Measuring Securities Litigation Risk*

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Initial draft: June 2010
This version: August 2010

Abstract

Previous research commonly uses industry-based measures of securities litigation risk. Because securities litigation depends on underlying firm and industry characteristics that vary through time, we predict that such industry-based measures provide relatively poor measures of litigation risk. Consistent with this prediction, we find that litigation rates vary considerably across industries and over time and that litigation rates in "high litigation" industries are not unusually high. Further, we show that a prediction model based on the simple industry-based litigation measure does a relatively poor job of discriminating between firm/years subject to litigation and those that are not, and that an alternative model based on firm characteristics has substantially better discriminatory ability. Finally, we show that the latter model also does a better job of measuring litigation risk in a research setting where we know that litigation risk plays an important role in affecting managers' disclosure choices. Because litigation risk affects many corporate decisions these findings have important implications for extant research.

* We appreciate the comments of Karen Nelson and seminar participants at the DC Area Accounting Symposium. Kim and Skinner appreciate financial support from the George Washington University School of Business and the University of Chicago Booth School of Business, respectively.

1. Introduction

A large body of research in accounting and finance investigates whether litigation risk (the risk of securities class action lawsuits) affects corporate decisions. While much research investigates the effect of litigation risk on managers' disclosure choices,[1] authors also investigate how litigation affects corporate cash holdings (Arena and Julio, 2010), equity-based compensation (Dai, Jin, and Zhang, 2008; Jayaraman and Milbourn, 2009), conservatism in debt contracting (Beatty, Weber, and Yu, 2008), IPO underpricing (Lowry and Shu, 2002; Weiss, Hanley, and Hoberg 2010), institutional monitoring and board discipline (Cheng, Huang, Li, and Lobo, 2010; Laux, 2010), MD&A disclosures (Brown and Tucker, 2010), audit fees (Seetharaman, Gul and Lynn, 2002), and auditors' resignation decisions (Shu, 2000).

Much of this research measures litigation risk using simple industry-based measures, either alone or in conjunction with other variables designed to capture litigation risk. A common proxy is based on membership in the biotechnology, computers, electronics, and retail industries. The use of this proxy originates from Francis, Philbrick and Schipper (1994a,b; hereafter FPS), who sample firms drawn from these industries to study the relation between litigation and disclosure because those industries were subject to "a high incidence of litigation during 1988-1992" (1994a, p. 144). These authors do not advocate the use of industry membership generally, or these industries in particular, as a universal proxy for litigation risk. However, as we discuss

[1] Graham, Harvey and Rajgopal (2005) provide survey evidence that litigation risk affects managers' financial reporting decisions. Papers that investigate the relation between managers' financial reporting and disclosure decisions and litigation risk include Skinner (1994, 1997), Francis, Philbrick and Schipper (1994a,b), Johnson, Nelson, and Kasznik (2000, 2001), Baginski, Hassell, and Kimbrough (2002), Frankel, Joos, and Weber (2002), Matsumoto (2002), Field, Lowry, and Shu (2005), Rogers and Van Buskirk (2009a), and Donelson, McInnis, Mergenthaler, and Yu (2010), among others.

further in Section 2, the use of this industry proxy to measure litigation risk is pervasive in the literature.

It is reasonable to expect that litigation is associated with industry membership. For example, stock volatility and stock turnover directly affect litigation risk because both are directly related to measures of stockholder damages that drive lawyers' decisions to file lawsuits (e.g., Alexander, 1991; Jones and Weingram, 1996a). Both of these variables are likely to be associated with industry; high technology stocks are by their nature inherently more uncertain, more variable, and hence more volatile.

Using industry membership to capture litigation risk makes it difficult to be sure that industry captures litigation risk as opposed to different underlying factors that also affect managers' disclosure decisions. Consider a study that investigates whether litigation risk affects managers' disclosure choices and uses industry to proxy for litigation risk. If managers' disclosure decisions depend on their firms' information environments (e.g., Einhorn and Ziv, 2008) and information environment varies systematically across industry,[2] disclosure will be associated with industry for reasons that have little to do with litigation risk. Similarly, if firms in high technology industries have higher proprietary costs than firms in more mature, low technology industries and proprietary costs systematically affect disclosure decisions there will again be a confound.

We provide three sets of empirical analyses to support our argument that industry is a poor proxy for litigation risk. First, we show that rates of litigation vary considerably

[2] For example, mandatory financial statement disclosures are relatively less useful for firms in high technology industries with lots of intellectual property and other intangibles (e.g., Lev and Zarowin, 1999; Tasker, 1998) so that managers of firms in these industries have stronger incentives to provide voluntary disclosures as a substitute for mandated disclosure.

both across industries and through time; while litigation tends to cluster in certain industries, this set changes over time. For example, the litigation rate for financial services firms is approximately zero in years before 2008 but increases dramatically during 2008 and 2009 due to the financial crisis.

Second, we develop and test a model of litigation risk that is based on underlying firm and industry characteristics rather than industry membership *per se*. In terms of some explanatory variables, this model is similar to those developed in previous research.[3] However, unlike previous research, we show that the inclusion of variables that directly capture litigation risk substantially improves the predictive ability of models of litigation risk. Moreover, we show that the simple FPS industry proxy, while typically statistically significant, does a poor job of explaining and predicting litigation in economic terms. We also show that the statistical significance of this variable declines substantially, sometimes to the point of insignificance, once we include the other variables, as one would expect if these variables provide a more direct and complete measure of litigation risk.

We find that the most important variables that affect litigation risk are firm size, stock exchange listing (NYSE firms are subject to higher litigation risk), financial distress (as measured by Altman's Z statistic), market-to-book ratio and sales growth rates (proxies for high technology, "growth" firms), assets-in-place, stock performance, volatility, and skewness (which together capture the likelihood of large, negative return draws), stock turnover, public issuance of equity and debt, and to some degree measures of insider trading and governance quality. These results are largely in-line with those of

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[3] This research is discussed further in Section 2. Representative papers include Francis et al. (1994b), Johnson, Kasznik, and Nelson (2000), Shu (2000), Rogers and Stocken (2005), Brown, Hillegeist, and Lo (2005).

previous research such as Johnson, Kasznik, and Nelson (2000), Brown, Hillegeist, and Lo (2005), and Rogers and Stocken (2005), although a number of these variables are new and increase the predictive ability of the models significantly. Finally, we find that a variable that captures whether a firm has been subject to securities litigation in the prior three years is strongly *negatively* related to the likelihood of securities litigation (a new result), which suggests that once subject to litigation, managers can take actions that make litigation less likely in the future. Overall, we find that these variables allow us to do a good job of predicting litigation risk in economic terms.

To evaluate our models, we first show that conventional measures of goodness of fit (such as pseudo R-squared measures) do not perform well in assessing the fit and predictive ability of these models. We use a number of alternative approaches suggested in the statistics literature (e.g., Hosmer and Lemeshow, 2000; hereafter H&L) to evaluate model fit and predictive ability, most notably the receiver operating characteristic (ROC) curve. These techniques confirm our conclusion that using the FPS industry-based litigation risk measures do a relatively poor job of predicting litigation relative to the other models that we develop.

Finally, to demonstrate the use of our measure in a conventional research setting, we perform an empirical analysis of the relation between pre-emptive earnings disclosures and litigation risk. This is a setting in which we can be reasonably sure that litigation risk affects managers' disclosure decisions.[4] Consistent with our other evidence, we find that our approach to measuring litigation risk performs well in this setting, especially in comparison to the FPS proxy.

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[4] The idea that litigation risk affects managers' pre-emptive earnings disclosures was first discussed in Skinner (1994, 1997) and Francis, Philbrick, and Schipper (1994a). It has been revisited many times since those early papers, most recently in a study by Donelson et al. (2010).

Our paper contributes to the literature in several ways. First, we provide comprehensive evidence on the usefulness of the FPS industry variables as a measure and predictor of litigation risk, an important task given the ubiquity of this measure in the extant literature. Second, we provide evidence that allows us to better understand what makes particular firms and industries vulnerable to litigation—is it industry membership *per se*, or is it the underlying economic characteristics of industries and firms that explains relatively high levels of litigation in particular industries and years? Third, we provide better measures of the predictive ability and goodness of fit of models of litigation risk than those typically used in prior literature.

Our findings have clear implications for researchers investigating the effect of litigation risk on corporate decisions. Our evidence makes it clear that the conventional industry-based measure of litigation risk is noisy at best. Consequently, if one wants to *control* for litigation risk in a regression design, using this variable likely increases the likelihood of a correlated omitted variables problem. If instead one wants to investigate the *effect* of litigation risk, the test is likely to be low powered because the proxy is simply ineffective in predicting securities litigation (a fact borne out in our Section 5 tests). Further, to the extent that this proxy captures economic factors associated with the dependent variable that are not related to litigation risk, the test will also potentially be biased. We therefore advocate the use of the more direct measures of litigation risk that we discuss in subsequent sections of the paper.

Section 2 reviews previous research and further develops our empirical arguments. Section 3 details the sample and provides evidence on how litigation rates vary over time and across industries and sectors. Section 4 provides more formal evidence on the determinants of litigation risk, comparing the predictive ability of the conventional FPS industry proxy to that of underlying firm characteristics that we hypothesize are more directly related to litigation risk. Section 5 compares the performance of the two competing litigation risk proxies in a research setting where litigation risk is likely to play an important role in affecting managers' disclosure decisions. Section 6 concludes.

2. Previous Research and Empirical Predictions

2.1 Previous Research

A considerable body of empirical research in accounting and finance investigates how securities litigation affects various corporate policies and managerial decisions. Much of this research uses some variant of the FPS industry proxy for litigation risk, either by itself in cross-sectional or panel regressions, as part of sample selection criteria, or as part of a litigation risk model. For example, Matsumoto (2002), Ajinkya, Bhojraj, and Sengupta (2005), Beatty et al. (2008), Jayaranyam and Milbourn (2009), Bhojraj, Libby, and Yang (2010), Brown and Tucker (2010), Donelson et al. (2010), and Hribar, Kravet, and Wilson (2010) all use a dummy variable for membership in the FPS industries to measure litigation risk.

Other authors who examine the determinants and effects of litigation risk limit their samples to firms in the FPS industries.[5] Ali and Kallapur (2001), Johnson, Kasznik

[5] Lowry and Shu (2002) study the role of litigation risk on IPO underpricing. Consistent with our main argument, their data does not show higher litigation risk for the high-tech firms captured by the FPS industry dummy: "interestingly, the descriptive statistics reveal little difference across the two samples in terms of membership in the high-tech industries. Forty-six percent of sued firms are in the technology industry, compared to 49% of non-sued firms (p. 322)." Field, Lowry, and Shu (2005) also use industry membership to measure litigation risk but develop their own measure by looking at industry litigation rates

and Nelson (2000, 2001), Johnson, Nelson, and Pritchard (2007), and Choi (2006) examine various hypothesized effects of the Private Securities Litigation Reform Act of 1995 (PSLRA). Choi (2006) uses a high technology industry dummy as an explanatory variable for litigation pre- and post-PSLRA. The other authors restrict attention to samples of firms drawn from the three high technology industries identified by FPS (although Ali and Kallapur show that their results are robust to using a broader sample of firms). Chandra, Wasley, and Waymire (2004) limit their sample to firms in high technology industries because high litigation risk is hypothesized to explain heightened income conservatism in these industries.

A number of papers develop models of litigation risk and use predicted probabilities from these models to measure litigation risk. These models typically include firm characteristics such as market capitalization, stock volatility, stock turnover as well as, in some cases, industry dummies based on FPS.[6] For example, Johnson et al. (2000) estimate a probit model that explains lawsuit filings as a function of market capitalization, stock beta, cumulative stock return, minimum stock return, return skewness, stock turnover, CEO power, management monitoring, external financings, and insider trading.[7] The market capitalization and stock return variables, including turnover, come from previous research (Alexander, 1991; Jones and Weingram, 1996a; Skinner,

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during the period before the sample test period (1988-1994) and sorting industries according to whether they had litigation rates above or below the median.

[6] Jones and Weingram (1996b) use a regression model to explain why technology and financial services firms experienced a high level of securities litigation in the period from 1989 to 1992. They include several stock market explanatory variables in a logit regression, along with a technology and financial services indicator. They find that the technology dummy is statistically insignificant when controlling for stock return variables, but the financial services dummy remains significant. They attribute this finding to an industry effect of the savings and loan crisis.

[7] Nelson and Pritchard (2008) use a reduced form of the model used in Johnson et al. (2000), with separate indicator variables for representation in the biotech, computer hardware, computer software, retail, and electronics industries.

1997) and are based on the idea that damages in Rule 10b-5 litigation depends on the size of the price decline, the number of shares traded during the period of the alleged fraud, and the stock price. (Larger potential damages amounts make firms more attractive to plaintiffs' attorneys, ceteris paribus, which explains why market capitalization is strongly associated with litigation risk.)

The inclusion of the CEO power and monitoring variables is motivated by the fact that CEOs who have more power and/or are less closely monitored are more likely to engage in aggressive financial reporting and other types of opportunistic behaviors likely to expose their firms to securities litigation (e.g., Dechow, Sloan, Sweeney, 1996). This is supported by evidence that underwriters of D&O liability insurance focus on corporate governance quality in assessing liability risk (Baker and Griffith, 2007) and that consulting groups use governance quality to predict litigation risk (e.g., The Corporate Library, 2009).[8]

These studies also commonly include measures of the extent of insider trading which arguably increases the likelihood of stockholder litigation, especially after PSLRA, as well as the extent to which firms have recently issued debt and/or equity.[9] Insider trading activity and external financing provide opportunities for managers to exploit high market valuations; if the valuations are achieved using false or misleading information, the activity increases the probability of a lawsuit filing.

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[8] Recent work by Daines, Gow, and Larcker (2009) finds that corporate governance and transparency ratings, such as those produced by Risk Metrics/ISS, Governance Metrics International and the Corporate Library, do not have predictive power for lawsuit filings.

[9] Johnson et al (2007) find that abnormal insider selling is more strongly associated with litigation after PSLRA, consistent with their prediction that the Act's more stringent pleading requirements encourages lawyers to focus on more objective evidence of managerial malfeasance.

Other papers that model litigation risk include Brown, Hillegeist, and Lo (2005) and Rogers and Stocken (2005), both of which use largely the same set of variables as in Johnson et al. (2000) but also include the FPS industry indicator variables.[10] These studies exclude the corporate governance variables from their litigation risk model, but similar to Johnson et al., Brown et al. (2005) include an insider trading variable.

Although there is some agreement in the literature in terms of the set of covariates usually included in these models, apart from reporting pseudo R-squareds these studies rarely report or discuss in much detail the goodness of fit or predictive ability of the litigation risk models.[11] One goal of our research is to present a more formal evaluation of these models in terms of both of these attributes.

2.2 Assessing the validity of the high technology litigation risk proxy

Our view is that industry litigation rates are likely to vary considerably over time, so that industry membership serves as a relatively poor proxy for litigation risk. If it is generally the case that economy-wide events tend to cause time-series variation in the fortunes of different industries, it is difficult to think of litigation risk as being specific to particular industries or firms. Instead, it seems more likely that economic shocks cause losses in value that vary systematically across industries and firms and that these losses trigger litigation.[12] This means that it will be hard to identify groups of firms that are *generally* (consistently over time) subject to higher litigation risk.

[10] Johnson et al. (2000, 2001) do not include the FPS industry dummies because their sample is restricted to firms in the FPS industries.

[11] As discussed further below, pseudo R-squareds have limitations as measures of goodness of fit.

[12] Consider two economy-wide events that occur during our sample period—the bursting of the tech bubble in 2001 and the financial crisis of 2007-2008. The damage, measured in terms of stockholders value losses, of both shocks was concentrated in particular industries.

On the other hand, it is reasonable to expect that there are firm and industry characteristics that make particular firms and industries more susceptible to litigation, *on average,* which is what we have in mind when we talk about ex ante litigation risk. For example, firms that operate in more volatile operating environments have greater levels of stock volatility, which leads to greater susceptibility to litigation. Notice, however, that it is the volatility of the operating environment, as opposed to industry membership *per se*, that magnifies litigation risk.

This discussion leads to two principal empirical predictions. First, we predict that litigation rates vary considerably across economic sectors and industries through time, and that the FPS industries will not show rates of litigation that consistently exceed those of other industries. Second, we predict that any statistical significance the FPS industry variables has in predicting litigation will be reduced or eliminated by the inclusion of more direct litigation proxies. Furthermore, these variables should collectively result in economically significant increases in the predictive ability of models of litigation risk.

Based on these arguments, we add a number of variables to those conventionally employed in the literature to predict litigation risk. We add a measure of economic performance (ROA) because as performance deteriorates, the likelihood of negative abnormal returns increases and stakeholders become dissatisfied, increasing the risk of litigation. Similarly, we include Altman's (1968) Z-statistic to proxy for the likelihood of financial distress, which should also increase litigation risk. We include several proxies for the nature of the firms' investment opportunities (working capital, market-to-book, R&D intensity, ratio of PP&E to total assets) because these variables are likely to affect corporate policies such as executive compensation, capital structure, and payout policy that could affect litigation risk (Smith and Watts, 1992). We also include an accruals measure because the overall aggressiveness of managers' accounting choices is likely to affect litigation (Dechow et al., 1996) as well as working capital and goodwill. We include the ratio of goodwill to assets to measure the extent of the firms' M&A activity, which likely increases litigation risk. Finally, we include exchange listing (NYSE dummy) to see if listing on the NYSE (as opposed to the NASDAQ) increases the risk of litigation, as sometimes discussed in the practitioner literature.

3. Sample and Evidence on the Relation Between Industry and Litigation Risk

We obtain data on filings of securities class action lawsuits from the Stanford Law School *Securities Class Action Clearinghouse*. These data begin in 1996 and continue through the current time. We include lawsuits filed against public companies (shares listed on the NYSE, ASE, or NASDAQ) and exclude IPO allocation, mutual fund, and analyst lawsuits common around 2001. This source also has data on lawsuit outcomes; we restrict attention to lawsuit filings.

Table 1, Panel A shows the number of lawsuits by year and by sector; the data are also shown in Figure 1. There are a total of 2,497 lawsuits filings from 1996 to 2009 for an average of approximately 178 lawsuits per year. The number of lawsuits varies somewhat from one year to the next. For example, there were 220 lawsuits in 2004 but only 112 in 2006. It is not clear what explains this variation. Cornerstone (2010) plots a marketwide measure of equity volatility (the CBOE Volatility Index or VIX), which seems correlated with the number of filings, perhaps because higher market volatility increases the likelihood of the sharp declines in firms' stock prices that often trigger litigation.[13] This suggests that economy-wide factors that vary through time help explain variation in the number of lawsuit filings.

Panel A of Table 1 also reports the fraction of lawsuits that allege a violation of SEC Rule 10b-5 (a misstatement or omission of material information), which are the lawsuits most likely to be of interest to researchers interested in financial reporting and disclosure issues.[14] The fraction of 10b-5 cases tends to be high, averaging 89% for the overall period.[15] When we break down the cause of filings by allegations (untabulated), the most common allegations are material misrepresentations regarding the business, failure to warn, and accounting or internal control problems.

Panel B of Table 1 reports the percentage of lawsuits by sector (as defined by *Bloomberg*). Consistent with our main thesis, these numbers show that there is a good deal of variation in litigation rates across sectors and that the share of each year's litigation attributable to each sector varies across years. In some sectors litigation rates are low in absolute terms and do not vary much from year to year. The basic materials, capital goods, conglomerate, energy, and transportation sectors generally account for a small fraction of litigation (in the 1% to 5% range); these fractions do not vary a great deal from one year to the next. On the other hand, the financial, healthcare, services, and technology sectors together account for about 80% of cases in a given year, although each of these sector's shares within this group varies considerably over time. The

[13] Alexander (1991) points out that a lawsuit filing following a large stock price decline supports "an award of attorneys' fees that would make it worthwhile to bring a case" (p. 513). As an empirical matter it is well-established that sharp, significant stock price declines are associated with lawsuit filings (Francis et al. 1994b; Jones and Weingram 1996).

[14] Most studies of disclosure and litigation (e.g., Skinner, 1997; Rogers and Van Buskirk, 2009a) limit their sample to Rule 10b-5 litigation.

[15] After being consistently high at around 90% or above from 1996 through 2006, the rate declines in more recent years, to 82% in 2007, 79% in 2008, and 75% in 2009. Cornerstone (2010, p. 27) reports that the fraction of suits that allege false forward-looking statements drops from 81% in 2005 to 50% in 2009.

technology sector accounted for, at the high end, 38% of all cases in 2000 and 42% of all cases in 2001 (when the bubble in tech stocks burst) but only 26% of cases in 2004, 18% in 2007, 15% in 2008, and 11% in 2009. Conversely, the financial sector contributed only 12% of all cases in 2000 and 6% of all cases in 2001 but 40% of all cases in 2008 and 34% of all cases in 2009, as the financial crisis peaked. There is less variation in the healthcare and services sectors. Overall, these numbers support the idea that cross-industry variation in litigation rates varies significantly over time.

If litigation rates vary across industries and through time, using industry membership as a proxy for litigation risk is likely to be ineffective. Table 2 (Panels A and B) reports, respectively, the number and percentage of unique companies subject to filings by industry (the number of firms sued in each industry/year divided by the total number of firms in that industry/year). We derive this sample after merging the set of lawsuits shown in Table 1 with *Compustat* and classify the filings by industry using two digit SIC codes. This allows us to provide evidence on whether the four industries that Francis et al. (1994a) designate consistently have relatively high litigation rates.[16] They define this group as biotech firms (SIC codes 2833-2836 and 8731-8734), computer firms (3570-3577 and 7370-7374), electronics firms (3600-3674), and retail firms (5200-5961); subsequent research typically follows these definitions. We report litigation rates for each of the four industry groups, for the FPS industries as a whole (this is the set of firms which subsequent studies identify as "high litigation"), and for the remaining industries

[16] Francis et al. limit their sample to four industries because "…investigations of the information mix defense require substantial familiarity with industry-specific information which may temper or offset alleged misleading statements." (Francis et al. 1994a, p. 144). They choose these four industries because they are subject to a "high incidence" of litigation during 1988-1992.

as a group. To make the table wieldier, we only report those industries where litigation rates exceed 5% in at least one year and eliminate industries with less than ten firms.[17]

The data in Table 2 show that litigation rates vary considerably through time by industry and that "high" litigation rates are not uncommon for industries usually excluded from the "high litigation" group. To give some examples, the litigation rate for the metal mining industry (SIC = 10) averages 1.9% overall but reaches 6% in both 2002 and 2005. Similarly, the litigation rate for the building construction industry (SIC = 15) is zero for all years except for 2007, when it reaches 19%. The motion picture industry (SIC = 78) has an overall litigation rate of 2.7%, which is comparable to that for the "high litigation" industries, but has rates of 7%, 6%, and 27% for 2003 through 2005, respectively. Overall, it seems clear that there are many industry/years for which litigation rates are high but that are excluded from the conventional "high litigation" industries.

Conversely, the numbers in Table 2 (Panels C and D) show that litigation rates in the "high litigation" industries are actually not all that high compared to those in other industry/years. For example, the average litigation rate for the biotech industry is 2.8% and varies from 0% in 1997 and 0.7% in 1996 to 5.4% in 2004, with rates more typically in the 2% to 3% range. These rates do not seem unusually high compared to the overall litigation rate of 1.6%. Similarly, for computers, the average litigation rate is 3.2% and varies between 1.4% in 1996 and 5.5% in 2004, while for electronics the average rate is 2.5% and varies from 0.7% in 1996 to 4.1% in 2007. The rates in retailing are even more modest, with an average of 1.8% and variation between 0.3% in 1996 and 3.4% in 2004. What apparently distinguishes these industries is not the absolute rates of litigation in

[17] These observations are, however, retained in the overall litigation rates reported at the bottom of the table.

particular years but rather the fact that litigation rates are consistently above zero. The main impression is that litigation rates in these industries do not seem all that high in absolute or relative terms.

These inferences are confirmed by the overall litigation rates reported at the bottom of Table 2, Panel D. For the four "high litigation" industries as a group, the average litigation rate is 2.7% and varies between 0.9% (in 1996) and 4.4% (in 2004). This compares to an overall average litigation rate for all other industries of 1.2%, with variation between 0.2% (1996) and 2.1% (2008). Chi-squared tests indicate that differences between the two groups are statistically significant at the 5% (1%) level in only five (one) of the 13 years reported—that is, litigation rates are not significantly higher in the "high litigation" industries in eight of 13 years. This reinforces the impression that "high litigation" industries are not all that different from other industries in terms of their litigation risk.

It is well known that litigation risk increases with firm size; previous studies on the determinants of stockholder litigation provide clear evidence that size is positively related to the likelihood of securities class action litigation (e.g., Jones and Weingram, 1996a). Given this, it could be the case that the FPS industry dummy does a better job of measuring litigation risk for large firms.

To address this possibility, we reperform the analysis reported in Table 2 for firms in the largest 5% of the size distribution (by year) as measured by assets. We report these results in abbreviated form in Table 3. As expected, litigation rates are significantly higher for the set of larger firms. The overall litigation rate here is 5.1% (Table 3, Panel B) compared to an overall rate of 1.6% in Table 2. In addition, this rate varies more from one year to the next, from lows of around 0.8% in 1996 and 1998, to highs of 12.2% in 2002 and 12.7% in 2008.

Although litigation rates are materially higher for larger firms, the numbers in Table 3 again provide little evidence that litigation rates are significantly higher in the FPS industries. Overall, the litigation rate for the larger firms in the FPS industries is 7.8% compared to 4.8% for the other industries, a difference that is not significant at the 5% level. Although differences in particular years are sometimes economically significant, the difference is statistically significant in only one of the 13 years. In seven of the 13 years, the difference is 2% or less or goes in the 'wrong' direction. Overall, even when we confine attention to relatively large firms, the evidence in favor of the idea that the FPS industries are subject to materially higher litigation risk is weak.

4. Predicting Litigation Risk

Our principal goal is to develop and evaluate models that predict litigation risk, and to benchmark these models against the FPS industry litigation measure that is widely used in the literature.

Table 4 shows how we form the sample for these analyses. We begin with the 2,883 lawsuit filings available from the Stanford Law School *Securities Class Action Clearinghouse* over 1996 to 2008. After eliminating non-Rule 10b-5 cases (120 filings), filings against firms not listed on the NYSE, ASE or NASDAQ (394 filings), filings related to IPO allocation, mutual fund, and analyst cases (210 cases), and firms without the requisite *Compustat* and *CRSP* data, we are left with 654 lawsuit filings. This set of filings translates into 1,220 firm-years which include a lawsuit class period, which when added to our sample of 27,088 non-lawsuit firm-years—for which there is no lawsuit class period or filing—yields a final sample of 28,314 firm-years.[18]

As a baseline, we first report the results of a simple prediction model in which membership in one of the FPS industries is interpreted as predicting a lawsuit. The results of this analysis are shown in Table 5. This "model" predicts lawsuits in 37.6% of all firm/years, which simply reflects industry membership. The table also reports a number of statistics conventionally used to evaluate the model's success in predicting lawsuits. The Type I error rate is high, at 93.8%, while the Type II error rate is low, at 3.2%, consistent with FPS industry membership being a poor predictor of litigation risk. Following Hosmer and Lemeshow (2000, Ch. 5), we also report model *sensitivity*, which is 53.5% (656/1,226), and *specificity*, which is 63.2% (17,111/27,088).[19] Overall model accuracy (the overall fraction of correctly classified observations) is 62.8%. If researchers (and managers) are concerned about litigation risk, model sensitivity is important because it provides information about the relative frequency with which the model correctly forecasts that a firm will be subject to litigation in a particular year.

We next report results for a series of logit models of litigation risk. The results for the first set of models are shown in Table 6. These models regress the lawsuit

[18] We require complete data on lawsuit filing (a dummy variable set to one for firm/years for which there is a lawsuit), the accounting variables (assets, return on assets or ROA, accruals, revenue growth rate, PP&E intensity, Altman's (1968) Z-score, market-to-book ratio), the return variables (prior 12 month cumulative abnormal return, skewness of returns, volatility of returns), the FPS industry indicator (a dummy variable that turns on for firm/years in the FPS industries), stock turnover, and equity and debt issuances.

[19] Sensitivity and specificity are common measures of the performance of a prediction model. Sensitivity reports the fraction of true positives correctly predicted. Specificity reports the fraction of true negatives correctly predicted. Similar to Type I and Type II errors, there is usually a tradeoff between sensitivity and specificity; however, it is possible to attain 100% sensitivity and specificity. An analogy can be drawn to metal detectors used in airport security screening. One can set the detector so that sensitivity is high and specificity is low to be sure all true security risks are detected (with the cost that it will incorrectly identify lots of belts and keys as security risks). Conversely, if it is relatively costly to pull people aside when they are not true security risks, one can lower sensitivity to increase specificity.

variable on the set of hypothesized covariates discussed in Section 2. The first model uses only the FPS industry dummy (model 1). Although the coefficient on the FPS variable is positive and highly significant (p-value of < .0001) its economic magnitude is modest. Based on the estimated coefficients, the predicted probability of being sued is 0.032 for firms for which *HITECH FPS* = 0 and 0.062 when *HITECH FPS* = 1.

This model also looks poor when evaluated for goodness of fit and predictive ability. The conventional measure of goodness of fit is pseudo R-squared. A number of pseudo R-squareds are used in the literature and results can vary materially across the different measures; we choose to report the McFadden (1973) pseudo R-squared, which is perhaps the most commonly reported, and the Cox and Snell pseudo R-squared.[20] This model has a (McFadden) pseudo R-squared of only 1.33% and a Cox and Snell pseudo R-squared of 0.47%, indicating poor fit. Unfortunately, there is no universally agreed upon pseudo R-squared or, more generally, measure of goodness of fit—there are variety of measures, but each has advantages and disadvantages (e.g., see H&L, Ch. 5; Long and Freese, 2006). This is an inherent feature of non-linear models of binary outcomes.

Another way of assessing goodness of fit is to use a classification table. To generate a classification table, we first specify a cutoff probability or "cutpoint" (estimated probability above which we predict that an observation will experience a lawsuit). It is common in the accounting and finance prediction literature to use arbitrary cutpoints such as 0.5 (e.g., Ohlson, 1980) or 0.3 (Altman and Sabato, 2007).[21] However,

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[20] The McFadden pseudo R^2 is based on the ratio of log likelihoods and has the desirable feature of varying between 0 and 1. However, unlike a conventional R square, it cannot be interpreted as the proportion of variation in the dependent variable explained by the regression covariates. See Long (1997) for more discussion of different pseudo R-squareds (pp. 104-108).

[21] Alternatively, the predicted probabilities can be converted into scores, such as the "F-score" that Dechow, Ge, Larson, and Sloan (2010) compute to measure the likelihood of accounting misstatements.

the predicted probabilities from model (1) are uniformly low, at around 5%, reflecting both the low unconditional incidence of litigation and the modest effect of the FPS industry variable. Moreover, classification tables cannot be compared for different samples, which becomes an issue below as we expand the set of independent variables.[22]

A better way of comparing models that does not rely on choice of a cutoff point is based on their ability to discriminate between firms that are sued and those that are not. This information is summarized by the ROC (receiver operating characteristic) curve and in particular by the area under the ROC curve (H&L, Ch. 5). The curve "plots the probability of detecting a true signal (sensitivity) and false signal (1 – specificity) for the entire range of possible cutpoints" (H&L, p. 160). The area under the ROC curve, which ranges from 0 to 1, provides a measure of the model's ability to discriminate. A value of 0.5 indicates no ability to discriminate (might as well toss a coin) while a value of 1 indicates perfect ability to discriminate.[23]

The area under the ROC curve for this model, at 0.583, is relatively small and well below the level normally seen as indicating "acceptable" discriminatory ability

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Such scores are simply the scaled predicted probabilities (obtained by dividing the predicted logit probability for each observation by the overall fraction of occurrences), so that a score of 1 represents a likelihood equal to that of the overall sample.

[22] According to H&L (2000, p. 160),"…one cannot compare models on the basis of measures derived from 2x2 classification tables since these measures are completely confounded by the distribution of probabilities in the samples upon which they are based. The same model, evaluated in two populations, could give very different impressions of performance if sensitivity or specificity was used as the measure of performance."

[23] Intuitively, the area can be thought of as follows. Assume we have n1 firm/years subject to litigation and n2 firm/years that are not. We can thus create n1 x n2 pairs. Of the set of all possible such pairs, the area under the ROC curve tells us the fraction for which the observation subject to litigation had a higher predicted probability than its pair. Under the null that the model has no discriminatory ability, this fraction is 0.5.

(Figure 2).[24] This is consistent with our thesis that the simple industry proxy does a poor job of capturing litigation risk.

Finally, as another measure of model fit, we also report the Hosmer-Lemeshow Chi-Square (H&L, 2000, Ch. 5; Long and Freese, 2006). This measure sorts the sample observations based on predicted probabilities and then divides the observations into (usually) ten groups. Within these groups, it then compares the observed frequency of the outcome to the expected frequency of the outcome (which is based on the predicted probabilities for the observations within the group). Under the null hypothesis that the model fits well, the observed and expected frequencies will be similar within groups. Thus, a significant test statistic indicates rejection of this null with the implication that the model fits poorly.[25] The Hosmer-Lemeshow chi-squared statistic for model 1 is 0 (p-value 0.000) which indicates a poor fit.

We next report a model (model 2) that includes the accounting, stock market, and issuance variables as well as the FPS industry dummy. Most of these variables are highly significant, with signs that are largely consistent with expectations. Firm size (*LNASSETS*), an indicator for listing on the *NYSE*, *SALES GROWTH*, *ALTMAN Z*, market-to-book (*MB*), and stock turnover (*TURNOVER*) are all positively related to the probability of litigation and highly significant, with p-values of better than 0.01. We also find that *PP&E* (a measure of assets in place), the 12 month abnormal stock return (*RETURN*), and return skewness (*RETURN SKEWNESS*) are highly significant and negatively related to the probability of

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[24] H&L (p. 162) indicate that an area under the ROC curve of 0.5 indicates no discrimination, an area under the ROC curve between 0.7 and 0.8 indicates acceptable discrimination, an area under the ROC curve between 0.8 and 0.9 indicates excellent discrimination, and area under the ROC curve greater than 0.9 is considered outstanding discrimination.

[25] This same approach is often taken in a less formal way by simply “eye-balling” differences between observed and expected frequencies (e.g., see Dechow et al (2010), Table 7, Panel B).

litigation. These results indicate that larger firms, firms listed on the NYSE, "growth" firms (that are growing quickly and have lots of growth options, as measured by market-to-book, intangibles, growth rate), firms in distress, firms with a higher likelihood of large negative returns, firms with high stock turnover, and (to a lesser degree) firms that are issuing capital are more likely to be sued. These results are largely consistent with those of prior research and/or our predictions, discussed in Section 2.

More importantly, these variables contribute significantly to the explanatory power of the model. The McFadden and Cox-Snell pseudo R-squareds for this model are noticeably higher than those for model 1, at 20.98% and 7.21%, respectively (versus 1.33% and 0.47%).[26] In addition, the ROC curve analysis (Figure 2) indicates that the area under the ROC curve increases to 0.835, substantially higher than that for model 1, and indicative of "excellent" discriminatory ability (H&L, Ch. 5). The Hosmer-Lemeshow chi-squared statistic is 9.71 (p-value of 0.286) for model 2, which is also indicative of a relatively good fit (not close to rejecting the null).

The magnitude and significance of the coefficient on the industry FPS dummy variable declines noticeably when the other variables are included in the regression. The coefficient on this variable is 0.680 (significant at better than 0.0001) when it is the only covariate but falls to 0.233 (with a p-value of 0.038) when the other variables are included in the model. The corresponding marginal effect declines from 0.028 to 0.008, which indicates that the effect of industry membership, while statistically significant, is even more modest once we account for the impact of the other variables on the likelihood of a lawsuit.

[26] Notice that the two pseudo R-squareds are quite different, consistent with our earlier discussion.

We have also estimated a model (not reported in tables) that includes these same variables along with an indicator for whether the firm was subject to a lawsuit in the previous three years. Because we need three years of data to generate this variable, sample size declines to 23,933 firm/years. Although most results are largely unchanged when we include this variable (McFadden R-square is 20.37%; coefficient on FPS dummy is 0.28), we find that the coefficient on the prior lawsuit dummy is negative (–0.886) and highly significant. This coefficient implies that the odds of a lawsuit for a firm with a prior lawsuit are about 40% of those of an otherwise similar firm (in terms of the other covariates) without a prior lawsuit, an economically material decline. It is somewhat surprising that this effect is negative and that the economic magnitude is this large. This result suggests that managers of firms subject to litigation can successfully take actions that make their firms less vulnerable to litigation in the future.[27]

We also estimate models that include the insider trading and corporate governance variables used in prior research.[28] Although the coefficients on these variables are generally statistically significant, they do not add much to the overall fit or discriminatory ability of the models discussed above, nor do they significantly affect our results on the FPS dummy variable. Consequently we do not report them in detail.

Because the data required to generate certain of the variables in the Table 6 regressions considerably reduces sample size, Table 7 shows a different model that omits those variables. This model drops the ROA, accruals, goodwill, PP&E, and Altman Z variables, but adds institutional ownership, insider trading, and insider holding variables.

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[27] This general issue is addressed in a recent paper by Rogers and Van Buskirk (2009a), who examine how managers change their disclosure behavior after their firms are subject to Rule 10b-5 litigation.
[28] Because these variables impose additional data requirements that constrain sample size, they are not included in the main analysis.

The sample size for these regressions is 35,204 firm/years compared to the 28,314 observations used in the Table 6 regressions. Also, in Table 7 we divide the sample into two sub-periods, 1996-2003 and 2004-2008, to assess whether, as suggested by some of our earlier descriptive results, there has been a shift in the drivers of stockholder litigation in the last five years.

The Table 7 results for the simple model, with the FPS indicator variable as the only covariate, are similar to those reported in Table 6. The coefficient on this variable is 0.693 and highly significant, with a marginal effect indicating that membership in one of the FPS industries increases the probability of litigation by 2.8% (or almost exactly doubles the odds of litigation). The overall fit of this model is again low, with a McFadden pseudo R-squared of 1.33% and Cox-Snell pseudo R-squared of 0.45%. The area under the ROC curve is 0.576, very similar to that of the corresponding model in Table 6 (0.583).

When we add the other covariates to this model, fit again improves markedly, with the McFadden pseudo R-squared increasing to 23.81% (Cox-Snell 8.07%). The Hosmer-Lemeshow chi-squared statistic is 12.2 (p-value of 0.143), consistent with a relatively good fit. Moreover, the area under the ROC curve increases to 0.853. The sign of the coefficients on the covariates are largely consistent with expectations: we find positive and significant (at 1% or better) coefficients on the NYSE indicator, firm size, sales growth, market-to-book, standard deviation of stock returns, stock turnover,[29] the proceeds from issuing both equity and debt over the previous two years, and negative and

[29] The Pearson and Spearman correlation coefficients between the *TURNOVER* and institutional holding (*INST*) variables are relatively high, at 35% and 54%, respectively (p-value <.0001). When the *TURNOVER* variable is removed and the *INST* variable is retained in the models in Table 7, the coefficient on the institutional holding variable is 1.4 and statistically significant (p-value <.001).

significant (at 1% or better) coefficients on 12-month abnormal stock returns and return skewness. The institutional trading and insider trading variables are not significant. The standard deviation of returns is highly significant here but not significant in Table 6 above.

More important, the coefficient on the FPS dummy variable is no longer significant once these other variables are included, with a coefficient of only 0.114 and a marginal effect of 0.004 (implying that membership in these industries essentially does not change the odds of a lawsuit). This is consistent with our argument that the underlying firm and stock characteristics captured by the other variables are the underlying drivers of litigation, that they are correlated with industry membership, so that they drive out the effect of industry when both are included in the regression.

We next turn to the subperiod results, also reported in Table 7. Considering first the simple models with only the FPS dummy variable included, we find that the coefficient on this variable is positive and highly significant in both subperiods but that it is considerably larger in the 1996 to 2003 subperiod than in the 2004 to 2008 subperiod. In the first subperiod the coefficient is 0.789 and the marginal effect is 0.028, once again suggesting that membership in one of the FPS industries increases the probability of litigation by 2.8%. In the second subperiod, however, the coefficient, while still significant, is only 0.457 with a marginal effect of 0.015. Consistent with previous results, fit for both of these regressions is low: McFadden pseudo R-squareds of 1.33% for both, Cox-Snell pseudo R^2s of 0.65% and 0.47%, Hosmer-Lemeshow statistics that are highly significant, and areas under the ROC curve that are less than 0.6.

When we add the additional covariates, we find results that are largely consistent across the two subperiods. The McFadden pseudo R-squared is 25.96% in the first subperiod and 24.55% in the second subperiod (the Cox-Snell pseudo R^2s are 9.47% and 6.98%, respectively) while the areas under the ROC curve are 0.857 and 0.853, respectively. The Hosmer-Lemeshow chi-squared statistic rejects for the first subperiod (p-value of 0.001, indicating relatively poor fit) but not in the second (p-value of 0.706, indicating relatively good fit). There are some differences between subperiods in terms of significance of individual coefficients. While firm size, sales growth, market-to-book, stock turnover, and the prior 12-month abnormal return have consistent signs across the two subperiods and are all significant at the 1% level, the NYSE indicator variable, 2-year equity issuance, and return skewness are all less significant in the 2004-2008 subperiod. Conversely, the standard deviation of returns, institutional holdings, and the average level of insider holdings all have positive coefficients, significant at 1% or better in the second subperiod (2004-2008).

More importantly, in both periods the coefficient on the FPS dummy becomes smaller and insignificant once the other covariates are included in the regression. This effect is somewhat more pronounced in the more recent subperiod (2004-2008) in that the coefficient is smaller here (0.033) than in the first subperiod (0.152), but in neither case is the coefficient statistically significant. This confirms the finding from the full period results that the FPS industry membership does not explain litigation once we augment the model with other variables that arguably do a better job of capturing the drivers of litigation risk.

5. The Relation Between Pre-emptive Earnings Disclosures and Litigation Risk

This section provides evidence on how models of litigation risk such as those we estimate in Section 4 perform relative to the use of simple industry-based proxies in an actual research setting. Since early research by Skinner (1994), a numbers of papers examine whether the pre-disclosure of adverse earnings news lowers litigation risk. Overall, this research suggests that, controlling for the endogeneity of managers' disclosure choices, the pre-disclosure of adverse earnings news reduces the expected costs of litigation (see e.g., Skinner, 1997; Field, Lowry, and Shu, 2005; Donelson et al., 2010). We start with the premise that litigation risk increases managers' incentives to predisclose adverse earnings news and use this setting to compare the performance of models of litigation risk (as developed in Section 4) to industry-based proxies such as the FPS dummy.

To undertake this task, we use First Call to obtain data on management forecast disclosures and earnings news. We define earnings news as the earnings realization for the quarter minus the analyst consensus prevailing at the beginning of the third month of the quarter. We have complete data for this and other necessary variables (discussed below) for around 91,000 firm/quarters from 1996 through 2008 (we choose this period to coincide with the sample period for our previous tests). Consistent with previous research, we define an earnings pre-disclosure as occurring when management releases a forecast of earnings for the quarter in the period from the beginning of the third month of the fiscal quarter through the earnings announcement date.[30]

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[30] See, for example, Soffer, Thiagarajan, and Walther (2000), Skinner and Sloan (2002), or Anilowski, Feng, and Skinner (2007) for evidence on the disproportionate tendency of managers to predisclose adverse earnings news in the latter part of the fiscal quarter or after the end of the quarter. We obtain similar but

We provide descriptive statistics for this sample in Panel A of Table 8. Managers predisclose earnings news in 11.9% of firm-quarters. So as not to impose linearity on the functional relation between pre-disclosure and earnings news, we sort the observations into quintiles based on earnings news. We measure litigation risk using both the FPS industry dummy variable and the predicted probability from the logit model estimated and reported in column (2) in Table 6 (the predicted probability of litigation).[31] Panel A shows that the predicted likelihood of litigation is roughly constant across earnings news quintiles, as expected if we are correctly measuring *ex ante* litigation risk (i.e., there is no reason to expect a relation between earnings news and *ex-ante* litigation risk, measured before the beginning of the quarter). In contrast, the FPS variable is noticeably higher in earnings news quintiles 3 and 4 than in the other quintiles, suggesting perhaps an industry effect in earnings news (this is not likely to be a litigation effect). This again raises the possibility that the FPS variable captures something other than litigation risk.

We report our main evidence in Panel B of Table 8. We estimate the relation between the likelihood of an earnings pre-disclosure (a dummy variable capturing whether management prediscloses earnings news, as defined above), and earnings news, litigation risk, and a number of controls using logit regressions. The first specification is a baseline logit regression that includes dummy variables for the earnings news quintiles, firm size (natural log of market value of equity), market-to-book ratio, number of analysts with estimates, and an indicator for whether the quarter falls after the October 2000 effective date of Regulation Fair Disclosure (Reg. FD).

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stronger results (not reported in tables) when we define pre-disclosures as earnings forecasts released after the end of the fiscal quarter but before the earnings announcement date (i.e., earnings pre-announcements).

[31] For the tests on the pre-disclosure of earnings news, we use the predicted probability of litigation risk estimated for the fiscal year prior to the current fiscal quarter so that the proxy is not affected by disclosure in the quarter.

This baseline regression shows the expected inverse relation between the likelihood that managers predisclose earnings and earnings news. The coefficient on earnings quintile 1 (the worst earnings news) is positive and strongly significant (coefficient of 1.02; p-value <.0001), the coefficient on earnings quintile 2 is positive but smaller in magnitude and less significant (p-value of .046), while the coefficients on the other two quintiles are negative and statistically significant. Turning to the control variables, the coefficient on firm size is insignificant, the coefficient on number of analysts is reliably positive, and the coefficients on market-to-book and Reg. FD are both reliably negative.

The negative and highly significant coefficient on Reg. FD is worthy of some comment. After Reg. FD was implemented, there has been a strong increase in the tendency for firms to release earnings guidance at the time they announce quarterly earnings (e.g., Anilowski et al., 2007; Rogers and Van Buskirk, 2009b). One possible explanation for this finding is that Reg. FD increased the risk of "stand alone" earnings disclosures, (those made separate from earnings announcements) causing firms to bundle these disclosures with other announcements to a greater extent.[32] We investigate this idea further below by interacting the Reg. FD dummy with our proxies for litigation risk.

The next two specifications in Table 8, Panel B include the two alternative litigation risk proxies. In each case, we include litigation risk as a main effect as well as including interactions with the earnings news quintiles and the Reg. FD dummy. Because conventional logit coefficients and standard errors are incorrect for interaction terms in non-linear regressions (Ai and Norton, 2003), we also report and discuss mean

[32] This is consistent with the idea in Rogers and Van Buskirk (2009a) that managers of firms that have been sued actually reduce subsequent disclosure, apparently as a defense against future litigation.

marginal effects and Z-statistics for these interaction terms. Our main interest is in comparing results for the two litigation proxies.

We first discuss results for the regression that uses the FPS dummy variable to measure litigation risk. The results show that the coefficients on the earnings news main effects are not greatly affected by the inclusion of the litigation risk proxy, including the associated interaction terms. The coefficient on the FPS litigation risk main effect is positive and significant (Z-statistic of 2.35), suggesting that this measure of litigation risk increases the tendency of managers to predisclose earnings news. Interestingly, the Reg. FD/litigation risk interaction effect is positive and significant (mean marginal effect of .020, mean Z-statistic of 3.46)[33]—suggesting that litigation risk increases managers' general tendency to predisclose earnings news after Reg. FD—while the overall effect of Reg. FD remains negative, in fact more strongly so than in the first specification.

The results of primary interest, however, are those on the litigation risk/earnings news interactions. These are consistent with our expectations to the extent that the FPS dummy captures litigation risk: we find that the marginal effect for the quintile 1 earnings news interaction is positive and significant (mean marginal effect of 0.046, mean Z-statistic of 5.52)—implying that higher litigation risk increases managers' tendency to predisclose adverse earnings news—that that for quintile 2 is also positive but smaller and less significant (mean marginal effect of 0.028, mean Z-statistic of 3.53) but that those for quintiles 3 and 4 are not significantly positive (the mean marginal effect for

[33] The analyses suggested by Ai and Norton (2003) result in a *distribution* of marginal effects with associated distributions of standard errors and Z-statistics (rather than just one of each). We choose to simply report the mean of these distributions. Plots of the interaction effects and associated Z-statistics are available upon request but are not included since there are five sets of plots for each regression (i.e., one set for each interaction term). In general, these plots indicate that inferences obtained from the mean Z-statistics are consistent with those obtained from analyzing the distribution of Z-statistics, i.e., when the mean Z-statistic is larger than 1.96 in absolute value we tend to find that all or the large majority of Z-statistics in the distribution are also of the same sign and larger than 1.96 in absolute value.

quintile 3 is reliably negative while that for quintile 4 is close to zero and insignificant). The coefficients on the control variables are similar to those reported in the baseline regression except that the coefficient on firm size is now positive and statistically significant.

We now turn to the results for the specification that uses the predicted probability of litigation (from our logit model) to measure litigation risk. The results for the earnings news main effects are similar to those for the previous specifications. Interestingly, however, the litigation risk main effect is insignificant in this regression, inconsistent with the corresponding result for the FPS measure (which was positive and significant). Further, the Reg. FD/litigation risk interaction is negative and strongly significant here, opposite to the corresponding result for the FPS variable (the mean marginal effect is -0.091 with a mean Z-statistic of -3.33). This suggests that litigation risk *reduces* the general tendency of managers to predisclose earnings news after Reg. FD. This is expected if managers perceived that Reg. FD increased the litigation risk of stand-alone earnings news generally (i.e., without conditioning on earning news).

The results of primary interest are again those on the earnings news interaction terms. Similar to the corresponding results for the FPS proxy, the coefficients on the interactions for news quintiles 1 and 2 are positive and statistically significant. However, the marginal effects show that these results are noticeably stronger than those for the FPS proxy, which we interpret as evidence in favor of the estimated litigation risk proxy. The mean marginal effect for the quintile 1 interaction is 0.216 (mean Z-statistic of 5.35), more than four times larger than the corresponding mean marginal effect for the FPS measure (of 0.046). Similarly, the mean marginal effect for the quintile 2 interaction is

0.169 (mean Z-statistic of 3.87) which is five times larger than the corresponding marginal effect for the FPS measure. The interaction terms on quintiles 3 and 4 are positive but only weakly significant (mean Z-statistics of 1.07 and 1.78, respectively), as we might expect since the argument applies only to adverse earnings news.

Overall, we interpret this evidence as supporting our principal thesis that a direct approach to measuring litigation risk outperforms the simple FPS industry dummy approach in a setting which prior evidence indicates that litigation risk is likely to play a major role. First, the coefficients on the adverse earnings news interaction terms (those for earnings quintiles 1 and 2) are substantially larger when we use our estimated litigation risk measure. Second, once the effect of adverse news is controlled for, we believe that litigation risk likely has a *dampening* effect on managers' overall tendency to predisclose earnings news after Reg. FD, consistent with the negative coefficient on the Reg. FD interaction. In contrast, the positive Reg. FD interaction observed for the FPS proxy makes less sense to us, raising questions about whether it is capturing something other than litigation risk. A similar type of comment applies to the main effect on litigation risk, which is not significant for our measure but positive for the FPS measure—we view the former result as more sensible because it is not clear why litigation risk would increase managers' *overall* tendency to predisclose earnings news.

6. Conclusion

We provide evidence on the validity of the simple industry-based litigation risk proxy commonly used in previous research. We provide three principal empirical findings. First, we show that industry membership generally is a noisy proxy for litigation risk; rates of litigation vary significantly across industries from one year to the next. We show that litigation rates in the four industries (biotechnology, computers, electronics, and retail) commonly perceived as having high litigation risk are, in actuality, not much different to those of other industries. In some years, other industries display noticeably higher litigation rates than those in the "high litigation" industries. These results cast doubt on whether the simple litigation risk proxy is a useful measure of litigation risk.

Second, we estimate logit models of litigation risk that include the industry-based litigation proxy often used in previous research along with other hypothesized determinants of litigation. We find that the industry-based measure is significantly related to litigation risk in a statistical sense but that this variable does not discriminate in an economically meaningful way between firm/years subject to litigation and those that are not. In contrast, the other hypothesized determinants of litigation risk significantly improve these models' ability to predict litigation. We find that the significance of the industry-based litigation proxy is substantially reduced, sometimes to the point of insignificance, once these economic determinants are included in the model.

Third, we compare the effectiveness of the industry-based proxy for litigation risk to our estimated litigation probabilities in a research setting where litigation risk is likely to play an important role—managers' tendency to predisclose adverse earnings news.

Consistent with our other evidence, we find that our logit-based estimates of litigation risk do a better job of capturing litigation risk than the industry-based proxy.

We see our results as important because an extensive amount of research in accounting and finance examines whether litigation risk affects corporate decisions, including those related to compensation, financial reporting and disclosure, project selection, raising capital, and so on. In spite of this, current technology for measuring litigation risk seems relatively crude, a situation that we believe can be improved through the use of measures such as those that we discuss here.

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Figure 1
Number of Lawsuit Filings by Year

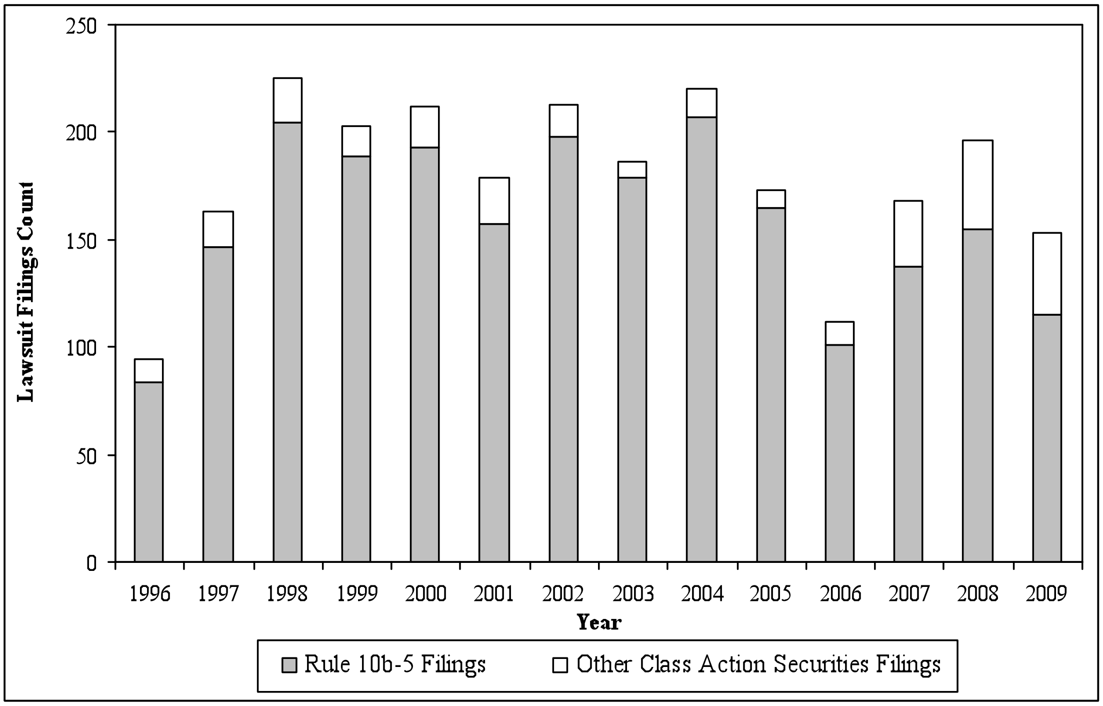

Figure 2
Receiver Operating Characteristic (ROC) Curve for Models in Table 6

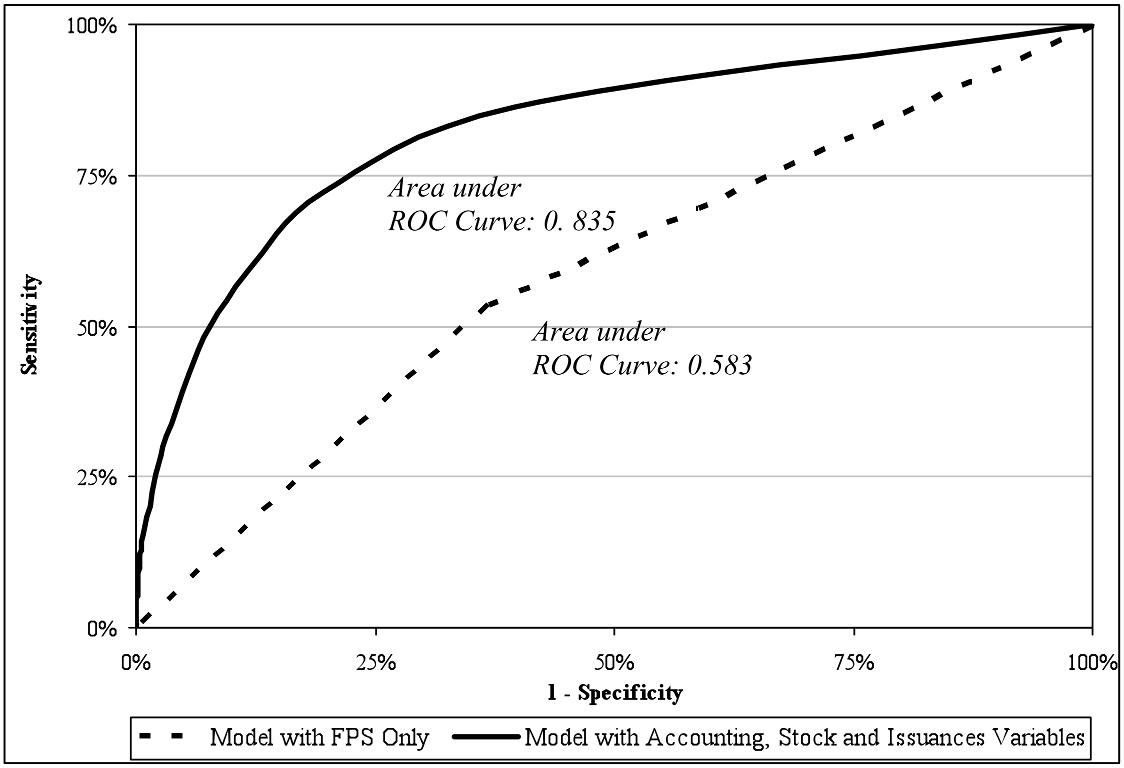

Table 1
Number and Percentage of Lawsuits by Year and Sector

Panel A: Number of Lawsuits by Year and Sector

Sector	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	Total
Basic Materials	2	7	4	5	6	6	3	7	5	7	2	2	7	7	70
Capital Goods	4	4	3	5	4	4	5	5	11	0	4	6	6	3	64
Conglomerates	0	1	0	3	2	1	3	3	1	1	0	0	2	3	20
Consumer Cyclical	3	11	11	19	10	10	4	9	8	13	5	6	3	4	116
Consumer Non-Cyclical	6	4	5	11	8	5	4	7	5	6	4	4	9	3	81
Energy	2	1	2	4	2	1	6	2	6	2	2	4	6	2	42
Financial	10	18	22	22	27	13	28	26	34	26	12	40	89	67	434
Healthcare	11	17	36	22	19	17	31	38	39	31	19	26	23	22	351
Services	20	37	52	51	47	38	52	38	46	31	23	44	19	21	519
Technology	32	58	81	59	78	76	53	45	55	53	39	33	27	14	703
Transportation	2	3	4	2	3	4	2	1	6	1	2	1	2	0	33
Utilities	0	2	4	0	6	4	21	5	4	1	0	2	3	1	53
No Sector Provided	2	0	1	0	0	0	1	0	0	1	0	0	0	6	11
Total Filings by Year	94	163	225	203	212	179	213	186	220	173	112	168	196	153	2,497
% of Filings Alleging Rule 10b-5 Violation	89%	90%	91%	93%	91%	88%	93%	96%	94%	95%	90%	82%	79%	75%	89%

The lawsuits in Table 1 are lawsuits filed against publicly-held firms and exclude IPO allocation, mutual fund, and analyst lawsuits.

Table 1
Number and Percentage of Lawsuits by Year and Sector
Continued

Panel B: Percentage of Lawsuits by Year and Sector

Sector	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	All Yrs
Basic Materials	2%	5%	2%	2%	2%	4%	2%	3%	2%	4%	2%	0%	4%	5%	3%
Capital Goods	5%	3%	1%	3%	2%	2%	3%	3%	5%	0%	4%	4%	3%	2%	3%
Conglomerates	0%	1%	0%	1%	1%	1%	2%	2%	1%	1%	0%	0%	1%	3%	1%
Consumer Cyclical	4%	7%	5%	9%	5%	6%	2%	5%	4%	7%	3%	3%	2%	4%	5%
Consumer Non-Cyclical	6%	3%	2%	6%	4%	3%	2%	4%	2%	4%	4%	3%	5%	2%	3%
Energy	1%	1%	0%	2%	1%	1%	3%	1%	2%	1%	2%	2%	3%	1%	2%
Financial	11%	11%	10%	11%	12%	6%	12%	14%	13%	14%	11%	24%	40%	34%	15%
Healthcare	11%	10%	17%	12%	9%	8%	15%	21%	18%	19%	16%	19%	14%	17%	15%
Services	21%	19%	24%	24%	21%	21%	24%	19%	22%	16%	22%	25%	12%	16%	21%
Technology	35%	37%	35%	29%	38%	42%	24%	24%	26%	31%	34%	18%	15%	11%	29%
Transportation	2%	2%	2%	1%	2%	3%	1%	1%	3%	1%	2%	1%	0%	0%	1%
Utilities	0%	1%	1%	0%	3%	3%	10%	3%	2%	1%	0%	1%	1%	1%	2%
No Sector Provided	2%	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	4%	0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

The lawsuits in Table 1 are lawsuits filed against publicly-held firms and exclude IPO allocation, mutual fund, and analyst lawsuits.

Table 2
Number and Percentage of Unique Companies Subject to Filings by Year and Industry

Panel A: Number of Unique Companies Subject to Filings by Year and Industry

SIC	Industry Name	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
10	Metal Mining	0	1	0	0	1	0	2	1	0	2	0	0	1	8
15	Building Construction	0	0	0	0	0	0	0	0	1	0	0	4	0	5
16	Heavy Construction	0	1	0	0	0	0	0	0	1	1	0	0	0	3
23	Apparel	0	2	0	2	1	1	0	1	0	1	0	1	2	11
24	Lumber and Wood Products	0	0	0	1	0	1	0	0	0	1	0	0	0	3
26	Paper and Allied Products	0	0	0	0	0	0	0	2	0	0	0	0	1	3
31	Leather	0	0	0	1	1	0	0	1	0	0	1	0	0	4
32	Stone, Glass, Clay, Concrete	0	0	1	0	0	1	0	0	0	0	0	0	0	2
37	Transportation Equipment	0	1	1	5	4	0	2	0	1	1	0	0	4	19
39	Misc. Manufacturing Inds.	0	0	1	1	1	0	0	1	1	0	0	3	0	8
40	Rail Road Transportation	0	1	0	0	0	0	0	0	0	0	0	0	0	1
42	Motor Freight Transportation	0	0	0	2	0	0	0	0	2	0	0	0	0	4
44	Water Transportation	0	0	0	0	1	0	0	0	1	0	0	1	0	3
47	Transportation Services	0	1	0	0	0	0	1	0	0	0	0	0	0	2
49	Electric, Gas, Sanitary Services	0	2	1	2	5	3	15	6	5	0	0	0	2	41
51	Wholesale Trade, Nondurable Goods	1	0	0	0	5	0	3	1	1	5	2	0	0	18
53	General Merchandise Stores	0	1	0	0	0	0	3	0	3	0	0	1	1	9
54	Food Stores	0	1	0	0	0	0	1	2	1	1	0	0	0	6
56	Apparel and Accessory Stores	0	1	0	0	2	0	0	1	0	2	1	0	3	10
57	Home Furniture, Furnishings, Equip.	0	0	1	0	0	1	0	0	1	0	0	1	0	4
59	Miscellaneous Retail	1	1	1	4	3	4	1	3	3	2	3	2	2	30
61	Nondepository Credit Institutions	0	2	2	2	2	0	5	3	2	2	1	4	5	30
62	Security and Commodity Brokers	0	0	1	3	2	1	0	3	5	5	0	5	11	36
63	Insurance Carriers	0	4	1	2	4	2	2	7	5	5	5	5	10	52
64	Insurance Agents, Brokers	0	0	1	0	0	0	1	0	4	3	0	0	0	9
72	Personal Services	0	0	0	2	1	1	0	2	0	1	1	0	0	8
73	Business Services	4	10	16	22	21	19	15	13	33	16	7	10	9	195
78	Motion Pictures	0	0	0	0	0	0	0	1	1	4	0	0	0	6
80	Health Services	2	0	3	2	1	3	7	1	7	0	0	2	1	29
82	Educational Services	0	0	1	0	0	0	1	1	1	2	0	1	0	7
99	Nonclassifiable Establishments	0	0	0	0	1	0	1	2	1	1	0	0	2	8
	Total Filings by Year	25	56	73	96	91	81	116	105	136	116	69	97	116	1,177

The lawsuits in Table 2 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) and exclude IPO allocation, mutual fund, and analyst lawsuits listed by 2-digit SIC code and year. To make the table wieldier, we only report those industries where litigation rates exceed 5% in at least one year and eliminate industries with less than ten firms. However, these observations are retained in the overall filings count at the bottom of the table.

Table 2
Number and Percentage of Unique Companies Subject to Filings by Year and Industry
Continued

Panel B: Percentage of Unique Companies Subject to Filings by Year and Industry

SIC	Industry Name	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	All Yrs
10	Metal Mining	0%	3%	0%	0%	3%	0%	6%	3%	0%	6%	0%	0%	3%	1.9%
15	Building Construction	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	19%	0%	1.7%
16	Heavy Construction	0%	6%	0%	0%	0%	0%	0%	0%	8%	8%	0%	0%	0%	1.6%
23	Apparel	0%	6%	0%	5%	3%	3%	0%	3%	0%	3%	0%	4%	7%	2.6%
24	Lumber and Wood Products	0%	0%	0%	5%	0%	5%	0%	0%	0%	6%	0%	0%	0%	1.1%
26	Paper and Allied Products	0%	0%	0%	0%	0%	0%	0%	6%	0%	0%	0%	0%	3%	0.6%
31	Leather	0%	0%	0%	7%	7%	0%	0%	7%	0%	0%	7%	0%	0%	2.2%
32	Stone, Glass, Clay, Concrete	0%	0%	3%	0%	0%	5%	0%	0%	0%	0%	0%	0%	0%	0.7%
37	Transportation Equipment	0%	1%	1%	6%	5%	0%	3%	0%	1%	1%	0%	0%	5%	1.7%
39	Misc. Manufacturing Inds.	0%	0%	3%	3%	3%	0%	0%	3%	3%	0%	0%	9%	0%	1.8%
40	Rail Road Transportation	0%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0.6%
42	Motor Freight Transportation	0%	0%	0%	5%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0.9%
44	Water Transportation	0%	0%	0%	0%	5%	0%	0%	0%	3%	0%	0%	2%	0%	0.7%
47	Transportation Services	0%	6%	0%	0%	0%	0%	6%	0%	0%	0%	0%	0%	0%	1.0%
49	Electric, Gas, Sanitary Services	0%	1%	1%	1%	3%	2%	10%	4%	3%	0%	0%	0%	1%	1.9%
51	Wholesale Trade, Nondurable Goods	2%	0%	0%	0%	9%	0%	6%	2%	2%	12%	4%	0%	0%	2.7%
53	General Merchandise Stores	0%	3%	0%	0%	0%	0%	10%	0%	11%	0%	0%	5%	5%	2.5%
54	Food Stores	0%	3%	0%	0%	0%	0%	4%	9%	5%	5%	0%	0%	0%	2.0%
56	Apparel and Accessory Stores	0%	2%	0%	0%	5%	0%	0%	2%	0%	5%	2%	0%	7%	1.8%
57	Home Furniture, Furnishings, Equip.	0%	0%	6%	0%	0%	6%	0%	0%	6%	0%	0%	6%	0%	1.7%
59	Miscellaneous Retail	1%	1%	1%	5%	4%	6%	1%	4%	4%	3%	4%	3%	3%	3.0%
61	Nondepository Credit Institutions	0%	4%	4%	4%	5%	0%	13%	7%	4%	4%	2%	8%	10%	5.0%
62	Security and Commodity Brokers	0%	0%	2%	4%	3%	2%	0%	6%	9%	8%	0%	6%	15%	4.4%
63	Insurance Carriers	0%	2%	1%	1%	3%	1%	1%	5%	3%	3%	3%	3%	7%	2.6%
64	Insurance Agents, Brokers	0%	0%	3%	0%	0%	0%	4%	0%	15%	12%	0%	0%	0%	2.6%
72	Personal Services	0%	0%	0%	14%	8%	8%	0%	15%	0%	7%	7%	0%	0%	4.4%
73	Business Services	1%	2%	3%	3%	3%	4%	3%	2%	6%	3%	1%	2%	2%	2.8%
78	Motion Pictures	0%	0%	0%	0%	0%	0%	0%	7%	6%	27%	0%	0%	0%	2.7%
80	Health Services	2%	0%	4%	3%	2%	4%	10%	1%	10%	0%	0%	3%	2%	3.2%
82	Educational Services	0%	0%	7%	0%	0%	0%	7%	7%	6%	11%	0%	5%	0%	3.2%
99	Nonclassifiable Establishments	0%	0%	0%	0%	9%	0%	8%	15%	9%	9%	0%	0%	13%	5.2%
	Total % Sued by Year	0.3%	0.9%	1.2%	1.7%	1.6%	1.5%	2.2%	2.0%	2.5%	2.1%	1.2%	1.8%	2.2%	1.6%

The lawsuits in Table 2 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) and exclude IPO allocation, mutual fund, and analyst lawsuits listed by 2-digit SIC code and year. To make the table wieldier, we only report those industries where litigation rates exceed 5% in at least one year and eliminate industries with less than ten firms. However, these observations are retained in the overall litigation rates at the bottom of the table.

Table 2
Number and Percentage of Unique Companies Subject to Filings by Year and Industry
Continued

Panel C: Number of Unique Firms Subject to Lawsuit Filings in FPS High Technology Classification

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
Biotech	2	0	7	7	6	9	10	15	18	12	8	15	8	117
Computers	7	18	23	23	26	23	16	12	28	16	9	7	8	216
Electronics	2	3	7	3	4	12	11	12	8	11	8	13	7	101
Retail	1	4	3	4	5	5	5	5	9	7	3	6	7	64
# FPS Firms Sued	12	25	40	37	41	49	42	44	63	46	28	41	30	498
# non-FPS Firms Sued	8	27	29	57	48	31	73	59	70	66	37	53	83	641

Biotech firms are classified as firms in SIC Codes 2833-2838 and 8731-8734; Computer firms are firms in SIC codes 3570-3577 and 7370-7374; Electronics firms are firms in SIC codes 3600-3674, and Retail firms are firms in SIC Codes 5200-5961. The lawsuits in Table 2 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) and exclude IPO allocation, mutual fund, and analyst lawsuits listed by year.

Panel D: Percentage of Unique Firms Subject to Lawsuit Filings in FPS High Technology Classification

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	All Yrs
Biotech	0.7%	0.0%	2.4%	2.4%	1.9%	2.9%	3.2%	4.9%	5.4%	3.6%	2.3%	4.2%	2.4%	2.8%
Computers	1.4%	3.3%	4.2%	3.7%	4.0%	4.5%	2.9%	2.3%	5.5%	3.3%	2.0%	1.6%	1.8%	3.2%
Electronics	0.7%	1.0%	2.3%	1.0%	1.2%	3.9%	3.5%	3.9%	2.5%	3.4%	2.5%	4.1%	2.3%	2.5%
Retail	0.3%	1.4%	1.0%	1.4%	1.8%	1.9%	1.9%	1.9%	3.4%	2.7%	1.1%	2.4%	2.9%	1.8%
FPS Firms % Sued	0.9%	1.7%	2.8%	2.5%	2.6%	3.5%	2.9%	3.1%	4.4%	3.3%	2.0%	3.0%	2.3%	2.7%
Non-FPS Firms % Sued	0.2%	0.6%	0.7%	1.4%	1.2%	0.8%	1.9%	1.5%	1.8%	1.7%	0.9%	1.3%	2.1%	1.2%
Chi-Squared between FPS and non FPS % Sued	3.83	3.90	6.35	2.86	3.77	7.10	2.28	3.67	5.41	3.61	3.17	3.94	0.25	13.68

Biotech firms are classified as firms in SIC Codes 2833-2838 and 8731-8734; Computer firms are firms in SIC codes 3570-3577 and 7370-7374; Electronics firms are firms in SIC codes 3600-3674, and Retail firms are firms in SIC Codes 5200-5961. The lawsuits in Table 2 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) and exclude IPO allocation, mutual fund, and analyst lawsuits listed by year.

Table 3
Number and Percentage of Unique Companies Subject to Filings by Year and Industry for Large Firms

Panel A: Number and Percentage of Companies Subject to Filings by Industry for Large Firms

SIC	Industry Name	Number	% Sued
10	Metal Mining	42	0.0%
20	Food and Kindred Products	78	2.6%
28	Chemicals and Allied Products	170	8.2%
29	Petroleum Refining and Related Industries	172	1.2%
33	Primary Metal Industries	30	0.0%
35	Industrial and Commercial Machinery	90	7.8%
36	Electronic and Other Electrical Equipment	112	4.5%
37	Transportation Equipment	123	6.5%
38	Measuring, Analyzing, Controlling Instruments	33	9.1%
40	Rail Road Transportation	43	2.3%
48	Communications	386	3.4%
49	Electric, Gas, Sanitary Services	254	5.5%
53	General Merchandise Stores	46	4.3%
60	Depository Institutions	733	3.0%
61	Nondepository Credit Institutions	119	11.8%
62	Security and Commodity Brokers	94	23.4%
63	Insurance Carriers	426	5.6%
73	Business Services	41	7.3%
99	Nonclassifiable Establishments	61	13.1%

The lawsuits in Table 2 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) above the 95th percentile in size, and exclude IPO allocation, mutual fund, and analyst lawsuits listed by year. To be included in this table, the observation count must be at least 20. Some industries that are included in Table 3 but not in table 2 is due to the fact that the minimum % sued in Table 2 criteria is 5% in any year.

Table 3
Number and Percentage of Unique Companies Subject to Filings by Year and Industry for Large Firms
Continued

Panel B: Percentage of Companies Subject to Filings by Year for Large Firms in the FPS High Technology Classification

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	All Yrs
Biotech	0%	0%	0%	0%	0%	0%	30%	10%	8%	10%	10%	50%	9%	10%
Computers	0%	0%	13%	25%	20%	11%	0%	0%	14%	14%	13%	0%	11%	10%
Electronics	0%	0%	0%	0%	0%	11%	11%	0%	11%	0%	0%	22%	0%	4%
Retail	0%	14%	0%	0%	0%	0%	20%	0%	25%	0%	0%	25%	0%	6%
All Large Firms % Sued	0.8%	1.9%	0.8%	4.9%	5.4%	3.3%	12.2%	5.8%	7.8%	4.1%	2.1%	6.6%	12.7%	5.1%
FPS % Large Firms Sued	0.0%	3.0%	2.9%	6.3%	5.7%	6.3%	16.7%	3.2%	12.5%	7.1%	6.3%	26.7%	6.3%	7.8%
Non-FPS % Large Firms Sued	0.9%	1.7%	0.4%	4.7%	5.3%	2.8%	11.6%	6.2%	7.0%	3.7%	1.4%	3.8%	13.7%	4.8%
Chi-Squared between FPS and non FPS % Large Firms Sued	2.58	0.54	1.58	0.37	0.10	1.01	0.79	-0.65	1.08	0.87	1.80	4.71	-1.18	2.58

Biotech firms are classified as firms in SIC Codes 2833-2838 and 8731-8734; Computer firms are firms in SIC codes 3570-3577 and 7370-7374; Electronics firms are firms in SIC codes 3600-3674, and Retail firms are firms in SIC Codes 5200-5961. The lawsuits in Table 3 are lawsuits filed against publicly-held firms (with shares listed on the NYSE, ASE, or NASDAQ) above the 95th percentile in size, and exclude IPO allocation, mutual fund, and analyst lawsuits listed by year.

Table 4
Progression of Observations to Useable Observations

Lawsuit filings spanning 1996–2008 from Stanford Law School *Securities Class Action Clearinghouse*	2,883
Less: Non rule 10b-5 violation cases	(120)
Less: Filings against private companies or filings against firms not listed on the NYSE, ASE, or NASDAQ	(394)
Less: IPO allocation cases, mutual fund, and analyst cases	(210)
Less: firm-years for which the *Compustat, Crsp* data items are not available	(1,505)
Total useable lawsuit filings	654
Total useable lawsuit filing firm-years (a class period occurred during the firm-year)	1,226
Firm-years for which no lawsuit filing/class period occurred	27,088
Total useable observations	28,314

Table 5
Prediction Model Under Which Membership in the FPS Industries is Interpreted as Predicting a Lawsuit

	Lawsuit Filing	No Lawsuit Filing	
Hitech FPS = 1	656	9,977	10,633
Hitech FPS = 0	570	17,111	17,681
	1,226	27,088	
Hitech FPS Predicts Lawsuit	9,977/(9,977+17,111)		37.55%
Correct Classification	(656+17,111)/(1,226+27,088)		62.75%
Sensitivity	656/1,226		53.51%
Specificity	17,111/27,088		63.17%
Type I Error	9,977/10,633		93.83%
Type II Error	570/17,681		3.22%
Goodman and Kruskal Gamma Statistic			0.0049

Hitech FPS is set to 1 for biotech firms (S`IC codes 2833-2836 and 8731-8734), computer firms (3570-3577 and 7370-7374), electronics firms (3600-3674), and retail firms (5200-5961), and 0 otherwise.

Table 6
Models of Litigation Risk

	Coefficient	Marginal Effects	Coefficient	Marginal Effects
INTERCEPT	−3.402***		−6.383***	
HITECH FPS	0.680***	*0.028*	0.233**	*0.008*
NYSE			0.404***	*0.014*
LNASSETS			0.238***	*0.008*
WC			−0.151	*−0.005*
ROA			−0.195	*−0.007*
SALES GROWTH			0.822***	*0.029*
R&D			0.575	*0.020*
GOODWILL			0.467**	*0.017*
PP&E			−0.603***	*−0.021*
ALTMAN Z			0.012***	*0.0004*
MB			0.069***	*0.002*
RETURN			−0.794***	*−0.028*
RETURN SKEWNESS			−0.266***	*−0.009*
RETURN STD DEV			4.057	*0.144*
TURNOVER			0.0004***	*0.00001*
USINCORP			0.077	*0.003*
EQUITY PROCEEDS			0.416***	*0.015*
DEBT PROCEEDS			2.344**	*0.083*
Pseudo R^2 (McFadden)		1.33%		20.98%
Pseudo R^2 (Cox-Snell)		0.47%		7.21%
Likelihood Ratio		134.23		2,118.33
Hosmer-Lemeshow Chi-Square		0.000		9.714
		[0.000]		[0.286]
Observation Count		28,314		28,314

***, **, and * indicate p-values of 1%, 5%, and 10% respectively. The p-values are based on robust standard errors that control for heteroskedasticity and serial correlation. Marginal effects of the coefficients are reported below the coefficients.

Table 6
Models of Litigation Risk
Continued

$$SUED = \beta_0 + \beta_1(HITECH\ FPS) + \varepsilon \quad [1]$$

$$SUED = \beta_0 + \beta_1(HITECH\ FPS) + \beta_2(NYSE) + \beta_3(LNASSETS) + \beta_4(WC) + \beta_5(ROA) + \beta_6(SALES\ GROWTH) + \beta_7(R\&D) + \beta_8(GOODWILL) + \beta_9(PP\&E) + \beta_{10}(ALTMAN\ Z) + \beta_{11}(MB) + \beta_{12}(RETURN) + \beta_{13}(RETURN\ SKEWNESS) + \beta_{14}(RETURN\ STD\ DEV) + \beta_{15}(TURNOVER) + \beta_{16}(USINCORP) + \beta_{17}(EQUITY\ PROCEEDS) + \beta_{18}(DEBT\ PROCEEDS) + \varepsilon \quad [2]$$

The variables are defined as

SUED	equals 1if a class period of a lawsuit filing occurred during the year, and 0 otherwise;
HITECH FPS	equals 1the firm is in the biotech (SIC codes 2833-2836 and 8731-8734), computer (3570-3577 and 7370-7374), electronics (3600-3674), or retail (5200-5961) industry, and 0 otherwise;
NYSE	equals 1if the firm is listed on the New York Stock Exchange, and 0 otherwise;
LNASSETS	is the natural log of total assets;
WC	is working capital accruals (current assets – current liabilities) scaled by beginning of year total assets;
ROA	is return on assets, defined as net income scaled by beginning of year total assets;
SALES GROWTH	is current year sales less prior year sales scaled by beginning of year total assets;
R&D	is research and development expenses scaled by beginning of year total assets;
GOODWILL	is goodwill scaled by beginning of year total assets;
PP&E	is property, plant and equipment scaled by beginning of year total assets;
ALTMAN Z	is the Altman (1968) Z score;
MB	is the market value of equity scaled by book value of equity;
RETURN	is the market-adjusted 12-month stock return. For sued firms, the accumulation period ends with the lawsuit class period end month. For non sued firms, the accumulation period ends with the fiscal year-end month;
RETURN SKEWNESS	is the skewness of the firm's 12-month returns;
RETURN STD DEV	is the standard deviation of the firm's 12-month returns;
TURNOVER	is the trading volume accumulated over the 12-month period ending with the lawsuit class period end month (for sued firms), and the fiscal year-end month (for non sued firms) scaled by beginning of the year shares outstanding. Note that the coefficient on TURNOVER is multiplied by 1000 for expositional convenience;
USINCORP	equals 1if the firm is incorporated in the United States, and 0 otherwise;
EQUITY PROCEEDS	is the dollar amount of equity proceeds issued by the firm during the current and prior year scaled by beginning of year total assets; and
DEBT PROCEEDS	is the dollar amount of public debt proceeds issued by the firm during the current and prior year scaled by beginning of year total assets.

Table 7
Models of Litigation Risk with Subperiods

	All Years		Subperiod 1: 1996–2003		Subperiod 2: 2004–2008	
	Model [1]	Model [3]	Model [1]	Model [3]	Model [1]	Model [3]
INTERCEPT	–3.338***	–7.930***	–3.261***	–6.986***	–3.500***	-10.288***
HITECH FPS	0.693***	0.114	0.789***	0.152	0.457***	0.033
	0.028	*0.004*	*0.028*	*0.006*	*0.015*	*0.001*
NYSE		0.320***		0.384***		–0.094
		0.011		*0.014*		*–0.003*
LNASSETS		0.404***		0.358***		0.543***
		0.014		*0.013*		*0.015*
SALES GROWTH		0.746***		0.689***		0.799***
		0.025		*0.025*		*0.022*
R&D		0.818*		0.461		1.665**
		0.028		*0.017*		*0.045*
MB		0.076***		0.072***		0.086***
		0.003		*0.003*		*0.002*
RETURN		–0.666***		–0.645***		–0.981
		–0.023		*–0.024*		–0.027
RETURN SKEWNESS		–0.331***		–0.413***		–0.171**
		–0.011		*–0.015*		–0.005
RETURN STD DEV		2.491***		–6.653		36.658***
		0.426		*–0.243*		*1.000*
TURNOVER		0.0004***		0.0006***		0.0004***
		0.00002		*0.00002*		*0.00001*
EQUITY PROCEEDS		0.535***		0.559***		0.665**
		0.018		*0.020*		*0.018*
DEBT PROCEEDS		2.167***		0.394		1.556
		0.074		*0.014*		*0.042*
INST		–0.017		0.068		0.885***
		–0.0006		*0.002*		*0.024*
INSIDER TRADING		–0.019*		–0.004		–0.035
		–0.001		*–0.00015*		*–0.001*
INSIDER HOLDING		1.137		0.530		3.694***
		0.039		*0.019*		*0.101*
Pseudo R^2 (McFadden)	1.33%	23.81%	1.33%	25.96%	1.33%	24.55%
Pseudo R^2 (Cox-Snell)	0.45%	8.07%	0.65%	9.47%	0.47%	6.98%
Area Under ROC Curve	0.576	0.853	0.587	0.857	0.549	0.853
Likelihood Ratio	157.6	2,963.1	148.4	2,280.7	18.5	888.8
Hosmer-Lemeshow χ^2	0.000	12.200	0.000	27.363	0.000	5.474
	[0.000]	[0.143]	[0.000]	[0.001]	[0.000]	[0.706]

Observation Count	35,204	35,204	22,928	22,928	12,276	12,276

***, **, and * indicate p-values of 1%, 5%, and 10% respectively. The p-values are based on robust standard errors that control for heteroskedasticity and serial correlation. Marginal effects of the coefficients are reported below the coefficients.

$$SUED = \beta_0 + \beta_1(HITECH\ FPS) + \varepsilon \qquad [1]$$

$$SUED = \beta_0 + \beta_1(HITECH\ FPS) + \beta_2(NYSE) + \beta_3(LNASSETS) + \beta_4(SALES\ GROWTH) + \beta_5(R\&D) + \beta_6(MB) + \beta_7(RETURN) + \beta_8(RETURN\ SKEWNESS) + \beta_9(RETURN\ STD\ DEV) + \beta_{10}(TURNOVER) + \beta_{11}(EQUITY\ PROCEEDS) + \beta_{12}(DEBT\ PROCEEDS) + \beta_{13}(INST) + \beta_{14}(INSIDER\ TRADING) + \beta_{15}(INSIDER\ HOLDING) + \varepsilon \qquad [3]$$

The variables are defined as

SUED	equals 1if a class period of a lawsuit filing occurred during the year, and 0 otherwise;
HITECH FPS	equals 1the firm is in the biotech (SIC codes 2833-2836 and 8731-8734), computer (3570-3577 and 7370-7374), electronics (3600-3674), or retail (5200-5961) industry, and 0 otherwise;
NYSE	equals 1if the firm is listed on the New York Stock Exchange, and 0 otherwise;
LNASSETS	is the natural log of total assets;
SALES GROWTH	is current year sales less prior year sales scaled by beginning of year total assets;
R&D	is research and development expenses scaled by beginning of year total assets;
MB	is the market value of equity scaled by book value of equity;
RETURN	is the market-adjusted 12-month stock return. For sued firms, the accumulation period ends with the lawsuit class period end month. For non sued firms, the accumulation period ends with the fiscal year-end month;
RETURN SKEWNESS	is the skewness of the firm's 12-month returns;
RETURN STD DEV	is the standard deviation of the firm's 12-month returns;
TURNOVER	is the trading volume accumulated over the 12-month period ending with the lawsuit class period end month (for sued firms), and the fiscal year-end month (for non sued firms) scaled by beginning of the year shares outstanding. Note that the coefficient on *TURNOVER* is multiplied by 1000 for expositional convenience;
EQUITY PROCEEDS	is the dollar amount of equity proceeds issued by the firm during the current and prior year scaled by beginning of year total assets;
DEBT PROCEEDS	is the dollar amount of public debt proceeds issued by the firm during the current and prior year scaled by beginning of year total assets;
INST	is the percentage of market value held by institutional investors;
INSIDER TRADING	is the average of the current and prior year insider sales net of acquisitions scaled by beginning of year revenue; and
INSIDER HOLDING	is the average of all insider shares held scaled by beginning of year total shares outstanding.

Table 8
Litigation Risk and Earnings Pre-Disclosure

Panel A: Descriptive Statistics of Pre-Disclosure Variables

	Obs Count	Mean	Median	Std Dev.
PREANN	90,633	0.119	0.000	0.323
NEWS	90,633	–0.006	0.010	0.113
RISK	90,633	0.054	0.027	0.086
NUMEST	90,633	6.753	5.000	5.414
FD	90,633	0.756	1.000	0.429

		Earnings News				
		Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5
NEWS	Mean	–0.158	–0.019	0.005	0.027	0.112
	Median	–0.100	–0.020	0.000	0.030	0.080
RISK	Mean	0.056	0.048	0.056	0.053	0.057
	Median	0.026	0.024	0.028	0.027	0.028
HITECH FPS	Mean	0.330	0.364	0.417	0.421	0.336
	Median	0.000	0.000	0.000	0.000	0.000

Table 8
Litigation Risk and Earnings Pre-Disclosure

Panel B The Likelihood of Earnings Pre-Disclosure

Base Model:

$$PREANN = \beta_0 + \beta_1(NEWS1) + \beta_2(NEWS2) + \beta_3(NEWS3) + \beta_4(NEWS4) + + \beta_5(LNMVE) + \beta_6(MB) + \beta_7(NUMEST) + \beta_8(FD) + \varepsilon \quad [4a]$$

With Hitech FPS:

$$PREANN = \beta_0 + \beta_{1\_4}(NEWS1-4) + \beta_5(HITECH\ FPS) + \beta_{6\_9}(HITECH\ FPS * NEWS1-4) + \beta_{10}(LNMVE) + \beta_{11}(MB) + \beta_{12}(NUMEST) + \beta_{13}(FD) + \beta_{13}(HITECH\ FPS * FD) + \varepsilon \quad [4b]$$

With Predicted Probability of Litigation Risk:

$$PREANN = \beta_0 + \beta_{1\_4}(NEWS1-4) + \beta_5(RISK) + \beta_{6\_9}(RISK * NEWS1-4) + \beta_{10}(LNMVE) + \beta_{11}(MB) + \beta_{12}(NUMEST) + \beta_{13}(FD) + \beta_{13}(RISK * FD) + \varepsilon \quad [4c]$$

	Model [4a]		Model [4b]		Model [4c]	
	Coeff.*	Z-statistic**	Coeff.*	Z-statistic**	Coeff.*	Z-statistic**
INTERCEPT	–2.519	*–42.34*	–2.720	*–41.08*	–2.501	*–39.91*
NEWS1	1.019	*33.00*	0.951	*24.05*	0.939	*25.39*
NEWS2	0.075	*2.00*	–0.048	*–0.96*	–0.020	*–0.44*
NEWS3	–0.336	*–9.61*	–0.259	*–5.66*	–0.367	*–8.71*
NEWS4	–0.184	*–4.96*	–0.238	*–4.74*	–0.233	*–5.24*
HITECH FPS			0.157	*2.35*		
RISK					0.064	*0.17*
*HITECH FPS * NEWS1*			0.046	*5.52*		
*HITECH FPS * NEWS2*			0.028	*3.53*		
*HITECH FPS * NEWS3*			–0.021	*–2.96*		
*HITECH FPS * NEWS4*			0.003	*0.44*		
*RISK * NEWS 1*					0.216	*5.35*
*RISK * NEWS 2*					0.169	*3.87*
*RISK * NEWS 3*					0.042	*1.07*
*RISK * NEWS 4*					0.073	*1.78*
LNMVE	0.011	*1.19*	0.047	*5.11*	0.010	*1.10*
MB	–0.013	*–4.49*	–0.021	*–6.72*	–0.015	*–4.97*
NUMEST	0.055	*22.05*	0.046	*17.76*	0.055	*21.10*
FD	–0.126	*–5.03*	–0.221	*–6.90*	–0.074	*–2.56*
*HITECH FPS * FD*			0.020	*3.46*		
*RISK * FD*					–0.091	*–3.33*
Pseudo R^2 (McFadden)	4.98%		5.55%		5.04%	
Pseudo R^2 (Cox-Snell)	3.56%		3.96%		3.61%	
Area Under ROC Curve	0.666		0.670		0.667	
Likelihood Ratio	3,284		3,660		3,328	
Hosmer-Lemeshow χ^2	122.9		71.46		144.4	
	[<.0001]		[<.0001]		[<.0001]	
Observation Count	90,633		90,633		90,633	

*** For interaction variables, the coefficient is the mean marginal effect from the Ai-Norton procedure. For stand-alone variables, the coefficient is the coefficient reported in the logit regression results.**

**** For interaction variables, the mean Z-statistic is reported in the Z-statistic column. For stand-alone variables, the Z-statistic from the logit regression results is reported in the Z-statistic column.**

The variables are defined as

PREANN	equals 1 if the firm's management issued a forecast anytime between the first day of the third month of the fiscal quarter to the earnings announcement date, and 0 otherwise;
NEWS	The First Call actual EPS less prevailing consensus analyst forecast at beginning of third month of fiscal quarter. Observations are excluded if the consensus analyst forecast was formed before the fiscal quarter end;
NEWS1-5	equal 1 if the earnings news (*NEWS*) is in the 1st – 5th quintile, respectively, and 0 otherwise.
HITECH FPS	equals 1the firm is in the biotech (SIC codes 2833-2836 and 8731-8734), computer (3570-3577 and 7370-7374), electronics (3600-3674), or retail (5200-5961) industry, and 0 otherwise;
RISK	is the predicted probability from the logit regression (2) in Table 6;
*HITECH FPS * NEWS1-5*	interaction term between *HITECH FPS* and *NEWS1-5*, respectively;
*RISK * NEWS1-5*	interaction term between *RISK* and *NEWS1-5*, respectively;
LNMVE	is the natural log of market value of equity;
MB	is the market value of equity scaled by book value of equity;
NUMEST	is the number of analyst forecasts that were used to form the consensus in the fiscal quarter;
FD	equals 1 if Regulation Fair Disclosure was in effect during the fiscal quarter (post 3rd quarter of 2000), and 0 otherwise.
*HITECH FPS * FD*	interaction term between *HITECH FPS* and *FD*; and
*RISK * FD*	interaction term between *RISK* and *FD*.