Market Efficiency, Crashes, and Securities Litigation

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In Basic Inc. v. Levinson the United States Supreme Court effectively affirmed the efficient market hypothesis by ruling that a plaintiff who purchased securities on an open and developed market can be presumed to have relied on the integrity of the market price and in that way to have relied indirectly on false public statements allegedly affecting that price. Although the Court confined its analysis to the question of reliance and explicitly avoided any question of damages, Justice White worried in his dissent that one could not be separated from the other. In this Article, we argue that Justice White’s concerns were well founded. In light of theoretical and empirical research in finance, we show that the failure to understand the differing implications of the efficient market hypothesis for proving reliance and assessing damages introduces a significant plaintiff’s bias in securities class action litigation. Furthermore, although Congress attempted to address this bias in passing the Private Securities Litigation Reform Act of 1995, the Act is likely to be ineffective in this regard.

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I. INTRODUCTION

In Basic Inc. v. Levinson, the United States Supreme Court made it easier for plaintiffs alleging securities fraud under section 10(b) of the Securities Exchange Act of 1934 and Securities and Exchange Commission (SEC) Rule 10b-5 to prove the essential element of

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reliance. The Court held that under the so-called fraud-on-the-market theory, a plaintiff who purchased securities on an “open and developed” market can be presumed to have relied on the integrity of the market price and in that way to have relied, indirectly, on allegedly false or misleading public statements of the defendants. The Court explained:

“The fraud on the market theory is based on the hypothesis that, in an open and developed securities market, the price of a company’s stock is determined by the available material information regarding the company and its business. . . . Misleading statements will therefore defraud purchasers of stock even if the purchasers do not directly rely on the misstatements. . . . The causal connection between the defendants’ fraud and the plaintiffs’ purchase of stock in such a case is no less significant than in a case of direct reliance on misrepresentations.”

... [W]here materially misleading statements have been disseminated into an impersonal, well-developed market for securities, the reliance of individual plaintiffs on the integrity of the market price may be presumed.

1. Basic Inc. v. Levinson, 485 U.S. 224 (1988). Section 10(b) makes it unlawful “[t]o use or employ, in connection with the purchase or sale of any security . . . any manipulative or deceptive device or contrivance in contravention of such rules and regulations as the [SEC] may prescribe.” Securities Exchange Act of 1934 § 10(b), 15 U.S.C. § 78j(b) (2000). Rule 10b-5, in turn, makes it unlawful “[t]o make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements made, in the light of the circumstances under which they were made, not misleading . . . in connection with the purchase or sale of any security.” 17 C.F.R. § 240.10b-5 (2006). Rule 10b-5 also prohibits various other forms of market manipulation, which raise issues that are beyond the scope of this Article. See id. § 240.10b-5(a), (c). Also, although there is some authority for the proposition that Rule 10b-5 prohibits pure omissions, not merely statements rendered misleading by omissions, for simplicity this Article discusses the issues in terms of statements. See Rowe v. Maremont Corp., 650 F. Supp. 1091, 1105 (N.D. Ill. 1986).


3. Id. (quoting Peil v. Speiser, 806 F.2d 1154, 1160-61 (3d Cir. 1986)). The fraud-on-the-market theory is based on the efficient market hypothesis, which can take three forms: strong, semistrong, and weak. See generally Eugene F. Fama, Efficient Capital Markets: A Review of Theory and Empirical Work, 25 J. Fin. 383 (1970). The so-called strong form posits that all information, both public and private, is incorporated into security prices. See id. at 383. The semistrong form theorizes that only all public information is incorporated into security prices. See id. The weak form posits that only one type of public information—historical security prices—is incorporated into current prices. See id.; see also 1 Louis Loss & Joel Seligman, Securities Regulation 181 n.41 (3d ed. 1998); Paul A. Ferrillo et al., The “Less Than” Efficient Capital Markets Hypothesis: Requiring More Proof from Plaintiffs in Fraud-on-the-Market Cases, 78 St. John’s L. Rev. 81, 102-03 (2004). The Basic Court appeared to focus its analysis on the semistrong form. See 485 U.S. at 246-47 & n.25. This Article does likewise.
Although the Court confined its analysis to the question of reliance and explicitly avoided any question of damages, Justice White worried in his dissent that one could not be separated from the other. He recognized that if, in the Court’s words, “‘The market is acting as the unpaid agent of the investor, informing him that given all the information available to it, the value of the stock is worth the market price,’” then damages and reliance are bound together. Justice White recognized that if market prices incorporate all public information and thereby reflect true value, then when a corrective disclosure occurs, the ensuing decline in the stock price will reveal the true value of the company, and the entire amount of the decline will be the plaintiff’s damages (all else being equal). Justice White concluded: “[A]nswers to the question of the proper measure of damages in a fraud-on-the-market case are essential for proper implementation of the fraud-on-the-market presumption.”

In the years since Basic, Justice White’s words have been borne out, for securities plaintiffs have come to use the efficient market hypothesis not only as a means of proving reliance, but also as the theoretical pillar supporting their damages estimates. Plaintiffs, in

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4. Basic, 485 U.S. at 248 n.28; id. at 254 n.5 (White, J., concurring in part and dissenting in part).

5. Id. at 244 (majority opinion) (quoting In re LTV Sec. Litig., 88 F.R.D. 134, 143 (N.D. Tex. 1980)); id. at 254 n.5 (White, J., concurring in part and dissenting in part).

6. See id. at 254 n.5, 257, 260 (White, J., concurring in part and dissenting in part). Traditionally, “the out-of-pocket measure of damages is applied in securities fraud cases, usually awarding plaintiff (in the case of a defrauded purchaser) the difference between the purchase price of the security and its actual value on the date of purchase.”). Austin v. Loftsgaarden, 675 F.2d 168, 180 (8th Cir. 1982). The Supreme Court recently held, however, that an investor suffers no compensable damages unless and until the stock price declines as a result of a corrective disclosure. Dura Pharm., Inc. v. Broudo, 544 U.S. 336, 342-44 (2005) (“[A] matter of pure logic, the moment the transaction takes place, the plaintiff has suffered no loss because the inflated purchase price is offset by ownership of a share that possesses equivalent value at that instant . . . . [A defendant only] becomes liable to a relying purchaser ‘for the loss’ the purchaser sustains ‘when the facts . . . become generally known’ and ‘as a result’ share value ‘depreciate[s].’” (quoting RESTATEMENT (SECOND) OF TORTS §§ 548A cmt. b (1977) (emphasis added))). Damages are also recoverable under section 10(b) and rule 10b-5 by defrauded sellers, but for purposes of simplicity, this Article discusses the issues in terms of defrauded purchasers. 17 C.F.R. § 240.10-5.

7. Basic, 485 U.S. at 254 n.5.

calculating damages, routinely spurn discounted cash flow analyses and other fundamental techniques for valuing securities in favor of simply analyzing stock price movements. Their approach finds substantial support in the finance literature, which frequently argues that calculating the value of securities based on traditional cash flow or earnings analyses is less reliable than calculating value based on asset-pricing models. As one author of this Article, Cornell, and R. Gregory Morgan opined: “[C]alculating the value [of a security] by analyzing asset value, earnings data, and other similar information is inherently speculative. The market model approach attempts to place the value [calculation] on firmer ground by calculating . . . value . . . on the basis of security price data.”

There are, to be sure, numerous technical issues that arise when attempting to infer damages from stock price movements. As described originally by Cornell and Morgan and confirmed recently by the Supreme Court, these include netting out movements attributable to market and industry factors, nonfraud related disclosures, and information leaks. Such issues have been addressed by the courts in numerous cases. Despite these complexities, however, courts have viewed inferring damages from stock price movements as inherently more reliable than applying more traditional valuation approaches of the type Daniel Fischel criticizes. Indeed, notwithstanding the difficulties that inhere in measuring damages from stock price movements, few if any courts since Basic have rejected the efficient

10 Id. at 903, 905; see also Dura, 544 U.S. at 342-43 (holding that a plaintiff can only recover for price declines caused by fraud, not nonfraud related factors such as “changed economic circumstances, changed investor expectations, [or] new industry-specific or firm-specific facts, conditions, or other events”).
11 See, e.g., In re Imperial Credit Indus., Inc. Sec. Litig., 252 F. Supp. 2d 1005, 1014-15 (C.D. Cal. 2003) (“A proper measure of damages in the securities context . . . requires elimination of that portion of the price decline or price difference which is unrelated to the alleged wrong. Because of the need ‘to distinguish between the fraud-related and nonfraud related influences of the stock’s price behavior,’ a number of courts have rejected or refused to admit into evidence damages reports or testimony by damages experts in securities cases which fail to include event studies or something similar.”) (citations omitted); see also, e.g., DeMarco v. Lehman Bros., 222 F.R.D. 243, 248-49 (S.D.N.Y 2004) (involving nonfraud related disclosures); RMED Int’l, Inc. v. Sloan’s Supermarkets, Inc., No. 94 Civ. 5587 PKL RLE, 2000 WL 310352, at *8 (S.D.N.Y. Mar. 24, 2000) (involving information leaks); In re Seagate Tech. II Sec. Litig., 843 F. Supp. 1341, 1368 (N.D. Cal. 1994) (involving market, industry, and other factors).
market hypothesis and analysis of stock price movements in favor of more traditional valuation tools.  

Given that market efficiency has come to play such a central role in both proving reliance and estimating damages, the manner in which courts assess efficiency becomes paramount. Assessing market efficiency must be an exercise in approximation from an economic point of view, because a paradox identified originally by Sanford Grossman and Joseph Stiglitz demonstrates that a market can never be truly efficient: If a market is perfectly efficient such that prices reflect all public information, including a company’s prospects, there would be no incentive for any investor to analyze public information when making investment decisions, but if investors do not analyze public information, there would be no mechanism by which such information would come to be reflected in the market prices, and the market would not be efficient.  

It follows, therefore, that even the most efficient markets, such as those for stocks traded heavily on the New York Stock Exchange (NYSE), must be sufficiently inefficient so that at the margin sophisticated investors have an incentive to analyze public information.  

As Jonathan Macey and Geoffrey Miller put it, “[M]arket professionals will only search out and analyze new information about a firm [when] an additional $1.00 expenditure on searching and analyzing is expected to produce [at least] an additional $1.00 in trading profits.”

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13. For examples of post-Basic cases holding fundamental valuation tools still useful in assessing damages, see Viacom International Inc. v. Icahn, 946 F.2d 998, 1000-01 (2d Cir. 1991) (“The efficient capital market theory clearly is not the sole means of determining value. Determination of a stock’s fair value is dependent on several factors. Market price is one of those factors but it is not the determining one.” (citation omitted)), and Litton Industries, Inc. v. Lehman Bros. Kuhn Loeb Inc., 709 F. Supp. 438, 447 (S.D.N.Y. 1989), rev’d on other grounds, 967 F.2d 742 (2d Cir. 1992) (“[M]arket value, asset value, dividends, earning prospects, the nature of the enterprise and any other facts which were known or could be ascertained . . . and which throw any light on future prospects . . . must be considered . . . .” (quoting Weinberger v. UOP, Inc., 457 A.2d 701, 713 (Del. 1983) (emphasis omitted))).


15. Courts consistently have held stocks traded on the NYSE to be efficiently traded. See, e.g., Bovee v. Coopers & Lybrand, 216 F.R.D. 596, 606 (S.D. Ohio 2003) (“Courts and commentators have noted that certain markets, such as the NYSE, are particularly efficient. . . . [A] well-developed and impersonal market, such as the New York or Pacific stock exchanges, will instantaneously incorporate all publicly available information about a given security into the market price of that security.” (quoting Deutschman v. Beneficial Corp., 132 F.R.D. 359, 368 (D. Del. 1990))).

Just as the idea of a perfectly efficient market makes no economic sense, the notion of a completely inefficient market, in which information is not disseminated at all and price bears no relation to value, likewise makes no sense. Even in the market for used cars, information is disseminated and price is related to value in the sense that people know that a one-year-old Porsche 911 is worth more than a ten-year-old Ford pickup, and the two vehicles are priced accordingly. In fact, the basic premise of free market economics, for which there is immense empirical support, is that price reflects the interplay of supply and demand. If this is true, then no securities market will be completely “inefficient” in the sense that price floats freely unrelated to supply and demand as influenced by information about company fundamentals.

The foregoing demonstrates that efficiency is not an on-off switch, but rather exists along a continuum. The relevant legal question therefore becomes: How efficient must a market be for a court to conclude that it is “efficient” for purposes of showing reliance or estimating damages? In this regard, the Court in Basic provided only vague guidance, speaking of “open and developed” markets and leaving to later decisions to hash out what “open and developed” means and to figure out how to assess efficiency. Moreover, the Court did not distinguish between efficiency in the reliance context and efficiency in the damages context.

Against this backdrop, this Article puts forth two arguments. First, in the reliance context, we argue that the standard for efficiency should be relatively low and tied to the fundamental reliance question. This question is whether but for the defendant’s statements the plaintiff would have purchased the security at the price at which the plaintiff did purchase it. In the reliance context, we argue that a market should be deemed “efficient” if an investor would be justified in relying on the integrity of the market price, i.e., if an investor knowing full well that the market cannot be perfectly efficient and that,

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18. See id. at 248 n.28.
19. “[Reliance] is inferred from a showing either that the plaintiffs would not have purchased the security but for defendant’s [fraud], or that they would have purchased it at a lower price.” In re Worlds of Wonder Sec. Litig., 814 F. Supp. 850, 867 (N.D. Cal. 1993), aff’d in part and rev’d in part on other grounds, 35 F.3d 1407 (9th Cir. 1994); see Peil v. Speiser, 806 F.2d 1154, 1163 (3d Cir. 1986) (holding that the fraud-on-the-market presumption can be rebutted by a showing that the statements did not affect the plaintiff’s purchase price); Stephenson v. Deutsche Bank AG, 282 F. Supp. 2d 1032, 1058 (D. Minn. 2003) (“Because Plaintiffs have alleged that they ‘would not have purchased the security but for defendant’s [fraud], or that they would have purchased it at a lower price,’ they have established transaction causation.” (citation omitted)).
accordingly, the market price may not reflect the true value of the stock, nevertheless would be justified in treating the market price as if it reflected true value. Reliance on the integrity of the market price invariably will result in reliance on a defendant’s statements because, as noted in the used car example above, even grossly inefficient securities markets incorporate information to some degree such that, but for the fraud, the plaintiff would not have purchased the stock at the price at which the plaintiff did purchase it. The precise extent to which the price was affected by the fraud is irrelevant to the reliance question. Accordingly, in the reliance context, the important question is when it is appropriate to presume that the plaintiff relied on the integrity of the market price, and thus to presume that the plaintiff relied indirectly on the defendant’s statements.20 Reliance on the integrity of the market price is sensibly presumed, we argue, if the market bears enough hallmarks of efficiency that investors, mindful of the costs they would incur if they went out and conducted their own research into stock values, reasonably could decide instead to treat the market’s prices as indicative of fair value.

Second, in the damages context, we argue for a much stricter standard for efficiency that is again tied to the fundamental issue. This issue, unlike in the reliance context, is the extent to which the alleged fraud affected the stock price. Damages cannot accurately be measured by reference to the decline in the stock price unless the market is perfectly efficient such that it reacts perfectly to fraudulent statements and the later revelation of the true facts. Yet as Grossman and Stiglitz demonstrate, perfect efficiency is not possible.21 Although damages in securities fraud cases, as in other types of cases, need not be measured accurately and only approximated,22 even approximating damages by reference to the decline in the stock price would require the market to approximate perfect efficiency because even minor inefficiencies are magnified significantly by selection bias.23 Unfortunately, courts have failed to appreciate the major impact that selection bias can have on estimates of damages even when deviations from market efficiency are relatively infrequent.

20. See Peil, 806 F.2d at 1161 n.11 (holding that reliance should be presumed only “‘where it [i]s logical to do so’” (quoting Sharp v. Coopers & Lybrand, 649 F.2d 175, 188 (3d Cir. 1981))).
As we show below in discussing the markets for the securities of Intel Corporation (Intel) and Bristol-Myers Squibb Company (Bristol-Myers), it is highly doubtful that even the most open and developed markets so much as approximate perfect efficiency. Accordingly, we argue that while it is not inappropriate to analyze stock price movements when assessing damages, even in the most efficient of markets, that analysis must be tempered with fundamental valuation techniques of the sort that have fallen out of favor in securities litigation. We show below that the courts’ tendency uncritically to apply the efficient market hypothesis when estimating damages and to import notions of efficiency appropriate for the reliance context into the very different context of damages has produced a pronounced bias in favor of plaintiffs. In short, we assert that Justice White’s concerns were well founded: Basic failed to treat the concept of efficiency with sufficient clarity and in so doing, blurred the implications of efficiency for reliance and for damages, creating a situation in which plaintiffs have been able to recover for price declines not proximately caused by fraud.

To develop our arguments, this Article proceeds as follows. Part II discusses judicial efforts since Basic to assess market efficiency. The pivotal cases in this regard are Cammer v. Bloom24 and Krogman v. Sterritt.25 Although Cammer and Krogman provide appropriate criteria for assessing efficiency, they do so only in the context of proving reliance. The Cammer and Krogman criteria have significantly different implications when assessing efficiency in the context of measuring damages.

Part III demonstrates that even the most efficient markets can behave very inefficiently, producing random crashes, i.e., price declines upon negative news that are grossly disproportionate to what the news reveals about company fundamentals. Part III demonstrates that uncritically applying efficient market theory in the damages context permits plaintiffs to use ex post selection bias to take unfair advantage of these crashes and to recover sums greatly in excess of actual damages.

Part IV examines recent financial research on market efficiency and explains some of the reasons that such crashes can occur. Part IV further demonstrates that markets should not be considered efficient when estimating damages, lest such estimates greatly overstate actual damages.

Part V explains that Congress attempted to address the problems crashes pose for damages estimates in the Private Securities Litigation Reform Act of 1995 (PSLRA), but that it did so ineffectually.

Part VI summarizes our conclusions.

II. ASSESSING MARKET EFFICIENCY FOR RELIANCE PURPOSES

_Cammer_ tried to resolve some of the questions left open in _Basic_ and in so doing, became the seminal decision on market efficiency in the reliance context. In _Cammer_, some of the defendants moved to dismiss the section 10(b) complaint on reliance grounds. The _Cammer_ defendants contended that the plaintiffs should not get the benefit of the fraud-on-the-market presumption because the company’s stock had not traded in an efficient market, in that it had not been listed on a national exchange but instead had traded over the counter. The _Cammer_ court eschewed such a bright-line rule and held that the critical inquiry was not where the securities were traded, but whether the market for the particular security was “open and developed” (and therefore, in the court’s view, inferentially efficient), as demonstrated by five criteria.

First, the court held that “an average weekly trading volume . . . in excess of a certain number of shares” would suggest efficiency. The court explained:

The reason the existence of an actively traded market, as evidenced by a large weekly volume of stock trades, suggests there is an efficient market is because it implies significant investor interest . . . . Such interest, in turn, implies a likelihood that many investors are executing

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29. _Id._
30. _Id._ at 1285-87. The court outlined the definition of an “open” market as “‘one in which anyone, or at least a large number of persons, can buy or sell’”; a “developed” market as “‘one which has a relatively high level of activity and frequency, and for which trading information (e.g., price and volume) is widely available’”; and an “efficient” market as “‘one which rapidly reflects new information in price.’” _Id._ at 1276 n.17 (quoting 4 ALAN R. BROMBERG & LEWIS D. LOWENFELS, BROMBERG AND LOWENFELS ON SECURITIES FRAUD & COMMODITIES FRAUD § 7:484, at 7-924 to 7-925 (2005)). The court noted that “‘[t]hese terms are cumulative in the sense that a developed market will almost always be an open one. And an efficient market will almost invariably be a developed one.’” _Id._ (quoting 4 BROMBERG & LOWENFELS, supra, § 7:484, at 7-924 to 7-925).
31. _Id._ at 1286.
trades on the basis of newly available or disseminated corporate information.\textsuperscript{32}

The court opined: “Turnover measured by average weekly trading of two percent or more of the outstanding shares would justify a strong presumption that the market for the security is an efficient one; one percent would justify a substantial presumption.”\textsuperscript{33}

Second, the court stated that “it would be persuasive [if] a significant number of securities analysts followed and reported on a company’s stock.”\textsuperscript{34} The court explained that “[t]he existence of such analysts would imply . . . [that company information is] closely reviewed by investment professionals, who would in turn make buy/sell recommendations to client investors.”\textsuperscript{35} The court stated that “[i]n this way the market price of the stock would be bid up or down to reflect the [company’s] financial information . . . as interpreted by the securities analysts.”\textsuperscript{36}

Third, the court noted that if “the stock had numerous market makers,” this would suggest efficiency.\textsuperscript{37} The court explained: “The existence of market makers and arbitrageurs would ensure completion of the market mechanism; these individuals would react swiftly to company news and reported financial results by buying or selling stock and driving it to a changed price level.”\textsuperscript{38}

\textsuperscript{32} Id.

\textsuperscript{33} Id. (citing 4 BROMBERG \& LOWENFELS, supra note 30, § 7:484, at 7-924 to 7-925).

\textsuperscript{34} Id.

\textsuperscript{35} Id.

\textsuperscript{36} Id.

\textsuperscript{37} Id.

\textsuperscript{38} Id. at 1286-87. The court was correct that arbitrageurs are important to market efficiency, because they take significant positions in stocks they believe may be mispriced and thus help keep market prices in line with fundamental value (a subject discussed in detail below). \textit{See infra} notes 94-109 and accompanying text. The court, however, was not correct that market makers are likewise important. Market makers neither disseminate information to the market about company fundamentals, nor trade based on the price of the security; indeed, they are indifferent to such matters in the sense that they seek to profit merely from the spread on transaction volume. \textit{See, e.g.}, O’Neil v. Appel, 165 F.R.D. 479, 502 (W.D. Mich. 1996) (“The economic literature has criticized reliance upon the number of market makers as an indicator of efficiency. [One] found no empirical correlation between the number of market makers and the efficiency of the market. [Another] notes that . . . market makers generally do not analyze and disseminate information about the stock that they make a market for and therefore do not contribute to the efficiency of the stock’s price. Market makers behave this way because acting as a market maker commits one to purchasing or delivering only a limited number of shares at the posted quotes.” (citing Victor L. Bernard et al., \textit{Challenges to the Efficient Market Hypothesis: Limits to the Applicability of Fraud-on-the-Market Theory}, 73 NEB. L. REV. 781, 799, 805 (1994))); Serfaty v. Int’l Automated Sys., Inc., 180 F.R.D. 418, 422 (D. Utah 1998) (similar); Krogman v. Sterritt, 202 F.R.D. 467, 476
Fourth, the court held that “the [c]ompany was entitled to file an S-3 Registration Statement in connection with public offerings,” this would suggest efficiency because “it is the largest and most well known companies which register equity securities on Form S-3,” and “such companies are widely followed by professional analysts and investors in the market place.”

Fifth, the court held that “it would be helpful to . . . [have] empirical facts showing a cause and effect relationship between unexpected corporate events or financial releases and an immediate response in the stock price.” As the court explained, “This, after all, is the essence of an efficient market and the foundation for the fraud on the market theory.”

Courts since Cammer have held that additional factors should be considered in assessing efficiency. The most important case in this regard is Krogman v. Sterritt, which added three factors to the list, again in the reliance context. First, the Krogman court held that “[m]arket capitalization, calculated as the number of shares multiplied by the prevailing share price, may be an indicator of market efficiency because there is a greater incentive for stock purchasers to invest in more highly capitalized corporations.” Second, the court held that “[c]ourts [should] look[] to a stock’s bid-ask spread in assessing the

(N.D. Tex. 2001) (“[T]he existence of a large number of market makers, without more, is virtually meaningless in establishing whether [a] market is efficient.”).

39. Cammer, 711 F. Supp. at 1271 n.5, 1285, 1287 (quoting Reproposal of Comprehensive Revision to System for Registration of Securities Offerings, 46 Fed. Reg. 41,902, 41,904 (Aug. 18, 1981)). Form S-3 permits an issuer in its registration statement to incorporate prior SEC filings by reference and to include minimal new information. Id. at 1284.

To be eligible to use Form S-3 in connection with an equity offering, an issuer must, among other things, have been filing reports under the Exchange Act for at least thirty-six months and either have outstanding $150 million of voting stock held by nonaffiliates or $100 million of such stock outstanding coupled with an annual trading volume of three million shares per year.

Id. at 1271 n.5. “[F]orm S-3] is predicated on the [SEC’s] belief that the market operates efficiently for these companies, i.e., that the disclosure in [prior filings] and other communications by the registrant, such as press releases, has already been disseminated and accounted for by the market place.” Id. at 1284 (quoting Reproposal of Comprehensive Revision, 46 Fed. Reg. at 41,904).

40. Id. at 1287.
41. Id.
42. 202 F.R.D. at 477-78.
43. Id. at 478; accord O’Neil, 165 F.R.D. at 503 (“[A]n important . . . factor[] is the size of the firm, measured in terms of market capitalization, coupled with trading volume. Large firm size and dollar trading volume tend to reflect the magnitude of economic incentive to eliminate mispricing. . . . [P]ricing inefficiencies are much more likely to be found in small companies, especially when their stock is not widely held by institutional investors.” (citations omitted)).
efficiency of its market,” because “[a] large bid-ask spread is indicative of an inefficient market, [in that] it suggests that the stock is too expensive to trade.”

Third, the court held that “courts [should] also consider the percentage of shares held by the public, rather than insiders” (i.e., the float). The court explained that “[b]ecause insiders may have private information that is not yet reflected in stock prices, the prices of stocks that have greater holdings by insiders are less likely to accurately [sic] reflect all available information about the security.”

Of the eight factors articulated by the Cammer and Krogman courts, arguably only two—the number of analysts reporting on the stock and whether there is a cause-and-effect relationship between information disclosures and price movements—directly speak to whether a market is efficient, i.e., whether information is readily disseminated and fully and accurately incorporated into market price. The other factors focus on the nature of the company and the trading of its stock and therefore speak to whether a market is “open and developed” rather than efficient. Further, even the question of whether there is a cause-and-effect relationship between disclosures and price movements is not, strictly speaking, directly probative of efficiency. Certainly a stock price failing to react to meaningful news would demonstrate inefficiency, but the mere fact of a response does not demonstrate efficiency. A stock can be significantly mispriced and still respond promptly to news. For example, a stock that was overpriced by fifty percent could jump ten percent in response to a positive announcement, as many dot-com stocks did, and still be overpriced by fifty percent, if not more.

Moreover, whether there is a cause-and-effect relationship between disclosures and price movements does not speak to the magnitude of the response to a disclosure—a subject which this factor must address if it in fact truly concerns efficiency. If efficient market theory is correct that prices fully and accurately reflect all public information, then in an efficient market, stocks not only must react to news, but must react in a manner that is consistent with what the news

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46. Id.
says about company fundamentals. Yet there are innumerable examples in the empirical record in which the market reacted out of all proportion to the fundamental information conveyed by the news. The most notable example in the postwar period is the stock market crash of October 1987, during which more than twenty percent of the aggregate market value of all stocks disappeared based on the release of only minor news. The crash is not unique in this respect, for it is well established that many of the biggest postwar movements in the Standard and Poor’s (S & P) 500 index were not accompanied by any particularly dramatic news events.

Inasmuch as the Cammer and Krogman factors for the most part do not directly speak to efficiency, but instead speak to whether a market is “open and developed,” they are best understood as constituting an indirect test by which courts infer efficiency for reliance purposes. The Cammer and Krogman courts apparently assumed that if the stock is actively traded by a large number of reasonably informed investors—i.e., if the market is “open and developed”—then a threshold level of efficiency can be inferred for reliance purposes.

This assumption makes economic sense. Given that a market can never be fully efficient, but that all securities markets are efficient enough to incorporate a defendant’s public statements to some degree, the fundamental question in the reliance context is whether the market is efficient enough that investors can be presumed to have relied on the integrity of the market price and thus to have relied on the defendant’s public statements. Stated conversely, the question is whether the market is so inefficient that it presents investors with profit opportunities that can be exploited by using public information. The market price will not be relied on by rational investors if exploitable profit opportunities exist because doing so would require forgoing the profit opportunities.

The distinction between markets that are efficient and markets in which exploitable profit opportunities exist is critical because market efficiency is a much stronger condition. If the market is truly efficient, then clearly there are no exploitable profit opportunities because all public information is instantaneously reflected in the market price. The converse, however, is false. A long strand of literature, beginning with Lawrence Summers, demonstrates that it is possible for market

50. See id. at 9-11.
prices to deviate widely and frequently from rational valuations—that is, for the market to behave inefficiently—without presenting investors with any obvious exploitable profit opportunities. If the deviations from fundamental value are sufficiently variable, and if there is sufficient uncertainty regarding their duration and size, then prices may vary markedly from fundamental value without presenting investors with exploitable profit opportunities. As Robert Merton stresses, the widely documented evidence that professional money managers on average underperform market indexes is strong evidence that readily exploitable profit opportunities do not exist.

Virtually all investors reasonably rely on market prices in such circumstances. Investors accept the market prices not because they believe they reflect all public information, but because investors recognize that they cannot exploit possible mispricing in light of the risks, information constraints, cognitive limitations, and trading costs they face. Consequently, reasonable investors behave as if the market were efficient, and it is therefore appropriate to presume that they rely on the integrity of the market price (and thus indirectly on the defendant’s statements by purchasing the stock at a price that is affected, at least to some degree, by those statements).

The distinction between markets that are efficient and markets in which exploitable profit opportunities exist has important implications for the interpretation of the law. From an economic perspective, the courts in Cammer and Krogman got it right. The dispositive question for reliance is not whether the market is truly efficient, but whether it is efficient enough that reasonable investors can be presumed to have relied on the market price. The Cammer and Krogman criteria, by assessing the extent to which the market is “open and developed,” attempt to infer the threshold level of efficiency required for reliance. The precise extent to which prices reflect information is irrelevant to the reliance question. As long as any deviations from rational pricing are sufficiently difficult to exploit that reasonable investors ignore them, it is appropriate to presume that investors relied on the integrity of the market price. Because the market price will always reflect information to some degree, it is also appropriate to presume that investors relied indirectly on the material public statements of the defendant. This is fortunate for plaintiffs, because after forty years of research, the extent of market efficiency, even for the most actively

traded NYSE stocks, remains a hotly debated question in the finance profession.53

There is almost no dispute, however, that for securities traded in “open and developed” markets as measured by the Cammer and Krogman criteria, it is reasonable for all but the most sophisticated investors to rely on the market prices.54 There is thus little dispute that with respect to such securities, reliance on the integrity of the market prices (and thus on the defendants’ statements) is appropriately presumed.55

Distinguishing between markets in which investors reasonably rely on market prices (i.e., markets that are efficient enough for reliance purposes) and markets that are truly efficient is critical because the two concepts have dramatically different implications for estimating damages. Too often the conclusion that the market is efficient enough for reliance purposes is taken to mean that it can be assumed to be efficient when it comes to estimating damages. Unfortunately, approximations that make economic sense in the reliance context are inappropriate when trying to measure damages. This is because even minor inefficiencies, which investors recognize that they cannot exploit, and, therefore, rationally ignore ex ante, can have a dramatic impact on the estimate of damages ex post.

III. RELIANCE VERSUS DAMAGES: EX ANTE AND EX POST

To illustrate the point, assume that a company’s stock price can diverge from fundamental value and, for this reason, is subject to

55. As noted, the foregoing analysis rests on the proposition that all markets are efficient enough to incorporate a defendant’s false statements to some degree, such that, if a plaintiff in fact relies on the integrity of the market price, the plaintiff ipso facto will rely to some extent on the defendant’s statements. Though that analysis is sound for present purposes, technically speaking it oversimplifies matters. Although no market will be entirely inefficient in the sense that market price will always be impervious to news about company fundamentals, a market nevertheless may be impervious to some types of news. For example, though even a grossly inefficient market will incorporate some degree news about extremely significant events (e.g., a sharp unexpected decline in earnings), it may be impervious to more minor news that is still material (e.g., the hiring of a new CFO). In such a market, whether a defendant’s statement will be incorporated into price to some degree will depend on the type and significance of the statement. A market this inefficient, however, undoubtedly will not satisfy the Cammer and Krogman criteria, and an investor will not be justified in relying on market price as a reflection of true value. The test for market efficiency that we propose for the reliance context, therefore, remains unchanged: Whether the market bears enough of the hallmarks of efficiency that investors reasonably could decide to treat the market’s prices as indicative of fair value.
random run-ups and crashes, i.e., changes in price that are significantly greater than those which can be explained by changes in company fundamentals. The company’s run-ups and crashes, however, are sufficiently variable and unpredictable that they do not present investors with easily exploitable profit opportunities. If the company’s stock trades in an “open and developed” market as described in Cammer and Krogman, all but the most sophisticated investors rationally will rely *ex ante* on market prices when making investment decisions, and reliance on the integrity of the market price (and thus on defendants’ statements) therefore appropriately can be presumed.

Damages are different, however, because they are measured *ex post*. Before a plaintiff files a class action lawsuit, the plaintiff has the privilege of seeing how the stock price moved. A plaintiff typically will not file suit unless the price dropped significantly on the release of information that can be related to an alleged fraud. To continue the hypothetical, assume that stock prices for individual companies are subject to random crashes catalyzed by the release of public information. A plaintiff can simply wait for such a crash to occur in conjunction with the release of information that the plaintiff can associate with an alleged fraud. Next, the plaintiff, by appealing to efficient market theory, can claim that the entire decline was caused by the release of fraud-related information. The plaintiff’s argument is compelling if one accepts the efficient market hypothesis at face value: If market prices accurately and immediately impound all public information, there can be no other explanation.

The problems raised by the possibility of crashes are deeper than the well-known issue of confounding information analyzed by Cornell and Morgan.\(^56\) Confounding information arises when, at the time of alleged fraud-related disclosures, other information is released which also may impact the stock price.\(^57\) Confounding information can make it difficult to separate fraud-related and nonfraud-related stock price movements, but it is still assumed that the market efficiently reflects both sources of information.\(^58\)

The concept of a crash is quite different. In a crash, the price decline dramatically exceeds that which is consistent with the release of *all* information, whether fraud-related or not.\(^59\) If a crash occurs, stock price movements will produce a greatly inflated estimate of damages. While crashes should be relatively rare in open and

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57. *See* id. at 903.
58. *See* id.
developed markets, economic theory indicates that they can occur, and empirical evidence demonstrates that they do.\(^\text{60}\) Indeed, numerous crashes can be expected in any particular year, given the large number of stocks traded in the United States and 253 trading days per year.\(^\text{61}\) All a plaintiff has to do is wait.

Two examples illustrate how a plaintiff can use hindsight combined with the efficient market theory to take advantage of market inefficiencies and crashes. The first is the case of Intel.\(^\text{62}\) Intel, for the last twenty years, has been one of the most actively followed, traded, and analyzed companies in the world.\(^\text{63}\) The firm and its products are in the news on an almost daily basis.\(^\text{64}\) Intel is one of the few companies to have reached a market capitalization of $500 billion.\(^\text{65}\) If any company trades in an “open and developed market” within the meaning of Cammer and Krogman, it is Intel.

On Thursday, September 21, 2000, at 4:16 p.m., EDT, Intel issued a brief and seemingly unexceptional press release.\(^\text{66}\) It informed the market that revenue for the third quarter was expected to be three to five percent higher than the second quarter’s revenue of $8.3 billion—results that fell short of the company’s previous forecast of seven to nine percent growth and of analysts’ projections of eight to twelve percent growth.\(^\text{67}\) The lower growth was attributed to a temporary decline in European sales associated with currency exchange rate fluctuations.\(^\text{68}\)

The market’s response was astonishing. Although trading in Intel was halted for the remainder of the day, the stock dropped in after-market trading from the price at the point of the halt of $61.48 per share to $48.25 per share—erasing over $91 billion in market value.\(^\text{69}\) The sell-off continued over the course of the next two trading days.\(^\text{70}\) By the time the market closed on September 26, 2000, the stock was down almost thirty percent to $43.31 per share, and $122 billion in

\(^{60}\) See id. at 10 tbl. 4.
\(^{61}\) See id.
\(^{63}\) See id. at 113.
\(^{64}\) See id.
\(^{65}\) See id. at 115.
\(^{66}\) See id. at 113-14, 115-19.
\(^{67}\) Id.
\(^{68}\) Id. at 113.
\(^{69}\) Id.
\(^{70}\) Id. at 119.
shareholder wealth, more than twice the market capitalization of Enron Corporation at its peak, had evaporated.\textsuperscript{71}

Intel executives were bewildered to say the least. A senior financial manager expressed extreme surprise that what appeared to him to be a relatively insignificant announcement had resulted in the evaporation of over $120 billion in shareholder wealth.\textsuperscript{72} In his view, the announcement simply reflected short-run developments in Europe (specifically the decline of the Euro), which merely increased the difficulty Intel would face selling its products in that market in the short term.\textsuperscript{73} He did not, however, believe it indicated “any change in Intel’s long-run strategy, product mix, competitive position, or even . . . the long-run demand for Intel’s products.”\textsuperscript{74}

One of the authors, Cornell, compares the $122 billion drop in market value with estimates of the change in fundamental value associated with the announcement.\textsuperscript{75} Cornell, using analysts’ forecasts of future financial performance, computes the discounted present value of future cash flows for Intel before and after the September 21, 2000, announcement.\textsuperscript{76} He finds that, depending on the assumptions used, the drop in the discounted cash flow value of the company accounted for between 1% and 4.5% of the market drop.\textsuperscript{77} This leaves over 95% of the decline unexplained.

The second example is the case of Bristol-Myers. Bristol-Myers in the mid-1990s was working on what it hoped would be a breakthrough compound called Vanlev for the treatment of hypertension.\textsuperscript{78} It filed a new drug application (NDA) with the Food and Drug Administration (FDA) in December of 1999 for the proposed marketing of the drug.\textsuperscript{79} On April 19, 2000, after Bristol engaged in extensive discussions with the FDA about Vanlev’s side effects, Bristol announced that it was withdrawing its application and that further tests would be conducted.\textsuperscript{80} Bristol said it planned to refile its application and hoped to win FDA approval, but analysts expected

\textsuperscript{71} Id. at 113; Paul M. Healy & Krishna G. Palepu, The Fall of Enron, J. ECON. Persp., Spring 2003, at 3, 3.
\textsuperscript{72} Cornell, supra note 62, at 113.
\textsuperscript{73} Id.
\textsuperscript{74} Id.
\textsuperscript{75} Id. at 119-28.
\textsuperscript{76} Id. at 123.
\textsuperscript{77} See id. at 126.
\textsuperscript{79} Id.
\textsuperscript{80} Id.
at least a twelve-month delay before the drug would reach the market.\textsuperscript{81}

The market’s response was immediate and dramatic: in apparent reaction to the announcement, Bristol-Myers’ stock price fell from the previous day’s close of $65.25 per share to $50.625 per share.\textsuperscript{82} Netting out the market and the industry, this drop of approximately 22\% destroyed $28 billion in shareholder wealth.\textsuperscript{83}

Because some security analysts estimate pharmaceutical company revenues on a drug-by-drug basis, it is possible to calculate the fundamental value of a drug to a company. Using analysts’ forecasts of revenues for Vanlev prior to the April 19, 2000, announcement and data on drug profitability collected by Henry Grabowski, John Vernon, and Joseph DiMasi, the fundamental value of the drug can be estimated to be approximately $5 billion—less than 20\% of the loss of market capitalization.\textsuperscript{84} Moreover, the April 19th announcement in no way implied that the value of Vanlev had fallen to zero; it simply indicated that the expected profits had been delayed and perhaps reduced, depending on which analyst’s report is considered. Considering the analysts’ reports that had individual drug forecasts, the decline in the discounted-cash-flow value of Vanlev associated with the withdrawal of the NDA is in the range of $1 billion to $1.5 billion—less than 5.5\% of the drop in Bristol-Myers’ market value.

Stock price crashes such as those experienced by Intel and Bristol-Myers are almost invariably associated with a news disclosure; in fact, recently developed economic models discussed in Part IV suggest that a catalyst in the form of new information is a key instigator of a crash.\textsuperscript{85} What makes a crash a crash is that the drop in the price is much larger than that implied by the change in fundamentals revealed by the new information. To draw an analogy, while both a large and a small fire require a spark to start, the size of the fire is not meaningfully related to the size of the spark. Similarly, in a crash, the magnitude of the price drop is largely unrelated to the importance of the information that precipitated it.

\textsuperscript{81} Id.; see also Vanessa Valkin, \textit{Pharma Group in FDA Move}, FIN. TIMES (London), Sept. 26, 2001, at 30 (discussing the company’s reaction one year later).

\textsuperscript{82} Big Charts, Bristol-Myers Squibb Company, Historical Quotes, http://bigcharts.marketwatch.com/historical (enter “bmy” for symbol and “4/19/00” for date) (last visited Nov. 27, 2006).

\textsuperscript{83} See Parvez Ahmed et al., \textit{Wealth Effect of Drug Withdrawals on Firms and Their Competitors}, FIN. MGMT., Autumn 2002, at 21, 24.


\textsuperscript{85} See discussion \textit{infra} Part IV.
Because crashes are almost invariably associated with the dissemination of new information, if a plaintiff chooses wisely, the plaintiff can put the defendants at a pronounced disadvantage. In the context of a crash that coincides with the release of allegedly fraud-related information, the trier of fact will be confronted with three salient points: First, fraud-related information was released (there may be confounding information as well, which is a logically separate issue); second, the stock price dropped dramatically, seemingly in response to the information; and third, the company satisfies the Cammer and Krogman criteria for efficiency. The apparent implication of these three points is that the damages are equal to the amount of the drop, net of the market, the industry, and the impact of confounding information. The fallacy is that rough notions of efficiency for establishing reliance, which Cammer and Krogman speak to, cannot be carried over to damages. Whereas reliance requires only approximate efficiency, using stock prices to measure damages is likely to produce a significant bias unless the market is nearly perfectly efficient.

Although plaintiffs obviously have an incentive to use efficient market theory in estimating damages, it is potentially a double-edged sword because it presents them with a logical hurdle: If the stock price drop used to measure damages is apparently inconsistent with fundamentals, as in the cases of Intel and Bristol-Myers, that suggests market inefficiency, potentially invalidating the plaintiffs’ approach to damages. Plaintiffs have developed a creative response to this apparent contradiction, namely, to interpret the disclosure contemporaneous with the stock price decline as providing the market not only with direct information about the company’s fundamentals, but with “indirect” information having a more nebulous impact on investor assessments of a company’s future cash flow. Typically, these more nebulous effects relate to alleged changing perceptions of the reputation of a company, the quality of its products, or the integrity or credibility of its management.

86. See, e.g., In re Ariba, Inc. Sec. Litig., No. C 03-00277 JF, 2005 WL 608278, at *1 (N.D. Cal. Mar. 16, 2005) (“Plaintiff alleges that, if Defendants had disclosed [an allegedly improper transaction], ‘the already-eroding confidence in management would have further diminished.’”). cf. In re Premiere Techs. Inc. Sec. Litig., No. 1:98-CV-1804-JOF, 2000 WL 33231639, at *11 n.9 (N.D. Ga. Dec. 8, 2000) (“In inefficient public markets, the price of a security is determined to a substantial extent by what the market believes about the company’s stock-factors including . . . the ability and reputation of its management team . . . .”).

Explanations for stock price movements based on such indirect effects of disclosures have the strength (and weakness) that they are virtually tautological. Presumably, if management is interpreted as being sufficiently dishonest or incompetent, or if the company’s reputation is sufficiently sullied, future cash flows can be expected to drop sharply enough to rationalize any decline in stock prices. For example, in the Bristol-Myers litigation, although no more than $5 billion of the $42 billion decline in market capitalization can be attributed to lost profits from the sale of Vanlev, if the market became sufficiently concerned regarding the integrity of the company’s management and the quality of the company’s research team because of the failure of Vanlev, an additional decline of $37 billion possibly could be rationalized—though it is anyone’s guess whether a trier of fact would be persuaded by such an argument.

The indirect cash flow argument makes the application or nonapplication of the efficient market hypothesis critical, for rarely, it seems, does a company release bad news and suffer a large stock price decline without at least a few journalists, pundits, or security analysts complaining about the quality of management or pointing to the diminished reputation of the company. Unfortunately, the indirect cash flow argument is extraordinarily difficult to assess empirically; it is nearly impossible to quantify the impact of such alleged changed perceptions on stock prices, largely because the perceptions themselves cannot be measured. However, the indirect cash flow argument is a plaintiff’s saving grace if the court accepts the efficient market hypothesis because any such measurement becomes unnecessary: if the stock price accurately reflects all public information, then the entire net decline following a disclosure, conveniently, must be rational and must be attributable to the fraud.  

IV. CRASHES AND NEWS: WHY MARKETS CAN OVERREACT

The indirect cash flow argument, however, is hardly the only, let alone the most compelling, explanation for market crashes. Dramatic fluctuations in the price of financial assets, in excess of any reasonable changes in fundamentals, are not new phenomena. There are several famous examples, including the Dutch Tulip Mania of the 1630s and the South Sea Bubble of the 1720s. In fact, Charles Kindleberger

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88. As stated earlier, it is assumed that the decline is measured properly net of the impact of confounding information and movements in the market and the industry. See supra notes 56-61 and accompanying text.

89. See Ofek & Richardson, supra note 48, at 265.
reports that even Sir Isaac Newton became exasperated trying to understand movements in asset prices after first making, and then losing, a substantial sum of money investing in the South Sea; as Newton put it, “I can calculate the motions of the heavenly bodies, but not the madness of people.”90 Perhaps the most oft-referenced comment in this regard is John Maynard Keynes’ observation that investing is like a beauty contest in which the objective is not to pick the most beautiful contestant, but instead to predict the contestant thought by the judges to be most beautiful.91

Prior to the dot-com experience, random crashes in stock prices were most commonly explained as reflecting the impact of “noise traders.”92 Noise traders are investors who buy and sell securities for reasons other than economic fundamentals, such as tips from friends, perceived patterns divined from stock price movements, and media reports, or who misinterpret economic fundamentals, such as projecting irrationally large growth for a technology company.93 Noise traders are indisputably prevalent in the market; the question is the extent to which they influence security prices.

Milton Friedman and Eugene Fama claim that noise traders, though common, do not meaningfully affect prices.94 They argue that if noise traders cause prices to diverge from fundamental value, exploitable profit opportunities arise and sophisticated arbitrageurs swoop in to take advantage of them.95 Moreover, they argue, in the course of trading, those noise traders whose judgments of asset values are sufficiently mistaken to affect prices lose money to arbitrageurs and so eventually disappear from the market.96 The alternative view is that risk, limited information, and impediments to trading such as transaction costs and short-sale constraints limit the impact of arbitrage and thus permit significant differences between price and fundamental value to persist despite the existence of arbitrageurs.97

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92. See, e.g., Fischer Black, Noise, 41 J. FIN. 529, 532 (1986).
95. See Friedman, supra note 94, at 174-77; Fama, supra note 94, at 36-39.
96. See Friedman, supra note 94, at 174-77; Fama, supra note 94, at 36-39.
97. See ANDREI SHLEIFER, INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE 12-14 (2000); Shleifer & Summers, supra note 93, at 21-22.
The type of arbitrage that Fama and Friedman describe is known as fundamental arbitrage because it involves taking risky positions in stocks based on assessments of misvaluation. The early research on the limitations of fundamental arbitrage focused on the risk caused by noise traders. As explained by Bradford De Long, among others, the unpredictability of noise traders’ beliefs, and therefore their demand for particular assets, create a risk in the price of assets that deters rational arbitrageurs from aggressively betting against them. Echoing Keynes, De Long stresses that “an arbitrageur selling an asset short when bullish noise traders have driven its price up must remember that noise traders might become even more bullish tomorrow, and so must take a position that accounts for the risk of a further price rise when he has to buy back the stock.” De Long further shows that by bearing a disproportionate amount of the risk that they themselves create, noise traders can earn higher expected returns than rational investors and therefore cannot be expected to disappear from the market. Thus, noise trading can continue to affect prices over the long-term, thereby allowing stock prices to take significant “random walks” away from “fundamental value.”

In the wake of the dot-com experience, financial theorists began to explore limitations on arbitrage that are more complex than simple noise-trader risk. Dilip Abreu and Markus Brunnermeier demonstrate that when noise traders are in the market, arbitrage involves complex timing issues. Abreu and Brunnermeier observe that if noise traders cause prices to rise irrationally, arbitrageurs, though knowing that the market will collapse, may attempt to ride the bubble, hoping, ideally, to exit their positions just prior to the collapse. Abreu and Brunnermeier show that this behavior can lead to a situation in which arbitrageurs actually accentuate movements away from fundamental value and, thereby, cause subsequently greater crashes. More specifically, if arbitrageurs face limitations on the size of the positions they can take, and if their assessments about the extent of overpricing
differ somewhat, a complex synchronization problem arises.\textsuperscript{106} Under such circumstances, negative information about a company reaching the market can have a disproportionate impact on stock price precisely because it serves as a catalyst that synchronizes the selling strategies of arbitrageurs.\textsuperscript{107} As new information causes the price to fall, progressively more arbitrageurs conclude that their ride is coming to an end.\textsuperscript{108} The information thus releases a pent-up demand to sell or to short the stock, which causes the prices to drop well in excess of the decline implied by the information itself.\textsuperscript{109}

Both the basic noise-trader models and the Abreu-and-Brunnermeier model are symmetric in the sense that overvaluations and undervaluations are equally likely, and run-ups and crashes are mirror images of each other. The models’ predictions are inconsistent, however, with the fact that big price changes are empirically more likely to be decreases than increases: of the ten biggest price movements in the S & P 500 index between 1946 and 1987, eight were declines and the main increase, 9.1% on October 21, 1987, was immediately after the 20.47% collapse of October 19, 1987.\textsuperscript{110} In addition, studies of option prices reveal that implied volatility is much greater on the downside.\textsuperscript{111}

To account for the fact that stock prices are more likely to crash down than to run up, Harrison Hong and Jeremy Stein extend the work of David Romer to develop a model that combines limitations on arbitrage with short-sale constraints.\textsuperscript{112} Short-sale constraints produce asymmetry because some investors who receive negative information, or interpret information negatively, will choose simply to stay out of

\textsuperscript{106} See id.
\textsuperscript{107} See id. at 193.
\textsuperscript{108} See id.
\textsuperscript{109} See id.
\textsuperscript{110} See Cutler et al., supra note 49, at 10 tbl. 4.
\textsuperscript{111} See Guojun Wu, The Determinants of Asymmetric Volatility, 14 REV. FIN. STUD. 837, 837-39 (2001). If the market price of an option is known, an option pricing model, generally the Black-Scholes model, can be used to solve for the volatility that equates the observed market price with the theoretical option price. The solution is referred to as the implied volatility. When the implied volatility is greater on the downside, it means that investors believe that large downward moves are more likely than large upward moves. See id.; Bernard Dumas et al., Implied Volatility Functions: Empirical Tests, 53 J. FIN. 2059, 2060 (1998).
\textsuperscript{112} See Harrison Hong & Jeremy C. Stein, A Unified Theory Of Underreaction, Momentum Trading, and Overreaction in Asset Markets, 54 J. FIN. 2143, 2143-44, 2158 (1999); David Romer, Rational Asset-Price Movements Without News, 83 AM. ECON. REV. 1112, 1115-17 (1993). The Hong and Stein article focuses primarily on market-wide crashes, but the same reasoning applies to individual securities.
the market rather than to sell the stock short. As a result, more total information comes out when the market is falling, which implies that the biggest observed price movements will be declines. From a legal standpoint, however, not all the drop in price is caused by the disclosure. The disclosure acts in part as a catalyst which brings the negative viewpoints of the pessimistic investors into the market. As a result, in the Hong-Stein framework, price declines on the release of alleged fraud-related information will tend to exceed the economic value of the information.

Models such as those posited by Abreu and Brunnermeier and by Hong and Stein provide sophisticated explanations as to why price declines may exceed the economic value of the simultaneous information release. It is not necessary, however, to have a model that explains why crashes occur to understand the impact of periodic crashes for estimating damages in securities litigation. As long as the market is not fully efficient—i.e., as long as price movements do not perfectly reflect publicly disclosed changes in economic fundamentals—there will be instances in which price declines markedly exceed the value of any information release because of the impact of random influences. If the market is relatively efficient, situations in which crashes occur will be relatively rare. As noted previously, however, given the large number of stocks trading in the United States and the great number of trading days, crashes will not be uncommon events. Plaintiffs have the advantage that they do not have to anticipate crashes ex ante, but simply wait for them to occur ex post. Because plaintiffs have the benefit of after-the-fact selection bias, the degree of inefficiency reflected in the stocks of defendant firms on dates on which alleged fraud-related information is disseminated to the market is likely to be large.

There is a final reason why stock price movements frequently overstate the damages associated with an alleged fraud: When a stock

113. There are several legal and institutional impediments to selling a stock short that are commonly referred to as “short sale constraints” in the finance literature. These include the requirement that the sale must occur on an uptick, the need to borrow the stock, the requirement to post collateral, and the requirement to repurchase the stock immediately if the lender calls the stock back and a new lender cannot be found. See Charles M. Jones & Owen A. Lamont, Short-Sale Constraints and Stock Returns, 66 J. Fin. Econ. 207, 210-11 (2002).
114. See Hong & Stein, supra note 112, at 2143-46.
115. See Abreu & Brunnermeier, supra note 103, at 193.
116. See supra notes 60-61 and accompanying text.
price drops dramatically in conjunction with information that could conceivably be related to an alleged fraud, the drop will reflect not only the information, but also the market’s recognition that a securities class action is likely.\textsuperscript{117}

Richard Booth demonstrates how this anticipation of a lawsuit theoretically can cause the stock price to drop by a multiple of the percentage decline attributable to the news itself.\textsuperscript{118} While Booth is theoretically correct, the exacerbation of the decline is likely to be limited by the fact that not all stock price declines lead to litigation, many lawsuits are dismissed, and among those that proceed, settlements typically are only small fractions of claimed damages.\textsuperscript{119} Because investors are presumptively aware of these facts, the amount by which the initial stock price drop is exacerbated should not be a multiple, as Booth suggests, though it is not a factor that can be ignored. Along with the economic issues discussed above, it will widen the potential wedge between the market value of the information contained in a disclosure and the amount by which the value of a company declines on the disclosure.

V. THE FAILURE OF THE PSLRA TO ADDRESS THE PROBLEM OF CRASHES

Congress attempted to address in the PSLRA the concern that factors unrelated to an alleged fraud can cause estimates of damages based on stock price movements to overstate actual damages. Congress recognized, in its own words, that “[t]he price of [a] security may . . . fall for reasons unrelated to the alleged fraud . . . [and that] [c]alculating damages based on the date corrective information is disclosed may end up substantially overestimating [a] plaintiff’s damages.”\textsuperscript{120} Congress appeared to envision that in the event of a crash out of all proportion to the fundamental news conveyed by information newly disseminated to the market, rationality is likely to take over and the stock is likely to rebound appropriately. Congress provided in the PSLRA that recoverable damages shall be limited by reference to the rebound: “[T]he award of damages to the plaintiff


\textsuperscript{119} For instance, recovery rates in securities class actions were only 2.7% of investor losses in 2002 and 2.8% of investor losses in 2003. See Elaine Buckberg et al., \textit{Recent Trends in Securities Class Action Litigation: 2003 Update}, 5 CLASS ACTION LITIG. REP. 304 (2004).

shall not exceed the difference between the purchase . . . price paid . . . and the mean trading price of [the] security during the 90-day period beginning on the date on which the information correcting the misstatement or omission . . . is disseminated to the market.”

The PSLRA’s provision is odd because it is inconsistent with notions of market efficiency; indeed, it implies enough inefficiency to suggest an exploitable profit opportunity. For the PSLRA to have meaningful benefits for defendants, it must be the case that stock prices tend to rebound within ninety days of a crash—yet that would suggest a profit opportunity exploitable by even the least sophisticated of investors and would be an extreme example of inefficiency. Not surprisingly, therefore, what the PSLRA appears to envision rarely occurs. Empirical research in finance does not support the view that following a crash, stock prices rebound predictably and meaningfully in the ensuing ninety days; such a profit opportunity is arbitraged away in the fashion that Friedman and Fama originally suggested.

This is not to say that research in finance leads unambiguously to the conclusion that there is no predictability in the path of stock prices. For instance, the widely cited work of Werner De Bondt and Richard Thaler provides evidence that prices do tend to rebound in the long run, but that tendency is not pronounced and the long run is three to five years. Furthermore, even that conclusion remains highly controversial. The empirical work in finance suggests that for time periods on the order of ninety days or less, if future stock price movements can be predicted at all on the basis of past movements, they are characterized by momentum (continued movement in the same direction), not reversals.

Further, none of the recent theoretical research on stock price crashes, including the work of Abreu and Brunnermeier and of Hong and Stein, predicts that crashes will be followed by rebounds in stock prices. In fact, the predictions are just the reverse. In virtually all of

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121. 15 U.S.C. § 78u-4(e)(1) (2000). Congress also codified the requirement of loss causation that the courts had long employed. See id. § 78u-4(b)(4) (“In any private action arising under [the Securities Exchange Act of 1934], the plaintiff shall have the burden of proving that the act or omission of the defendant . . . caused the loss for which the plaintiff seeks to recover damages.”).

122. See Friedman, supra note 94, at 174-77; Fama, supra note 94, at 36-39.


124. For example, Fama presents a convincing argument that the bounce back effect documented by De Bondt and Thaler may be an artifact of the statistical methods they employ. See Fama, supra note 53, at 287-88.

the models, crashes are permanent in the sense that following a crash, stock prices are as likely to fall further as they are to rise.\footnote{\textsuperscript{126} See \textsc{Abreu \& Brunnermeier}, \textit{supra} note 103, at 196-97; \textsc{Hong \& Stein}, \textit{supra} note 112, at 2143.}

Simply put, even though Congress in enacting the PSLRA appeared to recognize the problems crashes pose for damages estimates, the means Congress enacted to remedy the problem appear to be singularly ineffectual.

VI. CONCLUSION

In short, the research all points to one fundamental conclusion: Unless markets are fully efficient, which is not logically possible, estimates of damages based on the efficient market hypothesis and \textit{ex post} analyses of stock price movements frequently will overstate damages, often significantly. The reason for the overstatement is that lawsuits are only filed in situations where large stock price declines have already been observed, and in such situations, the impact of even small inefficiencies typically will be exaggerated. A further reason is that the very possibility that a lawsuit may be filed may exacerbate the decline.

The foregoing demonstrates that even when the market is deemed efficient for purposes of showing reliance, it should not automatically be deemed efficient for purposes of estimating damages. This does not mean, however, that stock price data should no longer be used as a tool for estimating damages; the point is that it should be only one of many tools. Stock price data by itself cannot answer whether the price decline is commensurate with the fundamental news conveyed by a fraud-related disclosure and thus whether the drop is a meaningful estimate of actual damages. Other standard valuation techniques, such as discounted-cash-flow analyses, must be brought back into securities litigation to answer that crucial question.

While such models involve the potential problems that Fischel identified in 1982, those problems can be overcome, at least to a degree, by using more traditional valuation models in conjunction with analyses of stock price movements.\footnote{\textsuperscript{127} Daniel R. Fischel, \textit{Use of Modern Finance Theory in Securities Fraud Cases Involving Actively Traded Securities}, 38 \textsc{Bus. Law.}, 1, 17 (1982).} Fortunately, standard valuation models and analyses of stock price movements focus on varying aspects of the problem of estimating damages, such that any errors, oversights, or elements of speculation involved in the application of one approach typically will differ from those that are likely to arise...
when applying the other. Consequently, using both techniques in conjunction with each other, and comparing the results, will give the trier of fact a more balanced and accurate measure of true damages than either applied alone.