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THE EFFECTS OF INCENTIVES TO INVEST
AND THE LEVEL OF INVESTMENT IN CLASS
ACTION LAW ENFORCEMENT ON THE
MAGNITUDE OF LIABILITY FOR HARM

Guy Halfteck

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Harvard Law School
Cambridge, MA 02138

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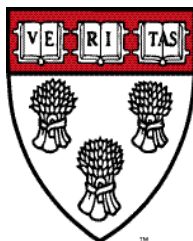
# Guy Halfteck[*]

## ABSTRACT

Class action law enforcement comprises a sequential, multi-stage investment opportunity under conditions of multi-dimensional uncertainty. This general proposition suggests that the myriad aspects of plaintiffs' attorneys' performance in the course of class action law enforcement can be treated and analyzed as sequential options to invest and sequential investment decisions. Thus, the extent to which private agents employ the class action mechanism to enforce the law is contingent upon their incentives to invest and the investment decisions they ultimately make throughout the multi-stage investment sequence. Against this backdrop, this Article examines the compound correlation between (i) the magnitude of private incentives to invest, (ii) the corresponding, aggregate level of investment, (iii) the magnitude of *ex ante* expected liability for systematic, mass-inflicted risk of harm and, consequently, (iv) the deterrence effects of class action law enforcement. Notwithstanding the observation that the specific properties of this correlation are highly law firm- and context-specific, the analysis generates unambiguous insights into the general properties of this correlation. These insights are germane to making qualitative statements on the existence of discrete, privately-optimal level of investment in class action law enforcement; the existence of discrete social optima; and the efficacy of possible regulatory intervention to bridge the private-social incentive divergence.

**Keywords:** Class actions, class-to-population ratio, counter-investment, damages, damages-to-harm ratio, deterrence, expected liability, incentives to invest, investment, plaintiffs' class, private law enforcement, probability of detection, systematic wrongdoing, victims' population

# *The Effects of Incentives to Invest and the Level of Investment in Class Action Law Enforcement On the Magnitude of Liability for Harm*

## Guy Halfteck[*]



## Harvard Law School
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# I. INTRODUCTION

The analysis presented in this Article integrates the general investment theory of class action law enforcement (which I have developed elsewhere[1]) with the general theory of deterrence, to generate insights on the effects of incentives to invest and the level of investment in class action law enforcement on the magnitude of deterrence of wrongdoing. Before I proceed to formulate the question which I set to investigate below (along with some important caveats, however), it would be useful to state the general propositions of the general investment theory of class action law enforcement that provide the motivation for the present inquiry.

The class action mechanism provides, in essence, a corrective social policy to alleviate social concerns over sub-optimal private incentives to use the legal system to prosecute systematic, mass-inflicted risks of harms in mass production society.[2] The social value of the class action mechanism as a corrective social measure emanates from the fundamental divergence between private and social law enforcement incentives that inextricably inheres in the recurrence of mass-produced, systematic risks of harm.[3] While the divergence of private from social law enforcement incentives is by no means a unique by-product of mass-produced risks of

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[1] *See* Guy Halfteck, *The Class Action Enterprise: A General Economic Theory of Mass-produced Law Enforcement* (S.J.D. Doctoral dissertation, Harvard Law School Library, 2003) (hereinafter: *The Class Action Enterprise*).

[2] The thrust of the argument relies on the thesis on the private-social incentive-divergence in litigation decisions –– that is, whether to bring suit, whether to settle a suit or proceed to trial, and how much to expend on litigating a suit –– which was advanced by Steven Shavell in a series of articles, most recent of which is *The Fundamental Divergence between the Private and Social Motive to Use the Legal System*, 26 JOURNAL OF LEGAL STUDIES 575 (1997).

[3] The divergence between private and social incentives to use the legal system to prosecute systematic, mass-inflicted risks of harm may be manifested on two different dimensions, namely, (i) the incentives to bring a suit and (ii) the incentives to invest in the prosecution of a suit. The former divergence arises when the pool of similarly situated victims is homogenous and consists of low-value claims; the latter divergence arises when a homogenous pool of victims consists of high-value claims. When the pool is heterogeneous, however, and consists of both low- and high-value claims, the private-social incentive divergence will be manifested on both dimensions.

harm,[4] its aggregate adverse welfare effects are by all means intensified in this domain, thereby rendering the class action functional capacity to mitigate this incentive divergence all the more desirable from a social welfare perspective.[5]

The functional capacity of the class action mechanism to alleviate the private-social incentive divergence and produce socially-desirable levels of deterrence (albeit, not the optimal)[6] squarely derives from integrating two economic properties in the design of the class actions mechanism, namely—(i) law enforcement entrepreneurship which is necessary to by-pass collective action problems and the resulting prohibitive transaction costs, and (ii) formal aggregation and

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[4] In fact, the private-social incentive divergence is a broadly-observed social phenomenon, cutting across all contexts of social activity, including litigation, manufacturing, using motor vehicles, and so forth. It stems from the general problem that decisions made by private economic actors do not take account of negative and positive externalities associated with the acts underlying their decisions. This problem is analyzed in Arthur Cecil Pigou, *The Economics of Welfare* (5th ed., 1952).

[5] The sheer magnitude of modern mass production makes the adverse welfare effects of mass-inflicted risks of harm a matter of serious social concern, the reason being that the magnitude of social loss increases linearly with the number similarly situated victims who are exposed to such wrongdoing. Thus, assuming all else remains equal, the social welfare benefits from increasing the level of deterrence of systematically-recurring, risk-taking conduct (and the resulting mass-infliction of risks of harm) are considerably higher than those gained from a similar increase in the level of deterrence of non-systematic risk-taking activities.

[6] Despite its functional capacity to alleviate the private-social divergence of incentives to use the legal system to prosecute mass-inflicted risks of harm and address the problem of sub-optimal deterrence, the class action mechanism gives rise to a secondary incentive-divergence, namely, an inextricable divergence between the private and social incentives to invest in class action law enforcement. Failing to take account of positive and negative externalities of their actions, plaintiffs' attorneys' incentives to invest in class action law enforcement are bound to diverge (in either direction) from the socially-optimal level of investment, defined as the level of investment beyond which any additional unit of investment (a social cost) will produce less than one unit of liability (a social benefit). Consequently, such divergence will inhibit the attainment of the socially-optimal level of deterrence given the social cost of law enforcement. While class action law enforcement can only provide an imperfect, second-best solution, its social benefits generally outweigh its costs.

collectivization of numerous similarly-situated victims into a single, cohesive pool, thereby creating an opportunity to exploit economies of scale of effort in class action law enforcement.[7]

Yet, absent explicit insights into the economic incentives of private agents, in whose hands the class action law enforcement enterprise is generally entrusted, and short of understanding how these incentives are shaped by the class action mechanism, merely recognizing the class action functional capacity to alleviate sub-optimal law enforcement incentives and generate deterrence does not readily translate into descriptive or normative insights regarding, for instance, (i) the private incentive to use class action law enforcement and the magnitude of the deterrent effect of class action law enforcement; (ii) the social costs, social benefits and the socially-desirable level of using class action law enforcement to generate deterrence; and (iii) should private incentives to use class action law enforcement diverge from the social incentive –- as they intrinsically do –- how could the latter be obtained through regulatory intervention.[8]

Having examined the incentive structure of the class action mechanism, however, I argued that class action law enforcement comprises, in essence, a form of investment, which is accurately formulated as sequential, multi-stage investment under conditions of multi-dimensional uncertainty. Providing a conceptually inclusive

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[7] The opportunity to exploit economies of scale of effort in class action law enforcement was originally identified by David Rosenberg. *See* David Rosenberg, *Mass Tort Class Actions: What Defendants Have and Plaintiffs Don't*, 37 HARVARD JOURNAL ON LEGISLATION 393 (2000); David Rosenberg, *The Unrecognized Social Advantage of Mass Tort Class Action* (Unpublished manuscript, Harvard Law School, 2001).

The economic properties underlying the functional capacity of the class action mechanism to rectify the private-social divergence of incentives –- including (i) law enforcement entrepreneurship as a solution to a collective action problem that impedes privately-efficient cooperation among similarly-situated victims and (ii) an opportunity to exploit economies of scale through aggregation and collectivization of numerous similarly-situated victims into a single pool –- are examined in Halfteck, *The Class Action Enterprise*, *supra* note 1.

[8] The intrinsic divergence between private and social incentives to invest in class action law enforcement is developed in Halfteck, *The Class Action Enterprise*, *supra* note 1. It is followed by a discussion of the normative implications and a general analysis of regulatory intervention that may be necessary to induce socially-desirable incentives to invest and level of investment in class action law enforcement in Parts XIII and XIV, respectively.

account of the process of class action law enforcement, this theoretical proposition suggested that the myriad aspects of plaintiffs' attorneys' performance in the course of class action law enforcement[9] ultimately boil down to -- and, indeed, are presently viewed and analyzed as -- sequential investment decisions.[10]  Stated more broadly, *the extent to which private agents employ the class action mechanism to produce deterrence is contingent upon their incentives to invest and the investment decisions they consequently make throughout the multi-stage sequence of investments in class action law enforcement.*

This Article unravels the linkage between incentives to invest, the aggregate level of investment, and the level of deterrence produced through class action law enforcement.  More concretely, I set to examine the following question: *How do (i) the magnitude of incentives to invest and (ii) the corresponding level of investment affect the magnitude of expected liability and, in turn, the deterrence effects brought about by class action law enforcement?*[11]  In other words, how do *ex ante* incentives to invest and the *ex post* level of investment in class action law enforcement affect firms' *ex*

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[9] These manifestations include, among other things, plaintiffs' attorney's shirking and malfeasant representation as well as collusion through "sweetheart" deals entered into with the defendant. *See generally* Bruce L. Hay and David Rosenberg, *"Sweetheart" and "Blackmail" Settlements in Class Actions: Reality and Remedy*, 75 NOTRE DAME LAW REVIEW 1377 (2000).

Shirking and collusion, giving rise to agency costs in class action law enforcement, are -- under the general investment theory -- all but the discrete manifestations of sequential investment decisions made by class counsel in the course of the investment sequence.

[10] Indeed, the class action law enforcement enterprise, broadly defined to commence with an initial investigation into potential, systematic wrongdoing and culminate with a class-wide judgment or settlement and the award of attorney's fees, entails a multi-stage sequence of investment decisions.

[11] The analysis is limited to the effects of the level of investment on the magnitude of expected liability and deterrence; no account of the effects of the level of investment on the total social cost of law enforcement is presently taken, however.  Hence, no statement is presently made with respect to the privately or socially-optimal level of investment.  A social welfare analysis of investment in class action law enforcement is presented in Halfteck, *The Class Action Enterprise*, *supra* note 1, Part XI.

*ante* incentives to invest in care to reduce risks of harm to potential victims?[12]

The present analysis focuses on the correlation between incentives, investment, and the magnitude of deterrence from class action law enforcement and identifies the general properties of this compound correlation without specific regard, however, to the private or social incentives to invest, nor to the privately or socially-optimal level of investment.[13] In fact, limiting the present analysis to the former is dictated by strict logic. For, absent explicit understanding of the effects of incentives to invest and investment in class action law enforcement (whatever their magnitude and level happen to be) on the magnitude of expected liability and deterrence, it would be virtually impossible to draw general, qualitative statements on the existence of a discrete socially-optimal level of investment in class action law enforcement,[14] on the existence of discrete privately-optimal level of investment, or on the efficacy of possible regulatory intervention to bridge any such divergence.[15]

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[12] I do not presently consider the economic pressures exerted on firms that operate in competitive product markets –- and the corresponding *ex ante* incentives –- to invest resources to minimize risks of harm from the design of their products. Nor do I distinguish between deterrence of wrongdoing that may inflict risks of harm on firms' costumers and deterrence of wrongdoing that may inflict risks of harm on third parties.

[13] I am primarily interested in gaining qualitative insight into the effects of investment on the production of deterrence, not in the extent to which private agents actually invest in class action law enforcement or have the incentives to invest, nor in the social interest that they do so.

An elaborate social welfare analysis of investment in class action law enforcement, however, is postponed to a later stage, where (i) I specify the social welfare objectives of class action law enforcement, (ii) identify the socially-optimal level of investment in class action law enforcement, and (iii) examine the inextricable divergence between private and social incentives to invest that inheres in class action law enforcement. These issues are analyzed below in Halfteck, *The Class Action Enterprise*, *supra* note 1, Parts XI and XII.

[14] While the functional capacity of the class action (through aggregation, collectivization and an opportunity to exploit economies of scale) enables class counsel to maximize the aggregate level of investment in law enforcement, doing so may not necessarily be desirable from a social perspective.

[15] In other words, making unqualified statements with respect to the general capacity of class action law enforcement to produce deterrence calls for obtaining

By way of disclaimer, it should be further clarified, that no attempt is presently made –- nor do I think it is generally feasible –- to generate precise statements on the specific correlation between the level of investment in law enforcement and the magnitude of expected liability. Because any such correlation is highly firm- and context-specific, such information, were it to be available, would entail very modest theoretical value in the general context of this inquiry. The present inquiry, it follows, does neither concern itself with the level of investment that will be necessary to obtain optimal deterrence in any context of social activity,[16] nor with the magnitude of expected liability given any level of investment in class action law enforcement.[17] *Instead, the inquiry that follows is concerned with generating unambiguous statements about the general effects of the magnitude of incentives to invest and the level of investment on the magnitude of ex ante expected liability and the deterrence effects of class action law enforcement.*

## II. THE DETERRENCE EFFECTS OF CLASS ACTION LAW ENFORCEMENT: THE DETERMINANTS OF THE MAGNITUDE OF EXPECTED LIABILITY

Deterrence of wrongdoing, including deterrence of mass risk-producing activities that are engaged in by firms across different contexts of social activity,[18] is ordinarily obtained by imposing on potential wrongdoers a threat of *ex post* liability for the full cost of harm caused to victims by their

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an explicit understanding of the interaction between incentives, investment and the magnitude of deterrence.

[16] Further, even where this level of investment can be unambiguously specified, it still remains to be examined whether it is desirable from a social welfare perspective that this level of investment will be actually incurred in pursuit of optimal deterrence.

[17] Thus, I do not try to specify what the magnitude of deterrence will be if the privately- or socially-optimal level of investment in class action law enforcement is actually made.

[18] It is unnecessary, however, to distinguish between risk of harm inflicted upon firm's costumers and risk of harm inflicted on third parties, although this general distinction bears significant implications on the desirability of liability as a means of inducing firms to invest appropriately in precautions.

wrongdoing.[19]  Imposing such threat leads firms to internalize *ex ante* the social cost of their contemplated behavior and make optimal investment in precautions to reduce the risk of harm.  Deterrence, it follows, implicates wrongdoers' *ex ante* expectations regarding the probability and the magnitude of the threat of *ex post* liability (*i.e.*, expected liability), should they decide to engage in wrongdoing.[20]  Where the magnitude of expected liability is equal to (or even slightly less than[21]) the full social cost of harm caused by the wrongdoer's conduct, the wrongdoer is optimally deterred from engaging in a contemplated wrongdoing.  Thus, optimal deterrence is obtained where wrongdoers face a threat of *ex post* liability for the total harm they cause, not less, not more.[22]

In order to examine the effects of the level of investment in class action law enforcement on deterrence, it is necessary to identify the factors that determine the magnitude of expected liability from class action law

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[19] A threat of liability for the full social cost of harm caused by wrongdoing (*i.e.*, compensatory damages) is the optimal measure of damages where the wrongdoer is found liable with certainty.  *See generally* A. Mitchell Polinsky and Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARVARD LAW REVIEW 869, 878-887 (1998).  Where wrongdoers may escape liability for harm for which they are responsible, however, the optimal threat of liability should exceed the social cost of harm generated by their conduct (*i.e.*, compensatory damages) –- by an award of punitive damages –- such that, on average they will pay for the harm caused.  *Id.*, at 873-76, 887-900.

[20] Where liability is a viable possibility regardless of whether the alleged-wrongdoer has acted wrongfully, the deterrence effects from such threat of liability are said to be inefficient because such liability creates an *ex ante* inducement to invest in precautions even though such investment is not socially-efficient.

[21] Attorney's fees that are incurred by the wrongdoer should also be counted in the cost that is internalized by the wrongdoer, so they can be added to obtain optimal deterrence.

[22] In fact, where wrongdoers face a threat of liability that exceeds or falls short of the measure of compensatory damages, potential wrongdoers will be over-deterred and under-deterred, respectively.  Over-deterrence leads firms to invest too much in precautions, product prices will be inappropriately high, and risk-producing but socially-beneficial activities will be performed less than is desirable.  Under-deterrence, in contrast, leads to inadequate investment in precautions; the prices of products will be too low, thereby leading to production and consumption beyond the socially-desirable levels; and undesirable, risk-producing activities will reach excessive levels.

enforcement. The magnitude of *ex ante* expected liability from class action law enforcement is a function of several independent variables, including (i) the probability of detecting the wrongdoer's systematic, risk-producing behavior, so as to bring a class action suit on behalf of the victims of this conduct;[23] (ii) the probability of holding the wrongdoer liable (to the aggregate cost of harm caused by its unlawful conduct) by obtaining a favorable class-wide judgment or a favorable class-wide settlement that is approved by the court;[24] (iii) the magnitude of average damages awarded to class members, whether damages awards are determined by the court following a full-blown jury or bench trial or agreed upon in the course of settlement negotiations; and, finally (iv) the number of similarly-situated victims (compared to the victims' population) that fall within the

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[23] Even though the probability of detecting a wrongdoer's systematic, risk-producing behavior normatively implicates the possibility of awarding punitive damages, whenever the wrongdoer may escape from liability for the harm caused, the present inquiry on the probability of detection focuses, instead, on the effects of the level of investment in class action law enforcement on the chances of discovering a given systematic wrongdoing. In fact, the reference to the probability of detection reflects the widespread observation that class action law enforcement often results from search and investigation by plaintiffs' law firms to discover wrongdoing, not from information that is affirmatively provided by harmed victims. This "entrepreneurial" observation is particularly accurate with respect to low-value harms, where victims' non-economic claims provide insufficient incentives to seek legal advice, let alone to incur the cost of prosecuting the underlying wrongdoing.

[24] The probability of prevailing through settlement or judgment factors-in the probabilities of prevailing throughout the class action law enforcement process generally, including (i) the probability of prevailing on pre-trial "screening" motions, including a motion to dismiss and a motion for summary judgment, (ii) the probability of prevailing on a motion for class certification, so as to have the lawsuits certified and maintained as a class action, and (iii) the probability of prevailing on a motion to approve a proposed class-wide settlement. With respect to the latter, however, the probability is often very high but not a matter of certainty –- given the court's discretion to decline approval –- because, unlike contested motions which are filed on behalf of the plaintiffs' class in earlier stages of the sequence, the motion to approve a proposed settlement under Rule 23(e) is co-filed by both parties and is, therefore, non-adversarial. Third-parties may intervene, however, to defeat approval of a proposed settlement.

definition of the class[25] and that are formally aggregated for the purpose of class action law enforcement.[26] It should be clarified that for the purpose of conceptual inclusiveness, the present reference to damages includes both (i) monetary damages and (ii) the cost to the wrongdoer of non-monetary remedies that were awarded to the class for the harm caused by the wrongdoer's conduct.

Formally, the magnitude of expected liability from class action law enforcement, denoted $L$, is given by

$$L = q \cdot p \cdot d \cdot n$$

where $q$ denotes the he probability of detecting a given systematic wrongful behavior, such that $0 \leq q \leq 1$; $p$ denotes the probability that the wrongdoer is held liable, namely, where the plaintiffs' class prevails through trial or settlement, such that $0 \leq p \leq 1$; $d$ denotes a non-negative award of average damages to members of the class, as determined by the court or agreed upon in settlement negotiations, such that $0 \leq d \leq D$, where $D$ denotes the actual magnitude of average harm inflicted on individual members of the plaintiffs' class; and $n$ denotes the number of

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[25] The point of interest here, more specifically, is to what extent does the plaintiffs' class, as defined by the court in its order on class certification, captures the entire pool of victims who suffered harm from the wrongdoer's conduct. In fact, it is not entirely inconceivable that the definition of the class will fail to capture this entire pool of victims, due, for example, to problems that arise from managing such large a pool of victims, issues that implicate conflicts of law, and what have you. *See* Samuel Issacharoff, *Administering Damage Awards in Mass Tort Litigation*, 10 THE REVIEW OF LITIGATION 463 (1991).

[26] Notwithstanding how inclusive is the definition of the class, where class members are afforded an opportunity to opt out of the class –- as Rule 23(c)(2) provides with respect to class action suits maintained under Rule 23(b)(3) –- the number of class members who are formally aggregated for the purpose of law enforcement may become smaller and, subsequently, result in a *proportional* decrease in the magnitude of the expected liability.

The magnitude of expected liability may further decrease where opting out reduces plaintiffs' attorney's incentives to invest and, hence, the privately optimal level of investment in law enforcement. Precisely this argument supports the case for mandatory, non-opt out class actions. *See* David Rosenberg, *Mandatory-Litigation Class Action: The Only Option for Mass Tort Cases*, 115 HARVARD LAW REVIEW 831 (2002). Opting out is unlike to reduce incentives to invest and is unlike to lower the privately optimal level of investment, however, where the marginal return from investment reaches the point where it is equal to its marginal cost notwithstanding the reduced size of the class.

similarly-situated victims who fall within the definition of the class and are thus formally aggregated and collectivized into a single, cohesive pool, such that $0 \leq n \leq N$, where $N$ denotes the actual (or statistically determined) size of the victims' population.

## III. THE EFFECTS OF INCENTIVES TO INVEST AND THE LEVEL OF INVESTMENT ON THE MAGNITUDE OF EXPECTED LIABILITY

How, then, does the magnitude of incentives to invest in class action law enforcement, broadly defined to commence with the initial investment in detecting and investigating a potential wrongdoing, affect the magnitude of *ex ante* expected liability, that is, before any wrongful behavior has actually been committed? Along the same line: how does the level of investment in class action law enforcement affect the magnitude of *ex post* liability that is actually imposed on the wrongdoer?

The reference to *the magnitude of incentives to invest* as distinguished from *the level of investment* is made for the sake of analytic precision. It emanates, however, from the following logic: the threat of liability that is necessary to obtain general deterrence is sustained only where similarly-situated wrongdoers can expect that, should they engage in systematic wrongdoing and inflict harm in the future, class action law enforcement will ensue in order to hold them liable for the full cost of harm they caused.[27] Maintaining such a threat of liability necessitates, more explicitly, sufficient *ex ante* incentives to invest in class action law enforcement which, subsequently, will induce sufficient level of *ex post* investment, should wrongdoers engage in systematic wrongdoing and

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[27] The points made throughout the analysis apply to both *general* deterrence and *specific* deterrence, a distinction generally known in the theory of deterrence. General deterrence refers to the effects that a threat of liability has on the behavior of similarly-situated wrongdoers in the future, while specific deterrence refers to the effects of imposing liability on the defendant at hand on that defendant's future behavior. The distinction between general and specific deterrence is briefly discussed in A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARVARD LAW REVIEW 869, 877 & n.13 (1998).

cause harm.   Deterrence, it follows, depends on the magnitude of incentives to invest in class action law enforcement.[28]

Recall that the magnitude of expected liability from class action law enforcement, denoted $L$, is a function of several independent variables, generally given by

$$L = q \cdot p \cdot d \cdot n$$

where $q$ denotes the he probability of detecting a given systematic wrongful behavior, such that $0 \leq q \leq 1$; $p$ denotes the probability that the wrongdoer is held liable, namely, where the plaintiffs' class prevails through trial or settlement, such that $0 \leq p \leq 1$; $d$ denotes a non-negative award of average damages to class members, such that $0 \leq d \leq D$, where $D$ denotes the magnitude of average harm inflicted on individual members of the plaintiffs' class; and $n$ denotes the number of similarly-situated victims who fall within the definition of the plaintiffs' class and are therefore formally aggregated and collectivized into a single, cohesive pool, such that $0 \leq n \leq N$, where $N$ denotes the actual (or statistically determined) size of the victims' population.

Each of these variables –- $q$, $p$, $d$ and $n$ –- however, is a dependent variable, the specific magnitude of which is a function of (i) the plaintiffs' attorney's level of investment in class action law enforcement, denoted $I$, and (ii) a generic variable, denoted $\theta$, indexing the effects of nature,[29] the effects of the court,[30] and the effects of counter-investment made by the

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[28] For the sake of convenience, the discussion that follows below focuses on investment, not incentives to invest, even though *incentives to invest* and *investment* can be used interchangeably.

[29] The underlying intuition is that nature affects, for example, the probability that a given plaintiffs' attorney's level of investment in initial investigation of potential, systematic wrongdoing actually leads to discovering such actionable wrongdoing (*i.e.*, $q$).  Nature, it is further posited, also affects (along with other variables) the probability of prevailing through judgment or settlement (*i.e.*, $p$), the magnitude of harm inflicted on similarly-situated class members (*i.e.*, $d$), the number of individuals exposed to and harmed by the defendant's systematic wrongdoing (*i.e.*, $n$) and, consequently, the expected magnitude of damages obtained on behalf the class as a whole (*i.e.*, $L = q \cdot p \cdot d \cdot n$).

[30] Here, the intuition is that (i) the procedural and evidentiary burdens imposed on the plaintiffs' attorney thorough the court's orders and (ii) the court's interpretation and application of the substantive law to allegations asserted in the class action complaint and to those invoked by the defense may affect $p$, $n$, and $d$, namely, the probability of prevailing through judgment or settlement

opposing party to defeat the class action suit and the plaintiffs' attorney's effort in prosecuting the suit.[31]    Thus, formally: $q=Q(I,\theta)$, $p=P(I,\theta)$, $d=D(I,\theta)$, and $n=N(I,\theta)$.   The magnitude of expected liability from class action law enforcement is given by the following expression

$$L = Q(I,\theta) \cdot P(I,\theta) \cdot D(I,\theta) \cdot N(I,\theta)$$

While the exact properties of these functions are not discernable, the general correlation between the independent and dependent variables can be fairly surmised, however.  It seems plausible to suggest that given any value of $\theta$, the magnitude of the dependent variables –- $q$, $p$, $d$ and $n$ –- increases with the level of investment, $I$, but reaches diminishing marginal rates at some level of investment.[32]   That said, I turn to investigate the properties of each of these functions more closely.

### 1.    The Probability of Detecting Systematic Wrongful Behaviors

Class action law enforcement, in general, is a highly information-intensive enterprise.   The sequence of investment in class action law enforcement often –- though not always[33] –- commences with the first-

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(including, of course, the probability of prevailing on pre-trial motions and motion for class certification), the definition and thus the size of the class, and the magnitude of damages award per class member.

[31] The intuition here is that, when relevant, the magnitude of counter-investment made by the opposing party throughout class action law enforcement may interact with the investment made by the plaintiffs' attorney to determine the magnitude of $p$, $n$, and $d$.  While the probability of detecting a systematic, wrongful conduct, $q$, is not affected by counter-investment, it may be affected by the nature of the wrongdoing itself or the effort of the wrongdoer to conceal its wrongdoing, which are also captured by $\theta$.

[32] It is also clear that, given any intensity of $\theta$, when $I=0$, $q=0$, $p=0$, $d=0$ and $n=0$. The interpretation is straightforward: where no investment is made in class action law enforcement (namely, where a plaintiffs' attorney refrains from starting to invest in the sequence), then the faction of attorney's fees is 0, the probability of obtaining a favorable judgment or having a favorable settlement approved is 0, the size of the class is 0 (because no class action is being brought), and the damages award per class member is 0 too.

[33] The sequence of investment in class action law enforcement may commence at a later stage where the information on a firm's wrongful conduct has been produced and made publicly available.   Information on wrongdoing may become available following, for instance, public investigation into an alleged

stage investment in searching and detecting systematic, wrongful corporate behaviors.[34] From the investment perspective of plaintiffs' attorneys, the reality of modern mass society comprises a pool of investment opportunities, where they may invest financial wherewithal and intellectual capital to discover and prosecute potential wrongdoing.[35]

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wrongful conduct and subsequent public law enforcement actions or following voluntary disclosure by the wrongdoing firm. Governmental investigations by the Securities & Exchange Commission's Law Enforcement Division into alleged fraudulent securities schemes and the investigation carried out by the Department of Justice's Antitrust Division into Microsoft's possible antitrust violations provide typical examples. *See generally* Howard M. Erichson, *Coattail Class Actions: Reflections on Microsoft, Tobacco, and the Mixing of Public and Private Lawyering in Mass Litigation*, 34 UNIVERSITY OF CALIFORNIA DAVIS LAW REVIEW 1 (2000). In contrast, voluntary disclosure by wrongdoing firms, including, most typically, financial restatements announced by publicly-traded companies, provides information that is crucial to initiate plaintiffs' attorneys' investigation.

Yet, even where information on systematic wrongdoing is not made publicly-available through public investigation or voluntary disclosure by the alleged wrongdoer, it may nevertheless become available to competing plaintiffs' attorneys once the first class action suit has been filed with a court. Being able to free-ride information produced through investment of their precursor and to use this information to file a "copy-cut" class action lawsuit, competing plaintiffs' attorneys may start the sequence of investment in class action law enforcement at an even later stage and avoid the cost of investment in investigation, detection, and preparation of a class action complaint. Hence, it is not surprising that the costless availability of information often results in duplicative class action lawsuits being filed, where similar claims regarding similar wrongs are invoked on behalf of the same pool of similarly-situated victims. Duplicative class action lawsuits are generally discussed by Geoffrey P. Miller in *Overlapping Class Actions*, 71 NEW YORK UNIVERSITY LAW REVIEW 514 (1996). *See also* Rhonda Wasserman, *Dueling Class Actions*, 80 BOSTON UNIVERSITY LAW REVIEW 461 (2000).

[34] The multi-stage sequence of investment in class action law enforcement is thoroughly discussed in Halfteck, *The Class Action Enterprise*, *supra* note 1, Part VI(B).

[35] The analogy to investment in R&D by technology firms that compete in a patent race is striking: similar to pharmaceutical firms, to take one example, plaintiffs' law firms may decide to invest in specific investment opportunities and incur expenditures in search and investigation of systematic wrongdoing (*i.e.*, discovery costs) to launch class action law enforcement (*i.e.*, an innovative

The actual size of the pool of law enforcement investment opportunities in any given society may depend on various context-specific factors, including, among other things, (i) the efficacy of the liability system in deterring wrongdoing;[36] (ii) imperfect competition in product markets;[37] (iii) costumers' imperfect information regarding the risk attributes of consumer products;[38] and (iv) the social and business norms that are instilled in the local culture.

The effort put to detect systematic wrongful behaviors and produce related information may vary from one case to another as well as across contexts of social activity. Notwithstanding context-specific observations, however, detection of wrongdoing generally entails (i) identifying systematic patterns of harm (or risk of harm) across a given population –– be it systematic product failures, systematic adverse health-related symptoms, or a systematic scheme of financial fraud, to name a few examples –– and, subsequently (ii) establishing a legally-actionable conduct that implicates one or several firms with the observed pattern of harm. Of course, manifestations of corporate wrongdoing are often more subtle than the earlier examples may seem to suggest, in which cases meticulous investigation or particular forensic studies are often necessary to reveal such systematic patterns of harm, let alone to associate its occurrence to the wrongful behavior of a specific firm. Cases involving

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good), in hope to obtain a monopoly over class action law enforcement brought with respect to the wrongful conduct they discovered (*i.e.*, a patent).

[36] When, for any given reason, the liability system produces less than the optimal level of deterrence, potential wrongdoers will under-invest in reducing the risk of harm and will excessively engage in risk-producing activities.

[37] Where a firm's product has no perfect or imperfect substitutes, the firm will have insufficient incentive to invest appropriately in precautions absent optimal liability for harm, knowing that its costumers have no alternative to consuming its products. Because given the firm's market power it will be able to set the product's price above marginal cost, less consumers will purchase its products, the full price of which equals to the market price plus the expected harm that is not recoverable given less than optimal liability. The firm's market power will counteract, to some extent, the effects of the diluted incentives to invest in precautions.

[38] The effects of customers' perfect and imperfect knowledge of the level of risk associated with firms' products on the incentives of firms to invest in precautions independently of liability for harm is discussed in Steven Shavell, FOUNDATIONS OF ECONOMICS ANALYSIS OF LAW Ch. 3, §§ 2.1-2.2 (2003).

antitrust violations or latent harms resulting from mass toxic exposure, for instance, often pose severe informational difficulties.

Whatever the nature of the wrongful conduct may be, and however subtle its harmful manifestations are, it is generally plausible that the probability of obtaining information on a given systematic wrongful behavior *increases* (up to some point, however) with the level of investment in search and investigation made during the initial stage of the multi-stage sequence of investment in class action law enforcement.[39] For, it is plausible that costly investment in hiring private investigators, in conducting particular forensic studies, in soliciting economic analyses of specific product markets, or in advertising in the printed or electronic media,[40] to take few examples, is likely to increase the chances of detecting systematic consumer fraud, mass toxic exposure, and financial fraud or antitrust violations, respectively.

Recall that the probability of detection depends not only on the plaintiffs' attorney's level of investment, denoted $I$, but also on the effects of nature[41] and the effects of counter-investment made by the wrongdoing firm[42] to conceal its wrongful conduct or to otherwise reduce the likelihood of being implicated with the harmful manifestations of its conduct, denoted $\theta$, such that $q=Q(I, \theta)$.[43] While it seems plausible that the

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[39] Technically, given $q=Q(I, \theta)$, the first derivative $Q'(I, \theta)>0$ given any level of $I$. Also, $q=0$ for $I=0$.

[40] Commercial advertising by plaintiffs' law firms in the printed and electronic media, as was frequently observed after the collapse of the Enron Corporation in December 2001, may increase the probability of obtaining such information from either individual victims or through referrals. *Accord* Stephen J. Spurr, The *Impact of Advertising and other Factors on Referral Practices, with Special Reference to Lawyers*, 21 RAND JOURNAL OF ECONOMICS 235 (1990).

[41] Nature, in the present context, may determine, for example, the distribution of harms across a given population and thus affect (in either direction) the efficacy of investment in detecting victims, whose harm establishes a systematic pattern of wrongful behavior.

[42] The effects of nature and those of counter-investment are captured by the generic variable $\theta$, such that $q=Q(I, \theta)$.

[43] The present inquiry, I should clarify, is neither concerned with the desirability of punitive damages, whenever the wrongdoer may escape from liability for harm caused, not with the effects of punitive damages on incentives to invest in law enforcement. Rather, the inquiry focuses on the effects of the level of investment in class action law enforcement on the probability of discovering such wrongdoing.

probability of detection increases with the level of investment up to some point, it is hard –- if not entirely impossible –- to predict how exactly will the marginal rate of that probability (*i.e.*, the marginal return on investment) vary with the level of investment.[44]  To be sure, the precise correlation between the level of investment and the probability of detection is highly context-specific, for which it is not amenable to broad generalization.[45]  At any rate, holding $\theta$ constant –- that is, assuming *ex arguendo* that the effects of nature and the magnitude of counter-investment are fixed[46] –- it is patent that, at some point, investment in detection will exhibit diminishing marginal returns (in terms of increasing

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In fact, the reference to the probability of detection reflects the widespread observation that class action law enforcement often results from search and investigation by plaintiffs' law firms to discover wrongdoing, not from information that is affirmatively provided by harmed victims.   This "entrepreneurial" observation is particularly accurate with respect to low-value harms, where victims' non-viable claims provide insufficient incentives to seek legal advice, let alone to incur the cost of prosecuting the underlying wrongdoing.

[44] Technically, it is unknown what exactly is the shape of the function *q=Q(I, θ)*, where $\theta$ is held constant.   While a convex function can be ruled out as implausible, the exact shape of the function and how does it look like at the limits is not clear.

[45] It is possible, for instance, that any dollar invested up to some point increases the probability of detection at an *increasing* marginal rate, but any dollar invested beyond that point increases the probability of detection at a *fixed* rate or at a *decreasing* marginal rate.   It is also possible that the probability of detection increases at a *decreasing* marginal rate for *any* level of investment.

Possibly, the probability of detection may increase at an *increasing* marginal rate up to some level of investment due to synergy between information signals obtained though investment.  The underlying intuition is that given the first unit of investment and the information signal it produces, the second unit of investment will be directed toward narrowing the scope of the investigation and obtaining more specific information, the marginal effect of which on the probability of detection is higher.

[46] In reality, however, strategic interaction between wrongdoers and law enforcement agents (*i.e.*, plaintiffs' attorneys) and best-response functions work to determine the intensity of $\theta$ (namely, the level of counter-investment) and the plaintiffs' attorney's level of investment, *I*.  In equilibrium, wrongdoers will maximize $\theta$, namely, set $\theta$ at its privately optimal level; given this strategy, plaintiffs' attorneys will invest up to the privately optimal level.

the probability of detection) due, for example, to the limited efficacy of the detection devices at one's disposal.[47]

On the whole, it seems fair to conclude that the probability of detection generally increases in the level of investment made by the plaintiffs' attorney in detection of wrongdoing. At some level of investment, however, the probability of detection will only increase at a diminishing marginal rate, thereby giving rise to a socially- (and privately-) optimal level of investment.[48] The marginal rate of return on investment, it is further suggested, is negatively correlated with the intensity of the effects of nature and those of counter-investment made by the wrongdoer to undermine the detection of wrongdoing.[49] Hence, it follows that, where all else remains equal –- namely, the probability of establishing the wrongdoer's liability, the magnitude of the average damages awarded to class members, and the size of the class –- the probability of detection and, consequently, the expected liability and deterrence from class action law enforcement increases in the plaintiffs' attorney's level of investment. The optimal level of investment, however, is reached at the point where the marginal return on investment in terms of the increase in expected liability from increasing the probability of detection equals the marginal cost of investment.[50]

## 2.    *The Probability of Holding a Defendant Liable for Wrongdoing*

The detection of systematic wrongdoing through investment in search and investigation –- or otherwise obtaining information on a firm's

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[47] Technically, given $q=Q(I, \theta)$ and holding $\theta$ constant, the second derivative $Q''(I, \theta)<0$ for any $I>I^*$.

[48] Specifically, the privately optimal level of investment in detection of wrongdoing is reached at the point where the benefits from increasing the probability of detection by investing the next dollar are equal to the cost of that investment.

[49] That is, the higher $\theta$ is, the lower the marginal return on investment.

[50] Technically, assuming $p$, $d$ and $n$ remain equal, the magnitude of $q$ and, thus, the magnitude of $L = q \cdot p \cdot d \cdot n$ increases with the plaintiffs' attorney's level of investment in class action law enforcement. This proposition holds true for any level of $\theta$.

systematic unlawful conduct[51] –- is merely the first stage in the multi-stage sequence of investment in class action law enforcement.  As a matter of fact, to hold a wrongdoer liable for the cost of harm caused by its conduct it is necessary to complete the remaining stages of the sequence of

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[51] Notwithstanding plaintiffs' law firms' investment in search and investigation, information on systematic wrongdoing may also be obtained from individual victims, whose high-value legal claims are likely to provide sufficient incentives to seek legal advice and representation.  A smooth client-referral system, which reduces the cost of shopping for legal services and ensures efficient matching of investment opportunities with talent and legal expertise, increases the probability that information provided by individual victims will ultimately reach a class action law firm, regardless of which law firm was the initial recipient of such information.  *Accord* Luis Garicano & Tano Santos, *Referrals* (NBER Working Paper Series No. 8367, 2001), available at <http://www.nber.org/papers/w8367>, visited Dec. 7, 2002.  *See also* Stephen J. Spurr, *Referral Practices Among Lawyers: A Theoretical and Empirical Analysis*, 13 JOURNAL OF LAW & SOCIAL INQUIRY 87 (1988).

Commercial advertising by plaintiffs' law firms in the printed and electronic media, frequently observed in the national media after the collapse of the Enron Corporation, may increase the probability of obtaining such information from either individual victims or through referrals.  *See* Stephen J. Spurr, *The Impact of Advertising and other Factors on Referral Practices, with Special Reference to Lawyers*, 21 RAND JOURNAL OF ECONOMICS 235 (1990).

Further, the virtual presence of plaintiffs' law firms on the Internet and, consequently, the lower cost of finding a plaintiffs' law firm and the costless reporting of such information, makes the Internet a viable means of obtaining such information from victims.   In fact, Internet websites maintained by plaintiffs' law firms often include an information-reporting portal.  Defrauded investors, for example, may report information on securities fraud through the website of the law firm of Milberg Weiss Bershad Hynes & Lerach, LLP.  *See* <http://www.milberg.com/mil-cgi-bin/mil?templ=report-fraud.html>   visited Dec. 7, 2002.  Lieff, Cabraser, Heimann & Bernstein, LLP, provides a contact form, where information on fraudulent or unlawful activity may be reported.  *See* <http://www.lieffcabraser.com/contact.htm> visited Dec. 7, 2002.

Finally, plaintiffs' law firms often follow information on wrongdoing produced and made publicly available through governmental investigations and law enforcement actions or by voluntarily releases by the allegedly wrongdoing firms.  *See generally* Howard M. Erichson, *Coattail Class Actions: Reflections on Microsoft, Tobacco, and the Mixing of Public and Private Lawyering in Mass Litigation*, 34 UNIVERSITY OF CALIFORNIA DAVIS LAW REVIEW 1 (2000).

investment in class action law enforcement.[52] The plaintiffs' attorney, more specifically, must, among other things (i) prepare and file a class action complaint;[53] (ii) survive pre-trial "screening" motions, including[54] a motion to dismiss,[55] a motion for judgment on the pleadings,[56] and a motion for summary judgment;[57] (iii) prevail on a motion for class certification, so as to have the lawsuit certified and maintained as a class action;[58] produce sufficient evidence to support of the case theory,[59]

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[52] Optimal deterrence is obtained only where a wrongdoer is held liable for the wrongdoing so as to internalize the full social cost of its behavior. While the present discussion focuses on the effects of investment in class action law enforcement on the probability of holding the wrongdoer liable, the discussion that follows below considers the effects of investment on the magnitude of damages awarded by the court or agreed upon in the course of settlement bargaining.

[53] This entails developing the case theory, filing a class action complaint, and incurring the filing fee.

[54] The defendant may also file motions pertaining to jurisdictional issues asserting, when appropriate, lack of subject-matter or personal jurisdiction. *See* FED. R. CIV. P. §§ 12(b)(1)-(2).

[55] Essentially, a motion to dismiss for failure to state a claim upon which relief can be granted tests the sufficiency of the legal theory on which the plaintiffs' attorney seeks to rest its case. *See* FED. R. CIV. P. § 12(b)(6). Defending against a motion to dismiss may be especially costly where the plaintiffs' attorney's case is sought on the basis of a novel legal theory.

[56] Similarly to a motion for summary judgment, where there is no genuine issue as to any material fact, a motion for judgment on the pleadings tests whether a dispute can be resolved on the basis of the pleadings alone and any facts of which the court may take judicial notice. *See* FED. R. CIV. P. § 12(c).

[57] A motion for summary judgment tests whether, given the evidence before the court, a reasonable jury could return a verdict in favor of the nonmoving party. If granted, the motion will result in a summary judgment entered in favor of the moving party. *See* FED. R. CIV. P. § 56. The defendant in a putative class action complaint may file such a motion, arguing that there is no genuine issue as to any material fact and that under the governing law no judgment in favor of the plaintiffs could be entered.

[58] *See* FED. R. CIV. P. §§ 23(a)-(b).

[59] Evidence produced in support of the claims asserted on behalf of the class is indispensable, regardless of whether these claims are tried or resolved through settlement bargaining. For, such evidence may interact with other factors to determine the plaintiffs' reservation value and, in turn, the settlement range; affect the actual outcomes of settlement bargaining; and bear impact on the

through discovery and otherwise; and, finally (iv) obtain a favorable class-wide judgment[60] holding the defendant liable for the social cost of the harm caused by its wrongdoing,[61] or obtain favorable settlement terms and gain the court's approval of that proposed settlement,[62] pursuant to which the wrongdoer internalizes the full social cost of harm caused by its wrongdoing (regardless of whether the settlement includes a formal admission of liability or not[63]).

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probability that, when agreed upon, a proposed settlement will gain the court's approval.

[60] Full-blown trials and judgments are very rarely observed, for the overwhelming majority of class action cases are settled pretty early.

[61] For the sake of analytic accuracy, I defer an elaborate discussion of the effects of the level of investment in class action law enforcement on the magnitude of damages awarded to class members (whether awarded in judgment or obtained through settlement negotiations) to Part III(3) below.

[62] Class action settlements are not binding unless the court approves them. *See* FED. R. CIV. P. § 23(e). Making the binding effect of settlements contingent upon the court's approval is one way in which the regulation of class action addresses its intrinsic agency problem.

[63] Defendants often negotiate class-wide settlements without *formally* admitting liability to the alleged wrongdoing. In fact, favorable settlements, in which defendants agree to pay for harm suffered (and harm that will be suffered) by class members without formally admitting to liability, are commonly observed in the landscape of class action law enforcement. *See, e.g.*, Milt Freudenheim, *Merck to Pay $42.5 Million to Settle Lawsuits Against Its Pharmacy-Benefit Unit*, NEW YORK TIMES, Dec. 10, 2002, at C11. From the standpoint of deterrence, however, it is entirely irrelevant whether the defendant formally admits to liability or not provided, of course, that the defendant actually pays for full social cost of its wrongdoing.

The probability of holding a wrongdoer liable to the social cost of harm caused by its wrongdoing, denoted *p*, incorporates, for the convenience of exposition, the discrete probabilities that the plaintiffs' attorney –- and, subsequently, the appointed class counsel –- prevails in each of these stages such that the wrongdoer is ultimately held liable for the harm caused. How, then, does the level of investment in class action law enforcement affect the probability of prevailing throughout *each* of these stages and, consequently, the probability of holding the wrongdoer liable to its unlawful conduct? Formally, the analysis below investigates the properties and behavior of the function $p=P(I, \theta)$.

Class action law enforcement is, to a very large extent, a knowledge-based enterprise.[64] In fact, the task of holding a wrongdoer liable involves several highly information-intensive undertakings. Those include (i) developing legal propositions to establish the liability of the wrongdoer; (ii) preparing and drafting of a class action complaint; (iii) producing sufficient evidence to support of the legal propositions;[65] (iv) defending against pre-trial motions, including a motion to dismiss, a motion for judgment on the pleadings, and a motion for summary judgment; (v) preparing, filing and arguing a motion for class certification, so as to have the lawsuit certified and maintained as a class action;[66] and, finally (vi) obtaining a favorable class-wide judgment[67] or obtaining favorable terms of settlement and gaining the court's approval of that proposed settlement.[68]

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[64] In fact, the information underpinnings of class action law enforcement, as I detail in the text below, are unparalleled in *scope* and in *kind* to those underlying ordinary litigation brought on behalf of one or few individual victims.

[65] Evidence produced in support of the claims asserted on behalf of the class is indispensable, regardless of whether these claims are tried or resolved through settlement bargaining. For, such evidence may interact with other factors to determine the plaintiffs' reservation value and, in turn, the settlement range; affect the actual outcomes of settlement bargaining; and bear impact on the probability that, when agreed upon, a proposed settlement will gain the court's approval.

[66] *See* FED. R. CIV. P. §§ 23(a)-(b).

[67] Full-blown trials leading to court judgments are only rarely observed in the domain of class action law enforcement.

[68] That probability of gaining the court's approval is often very high but never a matter of certainty –- given the court's discretion to decline approval –- because, unlike contested motions which are filed on behalf of the plaintiffs' class in

The information attributes of class action law enforcement, more generally, revolve around two analytically-distinct dimensions, including (i) the functional dimension and (ii) the material dimension. *Functional information* involves information that is necessary to satisfy regulatory ("entry") prerequisites for employing the class action mechanism and information that is necessary to meet subsequent doctrinal requirements in the course of class action law enforcement.[69] *Material information*, in contrast, refers to information that is necessary to establish and effectuate the legal propositions that lead, as a matter of law, to holding the wrongdoer liable, through either trial or settlement bargaining, to the harm caused by its unlawful conduct.[70]

The probability of producing the *amount* and *accuracy* of functional[71] and material information[72] that is required under the

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earlier stages of the sequence, the motion to approve a proposed settlement under Rule 23(e) is co-filed by both parties and is, therefore, non-adversarial.

[69] A proposed settlement, to take one example, must gain the court's approval before it can become binding upon the parties. To gain this approval, the class counsel must establish the fairness of the terms of settlement to the class. *See* FED. R. CIV. P. § 23(e).

[70] Material information may also serve functional purposes, where, for example, the information on the legal propositions in support of the wrongdoer's liability for the harm caused is necessary to satisfy the generally loose standards of pre-certification merit review.

[71] Investment of resources in producing functional information includes the plaintiffs' attorney's effort put and cost incurred in accumulating data on the scope of the defendant's wrongful conduct and the potential size of the class, the systematic attributes of harm inflicted on similarly-situated victims, and the legal claims and characteristics of the named plaintiff. Respectively, this information is necessary to establish the requirements of Rule 23(a), namely (i) that the class is numerous, (ii) that there are questions of law or fact common to the class, (iii) that the named plaintiffs are typical of the class, and (iv) that the representative parties will provide fair representation and adequately protect the interests of the class. *See* FED. R. CIV. P. §§ 23(a)(1)-(4). Additional investment is made in legal research and preparation of a motion for class certification; in providing a notice to the class (pursuant to the court's order); and in producing information necessary to establish the fairness and adequacy of a proposed settlement in a "fairness hearing" pursuant to Rule 23(e).

It has become a rather widespread practice that expert opinions –- including opinions of legal academics and economists –- are often relied upon by plaintiffs' attorneys to produce significant portions of the necessary functional information.

governing law and necessary given the specific circumstances of the defendant's wrongdoing to employ the class action mechanism and to establish the wrongdoer's liability,[73] respectively, *increases* (up to some point[74]) in the level of investment in class action law enforcement. Hence, it readily follows that the probability of surviving pre-trial "screening" motions;[75] the probability of prevailing on a motion for class certification, so as to have the lawsuit certified and maintained as a class action;[76] and the probability of obtaining a favorable class-wide judgment or the probability of obtaining favorable settlement terms[77] and gaining a court's

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Legal academics, for instance, are often hired to opine on issues implicated in class certification (*e.g.*, the manageability of the class) or those involved in approval of proposed settlements (*e.g.*, the fairness of the terms of the proposed settlement given the expected value from holding a class trial).

[72] Investment in producing material information –- that is, information that is necessary to establish legal propositions in support of the wrongdoer's liability for the harm caused –- generally include investment in legal research, preparation of a class action complaint, and production of evidence regarding the defendant's wrongful conduct, its harmful manifestations, and the magnitude of harm across the pool of similarly-situated victims. The production of evidence often entails costly investment in scientific evidence, including etiological and other forensic studies. *See* Sheila Jasanoff, SCIENCE AT THE BAR: LAW, SCIENCE, AND TECHNOLOGY IN AMERICA 126-128 (1995) (discussing epidemiological evidence in class action litigation).

[73] Such information affects the probability of prevailing in trial, the settlement range, and the settlement value.

[74] The marginal returns on investment in producing functional material information in class action law enforcement are discussed later in the text.

[75] Specifically, pre-trial "screening" motions may include a motion to dismiss, a motion for judgment on the pleadings, and a motion for summary judgment, all filed by the defendant to avoid any litigation of the plaintiffs' claims. Assuming all else remains equal, the higher is the level of investment in defending a pre-trial "screening" motion, the higher the probability of prevailing. Further, assuming all else remains equal, the higher the investment in material information that is incorporated into the class action complaint, the lower the probability that a pre-trial "screening" motion will be filed by the defendant and, should it be filed, the lower the probability that such motion will be granted.

[76] Class certification does not have a binary property; rather, it can vary in scope with respect to the causes of action, the stages of the litigation, etc. It may also be conditioned or revoked in the course of the litigation.

[77] Material information may interact with other factors to determine the plaintiffs' reservation value and, in turn, the settlement range; affect the actual

approval to that proposed class-wide settlement[78] *increase* in the level of investment in class action law enforcement. These discrete probabilities increase in the level of investment and, combined together, *increase* the overall probability of holding the defendant liable to the harm caused by its unlawful conduct.[79] Hence, assuming all else remains equal, the level of investment increases the expected liability from class action law enforcement, which is given by $L = q \cdot p \cdot d \cdot n$.

Notwithstanding, it seems plausible that, after a given level of investment has been made, the marginal rate of return on investment in producing functional and material information –- which is manifested in the marginal increase in the probability of holding a defendant liable –- reaches the point of diminishing marginal returns.[80] That is, there exists a discrete level of investment beyond which the payoffs obtained from any additional unit of investment are decreasing.[81] Thus, that at some point investment in class action law enforcement exhibits diminishing marginal returns suggests that there exist discrete social and private optima,

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outcomes of settlement bargaining; and bear impact on the probability that, when agreed upon, a proposed settlement will gain the court's approval. Hence, assuming other things remain equal, the more material information is produced through investment, the more favorable the settlement terms will be to the class.

[78] More specifically, while a "fairness hearing" held under Rule 23(e) is non-adversarial vis-à-vis the defendant, as the latter has no incentive to defeat a court approval of a proposed settlement to which he is a party, investment in providing the court with information that supports the fairness of the proposed settlement is necessary, notwithstanding, to confront counter-effort made by disgruntled third-party plaintiffs' attorneys who may find it in their best interest to defeat approval of a class-wide settlement, to which they are not a party.

[79] Technically, given *p=P(I, θ)*, the first derivative *P'(I, θ)>0* given any level of *I*.

[80] This proposition remains valid for any level of counter-investment made by the defendant or the intensity of the burdens imposed by the presiding court, denoted together as *θ*. In other words, the property of diminishing marginal returns characterizes investment in class action law enforcement independently of the magnitude of *θ*. In fact, it is conceivable that all the magnitude of *θ* can affect is (i) the exact level where the marginal returns on investment (in terms of the probability of holding the wrongdoer liable) reach the point of diminishing marginal returns and, more generally (ii) the actual rate of return (*i.e.*, the slope of that function).

[81] Technically, given *p=P(I, θ)* and holding *θ* constant, the second derivative *P''(I, θ)<0* for any *I>I\**.

respectively reached where the social and private payoffs from making an additional unit of investment are equal to the cost of that unit.

Analytically, diminishing marginal returns on investment, as exhibited in the diminishing marginal increase of the probability of holding a defendant liable, are likely to be observed due to two independent, yet non-mutually exclusive reasons.

*First*, after a given level of investment has already been made to produce functional and material information, the magnitude of the *effects* of any additional unit of information on increasing the probability of holding the defendant liable will decline, if not sharply drop to zero. This is primarily because holding a wrongdoer liable (to distinguish, however, from determining the magnitude of liability[82]) in class action law enforcement[83] –- whether, formally, through a full-blown class trial or, informally, in through settlement bargaining[84] –- is contingent upon a finite sequence of *binary* court decisions.[85] In order to maximize the probability of prevailing, class counsel must produce a *threshold* amount of functional or material information;[86] any additional information produced beyond the required threshold would not affect this probability,

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[82] I discuss the effects of the level of investment in class action law enforcement on the magnitude of damages awarded to class members in Part III(3) below.

[83] In this respect, class action law enforcement is not qualitatively different from litigation of claims brought on behalf one or few victims of harm.

[84] Defendants often negotiate class-wide settlements without *formally* admitting liability to the alleged wrongdoing. In fact, favorable settlements, in which defendants agree to pay for harm suffered (and, occasionally, for harm that will be suffered in the future) by class members without formally admitting to liability, are commonly observed in the landscape of class action law enforcement.

[85] Not surprisingly, the sequence of court decisions corresponds to the multi-stage sequence of investments in class action law enforcement. A highly detailed account of the latter is developed in Halfteck, *The Class Action Enterprise*, *supra* note 1, Parts VI(B) and IX(B)(1).

[86] Technically, the function $p=P(I,\theta)$ is non-continuous in the sense that the probability of holding a wrongdoer liable is rather low as long as the required threshold amount of information is not met (where, for example, the level of investment made is insufficient); once, however, the threshold amount is produced (that is, after sufficient investment has been made), the probability of holding the wrongdoer liable exhibits a sharp "jump."

however.[87]  Examined more closely, both these properties (*i.e.*, a *threshold* amount of information leading to a *binary* decision) properly characterize the legal standards applying to, and the court's range of possible decisions on (i) pre-trial "screening" motions,[88] (ii) a motion for class certification,[89] (iii) a determination of the defendant's liability for wrongdoing (as opposed to the magnitude of damages), and (iv) a motion to approve a proposed settlement.

*Second*, diminishing marginal returns on investment may also be observed because, after a given level of investment has already been made to produce functional or material information, the *amount* of information that may be produced with any additional unit of investment becomes smaller.  Investment in producing scientific evidence that is necessary to establish causation, to take one example, may reach a point where the amount of relevant evidence that is likely to be obtained with any additional unit of investment decreases.  This may be the case, for example, after the most effective means of research available at one's disposal have already been exhausted.

Finally, it seems fair to conclude that the probability of holding a wrongdoer liable increases in the level of investment, which at some point exhibits diminishing marginal returns (as manifested in the increase in the probability of holding that defendant liable).  Further, the marginal rate of return for any level of investment is negatively correlated with the intensity of the effects of counter-investment made by the defendant to defeat the plaintiffs' claims[90] and the burdens imposed on the class

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[87] A threshold amount of functional information is required, for example, in the case of a motion for class certification; a threshold amount of material information is required, for example, to prevail on a motion to dismiss or a motion for summary judgment.

[88] These include a motion to dismiss, a motion for judgment on the pleadings, and a motion for summary judgment in addition to motions pertaining to jurisdictional matters.  The binary nature of the court's ruling on pre-trial "screening" motions applies to any claim made in the class action complaint.

[89] The binary nature of the court's ruling on a motion for class certification applies to the certification of any cause of action asserted in the class action complaint.  The effects of investment on the size of the class, however, are discussed in Part III(4) below.

[90] In addition, disgruntled third-party plaintiffs' attorneys may seek to defeat approval of a class-wide proposed settlement to which they are not a party, and invest resources in pursuit of that end.

counsel by the court.[91]  It follows that, assuming all else remains equal,[92] the probability of holding the wrongdoer liable and, consequently, the expected liability and deterrence from class action law enforcement *increases* in the level of investment.   The socially-optimal level of investment, however, is reached where the marginal return on investment in terms of the increase in expected liability from increasing the probability of holding the wrongdoer liable equals its marginal cost.[93]

**3.      *The Magnitude of Average Damages Awarded to Class Members Compared with the Average Harm Caused to Victims***

The magnitude of expected liability in class action law enforcement, denoted $L$, is given by $L = q \cdot p \cdot d \cdot n$.[94]  How, then, does the level of investment in class action law enforcement affect the magnitude of average damages awarded to members of the plaintiffs' class, denoted $d$, whether damages are determined by the court following a full-blown jury or bench trial or agreed upon in the course of settlement bargaining?[95] Formally, the analysis below investigates the properties and behavior of the partial function *d=D(I,θ)*.

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[91] That is, the higher $\theta$ is, the lower the marginal return on investment.

[92] That is, assuming that the probability of detection of wrongdoing, the magnitude of damages awarded per class member, and the size of the class all remain the same.

[93] Technically, assuming the magnitude of $q$, $d$, and $n$ remains equal, the magnitude of $p$ and, hence, the magnitude of $L = q \cdot p \cdot d \cdot n$ increase with the level of investment in class action law enforcement.  This proposition holds for any level of $\theta$, which can only affect the marginal rate of return.

[94] A detailed discussion of the determinants of the magnitude of expected liability in class action law enforcement is contained in Part II above.

[95] The reference to *average* rather than to *individual* damages awards mirrors my primary theoretical concern with deterrence of wrongdoing, not with the allocation of compensation among victims for harm caused.  Specifically, the *ex ante* expectations of potential wrongdoers regarding the magnitude of the *ex post* threat of liability –- indeed, the only relevant perspective from standpoint of deterrence –- are solely geared toward the average magnitude of damages; the accurate distribution of damages among individual victims is entirely irrelevant, however.

Focusing the inquiry on the award of compensatory damages,[96] the benchmark for evaluating the effects of the level of investment on the magnitude of average damages is given by the magnitude of average harm that was inflicted by the defendant's wrongdoing on individuals in the victims' population, denoted $D$.[97] Indeed, using compensatory damages for the total harm caused by a firm's wrongdoing as a benchmark to evaluate the effects of investment on the magnitude of damages follows directly from the present theoretical objective, namely, gaining insight into the effects of the level of investment in class action law enforcement on expected liability and, hence, on deterrence of systematic risk-producing activities.[98] It should be clarified at the outset, however, that for the purpose of conceptual inclusiveness, the present reference to damages generally includes (i) monetary damages awarded to class members for harm caused by the wrongdoer's conduct or (ii) the cost to the wrongdoer of non-monetary remedies for the harm caused,[99] whether monetary damages or non-monetary remedies are ordered by the

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[96] The effects of the level of investment in class action law enforcement on the award of non-compensatory damages –- in particular, punitive damages –- poses intricate questions on both descriptive and normative levels, a thorough consideration of which lies beyond the scope of the present analysis. Thus, for the purpose of the present discussion it is assumed that the plaintiffs' claims for relief do not entitle them, as a matter of law, to any award of non-compensatory damages. A normative analysis of punitive damages in class action litigation from the standpoint of deterrence is undertaken elsewhere. *See* Guy Halfteck, *An Economic Analysis of Punitive Damages in Class Action Law Enforcement* (Harvard Law School, 2002).

[97] The average cost of harm inflicted by the wrongdoer's conduct on the individuals in the victims' population can be determined statistically in order to set the *exact* benchmark level of aggregate damages with respect to any particular wrongful conduct. In the present context, however, the reference to this benchmark is merely qualitative, not quantitative.

[98] Provided that the wrongdoer cannot escape from liability, imposing liability for damages for the full cost of harm caused by the wrongdoer's unlawful conduct is the optimal measure of damages. *See generally* A. Mitchell Polinsky & Steven Shavell, *Punitive Damages: An Economic Analysis*, 111 HARVARD LAW REVIEW 869, 878-887 (1998).

[99] *See generally* Geoffrey P. Miller & Lori S. Singer, *Nonpecuniary Class Action Settlements*, 60 LAW & CONTEMPORARY PROBLEMS 97 (1997).

court following full-blown jury or bench trial or rather agreed upon in the course of settlement bargaining.[100]

Before turning to examine the effects of the level of investment on the magnitude of average damages awarded to class members, I pause to observe how the magnitude of damages is determined in class action trials and, in turn, what type of information are plaintiffs' attorneys called to produce to make this determination possible and increase its accuracy.

Large-scale class action litigation often[101] poses severe administrative difficulties for trying the plaintiffs' claims and awarding damages on the basis of individualized proof.[102]  High administrative burden arises not only from the sheer size of the plaintiffs' class, but equally so from the complexity of the particularized proof that is necessary to determine the magnitude of harm caused to individual

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[100] For the sake of simplicity, however, the discussion that follows focuses on the effects of the level of investment on the magnitude of the aggregate monetary damages awarded to the class, though the insights gained equally apply to non-monetary remedies.

[101] The nature and complexity of particularized proof may vary across class action cases, however.  Proof of financial harm or loss suffered from securities fraud, to be sure, is nothing like poof of personal injuries in mass exposure class action litigation, where the harm caused to individual class members is not amenable to simple quantification.  The administrative burden in making individualized damages determinations far intensifies in mass toxic exposure, personal injury claims. *Accord* Jack B. Weinstein, INDIVIDUAL JUSTICE IN MASS TORT LITIGATION 22 (1995) (suggesting that flexible rules on the admissibility of evidence are essential to effective court-management of class action litigation of claims arising from mass disasters). *See generally* William Luneburg & Mark A. Nordenberg, *Specially Qualified Juries and Expert Nonjury Tribunals: Alternatives for Coping with the Complexities of Modern Civil Litigation*, 67 VIRGINIA LAW REVIEW 887 (1981).

[102] Jack Weinstein, a judge at the Federal District Court for the Eastern District of New York, who presided and managed numerous large-scale class action cases has stated that "[…] even with other aggregation techniques, it is close to impossible for one judge (particularly if he or she hopes to keep up with the rest of the caseload) personally to conduct the necessary fact-finding and negotiations, and then to develop, implement, and oversee a complicated ongoing administrative resolution of a mass tort case." *See* Jack B. Weinstein, INDIVIDUAL JUSTICE IN MASS TORT LITIGATION 143 (1995).

members of the class (or to establish individualized causation).[103] Furthermore, the burden of producing and presenting particularized evidence on harm caused to individual victims may set possibly-insurmountable hurdles not only for the trial court[104] but also for plaintiffs' attorneys who will have to produce and marshal such evidence[105] and present it to the court in an orderly fashion.[106]

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[103] *See, e.g.,* In Re Simon II Litigation, at \*100-101 (E.D.N.Y., Oct. 15, 2002) (Judge J. Weinstein) ("The idea that due process and jury trial rights require a particularized traditional form of evidence for each element [of the plaintiffs' claim] would make […] large-scale class action] cases […] impossible to try. […] In mass exposure cases with hundreds of thousands or millions of injured the cost of one-on-one procedure is insuperable and unsuitable for either a jury or a bench trial.")

[104] For this reason, trial courts have expanded the professional personnel to handle large-scale class action cases. Specifically, trial courts increasingly rely on special masters, who are frequently –- though not unrestrictedly –- appointed in large-scale class action litigation, especially in mass tort cases pursuant to FED. R. CIV. P. § 53. *See generally* Jack B. Weinstein, INDIVIDUAL JUSTICE IN MASS TORT LITIGATION 109-110, 143-45 (1995) (discussing the prevalence of special masters in large-scale litigation and the need to institutionalize their role). *See* David Rosenberg, *Of End Games and Openings in Mass Tort Cases: Lessons from a Special Master*, 69 BOSTON UNIVERSITY LAW REVIEW 695 (1989); Linda J. Silberman, *Judicial Adjuncts Revisited: The Proliferation of Ad Hoc Procedure*, 137 UNIVERSITY OF PENNSYLVANIA LAW REVIEW 2131 (1989) (arguing that delegation of authority to special masters has given rise to case-specific procedure). Special masters have been a useful means for gathering information in mass tort litigation. *See* Francis E. McGovern, *Toward A Functional Approach of Managing Complex Litigation*, 53 UNIVERSITY OF CHICAGO LAW REVIEW 440, 480 (1986).

[105] To be sure, this concern is entirely not far fetched. The plaintiffs' legal team, comprising a network of 1,500 law firms nationwide, faced severe financial difficulties in furnishing the capital necessary to litigate the mass-toxic exposure case known as "Agent Orange." The documented cost incurred by the plaintiffs' attorneys is said to exceed $10 million. *See* Peter H. Schuck, AGENT ORANGE ON TRIAL: MASS TOXIC DISASTERS IN THE COURTS 5 (1987). The suit involved claims of approximately 2.4 million Vietnam veterans, their wives and children, born and unborn (in addition to soldiers from Australian and New Zealand) in the "Agent Orange" case, arising from adverse health effects allegedly suffered from exposure to "Agent Orange," a herbicide used by the United States Army throughout the war to defoliate the jungle flora and reveal the enemy. *See* Jack B. Weinstein, INDIVIDUAL JUSTICE IN MASS TORT LITIGATION 151-52 (1995) (having presided the "Agent Orange" cases, Jack Weinstein states that "[p]laintiffs were

Mindful of these difficulties, district court judges have exercised broad discretion under the Federal Rules of Civil Procedure[107] and the Federal Rules of Evidence[108] to depart from traditional evidentiary requirements of particularized proof –- premised, fallaciously, on judicial preference for supposedly-accurate form of proof[109] –- in favor of a more

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running out of money to conduct the litigation"). Though it certainly was unparalleled, the "Agent Orange" case clearly demonstrates the type of possible financial difficulties that complex, large-scale class action law enforcement may pose for plaintiffs' attorneys.

[106] Hence, it is unsurprising that large-scale class action law enforcement often draws upon not only the representing plaintiffs' law firms themselves but, increasingly, satellite professional-services firms who offer litigation consulting and various information-management services. Litigation-support firms also offer to furnish the capital that is necessary to produce costly scientific evidence for trial. *See, e.g.*, Expert Finding, Inc., <http://www.expertfunding.com/>, visited Dec. 14, 2002 (The company describes its service as supplying "venture capital-like financing for a variety of different types of litigation and legal needs").

[107] Judicial discretion to control the presentation of evidence in class action litigation and to admit aggregate form of proof derives from Rule 23(d)(1), according to which "the court may make appropriate orders […] determining the course of proceedings or prescribing measures to prevent undue repetition or complication in the presentation of evidence." *See* FED. R. CIV. P. § 23(d)(1). This general authority is buttressed by Rule 1, according to which "[the federal rules of civil procedure] […] shall be construed and administered to secure the just, speedy, and inexpensive determination of every action." *See* FED. R. CIV. P. § 1. *See also* MANUAL FOR COMPLEX LITIGATION, THIRD § 21.422 (2000) ("In determining the appropriate limits, the court will need to confront difficult questions of balancing efficiency and economy against the parties' need to develop adequate record for summary judgment or trial").

[108] *See* FED. R. EVID. § 403 (court may restrict the presentation of cumulative evidence); FED. R. EVID. § 611(a) (court may exercise control over the mode and order of presenting evidence); FED. R. EVID. § 720-705 (discretion in admitting expert testimony).

[109] The traditional evidentiary requirements of particularized proof emanated from judicial reluctance to admit probabilistic evidence, commonly perceived as an inaccurate form of proof. Demonstrating the fallacious premise underlying the traditional evidentiary approach, David Rosenberg argued that "[t]he concept of 'particularistic' evidence suggests that there exists a form of proof that can provide direct and actual knowledge of [the parties' conduct]. 'Particularistic' evidence, however, is in fact no less probabilistic than is the

pragmatic,[110] cost-effective approach, ultimately allowing plaintiffs' attorneys to present non-traditional, aggregate forms of proof, including sampling and statistical extrapolation,[111] for the purpose of determining average damages for harm.[112] Judicial reliance on aggregate form of proof to determine average damages for harm –– presumably, by scarifying accurate victim-specific determination of harm –– is normatively warranted on welfare grounds.[113]

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statistical evidence that courts purport to shun." *See* David Rosenberg, *The Causal Connection in Mass Exposure Cases: A 'Public Law' Vision of the Tort System*, 97 HARVARD LAW REVIEW 851, 870 (1984). *Cf.* Jonathan J. Koehler & Daniel Shaviro, *Veridical Verdicts: Increasing Verdict Accuracy Through the Use of Overtly Probabilistic Evidence and Methods*, 75 CORNELL LAW REVIEW 247 (1990); Michael J. Saks & Robert F. Kidd, *Human Information Processing and Adjudication: Trial by Heuristics*, 15 LAW & SOCIETY REVIEW 123, 151 (1989-1990) ("Much of the testimony that is commonly thought of as particularistic only seems so. It is far more probabilistic than we normally allow jurors (or judges) to realize").

[110] *Accord* Kenneth R. Feinberg, *Lawyering in Mass Torts*, 97 COLUMBIA LAW REVIEW 2177 (1997).

[111] *Cf.* MANUAL FOR COMPLEX LITIGATION, THIRD § 21.493 (2000) ("The use of acceptable sampling techniques in lieu of discovery and presentation of voluminous data from the entire population, may produce substantial savings in time and expense.")

[112] *See, e.g.,* In Re Simon II Litigation, at *100-127 (E.D.N.Y., Oct. 15, 2002). *See also* Laurens Walker & John Monahan, *Sampling Liability*, 85 VIRGINIA LAW REVIEW 329 (1999) (statistical evidence is a reliable and practical method in mass trials); Robert G. Bone, *Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity*, 46 VANDERBILT LAW REVIEW 561 (1993).

[113] Provided that victims are not risk-averse, *ex ante* all victims would rationally prefer that damages for harm are determined on average –– by using, for example, statistical proof –– rather than by incurring costs to produce particularized proof in order to enhance the accuracy of the determination of damages. *See* Bruce Hay & David Rosenberg, *The Individual Justice of Averaging* (Discussion Paper No. 285, John M. Olin Center for Law, Economics, and Business, Harvard Law School, 2000); Bruce Hay, *Procedural Justice: Ex Ante vs. Ex Post*, 44 UNIVERSITY OF CALIFORNIA AT LOS ANGELES LAW REVIEW 1803 (1997); David Rosenberg, *Class Actions for Mass Torts: Doing Individual Justice by Collective Means*, 62 INDIANA LAW JOURNAL 561 (1987).

Stated more generally, where potential wrongdoers do not know *ex ante* the level of harm to victims which will be caused by their misconduct, costly legal procedures that enhance accuracy are wasteful and adopting them, on fairness

With that said, let us return to examine the effects of the level of investment in class action law enforcement on the magnitude of damages awarded to class members. The magnitude of average damages awarded to members of the plaintiffs' class, it seems, increases (albeit, up to some point) in the level of investment in producing aggregate proof on the harm caused by the wrongdoer's misconduct.[114] For, the higher is the level of investment in information –- *e.g.*, where a statistical sample is designed to include a larger number of victims and where more test trials are conducted[115] –- then, assuming all else remains equal, the smaller the size of possible error (and, hence, the higher the accuracy) of information on the average harm of members of the victims' population.[116] It follows that the higher the level of investment is, the more likely is it that the average damages awarded to class members, *d*, will more closely approximate the actual harm caused by the defendant's wrongdoing, *D* –- *i.e.*, the damages-to-harm ratio $\frac{d}{D}$ will become closer to 1 –- thereby making it more likely that the defendant is held liable to the actual social cost of harm inflicted on victims in the plaintiffs' class,[117] *i.e.*, $n \cdot D$ .[118]

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grounds, would make everyone worse-off. *See* Louis Kaplow & Steven Shavell, FAIRNESS VERSUS WELFARE 264-66 & n.101 (2002).

[114] Whether damages are determined on the basis of particularized or aggregate proof does not affect the general positive correlation between the magnitude of damages and the level of investment in class action law enforcement, though it may affect the marginal rate of return on investment.

[115] The enhanced accuracy is reinforced by the law of large numbers.

[116] *Accord* Blue Cross & Blue Shied of N.J., Inc., 36 F. Supp. 2d 560, 575 (E.D.N.Y. 1999) ("The aggregation of millions of alleged injuries […] can be expected to yield more accurate results […] since projections based upon a large statistical base will be available, thus reducing the size of the possible error.") *See also* Allen v. United States, 588 F. Supp. 247, 417 (D. Utah 1984), *rev'd on other grounds,* 816 F.2d 1417 (10th Cir. 1987) ("In a large population, random variations tend to cancel each other out, yielding an overall observed distribution that is far more useful in evaluating correlations, relationships and probabilities.")

[117] Where the certified plaintiffs' class is under-inclusive of the victims' population (*i.e.*, where *n<N*), the expected liability from class action law enforcement will be sub-optimal from the standpoint of deterrence even where the magnitude of average damages awarded to members of the class equals to the average cost of harm caused to individuals in the victims' population (*i.e.*, where *d=D*), for optimal liability is given by $L = D \cdot N$ . I discuss this possibility in further detail in Part III(4) below.

Note that the higher is the level of investment in class action law enforcement, the higher is the accuracy of information on the average magnitude of harm and, consequently, the closer is the average award of damages to the harm caused on average by the wrongdoer's misconduct.[119]

The general positive correlation between investment and the magnitude of awards of average damages seems to hold irrespective of whether damages are determined by the court following a full-blown trial or are negotiated in the course of settlement bargaining. For in both cases the information produced provides the basis upon which the award of damages is determined or the terms of the settlement are negotiated.[120]

Having said that, it seems plausible that, at some point, investment in producing aggregate information on the harm caused to the victims' population will exhibit diminishing marginal returns. This may be the case where the marginal effect of an additional unit of information (*i.e.*, a higher level of accuracy) on the award of damages will become smaller; this is likely to occur, for instance, where the capacity of the court or the jury to process information is limited.[121]

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[118] Recall that compensatory damages for the full cost of harm caused by one's wrongdoing is the measure of damages that will induce optimal deterrence.

[119] The accuracy of the aggregate harm inflicted on the victims' population ought to be distinguished from the accuracy of the level of harm caused to individual victims by the wrongdoer's misconduct. While costly investment to enhance the accuracy of *individual awards of damages* makes everyone worse-off and is undesirable on welfare grounds, costly investment to enhance the accuracy of the *aggregate award of damages* to the class as a whole increases the level of deterrence (*i.e.*, brings it closer to the optimal level), makes everyone better-off, and is therefore desirable from a welfare standpoint.

[120] More specifically, the information produced on the aggregate harm caused interacts with the probability of holding the wrongdoer liable to determine the plaintiff's expected damages from trial; it will therefore affect the plaintiffs' reservation value in settlement. Furthermore, assuming this information becomes common knowledge –– as it is indeed likely to be following pre-trial discovery –– this information will delineate the settlement range and interact with other factors to determine the settlement outcomes.

[121] In other words, given some level of information, the court's and the jury's decisions may become less sensitive to the information available to them.

On the whole, assuming all else remains equal,[122] the magnitude of average damages (awarded by the court or agreed upon in settlement bargaining) and, consequently, the aggregate expected liability and deterrence from class action law enforcement increase with the level of investment.[123]   The socially-optimal level of investment is reached, however, where the marginal return on investment in terms of the increase in expected liability from the increase in the magnitude of average damages equals its marginal cost.[124]

**4.      *The Size of the Plaintiffs' Class Compared with the Size of the Victims' Population***

One final question remains to be examined, namely:  How does the level of investment in class action law enforcement affect the size of the plaintiffs' class compared to the size of the victims' population,[125] the latter, it is presently assumed, is determined exogenously?[126]  Formally, the analysis below investigates the properties and behavior of the function $n=N(I,\theta)$, $n$ being the number of similarly-situated victims who fall within the definition of the plaintiffs' class, so as to be formally aggregated and collectivized into a single, cohesive pool for the purpose of law enforcement, such that $0 \leq n \leq N$.[127]  The benchmark against which the effects of the level of investment on the size of the plaintiffs' class are evaluated is given by $N$, a number that denotes the exogenously-determined size of the similarly-situated victims' population.[128]

More precisely, the present concern, from the standpoint of deterrence, is how inclusive is the plaintiffs' class of the actual victims' population.  This concern emanates from the theoretical observation that

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[122] That is, assuming that the probability of detection of wrongdoing, the probability of holding the wrongdoer liable, and the size of the plaintiffs' class remain the same.

[123] The marginal rate of return for any level of investment is negatively correlated to the intensity of the effects of counter-investment made by the defendant to defeat the plaintiffs' claims and the burdens imposed by the court on the class counsel, denoted together $\theta$.

[124] Technically, assuming the magnitude of $q$, $p$ and $n$ remains equal, the magnitude of $d$ and, hence, the magnitude of $L = q \cdot p \cdot d \cdot n$ increases with the level of investment in class action law enforcement.  This proposition holds for any level of $\theta$, which can only affect the marginal rate of return.

when a certified plaintiffs' class (or when the size of sub-classes combined together) is under-inclusive of the relevant victims' population, the deterrence objectives of class action law enforcement may, to some extent, be compromised. While some effects of under-inclusive class action law enforcement on the magnitude of expected liability and, hence, on deterrence are evident, other effects are somewhat subtle.

*First*, an under-inclusive plaintiffs' class means that, assuming all else remains equal,[129] the magnitude of expected liability from class action

[125] The size of a victims' population –- as well as the average magnitude of harm caused and its distribution across the population –- is determined by (among other things, *e.g.*, victims' investment in care), the characteristics of the wrongdoer's risk-producing activity, which, in turn, depend (among other factors, including, *e.g.*, competition in product markets), on the wrongdoer's incentives to invest in precautions to minimize expected harm to victims.

[126] For the purpose of the present discussion, it is assumed that the attributes of the victims' population –- including its size, the average magnitude of harm, and its distribution across the pool of victims –- are determined exogenously. The analysis thus focuses on the effects of the level of investment in class action law enforcement on the size of the plaintiffs' class, given the exogenously-determined attributes of the similarly-situated victims' population.

[127] More precisely, given the "numerosity" prerequisite of Rule 23(a)(1) –- namely, that "the class is so numerous that joinder of all members is impracticable" –- the lower-bound of $n$ is never 0, but often substantially higher. *See* FED. R. CIV. P. § 23(a)(1). *See, e.g.,* In re Corel Corp. Inc. Securities Litigation, 206 F.R.D. 533, 540 (E.D. Pa. 2002); Stewart v. Abraham, 275 F.3d 220, 226-27 (3rd Cir. 2001) ("generally if the named plaintiff demonstrates that the potential number of plaintiffs exceeds 40, the first prong of Rule 23(a) has been met"); Mullen v. Treasure Chest Casino, LLC, 186 F.3d 620, 624-25 (5th Cir. 1999), *cert. denied*, Treasure Chest Casino v. Mullen, 528 U.S. 1159 (2000) (a class of 100 to 150 members is within the range that generally satisfies the numerosity requirement).

[128] $N$ denotes the statistically-determined size of the victims' population. Using statistical data on background risks and data on specific risks generated by the defendant's wrongful activity, the exact size of the affected victims' population can be determined. Further, relying on statistical data to determine the magnitude of harm caused to victims on average, the total social cost of the defendant's activity can be ascertained and compared to actual liability outcomes. In the present context, however, the reference to $N$ is qualitative, not quantitative.

[129] Namely, assuming that (i) the probability of detection of wrongdoing, (ii) the probability of holding a wrongdoer liable, and (iii) the magnitude of damages awarded to class members all remain the same. Yet, as I explain below, an

law enforcement will be *proportionally* lower than the aggregate cost of harm caused to the victims' population by the wrongdoer's misconduct.[130] Formally, the reduction in expected liability is given by

$$L = (N - n) \cdot q \cdot p \cdot d$$

The reduction in expected liability from under-inclusive class action law enforcement is likely, however, to be *un-proportional* due to two distinct effects, which I identify below. The decrease in the magnitude of expected liability, in other words, will be greater than the proportional share of liability (*i.e.*, *L*) for harm caused to similarly-situated victims who are *not* included in the certified plaintiffs' class (*i.e.*, $N - n$).

*Second*, an under-inclusive plaintiffs' class also entails a relatively reduced opportunity to exploit economies of scale of investment in class action law enforcement[131] and, possibly, lower incentives to invest and a

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under-inclusive certified plaintiffs' class is likely to affect these variables too and further decrease –- in an un-proportional manner –- the magnitude of expected liability from under-inclusive class action law enforcement.

[130] Of course, the fact that a fraction (*i.e.*, $N - n$) of the similarly-situated victims' population is not presently included in the certified plaintiffs' class does not necessarily mean that the wrongdoer will not face liability for total harm it caused to the victims' population (*i.e.*, $(N - n) \cdot d$). In fact, provided that the value of their claim warrants incurring the cost of suit, victims may decide to invoke their legal rights individually. Alternatively, assuming the aggregate value of these claims is sufficiently high to warrant a plaintiffs' attorney's investment in class action law enforcement, class action may be brought on behalf of the remainder fraction of the victims' population. Whatever the case may be, however, under-inclusive class action law enforcement, as I show below, is undesirable on deterrence grounds, due, possibly, to (i) reduced economies of scale of investment and (ii) increase in the size of possible errors in the determination of damages and causation.

Further, even assuming that under-inclusive class action law enforcement does not result in diluted deterrence –- which, as I argue below, is theoretically implausible –- it is still socially-undesirable due to the somewhat duplicative litigation costs that law enforcement with respect to the remainder fraction of the victims' population will entail. *Accord* David Rosenberg, *Avoiding Duplicative Litigation between Many Plaintiffs and A Common Defendant: The Superiority of Class Action vs. Collateral Estoppel vs. Nothing* (John M. Olin Center for Law, Economics, and Business, Harvard Law School, 2001).

[131] Identifying the negative correlation between the size of the certified plaintiff's class and the opportunity to exploit economies of scale of investment in class action law enforcement, David Rosenberg argues that mandatory, non-

lower level of investment in the multi-stage sequence of investment in class action law enforcement.[132]  In fact, this effect may be undesirable, from the standpoint of deterrence, precisely –- and indeed only –- where the reduced economies of scale render otherwise-efficient investment in law enforcement economically unwarranted.[133]  Thus, when scale economies are reduced to a level where otherwise-efficient investment in law enforcement becomes economically unwarranted, the effects of an under-inclusive plaintiffs' class on the magnitude of expected liability would be un-proportional, namely, the decrease in the magnitude of expected liability will be greater than the proportional share of liability to victims who are not included in the class.[134]

   *Third*, regardless of the previous effects, an under-inclusive plaintiffs' class may increase the magnitude of error in determining the average damages awarded to class members.  Specifically, when damages are determined –- as they often are in large-scale class action litigation –- on the basis of aggregate forms of proof (*e.g.*, sampling and statistical

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opt-out class action litigation is preferable, on deterrence grounds, to opt-out classes.  This is because opting-out reduces the size of the plaintiffs' class and thus compromises the plaintiffs' opportunity to exploit economies of scale of investment, ultimately creating asymmetric incentives to invest. *See* Rosenberg, *Mass Tort Class Actions: What Defendants Have and Plaintiffs Don't*, 37 HARVARD JOURNAL ON LEGISLATION 393 (2000); David Rosenberg, *The Unrecognized Social Advantage of Mass Tort Class Action* (Unpublished manuscript, Harvard Law School, 2001); and, most recently, David Rosenberg, *Mandatory-Litigation Class Action: The Only Option for Mass Tort Cases*, 115 HARVARD LAW REVIEW 831 (2002).

[132] The effects of the level of investment on the probability of detection of wrongdoing, the probability of holding a wrongdoer liable to its conduct, and the magnitude average damages awards are discussed in Parts II(1)-(3) above.

[133] In other words, under-inclusive class action law enforcement –- and the reduced economies of scale it entails –- may not be a matter of concern from the standpoint of deterrence where the opportunity to exploit further enhanced economies of scale to lower the marginal cost of investment –- which is reached where the plaintiff's class is perfectly inclusive of the victims' population –- in order to increase the aggregate level of investment in law enforcement would not be socially-efficient because the benefits (in deterrence terms) of investing any additional unit of investment are lower than the social cost of that unit.

[134] For, a lower level of investment would bear impact on (i) the probability of detection, (ii) the probability of holding a wrongdoer liable, and (iii) the magnitude of average damages awarded to members of the class.

extrapolation,[135] increased risk-analysis,[136] and surveys[137]) the accuracy of the outcomes obtained is likely to increase with the size of the plaintiffs' class.[138]  In fact, assuming other things remain equal, the size of possible error will be entirely minimized where the certified plaintiffs' class is perfectly inclusive of the victims' population.[139]

Now that the effects of under-inclusive class action law enforcement on deterrence objectives have been identified,[140] I turn to examine how the level of investment in class action law enforcement affects the size of the plaintiffs' class compared with the size of the victims' population.

In general, two independent factors generally interact to determine the actual size of the plaintiffs' class for the purpose of law enforcement

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[135] *See generally* Robert G. Bone, *Statistical Adjudication: Rights, Justice, and Utility in a World of Process Scarcity*, 46 VANDERBILT LAW REVIEW 561 (1993).

[136] *See* David Rosenberg, *The Causal Connection in Mass Exposure Cases: A "Public Law" Vision of the Tort System*, 97 HARVARD LAW REVIEW 849 (1984); David Rosenberg, *Individual Justice and Collectivizing Risk-Based Claims in Mass Exposure Cases*, 71 NEW YORK UNIVERSITY LAW REVIEW 210 (1996).

[137] *See, e.g.,* In Re Simon II Litigation, at *100-127 (E.D.N.Y., Oct. 15, 2002).  *See also* Laurens Walker & John Monahan, *Sampling Liability*, 85 VIRGINIA LAW REVIEW 329 (1999) (statistical evidence is a reliable and practical method in mass trials).

[138] *Accord* Blue Cross & Blue Shied of N.J., Inc., 36 F. Supp. 2d 560, 575 (E.D.N.Y. 1999) ("The aggregation of millions of alleged injuries […] can be expected to yield more accurate results […] since projections based upon a large statistical base will be available, thus reducing the size of the possible error.")

[139] *Accord* Allen v. United States, 588 F. Supp. 247, 417 (D. Utah 1984), *rev'd on other grounds,* 816 F.2d 1417 (10th Cir. 1987) ("In a large population, random variations tend to cancel each other out, yielding an overall observed distribution that is far more useful in evaluating correlations, relationships and probabilities.")

[140] In fact, the social cost of under-inclusive class action law enforcement does not derive only from diluted deterrence.  For, even assuming that under-inclusive class action law enforcement does not result in diluted deterrence –- which, as I argue, is theoretically implausible –- it is still socially-undesirable due to duplicative litigation costs that law enforcement with respect to the remainder fraction of the victims' population will entail.  *Accord* David Rosenberg, *Avoiding Duplicative Litigation between Many Plaintiffs and A Common Defendant: The Superiority of Class Action vs. Collateral Estoppel vs. Nothing* (John M. Olin Center for Law, Economics, and Business, Harvard Law School, 2001).

and, hence, the class-to-population ratio $\frac{n}{N}$. These factors include (i) the scope of the certified plaintiffs' class, as defined by the court in its order on class certification,[141] and (ii) the rate of opt-out from the plaintiffs' class,[142] which is only relevant where class members are doctrinally afforded an opportunity to exercise an option to opt-out of the class.[143]

Generally, the scope of the certified plaintiffs' class, $n$, is likely to increase in the level of investment in class action law enforcement.[144] That is, the magnitude of $n$ increases in the higher the level of investment, thereby increasing the class-to-population ratio $\frac{n}{N}$. To see exactly why, consider the type and amount of information that plaintiffs' attorneys are called to produce and present to the court in support of a motion to certify a plaintiffs' class comprising the entire similarly-situated victims' population (or a large fraction thereof). Because the scope of the class

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[141] The scope of a plaintiffs' class –- and, similarly, the scope of any sub-class pursuant to Rule 23(c)(4)(B) –- that is certified by a court is bounded by the regulatory, "entry"-type limitations imposed by Rule 23 on using the class action mechanism. Analytically, while the "numerosity" requirement (*i.e.*, that the class is sufficiently numerous so as to render joinder impracticable) sets the lower-bound of a certified class, the "commonality" requirement (*i.e.*, that there are questions of law or fact common to the class) sets its upper-bound. *See* FED. R. CIV. P. §§ 23(a)(1)-(2).

An additional factor interacts to determine the upper-bound of a certified plaintiffs' class when certification is sought under Rule 23(b)(3), namely — the "manageability" of the class, which focuses on the difficulties the court is likely to encounter in the administration of the class action. *See* FED. R. CIV. P. § 23(b)(3)(D). *See, e.g.*, Zinser v. Accufix Research Institute, Inc., 253 F.3d 1180 (9th Cir. 2001) (where potential plaintiffs, witnesses and evidence are geographically dispersed, it is undesirable to concentrate litigation in one forum).

[142] Hence, the court's judgment must include and specify or describe those to whom notice was directed and who have not requested to opt-out of the class, which the court thus finds to be members of the class. *See* FED. R. CIV. P. § 23(c)(3).

[143] Doctrinally, the only situation in which individual members are afforded a front-end option to opt-out of the class, within a specified period of time, is where the action is certified and maintained as a class action under Rule 23(b)(3). *See* FED. R. CIV. P. §§ 23(b)(3), 23(c)(2).

[144] Technically, given $n=N(I, \theta)$, the first derivative $N'(I, \theta)>0$ given any level of $I$. Also, $n=0$ for $I=0$.

primarily depends on the information presented by the plaintiffs' attorney[145] to establish the "commonality" requirement[146] –– which is ordinarily satisfied by showing there are questions of law or fact that are common to the members of the putative class[147] –– then the more *inclusive* the common questions of law or fact are, and assuming all else remains equal,[148] the larger the scope of the class is likely to be.  The definition and scope of the class, to put it differently, depend on information that demonstrates to the court that the victims' population shares a sufficient common basis, namely, that the resolution of questions that are alleged to be common to the class is likely to affect all the members of that putative class.  To that end, it is not only necessary to obtain information on the wrongdoer's systematic conduct and the boundaries of the affected victims' population,[149] but it is also necessary to establish the common

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[145] Counter-effort made by the defendant to defeat class certification or narrow its scope may affect the scope of the class too, if one is certified.

[146] As the "numerosity" requirement presents a fairly loose, lower-bound threshold, the primary determining factor of the scope of the plaintiffs' class is the "commonality" requirement, which sets its upper-bound.  *See* Fed. R. Civ. P. § 23(a)(1) and § 23(a)(2), respectively.

[147] Courts generally apply liberal standards for satisfying the "commonality" requirement.  *See, e.g.,* Keele v. Wexler, 149 F.3d 589, 594 (7th Cir. 1998) (all which is required is a common nucleus of operative facts, such that factual variance among class members does not defeat certification); Lightbourn v. County of El Paso, 118 F.3d 421, 426 (5th Cir. 1997), *cert. denied*, 522 U.S. 1052 (1998) ("The commonality test is met when there is at least one issue, the resolution of which will affect all or a significant number of the putative class members").

[148] Simply, because the "manageability" of the class (when certification is sought under Rule 23(b)(3)) is, to some extent, negatively correlated with the scope of the class, not everything may remain equal.  *See, e.g.,* Mullen v. Treasure Chest Casino, LLC, 186 F.3d 620, 627 (5th Cir. 1999), *cert. denied*, Treasure Chest Casino v. Mullen, 528 U.S. 1159 (2000) (holding that the number of class members affects the manageability of the class action).

[149] Courts require that the putative class can be described with sufficient certainty and deny certification of amorphously-defined classes.  *See, e.g.,* Berman v. Narragansett Racing Ass'n, 414 F.2d 311, 317 (1st Cir. 1969), *cert. denied*, 396 U.S. 1037 (1970).  Where the definition of the class is vague, membership in the class is subject to uncertainty, notice to class members raises administrative difficulties, and the quantification of aggregate damages becomes a costly and possibly impracticable task.

questions, the resolution of which will bear impact on all the victims.[150] Precisely for these reasons, the higher the level of investment and the more information on the victims' population is produced, (i) the closer the alleged alignment of the class definition and the victims' population and (ii) the higher the probability of demonstrating to the court that the resolution of common questions will affect the entire victims' population or a large fraction thereof.

Notwithstanding the observation that the level of investment and the size of class are positively correlated, the size of the certified plaintiffs' class will only increase up to some point in the level of investment, which may, at times, be lower than the size of the victims' population, $N$. For, at some point, additional investment (i) in tracing the boundaries of the relevant victims' population or (ii) in producing information that establishes the required legal or factual common basis among the members of a putative class[151] will exhibit diminishing marginal returns in terms of increasing the size of the class and, hence, in increasing the class-to-population ratio $\frac{n}{N}$.[152]

Diminishing marginal returns on investment, more specifically, may correlate, for example, with the limited capacity of the court to fine-tune the definition of the class to additional information it is presented regarding the scope of the common legal or factual basis among the members of the class (hence, the possible limited efficacy of producing additional information).[153] Likewise, diminishing marginal returns may correspond with a practical upper-bound that the court may impose on the size of the class. In fact, such limitation is doctrinally embedded in the

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[150] Establishing commonality requires information that shows that members of a putative class share sufficiently common questions of law or fact, the resolution of which will likely affect them all. Hence, common questions exist, for example, when the same wrongful conduct is alleged to have harmed the members of the class; where the issue of causation is uniform across victims; and so forth.

[151] Establishing commonality requires information that shows that members of a putative class share sufficiently common questions of law or fact, the resolution of which will likely affect them all.

[152] Technically, given $n=N(I, \theta)$ and holding $\theta$ constant, the second derivative $N''(I, \theta)<0$ for any $I>I^*$.

[153] In other words, given some level of information, the court's decision may become less sensitive to the amount and accuracy of information it is actually presented with.

"manageability" requirement, which focuses on the difficulties the court is likely to encounter in the administration of the class action, an important variable of which is the size of the class.[154]

Once the scope of the plaintiffs' class has been determined by the court opt-out from the class, when legally available, may work to reduce its size.[155] The observed rates of opt-out in class action litigation, however, are generally very low –- often even negligible in percentage terms[156] –- due, in part, to rational apathy on behalf of victims who hold small-value, non-economic claims[157] or to the inadequacy of various forms of notice as means of providing information on a certified class action and the corresponding right of its members to opt-out. Depending on the heterogeneity of the class' composition, the rate of opt-out may vary, however, due to adverse selection –- that is, where low-value victims remain in the class and high-value victims opt-out –- which is likely to occur where average damages are awarded on the basis of aggregate, statistical proof.[158]

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[154] Doctrinally, this requirement applies only to class actions certified and marinated under Rule 23(b)(3). *See* FED. R. CIV. P. § 23(b)(3)(D). *See, e.g.,* Zinser v. Accufix Research Institute, Inc., 253 F.3d 1180 (9th Cir. 2001) (where potential plaintiffs, witnesses and evidence are geographically dispersed, it is undesirable to concentrate litigation in one forum).

[155] Opt-out, as a factor that interacts to determine the ultimate size of the class, is only relevant where class members are doctrinally afforded an opportunity to exercise an option to opt-out of the class. Doctrinally, the only situation in which individual members are afforded a front-end option to opt-out of the class, within a specified period of time, is where the action is certified and maintained as a class action under Rule 23(b)(3). *See* FED. R. CIV. P. §§ 23(b)(3), 23(c)(2).

[156] *See generally* Thomas E. Willging, Laural L. Hooper and Robert J. Niemic, *Empirical Study of Class Actions in Four Federal District Courts: Final Report to the Advisory Committee on Civil Rules*, FEDERAL JUDICIAL CENTER (1996), available at <http://www.fjc.gov/newweb/jnetweb.nsf/autoframe?openform&url_r=pages /556&url_l=index>, visited Dec. 14, 2002.

[157] Not exercising an option to opt-out of a class is a rational strategy for victims holding small-value, non-economic claims. Because low-value claims are generally unmarketable in the market for legal services, remaining in the class would make these victims better off given the costless positive expected value of their claims under the class action regime.

[158] A damage-averaging regime may carry differential effects on the incentive of class members to opt-out depending, among other factors, on the value of one's claim. If high-value victims exercise the option to opt-out, not only will the class

Having said that, it seems rather plausible that the rate of opt-out is relatively uncorrelated with the level of investment in class action law enforcement, for the plaintiffs' attorney's level of investment is not a determining variable which class members take account of in making opt-out decisions. More explicitly, low-value class members –- for whom the cost of individual suit is higher than its expected value –- are likely to remain in the class notwithstanding any level of investment made, simply because the opportunity cost of opting-out (*i.e.*, the lost recovery if damages[159]) and the zero gain from opting-out (given the prohibitive fully-internalized cost of bringing an individual suit) render such decision inefficient.[160]

High-value class members,[161] on the other hand, are likely, in theory,[162] to opt-out only where their net expected recovery of damages from class action law enforcement falls short of the net expected recovery from opting-out the plaintiffs' class in favor of bringing an individual suit.[163] While the aggregate cost of individual suit may be reduced by positive externalities of class action law enforcement –- namely,

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become smaller but the magnitude of statistically-determined average award of damages will decrease too. *See generally* Yoen-Koo Che, *Equilibrium Formation of Class Action Suits*, 62 JOURNAL OF PUBLIC ECONOMICS 339 (1996).

[159] Notice that where damages are awarded on an average basis, the opportunity costs of opting-out are considerably higher for low-value class members given their expected "windfall" from remaining in the class.

[160] Because low-value claims are unmarketable in the market for legal services, remaining in the class would make these victims better off given the costless positive expected value of their claims under the class action regime, for which not opting-out is a rational strategy.

[161] It is assumed that the cost of bringing an individual suit for high-value class members is lower than the expected value of such suit and, hence, is economically warranted. The cost of suit can, to some extent, be reduced by free-riding on information which was produced by plaintiffs' attorneys and later made publicly available.

[162] As I explain below, this remains a mere theoretical possibility, for it is ruled-out by the reality of large-scale class action law enforcement.

[163] High-value class members may also be induced by competing plaintiffs' attorneys to opt-out of the class so as to be included in a different class action suit brought by the latter. In that case, the decision to opt-out (assuming no incentive payments are made) depends on comparing the expected recovery of damages in each of these class action suits, a matter on which class members are generally very poorly informed.

information produced by plaintiffs' attorneys and made publicly-available[164] –– high-value victims would still have to internalize the remaining cost of bringing an individual suit.  It follows that when the cost of individual suit is considerable (in percentage terms), high-value class members are likely to be far better off remaining in the class –– and exploiting the economies-of-scale benefits of class action law enforcement in reducing per-victim cost of suit –– even where the plaintiffs' attorney's level of investment in class action law enforcement is insufficient to maximize their expected recovery.  The efficiency of remaining in the class is likely to become smaller, however, where (i) damages for harm in class action law enforcement are awarded on an average basis[165] and (ii) the magnitude of harm suffered by a high-value class member is higher than the average harm caused to members of the plaintiffs' class.[166]

Whatever the case may be, it seems that the level of investment in class action law enforcement will increase the rate of opt-out of high-value class members only where it falls below a *very low* threshold, namely, where given the plaintiffs' attorney's level of investment in law enforcement the net expected recovery of damages from remaining in the class falls short of the net expected recovery from opting-out the plaintiffs' class and bringing an individual suit.[167]  Yet, I would like to suggest that the actual effect of the level of investment on the rate of opt-out is even more negligible than what has just been theoretically observed.  This is

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[164] The magnitude of this positive externality depends, among other things, on the level of investment in class action law enforcement, because, other things remain equal, the higher the level of investment, the higher are the amount and accuracy of the information produced.

[165] The determination of damages in class action law enforcement and the use of particularized and aggregate forms of proof –– including sampling and statistical extrapolation, increased risk-analysis, and surveys –– were discusses in Part X(B)(3) above.

[166] Which is to say that under these two conditions –– namely, where (i) damages are awarded on average and where (ii) the private harm suffered is higher than the average harm inflicted on members of the plaintiffs' class –– adverse selection is more probable.

[167] High-value class members may also be induced by competing plaintiffs' attorneys to opt-out of the class so as to be included in a different class action suit brought by the latter.  In that case, the decision to opt-out (assuming no incentive payments are made) depends on comparing the expected recovery of damages in each of these class action suits, a matter on which class members are generally very poorly informed.

precisely because class members are generally very poorly informed on the magnitude of variables that are involved in making privately-efficient opt-out decisions. In fact, hardly are class members sufficiently involved in the litigation –– nor are they generally capable or otherwise well situated –– to observe the level of investment and decide accordingly whether to opt-out or not.

Over all, it seems fair to conclude that the level of investment bears impact on how inclusive is a plaintiffs' class of the actual victims' population which, indeed, is a matter of real concern from the standpoint of deterrence. Specifically, the size of the plaintiffs' class increases in the level of investment in class action law enforcement. At some point, as I have explained above, additional investment will exhibit diminishing marginal returns. It follows that the socially-optimal level of investment is reached at the point where the marginal return on investment in terms of the increase in expected liability from increasing the size of the class is equal to the marginal cost of investment. Finally, assuming all else remains equal,[168] the aggregate expected liability and deterrence from class action law enforcement will increase in the size of and the class-to-population ratio $\frac{n}{N}$.[169]

## IV. CONCLUSIONS: THE EFFECTS OF THE LEVEL OF INVESTMENT ON THE MAGNITUDE OF EXPECTED LIABILITY AND DETERRENCE

Recall that the determinants of the magnitude of expected liability and deterrence from class action law enforcement include (i) the probability of detecting systematic wrongful behaviors, (ii) the probability

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[168] That is, it assumed that (i) the probability of detection of wrongdoing, (ii) the probability of holding the wrongdoer liable, and (iii) the magnitude of average damages awarded to members of the class remain equal.

[169] The marginal rate of return for any level of investment is negatively correlated to the intensity of the effects of (i) counter-investment made by the defendant to defeat class certification and (ii) burdens imposed by the court on the class counsel, together denoted $\theta$.

Technically, assuming the magnitude of $q$, $p$ and $d$ remains equal, the magnitude of $n$ and, hence, the magnitude of $L = q \cdot p \cdot d \cdot n$ increases in the level of investment in class action law enforcement. This proposition holds for any level of $\theta$, which can only affect the marginal rate of return.

of holding the defendant liable to wrongdoing, (iii) the magnitude of average damages awarded to members of the plaintiffs' class (compared with the average harm caused to individuals in the victims' population), and (iv) the size of the plaintiffs' class (compared with the size of the victims' population). Formally, the magnitude of expected liability in class action law enforcement is given by[170]

$$L = q \cdot p \cdot d \cdot n$$

The magnitude of each of these variables –- $q$, $p$, $d$ and $n$ –- however, is a function of (i) the plaintiffs' attorney's level of investment in class action law enforcement, denoted $I$, and (ii) the intensity of a generic variable, denoted $\theta$. The latter variable indexes the effects of nature,[171] the effects of the court,[172] and the effects of counter-investment made by the opposing

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[170] Where $q$ denotes the he probability of detecting a given systematic wrongful behavior, such that $0 \leq q \leq 1$; $p$ denotes the probability that the wrongdoer is held liable, namely, where the plaintiffs' class prevails through trial or settlement, such that $0 \leq p \leq 1$; $d$ denotes a non-negative award of average damages to members of the class, as determined by the court or agreed upon in settlement negotiations, such that $0 \leq d \leq D$, where $D$ denotes the magnitude of average harm inflicted on individual members of the plaintiffs' class; and $n$ denotes the number of similarly-situated victims who fall within the definition of the class and are thus formally aggregated and collectivized into a cohesive single pool, such that $0 \leq n \leq N$, where $N$ denotes the actual (or statistically determined) size of the victims' population.

[171] The underlying intuition is that nature affects, for example, the probability that a given plaintiffs' attorney's level of investment in initial investigation of potential, systematic wrongdoing actually leads to discovering such actionable wrongdoing (*i.e.*, $q$). Nature, it is further posited, also affects (along with other variables) the probability of prevailing through judgment or settlement (*i.e.*, $p$), the magnitude of harm inflicted on similarly-situated class members (*i.e.*, $d$), the number of individuals exposed to and harmed by the defendant's systematic wrongdoing (*i.e.*, $n$) and, consequently, the expected magnitude of damages obtained on behalf the class as a whole (*i.e.*, $L = q \cdot p \cdot n \cdot d$).

[172] Here, the intuition is that (i) the procedural and evidentiary burdens imposed on the plaintiffs' attorney thorough the court's orders and (ii) the court's interpretation and application of the substantive law to allegations asserted in the class action complaint and to those invoked by the defense may affect $p$, $n$, and $d$, namely, the probability of prevailing through judgment or settlement (including, of course, the probability of prevailing on pre-trial motions and motion for class certification), the definition and thus the size of the class, and the magnitude of damages award per class member.

party to defeat the class action suit.[173]  Formally: $q=Q(I, \theta)$, $p=P(I, \theta)$, $d=D(I, \theta)$, and $n=N(I, \theta)$.  The magnitude of expected liability in class action law enforcement is thus given by

$$L = Q(I,\theta) \cdot P(I,\theta) \cdot D(I,\theta) \cdot N(I,\theta)$$

While the exact properties of these partial functions are not specifically discernable –- for which our understanding of these functions, absent simplifying assumptions, remains rather limited and such that unambiguous statements can only be made at a high level of generality –- I have shown nevertheless why the magnitude of $q$, $p$, $d$ and $n$ is likely to be positively correlated with the plaintiffs' attorney's level of investment in law enforcement.  The marginal return on investment, I have also shown, is likely to be negatively correlated with the intensity of $\theta$, however.  Finally, regardless of the intensity of $\theta$, additional investment in class action law enforcement will, at some indeterminate point, exhibits diminishing marginal returns in terms of increasing the magnitude of $q$, $p$, $d$ and $n$ and, consequently, the magnitude of expected liability.

Combined together, these propositions establish the concavity of the function of the magnitude of expected liability and, hence, suggest that there exist discrete private and social optima.  Figure 1 below demonstrates these points graphically.

Two caveats ought to be mentioned, however.  *First*, while the slope of expected liability curves may vary considerably across investors due to investor-specific attributes,[174] the general concavity of this function,

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[173] The intuition here is that, when relevant, the magnitude of counter-investment made by the opposing party throughout class action law enforcement may interact with the investment made by the plaintiffs' attorney to determine the magnitude of *p, d*, and *n*.  While the probability of detecting a systematic wrongful conduct, *q*, is not affected by counter-investment, it may be affected by the nature of the wrongdoing itself or the effort of the wrongdoer to conceal its wrongdoing, both of which are captured by *θ*.

[174] Plaintiffs' attorneys and plaintiffs' law firms more generally may vary from one another on many different dimensions.  Important firm-specific attributes include, for example, the opportunity to exploit firm-wide economies of scale and scope; the relative efficiency of a firm's investment in law enforcement; and the firm's position on an industry-wide learning curve.  These attributes will interact to determine the exact properties of expected liability curves and work to distinguish between different plaintiffs' attorneys and plaintiffs' law firms.

The normative implication of such variance is that, where all else remains equal, the regulatory assignment of multi-stage, sequential opportunities to

as presented below, is expected to remain unchanged so as to manifest itself in any investor-specific expected liability curve.[175]  *Second*, it follows that there exists no *a priori* correspondence between the socially-optimal level of investment in class action law enforcement (given the social cost of investment in class action law enforcement) and the optimal magnitude of liability for wrongdoing from the standpoint of deterrence.
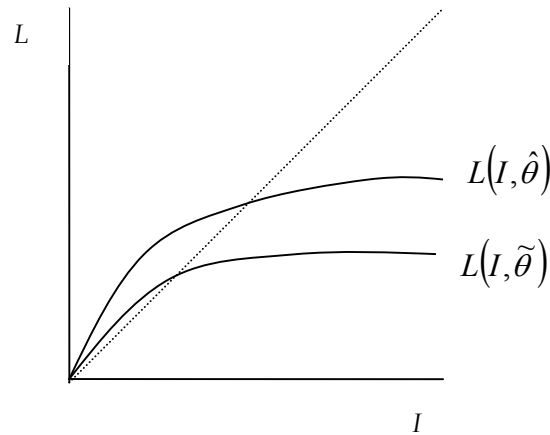


*Figure 1. Expected Liability as a Function of Investment*
*in Class Action Law Enforcement where $\widetilde{\theta} > \hat{\theta}$*

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invest in class action law enforcement should be designed to assign law enforcement investment opportunities to the most efficient plaintiffs' law firm. The social benefits of such regulatory assignment are twofold:  *First*, the plaintiffs' attorney's private optimum will be more closely aligned with the socially-optimal level of investment in class action law enforcement. *Second*, the overall social cost of producing deterrence through class action law enforcement will be minimized.

 [175] In other words, the concavity of this function is unrelated to investor-specific attributes or to the relative efficiency of investment across investors.