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SEMINAR IN LAW & ECONOMICS
Professors Louis Kaplow and Steven Shavell

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Hauser 102, 5:00 p.m.

“On Structural Bias In The Litigation Of Common Question Claims”

David Rosenberg and Kathryn E. Spier
ON STRUCTURAL BIAS IN THE LITIGATION OF COMMON QUESTION CLAIMS

David Rosenberg and Kathryn E. Spier

Abstract

This essay focuses on civil litigation that involves multiple plaintiffs suing a single defendant for damages or equitable remedies on causes of action that raise the same or similar legal and factual claims and/or defenses. Such common question claims comprise a large fraction of U.S. civil actions, ranging from the relatively simple traffic accident involving personal injury claims by two or more occupants of one car charging the driver of the other car with negligence to large-scale litigation consisting of numerous plaintiffs suing a business or government defendant on costly and complex claims. Examples of large-scale common question litigations include claims of products liability, securities fraud, deceptive consumer practices, corporate misgovernance, environmental pollution, employment discrimination, and unconstitutional state action. All common question litigation proceeds either by plaintiffs prosecuting their claims individually in separate actions or collectively in joint actions, voluntarily formed or judicially mandated such as by class action.

Using an analytical model, we explore the effects of the mode of action – separate versus joint – on the plaintiffs’ and the defendant’s respective incentives to invest in litigating outcome-determinative common questions. We demonstrate a general and heretofore largely unrecognized correlation between separate actions and litigants’ investment incentives that implies the existence of a structural bias favoring defendants in common question litigation. Essentially, in a given separate action the defendant spends to defeat all plaintiffs, while each individual plaintiff spends only to win for himself. Hence, in the separate action process, defendants have an inherent advantage (not due to their wealth but to their natural incentives to outspend each given plaintiff) that skews outcomes on average in their favor. In a joint action, both sides have equivalent aggregate investment incentives and hence there is no structural bias. Analytical demonstration of why and how such asymmetric investment incentives arise and structurally bias outcomes in separate but not joint actions sets the stage for consideration of the public policy implications. In particular, we discuss the potentially adverse consequences of vesting defendants with such superior litigation power over plaintiffs in separate actions for achieving the primary social objective of civil liability, deterrence of unreasonably risky behavior.

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I. Introduction

The object of this essay is to formally analyze the fundamental structural bias that skews outcomes in favor of the defendant in common question litigations. Common question litigations typically involve multiple plaintiffs suing a single defendant on causes of action for damages or equitable remedies that present the same or similar legal and factual claims and/or defenses. Generally plaintiffs prosecute their respective common question claims individually in separate actions or collectively in joint actions such as class actions. We explain the nature, cause and consequences of the structural bias in common question litigations, why it arises when plaintiffs prosecute their claims in separate actions, but not when they proceed by joint action, and the significance of its social welfare implications, particularly regarding the cost and deterrence benefit of litigation.

Overview of Argument

In essence, we show that fundamental structural bias arises in the separate action process quite simply because the defendant has an inherent investment advantage over plaintiffs in litigating common questions – due not to its wealth, but rather to its natural incentive to outspend the plaintiff in any given separate action. As the “owner” of the common defense to all claims, the defendant can not only fully capture and exploit the information and other benefits (“spillovers”) from litigating the common questions across all claims. But key to its superior litigation power, as we show, the defendant can also fully centralize its investment decisions to optimize its common question defense across all claims. By contrast each plaintiff in the separate action context will be myopic and concerned only with the value of his or her own recovery in damages or otherwise – a fraction of the recovery from all claims – and will invest accordingly.  

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1 Usually, plaintiffs elect the mode of action, though courts, often on a defendant’s motion, exercise authority to override the plaintiffs’ choice. Courts possess the power to deny plaintiffs’ preference to proceed by joint action, most notably in refusing to certify a class action. They also exercise authority to reject the plaintiffs’ preference for proceeding by separate actions, sometimes through compulsory joinder and class action certification, but frequently by mandating consolidation of claims. See e.g., Federal Rules of Civil Procedure, Rule 13 (compulsory counterclaim), Rule 14 (Third-party Practice), Rule 19 (Required Joinder of Parties), Rule 23 (Class Action); 28 U.S.C. §1407 (Multidistrict Litigation); 28 U.S.C. §2361 (Interpleader). State courts are similarly authorized to order joinder of claims, and more broadly to mandate class and other joint actions, though this latter power is now largely limited to intrastate disputes. See Class Action Fairness Act of 2005, 28 U.S.C. §§ 1332, 1453, 1711-1715.

2 Reference to plaintiffs’ investment incentive is meant to capture any relevant power of the plaintiff’s attorney to determine how much time, money, and other resources will be spent on litigation.
Each will also tend to free-ride on the efforts of others and consequently plaintiffs cannot match the defendant’s critical capacity to centralize investment decisions to maximize the value from litigating the common questions across all claims.

Joint action negates the structural bias favoring the defendant, leveling the playing field with plaintiffs. This leveling occurs not by preventing the defendant from exploiting spillover and centralized investment opportunities as fully as it otherwise would in the separate action context. The defendant always invests commensurate with its liability exposure in the aggregate, whether the total derives from many separate actions or a single joint action. Proceeding by joint action, however, enables plaintiffs to fully centralize their investment decisions as well capture information and other benefits from litigating the common questions. In short, plaintiffs can exploit centralized and spillover opportunities equivalent to defendant’s for maximizing their payoff from litigating the common questions in all claims.

Analytical demonstration of why and how this asymmetry in investment incentives biases the likelihood of prevailing at trial on average against plaintiffs and in favor of the defendant (and by extension similarly skews the terms for settlement) in separate but not joint actions sets the stage for consideration of the social welfare implications. We explain that the parties’ litigation investments would likely increase in a joint action relative to proceeding in structurally

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3 Because defendants naturally centralize investment decisions across all claims regardless of whether plaintiffs proceed by separate or joint action, the main functional distinction we draw between the separate and joint modes of action turns on the extent of centralized control on the plaintiffs-side over basic investment decisions such as whether and how much to spend on suit. To simplify the analysis we treat separate actions as characterized by decentralized decisionmaking, that is, by each plaintiff seeking only to maximize the individual return from his or her claim on the common questions presented. In contrast, joint actions in our analysis involve plaintiffs proceeding together, voluntarily or involuntarily, to maximize the aggregate or joint return across all claims from litigation of the common questions.

4 Common-question litigations that proceed by joint action differ from one another in many respects. For example, plaintiffs proceeding collectively sometimes seek to have all of their claims adjudicated in a single lawsuit, while for strategic or other reasons in other cases they may prosecute their respective claims in more than one lawsuit. Also, claims comprising a given common question litigation will vary in terms of the non-common questions they present. For example, products liability claims predicated on the common questions posed by a design defect cause of action often raise differing claim-specific issues relating to causation and the type, magnitude and valuation of damages. We ignore these and other variant features of common question litigation because taking them into account would complicate but not change our basic conclusion. Hence for simplicity we treat all common question litigations as proceeding either by separate actions or by joint action, and all claims comprising the litigation as presenting only common questions.
biased separate actions. At the same time, as we show, the level of socially beneficial deterrence would likely increase in a joint action relative to proceeding in structurally biased separate actions. Whether proceeding by joint action rather than structurally biased separate actions yields net deterrence benefit in a given type or instance of common question litigation is an empirical judgment beyond the scope of our paper.

The asbestos litigation provides a storied example. For decades, Johns Manville maintained a “conspiracy of silence” covering up the deadly cancer risk of its asbestos products in major part through a litigation strategy of overwhelming force. As each plaintiff filed his separate action seeking damages for death or serious disability from asbestos exposure, he was confronted with a lavishly financed defense consisting of a thicket of sophisticated legal arguments and maneuvers deployed by not one but several teams of lawyers from the nation’s biggest law firms. This strategy succeeded in shielding the defendant from any significant degree of discovery let alone liability; over time the litigation all but fizzled out. It might puzzle an outside observer that to defeat a given claim, Manville routinely marshaled such a high-priced defense, costing the defendant many orders of magnitude more than it would ever payout in damages. But this strategy was a simple matter of economic commonsense. Because the core legal and factual questions were common to all claims, such as the pivotal issues of whether exposure to the asbestos products causes cancer and, if so, when Manville knew or should have known of this carcinogenic risk, the defendant could develop its defense on a scale commensurate with its total potential liability. Because each plaintiff it faced was concerned only with the amount of damages he could recover in his own case, the defendant could rationally and prudently spend a vastly greater amount than the plaintiff to gain the upper hand in any given case. Indeed, only when a number of plaintiffs’ attorneys organized to finance a joint litigation effort in the 1970s were they able to wage the decade long, worldwide discovery campaign that eventually unearthed a trove of inculpating corporate documents and launched the largest, longest running, and most expensive common question litigation to date.5

Our analysis shows that structural bias favoring defendants is endemic to the litigation of common question claims in separate actions. Its existence is not a function of the size of the litigation; nor does it depend on the type and complexity of the case involved. The defendant’s investment advantage pervades the full spectrum of common question litigations, ranging from the simplest traffic accident case involving separate actions by two occupants of one car charging the driver of the other car with negligence to more complex cases involving numerous plaintiffs

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5 See Rosenberg (1985) (reviewing Paul Brodeur, Outrageous Misconduct: The Asbestos Industry on Trial, which describes the early litigation battles, the concerted action of plaintiff attorneys in financing and conducting the breakthrough discovery campaign, and the plaintiffs’ incentives to continue bringing separate actions to free-ride on the jointly produced work product.) On the history, scale, and cost of the asbestos litigation see, Carroll (2005).
prosecuting separate actions asserting claims of mass tort, securities or consumer fraud, unconstitutional state action, antitrust violation, employment discrimination, corporate misgovernance, environmental pollution and the like. The number of separate actions confronting the defendant is, however, a highly significant variable. We find that as plaintiffs file more separate actions against the defendant, the process of adjudication becomes more biased against them, and correlatively, that bias decreases as the number of separate actions falls, and ceases altogether when plaintiffs file no separate actions, but rather all proceed as one by joint action.

Relevance to Class Action Debate

Our demonstration of defendant’s investment advantage as the source of structural bias in the separate action process is especially relevant to the ongoing debate among judges, legislators, and academics over the use of class actions. To be sure, this source of bias is distinct from that which is commonly understood as calling for use of class actions, specifically bias resulting from the operation of the fixed costs of litigation (e.g., filing and service of process fees) in precluding claims with lower expected value (“negative expected value” claims). According to this view, “the very core of the class action mechanism is to overcome the problem that small recoveries do not provide the incentive for any individual to bring a solo action by aggregating the relatively paltry potential recoveries into something worth someone’s (usually an attorney’s) labor.” In contrast, our analysis emphasizes the source of bias constituted by the defendant’s centralized investment advantage regarding the variable costs of litigation – accounting for the great bulk, by far, of the parties’ expenditures. Class action or other functionally equivalent joint action negates this bias by enabling plaintiffs to centralize and optimize their variable investments

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6 In some types of common question litigations, such as copyright infringement, the relationship of the parties is reversed with a single plaintiff suing multiple defendants. Other types of litigation involve multiple plaintiffs suing a small number of competing or non-contractually related defendants. Our analysis explains the parties’ investment incentives and extent of structural bias when such litigations are prosecuted by separate actions rather than by joint action.

7 That is, the plaintiffs in separate actions have trouble achieving the so-called “minimum efficient scale.” See Posner (2011) (observing that “[v]ery small claims would create no problem for the legal system were it not for the fixed component in the costs of litigation; litigants would simply invest less when the stakes were smaller”); and Bone (2011) for a survey of the legal literature.

8 See Amchem Products, Inc. v. Windsor, 521 U.S. 591, 616 (1997). In Part IV we develop the point that the choice between using class action or separate actions to adjudicate a common question claims should turn on their relative output of net deterrence benefit and not on such extraneous circumstances as the profitability of litigation to lawyers and their clients.
across all claims, thereby matching the defendant’s litigation power and dramatically increasing their net expected returns from trial.9

But, as we show, in failing to consider the defendant’s variable investment advantage in separate actions – the conventional view greatly underestimates the magnitude of the fixed-cost bias it recognizes and completely misses the general impact of the variable-cost bias we identify and analyze. Wielding superior litigation power over variable investments, the defendant’s expenditures can drive the expected recovery from a separate action down below the fixed cost barrier, however much the conventional view would deem the claim an economically viable “solo action” and thereby disqualify it from class action treatment. As such, the defendant’s variable investment advantage expands the potential biasing effect of fixed costs virtually without limit. Regarding the claims that plaintiffs would nonetheless find economically worthwhile to prosecute as separate actions, the focus of our analysis,10 there is a broad based consensus that class action is not needed to overcome any bias in the separate action process.11 Indeed, the “decentralized process” of separate actions is presumed to assure “accurate
resolution” of the common question claims involved. 12 Our showing of the existence of structural bias in separate but not joint (including class) actions directly contradicts the premise of this argument that separate actions accurately resolve – or at least do not systematically distort resolution of – common question claims. We hasten to add that our aim in this paper is not to take sides in the debate, but rather it is simply to introduce a relevant, and in our view, highly significant consideration that generally has not been taken into account in prior policy assessments of class actions versus separate actions.13

Analytical Framework

We explore these issues in an analytical framework with two plaintiffs pursuing common question claims against single defendant. The probability that a given plaintiff prevails at trial depends on his expenditures on the common questions, the defendant’s expenditures, and possibly on the expenditures of the other plaintiff. In our main analysis, the investments are assumed to be fully variable and can be scaled continuously up or down. (Later, in discussing extensions of the basic analysis, we point out that the introduction of fixed costs – such as per-claim filing fees – magnifies the biasing effects of separate actions.) We also assume that the investments are chosen simultaneously by the litigants, and derive the Nash equilibrium of the resulting game.

The plaintiffs’ incentives to invest are affected by two key factors. The first key factor is the extent to which the investments in one claim generate spillover benefits, improving the chance of success at trial for the other claim. The spillover factor reflects the degree to which information and the litigation work product becomes a matter of public record or is otherwise cheaply disseminated and available for use in litigating both claims. The second factor concerns the extent to which the plaintiffs’ investment decisions are centralized in the sense that they are chosen to maximize the return from trial of both claims. The centralization factor reflects the extent to which the plaintiffs are legally constrained (e.g., by contract or court order) to coordinate their investments on the common questions and precluded from free-riding on each other’s work product. Because the defendant necessarily “owns” the defense interest in the outcome of the common question litigation, it naturally enjoys spillover benefits and centralizes its investment decision to maximize the return across the two claims.

12 In re Bridgestone/Firestone, Inc., Tires Prods. Liab. Litig., 288 F.3d 1012 (7th Cir. 2002); In re Rhone-Poulenc Rorer Inc., 51 F.3d 1293, 1297-1300 (7th Cir. 1995). The preference for separate over class actions is also expressed as emanating from first principles of “Anglo-American jurisprudence” that reflect “our ‘deep-rooted historic tradition that everyone should have his own day in court.” Ortiz v. Fibreboard Corporation, 527 U.S. 815, 868 (1999).

13 See infra for a survey of the relevant literature.
We then consider equilibrium incentives under several different scenarios. In our first scenario, we consider the effects of having the plaintiffs pursue separate actions independently (“independent actions”). To do this, we assume that there are no natural or practical means of effecting spillovers between the plaintiffs’ claims and that the plaintiffs make decentralized investment choices to maximize their return from their respective claims.\textsuperscript{14} Next we consider a scenario where each plaintiff enjoys full costless spillovers from the work product of the other plaintiff but, as in the case of independent actions, plaintiffs make decentralized investment decisions solely to maximize individual returns on their respective claims (“spillover actions”).\textsuperscript{15} Finally, we consider the scenario where the plaintiffs enjoy full spillovers in their investment choices and also make their investment decisions on a centralized basis to maximize the joint, aggregate return (“joint actions”). Implicitly, we are imagining in this case that the plaintiffs overcome any free-riding tendencies through private contracts with each other or through a commitment to joint representation by a common attorney or by virtue of a judicially mandated joint action, such as consolidation or class action.

As modeled and formally analyzed, the asymmetry in investment incentives and consequent structural bias favoring defendants persist in both common question separate action scenarios, though the defendant’s advantage is less pronounced in the spillover relative to the non-spillover case. Significantly, we also conclude that joint actions are characterized by investment symmetry and hence structural neutrality. We also extend the basic analysis, and show that the structurally biasing effects are magnified when the number of plaintiffs bringing separate actions grows, fixed costs of litigation are introduced, and/or the defendant commits to invest before the plaintiffs. The analysis has implications for the social desirability of joint actions. While joint actions increase the plaintiffs’ joint level of litigation spending, they also provide stronger deterrence incentives for injurers. Ultimately, the choice to use a class action depends on the context, that is, on whether joint action is necessary in a given type of case to increase the level of deterrence by motivating plaintiffs to invest more on the common questions.

Related Literature

The model in our paper is related to the literature on rent-seeking contests where two or more contestants are vying for a prize and the probability that any given contestant will win the prize depends on the investments or efforts of each of the contestants. Models along these lines have been used to explore a variety of topics, including persuasive advertising by manufacturers, tournaments in the workforce, R&D and patent races, sporting contests, political elections, and

\textsuperscript{14} For example, discovery of the defendant’s records by one plaintiff would not inure to the benefit of the other plaintiff who would have to spend equivalent resources for a similar discovery effort as a completely independent matter.

\textsuperscript{15} Thus, if one plaintiff hires and uses an expert witness, it would be to maximize the return on that plaintiff’s claim alone; the other plaintiff would freely copy and use the expert’s testimony
wars between nations. Konrad (2007) and Garfinkle and Skaperdas (2006) provide very useful surveys of the literature.\footnote{See Friedman (1958) and Schmalansee (1976) for models of advertising, Lazear (1981) and Lazear and Rosen (1995) for tournaments in the workplace, Fullerton and McAfee (1999) for R&D and patent races. Experimental work on rent-seeking contests includes Davis and Reilly (1998) and Millner and Pratt (1991).} Although the literature has taken a variety of approaches to modeling the underlying technology of these contests,\footnote{Some authors have approached the problem as an “all-pay auction,” where the contestant who invests the most wins the prize (Baye, Kovenock, and DeVries, 1996; Hillman and Riley, 1989); still others have posited that the probability of winning depends on the difference between the expenditures or efforts of the contestants (see Hirshleifer, 1989). Contest success functions based on the difference between expenditures have been used in the literature on labor market tournaments of Lazear and Rosen (1981) and Lazear (1995).} the most common approach – and the one taken here – has been to assume that the probability of winning depends on the ratio of the expenditures of the contestants (Tullock, 1980; Dixit, 1987). In particular, our model is analogous to a simple “lottery contest,” where a contestant’s probability of winning the lottery is simply the proportion of the tickets held by that contestant.\footnote{This lottery contest is a special case of the Tullock (1980) rent-seeking contest. The success function has axiomatic foundations (Skaperdas, 1996), and can also be viewed as a reduced form of a game where contestants bolster their positions by taking random draws from a common pool of evidence (Baye and Hoppe, 2003). It also emerges from a stochastic all-pay auction where the effective “bids” of the contestants depend on the expenditures of the contestants as well as exponentially distributed noise (Hirshleifer and Riley, 1992, pages 380-1).}

There is a small literature in law and economics that approaches litigation as a rent-seeking contest.\footnote{See Posner (1973, appendix) and Katz (1988) for early work along these lines. Braeutigam, Owen, and Panzar (1984), Hause (1989), and Katz (1987) argue that the English Rule under which the loser in litigation must pay certain legal expenses of the winner) will lead to greater litigation expenditures than the American Rule. See also Farmer and Pecorino (1999) and Baye, Kovenock and DeVries (2005). Parisi (2001) uses a contest model to explore inquisitorial and adversarial systems, Bernardo, Talley, and Welch (2000), Warneryd (forthcoming), and Sanchirico (2005) explore rules of evidence, and Che and Sanchirico (2004) to explore decoupling.} Posner (1973) argues informally in the context of non-common question litigation, that asymmetric stakes will lead to corresponding asymmetry in the parties’ litigation expenditures, and that a defendant facing a sequence of plaintiffs may try to establish a reputation for spending a lot on litigation to deter future plaintiffs from bringing suit. It has been argued (Posner 1977; Spurr 1991; Note 1978) that in a collateral estoppel regime, a defendant facing a sequence of plaintiffs suing separately on common question claims and who if it loses the first case would be precluded from relitigating its common defense in any succeeding case...
will have stronger incentives to invest than and consequently will gain an advantage over the plaintiff in litigation of the first case. 20 Challenging the attribution of the defendant’s investment advantage to the collateral estoppel rule, Rosenberg (2002a) shows that the investment asymmetry is not the product of the rule, but rather arises in any event as a result of the general structural bias endemic to use of separate actions, which we analyze in this essay.

Both the law-and-economics and policy-oriented legal literatures have also explored the incentives of litigants to aggregate their claims, and have noted that plaintiffs and the courts may benefit from the scale economies of joint actions. See Galanter (1974); Miller (1998); Coffee (1987); Posner (2011), Dam (1975); Kalven & Rosenfeld (1941). 21 These scale economy surveys observe that class action allows plaintiffs with negative expected value claims to spread fixed costs among all claimants and thus bring cases that would have otherwise been unprofitable as separate actions. 22 See Posner (2011); Bone (2011). None of these papers, however, examines plaintiffs’ variable costs or how their case is affected by the defendant’s expenditures, and consequently none addresses the questions of asymmetric investment incentive and structural bias in separate actions we investigate here. 23 More broadly, this paper is the first to formally generalize the differential effects of separate versus joint actions on the incentives of

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20 See also Che and Yi (1993).

21 Some papers have looked at competition between groups for common-good prizes. See Katz et al. (1990), Baik (1993), and Nti (1998). Several papers in the contest literature have looked at alliances or pooling of resources between two players in contest involving more than two players competing for a single prize. Skaperdas (1998) considers incentives to form alliances in a model where players have exogenous endowments. Garfinkle (2004) highlights the free-rider problem among members of the alliance when investments are endogenous, and argues that this can benefit all players by reducing the severity of the conflict. Others that have studied models of inter-group contests followed by intra-group disputes over the allocation of the single prize include Warneryd (1998) and Munster (2007). To the best of our knowledge, none of these papers considers alliances between non-competing players (the plaintiffs in our model) in parallel contests against a common adversary (the defendant).

22 Che (1996) points out that class actions face an adverse selection problem due to damage averaging. A plaintiff would only want to join a class if their damages are not too high. Che (2002) looks at informational advantages from class formation in the settlement of claims.

23 Che and Spier (2008) consider a model of settlement between a defendant and multiple plaintiffs in the presence of plaintiff-side scale economies, and argue that the defendant can coerce the (decentralized) plaintiffs into settling their claims for too little. Stremitzer (2008) shows that this result may be sensitive to the timing of moves. Surveys of the settlement of litigation literature include Hay and Spier (1998), Spier (2007), Daughety (2000), Daughety and Reinganum (2005).
litigants to invest in litigation and the resulting structural bias that favors defendants in separate but not in joint actions.\textsuperscript{24}

\textit{Organization of the Paper}

The paper is organized as follows. In Part II, we use a numerical example to illustrate why and how asymmetric investment incentives arise and structurally bias outcomes in separate but not joint actions. In Part III, we elaborate and apply a more general model successively to four litigation scenarios: (1) non-common question litigation; (2) common question litigation of separate actions prosecuted by plaintiffs independently and with no informational spillover from one to the other; (3) common question litigation of separate actions prosecuted by plaintiffs independently but with 100\% informational spillover from one to the other; and finally, (4) joint actions. In Part IV, we extend the analysis to negative expected value claims and plaintiffs’ incentives to sue, out-of-court settlement; and sequential litigant expenditures. In Part V, we discuss the welfare implications of our findings in relation to the costs of litigation and the deterrence function of civil liability. Part VI offers concluding remarks, including comments on the magnitude of structural bias on common question litigation in reality, and whether and when it may be socially desirable for courts to mandate joint action.

\section{II. Numerical Example}

A simple numerical example illustrates the structural bias that exists in separate but not in joint actions against a common defendant. Assume 10 plaintiffs, each suffering $50,000 loss from injuries separately incurred at various railroad crossings, sue the manufacturer of the signal equipment alleging its malfunction due to design defect. Further assume that the plaintiffs and defendant respectively could make either of two levels of cumulative litigation investment – $5,000 or $100,000 – for discovery, expert witnesses and so forth on the common design defect question with each level of investment yielding a corresponding probability of plaintiff success at trial. The probabilities that the plaintiff will win, and the (gross) expected judgment of each plaintiff at trial, are shown in Figure 1.

\textsuperscript{24} The argument that separate but not joint actions involve asymmetric investment incentives and structural bias favoring defendants was informally introduced in Rosenberg (1984) and developed in later work by him, including Rosenberg (2002b).
Defendant’s Investment

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<thead>
<tr>
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<th>$5,000</th>
<th>$100,000</th>
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<tbody>
<tr>
<td>$5,000</td>
<td>55% × $50,000 = $27,500</td>
<td>15% × $50,000 = $7,500</td>
</tr>
<tr>
<td>$100,000</td>
<td>85% × $50,000 = $42,500</td>
<td>60% × $50,000 = $30,000</td>
</tr>
</tbody>
</table>

Figure 1: Gross Expected Damage Awards

For perspective on the nature of the investment asymmetry in common question litigation prosecuted as separate actions, we begin by hypothesizing a non-common question litigation in which the 10 injured plaintiffs sue the various railroads asserting factually idiosyncratic claims of negligent maintenance of the signal equipment. That is, neither the defendants nor the plaintiffs enjoy economies of scope in litigation. The given plaintiff’s expected net payoff and the defendant’s expected total cost for liability and litigation, and the resulting litigation game, is shown in Figure 2. The plaintiff’s payoffs are in the lower left, and the defendant’s payoffs are in the upper right of the boxes.25

Defendant’s Investment

<table>
<thead>
<tr>
<th></th>
<th>$5,000</th>
<th>$100,000</th>
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</thead>
<tbody>
<tr>
<td>$5,000</td>
<td>$22,500</td>
<td>$2,500</td>
</tr>
<tr>
<td>$100,000</td>
<td>$47,500</td>
<td>$130,000</td>
</tr>
</tbody>
</table>

Figure 2: Non-Common Question Litigation

25 Suppose, for example, that both litigants invest $5,000. The plaintiff’s expected payoff is 55% × $50,000 − $5,000 = $22,500. The defendant’s expected payoff is −55% × $50,000 − $5,000 = −$32,500. If they both spend $100,000 per claim the plaintiff’s expected payoff is 60% × $50,000 − $100,000 = −$70,000 and the defendant’s expected payoff is −60% × $50,000 − $100,000 = −$130,000. The same reasoning explains the litigants’ payoffs from differing investments.
Under these circumstances, each party would invest $5,000 in equilibrium. The plaintiff receives $55\% \times $50,000 – $5,000 = $22,500 and the defendant pays $55\% \times $50,000 + $5,000 = $32,500. Investing $100,000 a piece would not improve the parties’ net returns relative to what they would be if each invested $5,000.\textsuperscript{26} The important point of the example is that in the absence of common questions, there is no asymmetry between the plaintiffs’ and defendant’s investment incentives and hence no structural bias in separate actions.

In contrast, consider what happens in this example if there are common questions of design defect, and that the defendant can achieve economies of scope in litigation. Rather than spending $5,000 or $100,000 per claim, the defendant can spread these costs among all 10 claims, spending $500 or $10,000 per claim as shown in Figure 3. The plaintiffs, on the other hand, must pursue separate actions and do not enjoy these economies.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|}
\hline
\textbf{Plaintiff’s Investment} & $500 & $10,000 \\
\hline
\textbf{Defendant’s Investment} & $22,500 & $2,500 \\
\hline
\textbf{(average cost per claim)} & –$43,000 & –$40,000 \\
\hline
\textbf{$5,000} & $500 & $10,000 \\
\hline
\textbf{$100,000} & –$57,500 & –$70,000 \\
\hline
\end{tabular}
\caption{Common Question Litigation with Independent Actions}
\end{table}

Taking advantage of the asymmetric opportunity to fully exploit economies of scope, the defendant would choose to spend $10,000 on average per claim (or $100,000 in total) to maximize its aggregate return from litigating the common questions in all ten cases. This optimal, aggregate return from the investment enables the defendant to marshal an overwhelmingly powerful case in each separate action against each given plaintiff whose investment is rationally – and structurally – constrained to maximize his or her claim-specific return, in the example a 1/10\textsuperscript{th} fractional return compared to the aggregate return motivating the

\textsuperscript{26} The plaintiff would not be willing to pay an additional $95,000 to raise the likelihood of winning from 55\% to 85\%, since the increase in expected damages, $15,000, is far smaller than the increased cost. Similarly, the defendant would not be willing to spend an additional $95,000 to reduce the probability that the plaintiff wins to 15\%. 
defendant’s investment decisions. Yet, the plaintiffs will still choose to spend $5,000 each, so the probability that a plaintiff will win at trial is 15%. The social desirability of this result, as we discuss later, would depend on the need for additional deterrence from civil liability in the type of case involved.

Finally, assume the plaintiffs are able to achieve the same economies of scope as the defendant, spending either $5,000 or $100,000 in the aggregate rather than individually, as shown in Figure 4. Unconstrained by the structural limitations on investment incentives in separate actions, plaintiffs are able in the joint action to enjoy economies of scope and optimally invest in maximizing the aggregate return from all claims and thereby to make their strongest case against the defendant on the common questions. In equilibrium, both parties will spend $10,000 on average per claim, maximizing the return for each plaintiff at $20,000 and minimizing defendant’s corresponding total liability and litigation costs at $40,000.

 défendant’s Investment  
(average cost per claim)  

<table>
<thead>
<tr>
<th>Plaintiff’s Investment (average per claim)</th>
<th>$500</th>
<th>$10,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>$500</td>
<td>$-28,000</td>
<td>$-17,500</td>
</tr>
<tr>
<td>$10,000</td>
<td>$27,000</td>
<td>$7,000</td>
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<tr>
<td>$-43,000</td>
<td>$-40,000</td>
<td></td>
</tr>
<tr>
<td>$32,500</td>
<td>$20,000</td>
<td></td>
</tr>
</tbody>
</table>

Figure 4: Common Question Litigation with Joint Actions

Of course, the mere fact that plaintiffs and defendant enjoy symmetrical aggregate-claim investment opportunities in a joint action does not mean plaintiffs will have a preponderant probability of success at trial or even that they will have economically viable claims. This example is constructed to illustrate the effects of structural bias favoring defendants, including the potential for turning what would otherwise be strong claims when prosecuted in a joint action into weak, even worthless claims when prosecuted in separate actions. Again, the policy implications of the structural bias we identify will depend on its consequence for deterrence.

27 The more general model will also explore the nuances of having the plaintiffs pursue spillover actions. In such actions, the plaintiffs proceed separately but derive benefits from the investments of others.
III. Model and Basic Analysis

We now present a model of common question litigation to illustrate the structural bias in separate but not joint actions. The model posits two plaintiffs, Plaintiff 1 and Plaintiff 2, pursuing common question claims against a defendant. All three litigants are assumed to be risk neutral. If a plaintiff prevails at trial, the court will award damages, x. We assume for simplicity that the damage award is fixed and commonly known by the litigants. For the same reason we ignore the possibilities of settlement, dismissal, and withdrawal of the claims, and assume that both claims will be prosecuted to trial (non-trial outcomes and other extensions of the basic model are considered in Part IV).

The probability that a plaintiff will win at trial depends on the expenditures of the three players. The individual expenditures of the plaintiffs are given by $c_1$ and $c_2$, and the aggregate expenditures of the defendant are given by $c_d$. We will assume that the three litigants choose their expenditures simultaneously, without directly observing the choices made by each other. The litigants fully understand the incentives created by this game, however, and therefore make rational conjectures or guesses about the likely investment decisions of the others. In the Nash equilibrium, each player chooses an investment level to maximize his net expected return from litigation, given his beliefs about the likely investments of the others.

To focus analysis on the relationship between the parties’ variable investment decisions and structural bias in our model of common question litigation, we begin by setting up and

---

28 The solution to the general model is presented in the technical appendix.

29 The litigants generally are represented by attorneys. In our analysis, the plaintiff should be interpreted as being the lawyer-client pair.

30 A risk averse litigant would be willing to spend additional money to reduce the risk at trial. While this would complicate the analysis, it would not change the main forces identified here.

31 Alternatively, we could imagine that at trial a plaintiff’s damage award is drawn at random from a commonly known distribution, and that x is the mean of that distribution. The results in the paper would be identical under this alternative interpretation.

32 That is, plaintiffs choose their investment to maximize their respective individual net return, the expected damage award minus the litigation cost, given their damages x and their expectations about the investment of the defendant. Similarly, the defendant chooses its expenditure to minimize its total payments (expected judgment plus legal expenditures) given its expectations about the investments of the plaintiffs. Although each litigant makes his investment decision without directly observing the choices made by the other litigants (since by assumption the litigants choose their investments simultaneously), in the Nash equilibrium, the litigants’ “guesses” about what the others will do are correct.
examining as a benchmark the parties’ decisions in non-common question litigation. From that baseline perspective we model the play out of that relationship in a series of common question scenarios: separate actions with no spillovers among plaintiffs; separate actions involving 100% spillovers among plaintiffs; and joint action.

1. NON-COMMON QUESTION LITIGATION

Given that the two claims present no common questions in the benchmark scenario, neither the defendant nor the plaintiffs can exploit spillovers in the litigation. Moreover, because there are no common questions, the defendant cannot benefit from centralized investment decisions. (We will assume the claims are pursued in separate actions, but that condition is irrelevant in the non-common question context.) The probability that a plaintiff will prevail in a given case is simply \( \frac{c_p}{c_p + c_d} \) where \( c_p \) is that plaintiff’s expenditure and \( c_d \) is the expenditure of the defendant. We will first explore the plaintiffs’ independent incentives to invest in litigation, taking as given the investment of the defendant. After doing this, we will explore the defendant’s incentives to invest in litigation and the Nash equilibrium of the broader game.

\[ \text{Plaintiff Investment Incentives} \]

How much money would the plaintiff choose to invest in non-common question litigation? The plaintiff would choose \( c_p \) to maximize its net return from litigation,

\[
\left( \frac{c_p}{c_p + c_d} \right) x - c_p. \tag{1}
\]

The first term in this expression is the plaintiff’s expected award at trial, the probability of winning \( \frac{c_p}{c_p + c_d} \) multiplied by the damages \( x \), and the second term is his litigation expenditure. Given the plaintiff’s beliefs about the expenditures of the defendant, \( c_d \), and the damages, \( x \), the plaintiff will invest to the point where the marginal benefit of the investment, which is the increase in the expected damage award, is equal to the marginal cost. 33

Assuming that the damages are \( x = 180 \) and that the plaintiff expects that the defendant will spend \( c_d = 45 \), this expression becomes \( \frac{c_1}{(c_1 + 45)}180 - c_1 \). In this example, the plaintiff will choose to spend \( c_p = 45 \) as well, yielding a probability of prevailing of \( \frac{45}{45 + 45} = 1/2 \) and an expected payoff of \( (1/2)(180) - 45 = 90 - 45 = 45 \). To see why \( c_p = 45 \) is the

\[33 \text{ Taking the first derivative of the first term in expression (3) establishes that the marginal benefit of investment is } \left[ c_d/(c_p + c_d)^2 \right] x. \text{ Setting this equal to 1, the marginal cost, and rearranging terms gives } c_p = \sqrt{c_d x} - c_d. \text{ The more general derivation of this result is found in the technical appendix.} \]
optimal decision for a plaintiff, suppose instead that a plaintiff increased his spending by a dollar to $c_p = 46$. The benefit of this decision for the plaintiff is a slightly higher probability of prevailing at trial, $46/(46 + 45) \approx .5055$ versus $.5000$ and a correspondingly slightly higher expected award, $90.99$ versus $90.00$. But the marginal benefit, $.99$, is smaller than the marginal cost of that dollar of extra spending. Therefore the plaintiff would not want to increase his spending above $c_p = 45$. So if a plaintiff expects the defendant to spend $c_d = 45$ then the plaintiff will choose to spend $c_p = 45$ as well.

**Defendant Investment Incentives**

Now consider the investment incentives of the defendant. Suppose that the defendant expects that the plaintiff will invest $c_p$. The defendant’s expected payments at trial are

$$
\left( \frac{c_p}{c_p + c_d} \right) x + c_d
$$

(2)

The first term reflects the expected damage payments at trial, and the second term is the defendant’s litigation expenditure. $^{35}$

Suppose that $x = 180$ and that the defendant expects the plaintiff to spend $c_p = 45$. From expression (4), the defendant’s payments are $[45/(45 + c_d)]180 + c_d$. It is not difficult to see that $c_d = 45$ is the optimal expenditure for the defendant, corresponding to total payments of $(1/2)(180) + 45 = 135$. Suppose instead that the defendant increased his expenditure by a dollar to $c_d = 46$. The benefit for the defendant is that the probability that each plaintiff would prevail would fall from $.5000$ to $45/(45 + 46) \approx .4945$, and the plaintiff’s expected damage award would fall from $90.00$ to $89.01$. The marginal benefit for the defendant, the savings of $.99$, is smaller than the marginal cost of that extra dollar, so the defendant would not want to spend more than $c_d = 45$. It is straightforward to show that the defendant would not want to invest less than $c_d = 45$, either.

$^{34}$ An analogous argument establishes that the plaintiff would not lower the legal expenditure to, say, $c_p = 44$.

$^{35}$ The defendant will want to minimize this expression, investing to the point where the marginal reduction in the expected damage awards, $[c_p/(c_p + c_d)^2]x$, equals the marginal cost, 1. Using simple calculus one can show that $c_d = \sqrt{c_p x} - c_p$. Comparing this expression to the analogous expression for the plaintiff’s optimal investment shows that the defendant has the same investment incentives as the plaintiff.
Nash Equilibrium

The investments $c_p = 45$ and $c_d = 45$ are, in fact, the unique Nash equilibrium of the game where $x = 180$ and the plaintiff and the defendant all choose their investment levels independently and simultaneously. As shown earlier, if the plaintiff believed that $c_d = 45$ then he would rationally choose to invest $c_p = 45$. This investment maximizes the plaintiff’s private returns from litigation. If the defendant believed that the plaintiffs would choose to invest $c_p = 45$, then the defendant would choose to invest $c_d = 45$. These investments are mutually reinforcing, and are the predicted outcome of the game. The probability that a plaintiff will win at trial is $1/2$.  

2. COMMON QUESTION LITIGATION IN THE SEPARATE ACTION CONTEXT

We now turn our attention to common question litigation in the separate action context. We assume that only the defendant centralizes investment decisions to optimize its common defense across all claims, whereas plaintiffs invest to maximize returns from their respective claims. Importantly, we also assume throughout the discussion that the defendant’s investments in one claim are equally valuable in the other and thus increase its likelihood of success in both claims. In other words, we assume that the defendant enjoys positive investment spillovers across the two claims. This is realistic because the defendant naturally knows and can use any information it obtains in litigating against either plaintiff whether they pursue their claims separately or jointly.

In contrast, plaintiffs do not naturally benefit from spillovers in common question litigation. In many cases, it may be impractical for plaintiffs to know who among them is contemplating or has filed suit, or what information has been or is being generated in their respective cases. Positive spillovers between the plaintiffs may arise, however, in a variety of contexts, and may or may not require explicit cooperation or coordination between the plaintiffs. Even if the two claims are being pursued in separate actions, possibly even in different jurisdictions, spillovers may occur if the work product of one plaintiff becomes part of the public record and is therefore readily and cheaply available to the other plaintiff.

To account for the range of possibilities, we model separate action scenarios first on the assumption of no spillovers (independent action scenario) and then on full spillovers for plaintiffs (spillover action scenario). In the next section, we compare the separate action scenarios to the joint action scenario in which plaintiffs and the defendant have equivalent opportunities to fully exploit spillovers and centralized variable investments to maximize their respective payoffs from common question litigation.

36 More generally, with non-common question litigation, a plaintiff will spend $c_p = x/4$ in equilibrium and the defendant will spend $c_d = x/4$. 

a. Independent Action Scenario

We first consider common question litigation where the defendant enjoys full spillover and centralized investment benefits but plaintiffs do not; that is, there are no spillovers across the plaintiffs’ claims and that the plaintiffs choose their investment strategies independently of each other.\textsuperscript{37} If there are no spillovers between the plaintiffs’ claims, higher investments by one plaintiff have no effect on the other plaintiff’s probability of success at trial on his claim. In this case, we assume that plaintiff’s probability of prevailing is simply the ratio of his own litigation spending to the sum of his spending and that of the defendant. In the case of no spillovers, the probabilities that Plaintiff 1 and Plaintiff 2 will win, $p_1$ and $p_2$, are given by:

$$p_1 = \frac{c_1}{c_1 + c_d} \quad \text{and} \quad p_2 = \frac{c_2}{c_2 + c_d}.$$  \hspace{1cm} (3)

If the three litigants each spend the same amount on litigation, $c_1 = c_2 = c_d = 10$ for example, then the probability that each plaintiff will win is 50 percent. A litigant could improve his or her odds by spending more money on the case, of course. If Plaintiff 1 raised his expenditure to $c_1 = 30$, say, then the likelihood of winning would rise to 75 percent (assuming that the defendant’s investment remained at $c_d = 10$). Similarly, if the plaintiffs’ investments remained at $c_1 = c_2 = 10$, the defendant could reduce the probability of being held liable to 25 percent by raising his litigation expenditure to $c_d = 30$.\textsuperscript{38}

The fundamental structural bias favoring the defendant arises in unmitigated degree in the case without spillovers between the plaintiffs. That is, an extra dollar spent by the defendant has exactly one dollar’s worth of impact in both claim 1 and claim 2. The plaintiffs, on the other hand, do not benefit from these spillovers and each must duplicate the efforts of the other. To achieve a win rate of 50 percent, for example, the plaintiffs must spend, in aggregate, twice as much as the defendant.

To elaborate, we first explore the plaintiffs’ independent incentives to invest in litigation, taking as given the investments of the defendant. After doing this, we will consider the

\textsuperscript{37} Absent spillovers, there would be no benefit from coordination. The plaintiffs do as well making independent decisions to maximize their private returns as they would through joint decision making.

\textsuperscript{38} Note also that as a plaintiff’s legal expenditure $c_i$ grows very large relative to the defendant’s expenditures, the chance that that plaintiff will win approaches 100 percent. If $c_1 = 990$ and $c_d = 10$, for example, then $p_1 = .99$. Similarly, in the limit as the defendant’s expenditure, $c_d$, grows large relative to the plaintiffs’ expenditure, the probability that each plaintiff will prevail approaches zero.
defendant’s incentives to invest in litigation and the Nash equilibrium of the broader game. We will see that the defendant has stronger incentives to invest than in non-common question litigation. Indeed, in our example with \( x = 180 \), the defendant’s variable investment advantage will lead it to spend \( c_d = 80 \), while the plaintiffs will spend 40 each to achieve a 1/3 probability of succeeding at trial. Compare the benchmark scenario in which the parties each spent \( c_d = 45 \) giving each plaintiff a 1/2 probability of success at trial.

**Plaintiff Investment Incentives**

Following the logic of the previous section, Plaintiff 1 would choose \( c_1 \) to maximize his net return from litigation,\(^{39}\)

\[
\left( \frac{c_1}{c_1 + c_d} \right) x - c_1. \tag{4}
\]

Assuming that the damages are \( x = 180 \) and that the plaintiffs expect that the defendant will spend \( c_d = 80 \), this expression becomes \( c_1 / (c_1 + 80) \) \( 180 - c_1 \). Now the plaintiffs will choose to spend \( c_p = 40 \) each, yielding a probability of prevailing of \( 40/(40 + 80) = 1/3 \) for each plaintiff and an expected net payoff of \( (1/3)(180) - 40 = 60 - 40 = 20 \). To see why \( c_p = 40 \) is the optimal decision for a plaintiff, suppose instead that a plaintiff increased his spending by a dollar to \( c_p = 41 \). The benefit of this decision for the plaintiff is a slightly higher probability of prevailing at trial, \( 41/(41 + 80) = .339 \) versus \( 1/3 \) and a correspondingly slightly higher expected award, 60.99 versus 60. But the marginal benefit, .99, is smaller than the marginal cost of that dollar of extra spending. So if a plaintiff expects the defendant to spend \( c_d = 80 \) then the plaintiff will choose to spend \( c_p = 40 \).

**Defendant Investment Incentives**

Now consider the investment incentives of the defendant. Suppose that the defendant expects that the two plaintiffs to invest the same amount each, \( c_1 = c_2 = c_p \). The defendant’s expected payments at trial are

\[
2 \left( \frac{c_p}{c_p + c_d} \right) x + c_d \tag{5}
\]

The first term reflects the expected damage payments at trial to the two plaintiffs, \( 2[c_p/(c_p + c_d)]x \), and the second term is the defendant’s litigation expenditure.\(^{40}\) Comparing

\[^{39}\] The plaintiff would invest \( c_1 = \sqrt{c_d x} - c_d \).

\[^{40}\] The defendant will want to minimize this expression, investing to the point where the marginal reduction in the expected damage awards, \( 2[c_p/(c_p + c_d)^2]x \), equals the marginal cost, 1. Using
this expression to the analogous expression for the plaintiff’s payoff function in (5), we see that the defendant will have stronger incentives to invest in litigation. Every dollar spent by the defendant has twice the impact on the defendant’s payoff, as reflected by the multiplier 2 in front of the first term of expression (6).

Suppose that the defendant expects the plaintiffs to each spend \( c_p = 40 \). From expression (6), the defendant’s total payments are \( 2[40/(40 + c_d)]180 + c_d \). \( c_d = 80 \) is the optimal expenditure for the defendant in this case, corresponding to total expected payments of \( 2(1/3)(180) + 80 = 200 \). Suppose instead that the defendant increased his expenditure by a dollar to \( c_d = 81 \). The benefit for the defendant is that the probability that each plaintiff would prevail would fall from \( 1/3 \) to \( 40/(40 + 81) \approx 0.331 \) and the corresponding sum of the plaintiffs’ expected damage awards would fall from \( 2(1/3)(180) = 120 \) to \( 119.01 \). The marginal benefit for the defendant, the savings of \( .99 \), is smaller than the marginal cost of that extra dollar, so the defendant would not want to spend more than \( c_d = 80 \).

**Nash Equilibrium**

The investments \( c_1 = c_2 = 40 \) and \( c_d = 80 \) are, in fact, the unique Nash equilibrium of the game where the plaintiffs and the defendant all choose their investment levels independently and simultaneously. If the plaintiff believed that \( c_d = 80 \) then they would rationally choose to invest \( c_1 = c_2 = 40 \). These investments maximize the plaintiffs’ private returns from litigation. If the defendant believed that the plaintiffs would choose to invest \( c_1 = c_2 = 40 \), then the defendant would choose to invest \( c_d = 80 \). These investments are mutually reinforcing, and are the predicted outcome of the game. The probability that each plaintiff will win at trial is \( 1/3 \).

It is important to emphasize once again that the defendant is at an advantage relative to the plaintiffs in this scenario. Although the litigation spending for the two sides is equal in this example, \( c_d = 80 \) for the defendant and \( c_1 + c_2 = 40 + 40 = 80 \) for the plaintiffs, the plaintiffs

simple calculus one can show that \( c_d = \sqrt{2c_p x} - c_p \). Comparing this expression to the analogous expression for the plaintiff’s optimal investment shows that the defendant has stronger incentives to invest. This is because the defendant enjoys economies of scope across the two claims – hence the multiplier of 2 in this equation – and has the incentive to minimize his aggregate losses.

\[^{41}\text{This is proven more generally in the appendix. In the absence of spillovers, the plaintiffs will each spend } c_1 = c_2 = 2x/9 \text{ in equilibrium and the defendant will spend } c_d = 4x/9. \text{ Note that although in equilibrium the plaintiffs spend the same amount as the defendant in total, } c_1 + c_2 = 2x/9 = c_d, \text{ the probability that each plaintiff wins is } 1/3.\]
only prevail 1/3 of the time. The reason for this asymmetry is that the defendant enjoys economies of scope between the two cases while the plaintiffs do not.

b. Spillover Action Scenario

Now suppose that there are perfect spillovers between the plaintiffs in separate actions. By investing more money before trial in this scenario, Plaintiff 1 not only improves his own odds of succeeding at trial but also improves the odds that Plaintiff 2 will prevail in his lawsuit. Specifically, we assume that the probabilities that Plaintiff 1 and Plaintiff 2 will prevail at trial, \( p_1 \) and \( p_2 \), are given by:

\[
p_1 = \frac{c_1 + c_2}{c_1 + c_2 + c_d} \quad \text{and} \quad p_2 = \frac{c_1 + c_2}{c_1 + c_2 + c_d}.
\]  

(6)

The numerators in the expressions are the combined expenditures of the two plaintiffs, while the denominators are the aggregate expenditures of the three parties. Note that an extra dollar of spending by Plaintiff 1 bolsters the strength of Plaintiff 2’s claim by just as much as it strengthens the case of Plaintiff 1. Similarly, additional spending by Plaintiff 2 improves the odds of Plaintiff 1.

Note that in equation (6), the plaintiffs enjoy the same positive spillovers that are enjoyed by the defendant. Spillovers can certainly help to level the playing field between the plaintiffs and the defendant. Our earlier example without spillovers required each plaintiff to individually match the defendant’s litigation spending in order to enjoy a win rate of 50 percent. To achieve parity, the plaintiffs would need to spend twice as much, in aggregate, as the defendant. With perfect spillovers, however, the plaintiffs can achieve the same win rate by each spending half as much as before. If the defendant spends \( c_d = 10 \), for example, the plaintiffs need only spend 5 each rather than the 10 that they each must spend in the absence of spillovers.

If the plaintiffs and defendant maintained their joint level of spending as in the previous section with independent actions, \( c_1 = c_2 = 40 \) and \( c_d = 80 \) then the outcome would be symmetric here: a plaintiff’s probability of prevailing would be \( (40 + 40)/(40 + 40 + 80) = .5 \). The plaintiffs would prevail half of the time, and the defendant would prevail the other half of the time. This will not be the equilibrium outcome, however, if plaintiffs fail centralize their investment decisions and seek to maximize their individual returns only. As we will see, the plaintiffs will free ride on the investments of the other and reduce their investments below jointly desirable levels.

Importantly we show that a structural bias exists even when plaintiffs enjoy full spillovers between their claims. If the plaintiffs make their private investment decisions to maximize their individual returns rather than their joint returns, then the plaintiffs will fail to internalize the full benefits of the spillovers. Suppose that when Plaintiff 1 decides how much to
invest, he considers his individual payoff, not the benefit that his spending will have on Plaintiff 2. Since Plaintiff 1 would bear the entire cost of his investment but only receive a share of the benefit, Plaintiff 1 will underinvest in litigation. In other words, there would be a free-rider problem where the plaintiffs choose to spend less than what they would consider to be jointly optimal. In the model, and in reality, when plaintiffs invest independently, on a decentralized basis, the defendant will wield an investment advantage over each of them in separate actions because it centralizes defense expenditures on common questions to maximize the aggregate return across all claims it expects to face.

**Plaintiff Investment Incentives**

Proceeding as before, Plaintiff 1 will choose \(c_1\) to maximize his net return from litigation,

\[
\left(\frac{c_1 + c_2}{c_1 + c_2 + c_d}\right)x - c_1. \tag{7}
\]

The first term in this expression is the plaintiff’s expected award at trial, the probability of winning \((c_1 + c_2)/(c_1 + c_2 + c_d)\) multiplied by the damages \(x\), and the second term is Plaintiff 1’s litigation expenditure.\(^{42}\)

Suppose, as we did in the previous section, that \(x = 180\) the defendant spends \(c_d = 80\) and the plaintiffs each spend \(c_1 = c_2 = 40\), so each plaintiff’s probability of prevailing is .5. The expected payoff for each plaintiff would be \((.5)(180) - 40 = 90 - 40 = 50\) in this hypothetical, which is higher than in the case of individual actions. It is easy to see that this outcome is not sustainable. In particular, each plaintiff has a unilateral incentive to reduce his level of litigation spending below 40. In fact, if Plaintiff 1 believed that Plaintiff 2 would spend \(c_2 = 40\) and that the defendant would spend \(c_d = 80\), then Plaintiff 1 would spend nothing at all; he would free ride on the efforts of Plaintiff 2 and would contribute nothing at all to the joint litigation effort. When Plaintiff 1 raises his expenditure from \(c_1 = 0\) to \(c_1 = 1\), the probability that Plaintiff 1 will win would rise from \(40/(40 + 80) = 1/3 = .333\) to \(41/(41 + 80) \approx .339\). Plaintiff 1’s expected damage award is higher as well, 60.99 versus 60, but as before the marginal benefit, .99, is

\(^{42}\) Setting the marginal benefit of investment equal to the marginal cost gives the optimal expenditure of Plaintiff 1, \(c_1 = \sqrt{c_d x} - c_d - c_2\). Plaintiff 2 would have a symmetric investment level. Taken together, we see that Plaintiff 1 and Plaintiff 2 would jointly invest \(c_1 + c_2 = \sqrt{c_d x} - c_d\). Since the plaintiff’s expenditures are perfect substitutes for each other in the case of spillover actions, the marginal private benefit to Plaintiff 2 of increasing \(c_2\) by one dollar depends on the plaintiffs’ *aggregate expenditures*, \(c_1 + c_2\), not on the *allocation of this amount* between the two plaintiffs. This is proven more generally in the appendix.
smaller than the marginal cost of that dollar of extra spending. So, to summarize, if Plaintiff 1 believed that Plaintiff 2 would spend \( c_2 = 40 \) then Plaintiff 1 would spend \( c_1 = 0 \).\(^{43}\)

So how much would the plaintiffs choose to invest if \( x = 180 \) if they expect the defendant to spend \( c_d = 80 \)? With perfect spillovers, there are in fact multiple equilibria of the game between the plaintiffs. It is certainly an equilibrium for Plaintiff 1 to spend \( c_1 = 40 \) and for Plaintiff 2 to spend nothing at all, as illustrated in the last paragraph. Indeed, there is a range of Nash equilibria, all with the property that \( c_1 + c_2 = 40 \). We will focus on the symmetric Nash equilibrium where \( c_1 = c_2 = 20 \) in the following consideration of the defendant’s investment incentives.\(^{44}\)

**Defendant Investment Incentives**

Now consider the investment incentives of the defendant. Suppose that the defendant expects that the two plaintiffs will invest \( c_1 \) and \( c_2 \), so the defendant’s total expected payments are

\[
2 \left( \frac{c_1 + c_2}{c_1 + c_2 + c_d} \right) x + c_d.
\]

The first term reflects the expected damage payments at trial to the two plaintiffs, and the second term is the defendant’s litigation expenditure.\(^{45}\) Comparing expression (8) to expression (7) we see that the defendant’s investment incentives are stronger than the plaintiffs’ incentives. As

\[\text{Defendant Investment Incentives}\]

\[\text{Now consider the investment incentives of the defendant. Suppose that the defendant expects that the two plaintiffs will invest } c_1 \text{ and } c_2 \text{, so the defendant’s total expected payments are}\]

\[2 \left( \frac{c_1 + c_2}{c_1 + c_2 + c_d} \right) x + c_d.\]

The first term reflects the expected damage payments at trial to the two plaintiffs, and the second term is the defendant’s litigation expenditure.\(^{45}\) Comparing expression (8) to expression (7) we see that the defendant’s investment incentives are stronger than the plaintiffs’ incentives. As

\[\text{As}\]

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\(^{43}\) What would Plaintiff 2 spend if he expected Plaintiff 1 to spend \( c_1 = 0 \)? It is not hard to see that Plaintiff 2 would, in fact, spend \( c_2 = 40 \). When \( c_1 = 0 \), Plaintiff 2’s expected net return at trial is \( c_2/(c_2 + 80)]180 - c_2 \), so his incentives are identical to what they would be in the case of purely independent actions.

\(^{44}\) There is a theoretical justification for focusing on the symmetric outcome: when the litigation efforts of the two plaintiffs are close but not perfect substitutes for each other, there is a unique symmetric equilibrium of the game. In the limit as the investments become closer and closer substitutes, the equilibrium that converges to \( c_1 = c_2 = 20 \). In the technical appendix, we show that when there are less-than-perfect spillovers there is a unique equilibrium for where \( c_1 = c_2 = 40/(1 + \theta) \) where \( \theta < 1 \) captures the degree of spillovers between the claims. When \( \theta = 0 \), then \( c_1 = c_2 = 40 \) as we saw in the case of independent actions. When \( \theta \) approaches 1, so the litigation efforts of the two plaintiffs become closer substitutes for one another, the equilibrium outcome remains unique and converges to \( c_1 = c_2 = 20 \). In this sense, the existence of multiple equilibria when \( \theta = 1 \) is a knife-edged result. Therefore we believe it makes sense to focus on the unique symmetric equilibrium with perfect spillovers.

\(^{45}\) The investment level that minimizes this expression is \( c_d = \sqrt{2(c_1 + c_2)x} - (c_1 + c_2). \)
before, this stems from the fact that the defendant reaps the gains from his investments in two lawsuits instead of just one.

When \( c_1 = c_2 = 20 \), so \( c_1 + c_2 = 40 \), the defendant’s optimal litigation expenditure is \( c_d = 80 \), the same as in the case of independent actions. Although the plaintiffs enjoy economies of scope, they spend only half as much as they did under independent actions. These two effects exactly offset one another, and the defendant’s incentives are unchanged; he chooses \( c_d \) to minimize his expected payments, \( 2[(20 + 20)/(20 + 20 + c_d)]x + c_d \), as before.

**Nash Equilibrium**

In the Nash equilibrium of our numerical example, the plaintiffs spend \( c_1 = c_2 = 20 \) and the defendant spends \( c_d = 80 \). With spillover actions, the plaintiffs jointly spend the same amount of money that just one plaintiff would have spent with an individual action. To put it another way, holding the expenditures of the defendant fixed, each plaintiff spends just half as much with spillover actions as they would under independent actions. The plaintiffs certainly benefit from the litigation cost savings, relative to the scenario with no spillovers at all.

But the outcome at trial remains asymmetric with the plaintiffs winning less than half the time. Indeed, the probability that a plaintiff will prevail, \((20 + 20)/(20 + 20 + 80) = 1/3\), is exactly the same as in the previous section on independent actions. The presence of perfect spillovers by itself does not eliminate the asymmetry between the plaintiffs and the defendant.\(^{46}\) When the plaintiffs choose their investments on a decentralized basis to maximize their individual returns, there is a free-rider problem where the plaintiffs invest too little (relative to what would be jointly optimal). The defendant retains a strategic advantage in litigation.

3. **JOINT ACTION SCENARIO**

With joint actions, we assume that the plaintiffs enjoy the benefits from both perfect spillovers between the claims and centralizing the choice of legal expenditures \( c_1 \) and \( c_2 \) to maximize their joint return from litigation.\(^ {47}\) Note that the plaintiffs spend more money here, in

\(^{46}\) More generally, each plaintiff spends half of what they spent in the case of individual actions, \( c_1 = c_2 = x/9 \), while the defendant spends exactly the same amount as before, \( c_d = 4x/9 \). Since the aggregate spending of the plaintiffs is \( c_1 + c_2 = 2x/9 \), the probability that each plaintiff is unchanged from the previous case, \( 1/3 \).

\(^{47}\) It is shown in the appendix that given damages \( x \) and defense spending \( c_d \), the plaintiffs would jointly want to spend \( c_1 + c_2 = \sqrt{2c_dx} - c_d \). The defendant would want to choose to spend \( c_d = \sqrt{4c_dx} - 2c_p \) if he expects the plaintiffs to spend \( c_1 = c_2 = c_p \). In the Nash equilibrium of the game, the plaintiffs spend \( c_1 = c_2 = x/4 \), so \( c_1 + c_2 = x/2 \), and the defendant spends the same amount, \( c_d = x/2 \).
aggregate, than they did in the two previous cases. There is clear intuition for this result. With spillovers, the marginal joint incentive to invest in litigation is higher than in the case of no spillovers, since a dollar of spending raises the probability of winning in two lawsuits instead of one. Furthermore, with centralized decision making by the plaintiffs, the natural temptation of the plaintiffs to free ride on the efforts of the other – an important issue in the case of spillover actions – is controlled. With perfect spillovers and centralized decision making, the playing field is leveled; the probability that the plaintiffs will prevail at trial is 1/2.

**Plaintiff Investment Incentives**

Suppose the plaintiffs choose their investments, $c_1$ and $c_2$, to maximize their joint expected return:

$$2 \left( \frac{c_1 + c_2}{c_1 + c_2 + c_d} \right) x - c_1 - c_2. \tag{9}$$

Suppose, as in the previous two sections, that $x = 180$ and the defendant spends $c_d = 80$. If the plaintiffs each spend $c_1 = c_2 = 40$ each plaintiff’s probability of prevailing would be $(40 + 40)/(40 + 40 + 80) = .5$. The expected joint payoff for the plaintiffs $2(.5)(180) - 40 - 40 = 180 - 80 = 100$ in this numerical example. In contrast to the logic of the previous section on spillover actions which explored individual incentives and showed that the plaintiffs would reduce their individual spending below $c_1 = c_2 = 40$, now the two plaintiffs have a joint incentive to raise their aggregate level of litigation spending above $c_1 + c_2 = 80$. To see why, suppose that $c_1 + c_2 = 81$. The probability that a plaintiff will prevail at trial is now $(81)/(81 + 80) \approx .503 > .5$. The expected damage awards for the two plaintiffs would then rise from $2 \times (.5)(180) = 180$ to $2 \times (.503)(180) = 181.1$. The marginal increase in the expected damage award, 1.1, exceeds the marginal cost of the extra dollar of litigation spending. So if the plaintiffs expect the defendant to spend $c_d = 80$, the plaintiffs would want to spend more than 80, in aggregate. In fact, the plaintiffs would raise their joint investments to almost 90 here.48

**Defendant Investment Incentives**

As in the previous sections, the defendant chooses his investment to minimize his total expected payments,

$$2 \left( \frac{c_1 + c_2}{c_1 + c_2 + c_d} \right) x + c_d. \tag{10}$$

Note that this expression is exactly the same as expression (8) for spillover actions. He will choose to invest to the point where the marginal benefit of that investment, the reduction in the

---

48 The plaintiffs would spend $c_1 + c_2 = \sqrt{2c_d x} - c_d = \sqrt{2 \times 80 \times 180} - 80 \cong 89.7$. 25
probability that the plaintiffs will prevail multiplied by the damage award, is exactly offset by the marginal cost.

Although expression (10) is the same as before, it should be clear that defendant’s expenditures are likely to differ. With spillover actions, we verified that in the Nash equilibrium the plaintiffs would choose to invest \( c_1 + c_2 = 40 \) and the defendant invested \( c_d = 80 \). With joint actions, the plaintiffs are likely to invest significantly more. Suppose that the defendant expects the plaintiffs to spend \( c_1 + c_2 = 90 \). Would the defendant want to spend more than \( c_d = 80 \)? If the defendant raised his expenditure from 80 to 90, the probability that a plaintiff will prevail falls from 53 percent to 50 percent. The corresponding expected damage payments would fall from \( 2(.53)(180) \approx 191 \) to \( 2(.5)(180) = 180 \). The benefit for the defendant, a reduction in the damage award of almost 11, outweighs the additional cost. One can verify that \( c_d = 90 \) is the optimal level of investment for the defendant in this case.

**Nash Equilibrium**

When the plaintiffs form a joint action, the Nash equilibrium of the contest between the defendant and the two plaintiffs leads to an equilibrium where the plaintiffs spend \( c_1 + c_2 = 90 \) and the defendant spends \( c_d = 90 \).\(^{49}\) Knowing that the plaintiffs have an incentive to spend more in a joint action than in the previous case of a spillover action, defendant increases his expenditures too.\(^{50}\) It follows that a plaintiff’s likelihood of winning at trial is equal to 1/2. With perfect spillovers and joint decision making, the plaintiffs are no longer at a strategic disadvantage relative to the defendant.\(^{51}\)

4. **SUMMARY OF RESULTS**

Figure 6 summarizes the results elaborated in Part III for the example where \( x = 180 \).

\(^{49}\) With perfect spillovers and joint decision making, we have that \( c_1 + c_2 = 90 \) is jointly optimal for the plaintiffs. They may achieve this in a variety of ways, including contractual obligations between the two plaintiffs or by a formal joinder with limitations on the ability of a player to opt out. The allocation of litigation costs, \( c_1 + c_2 = 90 \), between the two players would be the subject of negotiation.

\(^{50}\) The defendant’s best response or reaction curve is upward sloping in the relevant range, suggesting strategic complementarity of the investment decisions.

\(^{51}\) It is important to note, however, that relative to spillover actions, the incremental spending is much higher for the plaintiffs than for the defendant. In the example, plaintiffs spend a total of 50 more with joint actions, compared to the defendant’s incremental expenditure of 10. This is a general result due to the first-order effect from plaintiffs overcoming structural barriers to their fully capturing the benefits from spillovers and centralized investment decisions.
IV. Extension of Basic Analysis

In this Part we extend application of the model on several dimensions. First we show that as the number of plaintiffs suing separately increases so does the degree of structural bias against them. More precisely, in the limit as the number of plaintiffs becomes large, the separate claims become essentially worthless. We then include fixed costs of bringing suit, introducing the possibility of negative expected value (NEV) claims. Notably, we show that the defendant’s variable investment advantage in separate actions can drive the potential recovery of separate actions below the fixed cost, converting otherwise economically viable cases into claims with negative expected value. By enhancing (not simply aggregating) the expected value of the plaintiffs’ claims, joint action overcomes the fixed cost obstacle. Next we examine how the structural bias favoring defendants in separate actions operates to skew settlement outcomes and shape bargaining strategies. Finally, assuming sequential instead of simultaneous expenditures on litigation, we describe the parties’ phased investment strategies. Importantly, we highlight the overpowering effect of the defendant sinking (or credibly committing to sink) its aggregate investment at or before the start of the common question litigation.

1. More Plaintiffs Suing Separately Means More Structural Bias Against Them

The structural bias favoring defendants in common question litigation becomes even more pronounced as the number of plaintiffs suing separately grows larger. Suppose that there are one hundred plaintiffs in total instead of just two pursuing common question claims in independent actions. As before, each plaintiff has a claim with damages of 180.\(^2\) If the

\[ c_d = \sqrt{Nc_pX} - c_p. \]

Solving these equations simultaneously gives

\[ c_d = \frac{N}{(N + 1)^2} x \]

Suppose there are \( N \) plaintiffs with damages of \( x \) each. As before, if a plaintiff believes that the defendant will spend \( c_d \), the plaintiff will spend \( c_p = \sqrt{c_dX} - c_d \). If the defendant expects that the plaintiffs will spend spend \( c_1 = c_2 = \cdots = c_N = c_p \), then the defendant will spend \( c_d = \sqrt{Nc_pX} - c_p \). Solving these equations simultaneously gives \( c_d = \frac{N}{(N + 1)^2} x \) and
defendant expected the plaintiffs to spend 40 each as they did before, the defendant would spend over 800 defending against the claims. The defendant’s incentive to spend is stronger since every dollar spent impacts the outcome of 100 cases instead of just 2. Anticipating that the defendant’s incentives to invest are stronger than before, the plaintiffs will scale back on their individual investments. In the new Nash equilibrium, the plaintiffs spend about 1.8 each and the defendant spends approximately 176. The probability that a plaintiff will win at trial is about 1%, much lower than before, and a plaintiff’s net return is negligible, just under .02.  

<table>
<thead>
<tr>
<th>Aggregate Litigation Expenditures</th>
<th>Plaintiff Win Rate</th>
<th>Net Return (average per claim)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaintiffs</td>
<td>Defendant</td>
<td>Plaintiffs</td>
</tr>
<tr>
<td>Non-Common Question Litigation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45×100 = 4500</td>
<td>4,500</td>
<td>50%</td>
</tr>
<tr>
<td>Independent Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.76×100 = 176</td>
<td>176</td>
<td>1%</td>
</tr>
<tr>
<td>Spillover Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>.0176×100 = 1.76</td>
<td>176</td>
<td>1%</td>
</tr>
<tr>
<td>Joint Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4,500</td>
<td>4,500</td>
<td>50%</td>
</tr>
</tbody>
</table>

Figure 7: Summary of Results for One Hundred Plaintiffs

2. **Fixed Costs, Negative Expected Value Claims, and Incentives to Sue**

Up until this point, our analysis has ignored the fixed costs of litigation. Our model treated all costs as variable in the sense that the litigants could scale their expenditures up or down continuously in light of the stakes of the case and the expenditures of the other litigants; if a case had very low damages, then the plaintiffs and the defendant would spend proportionately less money in equilibrium. Even in situations with extreme structural bias (as in the example with 100 plaintiffs pursuing independent actions), plaintiffs’ claims always had positive expected value and no case was “too small” to be pursued. This section introduces fixed costs and the presence of negative expected value (NEV) claims. We show that if plaintiffs proceed by separate actions, instead of a joint action, the defendant uses its variable investment advantage to

\[ c_p = \frac{N}{(N+1)^2}x. \] The plaintiff win rate is \(1/(1+N)\) and a plaintiff’s net return is \(x/(1+N)^2\).

\[ c_d = \frac{N}{(N+1)^2}x. \] The plaintiff win rate is still \(1/(1+N)\) but a plaintiff’s net return is higher, \(Nx/(1+N)^2\). When \(N = 9\), the plaintiff’s net return is 16.2. When \(N = 99\), the plaintiff’s net return would fall to 1.8.

\(^{53}\) The plaintiffs are better off with spillover actions, since they will spread the litigation costs among themselves in equilibrium. Instead of spending \(\frac{N}{(N+1)^2}x\) each, they will each spend \(\frac{1}{(N+1)^2}x\). The defendant’s expenditure is the same as for independent actions, \(c_d = \frac{N}{(N+1)^2}x\). The plaintiff win rate is still \(1/(1+N)\) but a plaintiff’s net return is higher, \(Nx/(1+N)^2\). When \(N = 9\), the plaintiff’s net return is 16.2. When \(N = 99\), the plaintiff’s net return would fall to 1.8.
transform such claims into worthless NEV claims. Thus, the defendant is shielded from suit. We show that joint actions, including the class action mechanism, can transform this previously unrecognized type of NEV claim into a viable one by increasing the plaintiffs’ expected recovery at trial.

NEV claims are conventionally defined as claims that the plaintiff finds not worth filing because the estimated fixed cost of litigation exceeds the expected recovery from litigating the individual claim. Even the current federal court filing fee of $300 would render many small claims unmarketable to plaintiff attorneys as separate actions.54 Many commentators have argued that the class action mechanism can solve the problem of NEV claims by enabling plaintiffs to spread the fixed cost of suit across numerous aggregated small claims.55 (The plaintiffs, for example, could share the $300 federal filing fee.) These accounts only considered the effect of the class action on the plaintiffs’ fixed costs of litigation and did not consider the effect of the class action on the plaintiffs’ expected recoveries at trial. By focusing the comparison on expected recovery to fixed cost rather than to variable cost, the conventional analysis of the role of class action in solving the problem of NEV claims greatly underestimates both the magnitude of the problem and the utility of the solution.

In our analysis, the class action mechanism can solve the problem of NEV claims by increasing the plaintiffs’ recoveries at trial. Consider the example from the last section with 100 plaintiffs, each of whom had a claim with damages of $180. Suppose that in addition to any variable costs of litigation, each plaintiff needs to pay a $2 fixed cost to bring suit. Imagine further that this $2 per plaintiff cost is the same whether the litigation proceeds by independent action, spillover action, or joint action (so there is no fixed cost spreading). We can see in Figure 7 that this seemingly small fixed cost is larger than the net returns of .02 and 1.7 for the independent action and spillover actions cases, respectively. The defendant’s variable cost advantage creates a barrier to suit for these separate actions. It is only with joint actions that the net return exceeds $2 and the plaintiffs would find it worthwhile to sue.56 Thus, by solving the free-rider problem, joint actions can turn NEV claims into PEV claims. Note again that our argument does not rely on the class actions spreading the fixed costs of litigation among the

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54 Such costs would effectively bar many consumer fraud, environmental, and other small claim cases brought as separate actions. See e.g., Mobility LLC v. Concepcion, 131 S.Ct. 1740, 1751 (2011) (involving millions of consumer fraud claims for $32 each).

55 Carnegie v. Household International, Inc., 376 F.3d 656, 660 (7th Cir. 2004) (Posner, J. observing that the “realistic alternative to a class action is not 17 million individual suits, but zero individual suits, as only a lunatic or a fanatic sues for $30.”).

56 If the defendant credibly committed to spend more than the optimal amount, all plaintiffs might well be left with NEV claims even in the absence of fixed costs.
plaintiffs. Instead, it hinges on the improvement of the plaintiffs’ investment incentives and the resulting enhancement of their expected trial recoveries.

3. OUT-OF-COURT SETTLEMENT

The main analysis of our paper proceeded under the assumption that all cases go to trial. Although the litigants could modify their levels of investment in anticipation of trial, they could not avoid these costs altogether through settlement. This assumption is admittedly strong; in practice, most cases can and do settle out of court. It is important to emphasize that the key results of our analysis, namely the existence of a structural bias that operates in favor of defendants in common-question litigation, is robust to the possibility of out-of-court settlement. The parties’ settlement contracts would reflect the underlying fundamentals of the case, the mode of action, and the parties’ rational expectations of the investment incentives created by these factors. Since the plaintiffs are at a disadvantage when proceeding separately, they would likely settle their claims for less than they would under a joint action.

To see how this would work in our model, suppose first that the plaintiffs are pursuing a joint action against the defendant. As summarized in Figure 6, when the damages are $x = 180$ for each plaintiff, then we saw that each plaintiff would spend $45 and the defendant would spend $90, and the corresponding probability of winning was one half. Each plaintiff received a net return of $(1/2)(180) - 45 = 45$, and the defendant made total payments of $(1/2)(180) + (1/2)(180) + 90 = 270$, or $135$ per plaintiff. In a world with frictionless bargaining, we would expect the plaintiffs to settle out of court for an amount between $45$ and $135$ each. The level of the settlement would depend on the bargaining power of the two sides. If the defendant had all of the bargaining power and could make take-it-or-leave-it offers, the settlement would be close to the lower bound of $45$. If the plaintiffs had all of the power, on the other hand, then the settlement would be near the top of the range, or $135$.

Suppose instead that the plaintiffs are pursuing independent actions against the defendant. The plaintiffs would spend $40 each, the defendant would spend $80, and the corresponding probability of winning would be one third. Each plaintiff would receive a net return of $(1/3)(180) - 40 = 20$, and the defendant’s total net payments would be $(1/3)(180) + (1/3)(180) + 80 = 200$ or $100$ per plaintiff. Note that the associated bargaining range with independent actions, $[20, 100]$, is lower than the bargaining range for joint actions, $[45, 135]$, reflecting the structural bias that favors the defendant. Therefore we would expect that the settlement value to be lower as well.

The possibility of settlement does raise a number of interesting and subtle issues. In particular, when one plaintiff in common-question litigation with independent actions settles out of court, then the remaining plaintiff’s case would be transformed into a non-common question case. Facing one plaintiff instead of two, the defendant will rationally choose to reduce its
litigation expenditures below the level chosen in common-question litigation. This clearly benefits the remaining plaintiff, who receives a net return of 45. To put it somewhat differently, the decision of one plaintiff to settle out of court confers a positive externality on the remaining plaintiff. An important insight emerges: A plaintiff may be reluctant to accept a settlement offer if that plaintiff believes that other plaintiffs will settle out of court.

To see this more concretely, suppose that before the litigants make their investment decisions, the defendant offers to settle with each plaintiff for $21. Figure 8 represents the plaintiffs’ decisions to accept or reject settlement offers as a simple game. If both plaintiffs accept the settlement offers, they each get $21 as shown in the upper left of the table. If both plaintiffs reject the settlement offers, the plaintiffs proceed with their independent claims and receive net returns of $20, as shown in the lower right of the table. If one plaintiff accepts and the other rejects, the plaintiff who accepts gets $21 and the other plaintiff gets $45.

<table>
<thead>
<tr>
<th>Plaintiff 1’s Decision</th>
<th>Accept</th>
<th>Reject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accept</td>
<td>$21</td>
<td>$45</td>
</tr>
<tr>
<td>Plaintiff 2’s Decision</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accept</td>
<td>$21</td>
<td>$21</td>
</tr>
<tr>
<td>Reject</td>
<td>$45</td>
<td>$20</td>
</tr>
</tbody>
</table>

Figure 8: Settlement of Common Question Litigation

Would the plaintiffs accept the settlement offers of $21 each? The answer is “No.” If the first plaintiff accepted the settlement offer of $21, the second plaintiff would be in the enviable position of having a non-common question claim that is worth $45. So that second plaintiff would surely be better off rejecting the offer of $21. It is also not an equilibrium for the plaintiffs to both reject the settlement offers. If the first plaintiff rejected the $21 settlement offer, then the second plaintiff would rather accept the offer of $21 than receive a net payoff of $20 from a common-question independent action. In the Nash equilibrium, one plaintiff accepts the $21 settlement offer and the other plaintiff rejects it and receives a payoff of $45.\(^{57}\) Note that the plaintiffs are receiving more in settlement than they would if they went to trial. In this sense,

\(^{57}\) There is also a mixed-strategy equilibrium where the two players randomize between accepting and rejecting.
settlement may shift power back to the plaintiffs and mitigate the structural bias favoring the defendant.\footnote{58}

4. THE TIMING OF LITIGATION EXPENDITURES

The main analysis of our paper has assumed that the players, the plaintiffs and the defendant, all chose their litigation expenditures simultaneously. This section explores what would happen if instead the players chose their expenditures in sequence. Two alternatives will be explored. In the first, the defendant commits to its expenditures first and, after observing the defendant’s choice, the plaintiffs simultaneously choose how much they will invest. Second, we will see what happens when the plaintiffs choose their investments in sequence.

a. The Defendant Sinks Litigation Expenditures First

Recall that with common-question litigation, the defendant was at a structural advantage when the plaintiffs engaged in independent or spillover actions. With independent actions, for example, the plaintiffs spent \( c_p = 40 \) each and the defendant spent \( c_d = 80 \), yielding a probability of winning of \( 1/3 \). The defendant’s total payments were \( (1/3) (180) + (1/3) (180) + 80 = 200 \), and the net return of each plaintiff was \( (1/3)(180) – 40 = 20 \).

The defendant’s structural advantage in common question litigation is strengthened when the defendant can sink its litigation expenditures before the plaintiffs. In the example, the defendant would raise his level of spending dramatically, investing \( c_d = 180 \) instead of 80. Such a show of strength on the part of the defendant would render the plaintiffs’ investments worthless, and the plaintiffs would spend nothing at all.\footnote{59} The defendant’s total payments, the

\footnote{58} Although this settlement result increases the net aggregate payoff to plaintiffs in separate actions, it falls short of the net aggregate payoff as well as potential deterrence benefits achieved in a joint action. Moreover, it is unlikely plaintiffs will be able to pursue the separate-action settlement result in practice. Anticipating that it may have to pay more in the remaining case, the defendant might well reject piecemeal settlement. This may explain the defendant’s support for settlement-only class actions that condition settlement on a super majority of plaintiffs accepting its terms or inclusion of a “most-favored- nation” clause in an earlier settlement agreement that prevents the defendant from paying more to the plaintiff in a later settlement. See Spier (2003) Also, as we explain below, to avoid bearing higher costs from a partial settlement scenario, the defendant may refuse to settle out of court until it has fully invested in or credibly committed to developing its aggregate defense as if plaintiffs would prosecute all claims to trial. It also might adopt a further strategy of “cherry picking” the highest value claims for out of court settlement, while exploiting its structural advantage against the remaining, lower value claims.

\footnote{59} If the plaintiff spent \( c_p = 0 \), the probability of winning would be \( 0/(0 + 180) = 0 \) and the plaintiff’s net return would be 0 as well. If the plaintiff invested even a modest amount, say \( c_p = 10 \), the net return would be negative. The probability of winning would rise from 0% to \( 10/(10+180) = 5.3\% \) and the expected damage award would rise to 9.7, but this benefit is smaller
litigation expenditures of 180 with no additional liability, are smaller than his total payments with simultaneous investments, 200. Thus, the defendant can achieve a first-mover advantage in common question litigation with independent and spillover actions.

The defendant does not gain a first-mover advantage when the plaintiffs pursue their cases in a joint action, however. Recall that with simultaneous investments, the defendant spent $c_d = 90$ and the plaintiffs spent $c_1 + c_2 = 90$. If the defendant were to commit to spend $c_d = 180$ in a joint action, the plaintiffs would respond by lowering their joint expenditures to approximately 76, not all the way down to zero. The benefit to the defendant from the reduced liability would fall far short of the additional investment costs in this case. Intuitively, with a joint action, the plaintiffs choose their investments cooperatively to maximize their joint return. As a consequence, the plaintiffs are less inclined to back off when the defendant takes aggressive actions, diluting the incentives of the defendant to take aggressive actions to begin with.\footnote{60}

b. The Plaintiffs Choose Their Litigation Expenditures in Sequence

Thus far, we have assumed that the plaintiffs choose their investments simultaneously. This is admittedly a strong assumption. In practice, lawsuits involving common questions may arise sequentially. Moreover, even in cases with simultaneous actions, litigants can often control the timing of their investment decisions. In this section, we will explore the implications of alternative timings of the investment decisions for common question litigation with spillover actions. What would happen if the Plaintiff 1 must commit to an investment $c_1$ first, before Plaintiff 2 chooses $c_2$? Would Plaintiff 1 be at an advantage or disadvantage as the first mover?

With spillover actions, recall that if $c_d = 80$ then the plaintiffs, choosing investments simultaneously, would invest $c_1 + c_2 = 40$. Multiple equilibria that could arise in this situation satisfying the property that $c_1 + c_2 = 40$, but we focused on the symmetric Nash equilibrium where each plaintiff spent 20.\footnote{61} If Plaintiff 1 could move first in this scenario, committing its investment before Plaintiff 2, then Plaintiff 1 would commit to invest nothing at all, $c_1 = 0$. than the additional cost so the plaintiff will spend 0. One can show this result generally. Anticipating that the plaintiffs will spend $c_1 = c_2 = \sqrt{c_d x} - c_d$, the defendant will choose his expenditure to minimize his total payments, $2[(\sqrt{c_d x} - c_d)/\sqrt{c_d x}]x + c_d = 2(x - \sqrt{c_d x}) + c_d$. The derivative of the first term, $\sqrt{x/c_d}$, is the marginal benefit of investment and the marginal cost is 1. This marginal benefit is smaller than one for all $c_d < x$. Therefore the defendant would invest $c_d = x$ and the plaintiffs will invest $c_1 + c_2 = 0$.

\footnote{60} It can be shown that with joint actions, the sequence of moves has no affect on the equilibrium outcome. The defendant spends $c_d = x/2$ and the plaintiffs spend $c_1 + c_2 = x/2$ as well.

\footnote{61} There are also mixed strategy equilibria.
Plaintiff 1 would do this rationally, anticipating correctly that when Plaintiff 2’s turn came to invest, that Plaintiff 2 will invest \( c_2 = 40 \). In other words, when investing sequentially, the first plaintiff would choose to free ride on the efforts of the second plaintiff.\(^{62}\) Although Plaintiff 1 is certainly at an advantage in this situation, the implications concerning the defendant’s incentives, the structural bias in common question litigations, and deterrence are unchanged.

The outcome in the last paragraph relied on the assumption that the first plaintiff’s decision not to invest was binding and irreversible. Each plaintiff had exactly one opportunity to invest and then the game ended. If the first plaintiff could revise his investment decision after seeing what the second plaintiff did, and the second plaintiff could revise his decision after seeing the reaction of the first plaintiff, and so on and so forth then interesting dynamics could emerge. The plaintiffs might try to jockey to be in the position of investing nothing, each attempting to free-ride on the investments of the other. The game would resemble a game of “chicken,” where each hopes that the other plaintiff will “flinch” first, and invest heavily in pursuit of the common questions. However, if there were a point in time that represented the very last chance for the plaintiffs to invest – the proverbial 11\(^{th}\) hour – then the game would resemble the simultaneous move game explored earlier. In any case, the defendant would maintain (and given plaintiffs’ additional expenditures to play “chicken,” increase its) structural advantage in common question litigation with spillover actions.

V. Social Welfare Implications

Having shown the structural bias entailed by the choice to use separate actions rather than joint actions to resolve common question litigations, we are now in a position to comment on its social welfare implications. Based on the implicit social objective of minimizing total accident costs, we consider the effects of the different modes of action on two major factors: litigant expenditures and deterrence.

1. Litigant Expenditures

Our model has important insights regarding the level of total litigation spending. Figure 6 shows that the level of plaintiff spending in spillover actions is only half that in the case of independent actions without spillovers. The lower spending level associated with spillover actions reflects greater social efficiencies – the plaintiffs are able to achieve the same win rate of 1/3 by spending half as much as they did with independent actions. In other words, plaintiffs benefit from spillovers because they can avoid the duplication of effort. Importantly, however, spillover actions do not by themselves solve the free-rider problem among the plaintiffs. The plaintiffs spend considerably more to litigate the common questions in joint actions. The reason

\(^{62}\) This would, in fact, be the unique subgame perfect equilibrium of the game.
is straightforward: in contrast to independent and spillover actions, joint actions totally collectivize the stakes for both parties and fully enable them to exploit spillovers and centralize investment decisions to maximize their joint return from litigation.\(^{63}\)

It is important to note that the plaintiffs are better off with their higher spending levels in joint actions than they are in separate actions. Indeed, in joint actions the plaintiffs centralize and optimize their investments to maximize their net returns at trial. Thus, when the plaintiffs employ a joint action, the enhanced gross return at trial, necessarily exceeds any increased litigation expense.\(^{64}\) Of course, from an individual and social welfare perspective, the litigants – that is the plaintiffs and the defendant together – would be better off collectively if they could all agree to spend less money and achieve the same outcome at trial.\(^{65}\)

\(^{63}\) The reality of the central conclusion that litigants spend more in joint actions than in separate actions can be inferred from the calculation of court-awarded fees in consolidated and class actions. In such actions courts compensate the attorney’s expenditure of many more hours than he or she would spend in a separate action, implying that the greater investment is reasonably necessary to maximize the aggregate recovery. Thus a court might find, for example, that the attorney who would work for 100 hours at $250 per hour in each of 80 separate actions should be compensated for investing 10,000 hours at $250 per hour given the aggregate stakes in the joint action involving 80 plaintiffs.

\(^{64}\) It is also reasonable to assume that the defendant’s increased spending in a joint action is more than offset by greater net return in its total liability and litigation cost. To be sure, the defendant may well end up bearing greater liability and damages in a joint action compared to what it would payout in structurally biased separate actions. But, we emphasize, joint action does not imply inefficiency in the defendant’s expenditures. Doubtless, if they had the final say over the convening of a joint action, defendants would usually deny it in favor proceeding by structurally biased separate actions. Generally defendants have no such power; the decision to convene a joint action is largely for plaintiffs or courts to make. Recently, however, the Supreme Court has created an important and expansive exception for businesses to use arbitration agreements not only to preclude consumers and others from suing the firms in court, but also to preclude arbitrators from using class action to resolve the claims. See, AT&T Mobility LLC v. Concepcion, 131 S. Ct. 1740, 1751 (2011). Notably, neither the majority nor dissent in the case discussed the ruling’s structurally biasing effects in arbitration.

\(^{65}\) Recall that the litigation contest has the structure of a prisoners’ dilemma. If the plaintiffs and the defendant somehow could agree to reduce their litigation spending to, say, 10 each, then they both would be better off. The probability of prevailing would still be 50%, but the plaintiffs’ aggregate net return would be 50% (180) + 50% (180) – 10 = 170, while the defendant’s net return would be the sum of −50%(180), – 50%(180), – 10 = – 190. This would be true more generally for any continuous contest success function, \(p(c_p, c_d)\), that is increasing in \(c_p\) and falling in \(c_d\). Given any two investment levels, it is possible to reduce both investments while leaving the probability unchanged. In this regard, it is useful to note that one of the social benefits of
Finally, although plaintiffs and probably the defendant will spend more in a joint action to litigate the common questions than they would in separate actions, the incentives we investigate relate solely to the **variable costs** of litigation. A major benefit of joint actions, particularly in large scale litigations, is enhancing scale economies by avoiding **fixed, claim-specific costs**. Without joint action, both parties would in reality incur greater cost of having to redundantly litigate common questions in multiple separate actions typically conducted in widely dispersed venues across the country and in many cases across time as well.\(^{66}\)

Dispersed separate actions have other costs, including their deliberate strategic use by the parties to impose financial and other burdens on each other.\(^{67}\) Whether these savings from scale economies outweigh the additional litigant investments in joint actions is an empirical question and unlikely to yield a systematic answer.\(^{68}\)

2. **Deterrence**

Although joint actions may result in higher litigant expenditures – a social cost – these costs may be outweighed by the social benefit of greater deterrence. Recall that in the separate action scenarios, the defendant’s investment advantage enabled it to limit a given plaintiff’s joint action is the enhanced managerial power of courts to streamline the modes of proof and other aspects of the proceedings. See e.g., Federal Rule of Civil Procedure, Rule 23 (d) (1) (“the court may make appropriate orders … determining the course of the proceedings or prescribing measures to prevent undue repetition or complication in the presentation of evidence or argument”).

\(^{66}\) The fixed costs would range from claim filing fees to repeated direct- and cross-examinations of the same expert testimony. See e.g., Carroll et al. (2005) (reporting the tens of billions in redundant expenditure of private and public resources in decades long asbestos litigation). Economies of scale also accrue to the public in joint actions as fewer courts will be needed to resolve the litigation. However Rosenberg (2002b) notes that joint actions may lead courts to invest more judicial resources in fully exploiting spillovers and centralized investments to maximize the social benefits of adjudicating common question claims.

\(^{67}\) Although a supposed benefit of redundant separate actions is their utility in reducing the risk of outlier judgments, see e.g., In re Bridgestone/Firestone, Inc., Tires Prods. Liab. Litig., 288 F.3d 1012 (7th Cir. 2002), Hay & Rosenberg (2000) point out that this benefit can be obtained within the class action framework. They propose use of sampling claims in class actions to reduce the parties’ risk-bearing costs while affording plaintiffs the same opportunity the defendant has to fully exploit spillovers and centralized investments in making their case on the common questions.

\(^{68}\) Indeed, the lure of such savings may well induce a defendant to forsake its litigation advantage in separate actions and to support (or at least not oppose) plaintiffs’ or even to independently request that a court exercise its discretionary power in favor of ordering a joint action.
chance of winning to 1/3 compared to the joint action scenario of symmetrical investment incentives where the plaintiffs’ chance of winning increased to 1/2. The adverse deterrence effect of this structural bias in separate actions is apparent. Given that achieving optimal deterrence of unreasonable risk by means of civil liability requires the targeted risk-taker to internalize the total social costs of accident, structurally biasing the outcome of litigation in defendant’s favor will on average dilute the needed threat of liability and hence the risk-taker’s incentives to take needed precautions. With symmetric investment incentives in joint actions, plaintiffs can fully exploit spillovers and centralized investments to maximize aggregate return that will all else equal, increase defendant’s total costs from liability and litigation and create greater deterrence in the process.

This point is readily illustrated by our basic example with two plaintiffs. Suppose that at an ex ante stage the defendant can either take no care at all yielding a 100% likelihood of harm to the two plaintiffs, or can spend $220 in precautions, totally eliminating the chance of harm. With no care, the plaintiffs’ expected accident losses in the case would be $180 + $180 = $360. Taking precautions is clearly efficient here – the $220 precaution cost is smaller than the $360 accident harms (not to mention the litigation costs associated with the lawsuits). Suppose that liability is governed by the negligence rule, so taking precautions completely shields the defendant from suit. If the defendant is negligent and claims pursued in separate actions, the defendant may still evade liability at trial through aggressive litigation spending. It is evident that the prosecution of negligence claims in that context would fail to achieve the deterrence objective. Facing a threat of expected liability for damages of 120 plus litigation costs of 80, a total civil liability related cost of 200 (see Figure 6), the defendant would lack sufficient incentives to reasonably reduce the risk of accident. By comparison, if the defendant anticipated being sued by plaintiffs in a joint action, it would face a threat of aggregate liability for damages of 180 plus litigation expenditures of 90 for a total civil liability related cost of 270, which serves as sufficient sanction to motivate its taking socially appropriate care. Increased deterrence reduces total social costs in the example from 480 (120 total litigation costs + 360 accident costs) given spillover actions to 220 (the precaution costs alone) when the common question litigation would proceed by joint action.

The problem of under-deterrence tends to grow more severe with the filing of each new claim. If only one plaintiff files a claim, then the defendant would have zero advantage. When a second claim is filed the defendant is motivated to spend twice as much the plaintiffs do jointly in spillover actions. With one hundred plaintiffs bringing spillover claims, the defendant would spend 100 times more than the plaintiffs’ joint spending, rendering the spillover claims virtually worthless (see Figure 7). And, as discussed above, when there are numerous claims and claim-specific fixed costs of filing suit, uncoordinated simultaneous as well as sequential filings of some fraction would at some point lower the probability of success so far as to render prosecution of the remaining fraction uneconomical, negative expected value claims.
That joint action operates unconstrained by the structural bias and thereby increases deterrence relative to separate actions in common question litigations does not mean that the former should be used in place of the latter as a general matter. In essence, the joint action must yield a benefit of increased deterrence that exceeds its potential cost in greater litigant expenditures, including the volume of suit. Whether the deterrence payoff from joint action warrants its use will thus vary among types of common question litigations according to a ratio of the increased litigant expenditures to the incremental need for greater deterrence. Determining such greater need will require contextual assessment of a number of relevant factors, including the extent to which the risk is borne by the risk-taker, controlled by administrative regulation, liable to result in criminal sanctions, and would have repercussions in the marketplace.

VI. Concluding Comments

1. Separate Action Litigation of Common Question Claims in Reality

The formal analysis presented here is unapologetically stylized. The modes of action – independent actions, spillover actions, and joint actions – are rarely observed in their most pure forms. In independent actions plaintiffs often have access to much (if far from the most) important work product on the public record of judicial proceedings.\(^6\) The pure form of spillover actions depicted in the model where work product is transferred costlessly does not exist in reality, either. Arrangements for sharing important, non-public record work product are costly to negotiate, manage, and monitor, especially because they require the cooperation of rivalrous plaintiff attorneys who are competing against one another to increase their respective market shares of the common question claims. The need for such coordination also explains why the benefits of the spillover scenario depicted in the model are likely to far exceed those produced in reality. In the model the plaintiffs make uncoordinated, simultaneous investments that yield spillovers. Such a situation of blind expenditures by the plaintiffs might well lead in reality to the production of largely and possibly entirely duplicative work product. For example, plaintiffs’ uncoordinated respective investments in discovery might well involve seeking and obtaining the very same information from the defendant, which obviously does not qualify as a

\(^6\) Independent actions are likely to exist in the early phases of common question litigations when the number of claim filings is relatively low. See e.g., Smith v. Bayer Corporation, 131 S. Ct. 2368 (2011) (involving two class actions filed and litigated in different courts in the same state without either class counsel knowing of the other’s suit until the common defendant moved to preclude certification in one case based on prior denial of certification in the other).
spillover benefit across claims. Thus, the structural bias favoring defendants is likely to be greater in reality than in the formal analysis.

In reality, especially in large-scale common question litigations the defendant naturally starts off (often in anticipation of litigation before any plaintiff has sued and sometimes before any has threatened suit) from the dominant position of “de facto joint action” that enables it to fully exploit spillovers and centralized investments to maximize aggregate return from litigating the common questions in all claims it expects to face. Although claim-specific costs – e.g., for filing fees, local counsel, redundant preparation of discovery and motion papers – undermine somewhat these maximizing efficiencies, defendant will still possess considerable advantage over plaintiffs, who despite proceeding through voluntary, albeit costly, coordinating arrangements that achieve a significant degree of benefit from spillover and centralized investment will nonetheless probably remain in an inferior position throughout the litigation. This asymmetric investment advantage – with defendant spending to maximize aggregate return and plaintiffs spending to maximize some fractional return (in the limit, returns from their respective individual claims) – plays out to structurally bias outcomes on average in defendants’ favor. Indeed, when plaintiffs’ coordination costs are high, the defendant’s sinking of its aggregate investment at or before the startup of litigation can forestall the filing of claims altogether.

We believe that when considered in the realistic context of common question litigation, the arguments presented here have fundamental bearing upon, and therefore should figure more prominently in public policy debate about the design and use of class actions. Academic commentary and court opinions on the NEV claim portray the problem of plaintiff’s lack of incentive to invest in suit strictly in terms of fixed cost exceeding expected recovery. Virtually no attention is given to the role of variable expenditures, in particular to the crucial investment advantage of the defendant that biases outcomes in separate actions. As a result, the conventional understanding of NEV claims neglects a major source of the problem, understates its extent, and in consequence, fails to appreciate the utility of joint action as a solution. In other words, given the defendant’s asymmetric investment advantage in common question litigation, there will be many more uneconomical, NEV claims than those hobbled by fixed costs alone and the former claims devalued by structural bias should, as much as those blocked by fixed-cost, be regarded as candidates for class action treatment.

70 There could be informal coordination if the plaintiffs invested sequentially, for then each could capitalize on the other’s work product contribution. However, in addition to free-riding, there would be a first-mover problem, as discussed in Part IV. These complications would tend to exacerbate the structural bias identified here.

71 See e.g., Posner (2011); Mobility LLC v. Concepcion, 131 S. Ct. 1740, 1751 (2011); Wal-mart Stores, Inc., v. Dukes, 131 S. Ct. 2541 (2011).
2. **Net Deterrence Benefit from Joint Action**

Joint actions increase deterrence relative to separate actions. Whether this is desirable from a social welfare perspective hinges on whether the benefit of increased deterrence (namely the reduction in expected accident losses) outweighs any increase in variable litigation expenditures. In light of the informational burdens of making such a determination, it is doubtful that courts or legislatures could make refined judgments. They may, however, be able to make categorical determinations. The higher costs may generally outweigh the benefits in commercial contract cases in which sophisticated parties have ample incentive and contractual means to control the risk of harm to each other (see Hay et al., 2011) and in products liability for widely sold goods where safety is well-understood by consumers, publicity would trigger adverse consumer market reactions, and/or extensive federal and state regulation exists (see Polinsky and Shavell, 2010). Beyond the well-recognized cases in which sanctionable conduct by the defendant causes small harm to a large number of people who would not find it worthwhile to sue separately (as in Dam, 1975), joint actions might well yield significant net deterrence benefits in cases involving environmental pollution, civil rights, employment discrimination, securities fraud, mass tort and other claims that are typically laden with costly difficulties compounded by structural bias regarding proof of causation as well as defendant’s violation of the liability standard. In such cases, the deterrence benefit is a public good that privately financed plaintiffs will lack incentive to produce at the optimal level (Rosenberg, 1984).

3. **Mandatory Joint Action**

In cases promising a net deterrence benefit it may be socially desirable to mandate class, consolidated, or other joint action even when plaintiffs have not voluntarily convened one. Voluntarily joining multiple claims to effect full spillovers and centralized investment opportunities comparable to defendant’s advantages is an organizationally expensive enterprise that plaintiffs in many cases may find impractical or too costly to privately arrange. Obviously this is likely to be so in cases involving claims for small losses, the recovery of which would be largely consumed by the cost of an attorney’s effort to solicit them. Yet, efforts to voluntarily join large claims often encounter costly difficulties in negotiating and administering an agreement for allocating the burdens and payoffs among the plaintiffs and often their lawyers. These collective action problems grow as the number of plaintiffs increases, payoff and other differences among claims become more pronounced, and dispersion of claims across venues and times of accrual widens. Compounding these problems is the competition among plaintiffs’ attorneys for greater market share of claims that drives up the costs of claim-acquisition, moving first, free-riding, rent-seeking, and negotiating cooperative arrangements. Of course, the defendant’s asymmetric advantage increases as voluntary joinder becomes more expensive to accomplish.
Although plaintiffs’ voluntary joinder of their claims indicates, as we noted, that spending more on litigation makes them better off compared to their situation in separate actions, it does not necessarily follow that allowing them to “opt-out” from a joint action would be in their best interest or the interest of society. A plaintiff may give a personal reason for preferring to go it alone in a separate action, taking his or her lumps in the structurally biased process.\textsuperscript{72} In view of the consequences of facing the defendant’s superior litigation power, it is more likely that the expressed preference is not genuine but rather a pretext for free-riding on the joint action work product. There is also good reason to suspect that the plaintiff’s choice to opt-out results from inadequate or deceptive advice by an attorney whose profit from the litigation depends on representing an opt-out plaintiff. For the same reason that an investment asymmetry arises when plaintiffs proceed by separate actions, but not by joint action, so a given plaintiff will lack the incentives to spend adequately in comparatively evaluating individual to centralized investment returns from proceeding respectively in a separate versus joint action. Moreover, the plaintiff’s attorney might be tempted to provide less than forthright advice as centralized economics of joint action would likely reduce or eliminate the lawyer’s fee he or she would otherwise receive from a separate action.

From the social perspective, there is further reason for concern due to the fundamental divergence between the plaintiff’s and society’s incentive to use a costly civil liability system to resolve private party disputes. Society pursues deterrence benefits while the plaintiff, who captures little if any of that benefit, seeks mainly the private benefit of damages (or other privately valued remedies). Shavell (1997). This divergence in motive for suit may well lead a plaintiff to ignore the deterrence benefit in deciding whether he or she is best off by opting-out to reduce expenditures through free-riding in a separate action or spending more for greater return in a joint action.

\textsuperscript{72} When a large fraction of plaintiffs opt-out, the class action may unravel completely, subjecting plaintiffs to the defendant’s asymmetric investment advantage and its structurally biasing effects in the context of “independent” and “spillover” types of separate actions, as the model depicts in Part IV. More likely, however, a relatively small fraction of plaintiffs will opt-out, leaving the class action largely intact. In such a case, as we show, the defendant would be spending more in response to higher expenditure by plaintiffs in the class action than it would if all plaintiffs were to proceed in separate actions. Putting aside free-riding on the class action work product, plaintiffs who chose to opt-out would thus likely be made worse off if there was no class action and all of them prosecuted their respective claims in separate actions. The same reasoning applies to plaintiffs who opt to go it alone rather than contract with other plaintiffs to participate in informally arranged joint action.
VII. References


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VIII. Appendix

This appendix generalizes the intuitions and example in paper. Suppose that the probability that Plaintiff 1 will prevail at trial is given by

$$p_1(c_1, c_2, c_d) = \frac{c_1 + \theta c_2}{c_1 + \theta c_2 + c_d},$$

where by $c_1$, $c_2$, and $c_d$ are the expenditures of the two plaintiffs and the defendant, and $\theta \in [0, 1]$ is a parameter capturing the degree of spillovers between the plaintiffs. $^73$ When $\theta = 0$ there are no spillovers and the probabilities correspond to equation (1). When $\theta = 1$ there are full spillovers and the probabilities correspond to equation (2). Similarly, the probability that Plaintiff 2 will prevail at trial is symmetric and given by:

$$p_2(c_1, c_2, c_d) = \frac{c_2 + \theta c_1}{c_2 + \theta c_1 + c_d}.$$

As described in the text, we will consider the Nash equilibrium of the game where the three litigants choose their expenditures simultaneously. We will explore two cases. In the first, the plaintiffs choose their expenditures independently of each other to maximize their individual returns. In the second case, the plaintiffs choose their expenditures jointly. This will allow us to explore in more detail the roles of spillovers and joint decision making.

Decentralized Plaintiff Decision Making

Suppose the two plaintiffs choose their expenditures in to maximize their individual expected payoffs at trial. In other words, Plaintiff 1 chooses $c_1$ to maximize his expected damage award at trial minus his litigation costs, without concern for any benefits that his litigation spending will have for the other plaintiff. Plaintiff 1’s payoff may be written as

$$p_1(c_1, c_2, c_d) x - c_1 = \left(\frac{c_1 + \theta c_2}{c_1 + \theta c_2 + c_d}\right) x - c_1.$$

Plaintiff 1 will choose $c_1$ to maximize this expression, given the expectation that the other plaintiff and the defendant will choose to spend $c_2$ and $c_d$, respectively. In other words, Plaintiff 1 will choose to invest to the point where the marginal benefit of an extra dollar of expenditure, namely the increase in the probability multiplied by the damages, is exactly equal to the marginal cost. $^74$

$^73$ Since the denominator, $c_1 + \theta c_2 + c_d$, is weakly larger than the numerator, $c_1 + \theta c_2$, the probability is necessarily bounded between zero and one.

$^74$ One can derive this expression by taking the first derivative of Plaintiff 1’s payoff function with respect to $c_1$, holding the other litigants’ investments fixed.
\[
\frac{c_d}{(c_1 + \theta c_2 + c_d)^2} x = 1.
\]

Solving for \( c_1 \) establishes that Plaintiff 1’s preferred expenditure, \( c_1 \), depends on the expenditures of the other plaintiff and the defendant according to the following best-response or reaction curve:

\[
c_1 = R_1(c_2, c_d) = \sqrt{c_d x} - c_d - \theta c_2.
\]

Note that as the stakes of the case, \( x \), grow larger then Plaintiff 1 will spend more money on litigation. This makes sense – with larger stakes, the marginal value of an extra dollar of investment is larger (this is driven by the higher probability of winning at trial). Note that Plaintiff 1’s preferred choice of trial expenditure, \( c_1 \), is decreasing in the expenditure of Plaintiff 2. This follows from the structure of the probability function, \( p_1(c_1, c_2, c_d) \); when Plaintiff 2 spends more, then the marginal return to Plaintiff 1 is lower. It follows that the two plaintiffs’ expenditures are “strategic substitutes” for each other. It is also interesting to note that the right hand side of this expression is initially increasing but then decreasing in the defendant’s expenditures \( c_d \). Suppose that \( x = 180 \), and consider an extreme situation where the plaintiff expects the defendant to spend nothing, \( c_d = 0 \). In this case, the plaintiff can assure himself a 100 percent win rate with a tiny investment – a penny, say. At the other extreme, if \( c_d = 180 \) then equation (3) tells us that the plaintiff would not spend more than zero.\(^75\) For intermediate levels of defendant spending, the plaintiff will find it worthwhile to invest in litigation, however.

Similarly, if Plaintiff 2 is only concerned with his individual payoff, his preferred expenditure is:

\[
c_2 = R_2(c_1, c_d) = \sqrt{c_d x} - c_d - \theta c_1.
\]

Taking the defendant’s expenditure \( c_d \) as fixed for a moment, if the plaintiffs choose their expenditures simultaneously, then in the Nash equilibrium each plaintiff would choose to spend:

\[
c_p = \frac{\sqrt{c_d x} - c_d}{1 + \theta}.
\]

This is the unique point where the two best-response curves cross each other. This expression is consistent with the numerical example used in the paper. When \( x = 180 \) and \( c_d = 80 \), then this

\(^75\) If the plaintiff spent one dollar on litigation, the plaintiff’s expected damage award would rise by less than one dollar, rendering the investment unprofitable. This is because the marginal benefit of investment is increasing in \( c_d \) when \( c_d \) is small but decreasing in \( c_d \) when \( c_d \) is large.
becomes $c_p = 40/(1 + \theta)$. So with no spillovers ($\theta = 0$) the plaintiffs invest $c_1 = c_2 = c_p = 40$, and with full spillovers ($\theta = 1$) the plaintiffs invest $c_1 = c_2 = c_p = 20$. Note that $c_1 = c_2 = c_p = 20$ is the equilibrium in the limit as $\theta$ approaches 1.

It is also interesting to explore how the plaintiffs’ expenditures depend on the expenditures of the defendant, $c_d$. When $c_d = 0$, then plaintiffs will win their claims with one hundred percent certainty, even if their expenditures are infinitesimally small. Starting at the point where $c_d = 0$, the plaintiffs’ incentives to spend money on their claims increases if they expect the defendant to spend more money as well. The plaintiffs’ incentive to spend on litigation is dampened, however, when the defendant’s expenditures are large. When $c_d = x$, however, then the plaintiffs would rationally refrain from spending anything at all. The plaintiffs’ (aggregate) best-response curve is first increasing and then decreasing in $c_d$.

The defendant minimizes his expected payments given his beliefs about the expenditures of the two plaintiffs, $c_1$ and $c_2$, $p_1(c_1, c_2, c_d)x + p_2(c_1, c_2, c_d)x + c_d$. Substituting the expressions for the probabilities from above, this expression may be rewritten as:

$$
\frac{c_1 + \theta c_2}{c_1 + \theta c_2 + c_d}x + \frac{\theta c_1 + c_2}{\theta c_1 + c_2 + c_d}x + c_d.
$$

If the defendant expects the two plaintiffs to spend equal amounts, $c_1 = c_2 = c_p$, then the defendant will choose to spend

$$
c_d = \sqrt{2(1 + \theta)c_p} - (1 + \theta)c_p.
$$

This is the value that minimizes the defendant’s expected payments.\(^76\) Solving the system of equations, we find that the Nash equilibrium levels of spending for the plaintiffs and defendant, respectively, satisfy

$$
c_1 = c_2 = c_p = \frac{2x}{9(1 + \theta)} \quad \text{and} \quad c_d = \frac{4x}{9}.
$$

The plaintiffs expenditures are falling in $\theta$, the degree of spillovers between the claims. The defendant’s expenditure does not depend on the spillover parameter directly. Note that the defendant is at a strategic advantage in when the plaintiffs do not coordinate with one another: the probability that a plaintiff will win at trial is $1/3$. One can also calculate the payoffs for the plaintiffs, $\pi_1$ and $\pi_2$, and the defendant, $\pi_d$, respectively:

$$
\pi_1 = \pi_2 = \left[\frac{1}{3} - \frac{2}{9(1 + \theta)}\right]x \quad \text{and} \quad \pi_d = -\frac{10x}{9}.
$$

\(^76\) Differentiating the expression for the defendant’s total payments with respect to $c_d$ and setting the derivative equal to zero identifies this value.
Centralized Plaintiff Decision Making

Suppose that the plaintiffs choose their expenditures, \(c_1\) and \(c_2\), cooperatively to maximize their joint expected return from litigation, \(p_1(c_1, c_2, c_d)x + p_2(c_1, c_2, c_d)x - c_1 - c_2\). Their joint payoff may be written as

\[
\left(\frac{c_1 + \theta c_2}{c_1 + \theta c_2 + c_d}\right)x + \left(\frac{\theta c_1 + c_2}{\theta c_1 + c_2 + c_d}\right)x - c_1 - c_2
\]

If the two plaintiffs are fully coordinating their decisions, they will invest to the point where the marginal benefit of an extra dollar, which include both the effect on Plaintiff 1’s expected award at trial (as reflected in the first term in the expression) and the effect on the Plaintiff 2’s expected award (as reflected in the second term). Using simple calculus, we take partial derivatives of this expression with respect to \(c_1\) and \(c_2\) and set them equal to zero, yielding two first order conditions

\[
\frac{c_d}{(c_1 + \theta c_2 + c_d)^2} x + \frac{\theta c_d}{(c_2 + \theta c_1 + c_d)^2} x = 1,
\]

and

\[
\frac{\theta c_d}{(c_1 + \theta c_2 + c_d)^2} x + \frac{c_d}{(c_2 + \theta c_1 + c_d)^2} x = 1.
\]

Solving these two equations simultaneously gives the following solution:

\[
c_1 = c_2 = c_p = \frac{\sqrt{(1 + \theta)c_d x} - c_d}{1 + \theta}.
\]

Similarly, the defendant minimizes his expected payments, \(p_1(c_1, c_2, c_d)x + p_2(c_1, c_2, c_d)x + c_d\). If the defendant expects the two plaintiffs to spend equal amounts, \(c_1 = c_2 = c_p\), then it is straightforward to show that the defendant will choose to spend

\[
c_d = \sqrt{2(1 + \theta)c_p x} - (1 + \theta)c_p.
\]

Solving the system of equations, we find that the equilibrium levels of spending for the plaintiffs and defendant, respectively, satisfy

\[
c_1 = c_2 = c_p = \frac{2(1 + \theta)}{(3 + \theta)^2} x \quad \text{and} \quad c_d = \frac{4(1 + \theta)}{(3 + \theta)^2} x.
\]
When $\theta = 0$ (no spillovers) then $c_1 = c_2 = c_p = 40$ and $c_d = 80$. When $\theta = 1$ (full spillovers) then $c_1 = c_2 = c_p = 45$ and $c_d = 90$.

Finally, note that the defendant is at a strategic advantage in when the plaintiffs do not coordinate with one another: the probability that a plaintiff will win at trial is $(1 + \theta)/(3 + \theta)$. One can also calculate the payoffs for the plaintiffs, $\pi_1$ and $\pi_2$, and the defendant, $\pi_d$, respectively:

$$\pi_1 = \pi_2 = \left(\frac{1 + \theta}{3 + \theta}\right)^2 x \quad \text{and} \quad \pi_d = -\frac{2(1 + \theta)(5 + \theta)}{(3 + \theta)^2} x.$$