Managerial Opportunism? Evidence from Directors' and Officers' Insurance Purchases

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ABSTRACT

We analyze a sample of 72 IPO firms that went public between 1992 and 1996 for which we have detailed proprietary information about the amount and cost of D&O liability insurance. If managers of IPO firms are exploiting superior inside information, we hypothesize that the amount of insurance coverage chosen will be related to the post-offering performance of the issuing firm's shares. Consistent with the hypothesis, we find a significant negative relation between the three-year post-IPO stock price performance and the insurance coverage purchased in conjunction with the IPO. One plausible interpretation is that, like insider securities transactions, D&O insurance decisions reveal opportunistic behavior by managers. This provides some motivation to argue that disclosure of the details of D&O insurance decisions, as is required in some other countries, is valuable.

Corporate insiders are widely acknowledged to possess superior information about future prospects for the firms they manage, and to some degree to utilize that information to their private benefit. One well-known example that helps to establish this inference is that insider trades have been shown to contain information that helps to predict security returns. We refer to insiders' use of corporate information for private benefit as managerial opportunism. The managerial opportunism hypothesis says that rational managers, armed with superior information, choose to sell shares when the public valuation of the company's shares exceeds management's valuation estimate. In the context of insider trades, evidence by Seyhun (1986), Lee (1997), and Kahle (2000) provides support for the managerial opportunism hypothesis.

We test the managerial opportunism hypothesis in another context. We examine the decision that informed insiders make concerning the purchase of directors' and officers' (D&O) liability insurance around the time when a company is preparing to sell its initial public offering (IPO) of stock. If managers are behaving opportunistically and taking the company public when the IPO shares are overvalued, then we posit that rational managers will adjust other decisions they make to balance the costs and benefits of ex-

ploiting this overpricing. One cost of selling overvalued equity is that directors and officers face an increased likelihood of being sued by disgruntled stockholders. Directors' and officers' liability insurance protects directors and officers from financial loss in shareholder litigation. Therefore, if managers are behaving opportunistically in bringing the company public, we expect to find a negative relation between the amount of directors' and officers' insurance purchased and the stock price performance of the firm. As with insider selling, the D&O purchase decision is not readily observable ex ante to investors, since the details of the D&O insurance are not usually reported in the IPO prospectus.[1] However, unlike insider sales, the insurance decision has few disclosure requirements and is not the subject of civil and criminal laws, and is therefore potentially more revealing of managers' private information.

Using detailed proprietary information regarding insurance purchase amounts and annual premiums paid for a sample of 72 firms, we investigate whether the amount of D&O insurance coverage chosen by managers of IPO firms at the time of the IPO predicts post-IPO stock price performance. After controlling for other cross-sectional determinants of D&O insurance coverage, we find that there is a significant negative relation between the amount of D&O insurance purchased and subsequent firm performance. This evidence is consistent with the managerial opportunism story posited above.[2]

We also investigate the premiums paid for D&O insurance to test the managerial opportunism hypothesis. Managers exploiting private information are willing to pay abnormally high premiums because they benefit fully from the protection the insurance provides, but bear the cost of the insurance only in proportion to their fractional ownership of the firm's equity. Analyzing insurance premiums also can potentially reveal whether insurers are able to discern when managers' choice of the amount of insurance coverage reflects adverse private information. Conditional on managers selecting an abnormally high coverage level, an abnormally high premium charged to firms with poor future performance would be consistent with insurers being able to identify managers of firms with overpriced equity. Thus, payment of abnormally high premiums for D&O insurance by firms having poor post-IPO performance would be evidence consistent with the joint hypothesis that (a) managers have and use private information in their insurance decision, and (b) insurers can distinguish abnormally large insurance purchases driven by adverse information from those driven by abnormal risk aversion. Our evi-

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[1] Information about D&O insurance is also rarely provided or sought in pre-IPO "road show" presentations to prospective investors, according to knowledgeable industry sources.

[2] The evidence is also consistent with managerial opportunism that pertains to the insurance purchase decision but not to the timing of the IPO. That is, managers might be choosing to go public at the right time for capital infusion or other strategic reasons and purchase abnormally high insurance coverage only after observing an unexpectedly high offer price for the shares. Although we cannot empirically distinguish between these forms of hypothesized opportunism, if the purchase of D&O insurance does incorporate private information, its disclosure would inform shareholders.

dence does not support this joint hypothesis. The evidence from our first set of tests is consistent with managers choosing abnormally high D&O insurance coverage based on their belief that their shares are priced too high. However, in this sample, insurers do not charge abnormally high insurance premiums for coverage purchased in advance of poor performance. The only evidence we find consistent with insurers being able to uncover opportunistic managers is that insurers do appear to be able to predict those firms that, ex post, are the subjects of litigation and have purchased abnormally large amounts of D&O insurance.

The firms in our sample went public during the period 1992 through 1996. Although we show that, within their industry groups, there is nothing unusual about our sample firms, the limited sample size and the concentrated time period of the IPOs raise natural questions about the generality of our results. Balanced against these limitations is the availability of information about companies' D&O insurance that is not otherwise obtainable. Furthermore, and by coincidence, our time series straddles the period over which significant legislation was proposed and passed by the Congress in the Private Securities Litigation and Reform Act of 1995 (SLRA). One purpose of the SLRA was to deter class-action securities lawsuits in cases with questionable merit. We find evidence that the introduction of the SLRA is associated with a decline in D&O insurance premiums.

Our research provides a different test of managerial opportunism than the evidence in Ritter (1991) and Loughran and Ritter (1995), which report substantial underperformance following IPOs. More recent studies, such as Brav and Gompers (1997) and Eckbo, Masulis, and Norli (2000),[3] question the generality of the interpretation that IPOs are overpriced on average. While Loughran and Ritter conjecture that their evidence is consistent with the argument that managers exploit superior information in IPOs, that interpretation rests importantly on finding that *average* post-IPO performance is abnormal. Our analysis does not rely on an assumption that IPOs are overpriced on average. Whether average post-IPO stock price performance is abnormal or not, there are still differences in post-IPO performance across firms that we hypothesize are predicted by managers' decisions on the coverage and cost of D&O insurance.

Both managerial opportunism and D&O insurance have been subjects of earlier studies. However, our analysis brings a unique data set to bear on an interesting intersection of the two topics. Prior studies of D&O insurance have focused on other aspects of the insurance, almost exclusively in publicly traded companies. For example, Bhagat, Brickley, and Coles (1987) report positive stock price reactions to announcements by New York-chartered, publicly traded firms when they purchase D&O insurance and zero effect

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[3] Eckbo et al. (2000) dispute the interpretation that average postoffering returns are abnormal following seasoned equity offerings, and indirectly raise doubt about the proper interpretation of average post-IPO performance.

when they broaden indemnification under existing insurance.[4] They infer that D&O coverage does not exacerbate manager–stockholder conflicts. Holderness (1990) analyzes aspects of D&O coverage that he interprets as being consistent with insurers having a role in monitoring management and boards. The only other studies of which we are aware that estimate demand for D&O insurance are Core (1997, 2000), but his data are for Canadian firms that are already publicly traded. Unlike U.S. firms, Canadian firms must disclose the details of their D&O insurance in their proxy statements, which limits potential managerial opportunism associated with this purchase decision. The Canadian environment regarding shareholder lawsuits also differs from the U.S. environment in a number of ways. Nevertheless, the findings in both of Core's papers are consistent with an interpretation that entrenched (opportunistic) managers purchase more insurance.

Regarding managerial opportunism and IPOs, in addition to the Ritter (1991) and Loughran and Ritter (1995) studies, a more recent investigation that provides evidence consistent with managerial opportunism and timing of IPOs is Teoh, Welch, and Wong (1998). In their sample, issuers having larger discretionary accounting accruals that increase reported income have poorer abnormal stock price performance in the three years following the IPO. Their test implies that investors cannot see through the accounting screen to observe cash flows (that are presumed to determine the stock price behavior), whereas our experiment involves a publicly unobservable managerial decision with an impact on directors' and officers' expected wealth.

Consequently, there is stock return evidence consistent with rational managers exploiting their superior information in IPOs, but its interpretation is not without controversy. There is also analysis of the corporate demand for D&O insurance, albeit in non-U.S. and non-IPO circumstances. We relate the amount of D&O coverage chosen at the time of the IPO and its pricing to post-IPO stock performance. In so doing, we offer a direct test of the joint hypothesis that managers possess valuable private information at the IPO and expend corporate resources to financially protect their opportunistic decisions. Moreover, we posit that because information about the amount and cost of D&O insurance purchased by the firm is not easily observable, it may be more revealing of potential managerial opportunism than other more readily observable managerial choices, such as insider trading. As such, our results have potential policy implications for disclosure of information regarding D&O insurance.

Section I describes basic features of D&O liability insurance. Section II provides a detailed description of the sample and public data sources. Section III examines the supposition that post-IPO stock price performance and shareholder class-action lawsuits are related. The relations between insurance coverage and stock price performance and between insurance premiums

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[4] Unlike most states, New York requires that shareholders be notified when a firm purchases liability insurance.

and the amount of coverage chosen are analyzed in Sections IV and V. Section VI concludes.

I. What Is D&O Liability Insurance?

Most corporations reimburse directors and officers for the costs of defending and settling lawsuits, usually under an indemnification arrangement specified either by law in the state of incorporation, or in the bylaws of the corporation. D&O liability insurance[5] in turn reimburses the firm for these costs, less any deductible, and pays the directors' and officers' costs directly when the firm cannot.[6] Thus the standard D&O policy, which is a group policy purchased by the corporation, includes two types of coverage: (a) reimbursement to the corporation for indemnification costs, and (b) direct payment to directors and officers when reimbursement from the corporation is not possible. Coverage is provided as long as the officer or director does not violate his fiduciary duty to the shareholders and the firm. D&O insurance does not cover actions that were knowingly fraudulent, involve obvious conflicts of interest, or that should have been known to be illegal. It also does not cover the corporation alone. If a lawsuit names only the corporation but no directors and officers as defendants, there is no coverage.

D&O policy limits apply to the sum of covered claims made during the policy period (generally one year), not to each separate claim. The insurance coverage applies to claims made during the policy period, even though the claim may be based on actions taken prior to the start of the policy period. However, if the policyholder gives the insurer notice of a circumstance that could lead to a claim at a later date, then the claim when it is made would be covered by the policy that was in effect when the notice of circumstance was given. This provision protects policyholders from the risk of lost coverage resulting from an insurer's decision to not renew the policy if the insurer anticipates that a later claim will be filed. Policy limits are the same for both the corporate and personal coverage, and claims paid under one coverage count against the deductible of the other. The most common deductible for the corporate coverage for IPO companies is $250,000; the personal coverage deductible has a much smaller deductible (often zero). In practice, 90 to 95 percent of claims are paid under the corporate reimbursement coverage.

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[5] Our principal source for the description of directors' and officers' liability insurance is International Risk Management Institute, Inc., 1996, *Professional Liability of Directors and Officers, Section X: Directors and Officers.*

[6] Firms that are financially distressed may lack the resources to reimburse directors and officers for these costs. D&O insurance provides this funding. Also, D&O insurance pays directors and officers costs in derivative suits (wherein damages awarded are paid to the corporation rather than the shareholders bringing the suit), a circumstance in which indemnification offers no protection.

According to a 1996 Wyatt Company survey, approximately one-half of all claims made against directors and officers are filed by shareholders, while employees, customers, and clients together account for another 40 percent of claims. For newly public companies in the 1990s, securities class-action claims alleging violation of federal securities laws are the primary source of D&O liability, according to industry sources.

This is consistent with the decision by almost all of our sample firms to either initiate or substantially augment D&O insurance coverage at the time the company first offers its shares to the public. We find that 92 percent of our sample firms have a new D&O insurance policy in force within one day of the IPO prospectus date. Furthermore, among the firms in our sample, just 15 percent show any evidence of paying insurance premiums prior to going public. For those firms, the pre-IPO premiums are usually an order of magnitude smaller than the premiums paid in connection with the IPO.[7] There are only two sample firms (2.8 percent of our sample) that do not purchase new D&O insurance within five days of the IPO date.[8] Knowledgeable practitioners confirm that what we observe in the data is standard practice. In particular, the D&O insurers' goal is generally to have the policies prepared though not finalized prior to the IPO road show. Absent any surprises, those policies are made effective on the day of or day after the IPO date. In the event the IPO is repriced or additional shares are offered, the D&O coverage limits and premiums are reviewed and revised, sometimes substantially. To summarize, with few exceptions, the effective date of our sample firms' initial purchase of D&O insurance coincides with the IPO date, and standard practice is to finalize the coverage limits and premiums when the offering size and share price are known, thereby allowing managers to adjust their D&O coverage limits after observing differences between public and their private valuation estimates.

In the event a lawsuit is filed, the insurer customarily advances the cost of the defense once the deductible is exceeded. D&O policies generally prohibit the insured from incurring defense costs without the insurer's consent, but the policies also state that such consent cannot be unreasonably withheld. Most suits are settled without trial, and as Core (2000) argues, the insurance terms provide strong incentives for settlement. Directors and officers are presumed to have upheld their fiduciary duty, and therefore are entitled to coverage, as long as no admission of bad faith is included in the conditions of settlement. Insurers, because they cannot unreasonably withhold consent for payment of defense and settlement costs, will settle claims even when they suspect, but cannot convincingly establish, bad faith by directors and officers.

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[7] The database provided to us does not reflect preexisting insurance relationships with other providers, though we are told that the existence of D&O insurance for private firms was an unusual occurrence during our sample period. However, in the year 2000, it is becoming more common to see D&O insurance policies for private firms, especially among venture-capital-backed biotech firms.

[8] One of these firms had a policy in place about one-half year prior to its IPO, while the other firm's D&O policy became effective about one month after its IPO.

II. Sample Description and Public Data Sources

A. Sample Selection

We have obtained proprietary information regarding D&O liability insurance purchase dates and dates of coverage, the amounts of insurance purchased, and the insurance premiums paid between 1992 and 1996 for 216 companies, 152 of which are listed on CRSP. For 95 of these companies, we have information on D&O insurance at the company's initial listing date. We have offering prospectuses and the insurance information required for our analysis for 72 of these 95 companies.

Relative to the total number of initial public offerings during this time period, our sample is small. For example, Ritter (1999) reports that 2,439 IPOs with an offer price of five dollars per share or more occurred between 1992 and 1996. However, detailed information of the sort provided to us on a confidential basis about companies' D&O insurance is not publicly available. Our analysis, therefore, investigates relations that are not observable for the larger set of firms. We do not have reason a priori to believe that our sample is unrepresentative of the population of IPO firms. However, we identify where we can potential sample selection biases that might affect inferences from our results. We also describe in considerable detail the characteristics of our sample firms so that readers can make judgments about the extent to which our results warrant generalization to a broader set of firms.

In addition to the small fraction of IPO firms in our sample, one might question whether IPO firms are excluded from our sample because they sought but were unable to obtain D&O insurance. Information from knowledgeable practitioners indicates that being denied coverage is almost unheard of. Thus, this possible form of sample truncation does not seem material. Panel A of Table I presents the distribution through time of our sample and reveals that 71 percent (51 of 72) of the sample IPOs occurred in 1995 or 1996. Panel B of Table I identifies the industries in which these firms operate. The sample consists primarily of high-tech and biotechnology firms. Computer hardware and software, medical equipment, and biotech firms comprise over 90 percent (65 of 72) of the sample. In a study of all IPOs, Lowry (2001) reports that over our sample period, computer-related IPOs were the most common, and science firms (including biotech) were the fourth most common IPOs overall. Thus the high concentration of IPOs in these industries is not unusual during this time period.

Table II lists the variable descriptions that we use to characterize the sample and Table III provides descriptive statistics for these variables. The primary data sources include the database of D&O insurance purchases, data collected from IPO prospectuses, CRSP, and COMPUSTAT. We group the data into one of four categories relating to: D&O insurance, the firm's operations, characteristics of the board of directors, and terms of the IPO and post-IPO stock price performance.

Table I
IPO Year and Primary Business Activity of Sample Firms

Panel A: Years in Which our Sample Firms Made Their IPOs

Year	Number of Firms	% of Sample
1992	2	2.78
1993	12	16.67
1994	7	9.72
1995	21	29.17
1996	30	41.66
Total	72	100.00

Panel B: Primary Business of the 72 Firms in our Sample

Primary Business	Number of Firms	% of Sample
Software and software services	24	33.3
Computer and electronics manufacturing	17	23.6
Medical equipment and biotech	24	33.3
Business systems providers	3	4.2
Steel and hardware	2	2.8
Consumer and service goods	2	2.8
Total	72	100.0

B. D&O Insurance Data

The D&O insurance data include the policy coverage dates, the amount of insurance purchased, the annual premiums paid for the insurance, and the identity of the insurers. For the vast majority of our companies, D&O insurance is split among several insurers in layers of coverage. Policies beyond the primary layer are written to cover claims in excess of the coverage provided by the immediately preceding layer. For example, company ABC purchases $5 million in D&O insurance, with three different insurers providing the coverage. The first underwriter covers the first $1 million in losses, while the second underwriter covers losses in excess of $1 million up to a total of $3 million. Underwriter three covers losses in excess of $3 million up to the $5 million limit. Our information includes the coverage amount for each layer, premiums paid for each layer, and, for most firms, the insurance underwriter for each layer. In all of the results that we report in this paper, we aggregate the layers of insurance into a total coverage for the directors and officers and similarly we aggregate the premiums to represent the total cost of the entire insurance bundle.

Table III, Panel A, provides summary statistics on the D&O insurance coverage characteristics. Both the coverage purchased and the premiums paid for D&O insurance are substantial. The mean premiums paid are $238,000 and the mean policy coverage is $6.6 million. On average, firms purchase coverage that is 24 percent of the size of the IPO and 6 percent of the implied market value of total equity on the IPO date. The amount of coverage varies from 12 percent of the IPO at the 25th percentile to 28 percent at the 75th percentile. The amount spent on D&O insurance does not vary widely (the difference between premiums for the 25th percentile firm and the 75th percentile firm is $90,000), but relative to the scale of firms' financial activity, the premium expense is substantial and varies considerably. Of the 65 firms with positive revenue in the year preceding the IPO, one-fourth spend less than 0.5 percent of revenues, and one-fourth spend more than 9 percent of revenues for D&O insurance. For the 30 firms with positive operating income at the time of the IPO (not separately reported in Table III), D&O insurance expense is 9 percent of operating income for the median firm, but varies from less than 1 percent to over 400 percent across these firms.

The average price of D&O insurance is 4 cents per dollar of coverage. However, the price per dollar of insurance also varies significantly across firms. For example, the 10th percentile cost is 2.5 cents per dollar of coverage and the 90th percentile cost is 6.1 cents per dollar of coverage. In comparison to results from a 1996 survey by the consulting firm Watson Wyatt (Watson Wyatt Worldwide (1996)), our sample exhibits relatively high premiums and low coverage, which is likely to be related to the fact that the Watson Wyatt sample is composed of large, well-established firms whereas, by construction, our sample consists of IPO firms.

C. IPO Prospectus Data

Table III, Panel B, reports descriptive statistics about the operating and financial characteristics of the sample firms, which are used as control variables in our tests. Most of these firms have limited revenues, negative operating income, and negligible financial leverage. Given that the sample firms are issuing IPOs, we do not find any of these statistics particularly surprising. Panel C of Table III contains the board composition variables. In comparison to studies of established companies, such as Yermack (1996), these boards are small and the fractions of gray and outside directors are the reverse of what Yermack finds for his sample of public corporations.[9]

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[9] We define gray directors as former employees, family members of employees, or anyone with business ties to the firm. This classification of directors is used by MacAvoy et al. (1983) and Weisbach (1988). However, other classifications are also prominent in the literature. For example, Baysinger and Butler (1985) and Byrd and Hickman (1992) treat retired former employees and family members of corporate officers as insiders.

Table II

Variable Descriptions

Panel A: Directors and Officers Insurance Coverage	
D&O premiums paid	Annual premiums paid in connection with IPO insurance policy ($millions)
D&O policy limits	Total coverage limits purchased in year of the IPO ($millions)
Premium/revenue$_{-1}$	IPO year premium relative to revenue in year preceding the IPO
Coverage/MV equity	Ratio of D&O insurance coverage limits to the total market value of equity for the firm implied by offering price
Coverage/IPO size	Ratio of D&O coverage to IPO value
Premium per $ coverage	Ratio of premium to coverage limits purchased
Lead layer Lloyds dummy	Dummy variable equal to one if first layer of insurance is written by a Lloyd's association
Panel B: Firm Operating and Financial Characteristics	
Years of operating history	Number of years of operating history provided in the prospectus
Average revenues	Average reported revenues over the period preceding the IPO ($millions). Partial years are converted to full years by taking the ratio of partial year revenues to prior year partial year revenues and multiplying by the prior full year revenue figure. We refer to this as average adjusted revenues.
Revenue$_{-1}$	Revenue in year preceding the IPO
Leverage	Total debt divided by market value of equity plus book value of preferred plus book value of debt
Average operating income	Average operating income over the period preceding the IPO ($millions). Partial year operating income is converted to full year operating income by multiplying the current partial year operating income by 12 divided by the number of months in the partial year. We refer to this as adjusted operating income (OI). The adjustment for OI is different from revenues because of sign changes in OI.
SD adjusted revenue	Standard deviation of revenues ($millions)
SD adjusted operating income	Standard deviation of operating income ($millions)
Number of employees	Number of employees working for the firm

Panel C: Board Composition Variables

Board size	Number of members on the board of directors
O & D ownership percent	Percent of total shares outstanding owned by the officers and directors of the firm
Average years on BOD	Average number of years that the members of the board have been on the board
Average employment time	Average number of years that the members of the board have been employed by the firm if applicable
Pct inside directors	Percent of the total number of directors on the board that are inside directors
Pct gray directors	Percent of the total number of directors on the board that are gray directors
Pct outside directors	Percent of the total number of directors on the board that are outside directors
Average number of other boards	Average number of other corporate boards on which the members of the board serve

Panel D: IPO Characteristics

IPO offering size	Value of IPO ($millions)
Market cap at IPO	Market value of all outstanding shares at IPO offering price ($millions)
Fraction of firm sold	Ratio of IPO shares offered to total outstanding shares after offer
Blockholdings/shares out ($N = 55$ w/block holders)	Among companies with principal shareholders who are neither officers nor directors, the stake owned by the person with the largest shareholdings
Offer day return	The return from the offering price to the end of the first day of trading
3 yr buy-and-hold return	Three year buy-and-hold returns for the IPO sample
3 yr BH ret-BM/S control	Difference between IPO three year buy-and-hold return and the Book-to-Market and Size matched three-year portfolio returns
Underwriting fees (% of IPO)	Percent of IPO gross proceeds paid in underwriting fees
Other IPO expenses (% of IPO)	Company-paid expenses related to the IPO expressed as a percent of IPO proceeds
Underwriter reputation ($N = 68$)	Carter–Manaster underwriter ranks from Carter, Dark, and Singh (1998), 0–9
Frac of IPO sold by company	Fraction of IPO shares sold being sold by the company
Frac of IPO sold by VC	Fraction of IPO shares sold being sold by venture capitalists
Frac of IPO sold by SH	Fraction of IPO shares sold being sold by existing shareholders

Table III
Descriptive Statistics for the IPO Sample and D&O Insurance

Descriptive statistics for a sample of 72 IPOs issued between 1992 and 1996.

	Mean	Std. Dev.	10%	25%	Median	75%	90%
Panel A: Directors and Officers Insurance Coverage							
D&O premium paid ($millions)	0.24	0.11	0.13	0.18	0.21	0.27	0.38
D&O policy limits ($millions)	6.61	3.45	3.00	5.00	5.00	9.00	10.00
Premium/revenue$_{-1}$	0.218	0.481	0.002	0.005	0.017	0.092	0.940
Coverage/MV equity	0.06	0.04	0.03	0.04	0.06	0.07	0.10
Coverage/IPO size	0.24	0.12	0.12	0.16	0.21	0.28	0.33
Premium per $ coverage	0.040	0.013	0.025	0.032	0.038	0.045	0.061
Lead Layer Lloyds dummy	0.64	0.48	0	0	1	1	1
Panel B: Firm Operating and Financial Characteristics							
Years of operating history	4.26	1.09	3	3	5	5	5
Average revenues ($millions)	20.11	46.64	0.03	0.56	4.93	14.61	41.72
Avg adj rev ($millions)	23.51	49.77	0.07	0.98	7.09	19.51	48.19
Revenue in year$_{-1}$ ($millions)	30.79	58.18	0.08	0.56	10.28	29.30	65.04
Leverage	0.04	0.08	0.00	0.00	0.01	0.04	0.10
Average op inc ($millions)	−1.29	5.03	−5.66	−4.02	−1.85	0.37	1.87
Avg adj op inc ($millions)	−0.84	6.81	−6.24	−3.85	−1.52	0.55	2.83
SD adjusted rev ($millions)	1.23	2.29	0.07	1.39	5.65	14.13	29.16
SD adjusted op inc ($millions)	4.11	6.74	0.91	1.49	2.95	4.225	6.55
Number of employees	221	453	34	56	103	187	435
Panel C: Board Composition Variables							
Board size	6.26	1.81	4	5	6	7	9
O&D ownership percent	43	16	26	33	41	52	67
Average years on BOD	3.37	2.23	1.43	2.14	3.06	4.00	4.50
Average employment time	5.14	4.20	2.00	2.50	4.00	6.00	9.00
Pct inside directors	30	16	14	19	27	37	50
Pct gray directors	51	20	25	40	57	65	75
Pct outside directors	19	16	0	0	17	27	33
Avg number of other boards	2.12	0.66	1.28	1.71	2	2.5	3.17
Panel D: IPO Characteristics (n = 72)							
IPO offering size ($millions)	32.40	18.47	15.00	20.08	28.76	42.25	52.50
Market cap at IPO ($millions)	129.89	113.98	46.40	63.83	101.03	162.12	211.84
Fraction of firm sold	0.28	0.08	0.19	0.22	0.28	0.33	0.40
Blockholdings/shares out (N = 55 w/blockholders)	0.10	0.09	0.04	0.05	0.07	0.10	0.17
Offer day return	0.18	0.28	−0.03	0	0.07	0.39	0.50
3 yr buy-and-hold return	0.20	1.21	−0.80	−0.60	−0.23	0.59	1.78
3 yr BH ret—BM/S control	−0.00	1.21	−0.99	−0.80	−0.42	0.44	1.35
Underwriting fees (% of IPO)	7.07%	0.52%	7.00%	7.00%	7.00%	7.00%	7.06%
Other IPO expenses (% of IPO)	3.33%	2.32%	1.43%	1.88%	2.48%	3.83%	5.80%
Underwriter reputation (N = 68)	8.16	1.46	5.33	8.69	8.75	9	9
Frac of IPO sold by company	0.89	0.16	0.63	0.80	1	1	1
Frac of IPO sold by VC	0.04	0.09	0	0	0	0	0.12
Frac of IPO sold by SH	0.11	0.16	0	0	0	0.20	0.37

Again, these are sensible observations given that board members of a newly public company are likely to have some affiliation with the company, resulting in a high fraction of directors classified as gray.[10]

Panel D presents characteristics of the IPOs. The average IPO raises $32.4 million, and results in an average market capitalization of $130 million. For comparison, from Ritter (1999), we calculate that the average IPO with an offering price greater than five dollars was $62 million in 1995 and $63 million in 1996. Welch (1999) reports that, from 1990 to 1996, the average size of biotech IPOs was $20 million and for computer manufacturers, the average IPO size was $25 million. Thus, our sample consists of slightly smaller IPOs relative to all IPOs, but includes slightly larger IPOs when compared to the primary industries that make up the sample. The mean first-day IPO return is 18 percent while the median is 7 percent. This corresponds to Ritter, which reports the average IPO underpricing in 1995 was 21 percent and 17 percent in 1996. In addition, the average three-year buy-and-hold return for the sample firms is 20 percent, but the median three-year buy-and-hold return is a much lower −23 percent.

Because declines in raw stock price performance often lead to shareholder lawsuits, and because we conjecture that estimated damages can be most easily and convincingly presented to a jury based on the raw stock price change, our primary focus is on buy-and-hold returns after the IPO. However, mindful of the current debate over average long-run returns following IPOs, we report an abnormal return measure used by Brav and Gompers (1997) that adjusts returns using a control sample based upon size and book-to-market as detailed in the Appendix. Most current evidence on post-IPO stock price performance focuses on three- and five-year horizons, but our IPO dates are too recent to use five-year stock performance, so we construct three-year measures to ease comparison of our results to extant evidence. The mean three-year adjusted return is 0 percent, with the median benchmark-adjusted return at −42 percent.

As found in Chen and Ritter (2000) and Hansen (2001), underwriting fees are 7 percent for almost every IPO and other underwriting expenses average 3.33 percent of the offering. Using the Carter–Manaster rankings in Carter, Dark, and Singh (1998), we find that the average underwriter reputation ranking for the lead manager is high (8.16).[11] In addition, on average 4 percent of the IPO shares are sold by venture capitalists, 7 percent by other existing shareholders, and 89 percent are sold by the company. In companies with blockholders, mean blockholder ownership is 10 percent.

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[10] Board composition measures for our sample firms are similar to data reported by Baker and Gompers (2001). For more than 1,100 IPO firms from the 1978 to 1987 time period, they find an average board size of approximately six with outsiders holding slightly more than one seat on average.

[11] Carter et al.'s (1998) sample, which includes 2,292 IPOs issued from January 1979 to December 1991, find an average underwriter reputation of 6.97 and median of 8.00.

D. *The Private Securities Litigation Reform Act of 1995*

As mentioned earlier, our sample period encompasses the time during which the Private Securities Litigation Reform Act of 1995 (SLRA) was introduced to Congress (February 1995) and then passed into law in December 1995, despite a presidential veto. The SLRA imposes more stringent prerequisites for securities fraud suits, and was designed to reduce the incidence of lawsuits of questionable merit that were nonetheless being settled by defendant firms in order to save management time and avoid a long discovery process. The specific elements of the law fit into three categories: (a) reducing abusive litigation, (b) providing a safe harbor for forward-looking statements, and (c) providing for auditor disclosure of corporate fraud.[12] Some of the particular provisions that sought to reduce abusive litigation included an attempt to eliminate professional plaintiffs, excessive attorneys' fees, and an attempt to eliminate the past practice of sue first and then go forth and discover the allegedly misleading statements.

To the extent that the SLRA is effective in achieving its goals, firms going public after the introduction of the SLRA would purchase less insurance and/or be charged a smaller premium for their insurance. We introduce an indicator variable to capture the effects that the SLRA might have on D&O insurance coverage and premiums. In studying the record of the introduction and passage of the law, we made the determination that the primary uncertainty regarding this law was when it would be introduced, not whether it would pass. Hence, we set the SLRA dummy variable equal to one for all firms with IPO dates after the introduction of the SLRA bill.[13]

III. Post-IPO Stock Returns and the Incidence of Shareholder Class-action Lawsuits

An important premise in this study is that directors and officers fear shareholder suits as a consequence of selling overvalued equity, and D&O insurance protects the directors and officers from that liability. In this section, we provide a sense for the strength of the relation between the ex post occurrence of litigation and various measures of long-run performance in our sample firms. Of course, what determines managers' behavior are their ex ante beliefs about the relationship between overvaluation and the likelihood of shareholder lawsuits.

Several studies point to negative stock returns as a condition preceding class-action securities litigation. For example, Grundfest and Perino (1997)

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[12] The information presented here borrows extensively from Alexis (1996) and Roake and Davidson (1996).

[13] Johnson, Kasznik, and Nelson (2000) argue that substantial uncertainty remained until President Clinton's veto was overridden in December of 1995. If we instead set the SLRA dummy equal to one only after the *passage* of the SLRA, the significance of the coefficients on the SLRA variable is reduced to below conventional levels. However, none of our other inferences are affected.

report that prior to the SLRA, the average stock price return prior to a securities fraud claim was −19 percent, while after the SLRA, in 1996, the average return prior to securities fraud claims fell to −31 percent. Their study suggests that negative stock returns precede security fraud claims, and that the SLRA appeared to be effective in dissuading claims in less dramatic circumstances. In Skinner's (1997, p. 251) analysis of earnings disclosures, he says, "One aspect of the results that is striking is the fact that managers of these firms, given sufficiently bad news, seem to have little ability to avoid litigation. . . ." Furthermore, anecdotes from practitioners in the D&O insurance business suggest that a significant downturn in a stock's price is very commonly followed by class-action securities litigation. The evidence we provide below documents the relation between post-IPO stock returns and securities litigation for our sample firms.

In 9 of 72 cases (12.5 percent), the corporation and some of its directors and officers were named defendants in shareholder class-action lawsuits within three years of their IPO. We are unsure of an appropriate benchmark for the frequency of being sued. For instance, Lowry and Shu (2001) report that 5.76 percent of firms going public in the 1988 to 1995 time period are subsequently sued under the Securities Acts of 1933 or 1934 for violations directly related to the prospectus. None of our firms was sued for acts related to the prospectus (in such suits, the underwriter is also a defendant). Other alleged misleading financial statements precipitated the litigation for our sample firms.

Firms that are sued do appear to perform more poorly in the three years following their IPO. In our sample, the mean three-year raw returns for sued firms is −39 percent and the median is −47 percent. In contrast, firms not sued in our sample have average raw returns of 28 percent and median raw returns of −19 percent. The means are significantly different from each other at conventional levels of significance but the medians are not (z-statistic = 1.44).

To more fully investigate the relation between ex post stock performance and shareholder lawsuits, we examine whether the likelihood of a suit is related to stock price performance. Table IV reports results of logit regressions designed to estimate the probability that directors and officers will be sued in the three years following the IPO. These regressions include as control variables the measures we use to explain (in the following section) the insurance coverage limits selected by firms. We find that the likelihood of being sued is not significantly negatively related (t-statistic = −1.55) to buy-and-hold returns. Table IV also reports that the estimated probability of litigation is not related to IPO underpricing[14] and is also not significantly related to IPO size. This latter result is inconsistent with a so-called "deep pocket" hypothesis of shareholder litigation.

Table IV does not establish a clear link between long-run performance and litigation. This is somewhat surprising, although we note that estimating

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[14] Lowry and Shu (2001) show that because both underpricing and litigation are endogenous, interpretation of a simply specified relation between the two is unreliable.

Table IV

Predicting Insured Lawsuits

This table presents the results of four LOGIT models designed to estimate the probability that directors of an IPO firm will be sued in the three years following the IPO. The explanatory variables are the same as those used in models to predict the total coverage. The variables are defined in Table II. The dependent variable takes a value of one if the directors were sued in the three years following the IPO, and zero otherwise. Marginal effects are presented along with t-statistics in parentheses.

	(1)	(2)	(3)	(4)
Intercept	−0.131	−0.119	−0.045	−0.056
	(−1.203)	(−0.960)	(−0.397)	(−0.525)
IPO size	−0.001	−0.001	−0.001	−0.001
	(−0.746)	(−0.785)	(−0.829)	(−0.824)
Leverage	0.379	0.328	0.368	0.345
	(0.468)	(0.434)	(0.451)	(0.434)
Avg revenue	−0.001	−0.001	−0.001	−0.001
	(−0.526)	(−0.680)	(−0.454)	(−0.617)
Std dev revenue	0.006	0.004	0.006	0.005
	(1.168)	(0.998)	(1.178)	(1.003)
Average op income	−0.005	−0.004	−0.007	−0.005
	(−0.870)	(−0.713)	(−1.000)	(−0.815)
Std dev op income	−0.006	−0.003	−0.006	−0.003
	(−0.837)	(−0.530)	(−0.843)	(−0.526)
Age of firm	0.002	0.002	0.001	0.001
	(0.355)	(0.449)	(0.188)	(0.281)
Blockholder	−0.009	−0.011	0.003	−0.002
	(−0.207)	(−0.285)	(0.069)	(−0.060)
% held by VC	0.155	0.131	0.165	0.145
	(0.790)	(0.698)	(0.834)	(0.738)
% outside dirs	0.001	0.001	0.001	0.001
	(0.501)	(0.558)	(0.516)	(0.579)
Underpricing	0.104	0.078	0.098	0.078
	(1.141)	(0.855)	(1.101)	(0.833)
Securities Litigation Reform Act	−0.023	−0.009	−0.003	0.004
	(−0.487)	(−0.244)	(−0.061)	(0.098)
3 yr rets raw	−0.048		−0.050	
	(−1.545)		(−1.520)	
3 yr rets B/M & Size		−0.045		−0.046
		(−1.343)		(−1.337)
Std dev rets			−2.131	−1.665
			(−0.767)	(−0.641)
Number of obs	72	72	72	72
Pseudo R-squared	0.331	0.337	0.341	0.345

the probability of litigation from ex post incidence incorporates decisions by lawyers and plaintiffs, something that injects additional uncertainty into the process. In addition, although more than 25 percent of our IPO sample have returns worse than −50 percent, only 12.5 percent of our sample firms

are sued. These facts, and a limited sample, may contribute to a lack of power in the logit regressions. Nonetheless, what is important to our hypothesis is that directors and officers believe it to be true ex ante that they will face a greater litigation liability if their firms perform poorly. Based on the evidence in Skinner (1997) and Grundfest and Perino (1997), we believe the lack of power in our univariate comparison and logistic regression does not materially weaken the presumption that managers expect a relation to exist between stock price performance and the likelihood of being sued.

IV. Insurance Coverage Limits and Stock Price Performance

As discussed above, the managerial opportunism hypothesis predicts that the amount of D&O insurance coverage purchased by an IPO firm is inversely related to the firm's post-IPO stock price performance. This relation will exist in our data if some managers possess superior private information and conduct their IPO when they believe their shares to be overvalued, and the overvaluation is revealed over the ensuing three years. Under this hypothesis, post-IPO stock price performance proxies for managers' superior information at the IPO and the manager's D&O purchase decision reflects his assessment of the probability and magnitude of legal exposure to securities lawsuits, which is presumed to decrease as returns increase. The interpretation that there is a plausible connection between the manager's private information concerning the stock's true value and the amount of insurance purchased is consistent with the evidence presented above that managers can condition their D&O purchase on information gained from the pricing of the IPO. Especially in a small sample, there could be concern that perhaps some other mechanism is at work. For example, suppose that managers buy more insurance for riskier IPOs and in our sample riskier IPOs happen to have poor performance. We address this particular concern in the results that follow.

We initially report simple statistics that relate coverage levels to long-run stock performance. Partitioning the sample into quartiles by total coverage/IPO size, we find that the average raw three-year return for the lowest coverage quartile is 51 percent and the median is 20 percent. The corresponding average return for the highest coverage quartile is 18 percent with a median of −28 percent. While the relative magnitudes of these quartile means and medians are consistent with the managerial opportunism hypothesis, the differences are not statistically significant at conventional levels. As a more powerful test of the managerial opportunism hypothesis, we estimate a regression to predict the amount of insurance coverage purchased in conjunction with the IPO, controlling for factors that influence that decision and including long-run stock price performance as a proxy for information.

To identify determinants of D&O insurance coverage under normal circumstances, we use control variables similar to those in Core's (2000) analysis of firm characteristics that are important in the insurance coverage decision. Specifically, we use average revenues, the standard deviation of those revenues, average operating income, the standard deviation of operating income, the age of the firm, and the firm's financial leverage as prox-

ies for the risk of the firm's business activities. The percentage of outsiders on the board of directors serves as a governance proxy. The amount of the IPO and the offer day return provide measures of outsider capital invested and underpricing of the offering. D&O insurance professionals indicate that the size of the IPO is a primary determinant of the requested and recommended coverage limit. The percentage of common shares held by blockholders and the percentage of shares sold by venture capitalists are included as measures of incentive alignment and monitoring by informed investors. Finally, we include the dummy variable for the Private Securities Litigation Reform Act of 1995.

Table V reports the results from our cross-sectional regressions. As expected, IPO size is the most important variable in explaining the amount of insurance purchased. Of the variables reflecting the firm's operating and financial characteristics, only leverage is statistically significant and the relation is negative, which at first seems counterintuitive. Ceteris paribus, higher leverage is associated with higher equity risk. However, at least for well-established firms, Bradley, Jarrell, and Kim (1984) report that higher leverage is associated with a high proportion of tangible assets. Consequently, leverage may be capturing the overall risk of the company's asset mix, consistent with the argument by Smith and Watts (1992). We also note that few if any of these firms have substantial leverage. Table III reports that even at the 90th percentile, the leverage of our firms is 10 percent. The percentage of equity sold by venture capital (VC) companies is negatively related to the amount of insurance purchased.[15] The negative relation is somewhat surprising. If VC participation in the sale is interpreted as unfavorable information about the firm's prospects, one might expect VC sales to lead managers to purchase more D&O coverage. The amount of insurance coverage is significantly positively related to the percentage of the board of directors consisting of outsiders. This result appears contrary to the customary interpretation of strong governance being positively related to boards with high independence. However, for the newly public firms comprising our sample, the average number of outside directors is approximately one. We conjecture, therefore, that our result is more likely a consequence of the necessity of having sufficient protection from lawsuits to induce outside directors to join the board.[16] Finally, we do not find that firms select lower insurance coverage levels after the passage of the SLRA.

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[15] In other robustness checks, we have included a dummy variable for venture capital backing. It is insignificant and does not affect the significance of the percent sold by VC variable. Thus, the latter variable is not simply picking up the effect of venture capital backing for the start-up firm. We have also used post-IPO VC ownership, which averages 2.6 percent, as a regressor to test whether continuing VC ownership indicates expected favorable post-IPO performance, but its coefficient is insignificant and its inclusion does not affect other inferences.

[16] We have also analyzed other governance measures including board size, percentage of shares held by outside directors, and the average number of other board seats held by directors. These measures are not significant in any of our alternative regression specifications, and their inclusion does not change the inferences from other variables.

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Table V

Explaining the Total Amount of Coverage Purchased

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This table presents the results of regressions that attempt to explain the amount of D&O insurance purchases by each IPO firm. Variable definitions are given in Table II. Litigation is a dummy variable set to one if the firm and its directors are sued within three years of the IPO. Coefficient estimates are presented with t-statistics in parentheses. Heteroskedasticity-consistent standard errors are used. Coefficients in bold designate significance at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Intercept	**2.249**	**1.973**	0.898	0.470	−0.158	**1.515**	**1.602**
	(2.347)	**(2.114)**	(0.413)	(0.212)	(−0.076)	**(1.728)**	**(1.714)**
IPO size	**0.130**	**0.130**	**0.133**	**0.133**	**0.135**	**0.131**	**0.133**
	(9.400)	**(9.105)**	**(10.434)**	**(10.135)**	**(10.224)**	**(9.514)**	**(9.479)**
Leverage	**−18.318**	**−17.921**	**−19.031**	**−18.781**	**−18.918**	**−20.104**	**−18.103**
	(−2.444)	**(−2.402)**	**(−2.388)**	**(−2.355)**	**(−2.361)**	**(−2.631)**	**(−2.514)**
Avg revenue	0.001	−0.000	−0.000	−0.002	−0.003	0.007	−0.000
	(0.032)	(−0.014)	(−0.014)	(−0.061)	(−0.108)	(0.273)	(−0.006)
Std dev revenue	0.012	0.013	0.009	0.009	0.011	0.012	−0.004
	(0.329)	(0.348)	(0.217)	(0.226)	(0.285)	(0.295)	(−0.104)
Average op income	−0.065	−0.068	−0.040	−0.040	−0.037	−0.070	−0.041
	(−0.951)	(−0.976)	(−0.515)	(−0.501)	(−0.484)	(−1.016)	(−0.565)
Std dev op income	−0.022	−0.023	−0.030	−0.033	−0.039	−0.029	−0.005
	(−0.321)	(−0.347)	(−0.455)	(−0.498)	(−0.628)	(−0.430)	(−0.067)
Age of firm	0.093	0.097	0.107	0.113	**0.125**	0.087	0.100
	(1.286)	(1.337)	(1.530)	(1.601)	**(1.806)**	(1.218)	(1.356)
Blockholder	−0.592	−0.559	−0.639	−0.613	−0.555	−0.576	−0.458
	(−0.972)	(−0.901)	(−1.028)	(−0.964)	(−0.843)	(−0.890)	(−0.704)
% sold by VC	**−10.474**	**−10.181**	**−11.051**	**−10.853**	**−10.631**	**−10.912**	**−10.495**
	(−3.309)	**(−3.152)**	**(−3.193)**	**(−3.064)**	**(−2.882)**	**(−3.383)**	**(−3.663)**
% outside directors	**0.035**	**0.034**	**0.034**	**0.033**	**0.033**	**0.036**	**0.032**
	(2.193)	**(2.177)**	**(2.173)**	**(2.159)**	**(2.158)**	**(2.378)**	**(2.195)**
Underpricing	−0.731	−0.800	−0.794	−0.860	−0.865	−0.974	−1.010
	(−0.748)	(−0.819)	(−0.798)	(−0.866)	(−0.859)	(−0.928)	(−1.051)
Securities Litigation Reform Act	0.325	0.563	0.164	0.359	0.517	0.501	0.858
	(0.552)	(0.967)	(0.263)	(0.587)	(0.831)	(0.876)	(1.513)
3 yr rets raw	**−0.419**		**−0.364**				
	(−2.383)		**(−1.997)**				
Neg 3 yr rets raw						**−1.668**	
						(−2.554)	
3 yr rets B/M & Size		**−0.294**		−0.237			
		(−1.779)		(−1.280)			
Litigation							**1.564**
							(2.369)
Std dev rets			31.065	35.071	42.816		
			(0.639)	(0.709)	(0.897)		
Number of obs	72	72	72	72	72	72	72
Adj. R-squared	0.534	0.526	0.533	0.526	0.525	0.533	0.525

Our main variable of interest, the long-run stock price performance of the IPO firms, is negatively related to the amount of insurance purchased as shown in regressions (1) through (3) in Table V. We find a significant negative relation for both raw returns and the book-to-market and size-adjusted returns. In regressions (3) and (4), the post-IPO standard deviation of stock returns is included as an additional measure of risk.[17] Without either of the long-run return measures in the regression, the coefficient estimate on the standard deviation is positive with a White-adjusted t-statistic of 0.90 (column 5). Including both the standard deviation and long-run return measures attenuates the significance of both variables, although the raw returns remain negative and significant while the book-to-market and size-adjusted returns are negative but no longer significant at conventional levels. The insignificance of the standard deviation variable addresses the concern, mentioned above, that riskier IPOs simply performed poorly in our sample. The results from these specifications provide support for the managerial opportunism hypothesis. As hypothesized earlier, we find that the raw returns are more relevant in this context.

Regression (6) presents a specification in which the raw returns variable captures only negative returns (it is set to zero if the return is positive). The significantly negative coefficient on the negative returns variable demonstrates that the relation between returns and coverage is driven by higher coverage in advance of poor returns and not by abnormally low policy limits on firms performing well. Finally, regression (7) presents a specification using actual litigation in place of future performance. Litigation is an indicator variable equal to one if the firm was sued in the three years subsequent to the IPO, and zero otherwise. We expect results using actual litigation to be weaker than the results that use future returns because predicting whether performance will actually trigger litigation is likely to be more difficult for managers than predicting future performance. Contrary to our expectation, the results for the ex post litigation indicator variable are not weaker than the future performance measures. Managers of firms that later face actual litigation tend to purchase more insurance at the IPO date.

To interpret the economic magnitude of these results, we focus on the coefficient estimates from regression (1) using raw returns. The point estimate of the coefficient on the three-year buy-and-hold returns is -0.42 with

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[17] We include the standard deviation of daily returns, calculated from day 10 to the end of the first year, for two reasons. First, the standard deviation may be a proxy for the risk of the firm that could be known, although not empirically estimated, prior to the IPO. Second, it is possible that the nature of the manager's private information is not that the market is overly optimistic about the firm's prospects, but that the firm's risk is being underestimated by the market. If these risks are price-relevant risks that are not currently incorporated into the IPO price, then the standard deviation and long-run performance measures are likely to pick up very similar effects. That is, as the company risks are recognized, required rates of return rise, and current realized returns decline. Further, additional risk, even if it is unsystematic risk, can increase the probability of a lawsuit because sharp price drops, per se, can lead to lawsuits.

a White-adjusted t-statistic of -2.38. The median three-year buy-and-hold return in our sample is -23 percent. Thus, for the median firm, we expect to observe \$96,600 (or $-0.42 \cdot -0.23 \cdot 1{,}000{,}000$) more in D&O insurance coverage than for an otherwise similar firm with a zero post-IPO three-year stock return. This represents a 1.9 percent increase in the coverage for the median firm in our sample, which purchases coverage of \$5 million.

Overall, the results in Table V are consistent with the managerial opportunism hypothesis. We find a statistically significant negative relation between the three-year raw returns and the amount of insurance purchased on the IPO date. This implies that firms that purchase more insurance experience worse returns than firms that purchase less insurance. If we interpret the three-year future returns as a proxy for the managers' private information, we find evidence that firm managers purchase more insurance when they believe the after-market price of the IPO initially will be too high.

V. The Relation Between Insurance Premiums and Unexplained Coverage

This section presents estimates of the relation between insurance premiums and proxies for private information. The analysis addresses two questions. First, given the information provided by managers' insurance coverage decision, to what extent do insurers price the risk that the company's value will decline subsequent to the IPO? Opportunistic managers would be willing to pay abnormally high insurance premiums because they bear only a portion of the premium expenditures. A second question the premium data allow us to address is: To what degree does board structure influence the cost of the D&O insurance premium? Core (2000) addresses this second question for a sample of seasoned Canadian firms. He finds support for the hypothesis that commonly used measures of good board structure are related to lower insurance premiums.

Following Core (2000), we use a two-stage estimation procedure to examine the premium. The premium is a function of the firm's board structure, business risk, and the amount of coverage purchased. However, as shown above, the amount of coverage purchased is also a function of board structure, firm size, and business risk.[18] Therefore, we proceed by first estimating prediction equations for the amount of coverage, as in Table V. We use the residuals, which are the abnormal amounts of coverage purchased, from those regressions in our second stage, where we regress the premium on board characteristics, business risk, and abnormal coverage. The procedure can be seen more clearly in the following set of equations:

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[18] One could argue that the premium also affects the coverage decision, but we believe that it is a second-order effect, at best. The practice is to choose an amount of coverage based on business risk, size of the IPO, and so forth, and then solicit bids from the competitive D&O insurance market in the United States. Thus, we are assuming that, at the margin, the premium is not a primary determinant of the coverage amount.

$$\text{Coverage} = \beta_1 X_1 + e_1, \tag{1}$$

$$\text{Premium} = \beta_2 X_1 + \beta_3 \text{Coverage} + e_2, \tag{2}$$

so, substituting, we have

$$\text{Premium} = \gamma_1 X_1 + \gamma_2 e_1 + e_2, \tag{3}$$

where $\gamma_1 = (\beta_1 \beta_3 + \beta_2)$ and $\gamma_2 = \beta_3$.

The variables capturing board structure and business risk make up X_1 and influence both the premium and the coverage decisions. We estimate equation (3) and present the results in Table VI. By using abnormal coverage (the residual from equation (1)) in equation (3), the coefficient vector γ_1 captures the total effect of the independent variables on the premium. The total effect includes both their direct effect on the premium and their indirect effect through their influence on the coverage decision, which affects the premium. The coefficient on the residual from the coverage regression (γ_2) will determine the degree to which insurers price abnormal coverage. In the regression results, we also add a term that interacts the abnormal coverage (e_1) with the private information proxies. If insurers are able to identify issuers that are exploiting private information, we expect the coefficient on the interaction variable to be negative. That is, when the issuer is purchasing abnormally high coverage *and* long-run performance is poor, the insurance premium should be higher if insurers are able to identify opportunistic managers.

Table VI reports the results of the second stage regressions using abnormal coverage from a first stage regression that does not include any variables unknown at the time of the IPO, namely long-run returns, standard deviation of returns, or litigation. We find that the premium paid for D&O insurance is positively related to IPO size, negatively related to leverage, negatively related to the percentage sold by venture capitalists, negatively related to average operating income, and positively related to the unexplained coverage from the first-stage regression. Notably, the introduction of the SLRA resulted in significantly lower premiums, as shown by the significantly negative coefficients on the SLRA dummy variable.

The two-stage procedure produces coefficients in the second stage that reflect the total contribution of the variables, indirectly through their effect on coverage, which would be positively related to premiums, and also through any direct incremental effect on premiums. The significant coefficients on IPO size, leverage, and percentage sold by venture capitalists are at least partially coming from their effect on expected coverage. However, the coefficients on average operating income and SLRA were not significant in the first stage, so their significance comes from their direct effect on premiums. Thus, in addition to the effect of the SLRA noted above, one can infer that firms with a history of higher income are charged smaller premiums.

Table VI

Explaining the Insurance Premium

This table presents the results of second-stage regressions that attempt to explain the premium paid by the IPO firm for its D&O insurance. The first stage is a regression of the total coverage purchased on all of the independent variables listed in Table IV excluding variables that represent future information (future returns, standard deviation of returns, and litigation). The residuals from that regression are labeled "Unexplained Coverage," and enter into the second stage regressions reported here. Variable definitions are given in Table II. Coefficient estimates are presented with *t*-statistics in parentheses. Heteroskedasticity-consistent standard errors are used. Coefficients in bold designate significance at the 10% level or better.

	(1)	(2)	(3)	(4)	(5)
Intercept	**0.129**	**0.131**	**0.127**	**0.127**	**0.130**
	(7.629)	**(7.638)**	**(7.357)**	**(7.427)**	**(7.156)**
IPO size	**0.004**	**0.004**	**0.004**	**0.004**	**0.004**
	(6.496)	**(6.424)**	**(6.293)**	**(6.400)**	**(7.448)**
Leverage	**−0.731**	**−0.734**	**−0.728**	**−0.708**	**−0.753**
	(−4.628)	**(−4.769)**	**(−4.713)**	**(−4.781)**	**(−4.956)**
Avg revenue	0.000	0.000	0.000	0.000	0.000
	(0.822)	(0.893)	(0.779)	(0.782)	(0.564)
Std dev revenue	−0.000	−0.000	−0.000	−0.000	−0.001
	(−0.464)	(−0.500)	(−0.423)	(−0.432)	(−1.617)
Average op income	**−0.006**	**−0.006**	**−0.006**	**−0.005**	**−0.005**
	(−4.169)	**(−4.195)**	**(−4.188)**	**(−4.227)**	**(−3.710)**
Std dev op income	0.002	0.002	0.002	0.002	**0.004**
	(1.554)	(1.553)	(1.556)	(1.608)	**(2.920)**
Age of firm	**0.003**	0.003	**0.004**	0.003	**0.005**
	(1.705)	(1.617)	**(1.674)**	(1.631)	**(2.131)**
Blockholder	0.008	0.007	0.009	0.010	0.000
	(0.558)	(0.434)	(0.565)	(0.698)	(0.030)
% sold by VC	**−0.227**	**−0.224**	**−0.228**	**−0.223**	**−0.367**
	(−2.862)	**(−3.025)**	**(−3.041)**	**(−2.825)**	**(−4.940)**
% outside directors	0.000	0.000	0.000	0.000	0.000
	(0.521)	(0.520)	(0.522)	(0.547)	(0.649)
Underpricing	−0.008	−0.008	−0.008	−0.009	−0.002
	(−0.355)	(−0.345)	(−0.363)	(−0.410)	(−0.085)
Securities Litigation Reform Act	**−0.037**	**−0.038**	**−0.037**	**−0.036**	**−0.039**
	(−2.351)	**(−2.215)**	**(−2.173)**	**(−2.272)**	**(−2.707)**
Unexplained coverage	**0.021**	**0.021**	**0.021**	**0.032**	**0.017**
	(6.473)	**(6.645)**	**(6.908)**	**(4.662)**	**(6.652)**
3 yr rets raw × unexplained coverage		0.001			
		(0.268)			
3 yr rets B/M & Size × unexplained coverage			−0.001		
			(−0.234)		
Std dev rets × unexplained coverage				−0.211	
				(−1.724)	
Litigation × unexplained coverage					**0.048**
					(2.168)
Number of obs	72	72	72	72	72
Adjusted *R*-squared	0.558	0.551	0.551	0.555	0.505

The final variable in regressions (2) through (4) is designed to test whether the insurer anticipates and prices future abnormal performance or risk when managers buy an unusual amount of insurance. All variables are interactions between the unexplained portion of total coverage and one of our proxies for the private information of the managers. The insignificant coefficients on each of the long-run stock return interaction variables suggest that extra coverage is not more expensive for managers of firms that subsequently do poorly. From these results, we infer that insurers pool all types of excess coverage purchasers together and do not attempt, or are unable, to distinguish among those with negative private information and those that purchase extra coverage for some other reason, such as exceptional aversion to risk by the directors and officers. These latter firms appear to be subsidizing extra insurance purchases by opportunistic managers. Thus, we conclude that, while insurers do appear to price the unexplained coverage, the pricing is not related to the future returns measures that we use as proxies for managers' private information. Surprisingly, the coefficient on standard deviation of returns is significantly negative—opposite of what would be predicted if insurers charged more to ex post riskier firms. We have no explanation for this puzzling result.

However, insurers do appear to react differently to firms who purchase abnormally high coverage and are subsequently sued. Regression (5) presents a specification that interacts abnormal coverage with a dummy variable set equal to one if the firm is a defendant in securities litigation during the post-IPO return measurement period. This result suggests that insurers are able to identify firms with abnormal litigation risk and price that risk.

Table VI also reports that the coefficient estimate on the percentage of outside directors indicates that there is no statistically reliable relation between this measure of board quality and the insurance premium.

We believe that the specification we have chosen parsimoniously captures the relevant business and governance factors. Nonetheless, as we did with the insurance coverage regressions in Table V, we consider several other governance variables for our insurance premium regressions in Table VI. We have added board size, percentage of shares held by outside directors, and the average number of other board seats held by directors to the specifications. These variables are insignificant and their inclusion does not change the other inferences. We also considered estimating the models in natural logs, but average and adjusted average operating income are negative for some firms.

We have also checked the sensitivity of our second stage results to the way we treat our proxies of managers' private information. Including future stock return or standard deviation without interacting it with abnormal coverage does not produce a significant coefficient on either variable and leaves the other inferences unchanged.

VI. Conclusions

Our evidence indicates that the amount of D&O insurance purchased is an information-revealing action. We draw an analogy to Seyhun (1986), Lee

(1997), and Kahle (2000), who find that insider purchases and sales of company equity also contain information that is reflected in future abnormal returns. Consistent with the managerial opportunism hypothesis, there is a negative association between the amount of D&O insurance coverage at the IPO and the three-year stock price performance of the firm.

We do not find evidence to support findings for well-established companies that lower D&O insurance premiums are associated with conventional measures of good board governance. We do find that, controlling for other factors, D&O insurance premiums are significantly lower following introduction and later enactment of the Private Securities Litigation Reform Act of 1995.

This evidence provides a new element to the debate regarding post-IPO long-run stock performance. For those that believe there is real economic underperformance, a common explanation is that managers opportunistically exploit superior information and sell when stock is overvalued. The data we report are especially interesting because they reveal the actions of the agent in possession of the private information, and the insurance coverage limit is measured directly. Moreover, regardless of whether IPO firms perform poorly *on average*, our evidence shows that managers purchase higher insurance coverage in advance of poor future performance. Thus, even if not all managers are aware of their shares' overvaluation at the IPO, some are, and the actions they take to indemnify themselves reveal their superior information.

From a policy standpoint, there are various interpretations for the use of directors' and officers' liability insurance. One interpretation is that managers use insurance to bolster their ability to exploit inside information for personal advantage. A second, but not mutually exclusive, interpretation is that managers use insurance to protect themselves and corporate assets from opportunistic lawsuits. Although further research on the information contained in a firm's choice of its D&O coverage limit is warranted, our evidence implies that the former interpretation is likely to play a role in insurance purchases. Our confidence in this interpretation is bolstered by evidence from Yermack (1997) and Aboody and Kasznik (2000) in the context of executive stock option plans. Because the information about the issuance of stock options is commonly not released until the annual proxy discloses changes in option plans, there exist situations where opportunistic managers can utilize their superior information to increase their wealth by influencing the terms of soon-to-be-issued executive stock options. Yermack and Aboody and Kasznik find evidence of opportunistic behavior. There are three common elements to these situations where managerial opportunism appears to occur: (a) private information exists, (b) managers have incentives to exploit their informational advantages, and (c) disclosure is either not timely or nonexistent. In the context of D&O insurance, it would seem that if managerial opportunism has an impact on the directors' and officers' insurance decision, then the merit of mandatory disclosure of directors' and officers' liability insurance should be studied further. We note that some countries, such as Canada, have chosen to require full disclosure of these decisions.

Appendix: Calculating Abnormal Long-run Performance

Following Brav and Gompers (1997), for each year-end from 1991 to 1995, we construct a control sample of all CRSP stocks that have not issued common stock in the previous five years. We partition each year-end control sample into five market capitalization quintiles and further split each size quintile into five book-to-market quintiles. Using the book value of assets from the IPO firm's prospectus and its market capitalization at the close of the first day of trading, we assign a matching size and book-to-market control portfolio from the year-end immediately preceding the IPO for each IPO firm. The buy-and-hold returns for the sample and control firm are computed as follows:

$$R_{iT} = \prod_{t=first\ trading\ day}^{min[T, delist]} (1 + r_{it}) - 1, \tag{A1}$$

where T is set equal to 756 days. We choose to exclude the return on the first day (offer price to closing price, or underpricing) for two reasons. First, most extant evidence excludes that return. Second, we are interested in performance that the average investor, who is more likely to file a lawsuit than is an individual or institution privileged with an initial allocation, would experience. *Delist* is the delisting date, if any, for the sample IPO firm. In the event that a control firm delists or issues equity prior to the end of the compounding period, its returns are carried in the control portfolio until delisting or the date of the equity issue. The buy-and-hold returns for every firm in the matching portfolio are computed and then averaged. This is equivalent to making an equal investment in each stock in the portfolio at the start date and not rebalancing during the compounding period. The portfolio buy-and-hold return is subtracted from the IPO firm buy-and-hold return to compute the abnormal return.

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