Fraud and Firm Performance: Evidence from Fraud on the Market and Securities Class Action Lawsuits

Abstract

We investigate whether securities frauds are preceded by surprisingly good firm-specific performance over an extended period but are followed by rapid negative investor response when the fraud is disclosed. Using a sample of 430 firms that disclosed securities fraud and experienced class action lawsuits over1989-999 and an equal number of matched control firms, we find significant upward price drift during the five-year period before the alleged fraud commission, a sharp price drop at fraud disclosure, and evidence of marginal negative stock price drift after initial class action filing, especially for smaller capitalization stocks. The observed pre- and post-event abnormal returns cannot be explained on average by changes in systematic risk. Further, we find positive abnormal trading volume and return volatility during the pre- fraud commission horizon but a significant deterioration in market quality, as evidenced by a persistent negative abnormal drift in relative trading volume and a sustained increase in return volatility, for up to five years following class action filing.

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Fraud and Firm Performance: Evidence from Fraud on the Market and Securities Class Action Lawsuits

Corporate securities fraud is a recurring and troubling phenomenon, which is very expensive for shareholders when the fraud is exposed. Large highly publicized frauds like Cendant, WorldCom, Enron, Adelphia, Qwest, and Tyco and industry-wide frauds like the IPO laddering cases and the recent insurance contingent commission cases and investment management Ponzi schemes captivate the financial press.[1] The growing academic literature has improved our understanding of a variety of causes and consequences of corporate misconduct. Many earlier studies focus on firm performance *during the period managers engage in fraudulent behavior* and on investor reactions to the *detection* of frauds and *disclosure* of regulatory actions and shareholder lawsuits. More recent work has focused on how *concurrent* investor optimism, monitoring by the market and regulators, governance mechanisms and the structure of managerial compensation influence firms' incentives to commit fraud. In contrast to these papers, we believe that the *prior performance of firms themselves* is an important driver of misconduct when they confront a setback, for several reasons. First, managers have strong incentives to project an image of sustained strong firm performance even when confronted with an adverse shock so that they can raise funds and/or exercise incentive stock options on attractive terms. Second, superior prior firm performance is most effective in avoiding detection of subsequent fraudulent behavior because it lowers the intensity of monitoring by the board, auditors, investors and regulators. Finally, when the misconduct is disclosed and stock price plummets, investors are more vigilant and react sharply leading to rapid price adjustment. Therefore, our objective is to empirically examine the stock market performance of firms *both before and after* they engage in alleged fraudulent behavior. Specifically, we investigate whether securities frauds are *preceded* by surprisingly good long-term firm performance, but are *followed* by rapid negative investor response.

Our empirical study is inspired by several papers that examine a variety of factors internal and external to the firm that influence managers' incentives to commit fraud and

outsiders' incentives to monitor managers. Maksimovic and Titman (1991) present a finite horizon model in which financial adversity can reduce a highly levered firm's incentives to maintain its reputation for supplying high-quality products in an environment in which quality cannot be observed until after the product is purchased. Jensen (2005) argues that managers sometimes take steps to prop up overvalued shares that lead to value destruction. Burns and Kedia (2006) report that the sensitivity of the CEO's stock option portfolio to stock price is significantly positively related to the propensity to misreport. Kedia and Phillippon (2008) develop a model of earnings management and fraudulent accounting in which low-productivity firms hire and invest too much in order to pool with high productivity firms *during periods of misreporting.*

Our work is closely related to the empirical study of Wang, Winton, and Yu (2010) who investigate the predictions about firms' fraud propensities of two recent fraud models. Povel, Singh, and Winton (2007) argue that the incidence of fraudulent behavior tends to intensify when a boom period ends. Following periods of strong reported firm performance, some firm managers succumb to the pressure to keep reporting strong financial results despite deteriorating firm performance, while investors see little benefit from monitoring firms with positive public information. Their model is consistent with stylized facts about corporate securities fraud appearing in the financial press.[2] For instance, in the midst of the recent credit market turmoil, *The Economist* (2007) reports "Walter Ricciardi, deputy director of enforcement at the SEC,…notes a pattern of increased abuse during "market adjustments", ranging from America's savings-and-loan crisis to swings in energy markets at the start of this decade. When good times end abruptly, financial managers are often under pressure to meet expected earnings. As a result, he says, they are more likely to 'find creative ways to meet those expectations'." In Hertzberg (2005), incentive compensation, which is highly sensitive to short-term firm performance, is effective in motivating managers of good-quality firms, but it also tends to induce the managers of poor-quality firms to inflate the firm's reported performance. In good times, managerial manipulation delays the release of information about the true quality of the firm, but the opposite occurs when investors perceive worsening business conditions. This asymmetric learning dynamic leads to gradual booms and rapid recessions. As Karpoff, Lee, and Martin (2008b) explain, financial misrepresentation is

particularly costly to the firm because it undermines its credibility with customers, suppliers, and investors.[3]

We propose and test an intuitive extension to the boom-bust model of fraud of Povel et al. (2007). Our premise for the role of firm performance surrounding the incidence and detection of fraud can be explained as follows. When firms introduce an innovative product, service, or technology, some of them experience an extended period of surprisingly good performance. Further, as the prolonged good times are followed by an adverse firm-specific or macro-economic shock (such as snags in the development of a new product or service, emergence of substitutes due to the play of normal competitive forces, recession, etc.), some firms resort to concealing the effects of the setback in order to keep up the appearance of persistently positive abnormal performance. Since their above-average track record lends credibility, investors fail to detect the misreporting. When analysts and investors eventually catch up with the questionable published reports or detect the omissions, the fraudulent firm admits its misdeeds and disappointed investors react sharply. Based on the above arguments drawn from recent fraud models and stylized facts, we conjecture that securities frauds are preceded by surprisingly good firm-specific performance, but are followed by a concentrated negative market response.

We focus on the most visible form of managerial fraud, securities fraud, and the resulting federal securities class action lawsuits alleging "fraud on the market" in violation of Rule 10b-5 under the Securities Exchange Act of 1934, which are triggered by the revelation of the fraud. Section 10(b) of the Securities Exchange Act 1934, and in particular, Rule 10b-5, makes it unlawful for a firm to make an untrue statement of a material fact or to omit to state a material fact in its public announcements, which distorts the market prices of the firm's securities, especially its common stock. When the fraud is revealed, counsel for the class of investors who relied on the false information, transacted in the stock, and suffered losses as a result, typically files a 10b-5 class action lawsuit in federal district court to seek recovery of the shareholders' damages. The lawsuit typically specifies one or more of the following allegations: violations of generally accepted accounting principles, misleading forecasts of future sales or earnings, or failure to disclose product deficiencies or production difficulties, which are alleged to be intentional and designed to improperly inflate the price of the firm's shares. It often also

alleges excessive volumes of insider selling to exploit the inflation in the price of the firm's stock due to the fraud for their personal gain as evidence of the managers' fraudulent intent. The lawsuits are usually triggered by a negative disclosure event, such as the Securities and Exchange Commission announcing an enforcement action or the Department of Justice announcing a criminal investigation, the firm making a corrective disclosure in a press release, adverse news article(s) about the firm alleging improprieties, or the resignations or dismissal of top officer(s).

We examine the linkages between securities frauds followed by class action lawsuits and three attributes of firms' long-term stock market performance - stock returns, return volatility, and trading volume. Our study examines a sequence of three closely related events: the alleged commission of the securities fraud (*FC*), the fraud disclosure by the firm (*FD*), and the filing of a class action lawsuit (*CA*). Figure 1 illustrates the relative timing of the three dates in our sample. We do not observe the exact timing of the commission of alleged fraud, but we do know the beginning date of the class period when the fraud is alleged to have started. This date must be identified in the lawsuit in order to define the class of investors who were allegedly damaged by the fraud.

Figure 1 here

We rely on a private data source - PricewaterhouseCoopers (PwC) corporate litigation database - to conduct our empirical tests. Our sample consists of 430 cases of fraud on the market that were accompanied by class action lawsuits over 1989-1999 and a control portfolio of 430 firms matched on size and pre-event stock price momentum. We examine the long-term stock performance of the firm alleged to have committed the fraud and use the matched control firm to investigate the fraudulent firms' abnormal returns, changes in systematic risk, abnormal trading volume, and abnormal return volatility for the one-, three-, and five-year horizons preceding the month the alleged fraud was committed and following the month the class action lawsuit was filed.

Our main results are as follows: First, we find that sued firms exhibit a significant upward price drift, adjusted for abnormal returns on the control group, during the five-year horizon preceding the commission of securities frauds, followed by a sharp negative price reaction to the fraud disclosure and then weak evidence of a negative price drift

over the five years following the initial class action filing. Second, the observed pre- and post-event abnormal returns cannot be explained by changes in systematic risk (Fama-French factor loadings) of the sued firms, suggesting that the effects of fraud are confined primarily to changes in expected cash flows, rather than changes in the cost of capital. Finally, we find complementary evidence of positive abnormal drift in trading volume and return volatility of the (alleged) fraud sample, adjusted for similar abnormal patterns on the control group, during the pre-fraud commission horizon, but a persistent negative abnormal drift in trading volume and a sustained increase in return volatility during the post-class action filing period. The abnormal patterns are broadly consistent with our conjecture that securities frauds are preceded by surprisingly good performance but are followed by a concentrated negative market response. Further, we find deterioration in market quality of the sued firms, which persists for up to five years following the class action filing.

Our study differs from previous studies because of our focus on *long-term firm-specific* performance during the *pre-fraud* commission and *post-litigation* periods as well as our application of the robust calendar-time portfolio methodology. Wang, et al. (2010) investigate the prediction that the incidence of corporate financial fraud is high when *contemporaneous* investor beliefs about *industry business conditions* are good because of weak monitoring incentives of investors (Povel, et al. (2007)) and short-term executive compensation (Hertzberg (2005)). Using a recent U.S. sample of securities lawsuits alleging accounting-related IPO frauds, they find that the incidence of fraud increases with the level of investor beliefs about industry prospects, decreases when venture capitalists (who face lower monitoring costs) are present, decreases with underwriters' monitoring costs, and is positively related to short-tem executive compensation (all proxies measured *as of the beginning of the fraud year*). In contrast to their focus on contemporaneous investor beliefs about industry prospects as the driving force behind corporate misconduct, we concentrate on our conjecture based on Povel, Singh, and Winton (2007) that prior positive stock market performance of the firms themselves is associated with their fraud propensities in 'bad times' and on the implications of Hertzberg (2005) that the filing of the class action lawsuits triggers rapid market response.

Earlier studies by Kellogg (1984), Francis, Philbrick and Schipper (1994a, 1994b), Bizjack and Coles (1995), Beck and Bhagat (1997), Bhagat, Bizjack and Coles (1998), Ali and Kallapur (2001), DuCharme, Malatesta, and Sefcik (2004), Griffin, Grundfest and Perino (2004), Karpoff, Lee, and Martin (2008a), and Bauer and Braun (2010) investigate the conventional 'fraud on the market' hypothesis. This hypothesis posits that firms make defective/misleading disclosures, which lead to positive abnormal returns during the class period, defined as the interval between the initiation of fraud and the following corrective disclosure. These positive abnormal returns in the class period are followed by negative abnormal returns when firms make corrective disclosures. This hypothesis has little to say about firm performance prior to fraud commission, or about managerial incentives to commit fraud. Majority of these studies assess the stock price performance of firms primarily around one or more of the three fraud-related events. While most studies concentrate on the wealth effects, some researchers also scrutinize news releases by firms, changes in systematic risk, trading volume, firms' propensity to be sued, and industry spillover effects.

Other researchers have documented the costly reputation losses that result from fraud and other types of corporate misconduct (Beatty, Bunsis, and Hand, 1998, Alexander, 1999, Karpoff, Lee, and Vendrzyk, 1999, and Murphy, Shrieves, and Tibbs, 2009). Graham, Li, and Qiu (2008) find that bank loans initiated after a financial restatement have significantly greater spreads, shorter maturities, higher likelihood of being secured, and tighter covenants, and that banks require even tighter covenants following fraudulent restatements to compensate for the greater risk and informational problems owing to the fraud. Karpoff, Lee, and Martin (2008b) report that SEC enforcement actions concerning securities fraud impose a reputational penalty on the firm that is more than seven times the amount of the direct legal and regulatory penalties and that firms that commit securities fraud and get caught lose more than four dollars of market value for every dollar of inflated market value they artificially create through the fraud.[4] Gande and Lewis (2009) document the large statistically significant negative stock price reactions to shareholder-initiated class action lawsuits and furnish evidence of a spillover effect as investors anticipate similar lawsuits based on earlier lawsuits against other firms in the same industry.

Empirical research on corporate fraud has also examined the impact of independence and financial and accounting expertise of corporate boards in preventing fraud (Beasley (1996), Dechow, Sloan, and Sweeney (1996), and Agrawal and Chadha (2005)), the role of executive compensation (Burns and Kedia (2006), Goldman and Slezak (2006), Efendi, Srivastava, and Swanson (2007), Peng and R¨oell (2008), Armstrong, Jagolinzer, and Larcker (2009), and Johnson, Ryan, and Tian (2009)), the impact of monitoring on fraud prevention and detection by auditors and SEC (Francis (2004) and Li (2008)). Kedia and Phillippon (2008) find that firms hire and invest excessively and managers exercise stock options *during periods of suspicious accounting*. But when the misreporting is detected, firms shed labor and capital and productivity improves. Dyck, Morse, and Zingales (2010) report that fraud detection does not rely on standard corporate governance actors (investors, SEC, and auditors), but rather takes a village, including several nontraditional players (employees, media, and industry regulators).

In contrast to these studies, our strong belief is that prior firm-specific good times generate not only powerful incentives to misreport when under stress but also provide an effective camouflage against detection. Therefore, we focus on abnormal drifts in returns, trading volume and volatility up to five years before the alleged fraud commission and five years following the filing of the class action lawsuit in order to obtain a more complete understanding of the drivers of securities fraud. Our empirical work is similar in spirit to Beck and Bhagat (1997), who track the market performance of 127 firms facing allegations of securities fraud in class action lawsuits filed and settled between 1990 and 1993 for three years prior to and three years after the beginning of the class period. They rely on equal-weighted cumulative market-adjusted abnormal returns (defined as event firm return less market index return). Based on these cumulative abnormal returns (CARs), they find that the defendant firms exhibit higher systematic risk and experience positive market-adjusted CARs in the three years prior to the start of the class period, sharply negative abnormal returns during the class period (lasting about a year at the median), and no subsequent abnormal performance as compared with otherwise similar firms that are not accused of fraud.

We construct robust statistical tests by employing the Fama and French (1993) three-factor model to estimate both equal- and value-weighted abnormal returns. Mitchell and Stafford (2000) and Boehme and Sorescu (2002) find that long-term CARs and buy-and-hold abnormal returns (BHARs) are susceptible to asset pricing model misspecification and cross-sectional correlation among event-firm returns in nonrandom samples. Applying the calendar time portfolio methodology to reexamine abnormal price drifts associated with several key corporate events, they bring into question several previously documented market anomalies. Since the true asset pricing model is not known, especially in a market environment susceptible to information asymmetry about firm quality, CARs and BHARs tend to compound the biases due to any model misspecification over longer horizons. In addition, they fail to control for cross-sectional dependence, which can result in overstated statistical significance. Given the tendency of frauds to cluster through calendar time by industry, as noted by Gande and Lewis (2009), controlling for potential cross-sectional dependence in long horizon market-adjusted abnormal returns is of paramount concern in this study. To mitigate these and other size and momentum biases, we use the calendar time portfolio methodology of Mitchell and Stafford (2000) and Boehme and Sorescu (2002) with equal- and value-weighted returns of event and control firms matched on size and pre-event momentum.

Yet another distinguishing feature of this study is that our sample of 430 10b-5 securities fraud class action lawsuits over 1989-1999 gathered from PricewaterhouseCoopers corporate litigation database appears to cover fraud episodes that differ from other samples of financial misrepresentation used in prior research, such as, SEC enforcement actions, Accounting and Auditing Enforcement Releases (AAERs), and financial restatements. For example, our sample includes 86, 111 and 94 cases of securities fraud class actions for 1996, 1997 and 1998, respectively. For these three years, Gande and Lewis (2009) cover 23, 50 and 62 class action suits regardless of type, of which 6, 15 and 18 are accounting-based lawsuits. Karpoff et al. (2008b) report 54, 38 and 23 SEC enforcement actions for these years, of which only 39% on average have associated class action lawsuits. On the other hand, their sample covers 19, 20, 17, 20, 21, 35, and 33 annual enforcement cases for 1989 to 1995, as compared with 1, 0, 1, 4, 22, 30 and 72 securities fraud suits covered in our study. In Kedia and Phillippon (2008), 63, 65

and 114 earnings restatement announcements involving accounting irregularities resulting in material misstatements of financial results come from 1997, 1998 and 1999, respectively. Dyck, Morse, and Zingales (2010) study a sample of 216 federal securities class action lawsuits involving more than $750 million in assets over 1996-2004. In their study of short sellers and financial misconduct, Karpoff and Lou (2010) cover share price reactions to 454 SEC enforcement actions for financial misrepresentation from 1988 to 2005. Of the total sample of 382 IPOs sued for accounting irregularities between 1995 and 2007 in Wang, et al. (2010), 287 cases belong to the period from 1995 to 1999 that overlaps with our sample period. Although we are unable to assess the exact magnitude of overlap of fraud cases covered by the above studies, these comparisons highlight that our sample contains a relatively large number of cases covering a broad range of misbehavior (such as, misleading statements, inside trading, merger, seasoned equity offering, etc.), some of which appear to be unique episodes from the universe of corporate misconduct.

The rest of the paper proceeds as follows. Section I reviews recent theoretical models of corporate fraud and develops our hypotheses and conjectures about pre- and post-fraud abnormal performance of event firms. We discuss the sample of event and control firms and the methodologies we employ to assess their pre- and post-event abnormal price drifts in Section II. Section III presents the empirical results pertaining to abnormal returns during the pre-fraud commission horizons, while Section IV examines the abnormal price drift during the post-class-action period. We examine the possible sources of the shift from the pre-fraud positive price drift to the post-litigation negative price drift by measuring the change in systematic risk of the defendant stocks in Section V. To complement the preceding study of price drifts, we analyze the pre- and post-event abnormal patterns in trading volume and return volatility in Section VI. Section VII provides important regulatory and investor implications of our findings, and Section VIII concludes the paper.

I. Research questions

The fraud on the market legal doctrine holds that firms commit securities fraud when they either make ‘material’ misleading disclosures or fail to disclose ‘material’

information, which results in securities prices diverging from their true (unmanipulated) value. Unfortunately, this legal doctrine offers little insight into what factors motivate managerial fraud. Recent economic models of fraud, in contrast, focus on various factors that might stimulate intentional managerial misconduct. These models typically assume that managers have private information about firm quality, while investors can discover the true firm quality only through costly monitoring.

Developing a model of the causes and consequences of corporate misreporting, Bebchuk and Bar-Gill (2003) posit that uninformed investors set a single "pooling" price for all firms that announce high earnings. Owners and managers of low-earnings firms therefore have an incentive to overstate the firm's performance to improve the terms on which the firm can raise external capital to fund a new project or pay for an acquisition. Povel, et al. (2007) examine the link between economic booms, busts and corporate fraud and argue that weak firms' incentives to commit fraud are greatest in relatively good economic times when investors are optimistic and willing to provide them with unmonitored funding. In their model, the incidence of fraud peaks at the end of a boom when the true quality of firms deteriorates abruptly while investors mistakenly believe that boom conditions are continuing. Capitalizing on these beliefs, poor-quality firms commit fraud to attract funding, while investors do not invest more resources in monitoring firms with positive public information because, given their optimistic beliefs, the benefits of such monitoring appear small.

Hertzberg (2005) develops a model of gradual booms and rapid recessions in which incentive compensation affects managers' inclination to engage in earnings manipulation, depending on good or bad firm performance. In good states of the economy, firms on average are performing well, and incentive compensation that is sensitive to short-term firm performance (current stock price) is effective in inducing strong managerial effort. But it induces managers who are performing poorly to manipulate their firms' reported financial results. Since public signals are noisier and less informative due to the higher incidence of fraud in good times, investors are slow to discover the true quality of firms and the state of their industry. In contrast, investors are more vigilant in bad times, which lead to less managerial manipulation and to investors learning quickly about firm quality and the state of its industry.

Wang, et al. (2010) investigate the predictions of the above models that the incidence of corporate financial fraud is high when investors believe that contemporaneous industry business conditions are good and the structure of managerial pay is tied to short-term firm performance. They use three proxies for beliefs of institutional investor about business conditions: median annual earnings per share (EPS) growth forecast for a firm's industry, inverse of the median IPO book-building time by industry (a proxy for institutional investors' demand for an industry's IPO shares), and median Tobin's Q by industry. In addition, they use proxies for investor monitoring and short-term incentive compensation. All of their fraud detection proxies are measured as of the year of fraud. Based on a sample of securities lawsuits alleging accounting-related fraud associated with U.S. firms that went public during the 1995 to 2005 period, they find that the incidence of fraud (a) increases with the concurrent level of investor beliefs about industry prospects, (b) decreases when venture capitalists (who face lower monitoring costs) are present, (c) decreases with underwriters' monitoring costs, and (d) is positively related to short-tem executive compensation.

Povel, et al. (2007) point out that their predictions hold even when we analyze firm-level returns instead of investor beliefs about industry business conditions: "Thus, even if one defines "bad times" and "good times" in terms of the expected return to any given firm rather than the relative numbers of good and bad firms, our predictions still hold" (p. 1237). However, the empirical work of Wang, et al. (2010) focuses only on the impact of contemporaneous investor beliefs about industry prospects and does not investigate the linkages between fraud and prior firm performance. We do not test the model of Povel, et al. (2007) directly but instead apply their intuition to conjecture that firms succumb to securities fraud when they face an idiosyncratic shock or adversity following an extended period of unusually good firm performance. Firms may experience a sudden reversal of fortune due to firm-specific, industry-wide, or macroeconomic factors. Managers at such firms are aware that investors are optimistic about the firms' prospects in light of their superior track record, and they may believe that investors would be more willing to take the fraudulent reports at face value because their optimism has reduced the intensity of their monitoring.

The Rite Aid securities fraud offers an example that illustrates our application of the Povel, et al. (2007) intuition at the micro level: (a) a firm has exhibited pre-fraud commission positive abnormal stock price drift over a long period, (b) it commits fraud when it experiences a negative idiosyncratic shock, (c) investors fail to detect the fraud presumably because the long period of superior performance has made them optimistic about the firm and willing to accept its fraudulent reports at face value, and (d) the fraud is finally revealed and the firm's share price suffers a sharp negative announcement effect. Rite Aid, one of the largest retail drug store chains in the United States, announced fourth quarter 1998 earnings on March 12, 1999 (fraud disclosure date) that were substantially below Wall Street's expectations, and its stock price fell 39% by the close. Plaintiffs filed a class action three days later (class action filing date) alleging that Rite Aid had released materially false and misleading information to the market and omitted to state material facts that had artificially inflated the price of its stock between December 14, 1998 (fraud commission date) and March 11, 1999 (the class period).

Figure 2 here

In practice, the expected share price in the absence of the fraud is referred to as the "but-for share price." The but-for price is based on the expected total return estimated from a market model, such as the Fama-French (1993) three-factor model. Figure 2 compares Rite Aid's actual share price and its but-for share price during the class period, the preceding eight years, and several months following the end of the class period. We calibrated fthe Fama-French (1993) three-factor model to the total returns on Rite Aid common stock for the three-year period December 14, 1990 through December 13, 1993. We then used the model to calculate the expected returns on Rite Aid common stock during the five-year period December 14, 1993 through December 13, 1998 preceding the class period, the three-month class period ending on March 11, 1999, and the remainder of 1999. Rite Aid's stock exhibited unexpectedly positive performance during the five-year period preceding the class period as Rite Aid grew to become one of the largest U.S. retail drug store chains. But the good times came to an end in December 1998. The costs and expenses associated with opening or relocating new stores especially in the fourth quarter were substantially greater than it had reported, previously undisclosed severe software problems had delayed the opening of an important distribution center, and its

merchandising strategy during the most recent Christmas season had not been successful, all of which Rite Aid finally acknowledged on March 12.[5] Rite Aid's share price fell that day from $37 to $22-9/16 on trading volume of 47 million shares (as compared to 1.6 million shares per day in the prior year). The March 12 share price drop was almost double the maximum share price inflation during the class period.[6] Moreover, there is a pronounced negative share price drift following the disclosure of the fraud, and by the end of 1999, the continuing negative returns post-fraud disclosure more than offset the entire positive abnormal performance during the five years pre-fraud commission[7] Thus, the price reaction to the news of the fraud not only squeezed out the price inflation due to the misconduct (which occurred during the class period) but, in addition, entirely eliminated the prior five years' positive performance. Karpoff, Lee, and Martin (2008b) find that firms that commit securities fraud lose $4.08 in market value for each dollar of market value artificially created through the fraud. Figure 2 suggests that reversal of any positive pre-fraud price performance could be one source of this $3.08 added cost of cooking the books.

The arguments preceding the example lead us to investigate the following hypotheses concerning long-term price drifts over the pre- and post-event periods surrounding fraudulent managerial behavior. First, the commission of fraud is preceded by persistent positive abnormal returns. This occurs because (a) the managers' incentives to manipulate performance are high when the firm's good times end abruptly, (b) investors who are less informed about firm quality are surprised by the good prior performance resulting from a stroke of good luck, and (c) the investors' monitoring incentives are weak in relatively good times. Moreover, owners typically offer managers short-term incentives, such as stock and option compensation, which are effective in motivating managers in good times, but which tend to encourage manipulation by poorly performing managers. Investors are willing to invest in firms disclosing positive pubic information without much scrutiny because the benefits of such monitoring seem small due to the favorable economic environment. Since public signals are noisy due to an increase in the incidence of misleading firm performance reports at the end of buoyant firm-specific business conditions, optimistic investors are slow to discover the true

quality of firms. We term this pattern of stock price behavior the *pre-fraud persistent positive abnormal performance hypothesis*.

Second, we expect that the disclosure of fraud occurs when it is no longer sustainable and becomes impossible to keep hidden from investors. The subsequent filings of 10b-5 class action lawsuits are almost immediately followed by swift negative investor reaction, because the true quality of firms is more transparent to investors in the absence of distorted reports and because investors are more vigilant in bad times. This implies that the negative price drift over the post-litigation period would be more rapid as compared with the pre-event sustained positive price drift. However, in practice, fraud disclosure is not always concentrated in a single announcement. It is not uncommon for firms to issue multiple news releases admitting questionable activities and for investors to learn about the full extent and severity of the fraud through several lawsuits and long drawn-out court proceedings. Therefore, the length of the post-event price drift is an empirical issue. We term this pattern of stock price behavior the *post-litigation negative abnormal price drift hypothesis.*

Third, to investigate the sources of positive and negative abnormal returns, we examine whether managers commit fraud when their private forecasts reveal that firms' earnings are likely to deteriorate or when they believe its earnings are going to be less stable than in the past. In other words, is managerial manipulation associated with a subsequent decrease in a firm's cash flows or with an increase in the firm's systematic risk? For example, consider the common type of accounting fraud in which managers inflate revenue and/or understate operating expenses so as to raise reported earnings when they privately observe declining prospects for the firm (and its industry and the economy). Subsequently, when the effects of the deepening economic downturn on the firm make the fraud no longer sustainable and force the firm to disclose its fraudulent behavior, the disclosure triggers a sharp negative investor response. Bhagat, Bizjak, and Coles (1998) find that announcements of litigation alleging violations of securities laws result in a statistically significant 2.71% greater wealth loss for defendant firms than antitrust, breach of contract, or general litigation, and Gande and Lewis (2009) find that the mean cumulative effect of a class action lawsuit filing is a wealth loss of 19.61%.[8]

For another example, consider the manipulation known as “cookie jar reserve” accounting, which once ranked among the three most serious accounting frauds according to former SEC Chairman Arthur Levitt (1998). Brown and Heinzl (2004) note that the alleged manipulations at Nortel Networks Corporation were concentrated in an accounting adjustment known as cookie jar reserves, which consist of accrued liabilities covering discretionary charges for such items as merger costs, write-downs and contractual liabilities. These accruals give the firm a discretionary accounting reserve; it can dip into the accrued reserves (the cookie jar) by reversing part of the accrual to offset certain expenses and raise reported income to meet stock analysts’ earnings forecasts for the firm. This practice was often abused in the 1990s by managers, who inflated the reserve in good times and then released portions of it to improve earnings when the firm encountered unexpectedly difficult business conditions (which were unknown to the public). It is difficult to say in either of these examples whether the distortions increase or decrease the covariance between the firm’s returns and market returns, so their impact on the firm’s systematic risk is an empirical issue.

Finally, we investigate the link between fraud and stock market quality as evidenced by the trading liquidity and price volatility of the event firms’ shares. Similar to the pre-fraud persistent positive abnormal performance hypothesis, we conjecture an abnormal increase in the volume of stock trading and in stock volatility for fraud firms during good times when (less-informed) investors are surprised by favorable firm performance. Moreover, if investor reaction to the disclosure of the fraud and the filing of a 10b-5 class action lawsuit tends to occur swiftly with institutional investors exiting the market for the stock in reaction to the fraud, then we would expect sharp increases in trading volume and volatility when the fraud is disclosed followed by a negative drift in trading volume and a positive drift in volatility as the quality of the market for the stock deteriorates during the post-litigation horizon.

II. Sample and methodology

A major difficulty in testing our hypotheses concerns the duration of the period of fraud commission and identification of the fraud disclosure dates. As stressed by past studies, such as Beck and Bhagat (1997), the identification of the timing of the release of misleading reports and the corrective disclosures is especially complicated. Moreover,

many frauds involve a failure to disclose material information, that is, they involve errors of omission, rather than commission. Determining when the firm had this information in its possession but failed to disclose it is especially difficult unless the firm subsequently discloses the information and confesses when it first had it available, which seldom happens. Any such disclosure is afflicted by obvious agency problems.

One arguably objective and credible way to identify the three event periods is to rely on the class action lawsuits. They specify the period of the fraud, called the class period, over which the defendants allegedly misled shareholders either by publishing misleading statements or by making material omissions concerning the firm or its prospects. Our proxy for the fraud commission (*FC*) event is the month in which the class period begins. It is possible that our choice of *FC* is biased because the plaintiffs' attorneys, who are typically paid on contingency, have an incentive to select this period strategically so as to maximize the damage claim. Since they select the *FC* date *ex post*, they have an incentive to choose it such that the stock price reaches a peak during the class period, as in the Rite Aid example. Further, as Griffin et al. (2000) note, shareholder damages in a class action lawsuit are calculated by multiplying the number of shares damaged times the damages per share during the class period. These features of the class period could bias our empirical results based on the *FC* upward, because the beginning of the class period specified in the lawsuit may be a 'peak price' point that is followed by active trading. However, the heightened pleading standards of the Private Securities Litigation Reform Act of 1995 (PSLRA) require the plaintiff attorneys to describe the fraud in detail, including when it occurred (Fisch, 2009).[9] In particular, they require (1) specifying each misleading statement and (2) stating specific facts indicating fraudulent intent. We expect that the PSLRA's more stringent pleading standards would screen out the less meritorious lawsuits and result in a post-PSLRA sample in which the financial effects of securities fraud would be more pronounced. The PSLRA also appears to have restrained the use of class action litigation (Fisch, 2009). The U.S. Supreme Court further tightened the loss causation standard in 2005 by requiring plaintiffs to demonstrate that an actual trading loss occurred when a corrective disclosure exposed the fraud (Fisch, 2009).[10] Moreover, the plaintiff attorneys' choice of *FC* can be challenged by the defendants, who are incentivized to minimize damages. Therefore, the potential for bias

appears to be limited, and we conclude that it is reasonable to use the *FC* to examine the pre-event drift in price, systematic risk, trading volume and volatility for the event firms.

Our primary focus is on the stock performance of event firms and a matching sample of control firms over long horizons in the pre-FC period and the post-class action (CA) filing period. Following Lyon, Barber, and Tsai (1999), we exclude firms that have more than one fraud event disclosed during our sample period to minimize the lack of independence that would result from overlapping returns. In addition, unlike typical idiosyncratic firm-specific corporate events, theoretical models suggest that the incidence of frauds is vulnerable to cross-sectional dependence because these events frequently tend to occur in waves due to industry-wide and economy-wide shocks (Gande and Lewis, 2009). The resulting cluster of observations exacerbates the problem of overlapping pre- and post-event horizons. Moreover, given the varying degrees of information asymmetry surrounding fraud commission, disclosure, and litigation, there is considerable uncertainty about the true asset pricing model.

These problems are known to create significant biases in tests of long-run abnormal returns, especially in samples overpopulated with small firms. In the presence of these problems, Mitchell and Stafford (2000) show that the conventional buy-and-hold abnormal returns (BHARs) as well as cumulative abnormal returns (CARs) measured over long horizons tend to compound the biases in abnormal returns due to model misspecification, and lead to overstatement of statistical significance in nonrandom samples. Following their approach, we employ the calendar time portfolio methodology (CTPM) with event firms and control firms matched on market capitalization and pre-event momentum to mitigate the known biases in the Fama and French (1993) three-factor model. This methodology mitigates potential asset pricing model misspecification problems and cross-sectional dependence in our analysis of pre- and post-event long-run firm performance surrounding securities fraud.

We collected a sample of 430 federal 10b-5 class action lawsuits filed against listed firms between 1993 and 1999 and identical sample of matched control firms. For these cases, the frauds and ensuing lawsuits span the period 1989 through 1999. We examine the stock market performance of these firms over the 20-year window 1984 through 2004. The sample of fraud cases was initially drawn from the

PricewaterhouseCoopers (PwC) corporate litigation data base. Further details concerning the cases were obtained from the Stanford Law School's Securities Class Action Clearinghouse and the Bloomberg Financial Research Service. For a 10b-5 case to be included in the sample, we require that the three key event dates in the firm's history must be identifiable in Bloomberg or the Dow Jones Newswire: the beginning of the class period (fraud commission, *FC*), the fraud disclosure date (*FD*), and the 10b-5 class action lawsuit filing date (*CA*). If there is more than one 10b-5 class action lawsuit filed, CA is the date of the first lawsuit.[11] As illustrated in Figure 1, the typical sequence of these events is *FC* (which is observed *ex post),* followed by *FD,* and the final event is *CA.* Further, we require that the sample firms have daily trading volume data available from five years before *FC* through five years after *CA.* These filters leave us with a sample of 430 cases. Returns, trading volume, capitalization and stock prices were drawn from the Center for Research in Securities Prices (CRSP) data base. Treasury bill yields and indices for the small-minus-big (SMB) and high-minus-low (HML) factors were obtained from Kenneth R. French's data library website.[12]

The Fama-French (1993) three-factor asset pricing model is known to suffer from size and momentum biases (Fama and French, 1996, Lyon, Barber, and Tsai, 1999, and Mitchell and Stafford, 2000). To address these concerns, we follow Boehme and Sorescu (2002) and pick for each fraud firm a size-matched and momentum-matched control firm that is not subject to any 10b-5 class action filing during our study period. The control firm's equity market capitalization must be within 40% of that of the event firm, and its aggregate stock return over the preceding 12 months (measured over the interval *FC* (-12,-1) months) is the one closest to the 12-month total return of the event firm.

Table I here

Table I provides summary statistics for the sample. From Panel A, the fraud (control) sample has a median price of $21 ($16) in the month preceding the beginning of the class period (*FC* (-1)), and its corresponding median equity market capitalization is $0.5 ($0.4) billion. It is worth noting that the mean firm sizes are substantially higher at $2.4 billion and $2.2 billion for the fraud and control groups, respectively, indicating that some of the firms subject to 10b-5 class action litigation are relatively very large while the majority of our sample firms belong to the medium to small size class. The fraud

sample has a higher median market model beta in comparison to the control firms, 1.26 versus 0.99. Both samples are characterized by positive prior performance, as indicated by the median prior raw returns of 27% and 29% (measured over the 12-month interval *FC* (-12,-1)). The distribution of the fraud sample presented in Panel B shows that roughly half of the firms are in the manufacturing and computing industries, and the majority of the 10b-5 class action lawsuits were initiated during the 1995-1998 period. The industry and calendar time clustering evident in our data cause substantial overlap in the pre- and post-event long horizons and underscore the vulnerability of conventional long-term performance measures (BHARs and CARs) to the problem of cross-sectional dependence among event firms.

As Barber and Lyon (1997) note, continuously compounded returns yield inherently negatively biased estimates of long-run abnormal returns. Therefore, we use simple returns, which are measured as the change in price plus dividends, scaled by the beginning-of-period price. To measure abnormal performance surrounding the three fraud-related events, we follow Boehme and Sorescu (2002) and use two *calendar time* portfolio methodologies: the Fama and French (1993) three-factor model using monthly stock returns on calendar time portfolios (CTPM) and the mean monthly calendar time abnormal returns (CTARs).

To study pre-event abnormal performance, we construct for each calendar month *m* both equal-weighted and value-weighted calendar time portfolios of firms subject to fraud events during the succeeding [*m + 1, m + h*] months, where *h* refers to investment horizons of 12, 36, and 60 months. Monthly portfolio returns are calculated for each of the three fraud events (*FC*, *FD* and *CA*) over 1984 through 2004 and are winsorized at the 1% and 99% levels. These calendar time portfolios are dynamically rebalanced each month, and the prior month market capitalizations are used to compute value-weighted returns. Since our sample of fraud firms is heavily populated with relatively small firms, the equal-weighted returns are more susceptible to the misspecified asset pricing model problem described earlier. As Fama (1998) notes, value-weighting mitigates this problem by assigning higher weights to larger firms.

To measure the long-run pre-event performance, we follow the CTPM and regress the monthly calendar time portfolio excess returns on the Fama and French (1993) three factors to estimate the *unadjusted* intercept:

$$R_{p,t} - R_{f,t} = a_p + \beta_p(R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t} \quad (1)$$

where $R_{p,t}$ refers to the (equal- or value-weighted) return on the calendar time portfolio of fraud firms, and $R_{f,t}$ is the return on one-month T-bills. The regressors are the excess return on the CRSP value-weighted market portfolio ($R_{m,t} - R_{f,t}$), the difference in returns between the value-weighted portfolios of small and big stocks (SMB_t), and the difference in returns between the value-weighted portfolios of high and low book-to-market ratio stocks (HML_t). The regression intercept provides an estimate of monthly abnormal performance of the calendar time portfolio of fraud firms for the three events, *FC*, *FD*, and *CA*. We modify this methodology to evaluate the post-litigation (post-*CA*) abnormal performance over 12-, 36-, and 60-month horizons ([*m - 1, m – h,* where *m* denotes the current calendar month]). Since the number of firms in the calendar time portfolios can vary widely over time with monthly rebalancing, and because there can be small firm and large firm effects, we use both ordinary least squares (OLS) and weighted least squares (WLS) procedures. Monthly returns in the WLS regressions are weighted by the square root of the number of firms contained in the calendar time portfolio. The WLS *t*-statistics are calculated using the White (1980) procedure.

Since the traditional three-factor model described in equation (1) suffers from potential size and momentum biases in the presence of pre-event momentum, the potential for biased estimates of the regression intercept and biased t-statistics is a matter of paramount concern when trying to detect and measure pre- and post-fraud price drifts. To mitigate the potential size and momentum biases, we follow Boehme and Sorescu (2002) and subtract the monthly return on a control firm matched on size and one year pre-event momentum, $R_{control,}$ from the return for each event firm. Then we estimate an *adjusted* Fama-French model by regressing the return on this hedged calendar time portfolio on the three factors:

$$R_{event,t} - R_{control,t} = a_p + \beta_p(R_{m,t} - R_{f,t}) + s_p SMB_t + h_p HML_t + e_{p,t} \quad (2)$$

where the return measures, $R_{event,t}$ and $R_{control,t}$ are the monthly returns on the qualifying portfolios. The intercept of this regression provides an estimate of the monthly long-term performance adjusted for the potential size and pre-event momentum biases.

As an alternative to the CTPM based on the Fama-French three-factor asset pricing model, we estimate the calendar time abnormal return ($CTAR_t$) as the monthly difference between the return on the calendar time event firm portfolio ($R_{p,t}$) and that on the control firm portfolio ($R_{control\ t}$) dynamically matched each calendar month according to size and prior one-year momentum. The mean monthly *CTAR* is calculated as

$$\text{Mean monthly CTAR} = \sum_{t=1}^{n} \frac{CTAR_t}{n}, t \in \{1, n\}, \quad (3)$$

where *t* is the calendar month and n is the total number of months in the time horizon under examination. We compute both equal-weighted and value-weighted *CTARs*.

III. Pre-fraud abnormal price drift

This section begins with our empirical estimates of monthly abnormal returns for the three events, *FC*, *FD*, and *CA*. Then we examine the long-run abnormal returns associated with these three fraud-related events.

Table II here

A. Event month abnormal returns

Estimates of the unadjusted and adjusted Fama-French intercepts for the three fraud events are presented in Table II. The sample size of N = 77 for *FC* indicates that the 430 cases in our sample occur within 77 calendar months between 1989 and 1999. They are disclosed over 66 months (i.e., N = 66 for *FD*) and are followed by 10b-5 class action lawsuits spread over 56 months (i.e., N = 56 for *CA*). The key new results in this section pertain to the event *FC*, which has not received adequate attention in previous studies.

Our results demonstrate that the average monthly unadjusted and adjusted abnormal returns (equal- and value-weighted, and OLS and WLS) associated with the alleged incidence of managerial manipulations range from 4% to 7.5%. Surprisingly, our estimate of the mean *value-weighted* unadjusted monthly abnormal return (7.5%) is substantially larger than its *equal-weighted* counterparts. A straightforward explanation for this unconventional result is that several of our event firms are relatively large as

evidenced by the mean firm size of $2.4 billion versus the median firm size of $0.5 billion in Table I. It is also plausible that the higher value-weighted average abnormal return is due to the general tendency of plaintiffs to target larger firms (with deep pockets) coupled with targeting firms with the greatest price run-ups, as suggested by Bhagat, Bizjak, and Coles (1998). Such a choice of targets would lead to choosing firms with the greatest subsequent price drops when the fraud is disclosed so as to extract the greatest legal damages. Furthermore, it is likely that investors are more surprised by the (rosy) reports issued by larger firms and react more strongly to the favorable news, which results in greater price inflation. However, the adjusted value-weighted WLS mean abnormal return, which controls for the size and momentum biases, is insignificant.[13]

On the other hand, fraud disclosure (*FD*) leads to large average monthly negative unadjusted abnormal returns of 27% for the equal-weighted portfolio and 57% for the value-weighted portfolio, which are consistent with the significant large negative abnormal returns reported by Gande and Lewis (2009). The substantially sharper unadjusted price decline for the value-weighted portfolio suggests that the market is far more disappointed at the fraud disclosure by larger firms, which had previously registered greater positive price drifts at *FC.*[14] But the mean adjusted abnormal returns reported in the next column indicate that once we control for size and prior momentum along with the three Fama-French factors, the average monthly abnormal price decline associated with fraud disclosure is comparable between the equal- and value-weighted portfolios.

Moreover, the last two columns show that our sample firms suffer average monthly negative abnormal returns of 5 to 8% upon the filing of 10b-5 class action lawsuits (*CA*), which is consistent with the market impact on defendant firms of corporate securities litigation reported by Bhagat, Bizjak, and Coles (1998).[15] Again, the considerably more negative unadjusted intercept of the value-weighted portfolio (-8.4%) suggests that investors are more disappointed when larger firms with greater positive prior abnormal returns at *FC* are subsequently sued for fraud. Further, two out of three estimates of the average adjusted abnormal returns are significantly negative and smaller in absolute value in comparison to their unadjusted counterparts, which suggests that the share prices of firms in the control sample must also have moved in sympathy with those

of the sued firms. The mean *equal-weighted* adjusted abnormal returns are larger in magnitude than the mean *value-weighted* adjusted abnormal returns. One possible explanation is that the relatively smaller firms, which have more limited financial resources, decline proportionately more in price when the *CA* event occurs because investors fear that they are more vulnerable to adverse settlements or legal judgments when facing off against experienced plaintiffs' counsel.

Overall, our event month results with respect to *FD* and *CA* are broadly consistent with the results reported by Bhagat, Bizjack, and Coles (1998), Griffin, Grundfest and Perino (2004), and Gande and Lewis (2009). We enhance the quality of the accumulated empirical evidence by employing superior methodologies, such as the Fama-French (1993) model, the CTPM, value weighting, and correcting for size and prior momentum biases.[16]

B. Abnormal performance prior to fraud commission

Stylized facts as well as the economic models of fraud we discussed earlier lead us to conjecture that firms are more likely to commit fraud when they experience an adverse shock following a period of (fortuitous) "good times." As noted earlier, this argument leads us to hypothesize a positive price drift prior to *FC*.

Conducting a test for pre-fraud positive price drift poses a challenge because past studies point out that high pre-event momentum is common to several corporate events, including dividend initiation, earnings announcements, and stock repurchases, to name a few, and that failing to control for *pre-event* momentum may lead to misleading inferences in long-term event studies (see Fama and French (1996), Lyon, Barber, and Tsai (1999), and Boehme and Sorescu (2002)). To check for prior outperformance, we examine the intercepts from the Fama-French three-factor regressions for horizons of one, three, and five years prior to the alleged initial occurrence of fraud, as proxied by the beginning of the class period, *FC*. Moreover, we estimate not only the unadjusted intercept but also its adjusted counterpart to control for potential size and prior-year momentum biases.

Table III here

The pre-fraud price drift test results are presented in Table III. For the one-year horizon preceding the first month of the alleged fraudulent reporting, our results show

that the average unadjusted abnormal returns are positive and significant, varying from 2% to 3% per month. The adjusted abnormal returns are all positive but insignificant, but this is largely expected given that the control firms have the same pre-event momentum as the fraud sample. In contrast, the majority of the remaining adjusted estimates for the three-year and five-year horizons are (with two exceptions) significant and range from 0.5% to 1.1% per month. Further, we notice that the unadjusted value-weighted abnormal returns are often larger than the equal-weighted estimates, suggesting that positive prior abnormal performance is concentrated in relatively larger event firms.[17] But the opposite holds for the adjusted abnormal returns, suggesting that the smaller firms have greater positive abnormal returns after controlling for momentum. The adjusted abnormal returns, both equal- and value-weighted, are smaller than the unadjusted returns reflecting the neutralizing effect coming from the control sample.

To evaluate the economic significance of these results, we focus on the monthly adjusted abnormal returns of 1.1 percent and 0.6 percent for the equal- and value-weighted portfolios, respectively, under the WLS procedure for the three-year horizon. These estimates suggest abnormal performance of 48 percent and 24 percent, respectively, over three years. This abnormal performance appears large when compared to the realized average equity market risk premium ($R_m - R_f$) of approximately 8.5 percent per year over the 1927-1998 period. The significant positive pre-FC price drift adjusted for the performance of matched control firms provides strong support for our first hypothesis that firms experience significantly positive prior abnormal returns before committing securities fraud. As the intercepts are derived from the Fama-French three-factor regressions, our results do not simply reflect the effects of a bull market that prevailed during the latter part of our sample period. Our results demonstrate that prior superior firm-specific performance is an important driver of corporate financial misconduct.

Our findings complement the analysis of Wang, et al. (2010) who report that the incentives to commit fraud increase with the concurrent level of investor beliefs about industry prospects, intensity of investor monitoring, and short-term incentive compensation. It is worth comparing the different roles played by firm-specific performance between the two studies. In their analysis of frauds involving accounting

irregularities relates to IPOs, Wang, et al. note that firms that experience *large negative returns* are likely to be sued because shareholders are unhappy about their investment losses. They use annual buy and hold stock returns *measured at the year of fraud detection* as a control variable in their regression tests. Consistent with this argument, they find a significant negative relation between a firm's fraud propensity and its contemporaneous stock returns. In contrast, we focus on *long-term positive firm performance prior to the commission of fraud* as a driver of misconduct.

Table IV here

C. Abnormal performance preceding fraud disclosure and litigation

Models of corporate fraud suggest that managers commit fraud when they privately observe the firm's declining prospects but investors continue to believe that good times will persist. Although they do not directly address the firms' incentives to *disclose* fraud and investors' incentives to *seek legal remedies*, these models imply that the continuing deterioration of firm performance in conjunction with that of the general economic environment eventually makes the fraud unsustainable and forces managers to disclose their fraudulent behavior. Again, it is important to distinguish between the unadjusted (or stand-alone) and adjusted (or relative) outperformance of the subject firms. We expect negative unadjusted abnormal returns over the months just prior to fraud disclosure (*FD*) as investors start to become disappointed by the event firm's unexpectedly poor financial performance. However, we also expect that as the event firm struggles to maintain the appearance of good performance, it will outperform the control firm prior to *FD* because of the fraud. Thus, we expect positive adjusted abnormal returns over the months just prior to *FD*.

Similarly, since the filing of class action lawsuits (*CA*) closely follows *FD*, we expect negative unadjusted abnormal returns during the one-year window prior to *CA* when corroborating news reports and revelations about the concealed deteriorating firm performance lead investors to file 10b-5 class action lawsuits. However, the adjusted abnormal return could be negative or positive. It will be negative if additional disclosures between *FD* and *CA* indicate a more serious fraud or more severe underperformance than previously disclosed. It will be positive when the negative abnormal returns are smaller in magnitude for the event firm than for the control firm,

which might occur if either (a) new information between *FD* and *CA* indicates that the fraud is less severe than the initial *FD* announcement implied or (b) the *FD* event has a significant enough contagion or negative spillover effect on the control firm.

To investigate these implications, we estimate not only the unadjusted abnormal returns over the one-year time interval preceding *FD* and *CA* but also the corresponding adjusted intercepts to control for the hypothesized prior price drift. We report these results in Table IV.[18] It is important to correct for the potential momentum bias because we expect the pre-*FD* interval to be preceded by abnormally positive performance and the pre-*CA* interval to be preceded by abnormally negative performance.

As shown in Figure 1, the mean and median intervals between *FC* and *FD* in our sample are 9.74 and 8.0 months, respectively (the minimum is zero months and the maximum is 66 months). From Table IV, we see the unadjusted OLS equal- and WLS value-weighted alpha estimates (1% and 6%, respectively, per month) are negative and significant for the one-year horizon prior to *FD* for the event firms. The sharply higher negative price drift for the *VW* portfolio suggests that investors react very negatively to the disclosure of fraud by larger event firms, which had posted higher abnormal returns prior to and at the time of (unobservable) fraud commission, as indicated in Tables II and III. But their adjusted counterparts are insignificant, indicating that our adjustment for size and one-year prior momentum washes out the pre-event negative price drift. In contrast, the equal-weighted Fama-French adjusted intercept turns positive and significant, which is consistent with our expectation that the event firms will still outperform the control firms in the later stages of the fraud. Recall that event month abnormal returns for *FD* reported in Table II are sharply negative. Together, these results imply that (a) event firms are adversely affected by firm-specific and/or market-wide shocks prior to *FD*, and (b) they are able to maintain the appearance of superior performance through fraud but (c) eventually the deterioration in performance becomes serious enough that the fraud is no longer sustainable and they are forced to acknowledge their misdeeds.

In practice, the initial fraud disclosure by a firm is typically followed by further public disclosures by the subject firm and disclosures from other sources, such as regulators initiating enforcement actions. We expect these negative surprises to result in a

downward price drift prior to the filing of 10b-5 class action lawsuits, *CA*. From figure 1, the mean and median distances between *FD* and *CA* in our sample are only 2.75 and 0.77 months, respectively. The one-year pre-*CA* period thus overlaps substantially with the one-year pre-*FD* period. From the last two columns, the unadjusted alpha is significantly negative (at 0.9% and 8.7% per month, respectively, for the *EW* and *VW* portfolios) in two of the three regressions for the last year of the class period. The sharply higher negative price drift for the *VW* portfolio suggests that investors continue to react very negatively to episodes of fraud by larger firms as compared to smaller firms. However, the adjusted alphas are positive and highly significant for both *EW* portfolios. The positive adjusted abnormal returns signify that the event firms experience less negative price drift over the year immediately preceding *CA* as compared to their matched control firms, which reflects the successful efforts of the event firms to conceal the fraud prior to *FD*. Overall, these pre-event price drifts suggest that (a) investors are surprised by price drops common to both event and control firms over the year preceding *FD* and *CA,* (b) the deteriorating performance appears less severe for the event firm so long as it can continue the fraud but (c) eventually the deterioration in performance forces the event firm to disclose its fraudulent activity, and (d) the disclosure of the fraud and the resulting negative abnormal return provoke investors into filing 10b-5 class action lawsuits.

Table V here

D. Calendar time abnormal returns (CTARs)

To check the robustness of the calendar time portfolio (*CTPM*) abnormal return estimates derived from the Fama-French three-factor asset pricing model, we present calendar time abnormal return estimates (*CTARs*) in Table V. For the three- and five-year horizons over the pre-fraud period, the mean monthly *CTARs* are significantly positive with equal weighting, but not with value weighting. These results suggest that the hypothesized pre-fraud positive price drift is more pronounced for relatively smaller event firms as compared to larger firms. The mean monthly *CTARs* - both equal- and value-weighted - are negative but insignificant during the 12 months preceding *FD* and also during the year preceding *CA*. These results vary from the earlier adjusted Fama-French regression results because the *CTAR* methodology controls only for one-year prior momentum for firms of similar size but does not control for any systematic effects that

firm size and book-to-market may have on stock returns. Moreover, it dynamically changes the control firm for each fraud firm each month. The last row presents event month mean *CTARs* for all three events. These results are comparable to the adjusted abnormal performance estimates (Fama-French asset pricing model intercepts) under the *CTPM* presented in Table II.

Table VI here

It is of interest to compare our pre-fraud abnormal performance results – both Fama-French intercepts and *CTARs* – derived from the *CTPM* with the typical long-term cumulative abnormal returns (*CARs*) and buy-and-hold returns (*BHARs*) examined in past studies. Our sample of fraud commission, disclosure and class action litigation is characterized by significant calendar time clustering of events and overlapping of the pre- and post-event horizons. In such contexts, the *CTPM* is known to be much more robust to the misspecified asset pricing model problem as well as the cross-sectional correlation of event-firm abnormal returns in long-term event studies as compared to the traditional CARs and BHARs. Following Barber and Lyon (1997), we estimate for each calendar month equal- and value-weighted portfolio abnormal returns by measuring monthly differences between the returns of event firms and control firms matched on size and one-year prior momentum and averaging them across the sample. The resulting estimates and tests of *CARs* and *BHARs* are reported in Table VI. Similar to the results presented in Tables III and V, all of the estimates are positive and statistically significant.

There are two important differences that are noteworthy when comparing Table VI to Tables III and V. First, the value-weighted *CARs* and *BHARs* are typically considerably larger than the adjusted Fama-French WLS intercepts (see the last two rows of Table III) and *CTARs* (see column 4 of Table V).[19] For instance, the three-year mean value-weighted *CAR* and *BHAR*, respectively, are 27% and 83%, as compared to the average *CTAR* of -11% (-0.003 per month times 36 months) and the adjusted Fama-French WLS intercept of 22% (0.006 per month times 36 months). Similar observations hold for most of the equal-weighted abnormal returns, especially the *BHAR*s. The upward bias tends to increase from the one-year to the five-year horizon. This finding is consistent with the insights of Mitchell and Stafford (2000) and Boehme and Sorescu (2002), who point out that over long horizons, *BHARs* tend to inflate spurious abnormal

performance induced by potentially misspecified asset pricing models. Second, the statistical significance of both the equal- and value-weighted CARs and BHARs is typically considerably greater than that of the adjusted Fama-French intercepts (Table III) and *CTARs* (Table V). Again, this upward bias is consistent with the Mitchell and Stafford (2000) and Boehme and Sorescu (2002) insight that cross-sectional dependence among event firms results in overstated test statistics.

IV. Post-class-action abnormal returns

Next, we investigate possible stock price drift following the filing of 10b-5 class action lawsuits over one-, three-, and five-year post-event horizons. Karpoff, et al. (2008b) explain that the revelation of securities fraud can have negative effects on a firm's business. By diminishing the firm's reputational capital, it can lead to an increase in the firm's cost of operations or trade credit if the firm's vendors adjust their terms of trade. Murphy, et al. (2009) find that the loss of reputation from corporate misconduct results in a decrease in stock analysts' subsequent earnings forecasts and an increase in the firm's total risk as measured both by stock return volatility and by concordance among analysts' forecasts. These effects suggest that the initial negative reaction to the fraud disclosure and the 10b-5 class action lawsuit filing could be followed by a negative long-horizon abnormal drift in returns, unless the stock market fully anticipates the subsequent reduction in profitability and fully recognizes the higher cost of capital. On the other hand, recent studies have found that stock market investors appear to underreact initially to corporate news events.[20]

However, Hertzberg (2005) argues that firm quality is more transparent in bad economic times due to less managerial manipulation and more intense monitoring by investors. In contrast, booms are gradual because public signals are noisy due to the higher incidence of fraud in good times, leading to slow discovery of the true quality of firms and the state of the industry by investors. These arguments suggest that the negative price drift after the filing of the 10b-5 class action lawsuits has occurred would be less pronounced in comparison to the pre-fraud long-horizon positive abnormal returns. In addition, we expect the post-filing negative price drift to be short-lived in comparison to the pre-fraud long-horizon positive price drift, because of swifter investor reaction in bad times.

Table VII here

We report the abnormal returns following the class action filing in Table VII. There is an added complication that leads to downward price drift. Frequently, there are subsequent disclosures in which firms confess that the fraud began earlier than previously reported or disclose that other types of fraud were also perpetrated in addition to what was initially admitted. These disclosures could lead to further 10b-5 lawsuits. In results that are not reported in the paper, we confirmed that the unadjusted intercepts for the five-month post-*CA* window are all negative and significant and that the adjusted intercepts are all negative with one significant.[21] Accordingly, in measuring post-event abnormal performance, we exclude the first five months following the month the 10b-5 class action lawsuit is filed so as to minimize the effects of subsequent additional lawsuits for the same fraud. We redefine the one-year horizon as the period from the sixth through the 12th month in the post-filing era. Similarly, the three-year horizon covers months six to 36, and the five-year window includes months six to 60.

The one-, three- and five-year post-event horizons in Table VII contain 72, 96, and 120 monthly calendar time portfolio return observations. None of the Fama-French intercepts for the five-year horizon are significant, and three of the six intercepts for the three-year horizon are negative but only weakly significant. For both horizons, the value-weighted unadjusted and adjusted intercepts are all positive, although insignificant, which suggests that relatively larger firms tend to recover more quickly following the fraud episode.[22] For the one-year horizon, all six intercepts are negative, but only the equal-weighted unadjusted OLS intercept is significant at the five percent level.

Overall, we find marginal evidence of significantly negative stock price drift following the filing of 10b-5 class action lawsuits, especially for smaller capitalization stocks. There is hardly any negative abnormal performance over the three- and five-year horizons (based on the adjusted abnormal returns). Moreover, the post-fraud negative abnormal performance is less pronounced and not as long lasting as the pre-fraud positive price drift reported in Table III. This contrast generally supports our post-litigation negative abnormal price drift hypothesis.

V. Fraud and possible changes in risk factor loadings

The results obtained thus far provide strong evidence of positive abnormal returns in the month of fraud commission and significantly negative abnormal returns in the months of fraud disclosure and the 10b-5 class action filing. Furthermore, we find significantly positive price drift over a five-year period preceding fraud commission and evidence of significantly negative abnormal performance for up to one year in the post-filing period, especially for smaller capitalization stocks. Next, we investigate the sources of the reversal in the price drift and examine whether managers commit fraud when they forecast a decline in future cash flows or an increase in cash flow volatility.[23] We ask, is the change from positive price drift in the pre-*FC* period to negative price drift in the post-*CA* period due to an unexpected drop in cash flows or an unexpected increase in the cost of capital (or both)? In other words, does the firm's issuance of allegedly misleading favorable reports increase investor perception of the firm's expected cash flows or decrease their perception of the firm's systematic risk? Further, do the subsequent fraud disclosure and the filing of 10b-5 class action lawsuits decrease investor expectations concerning the firm's cash flows or increase their assessment of the firm's systematic risk? Based on the findings of Murphy, et al. (2009) that total risk increases and that stock analysts' earnings expectations fall following the revelation of corporate misconduct, we expect that lower cash flows would also be expected but that the impact on risk will depend on how the revelation of the fraud affects the systematic and nonsystematic components of total risk.

To address these issues, we focus on changes in the loadings of the Fama-French factors from the pre-*FC* horizon to the post-*CA* period and estimate the resulting average change in the aggregate cost of equity. Our objective is to test whether the mean change in the required rate of equity return from the pre- to the post-event period is zero or positive. An insignificant change would imply that the effects of the alleged fraud and litigation are primarily concentrated in the expected cash flows of the subject firms, which would mean that the alleged fraud-related events have little measurable bearing, on average, on the firm's risk factor loadings.

Another question of interest is related to the asymmetric price effects of fraud and litigation. As noted, the 'rapid recession' argument suggests that, unlike the gradual upward price drift associated with the unobservable occurrence of fraud, the price drop

following fraud disclosure and lawsuit filing would be swift, implying that the negative abnormal returns would be concentrated during the months when the 10b-5 class action lawsuits are filed. Consistent with this argument, we found at the *aggregate* level only weak evidence of average negative abnormal price drift during the *post-lawsuit-filing* period in the previous section, and this effect was concentrated in the first year following *CA*. To explore this result further, we investigate whether the negative price drift during the post-*CA* period is stronger for event firms with contemporaneous increases in the three Fama-French factor loadings. We expect this cross-sectional relation between *firm-specific* abnormal returns and concurrent risk changes to be negative but still weak if investors react rapidly to the announcement of fraud and the 10b-5 class action filing.

Table VIII here

To examine post-event changes in risk loadings, we follow Boehme and Sorescu (2002) and estimate the following Fama and French (1993) regression for each event firm:

$$\begin{aligned} R_{i,t} - R_{f,t} = {} & \alpha_i + D_t \alpha_{\Delta i} + \beta_i (R_{m,t} - R_{f,t}) + s_i SMB_t + h_i HML_t \\ & + \beta_{\Delta i} D_t (R_{m,t} - R_{f,t}) + s_{\Delta i} D_t SMB_t + h_{\Delta i} D_t HML_t + e_{i,t} \end{aligned} \tag{4}$$

In this specification, the dummy variable, D_t, is equal to 1 for calendar month six and beyond in the post-*CA* period, and 0 for months falling in the pre-*FC* period. The months between *FC* and the five months after *CA* are excluded from this estimation. The firm-specific regressions cover horizons of one, three, and five years, with corresponding N = 24, 72, and 120 months, respectively. The three coefficients (β_Δ, s_Δ, and h_Δ) associated with the product of the event dummy and the Fama-French factors provide estimates of changes in the risk loadings between the pre–event and post-event periods. The cross-sectional averages of these firm-specific coefficients are shown in the top section of Table VIII. None of the estimates of changes in the risk loadings is by itself significant across the three horizons. Systematic risk increases but the change is not statistically significant.[24]

We note that the regression alphas are positive and significant for all three horizons. Alpha measures the abnormal return over the pre-*FC* horizon averaged across all (about 430) firm-level regressions. The alpha estimates range from 2.4% to 2.8% per month for the three horizons. These OLS estimates are slightly greater than the calendar

time portfolio unadjusted OLS alphas we report in Table III, and they are consistent with the other evidence of pre-*FC* positive price drift we have presented. The alpha post-*CA* is negative over all three horizons, and the coefficient of the change in alpha is significant for the 3-year and 5-year horizons and is weakly significant for the 1-year horizon. These OLS results seem to provide weak evidence of a negative price drift for up to five years following the fraud. However, it is important to note that these estimates are known to be less robust than the calendar time portfolio intercept estimates to model misspecification in asset pricing and cross-sectional dependence in error terms in long-run event studies.

As a very rough gauge of their combined effects, we multiply the cross-sectional average of each risk change coefficient (β_Δ, s_Δ, and h_Δ) by the corresponding mean monthly estimate of each of the three risk factors during the pre- and post-event horizons, ($R_{m,,t} - R_{f,,t}$), SMB_t, and HML_t (presented in the lower panel of Table VIII). The sum of the three products represents a very rough estimate of the average monthly change in the required rate of return on equity between the pre-*FC* and the post-*CA* horizons. The bottom row indicates that the average monthly change in the cost of equity is positive and ranges from 1.7% for the five-year horizon to 2.3% for the one-year horizon. But none of the three changes in the required rate of equity return is statistically significant.[25] Therefore, we conclude that fraudulent disclosures (and non-disclosures) and the subsequent 10b-5 class action lawsuits do not appear to affect investors' perception of the defendant firms' systematic risk, on average. These results suggest that the price effects of fraud are primarily concentrated in changes in the expected cash flows of the defendant firms. While the initial misrepresentations are associated with increased reported cash flows, the subsequent fraud disclosure and the class action lawsuits lead to declines in expected cash flows. This finding is consistent with the results of Murphy, et al. (2009) that stock analysts' earnings forecasts decrease following an episode of corporate misconduct.

The post-event estimates in Table VII furnish evidence of a negative price drift up to one year post-*CA* despite little increase in the contemporaneous systematic riskiness of the underlying stocks at the *aggregate* level. One possible explanation for this apparent inconsistency is that the aggregate result masks the underlying inverse cross-sectional relation between *firm-specific* abnormal returns and concurrent systematic risk changes –

that those defendant firms with increases in risk factor loadings are the ones that suffer stock price declines in the post-event period. To investigate this negative cross-sectional relation, we estimate firm-specific changes in the cost of equity based on equation (4) and partition our sample of defendant firms into two groups, those with increased systematic risk (cost of equity) and those with decreased systematic risk during the post-*CA* period. For the full sample of 430 event firms, 170 experience risk decreases (negative change in cost of equity) and 260 firms undergo risk increases.

Table IX here

Next, we estimate the adjusted Fama-French intercepts for the three post-event horizons separately for the two risk classes and report these results in Table IX. The results provide weak evidence of a negative cross-sectional relation between post-*CA* price drift and contemporaneous changes in the systematic riskiness of event firms. Five of the nine intercept estimates are negative and significant for firms that experience an increase in risk, but only one of them is significant at the 5% level. By comparison, all but one of the intercepts are insignificant for firms that experience a decrease in risk. The lone exceptional case shows that firms with a decrease in their cost of equity earn a statistically significant value-weighted positive monthly abnormal return of 1.3% (under WLS) over the five-year post-*CA* horizon.

In summary, the cross-sectional results in Table IX suggest that the negative price drift in the post-*CA* period documented in Table VII is partly due to the subset of event firms that experience an increase in their risk factor loadings. The weakly significant negative abnormal returns for the risk-increasing firms coupled with the statistically insignificant abnormal returns for the risk-decreasing firms for three years post-*CA* suggest that apart from this risk-induced negative price drift, investors react swiftly to the information conveyed by the fraud and 10b-5 class action filing announcements by reducing their expectations of the firms' future cash flows.

VI. Abnormal drifts in trading volume and return volatility

Our analysis in section IV focused on the hypothesis that securities fraud tends to follow fortuitous good times leading to positive abnormal *price* drift. This hypothesis also suggests potentially positive abnormal drifts in trading volume and return volatility during the pre-*FC* period as investors are surprised by the flow of favorable public

information about the state of health of the firm (and its industry). Further, we would expect a surge in trading volume right after the fraud is first revealed and the 10b-5 class action lawsuit is filed as individual and institutional investors rebalance their portfolios. But the swift market reactions to the announcements of fraud and class action filing associated with the 'post-litigation negative abnormal price drift' hypothesis imply less pronounced and shorter post-event drifts in trading volume and return volatility. We would expect the trading volume to fall off because many institutional investors tend to abandon tainted stocks after the announcement of a fraud and a 10b-5 class action filing. We now turn to the exploration of these conjectures about the link between the pre- and post-event abnormal price drifts and the corresponding abnormal patterns in trading volume and volatility.

A. Abnormal trading activity

We begin with the relative trading volume (TV), defined as the number of shares traded per month divided by total shares outstanding. The relative trading volume is winsorized at the 1% and 99% levels to minimize the effects of outliers. We use the calendar time portfolio method to compute equal-weighted monthly trading volume for our event sample of 430 firms and an equal number of control firms matched on firm size and one-year pre-event momentum.

Table X here

Abnormal trading volume is defined as the difference between the event firm and control firm volumes and is measured for one-, three-, and five-year horizons before *FC* and after *CA*. The post-event horizons exclude the first five months immediately following the initial filing of 10b-5 class action lawsuits to mitigate the effects of volume spillovers. N represents the number of monthly calendar time portfolios contained within each horizon. The univariate differences in median trading volumes are tested in Panel A of Table X using the Wilcoxon signed rank test.

For the one-year pre-event horizon, the median monthly trading volumes are 12.2% and 6.8% of shares outstanding, respectively, based on 123 monthly calendar time portfolios of fraud event and control firms, which suggests an abnormal median trading volume of 5.3%. The corresponding figures for the three- and five-year horizons are 3.5% and 1.9%, respectively. All three estimates of median abnormal TV are positive and

highly significant, which is consistent with our hypothesis that there is a positive abnormal drift in trading volume during the pre-*FC* period.

Turning to the post-*CA* horizons, we notice significantly higher trading activity in both the event and matched control firm samples across the three horizons. For instance, the event firm monthly median trading volume increases from 12.2% during the one-year pre-FC horizon to 14.1% during the one-year post-*CA* horizon. Moreover, these firms experience significant abnormal positive TV for all three post-event horizons, ranging from 4.1% to 6.1% per month, as reported in the 'Abnormal TV' column. From the "difference in difference" estimates of 0.9% and 2.3%, we find that the median abnormal trading volume is significantly higher during the three- and five-year post-*CA* horizons as compared to the corresponding pre-*FC* horizons. These univariate results are inconsistent with our hypothesis that there are less pronounced and short-lived volume drifts during the post-event period. However, they fail to control for the other factors that can cause intertemporal changes in trading volume.

To further explore the long-term drift in trading volume, we estimate the following firm-specific time series regression using monthly event firm relative trading volume ($TV_{i,t}$) adjusted for the control firm relative trading volume ($TV_{control,t}$) over the period extending from five years prior to *FC* to five years after *CA*:

$$TV_{i,t} - TV_{control,t} = a_i + b_i\, TV_{m,t} + c_{1,i}FC(-12,-1)_{i,t} + c_{2,i}FC(0)_{i,t} + c_{3,i}FD(0)_{i,t} + c_{4,i}CA(0)_{i,t}$$
$$+ c_{5,i}CA(1,5)_{i,t} + c_{6,i}CA(6,60)_{i,t} + d_i MTS_t + \varepsilon_{i,t},\ t = 1,\ldots T;\ i = 1,\ldots 430\ firms \qquad (5)$$

$TV_{i,t}$ and $TV_{control,t}$ represent monthly trading volume (number of shares traded divided by shares outstanding) for the event and control firms, respectively. In the same manner, $TV_{m,t}$ is the monthly sum of shares traded for all publicly traded firms divided by total shares outstanding for those same firms. The following binary variables assume a value equal to one for event months falling within the respective window and zero otherwise: *FC(-12, -1)* represents the one-year pre-FC window, *FC(0)* stands for the month of fraud commission, *FD(0)* for the month of fraud disclosure, *CA(0)* for the month of the initial 10b-5 class action filing, *CA(1, 5)* for post-*CA* (+ 1 to 5 months), and *CA(6, 60)* for the five-year post-*CA* horizon (+ 6 to 60 months). *MTS* is a dummy variable that is equal to one for June 1997 onwards and zero otherwise. It is used to control for the potential increase in trading activity when the minimum tick size was

reduced from 1/8th to 1/16th of a dollar on the NASDAQ in June 1997. The regressions cover 430 firms and a total of 36,477 firm-month observations. We report cross-sectional equal-weighted averages of the regression coefficients in Panel B of Table X. The *t*-tests use cross-sectional standard errors computed from the distribution of 430 OLS estimates of each parameter.

The coefficient estimate on the aggregate market volume is highly significant. The average positive abnormal volume for the month of *FC* is 9.5% of shares outstanding, while those for *FD* and *CA* are 44.8% and 25.6%, respectively. More importantly, the average abnormal trading volume per month for the first five months after the initial class action lawsuit is insignificant, but it drops at the rate of 3.5% per month over months six through the end of five years during the post-*CA* window. The persistent decline in trading activity is in contrast to the negative abnormal price drift reported in Table VII that lasts up to only one-year into the post-*CA* interval. It is perhaps reflective of reduced demand from individual and institutional investors who continue to rebalance portfolio holdings away from tainted stocks. An alternative plausible explanation for the observed persistent long-term decline in trading volume is the gradual and diffused revelation of the severity of the fraud over a long drawn-out period as the class action litigation proceeds through the courts.

Table XI here

B. Abnormal volatility

To examine whether the abnormal price and trading volume drifts during the pre- and post-event periods are accompanied by similar patterns in return volatility, we follow the same calendar time portfolio-based univariate analysis procedure as we did with trading volume. Specifically, we use the equal-weighted calendar time portfolio methodology to examine the behavior of the standard deviation (SD) of monthly returns of event firms and control firms matched on firm size and one-year pre-event momentum in event windows consisting of one-, three-, and five-year horizons before *FC* and after *CA*. For each of the monthly calendar time portfolios, we compute cross-sectional SDs of individual stock returns and estimate abnormal volatility as the difference between the event firm and control firm SDs. As before, the post-event horizons exclude the first five months immediately following the initial 10b-5 class action filing to mitigate the effects

of volatility spillovers immediately after the lawsuits are filed. N represents the number of monthly calendar time portfolios within each horizon. The univariate differences in median SDs are tested using the Wilcoxon signed rank test in Panel A of Table XI.

For the one-year pre-*FC* horizon, the median monthly SDs drawn from 98 monthly calendar time portfolios of fraud event and control firms are 14.5% and 12.3%, respectively, resulting in an abnormal monthly SD of 2.2%. The corresponding figures for the three- and five-year horizons are 1.9% and 1.5%, respectively. All three estimates of abnormal volatility are positive and highly significant, which is consistent with our conjecture that there is positive abnormal drift in volatility during the pre-event period. Moving on to the post-*CA* horizons, we find significantly higher volatility in both the event and matched control samples across the three horizons. For instance, the event firm monthly median volatility increases from 14.5% during the one-year pre-FC horizon to 17.8% during the one-year post-*CA* horizon. Moreover, the 'Abnormal SD' column shows that the sample firms experience significant abnormal positive SDs for all three post-*CA* horizons, ranging from 2.9% to 3.9% per month. These findings are consistent with the results of Murphy, et al. (2009) that stock return volatility increases following an episode of corporate misconduct. From the "difference in difference" estimates of 0.2% and 1.4%, we also find that the estimates of abnormal volatility are significantly higher during the three- and five-year post-*CA* horizons as compared to the corresponding pre-*FC* horizons. Thus, similar to the post-event long-term drift in relative trading volume, the univariate tests are not supportive of our hypothesis that there is a less pronounced and short-lived volatility drift during the post-event period. However, they fail to control for the other factors that can cause intertemporal changes in stock volatility.

In order to scrutinize the robustness of these univariate test results, we perform tests for heteroscedasticity of error variances by using a variant of the two-step dynamic market model of Ng, Engle, and Rothschild (1992). In the first step, we use a univariate generalized autoregressive conditional heteroscedasticity-in-mean (GARCH(1,1)-M) model to regress the conditional excess returns on the market index on their conditional variances. In the second step, the estimated conditional mean and variance of the market excess returns are used in the following autoregressive conditional heteroscedasticity

(ARCH(1)) model separately for each firm using monthly data over the window beginning five years prior to *FC* and ending five years after *CA*:

$$R_{i,t} - r_{f,t} = \alpha_{0_i} + \alpha_{1_i}(R_{m,t} - r_{f,t}) + \alpha_{2_i} FC(-12,-1)_{i,t} + \alpha_{3_i} FCDCA_{i,t} + \alpha_{4_i} CA(1,5)_{i,t} + \alpha_{5_i} CA(6,60)_{i,t} + \varepsilon_{i,t},$$

$$\varepsilon_{i,t} \sim N(0, \sigma^2_{i,t}) \text{ and } t = -60, \ldots +60 \text{ months; } i = 1,..,430 \text{ firms.} \quad (6)$$

$$\sigma^2_{i,t} = \beta_{0_i} + \beta_{1_i}\varepsilon^2_{i,t-1} + \beta_{2_i}\sigma^2_{R_{m,t-1}} + \beta_{3_i} FC(-12,-1)_{i,t} + \beta_{4_i} FCDCA_{i,t} + \beta_{5_i} CA(1,5)_{i,t} + \beta_{6_i} CA(6,60)_{i,t} \quad (7)$$

In equation (6), the excess returns on stock *i* ($R_{i,t}$ - $r_{f,t}$) are regressed on the estimated conditional mean market excess returns ($R_{m,t}$ - $r_{f,t}$) and the four event binary variables (*FC(-12,-1), FCDCA, CA(1,5), and CA(6,60))*. *FCDCA* is a composite binary variable that combines the three fraud-related events – *FC(0), FD(0), and CA(0)* – used in equation (5). It takes on the value 1 for all calendar months falling within these three fraud windows and zero otherwise. In equation (7), the conditional variance of excess stock returns ($\sigma^2_{i,t}$) is regressed on its lagged squared disturbances ($\varepsilon^2_{i,t-1}$), the estimated lagged conditional variance of market excess returns ($\sigma^2_{R_{m,t-1}}$), and the event dummy test variables. We report the cross-sectional averages of 430 firm-specific regression coefficients (drawn from a total of 32,726 firm-month observations) in Panel B of Table XI. The *t*-tests use cross-sectional standard errors.

The estimates for the mean equation show that our fraud sample is more risky than the market index with an average beta of 1.312. The coefficient estimate for *FCDCA* implies that the sample firms suffer an average abnormal loss of 16.5% per month during the event period that extends from *FC* through *CA.* Moreover, they incur an average abnormal loss of 4.8% per month over the first five months following class action filing (*CA(1,5)*) and an additional loss of 2.8% per month over *CA(6,60).* It is worth noting that these OLS cross-sectional averages of firm-specific abnormal returns are substantially higher (in absolute value) and more significant than the equal-weighted OLS unadjusted Fama-French monthly intercept estimates of -1.7% and -0.6% per month for the one-year and five-year horizons, respectively, derived from the calendar time portfolio methodology reported in Table VII. These differences reflect our earlier caution that firm-specific OLS estimates are more vulnerable to misspecified asset pricing model bias and inflated test statistics.

From the variance equation, we find evidence of conditional heteroscedasticity in monthly stock returns for the fraud sample as indicated by the significance of the parameter estimate for the lagged squared error term after controlling for conditional market variance. The highly significant intercept estimate suggests an elevated level of conditional error variance over the first four years of the pre-*FC* window, and we find little increase in conditional error variance, on average, over the year preceding the month of fraud commission (*FC(-12,-1)*). As expected, the conditional error variance increases sharply at the average rate of 2.4% per month during the fraud event period (*FCDCA).* While we find little change in error variance from the base level over the first five months following the class action filing (*CA(1,5)*), the coefficient estimate of 0.014 for the post-CA period (*CA(6,60)*) is highly significant, which suggests heightened post-event volatility of returns for the firms that commit securities fraud. One plausible explanation for the higher volatility post-*CA* is the reduction in trading volume documented in Panel B of Table X diminishes market liquidity. The reduced liquidity raises price volatility because it diminishes the market's capacity to absorb purchases and sales. Since price and volatility are inversely related (Cox and Ross, 1976), the negative post-*CA* price drift we document in Table VII, especially during the first year post-*CA*, would tend to increase stock return volatility. However, this factor alone is unlikely to account for the heightened volatility because the negative price drift is relatively mild post-*CA* after one year. It is more likely the result of increased uncertainty regarding expected firm earnings and cash flow due to the firm's fraud-related loss of reputational capital (Murphy, et al., 2009).

In sum, our multivariate tests indicate a significant sustained decline in relative trading volume coupled with a persistent increase in the volatility of returns over the five years following *CA*. These trends imply a sharp deterioration in the quality of the market for the firm's stock following an episode of securities fraud.

VII. Regulatory and investor implications

Our findings have important implications for regulators and investors with respect to fraud detection, regulatory enforcement, and safeguarding the integrity of the capital markets to promote investor protection and trust. First, our robust findings of positive abnormal returns adjusted for firm size and momentum for up to five years preceding

fraud commission (see Table III) suggest that regulators and investors would be well advised to scrutinize firms that exhibit surprisingly persistent superior performance over an extended period. If this performance seems too good to be true, it may very well be. Second, the statistical significance of both equal-weighted and value-weighted pre-event abnormal positive price drift implies that investor skepticism and regulatory scrutiny should not be limited to small firms but should include large firms that unexpectedly outperform peer firms and accepted benchmarks for extended periods.[26] Third, the serious deterioration in market quality, as evidenced by a sharp fall in trading volume and a dramatic increase in return volatility for up to five years following the class action filing, suggests that the incidence of securities fraud causes long-lasting damage to market integrity and investor confidence.[27] This damage is large and long-lasting presumably because the class action lawsuit for securities fraud undermines the firm's credibility with investors and makes many investors wary of trading the firm's stock.

Stock investors would like to protect themselves against corporate wrongdoing by avoiding investing in stocks and bonds of firms that are about to commit fraud, whereas short sellers would like to short these securities before the firms disclose their wrongdoing. Similarly, regulators responsible for fighting corporate fraud and protecting the integrity of the market would prefer to anticipate and preempt, rather than just react to, episodes of corporate fraud. The patterns of pre-event drift in stock returns, relative trading volume, and stock volatility we document provide early warning signs of potentially fraudulent behavior, and investors and regulators are likely to find these patterns useful in identifying high-fraud-risk firms.

VIII. Conclusion

Based on stylized facts and recent economic models, we conjecture that corporate securities frauds are preceded by surprisingly good stock market performance, but are followed by a swift negative market response after the public disclosure of the fraud. We investigate the pre- and post-event price drifts by examining the long-term stock performance of a sample of 430 firms that were alleged to have committed securities fraud over 1989-1999 and an equal number of control firms matched on size and pre-event momentum in returns. Using the calendar time portfolio methodology, we estimate Fama-French (F-F) three-factor model-based adjusted monthly abnormal returns

surrounding three events: alleged fraud commission, fraud disclosure, and initial 10b-5 class action filing.

Consistent with our conjectures based on recent models of financial misconduct, we find significant upward price drift during the five-years preceding the (alleged) commission of securities frauds and marginal evidence of significantly negative stock price drift following the filing of class action lawsuits, especially for smaller capitalization stocks. The observed pre- and post-event abnormal returns on average cannot be explained by changes in systematic risk (Fama-French factor loadings), suggesting that the effects of securities fraud and subsequent 10b-5 class action lawsuits are confined primarily to changes in expected cash flows, rather than changes in the required returns. Further, we find complementary evidence of positive abnormal trading volume drift and increased return volatility during the pre-fraud commission horizon, followed by evidence of a negative drift in abnormal trading volume and a sustained increase in return volatility during the post-litigation period. Finally, the disclosure of securities fraud leads to significant deterioration in market quality, as evidenced by the persistent negative abnormal drift in relative trading volume and the sustained increase in return volatility, for up to five years after the filing of shareholder lawsuits.

The pre-fraud abnormal price drift that we have documented has a potentially important implication for recent research concerning the cost of cooking the books. Karpoff, et al. (2008b) find that firms that commit securities fraud lose $4.08 of market value for each dollar of market value artificially created through the fraud. They attribute $0.36 of the added cost to expected legal penalties and the remaining $2.71 to lost reputation. Our findings suggest that part of the reputational cost penalty may be due to investors imposing a partial give-back of any pre-fraud positive abnormal price performance, for example, if they suspect that some of those gains were also ill-begotten even though they pre-date the class period. The PSLRA's more stringent pleading standards require law firms to specify their claims with greater particularity, which could lead them to choose a later starting date for the class period when they are more confident the fraud has already begun. If investors believe that the beginning of the class period was chosen conservatively, they will recognize that the fraud may have commenced earlier. They might then attribute part of the pre-fraud commission abnormal positive

returns to the fraud and impose a penalty greater than the fraud-induced class period inflation in market value. This argument suggests that the size of the reputational cost penalty should be directly related to the size of any pre-fraud abnormal positive return and that the cost penalty should be proportionately greater beginning in 1995 when the PSLRA passed into law.

Past studies have examined several drivers of fraud propensities: contemporaneous investor beliefs about industry business conditions, monitoring by investors, regulators and other agents, structure of managerial incentive compensation contracts, and governance mechanisms. Our analysis highlights that firm-specific performance preceding fraud is an important driver of misconduct. Which mechanisms dominate a firm's fraud propensity? We leave the above conjectures and questions for future research.

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[1] The $50 billion Madoff Ponzi scheme is the highest profile example. See Bernard and Boyle (2009) for an insightful analysis of the impossibility of the investment performance Madoff claimed.

[2] See for example Efrati and Pulliam (2009), which notes the large number of securities fraud investigations following the end of the real estate boom and collapse of the mortgage market in 2007-2008, including investigations into whether AIG misled investors by overstating the value of its mortgage-related products, whether Lehman Brothers Holdings misled investors about the value of its real estate portfolio and its financial condition before it filed for bankruptcy, whether UBS and Merrill Lynch overvalued mortgage securities holdings before taking huge write-downs in 2007 and 2008, whether Bear Stearns portfolio managers lied to investors before two mortgage-backed securities funds collapsed in 2007, and a host of other mortgage fraud schemes.

[3] Anecdotally, such a large reputational cost can explain the rapid meltdown of Enron Corp. following the revelation of its financial problems in October 2001amid mounting evidence that a large securities fraud had occurred. Enron Corp. filed for bankruptcy in December 2001, soon after the revelation of the alleged fraud. Healy and Palepu (2003) discuss the reputational effects of Enron Corp.'s disclosures.

[4] Agrawal, Jaffe, and Karpoff (1999) and Helland (2006) find weak evidence that the outside directors of firms that are targeted in class action lawsuits bear directional reputational costs but Fich and Shivdasani (2007) find that these outside directors lose board seats at other firms. Karpoff, Lee, and Martin (2008a) document the costs due to loss of reputational capital to individuals who are targeted in SEC and DOJ enforcement actions involving securities.

[5] "Rite Aid Announces Preliminary Fourth Quarter Earnings Estimates," press release, March 12, 1999.

[6] Rite Aid's share price increased from $43.125 on December 11, 1998 right before the start of the class period to $50.9375 on January 8, 1999 before starting to decline, The $14.4375 drop on March 12, 1999 is 1.85 times the increase of $7.8125 to January 8, 1999.

[7] Rite Aid's share price closed at $7.9375 per share on December 14, 1993 and again on November 9, 1999.

[8] Gande and Lewis (2009) attribute about three-quarters of the effect (14.45%) to the CAR during the period extending from 10 days before to one day following the class action filing date and the rest (5.16%) to the market's anticipation of the lawsuit based on a spillover effect from other class action filings.

[9] 15 U.S.C. § 78u-4(b)(1),(2). The PSLRA was designed to reduce abusive and frivolous securities fraud litigation by heightening pleading standards, establishing a statutory lead plaintiff, replacing joint and several liability with proportionate liability for secondary defendants, and other changes (Fisch, 2009).

[10] *Dura Pharm., Inc. v. Broudo*, 544 U.S. 336, 342 (2005).

[11] There were 20 firms in the data base with either 2 or 3 separate and distinct class action filing episodes in the study.

[12] For a full overview of the Fama and French factor indices visit the data library: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[13] This lack of statistical significance of the adjusted value-weighted WLS abnormal return is noteworthy because it differs from the large OLS equal-weighted market-adjusted positive abnormal return reported by Beck and Bhagat (1997, p.574) in their Figure 1. This is one instance where the use of the more robust CTPM produces more reliable results because it is less prone to bias than the equal-weighted OLS approach.

[14] Moreover, Table III reports that the larger defendant firms in our sample had greater pre-*FC* positive price drifts.

[15] If fraud disclosure and the filing of 10b-5 lawsuits occur in the same month, then such cases are included in the abnormal return estimates for *FD* and are excluded from those for *CA.*

[16] Past studies on securities fraud rely primarily on the market model (as opposed to the Fama-French three-factor model), which exposes them to the potential misspecified asset pricing model problem. In addition, they often use *firm-specific* OLS regressions and equal-weighted abnormal performance measures, which are known to suffer from size and momentum biases and cross-sectional dependence.

[17] For example, in the five-year pre-fraud horizon, Oracle Corporation and Compaq Computer Corporation experienced twelvefold buy-and -hold returns.

[18] These estimates exclude instances where the beginning month of the class period (*FC*) occurs during the one year interval preceding *FD*. Similarly, instances of *FC* and *FD* occurring within 12 months prior to *CA* are excluded from the abnormal return estimates associated with *CA.*

[19] For the three- and five-year horizons, the VW BHAR results are much larger than the corresponding EW estimates. This rather unusual outcome is due mainly to some of the largest firms in the sample experiencing exceptional abnormal returns over the horizons. For instance, over the five-year horizon, Oracle Corporation and Compaq Computer Corporation experienced twelvefold buy and hold returns. While each of them contributes 0.018 to the EW BHAR, they account for 0.295 and 0.285, respectively, in the VW BHAR of 1.4242 due to their heavy value-based weights.

[20] See, for example, Ikenberry and Ramnath (2002).

[21] With respect to Table VII, the equal-weighted unadjusted intercepts for CA(+1,+5) are both negative and significant at the one percent level, and the value-weighted unadjusted intercept is significant at the five percent level. The equal-weighted adjusted WLS intercept is the only adjusted intercept significant at the five percent level.

[22] Further analysis, which is not reported in the paper, reveals stronger evidence of this post-fraud recovery bias for relatively larger firms, which is most evident beginning about one year post fraud. Details are available upon request from the authors.

[23] In the context of corporate dividends, Healy and Palepu (1997) argue that "managers (could) initiate dividend payments when they forecast that their firms' earnings will be more stable relative to past earnings. In this case, investors will view dividend initiations as a signal of a decrease in the riskiness of the initiating firms." (p. 30).

[24] We tested the robustness of this finding to the choice of model by rerunning the regression models using the CAPM. Beta increased but the change again was not statistically significant.

[25] These event-time firm-specific regression estimates of changes in risk factor loadings are vulnerable to potential cross-correlation among the event firms. Despite the resulting inflated test statistics, we find no significant change in the cost of equity.

[26] A large firm (by market value) may have evolved from a small firm because of fraud, as WorldCom Inc. did.

[27] This market deterioration also bears out the old Wall Street adage that it is usually unwise to buy into a major lawsuit.