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Anatomy of Initial Public Offerings of Common Stock

SEHA M. TINIÇ*

ABSTRACT

Initial public offerings of common stocks (IPOs) are typically underpriced. In this paper, the author develops and tests the hypothesis that underpricing serves as a form of insurance against legal liability and the associated damages to the reputations of investment bankers. The empirical results based on samples of IPOs that were brought to the market before and after the Securities Act of 1933 provide considerable support for the implicit insurance hypothesis. Specifically, gross underpricing and market segmentation between prestigious and fringe investment bankers in originating unseasoned new issues appear to be peculiar to the post-1933 era.

A NUMBER OF STUDIES have documented that unseasoned common stocks typically garner large positive abnormal returns during a short period following the initial offering. In his recent review of the empirical evidence on the initial returns of common stock offerings, Smith [36] concluded that the returns from offer price to after-market price have exceeded fifteen percent. His calculations did not include some of the earlier results obtained by McDonald and Fisher [23] and Logue [20]. When their samples are combined with those in Smith's review, the initial returns of unseasoned equity offerings appear even larger—over seventeen percent. These results imply that underwriters consistently offer the securities at substantial discounts from their values that are set in the after market. In other words, initial public offerings (IPOs) appear to be underpriced.

What is even more puzzling is the fact that, in some time periods, underpricing appears to be systematically larger than in other periods. Ibbotson and Jaffe [15] and Ritter [29] have documented that, during the postwar era, there have been a number of periods in which the initial returns of common stocks have been extremely high. Ritter, for example, reported that the average return from the offer price to the first after-market price was over forty-eight percent for IPOs in 1980 and 1981.¹ Similarly, the initial returns of unseasoned issues of common stock brought to the market in 1950, 1951, 1961, and 1968 were unusually large. These periods in which IPOs were grossly underpriced are referred to as the "hot-issue" markets. Why do investment bankers underprice IPOs? Why do issuers

* Graduate School of Business Administration, University of Texas at Austin. Earlier versions of this paper were presented in seminars at Dartmouth College, Southern Methodist University, and Washington University. I would like to acknowledge useful comments made by the participants. I am particularly indebted to Chris Barry, the late Karl Borch, Dick Bower, Robert Hansen, Pat Hughes, Dennis Logue, and my colleague Laura Starks for their insightful comments and suggestions. However, all results and interpretations are my responsibility. Financial support of the College of Business Administration Foundation at the University of Texas is gratefully acknowledged.

¹ Ritter [29, p. 215].

consent to leaving so much "money on the table," and what drives these "hot-issue" periods?

Several hypotheses have been offered in answer to these perplexing questions. Some of the simplistic explanations end up raising more questions rather than providing convincing answers. Others that are based on rigorous theoretical analyses offer important insights and testable propositions. However, the empirical support for some of the propositions appears weak; for others it is non-existent. It is fair to say that no single hypothesis has received overwhelming empirical support to reject reasonable alternative explanations. The purpose of this paper is to propose and test a hitherto unexplored hypothesis that is capable of answering the questions posed by the evidence documented in the literature. Stated briefly, I demonstrate that gross underpricing serves as an efficient form of protection against legal liabilities and the associated damages to the reputations of both the investment bankers and the issuers.² In other words, it is a form of implicit insurance against potential liabilities that may arise from the "due-diligence" and disclosure requirements of the federal securities regulations. Although avenues for legal recompense against misinformation and fraud existed before the Securities Act of 1933, the Act, in effect, replaced the principle of caveat emptor with the dictum: "Let the issuer and the investment banker beware."

Some of the implications of this hypothesis are not totally inconsistent with other explanations that are based on asymmetry of information either between investment bankers and issuers (Baron [3]) or between informed and uninformed investors (Rock [30] and Ritter [29]). However, most of the existing evidence and the new results reported in this paper provide stronger support for the implications of the "insurance-against-legal-liability" hypothesis.

The paper is organized along the following lines. The following section presents a brief review of the theories that have been suggested to explain underpricing of initial public offerings. In Section II, I provide the details of the "implicit-insurance" hypothesis and discuss its testable implications. Description of the data and the tests are presented in Section III. In Section IV, I examine the after-market performance of the IPOs issued before and after the Securities Act. The implications of the hypothesis for the so-called "hot-issue" periods are discussed in Section V. Summary and concluding comments constitute the last section.

I. Theories of Underpricing

The literature abounds with a variety of conjectures that purport to explain the observed underpricing in initial public offerings of common stock. However, with only a few exceptions, many of these stories can be dismissed without much consternation. They either lack a sound theoretical foundation or are refuted by the evidence. I review them here briefly for purposes of completeness.

² Both Logue [21, p. 138] and Ibbotson [14, p. 264] mentioned in passing that underpricing of IPOs may reduce potential statutory legal liabilities. However, they did not explore the implications of this hypothesis.

A. Risk-Averse-Underwriter Hypothesis

A popular explanation for underpricing of unseasoned equity is based on risk aversion of underwriters: investment bankers purposely underprice new common stocks to reduce their risks and costs of underwriting. In other words, underpricing serves as a method of reducing the chances of ending up with an unsuccessful issue and the associated losses. Although it may have some superficial appeal, this explanation is not very satisfactory. It fails to address why issuers do not insist on investment bankers to adjust their underwriting spreads to compensate for the risks of the offering. Besides, the investment bankers acquire reasonably good information about the potential demand for an IPO. It is not uncommon for underwriters to receive indications of interest from prospective investors that are much larger than the total amount of the offering. More importantly, if the principal driving force for underpricing were the investment bankers' desire to reduce their risk exposures, one would expect only IPOs underwritten on a firm-commitment basis to be underpriced.³ New issues distributed with a best-efforts contract should be more fully priced because investment bankers' risks under the best-efforts agreement are minimal. In contrast, the empirical evidence provided by Ritter [29] and Chalk and Peavy [9] indicate that, if anything, IPOs issued with best-efforts contracts tend to be underpriced by a much larger amount than the IPOs underwritten with firm-commitment agreements. Such a result is inconsistent with the risk-averse-underwriter hypothesis.

B. Monopsony-Power Hypothesis.

Some researchers—Ritter [29] for example—have suggested that gross underpricing may be a result of the monopsony power of the investment bankers in underwriting common stocks of small speculative firms. Their conclusions were based on the observation that large, reputable investment banking firms generally do not accept to underwrite common stocks of small, speculative, start-up firms. For example, Ritter [29, p. 237] stated, "Major bracket underwriters generally refuse to underwrite small offerings from start-up firms, possibly for reputation reasons." According to Ritter, the IPO market is segmented. The IPOs of small firms are underwritten by investment bankers who, for some unexplained reason, can exercise greater bargaining power over the issuers. These investment bankers intentionally underprice the securities and ration them to their large customers who regularly buy a variety of investment services from them. A similar line of reasoning was used by Chalk and Peavy [9], who claimed that the underwriters can increase their revenues by using an implicit discriminatory pricing scheme. That is, underpriced issues would be allocated only to the favored customers of the firm who regularly do business with the investment bank and pay commissions or fees far in excess of the competitive rates. In short, the monopsony hypothesis maintains that the underwriters of IPOs intentionally price the securities at a discount from their expected values in the after market because they can capture at least a fraction of the rents indirectly.

³ Prestigious investment banking firms very seldom distribute IPOs on a best-efforts basis. The best-efforts method is used primarily by regional underwriters in distributing small highly speculative unseasoned new issues.

While there is some anecdotal evidence on rationing, I cannot find any scientific evidence that would support the proposition that grossly underpriced IPOs are rationed to the underwriters' so-called favored customers. On the contrary, I will present some evidence later in the paper that shows that there is virtually no relationship between the amount of brokerage commissions generated from institutional clients of investment bankers and the allocation of underpriced IPOs to them. However, beyond the paucity of empirical evidence, there are several serious problems with the monopsony hypothesis. First of all, it does not explain why reputable investment bankers refuse to underwrite some IPOs. Second, market segmentation does not necessarily give monopsony power to fringe investment bankers as long as there is a sufficient number of fringe underwriters who compete for new business. Purely in terms of numbers, there are far more fringe investment bankers than "special-bracket" or "major-bracket" firms. Moreover, one would expect the substitutability among the underwriting services provided by the fringe investment bankers to be high because they do not have distinct reputations that could command brand loyalty and rents. Beyond all that, securities underwriting is an easily contestable business with relatively few, if any, barriers to hit-and-run entry. Third, the monopsony hypothesis implies that issuers are either ignorant or irrational. Somehow, they do not learn from the experiences of previous issuers and search for investment bankers who price IPOs more fully. Indeed, it is important to note that not every small start-up firm's IPO is underpriced. Approximately thirty percent of the IPOs underwritten by nonranked investment bankers were either priced fully or somewhat overpriced during the postwar era. Clearly, there must be another explanation for the issuers' apparent inability to search and find investment bankers who can price their IPOs more fully.

C. Speculative-Bubble Hypothesis

Under this hypothesis, large excess returns of the IPOs are attributed to the speculative appetites of investors who could not get allocations of the oversubscribed new issues from the underwriters at the offering prices. That is, the offering prices of the issues were consistent with their underlying economic values. However, the speculation in the after-market pushed their prices well above their intrinsic worth temporarily.⁴ The speculative-bubble hypothesis would imply that the initial positive excess returns of the IPOs should be followed by negative excess returns as the bubble bursts sometime later. There is no empirical evidence that supports such a pattern. Virtually every study that examined the returns of IPOs in the after-market concluded that their returns were indistinguishable from the return behavior of more seasoned common stocks. Ritter [29] specifically tested the speculative-bubble hypothesis with a sample of natural-resource issues that were underwritten in the hot-issue period of 1980. He concluded that, even in this sample of highly speculative small issues, there was no evidence that would support the implications of a speculative bubble.

⁴ A similar explanation is provided by the manipulation hypothesis. It is alleged that free riding and withholding by underwriters inflate prices of IPOs artificially in the after market. For example, see Wolfson [42, p. 45].

D. Asymmetric-Information Hypotheses

Unlike the hypotheses reviewed above, the models developed by Baron [3] and Rock [30] are not based on unsubstantiated assertions about the noncompetitive organization of the investment banking industry or on investor irrationality, nor do they require complicated schemes of indirect compensation between investment bankers, investors, and the issuers to explain underpricing of IPOs.

Baron's [3] model assumes that the investment bankers have more information about investors' demand for the securities than the issuers possess. Moreover, the investment bankers' reputations may help in certifying the quality of the issues and generate demand that may not otherwise exist. When the issuer is uncertain about the equilibrium price of its securities, it may delegate the pricing decision to the underwriter, who has better information about the state of the capital markets. However, the issuer has to compensate the investment banker for the use of his or her superior information by letting him or her offer the securities at a discount from the price expected in the after market. Baron demonstrated that the discount is an increasing function of the issuer's uncertainty about the market demand for its securities. His model predicts larger average underpricing for IPOs that are subject to greater uncertainty about their market clearing prices.⁵

Recent empirical evidence produced by Muscarella and Vetsuypens [25], however, does not support Baron's hypothesis. They reported that self-underwritten initial public offerings of securities firms were underpriced by a significantly larger amount than the offerings in which the issuing banker did not serve as the lead manager. The average initial return of the fourteen self-underwritten issues was 12.69 percent. In contrast, when the issuing firms did not serve as the lead manager of their own offerings, the securities were underpriced only three percent.

Rock's [30] model is also based on asymmetric information. However, the asymmetry of information is not between the issuers and their investment bankers. Instead, he assumed that there are two groups of potential investors in the market: (a) the so-called informed investors, who invest in information production and subscribe to IPOs only when they expect the after-market price to exceed the offering price and (b) uninformed buyers who subscribe to every IPO indiscriminately. Since there is always some uncertainty about the market prices of IPOs, if the issuers and their investment bankers attempted to offer the securities at their expected market-clearing prices, the uninformed investors would end up purchasing disproportionately large shares of the overpriced issues. In order to keep the uninformed investors in the IPO market, the investment bankers have to offer the securities at discounts from their expected after-market prices. With systematic underpricing, the uninformed buyers would earn a normal expected rate of return on the IPOs allocated to them. That is, their losses from the overpriced allocations would be compensated by the excess returns on the underpriced issues that are allotted to them.

Beatty and Ritter [6] extended Rock's model and showed that the expected underpricing is an increasing function of the uncertainty about the market-

⁵ Baron [3, p. 972].

clearing price of an IPO, which is consistent with Baron's model as well. Beyond that, they argued that investment bankers have an interest in maintaining an equilibrium amount of underpricing to earn a fair rate of return on their reputation capital.⁶ Investment bankers who underprice IPOs by more than the equilibrium amount would expect to lose potential issuers as clients. Those that underprice by less than the equilibrium amount would find it difficult to maintain the patronage of uninformed investors. Beatty and Ritter tested their hypothesis by examining the changes in the market shares of forty-nine investment bankers from one time period (1977–first quarter 1981) to the subsequent time period (second quarter 1981–1982). They concluded that investment bankers who deviated from the underpricing equilibrium by discounting either too little or too much during 1977 to 1981 experienced a reduction in their market shares of originating IPOs in 1981 to 1982.⁷

Their evidence in support of Rock's model and its extensions, however, is weak. The variable that measures the deviations from the underpricing equilibrium explains only seven percent of the cross-sectional variation in the market share changes. More importantly, the statistical relationship has virtually no explanatory power for predicting the changes in market shares among prestigious investment bankers. When the data are analyzed separately for twelve investment bankers who are traditionally classified as ranked firms (i.e., submajor, major, and special-bracket investment bankers), I find no statistical relationship between the changes in their market shares and the deviation of their discounts from the underpricing equilibrium in the preceding time period. The correlation coefficient between the two variables is -0.162 for the sample of ranked underwriters. The t -statistic is -0.52 , which indicates that the correlation between the two variables is not significantly different from zero at conventional probability levels. Since the theory of underpricing equilibrium is largely based on considerations of rate of return on reputation capital, it seems odd that the investment bankers who are extremely concerned about the prestige of their firms and who have invested more in building their reputations than others appear to be oblivious to the effects of their underpricing decisions on their relative market shares vis-à-vis their major competitors. However, there is an alternative explanation. It is conceivable that Beatty and Ritter's statistical results are reflecting nothing more than the systematic changes in the fraction of IPOs underwritten by ranked versus nonranked underwriters in different time periods. As I will demonstrate later in the paper, this is indeed a more likely scenario.

In any event, as Rock [30, p. 205] stated, "The crucial test of the model involves the degree to which shares are rationed on the offer date." The mere existence of rationing, however, is not sufficient to explain systematic underpricing. Rationing at the offer date must be more pronounced for issues that later exhibit large initial returns than for IPOs that are priced more fully. Unfortunately, the data on subscriptions (i.e., indications of interest) and allocations of IPOs to different investors that are necessary for a completely clean test of this proposi-

⁶ Beatty and Ritter [6, p. 217].

⁷ [6, p. 225].

tion are not generally available. Although the literature on IPOs is replete with references to how investment bankers ration "hot issues" to their favorite customers, no one to my knowledge has provided anything more than anecdotal or impressionistic evidence. The data presented in the *Institutional Investor Study Report* of the Securities and Exchange Commission (SEC), however, shed considerable light on the issue.⁸ The report documented institutional purchases of a random sample of eighty-four IPOs that were issued during the period from January 1968 to June 1969. More importantly, the report classified institutional purchases of new common stock offerings by the percentage changes in prices from the offering date to the first market quote. The SEC's data are reproduced in Table I.

The aggregate offering value of the sample of eighty-four IPOs was slightly over \$478.634 million. Institutional investors purchased approximately \$148.257 million, or almost thirty-one percent of the shares of the issues. Of this amount, 6.57 percent was invested in IPOs that experienced a decline in value from the offering date to the first after-market price. On the other hand, 41.99 percent of all institutional purchases experienced a price appreciation somewhere in the range of zero to nineteen percent; 35.69 percent had a price increase in the range of twenty to forty-nine percent, and so forth. The numbers in the first row of the table show the distribution of the price performance for the sample of IPOs as a whole. The fractions reported for institutional investors in the second row correspond very closely to the percentages calculated for the sample of IPOs. Institutions as a group had slightly smaller percentages invested in the offerings that declined and issues that appreciated by more than one hundred percent. However, these differences are minor. Indeed, the χ^2 statistic with 4 degrees of freedom, which provides a test of the hypothesis that institutional investors as a group experienced the same performance as the sample of eighty-four IPOs, has a value of 1.025. The critical value of the χ^2 with 4 degrees of freedom is 9.488 at the 0.05 probability level. Thus, one cannot reject the hypothesis that institutions as a group were *not* favored in the allocations of "hot" issues.

Purchases by banks, investment advisors, insurance companies, hedge funds, and foreign institutions, as a group, constituted almost eighty-one percent of the total institutional investment in the IPOs. While banks and insurance companies appear to have done somewhat better than the sample by purchasing a smaller fraction of the issues that declined in price, investment advisors did not do as well as the sample. However, the χ^2 statistics calculated separately for different classes of institutions are too small to reject the null hypothesis; they are 4.37 for banks, 5.68 for investment advisors, 6.09 for property and liability insurance companies, 7.29 for life insurance companies, 3.85 for hedge funds, and 7.24 for foreign institutions. On the other hand, self-administered employee benefit plans, tax-exempt institutions, off-shore funds, and the so-called other businesses, which collectively purchased 3.55 percent of the IPOs, exhibited allocations that were significantly different from the experience of the sample.

Overall, these results do not support the proposition that institutional investors in the aggregate have received disproportionately large amounts of grossly un-

⁸ SEC [33, pp. 2342-2412].

Table I
Institutional Purchases of IPOs Classified by Class of Institution and After-Market Price Change^a

Institution	Price Decline	0-19%	20-49%	50-100%	Over 100%	Percentage of IPOs Purchased by Classes of Institutions
Percentage of IPOs in Each Category	8.08%	38.40%	35.03%	13.56%	4.93%	N.A.
Percentage of the Total Institutional Purchases of IPOs	6.57	41.99	35.69	12.37	3.38	30.98
Banks	2.17	41.55	38.16	14.39	3.73	8.71
Investment Advisers	13.61	42.91	30.03	11.00	2.45	7.98
Property and Liability Insurance Companies	3.06	37.82	35.08	14.62	9.42	0.51
Life Insurance Companies	1.32	37.06	44.34	13.91	3.37	1.06
Self-Administered Employee Benefits	5.87*	57.53*	23.06*	9.52*	3.98*	1.31
Tax-Exempt Institutions	4.37*	58.26*	26.32*	8.10*	4.02*	0.98
Hedge Funds	8.71	48.13	28.39	11.80	3.23	2.38
Off-Shore Funds	1.98*	51.85*	26.32*	8.10*	4.02*	0.22
Foreign Institutions	3.71	35.45	47.18	11.44	2.22	4.42
Other Institutions	6.45	38.82	41.47	10.03	3.19	2.29
Other Businesses	7.82*	30.08*	30.41*	21.49*	10.20*	1.11

^a Source: Securities and Exchange Commission [33, p. 2366].

* χ^2 statistic is larger than the critical χ^2 at the 0.05 level.

derpriced IPOs. If one is willing, like Smith [36, p. 18], to make the assumption that institutional investors as a group constitute a good proxy for the "informed investors" in Rock's theory, then the data in Table I do not support the most important requirement for Rock's underpricing model. That is, a bias in rationing "good" issues to so-called informed investors is not detectable in the data.

The *Institutional Investor Study Report* also provided some interesting information about the allocations of the sample of IPOs to individual institutional investors. The data indicate that underwriters have a tendency to divide an oversubscribed issue into many small allocations. According to the *Institutional Investor Study Report* [33, p. 2373]:

Of the 23,596 institutional transactions at the offering price in the 84 first offerings, 62.6 percent involved 100 or less shares; 22.3 percent between 101 and 300 shares; 6.9 percent between 301 and 500 shares; 4.2 percent between 501 and 1,000 shares; 3.4 percent between 1,001 and 5,000 shares; and 0.7 percent more than 5,000 shares. *This concentration, in what for most institutions are small transactions, limits the validity of any theories that give undue stress to reciprocity as an explanation for the methods of allocating first offerings* [Emphasis added].

After controlling for the overall participation of each institutional investor and

investment banker in new issues, the formal statistical tests reported in [33] were unable to reject the hypothesis that the allocations of IPOs to particular institutional investors are unrelated to the brokerage business directed to the investment bankers by the institutions.⁹ This finding is particularly important because the data come from a time period when the brokerage commissions were fixed above the competitive rates. If there was ever a motive for rationing oversubscribed IPOs disproportionately to favored customers of the underwriters, it was during the era of fixed minimum commission rates, when the institutional investors in particular were being charged monopolistic rates on their securities transactions.

Of course, it can be argued that the aggregated data may mask systematic rationing or that larger fractions of IPOs are sold to individuals rather than to institutions. If there were a bias in rationing "hot" new issues to informed individual investors, systematic underpricing would be required to ameliorate the adverse selection problem faced by the uninformed investors. While this possibility cannot be rejected out of hand without looking at the empirical evidence, the data on institutional purchases of IPOs cast more than a modicum of doubt about the role of adverse selection as the primary driving force behind systematic underpricing of new common stock issues. Indeed, the fact that oversubscribed offerings are typically divided into many small allocations raises serious questions about the basic assumption of Rock's model. It is questionable that some investors can become better informed about the true value of the securities than the issuer and the investment banker when there is no guarantee that they will get enough of the underpriced issue to compensate for their information-gathering costs. Thus, it seems appropriate to look for an alternative explanation.

II. Underpricing as a Form of Insurance

Unlike the securities of seasoned corporations, there is little or no publicly available information about firms that decide to raise equity capital in the securities markets. Even when historical information on operating and financial statistics of the firms are available, these data do not convey more than some rudimentary information about the quality of their management. More importantly, the historical data cannot provide any meaningful indications about potential changes in the managerial agency costs that may accompany the transformation of the organization from a private to a public corporation. While the quality of management is a central concern for prospective investors, the issuers do not have a credible means of producing and conveying that information to that market directly themselves. It is the function of the originating investment banker to investigate the firm's overall prospects and estimate its value.¹⁰ Obviously, the investment banker faces considerable difficulties in ascertaining the "true" quality of untested management. However, to the extent that there

⁹ [33, p. 2377].

¹⁰ It is standard procedure in the investment banking industry that the originating underwriter conducts the due-diligence investigation. Other members of the underwriting syndicate do not conduct any investigations. Indeed, the participating investment bankers do not even check whether the originating underwriter is doing an adequate investigation. (See Wolfson [42, p. 19].)

are economies from specialization, investment bankers can produce the information that is necessary for estimating the value of the shares at a lower cost than the investors. Indeed, the amount of stock an investor can ordinarily expect to be allocated in a popular offering would be too small to compensate the costs of any meaningful investigation and analysis of the offering. Therefore, the investor may have to rely on the information produced by the investment banker.

The information produced by the investment banker would carry credibility for the investors because, by serving as a certifier of the issue, the investment banker would be putting the value of its reputation at risk. However, beyond that, investors know that the investment banker has a more immediate incentive to produce reliable information about the offering, particularly if the issue is being underwritten on a firm-commitment basis. Since in a firm-commitment offering the banker puts his or her own capital at risk by buying the securities from the issuer, he or she needs reliable information to avoid overpricing the shares and losing money on the offering. The issuing firm also has an incentive to see that information is produced so that it can avoid offering its stock at too low or too high a price. While the consequences of an underpriced offering for the issuer are obvious, the potential ramifications of selling overpriced shares are not altogether clear. It is conceivable that the gain from an overpriced offering can be overwhelmed by potential legal liabilities and/or by a higher risk premium that the market may demand on future securities offerings of the issuer.

Beyond the natural market forces that provide incentives for production and dissemination of information about IPOs, the securities regulations have imposed a positive obligation for every professional involved in the offering to diligently examine, inquire, and ensure that every material fact relating to the operations and affairs of the issuer that may affect a potential investor is properly examined and disclosed. Indeed, Section 11 of the Securities Act of 1933 mandates investment bankers to conduct "due-diligence" investigations to avoid liability not only for false or misleading information about the prospects of the issuer but also for material omissions in the registration statement. The Securities Act of 1933 specifically identifies the parties that may be subject to civil liabilities on account of false or inadequate information presented in the registration statement. To recover damages, a purchaser of an IPO can sue every person who has signed the registration statement, every member of the board of directors or partner in the issuing firm, every accountant, engineer, appraiser, or other consultant, and every investment banker that is associated with the offering. The Act stipulates that all or any one of these parties would be jointly and severally liable for the damages. The maximum damage that is recoverable is limited to the offering price to the public. In addition, the court may decide to award reasonable compensation for the plaintiff's costs of litigation and all or part of any punitive damages that may be sought by the plaintiffs. Needless to say, when the costs of defending the litigation, in terms of management time, lawyers' fees, expenses for expert witnesses, etc., are included, the total explicit and implicit costs associated with civil suits can be substantial. Beyond that, there is a cost for bruised or damaged reputation. Although it is virtually impossible to gauge even a rough magnitude of these costs, the statements contained in the prospectuses of Alex. Brown & Sons, Inc., and L. F. Rothschild, Unterberg, Towbin, Inc.—

two underwriters who frequently manage or co-manage IPOs—attest to the fact that potential legal liabilities can have serious financial consequences for the investment bankers.¹¹

The expected costs of legal liability would be particularly high for IPOs because performing the due-diligence investigations is fraught with difficulties and uncertainties. The securities regulations do not provide a checklist of items to be covered in such investigations. Even if they did, no single guideline could serve the purposes of all issuers and securities offerings. Thus, the standards for diligent investigation are, by necessity, vague. They have evolved on a case-by-case basis in the courts.

The issuers typically lack familiarity with the disclosure requirements. What to them may seem to be an inconsequential piece of information to be disclosed may *ex post facto* be judged a material omission in a civil action. Although the investment banker is more experienced in producing information about the affairs and the prospects of the issuer, the banker cannot totally eliminate the risk of overlooking what later may be deemed a material piece of information about the issuing firm. For example, in a 1968 benchmark legal case, *Escott v. BarChris Construction Corporation*, the court held that reasonable investigation by an investment banker requires that the banker verify the accuracy of all the claims made by the management.¹² As Nathan [26, p. 144] observed: “If you read *BarChris* carefully, it sets a standard for diligence that is rarely met in practice in an IPO context, even with the most careful preparation of a registration statement. It is extremely difficult to meet the standards the court announced in *BarChris*”

Paucity of verifiable information for many start-up firms that go public exposes the firms and their investment bankers to considerable risk of legal liabilities. As was reported in the Hot Issue Hearings of the SEC, reputable investment bankers claim that the most important part of their investigations centers around the quality of the management and around forecasting future earning capacity of the firm.¹³ Both are frequently based on subjective evaluation and judgement. Although the risks, uncertainties, and speculative qualities of the securities are frequently stated in the registration statements and prospectuses, they do not seem to deter investors from bringing civil suits against the issuers and the investment bankers. For example, the prospectuses of Coleco, Fortune Systems, Altos, and Dasonics all contained detailed statements of the risks and the usual disclaimers. Nevertheless, all of these firms were sued in 1983 soon after the prices of their shares plummeted in the after market.¹⁴

Since the issuers and their investment bankers both are vulnerable to legal liabilities, it may seem that an obvious means of protecting themselves would be

¹¹ Alex. Brown & Sons, Inc. [2, p. 28], and L. F. Rothschild, Unterberg, Towbin, Inc. [19, p. 23]. The prospectus of Alex. Brown & Sons, Inc., stated that approximately sixty public offerings in which the firm had participated were subject to litigation in 1986. Similarly, L. F. Rothschild et al. reported that the firm was involved in approximately seventy-three law suits dealing with securities underwriting.

¹² *Escott v. BarChris Construction Corporation* [10] and Wolfson [42, p. 19].

¹³ [42, p. 20].

¹⁴ Friedman et al. [11, p. 142].

to purchase jointly an insurance policy against potential damages. However, even if such an insurance policy were available, its premium may be prohibitive because there is a moral hazard problem. With insurance against legal damages, the issuer and its investment banker would have incentives to shirk their responsibilities to produce information about the firm. This would increase the probability of post-offering lawsuits and the expected losses for the insurer. To protect itself against this eventuality, the insurer would have to incur costs in verifying the quality of the investigations conducted by the investment banker and charge a predetermined penalty to the banker whenever he or she is found shirking. If the investment banker and the insurer can establish easily verifiable standards for a diligent investigation beforehand, then the cost of the policy can include a premium for the moral hazard. A simple game-theoretic illustration is presented in the Appendix.

However, ambiguity of the "due-diligence" concept may render explicit insurance impractical. If the investment banker and the insurer could not specify the standards for a diligent investigation, the resolution of their conflicts would require additional litigation. Instead, underpricing of the offering may provide the issuer and the underwriter with protection against potential legal liabilities more efficiently. Large initial returns may reduce both the probability of a lawsuit and the conditional probability of an adverse judgment (or an out-of-court settlement) if a civil action is brought. Beyond that, underpricing would also have an effect on the dollar amount of the damages that can be recovered from the issuer and/or the underwriter because the Securities Act limits the maximum recoverable damage to the offer price.¹⁵ Thus, underpricing would have a double-barrelled effect on the expected value of potential legal liabilities.

A. Initial Offering Price and Probability of Legal Action

To demonstrate the relationship between initial offering price and the expected legal liabilities more formally, I assume that the probability of a settlement or judgement against the issuer and/or its agents (the investment bankers, auditors,

¹⁵ This primarily limits a plaintiff who has purchased the securities in the after market rather than in the course of distribution. Section 11 of the Securities Act gives the same right of action to investors who purchased the securities in the after market. However, as amended in the 1934 Act, it includes a reliance requirement. That is, the plaintiff must be able to trace the alleged damage to material omissions or untruths in the registration statement. As was stated by Judge Frank for the Court of Appeals in the *Fischman v. Raytheon Manufacturing Co.*, "A suit under section 11 of the 1933 Act requires no proof of fraud or deceit, and such suit may be maintained only by one who comes within a narrow class of persons, i.e., those who purchased securities that are direct subject of the prospectus and registration statement." (See Loss [22, p. 1782].) The statute of limitations for liabilities under Section 11 is one year after discovery of the omission or untrue statement, or after such discovery should have been made by the exercise of reasonable diligence, and three years after the public offering (Loss [22, p. 1743]).

The intent of the 1934 amendments to Section 11 was to reduce the expected liabilities associated with price declines that may occur long after the public distribution is completed. As Loss [22, p. 1725] summarized, "the shift of the burden of proof to the defendant filled a long-felt need particularly during the early life of the security, when the registration statement is an important conditioner of the market; but after a substantial time, . . . there is less justification for so weighting the scales in the investor's favor, because the information in the registration statement then becomes outmoded and discounted by many factors."

etc.) is a monotonically decreasing function of P_t/P_0 , where P_t is the post-offering price of the stock in time $t = 1, 2, \dots, T$ and P_0 is the price at which the issue is offered to the subscribers. Similarly, I assume that the dollar value of the potential damages is an increasing function of the difference between P_0 and P_t if legal action is brought against the issuer and/or its underwriters at time t . With these assumptions, the expected legal liabilities in any post-offering time period $0 < t \leq T$ can be expressed as follows:

$$E[L_t] = f[P_t/P_0] \times g[P_0 - P_t]. \quad (1)$$

Let P^* designate the fair market value of the IPO at the offering date. If the stock is offered at P^* , the post-offering stock price relatives follow a lognormal probability-density function with mean $\exp(\mu t + \sigma^2 t/2)$ and variance $\{\exp(2\mu t + \sigma^2 t)[\exp(\sigma^2 t) - 1]\}$ at time t . Thus,

$$f[P_t/P_0] \propto \text{prob}[z \leq (-\ln P^* + \ln P_0 - t\mu)/\sqrt{t}\sigma]. \quad (2)$$

Since, for any given values of P^* , μ , and σ $\text{prob}[z \leq (-\ln P^* + \ln P_0 - t\mu)/\sqrt{t}\sigma]$ and $f[P_t/P_0]$ increase with P_0 in all t , setting the initial offering price, P_0 , below the "true" value of the stock, P^* , would reduce the issuer's and/or its agents' probability of incurring legal liabilities.

The dollar value of the potential damages, $g[P_0 - P_t]$, would also be smaller when the offering price, P_0 , were set below P^* . As a result, offering the stock at a price below its "true" value, P^* , reduces $E[L_t]$ in all $0 < t \leq T$.

In other words, underpricing may serve as an implicit insurance for the issuer and the investment banker against potential legal losses and the associated damages to their reputations. As Alchian and Demsetz [1, p. 778] put it in their classic article: "A lower price without warranty—an 'as is' purchase—places more of the risk on the buyer while the seller buys insurance against his 'cheating.'"

B. Testable Implications of the Theory

Unlike some of its alternatives, the "implicit-insurance" hypothesis provides an explanation for the issuers' willingness to leave some money on the table. Under the securities regulations, the issuer is jointly and severally liable for civil liabilities that may arise from disclosure of inadequate information.¹⁶ If the issuer were reluctant to buy insurance by underpricing its securities, it would not only face larger expected liabilities but would also have to compensate the investment banking firm for its higher expected liabilities. In other words, the issuer would have to incur much larger underwriting spreads without necessarily reducing its own exposure to potential lawsuits.

The implicit-insurance hypothesis has several testable implications. Foremost among them is the role of the Securities Act of 1933 on the potential liabilities of the issuers and their investment bankers. Although issuers and their underwriters were exposed to potential legal liabilities under the provisions of the blue-sky laws enacted by a number of state governments, under the fraud statutes

¹⁶ It is important to note that the issuing firm is unconditionally liable for untrue or omitted material facts. All other persons may avoid liability if they can prove that they met the standard of reasonableness in the statute.

enforced by the post office, and under common law before 1933, the Federal Securities Act specified considerably stricter criminal and civil liability provisions. The blue-sky laws exposed issuers and their investment bankers to some potential penalties and costs under antifraud and revocation provisions. However, their scope was much narrower than the Securities Act of 1933. Beyond that, the state statutes varied widely in their requirements, and state enforcement agencies were severely limited in their ability to regulate the sale of securities within their borders when they were originated in locations outside the state. In fact, as Parrish [28, p. 29] documented, "The Investment Bankers Association (IBA), despite sympathy for regulation of fraudulent issues, told its members that they could feel safe in ignoring the laws, for the purposes of making offerings by mail, and . . . it would be well . . . to close all transactions . . . outside the blue sky state." Thus, it seems reasonable to conclude that the prospect of civil and/or criminal liabilities constituted a relatively minor concern for issuers and investment bankers before 1933.

On the other hand, the 1933 Act significantly altered the civil liability provisions contained in the British Companies Act, which were generally consistent with the more limited common law definition of fraud.¹⁷ Indeed, during the legislative deliberations, the hostility of the IBA and the Wall Street community to the proposed Securities Act was focused principally on its stringent civil liability provisions.¹⁸ Thus, it seems reasonable to conclude that the need for insurance against potential legal liabilities would have increased considerably after the Securities Act of 1933. Under the implicit-insurance hypothesis, this would imply that IPOs issued after 1933 should exhibit relatively large initial excess returns. The IPOs brought to the market in the pre-SEC era should have been priced more fully.

In addition, several other testable propositions flow from the implicit-insurance hypothesis: (a) Investment bankers who have superior expertise in originating new issues and who know how to conduct relatively comprehensive due-diligence investigations should price their offerings more fully than the less experienced or less capable underwriters. The expected legal liabilities of the latter would tend to be larger, *ceteris paribus*. (b) Small and risky firms that go public would tend to leave larger amounts on the table than firms that are less likely to face legal liabilities. (c) Investment bankers for whom the costs of damaged reputation are high relative to the expected underwriting spreads would avoid originating highly speculative, small IPOs where conducting their customarily careful due-diligence investigations is either too difficult or too expensive. (d) During time periods when unusually large numbers of speculative new firms raise equity by going public, the combined market share of the less reputable or so-called "fringe" investment bankers should tend to exhibit a significant increase.

Since the Securities Act of 1933 dramatically increased the potential legal liabilities associated with bringing new common stock issues to the market, the propositions stated above are particularly germane to the post-SEC era. If legal liability was not a major concern for issuers and their investment bankers before

¹⁷ Parrish [28, pp. 54–55].

¹⁸ Seligman [34, p. 72].

1933, they need not hold during the pre-SEC years. Indeed, the implicit-insurance hypothesis would be more credible if the data supported these propositions *only* in the post-SEC years.

III. Empirical Investigation

A. Description of the Data.

The principal testable implication of the insurance hypothesis is that the IPOs issued after the Securities Act of 1933 should exhibit larger initial abnormal returns than the unseasoned new issues that were brought to the market in the pre-1933 years. To test this and other related propositions, two samples of IPOs were selected. The pre-SEC sample contained seventy IPOs that were issued during 1923 to 1930. These issues were originated and managed by forty-nine different investment bankers. The size of the issues and their offering prices spanned a wide range. Issue size ranged from \$0.54 million to \$84.0 million, while the offering prices spanned \$12 to \$60 per share. The post-SEC sample contained 134 IPOs that were underwritten by sixty-seven different investment bankers during 1966 to 1971. In this sample, the issue size and the offering price ranged from \$0.55 million to \$51.0 million and from \$5 to \$60 per share, respectively. The distribution of the sampled IPOs by years is presented in Table II.

The data on offering dates and prices, number of shares, and the identities of the managing underwriters were obtained from various issues of the *Commercial and Financial Chronicle* [40]. The subsequent issues of the same publication were used to collect the prices of the IPOs in the secondary market one week and one month after the offering date. To adjust the initial returns of the IPOs for overall market movements, Standard & Poor's Composite Index (S&P) was selected as the proxy for the market. Corresponding data on the values of the S&P 402 (for the pre-SEC period) and the S&P 500 (for the post-SEC period) were obtained from *Standard & Poor's Weekly Stock Price Indexes* [38] and *Standard & Poor's Daily Stock Price Indexes* [37], respectively.

Each stock's excess return, e_{it} , from the offer date to the market price observed

Table II
Composition of the Sample of IPOs

Pre-SEC Sample		Post-SEC Sample	
Year	Number of IPOs	Year	Number of IPOs
1923	7		
1924	3		
1925	11	1966	23
1926	8	1967	26
1927	5	1968	22
1928	16	1969	25
1929	15	1970	21
1930	5	1971	17
Total	70	Total	134

at time t was computed in the following manner:

$$e_{it} = \ln[P_{it}/P_{i0}] - \ln[I_t/I_0], \quad (3)$$

where P_{it} is the after-market price of stock i at time t , P_{i0} is the offering price of stock i , I_t is the value of the S&P index at time t , and I_0 is the index's value on the date the stock is offered to the public.

The procedure used to adjust for market returns in (3) assumes that the beta coefficients of the IPOs are all equal to one. However, there are very good reasons to expect that the unseasoned new stocks would tend to be riskier than the S&P 402 or the S&P 500.¹⁹ Indeed, Ibbotson [14, p. 258] documented that the volatility of the IPOs is considerably larger than the market's and that their beta coefficients tend to be large, particularly during the first two months following the offering date. Thus, the excess return, e_{it} , calculated in (3) provides a somewhat upward-biased estimate of the initial performance of an IPO relative to the market.

For obvious reasons, the quality and the reputation of the investment bankers are difficult to measure precisely. However, it is possible to gauge the relative position of different underwriters in the widely recognized hierarchy within the securities industry. Hayes [13], for example, classified investment banking firms into four groups in descending order of prestige and originating experience: special bracket firms, major bracket firms, submajors, and others. To test the implications of the insurance hypothesis, the fine demarcation between special vs. major or major vs. submajor bracket firms is not necessary. What is important is to distinguish between two classes of investment bankers who have distinct capabilities and experiences in underwriting new issues. Thus, I group underwriters designated as submajor or better by Hayes as the "ranked" investment bankers. All remaining firms are designated as "nonranked." The assumption is that the ranked investment bankers would have superior origination and investigation capabilities relative to their nonranked competitors. In the statistical work to follow, a dichotomous variable (1, 0) is used to designate the ranked and nonranked investment bankers, respectively.

B. Statistical Tests

As a first step in the analysis, the initial excess returns of the individual IPOs were averaged across the pre-SEC and post-SEC samples separately. As reported in Table III, the excess returns of the pre-SEC IPOs—from the date of offering to the after-market price one week later—averaged to 5.17 percent. The corresponding average for the IPOs in the post-SEC sample was 11.06 percent. The null hypothesis that the mean excess returns of the two samples of IPOs are equal can be rejected at the 0.01 level of significance. The t -statistic is equal to 2.821 with 199 degrees of freedom, which is based on Satterthwaite's [31]

¹⁹ Barry and Brown [4] demonstrated that securities for which there is relatively little information would have relatively higher systematic risk when that risk is measured appropriately. Obviously, estimation risk is particularly serious for IPOs because the quantity of information that is available to the market is by definition extremely limited.

correction for the degrees of freedom when two samples exhibit unequal variances. However, the proportions of the IPOs that had positive excess returns are virtually identical in the two samples: 68.57 percent and 65.67 percent, respectively. The *t*-statistic that tests the equality of the two proportions has a value of 0.320. It implies that the difference is not statistically meaningful.

Table III also presents disaggregated information on the excess returns of the IPOs that were underwritten by the so-called ranked and nonranked investment

Table III
Average Excess Returns, Issue Size, and Price Level
of IPOs Underwritten by Ranked and Nonranked
Investment Banking Firms

	Pre-SEC	Post-SEC
Sample Size	70	134
Average Excess Return ^a	0.05174 (0.0098)	0.11065 (0.01843)
Percentage of IPOs Underpriced	68.57%	65.67%
Average Issue Size	\$7,324,012 (1,329,384)	\$5,043,035 (590,529)
Average Price	\$34.00 (1.45)	\$15.37 (0.81)
Sample of IPOs Issued by Ranked Investment Bankers	30	53
Average Excess Return	0.04893 (0.0138)	0.06162 (0.01777)
Percentage of IPOs Underpriced	76.67%	58.49%
Average Issue Size	\$6,501,853 (876,772)	\$8,314,687 (1,295,867)
Average Price	\$37.09 (1.83)	\$20.99 (1.41)
Sample of IPOs Issued by Nonranked Invest- ment Bankers	40	81
Average Excess Return	0.05385 (0.0139)	0.14273 (0.02773)
Percentage of IPOs Underpriced	62.50%	70.37%
Average Issue Size	\$7,940,632 (2,240,593)	\$2,902,325 (316,325)
Average Price	\$31.68 (2.08)	\$11.70 (0.74)

^a Average excess return from the date of offering to after-market price one week later. Standard errors of the reported averages are presented in parentheses.

bankers.²⁰ The first column of the table shows that the average excess returns of the issues brought to the market by ranked and nonranked investment bankers before 1933 were virtually identical. The *t*-statistic computed for the difference in the mean excess returns of the IPOs underwritten by the two classes of investment bankers is equal to 0.251. Thus, the hypothesis that there were no measurable differences between the initial performances of the IPOs underwritten by the two categories of investment bankers cannot be rejected.

A similar comparison between the two groups for the post-SEC sample can be gleaned from the data in the second column of the table. The excess returns of the fifty-three IPOs issued by ranked investment bankers averaged 6.16 percent in the post-SEC sample. Although this is slightly larger than the 4.89 percent excess return in the pre-SEC sample, the difference is not statistically significant. In contrast, eighty-one issues brought to the market by the nonranked investment bankers after 1933 garnered an average excess return of 14.27 percent. The difference between the initial excess returns of the IPOs underwritten by the two classes of investment bankers is statistically significant beyond the 0.05 probability level for the post-SEC sample ($t = 2.463$).

Although the magnitudes of the excess returns in my post-SEC sample are substantially smaller than those observed by Logue [20], the general thrust of the results are consistent with his findings. Logue reported that the excess returns of the IPOs underwritten by prestigious investment bankers were substantially smaller than the initial returns garnered on issues brought to the market by the "fringe" investment banking firms. In his sample of 250 IPOs during 1965 to 1969, the mean excess returns of the two groups were 20.8 percent and 52.1 percent, respectively.

The large difference between the initial excess returns of the IPOs in the pre- and post-SEC samples is consistent with the insurance hypothesis. The dramatic difference in the initial performances of the IPOs underwritten by ranked and

²⁰ The data on initial excess returns, offering prices, and gross proceeds of the IPOs underwritten by three subcategories of the "ranked" investment bankers are presented below.

	Pre-SEC	Post-SEC
<u>Special-bracket firms</u>		
Number of issues	4	7
Mean excess return	0.0309	0.0905
Average offering price	\$32.875	\$22.750
Average issue size	\$8,197,662	\$14,160,357
<u>Major-bracket firms</u>		
Number of issues	21	32
Mean excess return	0.0424	0.0738
Average offering price	\$37.988	\$23.082
Average issue size	\$6,691,425	\$9,036,852
<u>Submajor-bracket firms</u>		
Number of issues	5	14
Mean excess return	0.0909	0.0194
Average offering price	\$36.700	\$15.321
Average issue size	\$4,349,000	\$3,741,189

nonranked investment bankers after 1933 also supports the hypothesis. There are several reasons why fringe underwriters would be particularly apprehensive about possible legal liabilities under the Securities Act. Typically these investment banking firms do not have the same expertise in originating new securities issues that the major houses possess. Indeed, as noted in the *Report of the Special Study of the Securities Markets* [32, p. 493], "many of these firms were relatively inexperienced and their principals were often unfamiliar with the complex controls governing underwriting." Most of the time they participate in selling groups of the syndicates managed by the ranked investment bankers. The fringe investment bankers originate new issues only sporadically, and many of them do not have much more than a skeleton corporate finance staff. Consequently, they would be more vulnerable to legal actions arising from errors in valuation and/or inadequate disclosure of information. Also, since they do not underwrite a steady stream of IPOs, it is considerably more difficult for them to diversify the risks of legal liabilities across a large number of new issues. Beyond that, given their size and capitalization, it would not take a very large settlement or court decision to force them into financial distress. While it can be argued that the size of their capitalization may make small fringe investment banking firms judgement-proof with respect to their statutory liabilities, Section 15 of the Securities Act extends liabilities designated under Section 11 to "controlling persons" of the underwriters. Thus, statutory liabilities that may be incurred by an underwriter may not be avoided by the bankruptcy of his or her firm.

The data in Table III also show that the Securities Act may have had an effect on the types of issues underwritten by the ranked and nonranked investment banking firms. While the differences in the sizes and offering prices of the IPOs underwritten by the two classes of investment bankers are virtually indistinguishable in the pre-SEC sample, they are strikingly visible in the post-SEC sample. It appears that the so-called prestigious or ranked investment bankers concentrated their underwriting activities primarily on relatively large new issues and set the offering prices relatively high. The IPOs brought to the market by the nonranked underwriters, on the other hand, were typically small and low-priced issues. Thus, there is a strong indication of a segmentation in the new-issues market during the post-SEC era.

While the post-SEC data indicate quite clearly that prestigious investment banking firms priced IPOs more fully than fringe underwriters, the data also suggest that underwriter quality may be serving merely as a proxy for the characteristics of the IPOs in the post-SEC sample. To investigate the relationship between the intensity of underpricing and issue characteristics, holding the quality of underwriter constant, the following regression equation was estimated separately for the IPOs underwritten by ranked and nonranked investment banking firms before and after the Securities Act of 1933:

$$e_{it} = \beta_0 + \beta_1 \ln S_i + \beta_2(1/P_{i0}) + w_i, \quad (4)$$

where e_{it} is the excess return on the i th IPO from offering date to one week later and S_i and P_{i0} are the size (gross proceeds) and the offering price per share of the i th IPO, respectively.

Earlier studies that examined underpricing of unseasoned new issues claimed

that the *ex ante* uncertainty about the true value of the shares is an important determinant of the size of the initial excess returns (e.g., see Logue [20] and Beatty and Ritter [6]). The insurance hypothesis also implies that the expected legal liabilities of the issuers and the investment bankers would tend to be large for IPOs that were inherently more difficult to evaluate. Thus, the implicit insurance in the form of underpricing would be more pronounced for the speculative IPOs. Obviously, it is virtually impossible to measure the degree of uncertainty faced by investment bankers in determining the value of a particular new issue. Two variables, issue size and offering price, are used as proxies for the *ex ante* uncertainty of the IPOs.

Issue size is measured by the total dollar value of the offering (gross proceeds). Small issues are typically offered by small start-up firms that are considered to be speculative issues. Large offerings, on the other hand, are associated with relatively seasoned large corporations. Thus, initial excess returns would be expected to exhibit a negative relationship with issue size in equation (4).

For any given issue size, however, the firm and its underwriter have considerable latitude in setting the offering price and the number of shares. For some puzzling reason, the offering prices of unseasoned new issues are typically set at levels that are lower than the prices of seasoned equity outstanding in the secondary markets. For example, the offering prices of the IPOs in the pre-SEC sample ranged from 17.62 percent to 88.11 percent of the average price of the NYSE-listed stocks during 1923 to 1930. The mean offering price was less than half the value of the shares that were trading on the NYSE (43.93 percent). Similarly, the average offering prices ranged from 11.01 percent to 132.13 percent of the average price of NYSE stocks during 1966 to 1971. The mean was 33.85 percent.

While financial theory is silent about the reasons why share prices are set at widely diverse levels, the conventional wisdom in the investment community is that low-priced stocks tend to be issued by highly speculative firms.²¹ This market folklore seems to have considerable empirical support. For example, Osborne [27, p. 265] documented that low-priced stocks are more volatile than high-priced shares. Blume and Husic [7, p. 290–293] and, more recently, Miller and Scholes [24, p. 1132] reported that the levels of share prices—or their reciprocals—predict subsequent returns of the stocks at least as good as their beta coefficients. Thus, the offering prices may contain information about risks of the IPOs. Beyond that, low-priced stocks tend to experience wider percentage bid-ask spreads in the secondary market. This implies that their post-offering returns would have to be commensurately larger than the return on high-priced securities. These considerations justify including $1/P_{i0}$ in the regression equation.

The estimated coefficients of the regression equation (4) are presented separately for the pre- and post-SEC samples in Table IV. The coefficient of issue size, β_1 , is not significantly different from zero in either the pre-SEC or post-SEC periods. Thus, there is no evidence of a relationship between initial excess returns and issue size with or without controlling for the quality of the underwriters.

²¹ Graham et al. [12, p. 649].

Table IV
Relationship between Issue Size, Offering Price, and Underpricing^a
 $\tilde{e} = \beta_0 + \beta_1 \ln S_i + \beta_2(1/P_{oi}) + w_i$

		Estimated Coefficients								
		Pre-SEC Period				Post-SEC Period				
	Sample Size	β_0	β_1	β_2	R^2	Sample Size	β_0	β_1	β_2	R^2
All IPOs	70	-0.1144 (-0.649)	0.0076 (0.692)	1.4446* (2.055)	0.060	134	-0.0871 (-0.187)	0.0076 (0.266)	0.9726 (1.638)	0.030
IPOs Offered by Ranked Investment Bankers	30	0.2679 (0.818)	-0.0182 (-0.865)	2.1307 (1.421)	0.091	53	0.1775 (0.340)	-0.0068 (-0.222)	-0.1914 (-0.162)	0.001
IPOs Offered by Non-ranked Investment Bankers	40	-0.2268 (-1.039)	0.0148 (1.086)	1.4815** (1.683)	0.082	81	-0.3700 (-0.495)	0.0286 (0.604)	0.9073 (1.128)	0.016

^a *t*-Statistics are presented in parentheses.

* Significant at the 0.05 probability level.

** Significant at the 0.10 probability level.

The coefficient of $1/P_{i0}$ is significant only in the pre-SEC sample. There is a weak statistical relationship between offering prices and excess returns only for the subsample of IPOs that were underwritten by the nonranked investment bankers in the pre-SEC period. Somewhat surprisingly, the coefficient of $1/P_{i0}$ is not significant in the post-SEC sample, where a larger number of low-priced small issues were brought to the market by both the ranked and nonranked underwriters.²²

In contrast, there is a statistically significant relationship between initial excess returns and the quality of the underwriter in the post-SEC period. The following regression equation formally estimates the relationship:

$$e_i = \alpha_0 + \alpha_1 D_i + u_i, \quad (5)$$

$$e_i = \alpha_0 + \alpha_1 D_i + \alpha_2 J_i + w_i, \quad (5a)$$

where D_i is a dichotomous variable equal to one if the i th IPO was underwritten by a ranked investment banker and zero if it was brought to the market by a nonranked underwriter; J_i is a dummy variable equal to one if the i th issue was offered in January and zero otherwise.

The estimated coefficients of (5) and (5a) are reported in Table V. While the coefficient of D_i is not significantly different from zero in the pre-SEC sample, it is significantly negative in the post-SEC period. Considered in conjunction with the data in Table III, the results presented in Tables IV and V suggest that the attributes of the issuers and their prospective offerings may be related indirectly to the degree of underpricing through the choice of the underwriter. That is, many of the highly risky small issuers may not constitute an acceptable clientele for the prestigious investment bankers who find the normal underwriting fees inadequate for the risk of potential legal liabilities and/or damages to their reputations.²³ This scenario implies that the revealed choices of the issuers between two classes of investment bankers capture the fundamental cross-sectional differences in the ex ante risks of the IPOs brought to the market.²⁴ The remaining cross-sectional differences in ex ante uncertainty in each subsample may not be large enough to reveal a systematic relationship between the characteristics of the individual issues and their excess returns.

Indeed, Logue's empirical results provide considerable support for this conjecture. In his study, issuer-specific factors and the variables related to the state of the stock market at the time unseasoned new issues were offered explained only

²² These results are very similar to Logue's [20] earlier findings. Using a different proxy measure for risk, Logue did not find a significant cross-sectional relationship between initial excess returns and the risks of individual IPOs underwritten by the same class of investment bankers.

²³ Beatty [5] documented a similar tendency for market segmentation in auditing services between the Big Eight and other CPA firms.

²⁴ The evidence contained in SEC [33, p. 2372] are consistent with this assertion. The quality of the originating investment bank was the most important determinant of the extent of institutional purchases of an IPO in the SEC's sample. Once the quality of the underwriter was accounted for, the size of the issuer had no explanatory power with respect to institutional purchases. That is, institutions purchased IPOs of prestigious investment bankers regardless of the size of the issuers. On the other hand, institutional investors did not purchase large amounts of initial public offerings of large issuers when they were originated by fringe investment bankers.

Table V
Relationship between Underwriter Quality and Underpricing^a

$$\tilde{e}_i = \alpha_0 + \alpha_1 D_i + u_i$$

$$\tilde{e}_i = \alpha_0 + \alpha_1 D_i + \alpha_2 J_i + \omega_i$$

	Sample Size	Estimated Coefficients			R^2
		α_0	α_1	α_2	
Pre-SEC	70	0.05385* (4.110)	-0.00492 (-0.246)		0.000
	70	0.04580* (3.436)	-0.00331 (-0.169)	0.06432* (2.117)	0.064
Post-SEC	134	0.14273* (6.104)	-0.08111* (-2.182)		0.035
	134	0.14417* (6.081)	-0.07924* (-2.10)	-0.02927 (-0.419)	0.036

^a *t*-Statistics are presented in parentheses.

* Significant at the 0.05 probability level.

four percent of the cross-sectional variation in the initial excess returns of the IPOs that were underwritten by the prestigious investment bankers. The same variables accounted for less than fifteen percent of the variation in the excess returns of the IPOs originated by the fringe underwriters.²⁵

To test the proposition that *ex ante* uncertainty of individual IPOs determines the choice of the underwriter, I estimate the following logit underwriter-likelihood model separately for the pre-SEC and post-SEC time periods:

$$p(i) = 1/[1 + \exp(-\beta_0 - \beta_1 X_{1i} - \beta_2 X_{2i})], \quad (6)$$

where $p(i)$ is the probability that the i th IPO will be underwritten by a ranked investment banker and X_{1i} and X_{2i} are the natural logarithm of gross proceeds and the reciprocal of issue price for the i th issue, respectively.

The model is based on the assumption that whether a particular IPO is originated by a ranked or nonranked investment banker depends on the size and risk of the issue as well as on the attributes of the investment bankers. If there are a large number of investment bankers interested in underwriting an IPO and the issuing firm selects the investment banker who would underwrite the stock at the lowest total cost (including underpricing), $p(i)$ would be a logit likelihood function of X_{1i} and X_{2i} .²⁶

The estimated coefficients of three versions of the logit model are presented in Table VI together with their *t*-statistics and the likelihood-ratio index, R^2 , which provides information about the explanatory power of the model. The results for the pre-SEC sample show that the coefficient of issue size is not statistically significant with or without the offering price in the equation. The reciprocal of the issue price, on the other hand, has a statistically significant

²⁵ Logue [20, p. 101].

²⁶ For a more detailed discussion of the logit probability function, see Johnson and Kotz [18].

Table VI
Estimates from Logit Underwriter Likelihood Model^a
 $p(i) = 1/[1 + e^{-\beta_0 - \beta_1 X_{1i} - \beta_2 X_{2i}}]$

	Estimated Parameters					
	Pre-SEC Period			Post-SEC Period		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Constant	-1.7693 (-0.387)	-4.8943 (-1.158)	1.3503 (1.852)	-7.2362 (-1.145)	-24.3680* (-5.222)	3.2163* (4.768)
Natural Log of Gross Proceeds (X_1)	0.1998 (0.678)	0.3003 (1.091)		0.6340** (1.643)	1.5930* (5.196)	
Reciprocal of Offering Price (X_2)	-48.2898* (-2.193)		-47.7574* (-2.304)	-35.9047* (-3.263)		-48.1093* (-5.226)
Likelihood-Ratio Statistic	6.97	1.23	6.50	57.16	42.44	54.29
Probability Level	0.03	0.27	0.01	0.0001	0.0001	0.0001
R^{2b}	0.031	0.00	0.047	0.296	0.225	0.291

^a The *t*-statistic computed to test the null hypothesis that the expected value of the coefficient is equal to zero is reported in parentheses.

^b R^2 is equal to $[Model \chi^2 - 2p] / -2L(O)$, where p = number of variables in the model excluding the intercept, and $L(O)$ is the maximum log-likelihood with only the intercept in the model. If $\chi^2 < 2p$, R^2 is set equal to zero. R^2 provides information about the explanatory power of the logit model.

* Significant at the 0.05 level.

** Significant at the 0.10 level.

negative coefficient. It indicates that highly speculative IPOs that tend to be offered at low prices were less likely to be underwritten by ranked investment bankers even before the Securities Act of 1933. However, the explanatory power of the model is extremely low in the pre-SEC period. The likelihood-ratio index, R^2 , is less than five percent. In contrast, the same model has a likelihood-ratio index of almost thirty percent in the post-SEC sample. The estimated coefficients have the correct signs and are statistically significant.²⁷ They indicate that highly speculative small issues that were offered at low prices were much less likely to be underwritten by the prestigious investment bankers after 1933.

The results provide considerable support for the proposition that "ranked" or prestigious investment bankers have intentionally limited their underwriting activities to relatively large and less speculative IPOs after 1933. Since the data for the pre-SEC sample do not show such a strong relationship between the characteristics of IPOs and the quality of the underwriters, it seems reasonable to conclude that the stringent statutory liabilities introduced in 1933 had a material impact on the structure of the market for IPOs. The market segmentation between ranked and nonranked investment bankers that is observed only in the post-SEC period is consistent with the implication of the insurance hypothesis.

The Securities Act of 1933 increased expected legal liabilities and the associated costs of a damaged reputation. It makes sense that the investment bankers who earn relatively large returns on their reputations would have attempted to avoid or reduce these costs by abstaining from underwriting securities of speculative small firms after 1933. As was observed in the *Report of the Special Study of the Securities Markets* [32, p. 493]: "Under the statutory scheme of free access with full disclosure, the determination of which issues are suitable for public ownership depends primarily upon the underwriter who originates and sells the issue." It appears that the prestigious investment bankers did not consider many small and speculative IPOs suitable for public ownership after 1933.

While it is impossible to gauge the magnitude of the change in expected legal liabilities caused by the Securities Act, the data presented in Table VII are suggestive of increased legal risks. They show the distribution of court decisions that pertain to public offerings of stocks and bonds over the years. Since a very large fraction of civil suits of this kind tend to be settled out of court, obviously the data show only the "tip of the iceberg." Nevertheless, the pattern is quite clear. The number of legal actions initiated against issuers and/or their agents appears to have increased steadily over the years. Although the concept of due diligence was contained in the British Companies Act as early as the 1900's, the Lexis computer search did not produce any court decisions in the U.S. that pertained to civil actions concerning issuers' and/or investment bankers' due-diligence responsibilities before 1937.

It is also interesting to note that the court decisions were in favor of the defendants—issuers and/or their agents—in only twenty-nine of the 219 cases

²⁷ While the correlation between $\ln S_i$ and $1/P_{i,0}$ is relatively low in the pre-SEC sample, -0.225 , it is -0.715 in the post-SEC sample. Thus, the standard errors of the coefficients of the model in the post-SEC sample are large.

Table VII

Civil Suits and the Securities and Exchange Commission Administrative Proceedings Related to Due-Diligence Investigations or Disclosure of Information in the Registration Statements^a

Decade	Number of Actions in Connection with IPOs	Number of Actions in Connection with Seasoned Issues	Number Brought by the SEC	Number of Cases Won by Plaintiffs	Number of Cases Won by Defendants
1915–1924	0	0	0	0	0
1925–1934	0	0	0	0	0
1935–1944	17	6	20	3	0
1945–1954	8	4	10	2	0
1955–1964	17	13	25	4	1
1965–1974	28	32	10	40	10
1975–1986	<u>49</u>	<u>45</u>	<u>21</u>	<u>55</u>	<u>18</u>
Total	119	100	86	104	29

^a Includes legal action brought against investment bankers, issuers, and other parties associated with the issuance of securities. Source: Mead Data Central, Lexis Service. Lexis is updated quarterly and includes virtually every case the courts release for publication.

(13.2 percent). When the SEC-originated actions are excluded, the fraction of the court rulings that favored the plaintiffs was still large—78.2 percent. Thus, the data are consistent with the proposition that potential legal liability became a much more serious concern for issuers and the investment bankers after the Securities Act of 1933. The data also suggest that the propensity for civil suits may have increased somewhat after the benchmark legal case, *Escott v. BarChris Construction Corporation*, in 1968. While I was able to find only seventeen court decisions before this case, there were 114 decisions in its aftermath. If the *Escott v. BarChris* case had indeed altered the standard for due diligence, the insurance hypothesis would predict that more pronounced underpricing should be observed after this benchmark decision.

To test this proposition, I examined the initial returns of IPOs that were issued before (March 3, 1965–March 29, 1968) and after (April 1, 1968–February 16, 1969) the court decision.²⁸ The pre-BarChris sample contained 110 IPOs. The initial returns of the issues from the offer date to the first observed after-market price averaged 25.74 percent, with a standard deviation of 44.99 percent. The post-BarChris sample of 140 IPOs, on the other hand, garnered an average initial return of 54.77 percent. The standard deviation was 68.15 percent. The value of the *t*-statistic that tests the difference in the mean returns of the pre- and post-BarChris samples is -4.03 . In other words, IPOs brought to the market after the benchmark court decision were underpriced by a significantly larger amount. This result provides additional support for the legal liability or the insurance hypothesis.

It is also important to note that the average underwriting spreads in the pre- and post-BarChris samples were virtually identical. While the average percentage

²⁸ I am grateful to Dennis Logue for providing me with his data for this analysis.

spread of 8.31 percent in the post-BarChris sample appears to be slightly larger than the average spread of 8.14 percent in the pre-BarChris sample, the difference is not statistically significant ($t = 0.961$). Considered in conjunction with the data on underpricing, this result seems to rule out the claim that underpricing and explicit underwriter fees may constitute closely interdependent “marketing-mix” decisions for the issuers and investment bankers.²⁹

IV. After-Market Performance of IPOs

The insurance hypothesis claims that IPOs are deliberately underpriced to reduce the probability of the after-market price, P_t , falling below the offer price, P_0 . In an efficient securities market, the excess returns of the IPOs would accrue to investors who purchased the securities from the underwriters at the offering price. Unlike the speculative-bubble or manipulation hypotheses, the insurance hypothesis does not claim that investors can predict the after-market performances of the IPOs on the basis of their initial excess returns, nor does it imply any differences in the after-market performances of the IPOs underwritten by prestigious and fringe investment banking firms.

To examine the relationship between after-market performance and the initial excess returns of the IPOs, the following cross-sectional regression equation was estimated separately for the two classes of investment bankers in the pre- and post-SEC periods:

$$e_{i,t+3} = \alpha_0 + \alpha_1 e_{i,t} + w_i, \quad (7)$$

where $e_{i,t+3}$ is the excess return of the i th IPO from one week after the offering date to one month after the offering date and $e_{i,t}$ is the excess return from the date of offering to one week later.

Market efficiency implies that α_0 and α_1 are equal to zero for both classes of investment bankers. Indeed, the results reported in Table VIII show that the null hypotheses that $\alpha_0 = 0$ and $\alpha_1 = 0$ cannot be rejected at the conventional levels of confidence in any of the four subsamples. Neither the quality of the investment banker nor the size of the initial excess return provides any useful information for predicting the subsequent performance of the IPOs in the after market. Thus, the data do not reveal any patterns in excess returns that would be consistent with speculative bubbles or manipulative practices during the month following the date of offering.

V. Hot-Issue Periods

Several studies documented that the average excess returns of the IPOs brought to the market during some time periods were unusually large. These so-called “hot-issue” periods include 1927, 1928, 1950, 1951, 1961, 1968, 1980, and 1981.³⁰

According to the insurance hypothesis, the post-SEC hot-issue periods should

²⁹ This conclusion is supported by earlier findings by Logue [20] and Wolfe [41] as well.

³⁰ These hot-issue periods were documented in Shaw [35], SEC [32], Ibbotson and Jaffe [15], and Ritter [29].

Table VIII
The Relationship between Initial Offering and the After-Market Performance of IPOs Underwritten by Ranked and Nonranked Investment Banks^a

$\hat{e}_{t+3} = \alpha_0 + \alpha_1 \hat{e}_t + \omega_t$								
Estimated Coefficients								
Pre-SEC Period (1923–1930)								
	Sample Size	α_0	α_1	R^2	Sample Size	α_0	α_1	R^2
IPOs Offered by Ranked Investment Banks	30	0.02612 (1.896)	−0.14663 (−0.948)	0.0311	53	0.01891 (0.959)	0.05374 (0.386)	0.0029
IPOs Offered by Nonranked Investment Banks	40	0.00015 (0.009)	−0.10829 (−0.638)	0.0106	81	0.01837 (0.761)	0.11599 (1.375)	0.0234

^a *t*-Statistics are presented in parentheses.

be characterized by unusually large numbers of speculative small firms raising equity by going public. Since evaluating the prospects of these firms and performing meaningful due-diligence investigations are fraught with difficulties, the potential legal liabilities for the issuers and their underwriters would be relatively large. There is persuasive evidence that the prestigious or "ranked" investment bankers avoid underwriting highly speculative IPOs. Thus, the insurance hypothesis would predict that periods of exceptionally large underpricing in the post-SEC era should correspond to those years when the market share of the fringe or nonranked underwriters was larger than usual.

To test this proposition, additional samples of IPOs, issued in various hot- and cold-issue periods during 1950 to 1985, were collected from a number of different sources (referenced in Table IX). The originating underwriter of each of the 3,501 IPOs was classified as "ranked" or "nonranked." The fractions of the IPOs

Table IX
Percentage of the IPOs Underwritten by Ranked and
Nonranked Investment Banks in Selected Time
Periods

Time Period	Sample Size	Percentage Underwritten by	
		Ranked	Nonranked
Pre-SEC (1923–1930) ^a	70	57.14%	42.86%
Hot-Issue Period, 1927–1928	21	47.62%	52.38%
Post-Sec (1966–1971) ^a	134	22.11%	77.89%
1950 (Hot-Issue Period) ^b	80	11.25%	88.75%
1951 (Hot-Issue Period) ^b	64	18.75%	81.25%
1961 (Hot-Issue Period) ^c	237	17.30%	82.70%
1965 ^b	137	43.79%	56.21%
1966 ^b	113	38.90%	61.10%
1967 ^b	160	31.87%	68.13%
1968 (Hot-Issue Period) ^b	228	29.82%	70.18%
1974 ^d	67	68.66%	31.34%
1975–1985 ^e	2,415	31.55%	68.45%
1975–1985 (Excluding 1980 and 1981)	1,849	36.56%	63.44%
1980 (Hot-Issue Period) ^b	43	9.31%	90.69%
1981 (Hot-Issue Period) ^f	523	15.67%	84.33%
All Post-SEC Hot-Issue Periods Combined	1,175	18.38%	81.61%
All Post-SEC Cold-Issue Periods Combined	2,326	37.70%	62.29%

^a Percentages were estimated from the samples used in this study.

^b Source: *Commercial and Financial Chronicle* [40] (various issues).

^c Obtained from Securities and Exchange Commission [32, p. 612].

^d Source: Institutional Investor [16, pp. 55–60].

^e Source: Stern and Bornstein [39, pp. 155–60]. Includes IPOs from January 1, 1975 through June 30, 1985.

^f Source: *Investment Dealer's Digest* [17, pp. 17–35].

underwritten by the two classes of investment bankers in various hot- and cold-issue periods are reported in Table IX. The implication of the insurance hypothesis is strongly supported by the data. While the prestigious investment bankers originated, on average, 37.7 percent of the IPOs in the cold-issue periods, they managed only 18.4 percent of the new issues in hot-issue periods.

The null hypothesis that market shares of the ranked underwriters in hot- and cold-issue periods were equal is easily rejected by the data. The calculated value of the t -statistic with 3,499 degrees of freedom is equal to -11.65 . Lest the readers wonder whether the test result is affected by a few outliers, the data indicate that the market share of the fringe or nonranked underwriters was large in virtually all of the post-SEC hot-issue periods when exceptionally large average underpricing was documented.

In contrast, the changes in the market shares of ranked and nonranked investment bankers during the pre-SEC hot- and cold-issue periods are unnoticeable. Although the percentage of the IPOs originated by the ranked underwriters during 1927 to 1928 was slightly less than the fraction during the rest of the pre-SEC sample, the difference is not statistically significant ($t = -1.05$). Out of the seventy IPOs in the pre-SEC sample, twenty-one issues were offered during 1927 to 1928. The mean excess return of these issues was 4.82 percent, which is not significantly different from the mean excess return of the IPOs in the rest of the pre-SEC sample. Furthermore, the initial excess returns of the IPOs underwritten by the ranked and nonranked investment bankers in 1927 to 1928 were virtually identical. In short, there is no evidence that the so-called hot-issue periods of the 1920's were associated with major changes in the market shares of the two classes of investment bankers.

The striking differences between the pre- and post-SEC behavior of the investment banking firms lend considerable empirical support for the proposition that the statutory liabilities became an important consideration in originating and setting the offering prices of IPOs after the Securities Act of 1933.

VI. Summary and Concluding Comments

The main proposition of this study is that underpricing serves as an efficient form of insurance against potential legal liabilities of issuers and their agents. The insurance hypothesis claims that the IPOs issued after 1933 should exhibit substantially larger initial excess returns than the new issues brought to the market before the enactment of the Securities Act. It also predicts that issuers and investment bankers whose exposure to potential legal liabilities is low should price their offerings more fully than highly speculative firms that employ relatively inexperienced fringe investment banking firms.

The implications of the insurance hypothesis were tested with data on IPOs that were issued before and after the Securities Act of 1933. The results indicate that the Act had a significant impact on the behavior of investment banking firms and on the pricing of unseasoned new issues. While the initial excess returns on the pre-SEC sample of IPOs were significantly positive, the magnitude

of the underpricing paled in comparison to the excess returns garnered by the IPOs issued after 1933. Also, there was no relationship between the magnitude of underpricing and the quality of the originating investment banking firms before 1933. In contrast, the post-SEC data clearly show that the prestigious underwriters have priced IPOs more fully than the fringe underwriters, who typically lack the experience and the capabilities to conduct thorough due-diligence investigations.

Moreover, the data indicate that the prestigious investment banking firms started to avoid underwriting highly speculative small issues after 1933. On the other hand, the pre-SEC data do not reveal any evidence of segmentation in the market for unseasoned new issues.

While these empirical findings provide strong support for the insurance hypothesis, it can be argued that some of the results are also consistent with models of underpricing that are based on asymmetric information between issuers and the underwriters or between informed and uninformed investors. For example, the relationship between initial excess returns and the quality of the IPOs, as captured by the quality of the underwriter, in the post-SEC era is consistent with both Baron's and Rock's hypotheses about underpricing.

However, the results of the pre-SEC sample cast serious doubt that the types of information asymmetries depicted by Baron and Rock are the principal forces that drive underpricing of IPOs. Unless it is demonstrated that information asymmetries were less pronounced or the cost of becoming informed was lower in the 1920's than it was in the late 1960's, the observed differences in the magnitudes of the initial excess returns cannot be explained by models that rely on differential information. Needless to say, it would seem strange that the cost of becoming informed was on average larger in the 1960's, when more extensive information was disclosed, than in the 1920's.

However, these comments are not meant to rule out information asymmetries as a contributing force to underpricing of unseasoned new issues. After all, if all parties to the transaction have identical information, much of the grounds for legal action would vanish. Then, there would be little need for underpricing as a form of insurance against legal liability. Obviously, the statutory requirements for due-diligence investigations and information disclosure are based on the recognition that issuers, underwriters, and the purchasers of IPOs do not ordinarily have identical information.

Although this study focused only on IPOs, the insurance hypothesis may also explain underpricing of seasoned new issues, which has been documented in the literature. For obvious reasons, potential due-diligence liabilities associated with underwriting seasoned securities would be much less serious than in the case of IPOs. Therefore, the implicit insurance premium in the form of underpricing would tend to be small.

Finally, the concern with due-diligence liability may also explain the reluctance of many qualifying firms to use Rule 415, shelf registrations, for their common stock offerings. The traditional registration and underwriting method may have lower expected legal liabilities than shelf registrations. However, I leave these issues to a future study.

Appendix: Insurance Premium for Moral Hazard

To illustrate how insurance policies against due-diligence liabilities would incorporate a premium for moral hazard, I assume that the investment banker has two strategies: (a) complete and thorough investigation, which totally eliminates legal liabilities, or (b) superficial investigation and disclosure, which exposes him or her to expected legal liability $E[L]$.

The insurer is assumed to have two strategies as well: (a) inspect the quality of the due-diligence effort of the banker or (b) do not check. Suppose that Q is a penalty that the insurer charges to the underwriter if the underwriter is caught violating the insurance contract; C is the cost of undertaking a thorough due-diligence investigation; and D is the insurer's cost of inspecting the banker's efforts. I assume that the cost of a superficial due-diligence investigation is zero.

With the stipulated strategies available to the investment banker and the insurance company, the problem can be formulated as a two-person game with the payoff matrix shown in Table X.

If the investment banker undertook a thorough due-diligence investigation with a probability p and the insurer inspected his or her efforts with a probability q , the optimal mixed strategies would be as follows:

for the insurer:

$$-E(L)(1 - p) + p(0) = (1 - p)[Q - D - E(L)] - D(p),$$

$$p^* = [(Q - D)/Q], \text{ and}$$

for the investment banker:

$$(1 - q)(0) + q(-Q) = (1 - q)(-C) + q(-C),$$

$$q^* = [C/Q].$$

Then, the expected values of the game to the insurance company and the investment banker can be calculated as follows:

$$V_{\text{insurer}}(p^*, q^*) = -E(L)\{1 - [Q - D]/Q\} = -\{[E(L)D]/Q\},$$

$$V_{\text{banker}}(p^*, q^*) = [C/Q](-Q) = -C.$$

Table X
Payoffs to Investment Banker and Insurer

	Investment Banker	
	No Investigation Probability = $(1 - p)$	Thorough Investigation Probability = p
Insurer		
Do Not Inspect Probability = $(1 - q)$	$[-E(L), 0]$	$[0, -C]$
Inspect Probability = q	$[[Q - D - E(L)], -Q]$	$[-D, -C]$

$[E(L)D/Q]$ is the expected cost of moral hazard to the insurer. That amount would be included in the premium of the insurance policy against legal liabilities.

The solution is meaningful if the following two conditions are satisfied: (a) $Q > D$; otherwise the insurer will never inspect the investment banker's efforts; and (b) $Q > C$; otherwise the investment banker will never perform a thorough due-diligence investigation.

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