zero real or zero nominal natural growth in claim values, the two bankruptcy waves combined to increase defendant-specific claim values by 157 percent or 200 percent, respectively. Based on these findings, we conclude that the true bankruptcy-induced growth rate is likely to lie between 56 and 157 percent.\(^{22}\)

4 Effect on the solvency of co-defendants

Our findings suggest that a substantial amount of liabilities were transferred from bankrupt companies to solvent defendant from 1990 - 2002. As a result, bankruptcies increased the value of asbestos-related claims at least 56 to 157 percent, which translates to annual bankruptcy-induced growth of 5 to 10 percent.\(^{23}\) To put it another way, if no companies had gone bankrupt in the 1990s due to asbestos-related liabilities, current defendants’ liabilities would be at most two-fifths

\(^{20}\)Figure 2 illustrates why we estimate zero real growth from aggregate payments. Although total payments increased by 33 percent from 1991 to 2001, compound inflation was 30 percent over this period. Therefore, this measure of payments indicates positive nominal growth in plaintiff claim values, but close to zero real growth. Figure 3 illustrates why we estimate zero nominal growth from the estimator in (5). The average payment by each settling defendant ranges from $3,000 to $4,500 and has no pattern over time. Thus, although these companies are a select subset of asbestos defendants, the average nominal settlement value across these companies does not grow over time. Finally, on a company-by-company basis, average payment per settled claim rose 38 percent for companies in the 10-K data set during the experiment period. We get an identical estimate from our judgments data. This increase is equivalent to an average of 8.5 percent growth annually. Inflation over this period averaged 2.4 percent annually, resulting in 6.1 percent real growth.

\(^{21}\)Using a straight average across companies has no impact on the bankruptcy-induced growth rate during bankruptcy wave I, but increases the growth rate during wave II by about 30 percentage points.

\(^{22}\)We use 157 percent estimate from the aggregate payment estimator rather than 200 percent estimate from the average claim value estimator because both estimators purport to give us upper bounds on the natural growth rate and the aggregate payment estimator is the lower of the upper bounds.

\(^{23}\)Our estimates mask a large number of bankruptcies, specifically 7 in wave I and 28 in wave II. Simple division suggests that the mean effect of any given bankruptcy on the growth of claims against solvent companies is 3.7 to 8.8 percent in wave I and 0.6 to 1.6 percent in wave II. The reason for the reduction in the marginal impact of bankruptcies on growth in claim values is likely the fact that earlier bankruptcies involved larger defendants and that the number of companies named by plaintiffs rose over time.
to two-thirds of their present size. We say "at most" for two reasons. First, plaintiffs named an increasing number of defendants per complaint during the 1990s and, as we explain in the appendix following (11), this depresses the overall growth rate of per-claim payments by individual defendants once purged of the natural growth rate of the value of these claims. Second, there were a number of important defendants that went bankrupt before 1990. For example, Johns-Manville Corporation, which filed for Chapter 11 in 1982, alone had a products market share of 30 percent. Therefore, the numbers we started with already embed a certain amount of reallocated liability. Further, our analysis only identifies growth during two bankruptcy waves. It does not account for growth due to bankruptcies during 1993 - 1999.

Because the bankruptcy of a defendant raises the liabilities, but not the assets, of jointly liable, solvent defendants, it increases the pressure on the latter to also file for bankruptcy. Of course the exact amount of pressure depends on two omitted variables: the amount of solvent defendants' assets and the number of claims filed. The former is difficult to estimate in the asbestos context, not just because it is difficult to get precise values for a corporation's unsecured assets, but because joint and several liability is piggy-backed on an underlying theory of liability that permits plaintiffs to attack any parties in the chain of distribution for asbestos. Therefore, it is very difficult to identify all possible defendants whose assets could be used to satisfy tort claims. (Indeed, given the widespread use of asbestos, the number of defendants may be quite large. Recall that over 8,000 different companies have already been sued.)

It is possible, however, to obtain data on the number of claims filed annually. For example, the average number of filings against the 17 companies we have 10-K data for has grown from 7,317 in 1990 to 34,026 in 2002, equivalent to a compound rate of 13.7 percent. Our estimate is consistent with those from other sources [37, p. 42]. Because the aggregate liability is the product of the number of claims filed and the value of claims filed, growth in liability is the product of the percentage growth in filings and claim values. (So, e.g., if filings double and claim values double, overall payments quadruple.)

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24 This actually implies an approximately 15 percent share of aggregate liability because aggregate liabilities are roughly one-half products liabilities and one-half operations liability.
5 Comparing joint and several liability with and without reallocation

Our finding that reallocation causes the bankruptcy of one defendant to place significant pressure on the financial status of jointly liable but still solvent defendants has important welfare implications. The reason is that there are significant direct and indirect cost of bankruptcies, especially in the case of asbestos. For example, Austern (2002) notes that, in 1988 dollars, the bankruptcy of Johns-Manville Co., which had a market cap of $1.8 billion when it went bankrupt due to asbestos liabilities, generated $100 million in transactions costs. Stiglitz et al. (2003) estimate that bankruptcies have also been responsible for the loss of 52,000 - 60,000 jobs; that each of these workers lost on average $25,000 - $50,000 in wages as a result of these bankruptcies; and that each of these workers who were at firms with a 401(k) plan lost on average $8,300 in pension benefits.

While bankruptcy costs cannot be considered a social loss in the case of firms that are distressed due to economic shocks because such firms would not be operationally profitable even in the absence of bankruptcy [40], the same cannot be said about firms in distress due to financial shocks. The latter would be operationally profitable in the absence of the distress. Reallocated asbestos liabilities are examples of financial shocks because they are based on behavior that occurred typically four decades prior to suit and had ceased by 1979, and, more importantly, because firms to which liabilities are transferred often have a very remote connection to the initial tortious behavior.26

In this section we work through a hypothetical in order to compare the compensation benefits of reallocation to its associated bankruptcy costs. Our hypothetical assumes that the reallocation after the first wave of asbestos bankruptcies in 1990 - 1993 caused the second wave of asbestos bankruptcies in 2000 - 2002. The benefit of the reallocation of liabilities from wave I companies is the reallocated share of total payments made on asbestos claims from 1994 - 2002. The cost of this reallocation is the direct and indirect costs associated with the bankruptcy of wave II companies.

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25 Estimates of costs in the case of firms in distress from financial shocks are similar to those for firms in distress due to economic shocks [11].

26 We admit, however, that the same cannot be said about all torts subject to joint and several liability.

27 Of course we cannot be certain of this causation because we do not know for sure whether wave II companies would have become insolvent if wave I companies had not. But the assumption of causation is reasonable because the companies that went bankrupt in wave I are larger asbestos manufacturers than those in wave II. It would be odd to assume that wave II companies were less able to handle their asbestos liabilities outside of bankruptcy than wave I companies.
The total amount of payments made on asbestos claims during the period 1994 - 2002 is estimated by the actuarial firm Tillinghast-Towers Perrin to be $53.3 billion [27]. In Section 3 we estimated that 36 - 61 percent of asbestos payments are reallocated liabilities. Moreover, RAND estimates that roughly 66 percent of payments are taken up by the legal expenses of plaintiffs and defendants combined [37]. This suggests that total additional compensation due to reallocation is $6.5 - $11 billion.

We assume, based upon a recent review of the bankruptcy costs literature [5], that the costs of wave II bankruptcies are 12 - 20 percent of the pre-distressed value of wave II companies. Pre-distressed value is taken to be enterprise value (stock plus debt) from the mid-1990s, before the height of the 1990s stock market bubble. Because many of the wave II companies are private, we cannot rely on public reporting to calculate value. Rather we multiply any available sales or revenue from each wave II company with ratios of sales or revenues to enterprise value among other firms in the same industry as each wave II company. In the case of wave II companies for whom no data at all is available, we assign the average enterprise value among other wave II companies, in the same industry if possible. Our estimate of the aggregate enterprise value of wave II companies is $21.5 billion, which implies bankruptcy costs of $2.6 - $4.3 billion. In other words, each additional dollar of compensation due to reallocation costs between 23 and 66 cents in bankruptcy-related expenses. We are led to the conclusion that reallocation is an unduly expensive form of insurance.

6 Comparing joint and several liability to superpriority and other reforms

Given that reallocation does not appear to be a cost-effective form of insurance against insolvency it is worth considering alternatives. A number have been proposed. Hansmann and Kraakman (1991) have called for elimination of corporate limited liability for tort claims, so that victims

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28 This is calculated by taking cumulative payments by U.S. insurers during this period ($16 billion) and dividing by the share of all payments by U.S. insurers (30 percent). Tillinghast-Towers Perrin estimates non-U.S. insurers are responsible for 31 percent and defendants for 39 percent of all liability payments.

29 Computations available from authors.

30 If one also takes into account the litigation costs (assumed to be proportional to the reallocated share of the $53.3 billion in payments), the price of each dollar of compensation is between $1.39 and $3.96!
can recover directly from shareholders even if a defendant company becomes insolvent. Coffey (1994) has suggested requiring companies to purchase insurance to cover the risk of insolvency to tort claimants. Bibler (1987) has argued that bankruptcy courts do not have the authority to discharge tort liabilities. Although courts have ignored his argument, his analysis suggests an obvious reform: whichever party ends up with the equity of a company after reorganization, the company still owes tort victims full compensation. The most commonly recommended reforms, however, seek to manipulate the priority assigned to tort claims. Currently, tort claimants have the same priority as unsecured creditors of a defendant. Painter (1984) has recommended that tort claimants be given the same priority as secured claimants and Price (1995), among others [29], has recommended they be given "superpriority" over all other creditors.31 In this section we compare joint and several liability with reallocation to superpriority for tort claimants in bankruptcy on two measures: insurance against insolvency and deterrence of torts through monitoring.

When comparing reallocation to superpriority, one must be careful to specify exactly which policies are being compared. The reason is that joint and several with reallocation is a tort rule, superpriority is a bankruptcy rule, and the two are not mutually exclusive. Here we compare reallocation and no superpriority to superpriority and no reallocation, holding joint and several liability constant. The reason is that pairing superpriority with several liability would change the treatment of defendants not just in bankruptcy, but also outside bankruptcy.32 Our goal is to narrow the focus to policy choices in the states of the world in which defendants are insolvent.33

Our central observation is that the choice between reallocation and superpriority is in effect a choice between deterrence (via monitoring) and insurance, respectively. The first order effects of reallocation are to shift the onus of monitoring and insurance onto co-defendants.34 The first order

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31 Price also recommends elimination of limited liability for companies without creditors capable of forcing them into bankruptcy.
32 Actually, several liability reduces the incentive of co-defendants to monitor defendants only to the extent that (a) the probability of being sued for other defendants’ liabilities under joint and several rules times the cost of litigating for contribution is greater than (b) the cost of being sued with certainty under several liability. If the the former costs are not meaningfully greater than the latter costs, there is not significantly greater incentive to monitor under joint and several because contribution shifts liability back to primary defendants. Of course, if contribution is not permitted or otherwise inadequate, the incentive to monitor is increased.
33 It should also be noted that superpriority has broader implications than reallocation, as measured by legal case coverage. Reallocation only applies to joint and several liabilities but superpriority applies to all tort liabilities. Because this paper focuses on reallocation and not insurance against defendant insolvency generally, we further confine our comparison to joint and several liability with reallocation versus superpriority — but no reallocation — for joint and several liabilities.
34 This burden, and thus the incentive to monitor, is actually shared by co-defendants and perhaps, if co-defendants are driven into bankruptcy by reallocation, unsecured creditors of co-defendants. Co-defendant’s liabilities, upon
effects of superpriority are to shift the onus of monitoring and insurance onto secured creditors.\textsuperscript{35} It is likely that co-defendants are better monitors and than secured creditors and that latter are better risk-bearers than the former. The reason co-defendants are better monitors is that, by virtue of standing in the same or similar shoes, co-defendants have better information about the tortious implications of the defendant’s behavior. They also have equal economic leverage as creditors over the defendant. They can refuse to purchase or install the defendant’s products. If they are competitors, they can limit their own production (and thus exposure to the defendant’s liability) or disclose the defendant’s wrongdoing to the public. Creditors are better able to bear the risk of insolvency than are co-defendants because they are better diversified, having loaned money to or invested in companies from many different industries. Co-defendants, however, are from the same industry as the defendant and suffer the same economics shocks.

It is true that the difference in effects of the two policies we consider may be mitigated by contracting. Specifically, creditors may hire co-defendants or professional auditors as monitors and co-defendants may insure their reallocated liabilities. But, with regard to creditors contracting out monitoring, there is the risk of collusion among co-defendants to understate the extent of tortious activity mutually to lower capital costs. Moreover, monitoring by auditors is expensive and subject to conflicts of interest if auditors also service co-defendants. With respect to co-defendants contracting out risk-bearing, it should be noted that, to the extent of the authors’ knowledge, no insurance company has offered policies to cover asbestos liabilities, directly incurred or inherited via reallocation, since 1985.

So which policy is preferable? If the goal is not deterrence or deterrence is unlikely to be effective, superpriority seems superior due to creditors’ advantages with risk-bearing. If deterrence is central and feasible, reallocation appears the proper choice due to the superior knowledge of co-defendants. If, after contracting, the difference between the effects of the two policies is minor, the domino-bankruptcy costs of reallocation suggest that superpriority is the better policy. Contrary to intuition, adopting both reallocation and superpriority is not superior to either policy. There

\textsuperscript{35} Or onto unsecured creditors if the bankrupt defendant has sufficient assets to cover tort claimants and secured creditors, but not unsecured creditors.
is no benefit in terms of risk-bearing because, under simple reallocation and current bankruptcy priorities, unsecured creditors already bear any residual liabilities not covered by co-defendants' assets. There is no benefit in terms of deterrence because monitoring is a public good with a fixed cost. The greater the number of parties responsible for monitoring, the smaller the incentive of any one party to monitor the defendant.36

7 Conclusion

A final question raised by the analysis in this paper is: to what extent can it be generalized beyond the asbestos context? Before answering, we note that even if it could not be generalized, our cost-benefit calculation concerning reallocation of asbestos liabilities is important to the legal system. Asbestos is the single largest — in terms of filings or dollars — personal injury litigation in U.S. history. Its impact is not confined to a small set of traditional manufacturing industries. Due to reach of joint and several liability, asbestos litigation affects such unexpected companies as Viacom and Pfizer, which recently sent a subsidiary into bankruptcy due to asbestos liabilities. The asbestos crisis is so serious that Congress is considering special legislation to take asbestos litigation out of the court system. This legislation would establish a national trust, funded by defendants and their insurers, that would pay all presently unresolved asbestos claims.

In any case, our analysis of reallocation has important applications outside asbestos. There are a number of new litigations that are following the path of asbestos. These include silica and mold/fungi. The former concerns a lung disease (silicosis) caused by occupational exposure to crystalline silica dust. The latter concerns various ailments associated with the growth of mold in home and building construction. Both are toxic torts subject to joint and several liability rules, with claim filings already in the tens of thousands and claim payments in the billions. In addition, a number of more novel claims, if accepted, would follow in the path of asbestos. These include suits against gun manufacturers and distributors for gun-related injuries and against food manufacturers, distributors, and restaurants for obesity. These claims also involve an uncertain line of causation, justifying the use of joint and several liability rules, and a large number of claimants, creating the risk of bankruptcy.

36 An implication of this observation for the literature on bankruptcy reform is that the argument for superpriority in tort is weaker in the case of joint and several liabilities.
The main lessons to be drawn from our analysis are, first, that the insurance reallocation provides against the insolvency of a defendant is very costly. The deterrence benefits of reallocation would have to be quite large to justify this mechanism. In the case of asbestos, there are good reasons to suspect that the deterrence benefits are minimal, suggesting that reallocation reduces social welfare in this context. The second lesson is that the choice between reallocation and superpriority in bankruptcy is really a choice between better deterrence and better insurance, respectively. In the case of asbestos, superpriority seems like a better bet. But for newer toxic torts, if the benefits of deterrence are not just great, but weighted much more strongly than those of insurance, it is possible that reallocation is preferable. Finally, if co-defendants can purchase insurance against reallocation and creditors can hire co-defendants or auditors to monitor defendants, and therefore the two policies have similar effects, then the transactions costs of reallocation argue strongly for superpriority, regardless of deterrence concerns and even for non-asbestos torts.

Appendix: Estimators for the total and bankruptcy-induced growth rates

Define $S_j$ to be the equitable share of company $j$ and $L_i$ to be the claim value of plaintiff $i$. Total liability of defendant $j$ to plaintiff $i$ is

$$T_{ij} = \left[ S_j + \frac{S_j}{\sum_{\text{named}} S_m} \left( \sum_{\text{bankrupt}} S_m + \sum_{\text{not-named}} S_m \right) \right] L_i \quad (6)$$

The first term on the right hand side captures equitable share. The second term is the the product of (a) the shares of bankrupt companies and companies who are not named in the plaintiff’s complaint that are reallocated to solvent and named defendants, respectively, and (b) the share of reallocated liabilities that is assigned to defendant $j$ in particular. The overall share in the square brackets, which we shall call the residual share, is multiplied by the total recovery owed to the plaintiff by all defendants.\footnote{Actually, payments also reflect the amount not covered by other defendants who settled and the amount below the residual share for which defendant $j$ may settle. Because we will be summing across all relevant defendants, however, these terms should cancel.}

We assume that shares are constant across plaintiffs. This is technically incorrect, but should not affect our results. If we indexed shares by $i$, we would could use the trick $\sum_i x_i \sum_{ij} y_{ij} = \bar{y} \sum_i x_i$, where $\bar{y} = \sum_i x_i \sum_{ij} y_{ij} / \sum_i x_i$, and estimate the weighted mean of shares, where the weights were the liabilities owed to different plaintiffs.
of the reallocated shares of unnamed defendants. The goal of our analysis is to estimate the growth in $R_{\text{bank}} = \sum_{\text{bankrupt}} S_m / \sum_{\text{named}} S_m$, which is the amount reallocated from bankrupt to solvent defendants.

The average payment of defendant $j$ to a single plaintiff is

$$T_{Pj} = \frac{1}{N_{Pj}} \sum_i T_{ij}$$

(7)

where $N_{Pj}$ is the total number of plaintiffs who file an asbestos-related tort suit against defendant $j$. Plugging (6) into (7) yields

$$T_{Pj} = [1 + R_{\text{bank}} + R_{\text{named}}] S_j \frac{1}{N_{Pj}} \sum_i L_i$$

(8)

where $R_{\text{not-named}} = \sum_{\text{not-named}} S_m / \sum_{\text{named}} S_m$. Because we are interested in changes over time, we shall now index by $t$ and take the ratio of (8) for two consecutive periods:

$$\frac{T_{Pj,t+1}}{T_{Pj,t}} = \frac{[1 + R_{\text{bank},t+1} + R_{\text{not-named},t+1}]}{[1 + R_{\text{bank},t} + R_{\text{not-named},t}]} \times \frac{L_{t+1}}{L_t}$$

(9)

where $L_t$ is the total liability owed by all defendants to the average plaintiff. This is independent of the identity of the defendant; variation across payments to a plaintiff by different defendants is fully captured in the share of that plaintiff’s liability owed by different defendants. Note that the equitable share of defendant $j$ cancels out because it is unchanged over time; most of these liabilities were generated 40 years before claims were filed [3, p. 3]. The left-hand side term in (9) is the overall growth rate of payments from defendant $j$ to individual plaintiffs. The second term on the right-hand-side is the natural growth rate of tort claims. This equation is a more precise statement of (2).

We estimate the overall growth rate $T_{Pj,t+1}/T_{Pj,t}$ for any given company $j$ on which we have 10-K data with

$$\frac{\hat{T}_{Pj,t+1}}{\hat{T}_{Pj,t}} = \frac{\hat{T}_{j,t+1}}{\hat{T}_{j,t}} \frac{\hat{N}_{Pj,t}}{\hat{N}_{Pj,t+1}}$$

(10)

where $\hat{N}_{Pj,t}$ is the total number of plaintiffs reported in the company $j$’s 10-K as having settled complaints against it in year $t$, and $\hat{T}_{j,t}$ is the total amount company $j$’s 10-K reported that the
company paid in \( t \) to resolve asbestos claims.\(^{38} \) The next subsection discusses precisely how we estimate the natural growth rate \( \bar{L}_{t+1}/\bar{L}_t \). In particular, we offer two methods, which we argue give upper and lower bounds for the natural growth rate.

Dividing the over growth rate by the natural growth rate leaves us with an estimate of

\[
\frac{[1 + R_{\text{bank},t+1} + R_{\text{not-named},t+1}]}{[1 + R_{\text{bank},t} + R_{\text{not-named},t}]} = 1 + G_{\text{bank},t+1} + G_{\text{not-named},t+1}
\]

(11)

where

\[
G_{\text{bank},t+1} = \frac{(R_{\text{bank},t+1} - R_{\text{bank},t})}{[1 + R_{\text{bank},t} + R_{\text{not-named},t}]}
\]

\[
G_{\text{not-named},t+1} = \frac{(R_{\text{not-named},t+1} - R_{\text{not-named},t})}{[1 + R_{\text{bank},t} + R_{\text{not-named},t}]}
\]

are the growth rates of the reallocated shares from bankrupt and unnamed defendants to solvent and named defendants, respectively. Because the number of named companies rises over time, we expect that \( G_{\text{named},t+1} \) is negative. Therefore, if we estimate \( G_{\text{bank},t+1} \) by simply subtracting one from the left-hand side of (11), we will underestimate the growth in liability shares reallocated from bankrupt to solvent, jointly-liable defendants.

**References**


\(^{38}\) We acknowledge that the companies with 10-K filings that provide overall payments to resolve asbestos liabilities are not representative of all companies with asbestos liabilities. In particular, the companies in our 10-k sample are larger and more mature defendants. We have no reason to think, however, that the growth rate in their payments per plaintiff is higher or lower than the growth rate in such payments by smaller defendants. Moreover, because the larger, more mature asbestos defendants have more at risk, they are more vulnerable, all other things being equal, to bankruptcy. Therefore, the growth rate in their overall claims are more relevant to determining the domino bankruptcy effect of joint and several liability in the asbestos context.

A concern with estimating the overall growth rate of claims is that there may be growth in settlement values due to externalities from early settlement of joint and several liabilities. A defendant who settles early for less than his share will raise remaining defendants’ liabilities were the matter litigated in court. Therefore, the subsequent defendants would have to pay more, even if they were to settle \([23]\). This settlement externality does not cause (10) to overestimate the overall growth rate for two reasons. The externality manifests itself as growing settlement values for the same plaintiff across different defendants over time. Our estimator, however, follows the same defendant across different plaintiffs over time. In addition, we do not believe that the defendants in our sample tend to become later settlers during the course of our sample period.


Figure 1: New asbestos-related bankruptcy filings per year and the average payment per tort claim by certain large asbestos defendant companies, 1982-2002. (Average payment is per company for seven large asbestos defendants who are in our 10-K data set and solvent for the entire period from 1990-2002.)

Figure 2: Total asbestos liability costs across all companies in 10-K data set, by year, 1990-2002.
Table 1: Liability for asbestos exposure in the 50 states and D.C.

<table>
<thead>
<tr>
<th>State</th>
<th>Liability rule for asbestos claims (D is defendant, P is plaintiff)</th>
<th>To whom may insolvent's liability be reallocated?</th>
<th>State</th>
<th>Liability rule for asbestos claims</th>
<th>To whom may insolvent's liability be reallocated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>NH</td>
<td>Pure J&amp;S or J&amp;S if D's share &gt; 50%</td>
<td></td>
</tr>
<tr>
<td>AL</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>NJ</td>
<td>J&amp;S if D's share &gt; 5% to 60%</td>
<td></td>
</tr>
<tr>
<td>AR</td>
<td>J&amp;S if P's share &lt; D's share</td>
<td>D</td>
<td>NM</td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>AZ</td>
<td>Several</td>
<td>NV</td>
<td>NY</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>CA</td>
<td>J&amp;S for econ. damages</td>
<td>Several</td>
<td>OH</td>
<td>J&amp;S for econ. damages if D's share &gt; 50%</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td>Several</td>
<td>Several</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td>J&amp;S for econ. damages</td>
<td>D (econ. damages)</td>
<td>OK</td>
<td>J&amp;S if P w/o fault</td>
<td></td>
</tr>
<tr>
<td>DC</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>OR</td>
<td>J&amp;S for econ. damages if D's share &gt; 15% and &gt; P's share</td>
<td>D if share &gt; 25% and &gt; P's share</td>
</tr>
<tr>
<td>DE</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>PA</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>FL</td>
<td>J&amp;S for econ. damages up to flexible cap</td>
<td>D</td>
<td>RI</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>GA</td>
<td>J&amp;S if P w/o fault</td>
<td></td>
<td>SC</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>IA</td>
<td>J&amp;S for econ. damages if D's share &gt; 50%</td>
<td>D</td>
<td>SD</td>
<td>J&amp;S (D liable only up to 2x its share)</td>
<td>D</td>
</tr>
<tr>
<td>ID</td>
<td>Several</td>
<td>TN</td>
<td></td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>IL</td>
<td>J&amp;S if D's share &gt; 25%</td>
<td>Several</td>
<td>TX</td>
<td>J&amp;S if D's share &gt; 15%</td>
<td>D</td>
</tr>
<tr>
<td>IN</td>
<td>Several</td>
<td>Several</td>
<td>UT</td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>HI</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>VA</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>KS</td>
<td>Several</td>
<td>VT</td>
<td></td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>KY</td>
<td>Several</td>
<td>WA</td>
<td></td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>LA</td>
<td>Several</td>
<td>WI</td>
<td></td>
<td>J&amp;S if D's share &gt; 51%</td>
<td>D</td>
</tr>
<tr>
<td>MA</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>WV</td>
<td>Pure J&amp;S</td>
<td>D</td>
</tr>
<tr>
<td>MD</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td>WY</td>
<td>Several</td>
<td></td>
</tr>
<tr>
<td>ME</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MI</td>
<td>Several</td>
<td>MN</td>
<td></td>
<td>D, P</td>
<td></td>
</tr>
<tr>
<td>MN</td>
<td>J&amp;S (but if D's share &lt; 15%, liable only up to 4x D's share)</td>
<td>D, P</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MO</td>
<td>J&amp;S if P w/o fault</td>
<td>D and (if P is at fault)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MS</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>J&amp;S if share &gt; 50%</td>
<td>D if share &gt; 50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NC</td>
<td>Pure J&amp;S</td>
<td>D</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ND</td>
<td>Several</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NE</td>
<td>J&amp;S for econ. damages</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes. Cites available from author. * - After 2007, a defendant is J&S liable for 50% of plaintiff's economic damages if defendant's share is greater than 30%.
Table 2: Contribution rules based nature and size of payments by defendants and by solvency of defendants.

<table>
<thead>
<tr>
<th>Judgment</th>
<th>Settlement</th>
<th>Insolvency</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1 &lt; L1</td>
<td>No contribution.</td>
<td></td>
</tr>
<tr>
<td>J1 &gt; L1</td>
<td>Contribution against D2 (but J2 = 0 maybe required). Set-off rule should avoid this.</td>
<td>Bad bargaining by defendants. No contribution.</td>
</tr>
<tr>
<td>S1 &lt; L1</td>
<td>No contribution. No contribution. No contribution.</td>
<td></td>
</tr>
<tr>
<td>S1 &gt; L1</td>
<td>Contribution against D2 (but J2 = 0 maybe required). Set-off rule should avoid this. No contribution against D2 unless P releases D2 from liability. No contribution.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insolvency</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 &lt; L1</td>
<td>No contribution against D1. Possible only if reallocation. Contribution from D1 estate permitted (but S2 = L maybe required). No contribution.</td>
</tr>
</tbody>
</table>

Table 3: Distribution of claims across disease-types, by year of settlement, 1990-2000.

<table>
<thead>
<tr>
<th>Year of settlement</th>
<th>Non-malignant</th>
<th>Other cancer</th>
<th>Lung cancer</th>
<th>Mesothelioma</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>85.89%</td>
<td>2.01%</td>
<td>7.60%</td>
<td>4.51%</td>
</tr>
<tr>
<td>1991</td>
<td>88.30%</td>
<td>1.44%</td>
<td>6.59%</td>
<td>3.66%</td>
</tr>
<tr>
<td>1992</td>
<td>84.35%</td>
<td>3.26%</td>
<td>8.79%</td>
<td>3.60%</td>
</tr>
<tr>
<td>1993</td>
<td>88.87%</td>
<td>1.80%</td>
<td>6.57%</td>
<td>3.81%</td>
</tr>
<tr>
<td>1994</td>
<td>86.09%</td>
<td>2.56%</td>
<td>7.54%</td>
<td>3.81%</td>
</tr>
<tr>
<td>1995</td>
<td>85.42%</td>
<td>1.81%</td>
<td>7.41%</td>
<td>5.36%</td>
</tr>
<tr>
<td>1996</td>
<td>86.74%</td>
<td>2.00%</td>
<td>6.85%</td>
<td>4.41%</td>
</tr>
<tr>
<td>1997</td>
<td>83.66%</td>
<td>2.53%</td>
<td>7.83%</td>
<td>5.99%</td>
</tr>
<tr>
<td>1998</td>
<td>87.46%</td>
<td>1.92%</td>
<td>6.54%</td>
<td>4.07%</td>
</tr>
<tr>
<td>1999</td>
<td>91.02%</td>
<td>1.57%</td>
<td>4.73%</td>
<td>2.67%</td>
</tr>
<tr>
<td>2000</td>
<td>86.55%</td>
<td>2.37%</td>
<td>6.66%</td>
<td>4.43%</td>
</tr>
</tbody>
</table>
### Table 4: Timing of major asbestos-related bankruptcies during 1990-2002.

<table>
<thead>
<tr>
<th>Bankruptcy wave</th>
<th>Company</th>
<th>Year of bankruptcy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wave I</td>
<td>Raybestos</td>
<td>1989</td>
</tr>
<tr>
<td></td>
<td>Celotex (Carey Canada)</td>
<td>1990</td>
</tr>
<tr>
<td></td>
<td>National Gypsum</td>
<td>1990</td>
</tr>
<tr>
<td></td>
<td>Eagle Picher Industries</td>
<td>1991</td>
</tr>
<tr>
<td></td>
<td>Keene Corporation</td>
<td>1993</td>
</tr>
<tr>
<td>Wave II</td>
<td>Armstrong World Industries</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Babcock &amp; Wilcox</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>GAF Corporation</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Owens Corning/Fibreboard</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Pittsburgh Corning</td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>Federal Modul</td>
<td>2001</td>
</tr>
<tr>
<td></td>
<td>USG</td>
<td>2001</td>
</tr>
<tr>
<td></td>
<td>W.R. Grace</td>
<td>2001</td>
</tr>
<tr>
<td></td>
<td>AC&amp;S</td>
<td>2002</td>
</tr>
<tr>
<td></td>
<td>Harbison Walker Refractory Company</td>
<td>2002</td>
</tr>
<tr>
<td></td>
<td>Kaiser Aluminum and Chemical Company</td>
<td>2002</td>
</tr>
<tr>
<td></td>
<td>North American Refractories</td>
<td>2002</td>
</tr>
</tbody>
</table>

### Table 5: Estimates of the natural and bankruptcy-induced growth rate.

<table>
<thead>
<tr>
<th>Technique</th>
<th>Annual natural growth rate</th>
<th>Cumulative bankruptcy-induced growth rate (nominal and real)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Real</td>
</tr>
<tr>
<td>1a - aggregate payment</td>
<td>2.9%</td>
<td>0.2%</td>
</tr>
<tr>
<td>1b - average payment</td>
<td>0.0%</td>
<td>-2.7%</td>
</tr>
<tr>
<td>1994 to 1999 “natural” experiment</td>
<td>8.5%</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

### Table 6: Company-specific growth in claim values.

<table>
<thead>
<tr>
<th>Company</th>
<th>Ave. annual growth in nominal claim values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wave 1</td>
</tr>
<tr>
<td>Grace</td>
<td>-10%</td>
</tr>
<tr>
<td>FWC</td>
<td>52%</td>
</tr>
<tr>
<td>CCK</td>
<td>5%</td>
</tr>
<tr>
<td>Coltec</td>
<td>-2%</td>
</tr>
<tr>
<td>GP</td>
<td>24%</td>
</tr>
<tr>
<td>B&amp;W</td>
<td>33%</td>
</tr>
<tr>
<td>OI</td>
<td>38%</td>
</tr>
<tr>
<td>ABB</td>
<td>n/a</td>
</tr>
<tr>
<td>Kaiser</td>
<td>0%</td>
</tr>
<tr>
<td>HAL</td>
<td>-10%</td>
</tr>
<tr>
<td>Weighted ave.</td>
<td>17%</td>
</tr>
</tbody>
</table>
Figure 3: Average claim values of companies in 10-K data set (including defense costs and dismissals), by year, 1990-2002.