

INITIAL PUBLIC OFFERINGS: EMPIRICAL STUDIES OF ALLOCATIONS,
PERFORMANCE, AND SHAREHOLDER LITIGATION

by

BEATRICE BOEHMER

(Under the Direction of Jeffry M. Netter)

ABSTRACT

We analyze allocations to institutional and retail investors in 441 initial public offerings (IPOs) and test whether institutions obtain IPOs with superior long-run performance. In addition to favorable first-day returns that were documented previously, we show that institutions also obtain more allocations in IPOs with better long-term performance. Moreover, we examine whether institutions possess better information than retail investors once trading has begun by analyzing how actual flipping by institutional and retail investors relates to long-run IPO performance. In contrast to previous research, we find no significant relationship between institutional or retail flipping and returns. Both results lend strong support to bookbuilding theories.

In the second part, we examine the determinants of IPO-related securities-fraud lawsuits. Using duration analysis, we find that not only variables known at the time of the IPO predict the filing of subsequent lawsuits but also information that changes over time and becomes available after the IPO. Furthermore, we provide additional evidence on the lawsuit-avoidance theory of underpricing (Tinic (1988)). In contrast to recent research, we are not able to find support for this hypothesis in our data.

INDEX WORDS: Initial Public Offering, Allocations, Flipping, Long-Run
Performance, IPO Underpricing, Securities Litigation

INITIAL PUBLIC OFFERINGS: EMPIRICAL STUDIES OF ALLOCATIONS,
PERFORMANCE, AND SHAREHOLDER LITIGATION

by

BEATRICE BOEHMER

Diplom-Kauffrau, Humboldt Universitaet zu Berlin, Germany, 1998

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in
Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2003

© 2003

Beatrice Boehmer

All Rights Reserved

INITIAL PUBLIC OFFERINGS: EMPIRICAL STUDIES OF ALLOCATIONS,
PERFORMANCE, AND SHAREHOLDER LITIGATION

by

BEATRICE BOEHMER

Major Professor: Jeffry M. Netter

Committee: Scott E. Atkinson
James S. Linck
Annette B. Poulsen

Electronic Version Approved:

Maureen Grasso
Dean of the Graduate School
The University of Georgia
May 2003

TABLE OF CONTENTS

	Page
CHAPTER	
1 INTRODUCTION	1
2 LITERATURE OVERVIEW.....	4
2.1 Pricing and Performance of Initial Public Offerings and the Role of the Underwriter	4
2.2 An Overview of Empirical Research on Securities-Fraud Litigation	28
3 DO INSTITUTIONS RECEIVE FAVORABLE ALLOCATIONS IN INITIAL PUBLIC OFFERINGS WITH BETTER LONG-RUN RETURNS?.....	38
3.1 Introduction	38
3.2 Methodology	43
3.3 Data Sources and Sample Description	46
3.4 Allocations, Flipping, and Long-Run Returns	56
3.5 Conclusions	72
4 DETERMINANTS OF IPO-RELATED LITIGATION RISK AND THE INSURANCE EFFECT OF IPO UNDERPRICING	74
4.1 Introduction	74
4.2 Methodology	80
4.3 Potential Determinants of IPO-Related Class-Action Lawsuits.....	81

4.4 Data	86
4.5 Determinants of IPO-Related Securities-Fraud Lawsuits - Multivariate Analysis	101
4.6 Conclusions	127
5 CONCLUSIONS.....	130
REFERENCES	133

CHAPTER 1

INTRODUCTION

Initial public offerings (IPOs) of equity securities are an important step in the life of a firm. During the last 20 years, IPO activity has been particularly high. For example, only 112 firms were going public with total gross proceeds of about 1 billion US Dollars from 1975 to 1979, but this number increased to 523 IPOs raising more than 12 billion US Dollars of equity in 1983. From 1990 to 1999, 4129 firms issued equity securities for the first time with total gross proceeds of more than 294 billion US Dollars.¹

Initial public offerings have attracted tremendous attention in academic research during the last two decades. Although an extensive body of theory and empirical evidence has emerged, many puzzling questions remain to date. The IPO literature primarily focuses on the pricing of new issues, and in particular on the phenomenon of underpricing, the allocation of new shares, and the long-run performance of new issues (see also Ritter and Welch (2002)). Other important questions concern the reasons why firms are going public and for fluctuations in IPO volume over time. Furthermore, the role of investment banks and underwriters in IPOs has also attracted considerable academic interest.

During 1999 to 2000, the years of the "dot-com bubble" or "internet bubble", IPOs and their underwriters received even more attention from the public, from academics, and also from the U.S. Securities and Exchange Commission (SEC). During

these years, IPO underpricing, defined as the return from the offer price to the closing price on the first day of trading (initial return), reached an average level significantly higher than in previous years. In the aftermath of the dot-com bubble, the SEC and the U.S. attorney's office in Manhattan began a joint investigation of whether IPO underwriters were violating securities laws by extracting unusually large trading commissions from clients in return for allocations of hot IPO stocks. In addition, IPOs and their underwriters became subjects of a wave of securities-fraud class-action lawsuits alleging omissions and misrepresentations in registration statements and prospectuses.

The first part of this dissertation analyzes both initial returns and the long-run performance of IPOs. Using a unique data set, it investigates whether institutions receive higher allocations in IPOs with better initial and long-run returns. This adds an important and novel dimension to the understanding of IPO pricing. Previous studies examine the relation between first-day returns and allocations, but do not address the long-run profitability of holding an IPO investment. Moreover, combining the longer-term perspective with information on flipping by investors who were allocated shares in the offering allows an investigation whether informed investors reveal all relevant information to underwriters. This is examined by relating flipping to underpricing and subsequent returns.

The second part of the dissertation examines the determinants of IPO-related securities-fraud class action lawsuits for IPOs from 1996 to 2001. It employs duration analysis to investigate the factors that lead to the filing of a class action lawsuit. Thus, for the first time, a study can incorporate information flows after the firm went public, in

¹ See Jay Ritter's website at <http://www.bear.cba.ufl/ritter>

addition to the more commonly studied information known at the time of the IPO. In addition, the second part of the dissertation provides an additional test of Tinic's (1988) lawsuit-avoidance theory of IPO underpricing. The reasons for the underpricing of IPOs are still puzzling. Several theories exist that attempt to explain the on average large initial returns experienced by IPOs (see the literature overview in Chapter 2). Tinic (1988) proposes that IPOs are underpriced by issuers and their underwriters to insure themselves against subsequent lawsuits related to the IPO. Empirical evidence for his model has been very scarce and inconclusive. The second part of the dissertation provides evidence that is not consistent with his model.

The dissertation is organized as follows. Chapter 2 provides an overview of the academic literature on initial public offerings and on securities-fraud litigation. Chapter 3 examines allocations in IPOs, flipping, and IPO long-run performance. Chapter 4 analyzes the determinants of IPO-related securities-fraud class action lawsuits and provides a test of Tinic's (1988) lawsuit-avoidance theory of IPO underpricing. Chapter 5 offers conclusions.

CHAPTER 2

LITERATURE OVERVIEW

2.1 Pricing and Performance of Initial Public Offerings and the Role of the Underwriter

This section reviews important aspects of initial public offerings that have been attracting extensive academic interest. Specifically, we discuss theoretical and empirical academic research related to pricing and performance of IPOs, and the role of the investment bank during and after the IPO process.

2.1.1 The Underpricing of IPOs

A. Theories of IPO Underpricing

A phenomenon that has been widely documented in the academic literature is the underpricing of IPOs (see for example Ibbotson (1975), Ibbotson, Sindelar and Ritter (1994), and Loughran, Ritter, and Rydqvist (1994) for international evidence). The amount of underpricing or initial return is generally calculated as the return from the offer price to the closing price on the first day of trading. Investors buying IPOs at the offer price realize an initial return of about 15% on average. However, during 1999 to 2000, where many companies in the computer- and internet industries went public, the first- day return increased to about 65% (see Ritter and Welch (2002). Loughran and Ritter (2002) attribute much of the higher underpricing during the later years to a change in issuer objectives, suggesting that maximizing IPO proceeds was not considered as important as prior to the internet bubble years.

There exists an extensive body of theoretical work attempting to explain the underpricing of IPOs. A large proportion of the theories rest upon an assumption of asymmetric information: either between different groups of investors (informed and uninformed), between the issuing firm / investment banker and investors, or between issuing firm and investment banker. The following paragraphs present the most important models of asymmetric information.

Rock (1986) assumes that there exist two groups of investors, informed and uninformed, and that new issues are rationed. Uninformed investors face a winner's curse: the probability that they receive an allocation of underpriced issues is smaller than the probability of receiving an allocation of overpriced issues. This allocation bias causes the uninformed investors to value the new shares less than they would otherwise do. They do not participate in the market until the price is low enough to compensate them for the allocation bias. Rock shows that, in an equilibrium, new shares will be underpriced to attract uninformed investors. Beatty and Ritter (1986) extend the model and argue that the greater the ex-ante uncertainty about the value of an issue, the greater is the expected underpricing. This is because as the ex-ante uncertainty increases, the winner's curse problem intensifies.

Carter and Manaster (1990) propose a model similar to Rock with the extension that underwriters with a high reputation reduce the required underpricing. They show that the decision of an investor to acquire information at a cost is equivalent to the decision to buy call options on the asset. The value of a call option is increasing in the risk of the underlying asset, so the greater the risk of the IPO the greater the propensity for investors to become informed. If the risk of the IPO is low, the issuer will benefit from

communicating this to the market because with a low risk, less informed investors will be attracted and less underpricing is required to attract the uninformed investors. To communicate a low risk, issuers choose a prestigious underwriter.

In Baron (1982), asymmetric information exists between issuers and underwriters. Because the investment banker is better informed about capital market conditions it is optimal for the issuer to delegate the offer price decision to the banker (Baron and Holmstrom (1980)). Since the issuer can not perfectly monitor the underwriter's distribution effort, offer prices will be set lower than without information asymmetries. Underpricing can also be regarded as a compensation of the banker for the use of his information such that he can share in the gains from his superior information.

Considering the process of bookbuilding by the lead underwriter, another group of theories of IPO underpricing has emerged, beginning with Benveniste and Spindt (1989). Benveniste and Wilhelm (1990), Spatt and Srivastava (1991), Benveniste and Busaba (1997), Sherman (2000), and Sherman and Titman (2002) also develop book-building models in which differential information production leads to differential allocations. Recently, these models have attracted considerable attention in empirical work. In Benveniste and Spindt, the IPO marketing process is modeled as an auction where the underwriter is collecting information from his client investors in order to price the IPO. Informed investors do not have an incentive to reveal positive information prior to the sale of the stock because they would like to purchase it for a low offer price and then sell it for the higher full-information price. However, Benveniste and Spindt show that the underwriter is able to induce investors to reveal their information by setting a low offer price. Underpricing thus acts as a compensation for informed investors. Furthermore, the

underwriter is able to reduce the required amount of underpricing by selling IPOs repeatedly to the same regular investors: their allocation priority may be reduced if they do not reveal private information about the issue.

One strand of IPO underpricing theories focuses on signaling effects: asymmetric information between issuers and investors is reduced by signaling firm value through underpricing or the choice of a prestigious underwriter and / or auditor.

Allen and Faulhaber (1989) assume that the issuing firm is better informed about its own prospects than are investors. Underpricing is an equilibrium signal of firm quality. It is a credible signal to the market because it results in an immediate loss to the firm's initial owners. Only high-quality firms will be able to recover this loss, low-quality firms can not afford the signal. What incentive do good firms have to underprice their issues? With previous underpricing, firms can more easily return to the capital market to raise seasoned equity and investors will interpret subsequent dividend results more favorably. In Grinblatt and Hwang (1989), the issuer overcomes the asymmetric information problem in a similar way: he signals the true value of the firm by selling the shares at a discount and additionally, by retaining some of the shares in his own portfolio. A model by Welch (1989) shows that high-quality firms underprice at the IPO in order to obtain a higher price at a seasoned offering. In Titman and Trueman (1986), the issuer signals firm value with the choice of a high-quality underwriter and / or auditor which results in less underpricing. Beatty (1986) hypothesizes and presents evidence that the reputation of the audit firm is inversely related to the initial return earned by an investor in the IPO.

Further explanations of underpricing that I do not assign to the categories of models described above have been advanced by Tinic (1988), Welch (1992), Boehmer and Fishe (2001), and Mauer and Senbet (1992). Tinic (1988) proposes a model where underpricing is an efficient form of insurance against potential legal liabilities of issuers and their agents and also against damages to the reputation of investment bankers that may arise from due-diligence and disclosure requirements of federal securities regulations (see also Hughes and Thakor (1992)).

Welch (1992) argues that the pricing decisions of issuers can be due to informational cascades. Later investors are assumed to rely completely on the purchasing decisions of earlier investors and to ignore their own information. If the first few investors purchase the issue, later investors will follow suit. Issuers underprice to induce the first few investors to purchase the IPO and to cause a cascade. The underwriter's role is to distribute the offering widely, thus diminishing the information aggregation among investors and reducing the informational disadvantage of the issuer.

In Boehmer and Fishe (2001), underpricing is in the interest of the lead underwriter since he gains revenue from aftermarket trading. According to Ellis, Michaely, and O'Hara (2000), the underwriter in most cases becomes the market maker for the stock and the dominant dealer.

Mauer and Senbet (1992) propose a model inspired by the literature on asset pricing in segmented markets that may explain part of the underpricing of IPOs. They argue that underpricing is a consequence of IPOs being traded in two separate markets: in the primary market during the offering stage and in the secondary market thereafter. The primary market is populated by firms with little operating history and relatively few

comparable firms in the secondary market (young start-up companies with new technologies) whereas secondary markets are larger and more centrally accessed. Primary issues thus are incompletely spanned in the secondary market, i.e. there does not exist a portfolio of firms that is a perfect substitute for the IPO in the secondary market. The IPO in the primary market therefore trades at a risk premium which results in different secondary market and initial offer values. The model predicts that there are differences in underpricing across IPO technologies and investor accessibility to the IPO at the offering stage.

B. Empirical Evidence on Theories of IPO Underpricing

While many of the earlier empirical studies on IPO underpricing focus on implications of asymmetric-information and signaling theories, the amount of empirical work dedicated to bookbuilding and allocation of new issues has increased during the last few years

Muscarella and Vetsuypens (1989a) test the asymmetric information hypothesis between issuer and banker (Baron 1982) and between informed and uninformed investors (Rock 1986). They examine the underpricing of IPOs that were publicly owned before, then experienced a leverage buyout and went public again after an average of 34 months. For those firms, uncertainty about their value is assumed to be substantially reduced because there is more information available than for the typical IPO and thus these second initial public offerings should exhibit less underpricing. The results of the study are consistent with the asymmetric information hypothesis: on average, the initial return is significantly lower for second initial public offerings than for the control sample of typical IPOs.

Muscarella and Vetsuypens (1989b) present a test of Baron's (1982) model of IPO underpricing. The model predicts that the offer price will be lower in the absence of asymmetric information between issuer and underwriter. In their study, Muscarella and Vetsuypens look at IPOs of investment bankers who market their own securities: there should be no information asymmetry present and thus no or less underpricing. Inconsistent with Baron's model, the self-marketed IPOs experience a mean initial day return not significantly different from the first-day return of typical IPOs of comparable size.

Barry, Muscarella, Peavy and Vetsuypens (1990) find evidence consistent with the asymmetric information models of Rock (1986), Beatty and Ritter (1986), Carter and Manaster (1990) but inconsistent with the model of asymmetric information between issuer and banker (Baron (1982)). They investigate IPOs of firms that are venture-capital backed. Underpricing is related to proxies for the monitoring quality of the venture capitalist: the higher the quality, the less underpricing. High-quality venture capitalists appear to reduce underpricing because they reduce uncertainty about the value of the IPO (their investment position and details about their activity within the IPO firm are revealed in the offering prospectus). However, the average initial-day return of venture-capital backed IPOs is not significantly different from a control IPO sample and venture capitalists affiliated with the investment banker or lead underwriter assumed to reduce the information asymmetry between issuer and banker do not reduce underpricing. Megginson and Weiss (1991) also examine the role of venture capitalists in IPOs: are they able to certify through their presence that the offering price of the issue reflects all available and relevant information? They find that venture-capitalist backing reduces the

mean and median degree of underpricing by reducing the information asymmetry between issuer and investors and underwriter and investors.

Several studies examine special IPOs that are expected to have more or less uncertainty about firm value than typical IPOs and that were mostly excluded in other studies of IPO underpricing. Peavy (1990) compares closed-end fund IPO returns to non-fund IPO returns. Because the underlying asset is a portfolio of marketable securities and the composition and net asset value of the portfolio is reported in the prospectus, closed-end funds are associated with less uncertainty about share value. The mean initial return of the sample is not significantly different from zero which lends support to models of asymmetric information between informed and uninformed investors. In contrast to closed-end funds, REITs invest in infrequently traded real estate assets and as a consequence, there is much uncertainty regarding their values. Wang, Chang and Gau (1992) find that REIT IPOs (sample from 1986 to 1987) are systematically overpriced, not underpriced. Since the buyers of REIT IPOs are predominantly individual investors or non-institutional investors there are no informed investors participating in the IPO and there should be no reason for underpricing (Rock (1986), Beatty and Ritter (1986)). However, there is no theoretical explanation for the overpricing. Ling and Ryngaert (1997) examine a later sample of REIT IPOs (1991-1994): these REIT IPOs differ from their predecessors in organization, business plans, ownership structure and are managed more actively. There is much more uncertainty than before and there are more institutional investors participating now. Consistent with the winner's curse (Rock (1986), Beatty and Ritter (1986)) but also with other explanations (Benveniste and Spindt (1989)), the results show a positive average initial return significantly different from zero,

negatively related to underwriter reputation and positively related to the initial level of institutional share ownership.

The most direct support for Rock (1986) comes from Koh and Walter (1989). They use a unique data set of Singaporean IPOs that includes the extent to which shares are rationed on the offer date. The allocation patterns show that there exists indeed a winner's curse since issues with a higher initial return experience a higher rationing.

Hanley and Wilhelm (1995) present the first direct evidence on institutional domination of the short-run profits associated with IPOs, using a unique data set. Their findings lead to some doubt of Rock's (1986) explanation of underpricing: although institutional investors may be better informed, they can not use this informational advantage to avoid investing in overpriced offerings and the lemons problem for uninformed investors may not exist. The data show that institutional investors are allocated large positions when the issue is underpriced but also when it is overpriced. Consistent with their data is the prediction of Benveniste and Spindt (1989) that underwriters have an implicit threat against institutional investors by allocating issues repeatedly to the same investors and are able to induce institutional investors to participate in overpriced offerings.

In bookbuilding models (see, for example, Benveniste and Spindt (1989)), the underwriter compensates informed investors with underpriced shares to induce them to reveal positive information. There is a fairly large amount of empirical evidence consistent with models of bookbuilding. Hanley (1993) shows that the information gathered from potential investors prior to the issue is directly related to the amount of underpricing. Hanley and Wilhelm (1995), using a small sample of 38 IPOs, find that

institutions are allocated about equal percentages of shares in overpriced and underpriced issues (around 70%). If institutional investors are indeed well informed, the underwriter appears to be able to induce them to buy weaker issues due to the long-term relationship between underwriter and investors who are interested in IPOs, as predicted by bookbuilding models. Aggarwal, Prabhala, and Puri (2001), who examine a larger sample, find that institutional allocations are significantly larger when pre-issue demand is stronger. Cornelli and Goldreich (2001) show that investors who submit more detailed information are allocated more shares in favorable offerings. Ljungqvist and Wilhelm (2001), in a sample of international IPOs, confirm that institutions receive higher allocations the more positive information they disclose. An exception is a recent paper by Jenkinson and Jones (2002) who provide evidence that is contrary to implications of bookbuilding models: investment banks do not seem to reward investors who reveal more information (by submitting limit-price bids) with higher allocations.

While the empirical evidence supports models of bookbuilding in general, there is little direct evidence on the informed-investor view if institutions as a group are regarded as informed investors. Aggarwal, Prabhala, and Puri (2001), employing actual allocation data, suggest that institutional investors have private information about first-day IPO returns. For IPOs in Finland, Keloharju and Torstila (2002) document that institutional investors do not realize a larger initial return on average but this may be due to allocation rules that favor small investors. Krigman, Shaw, and Krigman, Shaw, and Womack (1999) show that first-day sell-signed block-trade dollar volume as a percentage of total dollar volume, an approximation for flipping by institutions, is negatively related to 6- and 12-month aftermarket performance. However, Houge, Loughran, Suchanek, and Yan (1999)

find that block and non-block traders sell IPOs that exhibit weak performance over the long run in similar proportions, which suggests that institutions may not have an information advantage.² More troubling is that Aggarwal (2002), using actual flipping data, documents that only around 19 percent of the trading volume in the first few days after the IPO is accounted for by flipping. Given that institutional investors typically receive 65 to 70 percent of the shares allocated, the small amount of flipping suggests that institutions may not be very informed as a group.

Michaely and Shaw (1994) test signaling and adverse selection (winner's curse) theories by comparing the underpricing in two markets with different degrees of informational heterogeneity: IPOs of master limited partnerships (MLP) and regular IPOs. MLP IPOs are largely avoided by institutional (informed) investors for tax reasons and the market knows this. Thus, the lemons problem uninformed investors face is expected to be less for MLP IPOs. Michaely and Shaw find that regular IPOs are significantly more underpriced than MLP IPOs (initial return not significantly different from zero) which is consistent with the adverse selection theories. However, a simultaneous equations model applied to the data (947 IPOs from 1984-88) does not support any of the signalling models (Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989)). They also find support for the prediction that reputation of the underwriter plays an important role in explaining initial-day returns.

² Aggarwal's (2001) results question the use of block trades to measure flipping because she finds many institutional flips less than the 10,000 share block size.

Beatty and Welch (1996) find that the strong negative relation between underwriter reputation (quality) and underpricing, which has been found in data from the late 1970s and 1980s, has actually reversed in the 1990s.

Signalling models in which firms underprice their IPOs so that they can subsequently issue seasoned equity at more favorable prices (Allen and Faulhaber (1989), Grinblatt and Hwang (1989), Welch (1989)) are tested in Jegadeesh, Weinstein and Welch (1993). The models predict that firms with greater underpricing are more likely to subsequently issue seasoned equity, to issue larger amounts, to issue more quickly after the IPO and to experience a smaller price drop when the seasoned equity offering is announced. They find support for the predictions in the data but the relations are weak from an economic perspective.

All theories of underpricing imply that underpricing is a device to reward the individuals who participate in the issue. Barry and Jennings (1993) ask the question: Who actually gains the benefits of IPO underpricing? They show that about 90% of the initial day's mean return is earned on the opening transaction and the subsequent average intraday return is smaller than estimates of transaction costs. As predicted by most of the theories on underpricing, only investors that bought the stock at the offer price benefit from the underpricing of IPOs.

Taken together, the empirical evidence to this time has not led to a strong conclusion about a single cause of IPO underpricing. A considerable proportion of the studies described above yield some support for models of asymmetric information between informed and uninformed investors, in particular for models of bookbuilding.

Signaling models are rarely supported by the data. Several studies, described in the following, suggest that there might be additional factors leading to high initial IPO returns.

Kandel, Sarig and Wohl (1999) examine a unique data set of 27 auctioned IPOs in Israel. The auctions are nondiscriminating with a minimum but no maximum price and are open to all investors. The lead underwriter aggregates the individual orders and sets the clearing price at the highest price at which demand equals at least supply. On the day after the auction, the clearing price and the oversubscription at the minimum price are published and the offer is distributed. Trading starts 3-5 days after the auction. The average initial abnormal return is 4.5%, significantly different from zero. None of the existing theories is able to explain the underpricing in this case: all of them are based on the fact that in most IPOs prices are fixed by the firm or the underwriter before the IPO is sold.

Ruud (1993) imposes a challenge to previous theories of underpricing that rest on the premise that the positive mean initial IPO returns result from deliberate underpricing. She claims that underwriter price support may be sufficient to explain the high initial returns. Underwriter price support reduces the number of negative initial returns. Ruud examines the distribution of initial returns of IPOs and finds that it peaks steeply around zero and includes very few observations in the negative tail – it is positively skewed. As the holding period lengthens, skewness and kurtosis decrease. When the artificial suppression of the left tail of the return distribution is taken into account, the resulting mean-one-day return is close to zero and the distribution is nearly symmetric like ordinary daily returns.

Brennan and Franks (1997) show that underpricing of an issue may have additional or different reasons than proposed by the theories: insiders may underprice issues to retain control. An examination of IPOs in the United Kingdom shows that there is a discrimination against large block applicants for the IPO to reduce the block size of new shareholdings. Underpricing seems to be an effective mechanism to ensure outside dispersed ownership to reduce monitoring of management. Consistent with this reduced-monitoring hypothesis is their result that, of pre-IPO shareholders, directors sell only little at the time of the IPO whereas non-directors sell almost all their holdings. Further, the issuers experience very few hostile takeovers until up to seven years after the IPO, thus the protection of insiders against hostile changes of control appears to work effectively.

2.1.2 The Role of the Underwriter

As the previous sections suggest, underwriters play an important role in pricing and distributing new issues. Underwriters seem indeed to add value in pricing IPOs as documented by Kim and Ritter (1999). Investment bankers use accounting information and comparable-firm multiples as benchmark for choosing a preliminary offer price range. However, the additional information they process about the market's demand leads to much more accurate pricing. It is still an open question how much of this improvement is due to superior fundamental analysis and how much is due to merely canvassing market demand. Lowry and Schwert (2002) suggest that with regard to the treatment of public information, the IPO pricing process is more or less efficient. They find that underwriters incorporate most public information into the offer price.

Besides pricing and distributing the offer, an important post-issuance activity of the investment bank appears to be price stabilization in the aftermarket. Why and when is price stabilization done? How is it done? What impact does it have on the market? The following studies attempt to find answers to these questions. While earlier work had to rely on indirect methods for observation, recently available data has facilitated direct observation of stabilization activities,.

An economic rationale for price stabilization practices complemented by penalty bid provisions has been advanced by Benveniste, Busaba and Wilhelm (1996). They extend the underpricing model of Benveniste and Spindt (1989) where underwriters reward investors for revealing their private information about the issue. Benveniste and Spindt's model did not take into account the underwriter's potential incentive to overstate investor interest which would lead to a higher offer price. A commitment of the underwriter to provide post-offer price stabilization is bonding him against an overstatement. The stabilization commitment is efficient because the stabilization bid is not open to all investors: penalty bids are exercised for retail investors.

Schultz and Zaman (1994) study the aftermarket for 72 IPOs using comprehensive trade and quote-change data from every market maker including the underwriter for the first three days of trading. They find pervasive evidence of aftermarket support: Underwriters are almost always at the inside bid for cold IPOs (IPOs that trade at or below their offering price) whereas other dealers are mainly at the inside ask and underwriters on average repurchase over 20% of the issued shares during the first three trading days. The volume of the aftermarket repurchases suggests that stocks are

supported by permanently reducing the supply of shares. For hot IPOs the overallotment option is exercised.

Hanley, Kumar and Seguin (1992) indirectly examine the effects of price stabilization on the market for IPOs using NASDAQ IPOs from 1982-87. They find evidence suggesting that stabilization (purchasing shares to prevent or retard a drop in the open market price of the IPO) significantly affects quoted spreads: they are narrower when transaction prices are close to the offer price during the first 10 – 15 trading days. When it is assumed to be suspended, IPO market prices decline by about 2.5% over the following five days. There are also differences between the bid-ask spreads for IPOs and for seasoned stocks: on average, the bid-ask spread for IPOs is only 75% as wide as for seasoned stocks (Hedge and Miller (1989)). This may be due to stabilization and liquidity-providing activities of underwriters.

Ellis, Michaly and O'Hara (1999) directly examine the trading activity of the lead underwriter in the IPO aftermarket. They also find that it always becomes the market maker and the most active dealer (on average, it handles 60% of all volume during the first day, 50% during the first month, 40% during first 3 months), independent of the performance of the IPO.³ The underwriter seems to accumulate substantial inventory positions in the stock that are especially large when the IPO is trading below the offer price. This inventory position is reduced by the standard 15% overselling of the issue at the offering day and the overallotment option. An important result of their study is that post-IPO trading (stabilization activities) are not costly for the underwriter: instead, he realizes trading and inventory profits (23% of total profits, compensation from

³ See also Ellis, Michaely, and O'Hara (2002)

underwriting fees is 77% of total profits). Furthermore, they find a significant link between underwriter trading profits and IPO underpricing, suggesting that the underwriter directly benefits from underpricing the issue.

Aggarwal and Conroy ((1999) examine how the price of an IPO changes from the offer price to the first trading price. They find that the lead underwriter is always the market maker and initially decides at what price to start quoting and trading the stock. This first quote explains a large portion of initial returns.

A first comprehensive analysis of exactly how aftermarket activities of underwriters are conducted is provided by Aggarwal (2000) by using a unique data set. There are three forms of aftermarket activities: pure stabilization, aftermarket shortcovering (covered by exercising the overallotment option or buying shares in the aftermarket) and a naked short position for anticipated weak demand, and penalties for syndicate members whose customers flip. Surprisingly, Aggarwal finds that pure stabilization is never done, probably because stabilization bids carry a stabilization flag. Aftermarket short covering emerges to be the main form of stabilization: it yields the same results as pure stabilization but is less risky, less expensive (by exercising the overallotment option), and does not have to be disclosed. On average, the syndicate even starts with a total short position that is 17.08%, greater than the 15% overallotment option, but the ex-ante short position is higher for weak offerings. Penalty bids are used selectively and mostly for weak offerings. Price support is done also for offerings that start trading a little above the offer price. The aftermarket short-covering activities usually end after 10-15 days but in some cases they continue for several months. The

overallotment option and penalty bids are usually exercised during the 30-day period after the first trading day.

Is the role of the underwriter in an IPO exhausted by pricing, distributing and stabilizing the issue? Krigman, Shaw and Womack (1999) do not suggest so. 180 of 578 firms conducting a seasoned equity offering between 1993 and 1995 within 3 years of their IPO switched the underwriter. Krigman, Shaw and Womack find that switching is not primarily driven by dissatisfaction with the actions of the lead underwriter around the time of the IPO (or with underwriting fees), but that the main areas of dissatisfaction relate to long-term and service-oriented issues. Issuers, when possible, trade up to higher-reputation underwriters for the first SEO and regularly initiate a change, addition or improvement in research coverage by the lead underwriter during the follow-on offer. Issuers seem to place a very high value on continuing services after the IPO, for example on research provision by the underwriter's security analysts. However, underwriter analysts may issue overly optimistic (positively biased) recommendations for the IPOs. Michaely and Womack (1999) examine buy recommendations of brokerage analysts after the "quiet" period (25 calendar days after the IPO). They find that in the month after the quiet period, lead underwriter analysts issue 50% more buy recommendations on the IPO than other analysts. Further, stock prices of firms recommended by the lead underwriter fall, on average, in the 30 days before the recommendation whereas prices of those recommended by non-underwriters rise. The long-run post-recommendation performance (buy-and –hold return for two years beginning on IPO day) of underwriter-recommended firms is significantly worse than that of non-underwriter recommended firms. A survey of

underwriter analysts shows that they intentionally issue positively biased recommendations for their IPO firms.

However, a recent study by Bradley, Jordan, and Ritter (2002) casts doubt on the conflict-of-interest hypothesis where the conflict is supposed to exist between the investment bank's research and corporate-finance divisions. Bradley, Jordan, and Ritter document significantly positive abnormal returns when analyst coverage is initiated for IPOs at the end of the "quiet" period (about 25 calendar days after the IPO). Whether it is the underwriter or not who initiates coverage does not have any impact on the market reaction. The number of analysts initiating coverage does, however, increase the abnormal return, suggesting a "confirmation" effect.

Finally, the questions arises: What are the costs of underwriter services for firms going public? Ritter (1987) presents some evidence on the transaction costs of going public. Expenses are divided into direct costs, involving investment banking fees, and indirect costs, which equal the amount of underpricing. The average total expenses as a percentage of realized market value of the securities issued is 21.22% for firm commitment offers and 31.87% for best effort offers. Ritter analyzes the contract choice decision of the firm and finds that it is related to the role of asymmetric information between investors and issuers: firms whose value is more certain will use firm commitment offers, whose value is highly uncertain will use best efforts offers.

Chen and Ritter (2000) report that the direct costs to issuers, the commissions paid to the investment bankers (gross spreads) have increased and exhibit clustering around 7% in recent years (1995-98). This is puzzling because economies of scale are likely to exist. In other countries, spreads are only half the US level. Furthermore, for

bonds and seasoned equity offerings in the US, there is no clustering of spreads. Ritter proposes a strategic pricing explanation for the puzzle: underwriters realize that if one of them tries to win business by cutting spreads, the underwriting industry is likely to move to an equilibrium with low spreads and all investment bankers will be worse off. However, tests of this hypothesis by Hansen (1999) do not yield evidence that such a cartel exists. He finds that the IPO market is not concentrated, that entry into the market has been strong, and that there is no evidence of monopoly profit in underpricing. Furthermore, the 7% contract has persisted despite investigations of the Department of Justice into collusion allegations. Hansen offers an alternative explanation for the 7% clustering based on an efficient-contract theory: the 7% contract may be a specialization suited specifically for IPOs and the convergence to 7% may be due to practical considerations. His empirical results support this explanation: investment banks do indeed compete, not on fees, but on the basis of their reputation, placement service and underpricing which complements the 7% spread. This is consistent with Krigman, Shaw and Womack (1999).

Although the underpricing of IPOs results in substantial indirect costs for the issuing firm, issuers do not get upset about leaving the money on the table, as the results of Krigman, Shaw and Womack (1999) suggest: fees are not an important reason for switching the underwriter. Loughran and Ritter (1999) present a prospect theory model to explain why issuers appear not to care about the money left on the table, an amount that is, on average, twice as large as the fees paid to investment bankers. Prospect theory is a descriptive theory of choice under uncertainty. In that framework, gains and losses to the issuer are computed relative to the offer price that the issuer had anchored on, which is

the midpoint of the file price range. Issuers with an upward revision of the offer price and underpricing can integrate the two outcomes - one of them is good, the other one is bad – which results in a good net outcome because the loss (amount of underpricing) is smaller than the gains (a big net worth increase).

2.1.3 The Long-Run Performance of IPOs

An anomaly in the pricing of IPOs that has been documented in the academic literature is the long-run underperformance of new issues. Ritter (1991) shows that the average holding period return for IPOs (1975-84) over three years (beginning with the closing price on the first trading day) is 34.47% whereas for a sample of matching firms the average return is 61.86% for the same period (see also Levis (1993)). Younger firms and companies going public in heavy-volume years exhibit even more underperformance. Smaller offers tend to have the highest adjusted initial returns and the worst aftermarket performance. Ritter proposes investor overoptimism and fads in the IPO market as possible explanations.

A related study by Loughran and Ritter (1995) examines the long-run performance for IPOs and SEOs (from 1970 to 1990). Both significantly underperform relatively to nonissuing firms for five years after the offering. The underperformance holds even after adjusting for book-to-market effects and again, it varies over time: issuers in high-volume years severely underperform whereas issuers in low-volume years do not exhibit much underperformance. Explanations like size and book-to-market effects, long-term return reversals or differences in betas are shown not to explain much of the underperformance. Instead, consistent with the data, firms may take advantage of windows of opportunity and issue equity when, on average, it is overvalued. The reported

patterns are, indeed, not unique to the United States: Loughran, Ritter and Rydqvist (1994) document a positive correlation between annual IPO volume and the level of the stock market for 14 of 15 countries in the last 20-30 years. In 10 of 15 countries, the annual IPO volume is negatively related to the market return in the following year. Lee, Taylor, and Walter (1996a) document IPO underperformance in Australia for three years after going public.

The results on IPOs underperforming in the long-run, however, are disputed among researchers. Brav and Gompers (1997) replicate and extend the results of Loughran and Ritter (1995) using different benchmarks and methods of measuring performance and controlling for the impact of venture capitalists. They report that long-run underperformance is mainly found in small, non-venture capital backed IPOs (see also Brav, Geczy, and Gompers (2000)). The returns of non-venture capital backed IPOs are significantly below those of venture-capital backed IPOs. Furthermore, they argue that underperformance is not an IPO effect and that the underpricing found in Loughran and Ritter (1995) is not unique to firms issuing equity since small, low book-to-market IPOs do not perform differently from small, low book-to-market nonissuing firms.

Because the magnitude and sometimes the sign of long-term abnormal returns are sensitive to alternative measurement methodologies, their existence and relevance have been questioned. It has been argued that the evidence of anomalies (and thus long-run abnormal returns of IPOs) suffer from data mining and from the joint-hypothesis problem. Loughran and Ritter (2000), using simulations, argue that the magnitude of abnormal returns should indeed differ *because* various methodologies use different weighting schemes, and they should differ in a predictable manner: if there are significant

misvaluations in the stock market, abnormal returns should indeed not be robust to alternative methodologies. They reexamine the long-run performance of IPOs implementing the Fama-French 3-factor model with a reconstruction of the factors with sample firms omitted. They find that new issues underperform on both a value-weighted and equally-weighted basis (4% per year) and that the underperformance is more severe in high-volume periods, which confirms earlier results.

The measurement of long-run abnormal returns in general is controversial. The misspecification of test statistics for long-run excess returns has been documented by Barber and Lyon (1997), Kothari and Warner (1997), Fama (1998), Lyon, Barber, and Tsai (1999), and Mitchell and Stafford (2000).

Thus far, only a few explanations for the long-run underperformance of IPOs have been offered. One possibility, as proposed by Ritter (1991), is investor overoptimism. Teoh, Welch and Wong (1998) explore a possible source of excessive investor optimism. Issuers can report unusually high earnings by adopting discretionary accounting accrual adjustments that raise reported earnings relative to actual cash flows. The paper examines whether accruals from the first fiscal year financial statements (when the firm goes public) predict the cross-sectional variation in post-IPO long-run stock return performance. Discretionary accruals are current working capital accruals that are unusual in comparison to industry peers. Teoh, Welch and Wong find that discretionary current accruals are good predictors of the subsequent 3-year stock return performance in a wide variety of test specifications, using different benchmarks and controlling for market, size and book-to-market ratio. Additional tests suggest that the ability of accruals to predict IPO underperformance derives from a general ability of accruals to predict

returns in all firms and an incremental special ability of IPO accruals to predict returns, but discretionary current accruals of IPO firms are much larger.

The results of Teoh, Welch and Wong are consistent with an earlier study of Jain and Kini (1994) who report that firms going public (1976-88) exhibit a substantial decline in post-issue operating performance, measured as operating return on assets and adjusted for industry. Their results support the finding of long-run underperformance of IPOs. One possible explanation they offer for the decline is that managers try to window-dress their accounting numbers prior to going public which is supported by Teoh, Welch and Wong.

Mikkelson, Partch and Shah (1997) confirm the results of Jain and Kini: the operating performance of IPO firms declines after the offering. They examine if this may be due to the typical ownership changes in firms going public but are not able to find such a relation which indirectly supports the window-dressing explanation. Pagano, Panetta and Zingales (1998) report that investment and profitability of private firms in Italy decrease after going public. They suggest that firms attempt to time the market.

Another explanation of long-run underperformance of IPOs are short sale constraints and divergence of opinion between opening-day traders (see Miller (1977) for theoretical foundations), as suggested by Houge, Loughran, Suchanek, and Yan (1999).

While several studies have related different IPO characteristics like, for example, underwriter reputation and initial returns to their long-run performance (see, for example Carter, Dark, and Singh (1998), Krigman, Shaw, and Womack (1999)), it is still unclear what the sources of IPO underperformance over longer horizons are.

2.2 An Overview of Empirical Research on Securities-Fraud Litigation

2.2.1 Introduction

US corporations are threatened by shareholder litigation. Class action lawsuits by shareholders that allege violations of rule 10b-5 of the Securities Exchange Act are common in the US and have led academic research to cover a substantial part of the surrounding issues and questions. Securities fraud class action lawsuits have caused a continuing debate. Proponents request that shareholders be protected against fraudulent activities of managers, opponents argue that suits are largely meritless and filed primarily based on large stock price movements, reducing the global competitiveness of US companies. In 1995, Congress passed the Private Securities Litigation Reform Act (hereafter the Reform Act or Act) which changed the litigation environment and has given rise to more academic research. This overview summarizes existing literature, starting with the question of wealth effects on companies when they become defendants in securities fraud lawsuits. Of high interest to companies are the factors determining the risk of shareholder litigation. In section 2.2.3 we will summarize the most important empirical evidence regarding this issue. We will continue discussing evidence concerning the debate of meritorious versus abusive securities fraud litigation which is inconclusive in section 2.2.4. In section 2.2.5 we present studies that examine the impact of the Reform Act on the litigation environment.

There are many open questions left which provide a fruitful area for future research. After the Reform Act, more and more lawsuits are dismissed or go to trial rather than being settled which promises more direct evidence on the issue of meritorious or

meritless lawsuits and the characteristics of companies that are the defendants.⁴ Another interesting issue is the relation between market reaction on the lawsuit filing date / negative disclosure date and the outcome of the case (settlement, dismissal or trial outcome). More evidence is needed on the long-run impact of the Reform Act . Have abusive lawsuits been reduced or is it more difficult now to sue companies whose managers did indeed commit securities fraud? Do we see a decline in the quality of financial reporting by companies following the Act? With more and more post-Act data available, a comparison of the litigation risk for companies and its determinants prior and following the Act might also be feasible.

2.2.2 Stock Price Reaction to the Announcement of Shareholder Litigation

What are the wealth effects for a company when a securities fraud lawsuit is filed against it? There are relatively few studies that examine the announcement effect on the defendant company's stock return.⁵ They find that the abnormal return is negative on average.

Griffin, Grundfest, and Perino (2000) analyze a sample of firms that have been sued for securities fraud during one year before and after the Passage of the Private Securities Litigation Reform Act of 1995 (see also Griffin and Grundfest (2000), using a sample up to 1999). They document a significant average abnormal return of -3.9% on the day prior to the announcement and -2.1% on the announcement day. Firm size is

⁴ See the Securities Class Action Clearinghouse website

⁵ Stock price effects of negative-information disclosure in general are identified, for example, in Francis, Philbrick and Scipper (1994), and Hayn (1995).

positively related to the abnormal return on the announcement day, whereas a delayed filing (filed several weeks after the disclosure of lawsuit-triggering information) and a filing prior to the Reform Act (versus post-Act filing) leads to a more negative response. Furthermore, the results show a statistically significant negative response that persists for about two weeks after the announcement, a result that the authors claim to be consistent with the resolution of residual investor uncertainty regarding the actual filing of a lawsuit.

A more general study of lawsuit filing effects is Bhagat, Bizjak, and Coles (1998). They examine the stock price reaction to all types of lawsuit announcements in cases where at least one side, plaintiff or defendant, is a corporation. Their results show that defendant companies experience a significant negative return on average. In particular, for lawsuits that involve a violation of security laws, the abnormal return is -2.71% and for lawsuits that involve a private party (including shareholders) in general, the abnormal return is -0.81%. There is no significant abnormal stock return when a settlement between the private party and the sued company (including securities class action lawsuits) is announced. Consistent with Griffin, Grundfest, and Perino (2000), firm size is significantly positively related to the abnormal return on the lawsuit announcement.

Related studies analyze stock-market reactions to interfirm litigation announcements (Bhagat, Brickley, and Coles (1994) and Bizjak and Coles (1995)).

2.2.3 Determinants of Litigation Risk

Of great importance for regulators and public companies is the question what factors affect the probability of securities fraud litigation. Suggested determinants of litigation risk include the timeliness of earnings disclosure, business risk, variables that

are related to the damage from securities fraud that occurs to shareholders and stock market variables.

Skinner (1994, 1997) hypothesizes that the more timely managers disclose the company's earnings the less likely shareholder litigation may occur. However, his results (1997) do not support this hypothesis. A significant number of lawsuits in his sample (1988-94) are associated with voluntary earnings disclosure even before the mandated date. Furthermore, disclosure in quarters that result in lawsuits is more timely than disclosure in quarters that do not lead to lawsuits. Nonetheless, settlement amounts seem to be less the more timely the disclosure. Consistent with his results, Francis, Philbrick, and Schipper (1994) conclude that failure to disclose adverse earnings news early does not necessarily lead to shareholder litigation.

Francis, Philbrick, and Schipper (1998) investigate if business risk, proxied by sales volatility, operating leverage and financial leverage, is related to earnings-based shareholder litigation. For a sample of sued and non-sued companies in the same industries from 1983-93 they find that lawsuit firms have significantly higher operating leverage and more sales volatility. However, lawsuit firms do not have higher financial leverage than the control sample.

Jones and Weingram (1996a) identify variables that determine the damage to shareholders in securities fraud. They show that stock price declines and the proportion of a firm's shares that traded during the year prior to litigation, the firm's market capitalization, and the magnitude of share price drops on the date when the firm makes corrective or negative announcements are important determinants of the litigation risk.

For initial public offerings, Bohn and Choi (1996) confirm that larger firms with larger aftermarket losses are more likely to be sued.

Technology firms appear to have a higher litigation risk on average than companies in other industries. Jones and Weingram (1996b) suggest that technology firms are more likely to be sued based on stock market variables. A large part of the higher litigation risk is explained by the estimated proportion of outstanding shares that traded during the year previous to litigation. Unexpectedly, the high volatility of technology firms plays a minor role in explaining the higher litigation risk.

2.2.4 Meritorious or Frivolous Lawsuits?

There is a continuing debate on whether securities fraud lawsuits do have merit in general. Proponents request that shareholders be protected against fraudulent activities of managers and claim that the threat of litigation will lead to more accurate disclosure in general, opponents argue that suits are largely frivolous and filed primarily based on large stock price movements, reducing the global competitiveness of US companies. The Reform Act of 1995 was designed to address these concerns.⁶ One reason why the question of meritorious or frivolous lawsuits (also "strike suits") is particularly difficult to answer is that the majority of cases is settled rather than brought to trial. Researchers have been able to address this question only in an indirect way. However, there is some hope for more direct evidence in future work as more cases seem to go to trial after the

⁶ See next section for details.

implementation of the Reform Act.⁷ To this point, the sample of cases that did is still very small. The empirical evidence available on whether securities fraud lawsuits do in general have merit or not is inconclusive.

Alexander (1991) suggests that the merits of securities fraud lawsuits do not matter with respect to the settlement outcome. Investigating 9 IPOs in the same industry in 1983 of firms that were sued later, she finds that the settlement amounts were about the same for almost all of the cases (25% of stakes) although there was reason to believe that the merits varied across the sample. Unfortunately, the sample is very small, dated, and there is no guarantee that the merits should have been different across the sample. Bohn and Choi (1996) use a much larger sample of 3519 IPOs between 1975 and 1986. They also conclude that most securities-fraud class actions are frivolous since higher-quality underwriters are related to the filing of lawsuits while the amount of stocks sold by company insiders at the IPO is not. They show that most lawsuits are settled, interpreting this a supportive for the strike-suit hypothesis.

Beck and Bhagat (1997) examine financial performance of sued firms and the way they release news during the period they have been alleged to have misled the market. Their results show that sued firms have higher systematic risk than non-sued firms and experience a significant negative return during that period compared to the market average. Sued firms release more positive news during that period than non-sued firms. In contrast to Alexander (1991), settlement amounts for their sample are positively related to how serious the allegations are, the length of the alleged misleading

⁷ See an internet broadcast by Reliance National, "Securities Laws and Corporate Governance: The Advent of a Meltdown?" on May 13, 1999.

information period and to the optimistic tone of announcements during that period. However, Beck and Bhagat do not conclude that all securities fraud lawsuits have merit.

Other authors searched for incentives of managers to delay disclosure of negative information. If those incentives exist for managers of sued companies, this would be at least necessary for the merit hypothesis but not sufficient for its acceptance. Niehaus (1999) examines insider trading and the incidence of seasoned equity issues during the class period. He finds no abnormal average insider selling and only limited evidence of increased equity issuance during that period. CEOs of defendant firms are more likely than CEOs of matched firms to lose their job following securities class action filings which is consistent with the merit hypothesis.

Griffin and Grundfest (2000) compare insider selling activity during the class period and prior and following the class period. Their results show that net insider selling for defendant firms is significantly higher during the class period than before the class period and it decreases sharply following the end of the class period. The interpretation of abnormal insider trading for defendant firms versus control firms (or during the class period versus before or after the class period for the same firm) is problematic because it can be explained by arguments that support the hypothesis of meritorious as well as the hypothesis of frivolous lawsuits: insiders may indeed have intentionally delayed disclosure to trade profitably or law firms may have been successful in identifying firms with insider trading that supports a strong inference of fraud. Unfortunately, the same caveat characterizes conclusions drawn from this type of evidence in general.⁸

⁸ Klement (2001) proposes private monitoring by self-interested individuals instead of monitoring by courts and class members themselves to mitigate the latter problem.

An aspect related to the question of meritorious or abusive securities fraud litigation is the fact that class action lawyers' gain and compensation is a substantial part of the compensation to shareholders from settlements. This could increase the incentives for frivolous lawsuits on one hand, on the other hand it leads to an agency problem between lawyers and class members.

2.2.5 The Impact of the Private Securities Litigation Reform Act of 1995

The aim of the Private Securities Litigation Reform Act of 1995 was to increase the hurdles for abusive securities fraud class action litigation. Important features of the Reform Act are for example a heightened pleading standard, a stay-of-discovery provision while a motion to dismiss is pending, and a lead plaintiff provision. Critics of the Reform Act argued that it would protect managers committing fraud and thus increase the incentives to commit securities fraud. The following paragraphs describe two event studies that provide some early evidence on the Reform Act's impact.

The passage of the Reform Act was anticipated in advance since the legislative process took about four years. However, two events were particularly suited for investigation because of their surprise effect: the presidential veto and the subsequent House override vote. Spiess and Tkac (1997) use a sample of firms in four industries (biotechnology, computers, electronics, and retailing) likely to be affected by the Reform Act. They document a significantly negative stock price reaction to rumors of the presidential veto and a significantly positive response to the House override vote. The positive impact of the Reform Act even on stock returns of firms with weak internal governance structures (proxied by levels of institutional ownership, levels of insider

ownership, and board structures) suggests that the costs from increased securities fraud are offset by cost savings from reduced litigation.

A more detailed analysis of the impact of the Reform Act on high-technology firms, classifying companies into two groups according to their risk of being sued in a meritorious lawsuit, can be found in Johnson, Kasznik, and Nelson (2000). Overall, they suggest that the Reform Act was wealth increasing for all firms and more so for firms with a higher overall risk of litigation. However, for firms with a high risk of being sued for committing fraud, identified by variables that imply a high probability of being sued for committing fraud (CEO power, monitoring, financing, leverage, insider sales) as opposed to variables that imply a high probability of being sued for non-merit based factors (market value of equity, beta, cumulative return, minimum return over any 20-day trading period, skewness of raw returns, turnover), the market reaction is negative. The authors claim consistency with the notion that, to some extent, the Reform Act established hurdles to sue companies that are indeed committing securities fraud. This conclusion is problematic: Variables like insider sales, monitoring, or CEO power do not necessarily comply with a high probability of meritorious lawsuits nor does a lawsuit following a sharp stock price decrease necessarily imply a frivolous lawsuit. Thus, the classification of their sample into firms with a high probability of meritorious lawsuits and those with a high probability of frivolous lawsuits may in fact be incorrect.

A detailed summary on securities fraud class action lawsuits during the first year following the Reform Act can be found in Grundfest and Perino (1997). Perino (2002) examines a very comprehensive data set of post-Reform Act litigation which extends to December 2001. He finds that there are as many cases filed annually after the passage of

the Act as before, class actions are filed as quickly as before and high-technology issuers are not filed less frequently after. Nonetheless, he suggests that the Reform Act may still have reached some of its goals. For example, he presents evidence that overall case quality after the Reform Act has improved due to the Act's provision of a heightened pleading standard. Bajaj, Mazumdar, and Sarin (2000) provide a comprehensive empirical analysis of settlements for lawsuits from 1988 to 1999, including a comparison of pre- and post Reform Act data. Overall, litigation rates have been little changed, allegations of accounting irregularities or trading by insiders increased substantially as percentage of all lawsuits and were the main allegations following the Act, litigation follows larger price declines than observed prior to the Act, and high-technology firms continue to be the most frequent targets of class action litigation. However, it is still too early to come to a final conclusion about the impact of the Reform Act and further research will shed additional light on this issue. After the passage of the Act, lawsuits have been increasingly shifted from federal to state court since state securities fraud actions were left untouched by the new legislation. In 1998, Congress passed the Securities Litigation Uniform Standards Act aimed at eliminating the migration of lawsuits from federal to state courts. However, Levine and Pritchard (1998) claim that the Uniform Standards Act, benefiting institutional investors and wealthy individuals who may still sue companies in state courts, creates a "two-tiered" justice system.

CHAPTER 3

DO INSTITUTIONS RECEIVE FAVORABLE ALLOCATIONS IN INITIAL PUBLIC OFFERINGS WITH BETTER LONG-RUN RETURNS?

3.1 Introduction

Bookbuilding models of pricing in initial public offerings (IPOs) imply that underwriters favor informed investors with allocations in higher quality IPOs. In Benveniste and Spindt (1989), the underwriter compensates informed investors with underpriced shares to induce them to reveal IPO valuations. In Sherman and Titman (2002), the incentive to participate in the IPO is the binding constraint, so underpricing also compensates for the cost of information acquisition. In these models, informed investors truthfully reveal all valuation information to underwriters. Thus, informed investors retain no special information that may help them in the aftermarket for the IPO.

The empirical evidence on bookbuilding provides only partial evidence on information revelation and allocation decisions. Hanley (1993) shows that the information gathered from potential investors prior to the issue is directly related to the amount of underpricing. Cornelli and Goldreich (2001) show that investors who submit more detailed information using limit orders are allocated more shares in favorable offerings. Ljungqvist and Wilhelm (2002), in a sample of international IPOs, confirm that institutions receive higher allocations the more information they disclose. However, evidence provided by Jenkinson and Jones (2002) is not consistent with greater rewards

for more information. They find no additional allocation benefits to informed bidders who reveal their information through price limits.

In this paper, we contribute to the debate about information provision in IPOs by examining the relationship between allocations, returns, and investors' decisions to flip their allocations.⁹ Our study adds an important dimension to the understanding of IPO pricing. Previous studies examine the relation between first-day returns and allocations, but do not address the long-run profitability of holding an IPO investment. Yet, this may be important, because most investors hold their IPO shares for a longer period than just one day. One reason is that underwriters often discourage both institutional and retail investors from flipping. Aggarwal (2002) shows that IPO investors typically flip only little more than 20% of their allocation during the first trading day, which is consistent with our own analysis below. This, in turn, implies that 80% of allocated shares are held longer than two days. Therefore, initial returns appear to be a poor measure of the performance of these investors' initial allocation.

We extend previous analyses to examine both first-day and long run performance of IPOs. Specifically, we investigate whether institutions receive higher allocations in IPOs with better initial and long run returns. We believe that a longer-term view enhances our understanding of the bookbuilding process, because we can shed light on another dimension of the value of initial allocations that extends beyond initial

⁹ In their recent survey of the literature on initial public offerings, Ritter and Welch (2002) note the importance of understanding the role played by allocations in IPO performance, and previous research provides mixed evidence on this relationship.

underpricing.¹⁰ Moreover, combining the longer-term perspective with information on flipping allows us to assess whether informed investors reveal all relevant information to underwriters at the time of the IPO.

For example, suppose that certain investors indeed obtain more allocations in underpriced IPOs than in overpriced IPOs. This suggests that they are rewarded for information with a share in underpriced issues. However, suppose further that these investors tend to flip underpriced issues with poor long-term performance, but hold the ones with better performance thereby creating a negative relationship between shares flipped and long-term returns. The decision to flip weaker issues indicates that they revealed only part of their information, a possibility that does not conform with the truth-revealing features of existing bookbuilding models. Alternatively, a positive or insignificant relationship between flipping and long-run returns would raise doubts about whether institutions have retained any valuable private information about IPOs.

¹⁰ The long-run performance of initial public offerings (IPOs) has attracted considerable academic interest. Several authors, beginning with Ritter (1991) and Levis (1993), have documented the long run underperformance of IPOs. See also Loughran, Ritter, Rydqvist (1994), Lee, Taylor, and Walter (1996a), and Loughran and Ritter (1995). These results, however, are not uniform across IPOs. For example, Brav and Gompers (1997) report that venture-backed IPOs outperform non-venture-backed issues and Brav, Geczy, and Gompers (2000) find that underperformance is concentrated primarily in small issuing firms with low book-to-market ratios. Several explanations are offered to explain the poor long-run performance, including investor over-optimism, fads, short sale constraints and the divergence of opinion between opening-day traders, and issuers taking advantage of windows of opportunity (see Miller (1977), Ritter (1991), Loughran and Ritter (1995), Rajan and Servaes (1997), and Houge, Loughran, Suchanek, and Yan (1999)).

To investigate this question empirically, we examine how flipping is related to underpricing and subsequent returns. Two recent studies of IPO flipping behavior provide indirect and inconclusive evidence on this issue. Krigman, Shaw, and Womack (1999) show that first-day, sell-signed block-trade dollar volume as a percentage of total dollar volume, an approximation for flipping by institutions, is negatively related to 6- and 12-month aftermarket returns. However, Houge, Loughran, Suchanek, and Yan (1999) find that both block *and* non-block traders sell IPOs that exhibit weak performance over the long run in similar proportions, which suggests that institutions may not have an information advantage.

These two flipping studies rely on proxies for institutional flipping. In contrast to actual flipping, the proxies have the advantage that they are publicly observable. As a measure of actual selling by initial investors, however, they may not be very accurate. Aggarwal (2002) documents that less than 20 percent of trading volume in the first two days after the IPO is from actual flipping by initial institutional investors.¹¹ In contrast, Krigman, Shaw, and Womack report that block trades account for about 60 percent of volume on the first day, which suggests that block trades are capturing much more than trades by institutions receiving initial allocations.

Using a unique database of initial allocations in 441 IPOs issued between May 1997 and June 2001, this study examines actual allocation and flipping records for both institutional and retail customers. These data contain aggregate allocations and flips by institutional and retail categories. They allow us to consider the private information held

¹¹ Aggarwal's (2001) results question the use of block trades to measure flipping because she finds many institutional flips less than the 10,000 share block size.

by both types of investors to examine whether flipping can predict long-run IPO performance, and whether investors retain any private information.

Our analysis begins by relating institutional and retail allocations to initial and long-run risk-adjusted IPO returns. If differential allocations reflect differing information provided to underwriters as book-building theories predict, then the ratio of institutional to retail allocations is a proxy for the relative information provided by these two groups.¹² We find that this ratio and also the percentage of institutional allocation of total shares offered tend to be significantly positively related to six-month, one, two, and three-year risk-adjusted holding period returns. Thus, we support the view that institutions are likely more informed than retail investors, which is consistent with the findings of Field (1995) and Aggarwal, Prabhala, and Puri (2002).¹³

We then examine whether the flipping pattern of institutions and retail investors supports the view that these investors hold private information about long run IPO

¹² Benveniste and Spindt (1989), Benveniste and Wilhelm (1990), Spatt and Srivastava (1991), Benveniste and Busaba (1997), Sherman (2000), and Sherman and Titman (2002) develop book-building models in which differential information production leads to differential allocations.

¹³ Field (1995) supports the view that institutional investors may be more informed investors. She shows that institutional holdings at the end of the first quarter after the firm went public are higher when the IPOs perform better in the long run. Aggarwal, Prabhala, and Puri (2002) find that they receive about 60 percent of the allocation in overpriced issues and about 75 percent of the allocation in underpriced issues. In contrast, Hanley and Wilhelm (1995), using a small sample of 38 IPOs, find that institutions are allocated about equal percentages of shares in overpriced and underpriced issues (around 70%). Also, for IPOs in Finland, Keloharju and Torstila (2002) document that institutional investors do not realize a larger first-day return on average.

returns. We analyze the amount of flipping by institutions and retail investors during the first two days relative to allocations received in the offering. As noted in Boehmer and Fishe (2001), most reported flipping occurs within the first two days after trading begins. We find a rarely significant, but non-negative relationship between institutional or retail flipping and various measures of holding period excess returns. In contrast to the results of Krigman, Shaw, and Womack (1999) and Houge, Loughran, Suchanek, and Yan (1999), these results support the view that informed investors reveal all private information to underwriters, who use it to make discretionary allocations.

The remainder of this analysis proceeds as follows. Section 3.2 describes our methodology and the general research design. In section 3.3 we discuss descriptive statistics on the sample and the differences to the population of IPOs during the same period. In addition, we revisit the relation between allocations, flipping, and underpricing to anchor our results to previous research. Section 3.4 presents univariate results on long-run returns and analyzes the relationship between returns and measures of allocation and flipping. As a robustness check, we also compute Fama-French time series regressions on returns. Finally, we present a multivariate analysis of the cross-sectional variation in long-run returns. Section 3.5 provides our conclusions.

3.2 Methodology

The focus of this paper is not to establish the existence of abnormal long-run returns, but rather to analyze differences across IPOs in the relation between long-run performance and measures of allocation and flipping. While this goal makes the results less sensitive to alternative assumptions about the return-generating process, we compute

several return measures to judge the robustness of our estimates. All alternative measures yield qualitatively identical results.

We follow Barber and Lyon (1997) and favor holding-period excess returns (HPERs) over cumulative abnormal returns, which they show suffer from several biases.

¹⁴ HPERs are computed as the difference between the continuously compounded raw holding period return, and that of a benchmark. We use six alternative benchmarks to adjust continuously firm-specific returns: (1) the equally-weighted CRSP index, (2) the value-weighted CRSP index, (3) the relevant CRSP size decile, (4) the Bloomberg IPO index, (5) an industry (two-digit SIC) and size-matched control firm trading on the same primary market, and (6) a size and book-to-market matched control firm trading on the same primary market. The control-firm adjustments alleviate the new listing, rebalancing, and skewness biases associated with reference-portfolio adjusted returns that were documented by Barber and Lyon (1997).

Our control firms are drawn with replacement from all firms in the merged CRSP-Compustat data that trade on the same primary exchange as the sample firm. Drawing with replacement causes about 20% of the matched firms to be assigned to more than one sample firm. This may create an increased sensitivity to the idiosyncratic performance of these multiple matches, but it reduces the complexity of the matching algorithm. Given the negligible effect of different benchmarks on our conclusions, we believe that matching with replacement does not affect our cross-sectional analysis. For the size match, we choose the next largest firm based on year-end market value. For the size and

¹⁴ For additional results on the misspecification of test statistics for long-run abnormal returns, see Kothari and Warner (1997).

book-to-market match, we choose the firm that minimizes the sum of the absolute percentage differences between the size and book-to-market ratio, respectively, of the sample firm and all possible matches. These two matching procedures have also been used by Linck et al. (2002).

We choose the length of the analysis periods based on two considerations. First, in addition to allocations we analyze two-day flipping as a potential determinant of long-run performance. To assure the exogeneity of the associated variables, we compute holding period returns starting on the third trading day of each new issue. The end of the analysis period is mandated by the recent nature of our data. We analyze six calendar months (126 trading days), one year, two years, and three years following the offering, but lose a large proportion of the sample for the longer periods.

To check the robustness of the event-based HPERs, we also estimate abnormal performance based on a calendar-time procedure. Fama (1998), Lyon, Barber, and Tsai (1999), and Mitchell and Stafford (2000) argue that the correlation of returns across events represents a problem for inference from HPERs. To address this concern, we compute Fama-French (1993) 3-factor time series regressions in our multivariate analysis. However, the restricted time-series dimension of our sample limits the statistical power of this method.¹⁵

In addition to univariate tests, we report cross-sectional regressions using HPERs based on the equally-weighted CRSP index as the dependent variable. We control for several known determinants of long-term returns in these regressions. First, Brav and Gompers (1997) and Brav, Geczy, and Gompers (2000) find that long-run

¹⁵ See also Loughran and Ritter (2000).

underperformance of IPOs is mainly associated with small, low book-to-market value firms. We include size (market value on first trading day) and the ratio of year-end book value to the market value on the first trading day. Second, we also control for venture-capital backing with a dummy variable (see Brav and Gompers (1997)). Lastly, although the relation between long-run returns and underpricing is ambiguous, we include the initial return as a control variable.¹⁶

We report our results without a control for underwriter reputation in our regressions, although Carter, Dark, and Singh (1998) find that long-term IPO performance is affected by underwriter reputation. More recent evidence from Logue, Rogalski, Seward, and Foster-Johnson (2002) implies no relationship between underwriter reputation and investor returns over different holding-period horizons. In addition, Doukas and Gonenc (2001) confirm that underwriter reputation is not linked to post-issue IPO performance when venture-capital backing of the IPO is included as a control variable. In unreported tests, we find that a reputation measures based on Carter, Dark, and Singh does not change the coefficient or variance estimates of any other variable.

3.3 Data Sources and Sample Description

Flipping and allocation data are available for three IPO samples since 1997. The first sample consists of 142 IPOs between May 1997 and June 1998, the second sample consists of 262 IPOs between June 1999 and May 2000, and the third sample consists of

¹⁶See Ritter (1991), Levis (1993), Affleck-Graves, Hegde, and Miller (1996), Krigman, Shaw, and Womack (1999).

37 IPOs between November 2000 and June 2001. The first sample is limited to issues by nine well-known investment banks that acted as the lead underwriter for these issues; the second and third samples represent issue-specific data on all issues that were monitored by the Depository Trust Company's (DTC) IPO Tracking System during these periods.

We augment the DTC information on these 441 IPOs with basic data on stock prices from CRSP, issue information from the Securities Data Corporation (SDC) Global New Issues database, financial data from Compustat, trading volume data from Bloomberg and Factset, and information from the 424B filings. Where possible, we compare the different data sources to eliminate errors in the SDC variables and in the CRSP first-day volume data. All issues are firm-commitment IPOs primarily sold in the U.S.; we exclude foreign issuers, American depositary receipts, real estate investment trusts, closed-end funds (including unit trusts), unit offerings, mutual-to-stock conversions, and limited partnerships.

The allocation data are based on reports from the DTC. To facilitate the tracking of flips, the lead underwriter and the syndicate members provide the DTC with information on initial share allocations. Our data consist of the syndicate takedown (number of shares received by each syndicate member), and issue-specific data on the number of shares allocated to institutions and retail investors. These aggregates are reported separately for each syndicate member. An institution is defined as any investor that has its own institutional clearing and settlement account with the DTC. Because our first sample does not include allocations or flips by syndicate members, we limit our analysis to shares allocated by the Lead.

The IPO tracking system at the DTC also provides daily flipping reports to lead underwriters and syndicate members for a period up to 90 days after an offering, although tracking usually stops after 30 days. For investors who have received an initial allocation, sell transactions are classified as flips until the tracking period ends or their initial stock is exhausted. Our data includes daily flipping information aggregated for each investor group (institutional and retail) for 237 IPOs.

3.3.1 Summary Statistics

Panel A in Table 3.1 compares offering characteristics of our sample to those of all IPOs available in the SDC dataset during the same time period (applying the same filters as for our sample). Median proceeds are larger for our sample by about one third compared to all IPOs during that time period. The median number of shares sold, offer price, overallotment options and first-day returns are slightly larger for our sample than for all SDC IPOs. On average, IPOs in our sample experience a first-day return of 23 percent while all SDC IPOs on average experienced an initial return of 15 percent. However, there are no noticeable differences in the distribution of initial returns when they are divided into quartiles. We find no statistically significant difference in the book-to-market ratio between our sample and all IPOs. Our sample IPOs are as often listed on Nasdaq, NYSE and AMEX as are all SDC IPOs during the corresponding time period (Panel B).

Characteristics of DTC variables are summarized in Panel C. The lead underwriter allocates about 79% of all IPO shares in our sample. The median allocation to institutional investors is 86% of Lead allocations and 77% of total allocations. The percentage allocations to institutions in our sample are similar in magnitude to those

Table 3.1

Offering Characteristics for Sample IPOs and All IPOs

The table is based on 441 sample IPOs between May 1997 and June 2001. The sample includes only firm-commitment IPOs and excludes Funds, foreign issuers, REITs, unit offerings, unit trusts, mutual to stock conversions, and rights offers. Panel A compares publically available sample characteristics to those of IPOs covered by the SDC during the same period. The 'All IPOs' columns contain SDC data on the set of all IPOs during the respective periods after applying the same filter as for the sample firms. Panel B provides sample characteristics from the DTC tracking system. A "****", "***", and "**" indicate significance at the 1%, 5%, and 10% level, respectively.

					Wilcoxon test of equal medians
Description	Sample IPOs		All IPOs		
	N	Median	N	Median	
<i>Panel A: Sample and SDC Characteristics</i>					
Proceeds from offer in \$	441	82,800,000	1,431	63,000,000	***
Book-to-market	441	0.19	1,307	0.21	
Offer price	441	14.00	1,545	13.00	***
No. of shares sold incl. OAO and naked short	441	5,769,933	1,431	4,715,000	***
No. of shares offered by issuer	441	5,000,000	1,431	4,200,000	***
Exercised portion of OAO	441	655,800	1,545	450,000	***
Naked short position of underwriter	441	48,891	n/a	n/a	
First-day return	441	23%	1,545	15%	***
Quartile 4: First-day return $\geq$ 57.08%	111	123%	301	125%	
Quartile 3: First-day return $\geq$ 20.59%	110	40%	337	36%	*
Quartile 2: First-day return $\geq$ 5.11%	110	12%	422	12%	
Quartile 1: Lowest First-day return	110	0%	485	0%	
<i>Panel B: Initial Listing Decisions</i>					
	N	Mean	N	Mean	t-test of equal means
Firms listing on NYSE	441	15%	1,545	12%	
Firms listing on AMEX	441	1%	1,545	2%	*
Firms to be traded on NASDAQ	441	84%	1,545	85%	
<i>Panel C: DTC Tracking System Characteristics</i>					
Shares sold allocated by Lead	441	79%			
Lead shares allocated to institutions	441	86%			
Lead inst allocation / Lead retail allocation	441	610%			
Total shares allocated to institutions	441	77%			
Two-day institutional flips / two-day volume	237	13%			
Two-day retail flips / two-day volume	237	1%			
Two-day institutional flips / shares sold	237	17%			
Two-day retail flips / shares sold	237	1%			
All institutional flips / shares allocated (Lead only)	236	25%			
All retail flips / shares allocated (Lead only)	237	11%			

reported by Aggarwal, Prabhala, and Puri (2001), but slightly higher than those in Hanley and Wilhelm (1995). For a very diverse sample of international new issues, Ljungqvist and Wilhelm (2002) show that average allocations to institutional investors are two to three times higher than to retail investors. In our sample, institutions receive six times (only Lead allocations) as many allocations as retail investors. We also document that institutional investors flip proportionally more shares of their allocation, of total shares sold (offer size plus green shoe plus additional shares, if any, sold by the underwriter), and of trading volume during the first two trading days than retail investors. For example, institutions flip about 25% of their Lead allocation and retail investors flip 11%.

3.3.2 The Relation Between Allocations, Flipping Activity, and Initial Returns

Very few studies use actual allocation and flipping activity data. Our sample is larger than that of Aggarwal, Prabhala, and Puri (2001) and Aggarwal (2001), although our 1997 sample covers the same time period as these papers (corresponding to the portion of our sample between May 1997 and June 1998). In light of this very scarce empirical evidence, we document institutional allocations and institutional versus retail flipping activity for different initial-return groups in Table 3.2.

We obtain similar results as Aggarwal, Prabhala, and Puri (2001). Institutional investors receive about 76% in underpriced and 70% in overpriced issues (the difference is statistically significant at the 5% level). The lead underwriter alone allocates 84% of underpriced and 79% of overpriced issues to institutions. We obtain similar results comparing initial-return quartiles: institutions receive the highest percentage of issues in the highest initial-return quartile. Assuming that they have superior information about

Table 3.2

The Effect of First-Day Returns on Allocations and Flipping

The table is based on 441 sample IPOs between May 1997 and June 2001. The sample includes only firm-commitment IPOs and excludes Funds, foreign issuers, REITs, unit offerings, unit trusts, mutual to stock conversions, and rights offers. The first-day return quartiles are determined from the combined sample IPOs from periods 1 and 2 and are as in Table 1. To test for equality across classifications, we use the following tests: t-test for means, Wilcoxon test for medians (binary classification); Anova for means, Kruskal-Wallis for medians (quartile classification). A "****", "***", and "*" indicate significance at the 1%, 5%, and 10% level, respectively.

Description	Initial return > 0		Initial return quartiles (low to high)				Tests of equality across initial return classifications	
	No	Yes	1	2	3	4	Binary	Quartiles
			(R<3.5%)	(3.5%<=R<22.6%)	(22.6%<=R<63.5%)	(R>=63.5%)		
Number of observations	75	366	110	110	110	111		
<i>Panel A: Means</i>								
% of all shares allocated to institutions	70%	76%	70%	77%	76%	77%	**	***
% of Lead shares allocated to institutions	79%	84%	78%	83%	84%	85%	*	***
Two-day institutional flips / two-day volume	14%	14%	14%	16%	16%	12%		***
Two-day retail flips / two-day volume	2%	2%	2%	3%	2%	2%		
Two-day institutional flips / institutional allocation	23%	27%	21%	25%	27%	31%		***
Two-day retail flips / retail allocation	10%	18%	9%	22%	15%	19%	***	***
<i>Panel B: Medians</i>								
% of Lead shares allocated to institutions	85%	87%	84%	87%	87%	87%	*	*
Lead inst allocation / Lead retail allocation	5.6	6.4	5.3	7.0	6.7	6.6	*	*
% of all shares allocated to institutions	75%	78%	75%	79%	77%	78%	**	**
Two-day institutional flips / two-day volume	14%	13%	13%	16%	15%	12%		***
Two-day retail flips / two-day volume	0%	1%	1%	1%	1%	1%	*	
Two-day institutional flips / institutional allocation	20%	25%	18%	23%	25%	30%	**	***
Two-day retail flips / retail allocation	4%	13%	4%	12%	13%	16%	***	***

first-day returns, this is consistent with bookbuilding models where the underwriter compensates informed investors with underpriced shares for revealing private information. It is also consistent with a winner's curse (Rock (1986)) for retail investors.

Similar to Aggarwal's (2001) sample, flipping represents only a small portion of trading volume during the first two days. Average institutional flipping activity as a percentage of institutional allocations during the first two trading days is not significantly different for overpriced and underpriced issues (ranging from 23% to 27%) while average retail flipping activity as a percentage of retail allocations is significantly higher for underpriced than overpriced issues (18% versus 10%). This is consistent with institutional flipping of cold issues being restricted by underwriters, with institutions committing to be long-term investors, or with institutions having superior information regarding the long-run performance of certain cold issues. However, across initial-return quartiles, institutional investors appear to sell a higher percentage of the most underpriced quartile IPOs than of all other quartiles. Retail investors flip those issues the least that exhibit the lowest initial returns.

Using a proxy for flipping, Krigman, Shaw, and Womack (1999) find that institutional flipping is highest for cold IPOs (initial return equal to or smaller than zero) and lowest for extra-hot IPOs (initial return greater than 60%). Our measure of actual institutional flipping as percentage of volume during the first two days is significantly larger for return quartile 1 than for quartile 4, which is roughly consistent with their results. However, we find the highest flipping ratio for quartiles 2 and 3. Retail flipping relative to volume shows no discernible pattern. Moreover, when we divide the sample into underpriced and overpriced issues, institutions (and retail investors) appear to flip the

same amount of overpriced and underpriced shares relative to trading volume (14%, 2% for retail investors). This contrasts with the strong relation between the flipping ratio and volume documented by Krigman et al., and the result is robust to alternative specifications.¹⁷

One problem with measuring flipping relative to trading volume is that initial volume is only partially due to initial investors. Thus, the metric does not exclusively reflect initial-investor information. Because we intend to measure the information content associated with flipping, we believe that measuring flipping relative to allocations received is more appropriate. We will concentrate on this measure in the rest of our paper.

In sum, these findings show that institutional allocations are positively related to initial returns. Flipping relative to trading volume has no clear relation with returns, but flipping relative to initial allocations increases with underpricing. These flipping patterns are similar for institutions and retail investors, but institutions flip almost twice as much of their allocations.

¹⁷ One concern is that the underpricing quartiles are period specific. Specifically, the highest underpricing quartile is concentrated in the years 1999 and 2000. To test whether our result is period specific, we divided the sample into a high-underpricing period (March 1999 to September 2000) and a low-underpricing period (remaining months before and after). We then define period-specific underpricing quartiles, so that IPOs from both periods are equally likely to be represented in each quartile. We find: (1) none of the allocation variables in Table 2 is significant different across periods; flipping/volume is higher, but flipping/allocation is the same across periods; (2) replicating the tests in Table 2 using period-specific underpricing quartiles does not qualitatively our conclusions.

3.4 Allocations, Flipping and Long-Run Returns

In this section, we examine the relationship between IPO allocations and long-term IPO performance. If institutional investors have superior information relative to retail investors about the long-run performance of IPOs, and allocations are proportional to the quantity of IPO shares applied for, we would expect a positive relationship between institutional allocations and long-run performance.¹⁸

Few papers have examined the relationship between institutional allocations and initial returns. Including our results in the previous section, the evidence is mixed. Several studies investigate the relationship between initial and long-run returns. The results are mixed there as well. Although the evidence generally supports the view that institutional investors receive better first-day performers, it is not known whether these issues also perform better in the long run. In the following, we examine directly whether institutional investors receive more allocations in issues with higher performance in the long run.

We also reexamine the impact of flipping during the first two trading days on subsequent IPO performance, because previous studies relied on proxies for flipping activity. Krigman, Shaw, and Womack (1999) find that the higher the flipping (sales) by block traders as a percentage of first-day trading volume, the smaller is the subsequent

¹⁸ Lee, Taylor, and Walter (1999) compare application and allocation data for Singapore IPOs and find that there are differences between unconstrained demand and eventual allocation. However, the allocation process in Singapore is different from the U.S., because oversubscribed IPOs are allocated by random drawing. Also, no long-run underperformance has been detected for Singapore IPOs (Koh and Walter (1989), Lee, Taylor, and Walter (1996b)).

long-run (six and twelve months) performance of the IPO. Thus, first-day block sellers, which might represent institutional investors, appear to have information regarding the performance of new issues in the long run. However, Houge, Loughran, Suchanek, and Yan (1999) show that sell-signed block and non-block first-day trades relative to volume alike are negatively related to the one- and three-year IPO performance. This section combines information about actual flipping with that on allocations to examine long-run returns.

3.4.1 Gains for Institutional and Retail Investors

For illustration purposes, we find it useful to document the differences in the actual investment gains for institutional and retail investors who receive allocations, both in dollar and percentage terms. We calculate dollar gains by multiplying the offer price with the number of shares received and by one plus either the raw- or risk-adjusted holding period return, and then summing over IPOs. The percentage gains are dollar gains relative to the total amount invested in all sample IPOs by the specific investor group.

Table 3.3 illustrates the importance of looking at long-run performance to assess the role and value of IPO allocations. This table shows that aggregate initial gains, based on the change from the offer price to the first day's close, are \$32.1 billion for institutions and \$5.5 billion for retail investors. However, in percentage terms the retail investors receive 46%, while institutions receive 41%. Thus, retail investors as a group receive fewer allocations but tend to participate in more underpriced IPOs. This picture reverses when we take a longer-term view: for each period after the offer, the percentage (and also the absolute) institutional gain relative to the offer price exceeds the retail gain.

Table 3.3

Dollar and Percentage Gains of Institutional and Retail Investors in IPOs

The table is based on 441 sample IPOs between May 1997 and June 2001. The sample includes only firm-commitment IPOs and excludes Funds, foreign issuers, REITs, unit offerings, unit trusts, mutual to stock conversions, and rights offers. Total gains in millions of dollars are the sum of holding-period gains from all IPOs, assuming it each share is bought at the offer price. Percentage gains are total gains divided by the aggregate investment in these IPO.

Description	First day (N=441)	6 months (N=441)	1 year (N=409)	2 years (N=286)	3 years (N=146)
<i>Panel A: Gains Based on Raw Returns</i>					
Total institutional gains (\$ million)	32,100	13,205	677	6,837	6,482
Total retail gains (\$ million)	5,506	1,145	-784	543	672
Institutional gains as % of amount invested	41.1%	16.9%	0.9%	8.8%	8.3%
Retail gains as % of amount invested	46.0%	9.6%	-6.5%	4.5%	5.6%
<i>Panel B: Gains Based on Equally-weighted Index Adjusted Returns</i>					
Institutional gains as % of amount invested		2.5%	-16.1%	-23.9%	-12.0%
Retail gains as % of amount invested		-4.8%	-23.7%	-31.2%	-19.3%
<i>Panel C: Gains Based on Industry- and Size-matched Control Firm Adjusted Returns</i>					
Institutional gains as % of amount invested		4.3%	1.2%	1.2%	1.1%
Retail gains as % of amount invested		-10.3%	-14.5%	-1.1%	-6.3%
<i>Panel D: Gains Based on Size- and Book-to-market Matched Control Firm Adjusted Returns</i>					
Institutional gains as % of amount invested		-8.1%	-28.4%	-7.0%	5.1%
Retail gains as % of amount invested		-19.9%	-27.4%	-1.2%	7.2%

Regardless of the procedure used to adjust for risk differences, Table 3.3 shows that percentage institutional gains exceed percentage retail gains. The only exceptions are the one to three-year periods when we use size / book-to-market matched control firms as a risk control. This result is consistent with Krigman et al.'s (1999) conclusion that institutions execute more profitable trading strategies than retail investors.

We also observe that post-IPO returns are sufficiently negative to offset initial gains due to underpricing. This result, however, may be highly sample-period specific, and we do not focus on the magnitudes of the gains. Rather, we will concentrate on tests of the relative performance of institutional allocations to retail allocations.

3.4.2 Univariate Analysis

Table 3.4 contains mean raw holding period returns, CRSP equally-weighted index-adjusted holding period returns, and holding period returns adjusted by the return on an industry (two-digit SIC)/size-matched and book-to-market/size-matched control firm. We report HPERs for six months, one, two, and three years after the IPO, starting from the third trading day. We do not report medians or the alternative risk-adjustments described above, because the results are qualitatively similar. We first stratify HPERs by the percentage Lead allocation to institutions. The cutoff between high and low allocations is the median (similarly for flipping activity). Raw, CRSP and industry-/size-matched firm-adjusted returns for all holding periods are generally greater when institutional investors receive more (retail investors receive fewer) allocations, significantly so for one- and two-year holding periods. This difference becomes more pronounced the longer the period after the IPO. For example, IPOs with low institutional allocations yield an industry/size-matched firm-adjusted return of -32% over a holding

Table 3.4

Mean HPRs by Allocation, Flipping, and Underpricing

The table is based on 441 sample IPOs between May 1997 and June 2001 as described in Table 1. Raw holding period returns (HPRs) are computed from the third trading day after the offering for the indicated period. Value-weighted adjusted holding period excess returns (HPERs) are computed by subtracting the HPR on the CRSP value-weighted combined index. Industry- / size-matched and book-to-market / size-matched firm-adjusted holding period returns are computed by subtracting the HPR of a matched control firm. For delistings, the delisting return is accounted for on the delisting date; thereafter, the proceeds (if any) from the sale of the delisting firm are distributed equally across the remaining firms in the portfolio. The median cutoff for the institutional allocation groups is 87.9%, that for institutional flips relative to their allocation is 24.1%, and that for retail is 11.6%. To test whether the mean equals zero, we use a standard t-test. To test for equality of means across classifications, we use t-test for binary classification and Anova tests for quartile classifications. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively.

<i>Panel A: Holding Period Returns And CRSP Equally Weighted Index-Adjusted HPERs</i>												
Period in trading days from day 3 after the offering	Sample Size				Raw holding-period return				CRSP equally-weighted index-adjusted			
	6 mo.	1 yr.	2 yrs.	3 yrs.	6 mo.	1 yr.	2 yrs.	3 yrs.	6 mo.	1 yr.	2 yrs.	3 yrs.
<i>Institutional Allocation</i>												
Lead inst allocation low	220	209	149	77	-4%	-32% ***	-14%	5%	-16% ***	-46% ***	-57%	-68%
Lead inst allocation high	221	200	137	69	-4%	-17% ***	52% *	99% *	-15% ***	-31% ***	9% ***	18% ***
Test for equality						*	**			**	**	
<i>Institutional Flipping</i>												
2-day inst flip to allocation low	323	291	217	98	5%	-19% ***	-2%	56%	-9% ***	-36% ***	-45%	-22%
2-day inst flip to offer high	118	118	69	48	-30% ***	-38% ***	79% *	34%	-34% ***	-45% ***	36% ***	-39% ***
Test for equality					***	**	*		***		*	
<i>Retail Flipping</i>												
2-day retail flip to allocation low	322	290	208	85	1%	-25% ***	-10%	29%	-12% ***	-41% ***	-51%	-45%
2-day retail flip to allocation high	119	119	78	61	-19% ***	-24% ***	90% **	78%	-25% ***	-33% ***	42% ***	-3% ***
Test for equality					***		**		*		**	
<i>Initial Return</i>												
First-day return quartile 1	110	100	74	40	-2%	-20% **	10%	13%	-14%	-37% **	-34% **	-58% **
First-day return quartile 2	110	96	77	58	3%	-7%	17%	31%	-5%	-19% ***	-29%	-45%
First-day return quartile 3	110	103	72	37	3%	-22% ***	25%	79%	-8% ***	-35% ***	-18%	-5%
First-day return quartile 4	111	110	63	11	-22% ***	-46% ***	18%	176% *	-34% ***	-60% ***	-21%	101%
Test for equality					*	***			**	***		

Panel B: Industry / Size-matched and Book-to-market / Size-matched HPERs

Period in trading days from day 3 after the offering	Sample Size				HPR adjusted by industry/size-matched control firm return				HPR adjusted by book-to-market/size-matched control firm return			
	6 mo.	1 yr.	2 yrs.	3 yrs.	6 mo.	1 yr.	2 yrs.	3 yrs.	6 mo.	1 yr.	2 yrs.	3 yrs.
<i>Institutional Allocation</i>												
Lead inst allocation low	220	209	149	77	-22% ***	-36% ***	-32% *	-21%	-35% ***	-50% ***	-34% ***	-14%
Lead inst allocation high	221	200	137	69	-12% **	-18% **	28%	58%	-35% ***	-52% ***	-13%	20%
Test for equality						*	*					
<i>Institutional Flipping</i>												
2-day inst flip to allocation low	323	291	217	98	-13% **	-26% ***	-22%	23%	-27% ***	-49% ***	-32% **	28%
2-day inst flip to offer high	118	118	69	48	-29% ***	-29% ***	56%	1%	-56% ***	-57% ***	2%	-51%
Test for equality							*		***			
<i>Retail Flipping</i>												
2-day retail flip to allocation low	322	290	208	85	-17% ***	-30% ***	-26% *	-6%	-32% ***	-54% ***	-43% ***	-4%
2-day retail flip to allocation high	119	119	78	61	-18% ***	-21% **	56%	47%	-42% ***	-45% ***	26%	10%
Test for equality							*				*	
<i>Initial Return</i>												
First-day return quartile 1	110	100	74	40	-4%	-17% *	-18%	-3%	-20% **	-33% ***	-22%	-7%
First-day return quartile 2	110	96	77	58	-7%	-8%	-9%	14%	-5%	-18%	4%	17%
First-day return quartile 3	110	103	72	37	-16% *	-29% **	11%	29%	-30% ***	-57% ***	-51%	-33%
First-day return quartile 4	111	110	63	11	-43% ***	-51% ***	3%	54%	-83% ***	-92% ***	-31%	74%
Test for equality					**	**			***	***		

period of two years while the same return for IPOs with high institutional allocations is 28%. Note that nonetheless, even IPOs with high institutional allocation tend to underperform the benchmark over six months and one year. However, only IPOs with low institutional allocation consistently exhibit negative returns. The differences in book-to-market/size-matched firm-adjusted returns show a similar pattern, but are not significantly different for IPOs with high and low institutional allocation.

Consistent with Krigman et al. (1999), Table 3.4 also shows that IPOs with high institutional flipping relative to the allocations experience lower adjusted returns after one year. However, this difference is not statistically significant (which may be due to our much smaller sample size). Moreover, this relation reverses direction and in fact becomes marginally significant over longer periods. We obtain similar results for retail flips relative to retail allocations. Overall, it is difficult to detect an unambiguous relation between retail or institutional flipping and long-run returns.

Finally, Table 3.4 reports IPO long-run performance by initial return quartiles. We cannot detect a reliable monotonic relation across quartiles or different holding periods. For periods up to one year, there is some indication of an inverse U-shaped relation between underpricing and returns. The second underpricing quartile is associated with the greatest returns, and the highest quartile with the lowest returns. This is generally consistent with Krigman et al. (1999), although this relationship disappears for longer periods. These IPOs tend to experience high returns over 3 years while IPOs in the lowest initial-return quartile seem to perform worst over 2 and 3 years but the differences are insignificant.

3.4.3 Fama-French Regressions

As a robustness check for our cross-sectional results we estimate time-series regressions of monthly excess returns. We form monthly portfolios between May 1997 and December 2001 based on (i) the percentage institutional allocation of shares offered by the lead underwriter, and (ii) institutional and retail flipping as percentage of shares allocated. A firm is assigned to the high-institutional-allocation portfolio if the percentage allocated exceeds the sample median, and analogously for the flipping portfolios. Our primary emphasis is on value-weighted portfolios, but we also compute equally-weighted portfolios for comparison. Then we regress the monthly excess returns (returns adjusted for the risk-free rate) on the three factors suggested by Fama and French (1993): excess returns on a market portfolio, the performance of small stocks relative to large stocks, and the performance of value stocks relative to growth stocks. Factor returns are taken from Ken French's website. The intercept in these regressions provides a measure of abnormal return on our allocation and flipping portfolios. However, the short time series associated with our IPO sample (56 monthly observations) limits the statistical power of the test.

The results for institutional allocation in Table 3.5 are largely consistent with our findings from the previous section. The only significant estimate is associated with the abnormal returns for IPOs with high institutional allocations (using value-weighted portfolio returns). Also consistent with our previous results, portfolios based on institutional or retail flipping do not appear to yield abnormal returns.

3.4.4 Multivariate Analysis

In this section we employ regression analysis to investigate the impact of institutional IPO allocations (panel A) and flipping activity (panel B) on post-IPO

Table 3.5

Fama-French 3-Factor Time-Series Regressions

The table shows equally- and value-weighted portfolio time-series regressions of monthly excess returns between May 1997 and December 2001. The table is based on 441 sample IPOs between May 1997 and June 2001 as described in Table 1. Portfolio cutoffs are based on the sample medians. The sample contains 56 monthly observations that reflect a twelve-month investment in each IPO starting one the first day of trading. Monthly excess returns (adjusted by the risk-free rate) are regressed on the three Fama-French (1993) factors representing market risk, size, and the book-to-market ratio. A "***" indicates statistical significance at the 5% level.

Dependent Variable: Monthly portfolio returns	Value weighted		Equally weighted	
	Intercept	Adj. R squared	Intercept	Adj. R squared
Low institutional allocation	0.015	0.54	-0.002	0.63
High institutional allocation	0.033 **	0.65	0.009	0.68
Low institutional flipping	-0.004	0.63	-0.011	0.6
High institutional flipping	0.002	0.42	-0.013	0.49
Low retail flipping	0.014	0.65	-0.001	0.72
High retail flipping	0.022	0.66	0.008	0.066

HPERs, and control for initial return, venture-capital backing, size, and the book-to-market ratio. Because we have no theoretical guidance for the functional relation we attempt to model, we use two alternative normalizations of the Lead' allocation to institutions: (i) total shares allocated by the Lead (Model I), and (ii) the logarithm of institutional shares over retail shares allocated by the Lead (Model II). We report HPERs based on the equally-weighted CRSP index, but adjustments using the value-weighted, size-decile, or IPO-index returns are qualitatively identical.

Panel A in Table 3.6 shows that the IPOs with higher percentage allocations to institutions have significantly greater HPERs over six months, 1, and 2 years. The allocation coefficient is also positive for three-year HPERs, but not significant. In contrast, the ratio of institutional to retail allocations is generally not significant. However, when we include flipping measures (panel B) the positive relation is significant for all holding periods. These findings confirm our univariate results that institutions receive shares in issues with superior long-term performance and are consistent with institutional investors having superior information relative to retail investors.

In contrast to the negative relation between returns and flipping as a percentage of trading volume reported by Krigman, Shaw, and Womack (1999) and Houge, Loughran, Suchanek, and Yan (1999), we find no evidence of such a relationship in our sample. Institutional flipping as percentage of allocations received does not have explanatory power for six-month, one-year and three-year excess holding period returns (panel B). In fact, the coefficient on institutional flipping is significant for two-year returns in both regressions but has a positive sign. For better comparability with the two studies above, we repeated these regressions using flipping relative to volume, and obtained very similar

Table 3.6

Regression Analysis of Equally- and Value-Weighted Index-Adjusted IPO Holding

Period Returns

The table shows coefficient estimates of an OLS regression where the dependent variable is equally-weighted index-adjusted IPO holding period excess returns (6 months, 1, 2, and 3 years). The table is based on 441 sample IPOs between May 1997 and June 2001 as described in Table 1. Initial return is calculated from the offer price to the closing price on the first trading day, % inst. allocation is the allocation institutions received from the Lead underwriter as percentage of total shares offered, inst. or retail flipping/alloc is the number of shares flipped by institutional or retail investors during the first two trading days as percentage of the allocation received. Inst. alloc./retail alloc. is the ratio of the Lead underwriter institutional to retail allocation, venture capital is a dummy variable with a value of one if the IPO was backed by venture capital, zero otherwise. Numbers in parentheses represent p-values of coefficient estimates.

Description	Model I								Model II							
	6 months		1 year		2 years		3 years		6 months		1 year		2 years		3 years	
Panel A: Standard Model																
Intercept	1.20	(0.09)	0.30	(0.69)	2.54	(0.40)	0.54	(0.93)	1.26	(0.09)	0.35	(0.66)	3.17	(0.30)	2.36	(0.72)
Log (market value)	-0.08	(0.04)	-0.06	(0.16)	-0.23	(0.15)	-0.19	(0.58)	-0.07	(0.08)	-0.03	(0.42)	-0.20	(0.21)	-0.22	(0.52)
Log (book-to-market)	0.00	(0.84)	0.02	(0.33)	-0.02	(0.87)	0.13	(0.55)	0.01	(0.77)	0.03	(0.27)	-0.02	(0.86)	0.10	(0.62)
Initial return	-0.06	(0.28)	-0.09	(0.08)	-0.09	(0.67)	1.90	(0.08)	-0.06	(0.20)	-0.10	(0.04)	-0.12	(0.55)	1.88	(0.08)
Venture capital	-0.12	(0.12)	-0.10	(0.23)	0.48	(0.11)	1.02	(0.09)	-0.10	(0.18)	-0.07	(0.37)	0.52	(0.09)	1.00	(0.10)
% Inst. allocation	0.43	(0.05)	0.76	(0.00)	1.88	(0.06)	2.79	(0.23)								
Log (inst. alloc./retail alloc.)									0.01	(0.54)	0.04	(0.13)	0.16	(0.13)	0.56	(0.08)
No. of obs.	435		403		280		140		432		402		280		140	
Adj. R squared	0.03		0.05		0.01		0.03		0.02		0.04		0.01		0.04	

Panel B: Standard Model Plus Variables to Measure Institutional and Retail Flipping																
Intercept	0.80	(0.24)	0.68	(0.48)	-2.09	(0.72)	-2.33	(0.79)	1.08	(0.12)	0.89	(0.36)	-0.97	(0.86)	-0.61	(0.94)
Log (market value)	-0.08	(0.03)	-0.09	(0.08)	-0.09	(0.77)	-0.05	(0.90)	-0.06	(0.08)	-0.07	(0.17)	-0.07	(0.83)	-0.04	(0.92)
Log (book-to-market)	0.01	(0.74)	0.02	(0.57)	-0.22	(0.53)	0.55	(0.28)	0.02	(0.51)	0.03	(0.47)	-0.21	(0.53)	0.54	(0.29)
Initial return	-0.06	(0.19)	-0.09	(0.20)	-0.21	(0.61)	2.67	(0.14)	-0.07	(0.14)	-0.10	(0.15)	-0.25	(0.55)	2.62	(0.14)
Venture capital	-0.19	(0.01)	-0.07	(0.51)	1.07	(0.07)	1.43	(0.10)	-0.17	(0.03)	-0.05	(0.66)	1.09	(0.06)	1.41	(0.10)
% Inst. allocation	0.90	(0.00)	0.88	(0.01)	3.06	(0.14)	3.89	(0.28)								
Log (inst. alloc./retail alloc.)									0.08	(0.00)	0.06	(0.09)	0.58	(0.06)	0.83	(0.08)
Inst. flipping/alloc.	-0.30	(0.18)	0.21	(0.52)	2.73	(0.06)	-0.14	(0.94)	-0.27	(0.23)	0.25	(0.43)	2.67	(0.07)	-0.25	(0.90)
Retail flipping/alloc.	0.09	(0.61)	0.45	(0.07)	0.11	(0.93)	-1.83	(0.28)	0.15	(0.40)	0.51	(0.04)	-0.18	(0.89)	-2.40	(0.17)
No. of obs.	228		228		133		103		228		228		133		103	
Adj. R squared	0.12		0.07		0.05		0.02		0.11		0.05		0.06		0.03	

results. Specifically, most coefficients are positive and none of the significant ones is negative. We also obtain qualitatively similar results when we drop the allocation variable from the regression model.

3.5 Conclusions

In this study, we use a unique database of 441 IPOs to examine whether initial institutional investors are more informed relative to initial retail investors in that they are able to identify IPOs with superior long-run performance. Previous studies suggest that institutional investors have private information about the first-day returns of IPOs, but no other study has tested for a relationship between initial institutional allocations and long-run returns. We find that institutional relative to retail allocations, and also institutional allocation as percentage of total shares offered, are significantly positively related to six-months, one, two, and three-year risk-adjusted holding period returns. If allocations are in proportion to the quantity of IPO shares applied for, institutional investors as a group indeed appear to be able to identify high-quality IPOs.

This is consistent with a winner's curse for uninformed investors (Rock 1986) and several models of bookbuilding in the spirit of Benveniste and Spindt (1989). However, if allocations are not in proportion to the quantity applied for, an alternative explanation is that only underwriters have superior information about the long-term performance of new issues (for example, due to their experience or due-diligence research) and reward institutional investors with superior long-term issues for reasons other than the provision of information. For example, issuers may desire that underwriters place higher quality

IPOs with reliable long-term investors (we found that institutional investors flip only about a quarter of the allocations they received).¹⁹

We also reexamine whether institutional and retail flipping as a percentage of allocations received has any predictive power for long-run returns. Our findings are that these flipping have only weak predictive power for future holding period returns. If significant, the relation between institutional flipping and long-term performance is positive, which suggests that institutions do not retain any private information about future IPO performance. This result is again consistent with models of bookbuilding, but it contrasts with recent empirical findings that suggest that when institutional flipping is relatively higher, long-run returns are lower.

¹⁹ A recent study by Jenkinson and Jones (2002) lends supports to this explanation. They show that underwriters tend to favor high-quality investors who are most likely to hold allotted shares for the long term and high-frequency investors.

CHAPTER 4

DETERMINANTS OF IPO-RELATED LITIGATION RISK AND THE INSURANCE EFFECT OF IPO UNDERPRICING

4.1 Introduction

Securities fraud litigation is a common threat faced by U.S. companies.²⁰ Direct costs such as settlement and legal expenses and indirect costs, including the interruption of daily business and management time dedicated to the lawsuit, impose financial strain on sued companies. For example, for lawsuits filed between 1996 and 1999, sued companies paid an average settlement of about \$18,000,000 (Bajaj, Mazumdar, Sarin (2000)). Securities fraud litigation by shareholders commonly relies on Rule 10b-5 of the Securities Exchange Act of 1934 and takes the form of class action lawsuits.

For companies issuing stock in an initial public offering (IPO) and their underwriters, additional securities-fraud litigation risk arises from liabilities for a material untruth or omission in the prospectus, registration statements, or associated oral and written statements according to Sections 11 and 12 of the Securities Act of 1933. Rule 10b-5 of the Securities Exchange Act of 1934 imposes similar liabilities with the difference that an intention of fraud by the issuer or the reliance of investors on false information disseminated by issuer or underwriter has to be proven by the plaintiff. In

²⁰ For example, from January 1996 to May 2002, about 1500 securities fraud class action lawsuits have been filed (see Securities Class Action Clearinghouse website at <http://securities.stanford.edu>).

general, investors who purchased shares in the IPO directly and, to some extent, even investors who purchased IPO shares in the aftermarket are able to join the class action. Investor damages in Section-11 allegations are calculated as the difference between offer price and price at the time of sale or lawsuit (when not sold), or between aftermarket purchase price (if lower than offer price) and price at the time of sale or lawsuit (when not sold). Damages to investors in Section-12 and Section 10b-5 allegations are calculated based on the purchase price. Almost all IPO-related lawsuits occur within three years after the company went public. In general, cases alleging violations of securities laws at the time of the IPO can not be initiated after a period of three years has elapsed.²¹

This study provides an in-depth analysis of IPO-related securities litigation. On average, during the last six years, IPO-related class action lawsuits alleging violations of securities laws have been filed against 3 to 5 percent of new issuers in a certain year. However, this percentage is much higher for firms that went public between 1998 and 2000. For example, about 34 percent of companies that went public in 1999 were sued during the subsequent 2 years. These IPO-related class action lawsuits in the aftermath of the "dot-com bubble" typically allege failure to disclose excessive commissions to underwriters and a practice known as "laddering" in its registration statement and

²¹ See the statute of limitation in Securities Act § 13, 15 U.S.C. § 77m, and also Bohn and Choi (1996).

prospectus.²² We will refer to these as *ECL* lawsuits. In particular, the complaints allege that underwriters agreed with certain investors to provide them with preferential allocations of IPO shares in exchange for exorbitant and undisclosed commissions. A similarly frequent complaint is that underwriters would allocate shares in the IPO to certain customers in exchange for their promise to purchase shares in the after-market at pre-determined prices. In mid-2000 the US Securities and Exchange Commission (SEC) and the U.S. attorney's office in Manhattan began a joint investigation of whether firms were violating securities laws by engaging in these practices.²³

In this study, we analyze what determines the risk of an IPO-related lawsuit. This issue has received limited attention in the literature. Several studies attempt to identify determinants of securities fraud litigation risk in general (Section 10b-5) but do not focus specifically on IPO-related lawsuits.²⁴ Bohn and Choi (1996) examine certain IPO characteristics and their impact on the incidence of an IPO-related lawsuit. However,

²² See, for example, the front-page article of the Wall Street Journal on Dec. 6, 2000, and John Labate and Lesia Rudakewych, *The Americas - SEC probes the mysteries of initial public offerings*, Financial Times, Dec.20, 2000.

²³ For example, on January 22, 2002, the SEC charged Credit Suisse First Boston (CSFB) that between April 1999 and June 2000, it had allocated IPO shares to over 100 customers (mostly hedge funds) who, in return, were forced to return between 33 percent and 65 percent of their profits to CSFB by paying excessive brokerage commissions on other transactions. See the SEC press release 2002-14 at <http://www.sec.gov>. CSFB agreed to a settlement with the SEC and the NASD of US\$ 100 million.

²⁴ See, for example, Skinner (1997) and Francis, Philbrick, and Schipper (1994a,b, 1998) for earnings-based securities litigation risk, Jones and Weingram (1996a, 1996b), Johnson, Kasznik, and Nelson (2000), Beck and Bhagat (1997).

their primary motivation is to test enforcement versus strike-suit theories. This addresses the ongoing debate whether class-action suits alleging securities fraud play an important enforcement role or represent a means of rent extraction by plaintiff's attorneys from defendant firms (see Bohn and Choi (1996), p. 912-926). For a sample of IPOs from 1975 to 1986, they conclude that larger IPOs with larger after-market losses and higher-quality underwriters are more likely to be sued. They interpret this evidence as supporting the claim that most IPO-related securities-fraud lawsuits are frivolous. A recent study by Lowry and Shu (2002) models the initial IPO return and the lawsuit risk of IPOs as a system of simultaneous equations. For a sample of IPOs from 1988 to 1995, they find some evidence that market capitalization, venture-capital backing and share turnover are positively, and age of the company going public is negatively associated with the incidence of an IPO-related lawsuit.

The studies typically employ probit or logit regression analysis to model the probability of a lawsuit. By construction, such an approach has a static nature. The explanatory variables (the potential determinants of litigation risk) must be measured at a certain point in time (usually the IPO date) to avoid hindsight bias in the regression. In this paper, we argue that such a static approach is unlikely to incorporate all information that may be related to litigation risk. Rather, we believe that information generated between the IPO and the lawsuit (or until three years after the IPO, if no lawsuit occurs) contains important information about a firm's litigation risk. To incorporate such dynamic information, we estimate a duration model (also known as survival or hazard function analysis) to identify the factors that affect the risk of an IPO-related lawsuit. In contrast to logit or probit models, survival analysis takes into account the relative timing

of IPO-related lawsuits and allows explanatory variables (covariates) to vary over time. Using this approach, we can still assess the affect of static variables such as IPO characteristics. In addition, however, we can also estimate how changes in the firm's post-IPO firm performance, potentially measured relative to its peers or the market, is related to litigation risk.

In this dynamic context, we also investigate whether IPO underpricing can serve as an insurance against IPO-related lawsuits. The underpricing of IPOs has received tremendous attention in the academic literature. One of the explanations for the high initial returns of IPOs suggests that issuers and their underwriters underprice to avoid future IPO-related lawsuits (see Tinic (1988), Hughes and Thakor (1992), Hensler (1995)).

Empirical evidence for the lawsuit-avoidance theory of underpricing is scarce and inconclusive. Drake and Vetsuypens (1993) find no evidence that issuers that were sued subsequently to their IPO have different underpricing than issuers that were not. Keloharju (1993) shows that Finnish IPOs are underpriced only somewhat less than U.S. IPOs. Because the regulatory environment in Finland does not provide shareholder litigation rights as in the U.S., he argues that lawsuit avoidance cannot be a primary reason for underpricing. Lowry and Shu (2001) claim that the analysis of Drake and Vetsuypens (1993) suffers from an endogeneity problem: issuers underprice more when they perceive the litigation risk as high. This may lead to the impression that IPOs with higher initial return were sued more often, which would be inconsistent with Tinic (1988). In a simultaneous-equation approach, Lowry and Shu find some evidence for higher underpricing when the perceived litigation risk is high.

We contribute to this debate by additionally investigating the effect of changes after the IPO on litigation risk on more recent data. Initial return serves as a covariate in our duration analysis, which allows us to directly compare the importance of underpricing with that of the time-varying variables describing the firm's relative performance over time. To control for potential endogeneity, we also use an instrument for initial return, consisting of variables that are known to explain a large part of the initial return of IPOs.

Our results suggest that information arriving after the IPO is an important determinant of the incidence of IPO-related securities-fraud lawsuits. The IPO firm's own stock returns and return volatility as well as the overall market performance have a significant impact on the occurrence of IPO-related litigation. IPOs are sued more often when the stock performance declines and when the return volatility is higher. In addition, the better the overall market performance the more likely will an IPO-related lawsuit occur. Variables known at the time of the IPO such as Nasdaq listing, whether previous owners and potential insiders sell shares in the offer, or the reputation of the underwriter also appear to play a role with regard to subsequent lawsuits. IPOs with more reputable underwriters, IPOs that sell secondary shares and that are not listed on Nasdaq are more prone to be sued. In contrast to Lowry and Shu (2002), we do not find any support for the lawsuit-avoidance theory of underpricing of Tinic (1988). We cannot conclude that higher underpricing deters litigation, which is consistent with Drake and Vetsuypens (1993).

The paper proceeds as follows. Section 4.2 describes our methodology. In section 4.3 we develop hypotheses about potential determinants of IPO-related securities-fraud

lawsuits. Section 4.4 presents the data and relevant summary statistics. We conduct multivariate analyses of lawsuit determinants in section 4.5 and the final section offers conclusions.

4.2 Methodology

Our primary goal is to examine the determinants of the probability of an IPO-related lawsuit that alleges violations of Sections 11 or 12 of the Securities Act of 1933 or of Section 10b-5 of the Securities Exchange Act of 1934. These determinants may include variables that are observable at the time of the IPO, such as underwriter reputation or firm age. It is plausible, however, that also time-varying variables that are not known at the time of the issue affect litigation risk. To incorporate both, we estimate a duration model. Unlike static probit or logit analysis, this duration analysis allows us to model the likelihood of a lawsuit conditional on the time passed since the IPO, and conditional on changes in potential determinants since the IPO. Furthermore, duration analysis easily incorporates information from censored observations.

More specifically, let t be the time from the IPO until an IPO-related lawsuit occurs with continuous probability distribution $f(t)$ and cumulative probability distribution $F(t)$. Then

$$S(t) = 1 - F(t) \tag{1}$$

is the probability that the time to an IPO-related lawsuit is at least of length t , also called survival function. For easier interpretation one commonly defines the hazard rate

$$\lambda(t) = f(t) / S(t). \tag{2}$$

The hazard rate can be interpreted as the instantaneous probability that a lawsuit will occur at time t given that no lawsuit occurred until time t . It corresponds directly to

the risk of a lawsuit at time t . For estimation, we start with the semi-parametric Cox proportional hazards model (Cox (1972))

$$\lambda(t) = \lambda_0(t) \exp [\beta_1 x_1 + \dots + \beta_k x_k] \quad (3)$$

or

$$\log \lambda(t) = \log \lambda_0(t) + \beta_1 x_1 + \dots + \beta_k x_k \quad (4)$$

where $\lambda_0(t)$ is a baseline hazard function that is left unspecified with the restriction that it can not assume negative values, x_k are the covariates or explanatory variables, and β_k are the coefficients of the covariates. The proportional hazard model assumes that the hazard for any IPO is a fixed proportion of the hazard of any other IPO. Cox regressions have the advantage that the coefficients on the explanatory variables are estimated without the need to specify the baseline hazard function. The coefficients are estimated by maximizing partial likelihood functions. Partial likelihood estimates are consistent and asymptotically normal. When we introduce time-varying covariates into our analysis, we need to extend the Cox model to allow for nonproportional hazards. This can be easily accomplished with partial-likelihood estimation.

4.3 Potential Determinants of IPO-Related Class-Action Lawsuits

In this section, we discuss potential determinants of litigation risk. We first present variables that have been identified in previous research, and then introduce our new measures of post-IPO performance.

4.3.1 Variables Known at the Time of the IPO

We expect that firm size (market capitalization subsequently to the IPO or, alternatively, larger IPO proceeds) is positively related to the likelihood of an IPO-related

securities fraud lawsuit. Jones and Weingram (1996a), Bohn and Choi (1996), and Lowry and Shu (2002) find that firms with higher market capitalization are more likely to be sued for securities fraud. This is consistent with class actions targeting firms that are able to pay larger settlement amounts and lawyers being able to extract rents.

The relation between underwriter quality or prestige and the incidence of IPO-related lawsuits is not clear. On one hand, prestigious underwriters may certify the quality of the new issue (see Carter and Manaster (1990), Megginson and Weiss (1991), Carter, Dark, and Singh (1998)) and be better able to price the issue (Beatty and Ritter (1986)). However, several studies find no reliable support for a relation between underwriter reputation and the subsequent performance of an issue (Logue, Rogalski, Seward, and Foster-Johnson (2002), Doukas and Gonenc (2001), Ritter and Welch (2002)). On the other hand, in IPO-related litigation underwriters may also be liable for damages experienced by investors. Thus, class actions may target IPOs issued by highly prestigious underwriters who have the financial ability to help cover shareholder damages. Some evidence for this behavior is presented by Bohn and Choi (1996).

Carter and Manaster (1990), Megginson and Weiss (1991), and Carter, Dark, and Singh (1998) suggest that venture-capitalist backing certifies the quality of a new issue. Thus, we expect that IPOs backed by venture capitalists are less likely to be sued. Lowry and Shu (2002) find some evidence in support of this hypothesis.

Francis, Philbrick, and Schipper (1994b) examine cases of earnings-based securities fraud litigation and suggest that the size and quality of the company's auditor may have an impact on the incidence of securities-fraud lawsuits. It is conceivable that, in

addition to underwriter quality, a reputable auditor can decrease litigation risk. We therefore include a measure of auditor prestige.

Jones and Weingram (1996b) suggest that firms in high-tech industries are more frequently subject to securities-fraud shareholder litigation. Thus, we expect new issues in high-tech industries, firms that are younger, and firms listing on Nasdaq to be sued relatively more frequently. These firms may be riskier and the offer price is more difficult to determine than for firms in mature industries with a long operating history. Lowry and Shu (2002) provide some support for the hypothesis that younger firms are sued more often.

We also include a measure for the percentage of shares sold by firm insiders at the time of the IPO. Leland and Pyle (1977) suggest that insider equity ownership can be interpreted as a signal of firm quality. The less insiders sell when taken their firm public, the less likely should a lawsuit be.

Tinic (1988), Hughes and Thakor (1992), and Hensler (1995) predict that a larger amount of IPO underpricing acts as a form of insurance against IPO-related securities-fraud litigation. The evidence is ambiguous. Drake and Vetsuypens (1993) document that underpricing does not differ between companies that were sued regarding their IPO and those that were not. Lowry and Shu (2002) suggest that this result suffers from a potential endogeneity problem. To address it, they model initial return and litigation risk as a system of simultaneous equations and find weak support for the notion that more underpricing may be able to deter IPO-related class actions. We include the IPO's first-day return as a covariate in our duration analysis. To address a potential endogeneity problem, we alternatively include an instrument. The instrument is constructed as the

fitted values from a regression of first-day returns on several variables, including underwriter quality, the market return over the 15 days prior to the IPO, and the filing-range price update. These variables are known to be strongly related to first-day returns (see, for example, Ritter (1984), Benveniste and Spindt (1989), Hanley (1993), Carter and Manaster (1990), Loughran and Ritter (2002), Lowry and Schwert (2002)).

Weingram and Jones (1996a, 1996b) suggest that stock market variables, such as volatility and turnover, could be a factor in explaining the incidence of securities-fraud lawsuits, because they enter shareholder damage formulas. While we believe that actual post-IPO measures of volatility and turnover would be better predictors of litigation risk, we also construct the static measures used in Lowry and Shu (2002). Using their methodology, we compute standard deviation and turnover of a matched portfolio of control firms (described below) to get an estimate of expected volatility and expected turnover at the time of the IPO. Lowry and Shu find a positive relation between matched-firm turnover and the likelihood of a lawsuit.

Finally, we also include the year the firm is going public and the file update as control variables. The change between the initial filing range midpoint and the offer price can be interpreted as a measure of the aggressiveness of pricing, as suggested by Lowry and Shu (2002). They find that firms with greater price updates are sued more often.

4.3.2 Time-Varying Variables

Prior studies of 10b-5 securities-fraud class actions suggest that several stock market variables are able to predict lawsuits, for example the firm's stock returns (Beck and Bhagat (1997), Bohn and Choi (1996)), stock return volatility and share turnover (Jones and Weingram (1996a)). Some of these variables enter shareholder damage

formulas and thus have an impact on settlement amounts. Specifically, we expect that the higher the share turnover of a firm, the more likely is the incidence of a lawsuit. Higher share turnover leads to a larger number of shareholders experiencing damages from violations of Section 11, 12, or 10b-5; thus, more shareholders will participate in a class action and potential settlements will be larger.

Large stock price declines have been shown to trigger securities-fraud lawsuits, so we expect IPO-related lawsuits to occur after the stock-market performance of the firm has deteriorated. We include the firm's raw return as a time-varying variable. To control for exogenous price changes, we also include the contemporaneous market return (measured on the CRSP value-weighted index). In alternative specifications, we have also used returns on a portfolio of matched control firms (described below) instead of market returns. Because the results are qualitatively identical, we do not report them in the paper.

Finally, we also include the standard deviation of the firm's raw returns and, alternatively, the daily price range as time-varying variables. A more volatile stock is more likely to be subject to a lawsuit than a less volatile stock, because it carries a higher risk of price declines (which may trigger lawsuits) and is more difficult to value at the time of the IPO. Again, we control for the standard deviation of market returns but obtain qualitatively identical results when using those of the control-firm portfolio.

4.4 Data

4.4.1 Sample

From SDC we retrieve all 2954 IPOs that occurred between January 1, 1996 and December 31, 2001. For each firm, we attempt to obtain daily security data from CRSP and financial-statement information from Compustat up to December 31, 2001. Then we use criteria from SDC and CRSP to construct a sample for further analysis. We exclude 182 unit offers identified from SDC and CRSP information, and additional cases from Jay Ritter's website. We further delete 3 issues that CRSP classifies as certificates and other securities and 331 limited partnerships, REITs, closed-end funds, and ADRs using SDC and CRSP classifications. For another 152 issues we were either not able to find data on CRSP, or price data starts later than the IPO date. Finally, we delete 3 IPOs where the offer date from SDC and the first trade date on CRSP can not be reconciled. This leaves 2283 IPOs for further analysis.

We then compare our list of sample firms with the list of securities-fraud class-action lawsuits between January 1996 and March 2001 from the Securities Class Action Clearinghouse webpage (<http://securities.stanford.edu>). This webpage lists all securities-fraud class-action lawsuits filed between 1996 and today, often including a description of the case and links to court documents. For cases where the website does not contain case descriptions, we search Lexis-Nexis and the Dow Jones News Retrieval to obtain it. Since we are interested in IPO-related lawsuits only, we read all available case descriptions to determine whether a sample firm was sued in connection with its IPO and whether it is alleged to have violated Sections 11 or 12 of the Securities Act of 1933, or Rule 10b-5 of the Securities Exchange Act of 1934. We further obtain the lawsuit filing

dates and determine whether the lawsuit filing alleges excessive commissions to underwriters and laddering (ECL). If a firm experiences more than one IPO-related lawsuit, we only record the first filing date. We delete one firm that has been sued 3 years and 10 weeks after its IPO. Generally, a statute of limitations provides a limit of three years after the issue.²⁵

Thus, our final sample consists of 2282 IPOs. Because our data end in December 2001, all issues that were sold between 1999 and 2001 and not sued are censored, because they may still be sued in the future. We will take this into account explicitly in our estimation.

For each sample firm, we obtain a portfolio of control firms from the combined CRSP and Compustat files following Lowry and Shu (2002)). The portfolio includes all firms that meet the following criteria:

- stock price is between \$5 and \$1000,
- security is classified as a domestic, single-class common stock,
- publicly traded for at least one year,
- same 3-digit SIC-code classification as the sample firm,
- market capitalization is between 80% and 120% of the market capitalization of the sample firm on the close of its first trading day.

If no firms match these criteria, we repeat the procedure for the unmatched sample firms using successively less restrictive industry restrictions (first one-digit SIC codes, then we omit the restriction). All control-portfolio variables are computed as averages across all matches for a particular sample IPO.

²⁵ See Securities Act § 13, 15 U.S.C. § 77m and Bohn and Choi (1996).

We obtain IPO variables (except firm age) from CRSP, SDC, and Compustat, and return and turnover data from CRSP. We thank Alexander Ljungqvist for providing the founding years for the sample firms, and corrected shares outstanding for IPOs between 1996 to 2000. We hand-collect these variables from the prospectuses for IPOs in 2001.

4.4.2 Summary Statistics

Table 4.1 summarizes the frequency of IPO-related lawsuits for our sample firms. Because IPOs after January 1999 are potentially censored, we present separate columns for the entire sample and uncensored observations. On average, 4.04 percent of IPOs from 1996 to 1998 experienced the filing of an IPO-related lawsuit, which is similar Lowry and Shu's (2002) sample for IPOs between 1988 to 1995. For our total sample from 1996 to 2001 the percentage is much higher at 14.33 percent (which is still underestimated because more suits may be filed after December 2001). About 13 percent of IPOs experience filings that allege violations of Section 11, 10 percent of Section 12, 12 percent of Rule 10b-5, and 11 percent experience lawsuit filings that allege excessive commissions to underwriters and laddering. These numbers are not too far apart because in most cases, the complaints contain allegations of violations of several securities-law sections at a time.

Table 4.2 breaks down lawsuit filings by IPO year. The largest number of IPOs occurred in 1996 (658) whereas during 2001 very few companies went public (75). Coinciding with the "dot-com bubble", new issues during 1999 and 2000 experienced a surge of IPO-related lawsuits (about 37 and 29 percent, respectively, were sued). However, when we subtract ECL suits, the ex-post litigation risk is very similar for each IPO year. When we look at the distribution of lawsuits over single years, we find a

Table 4.1

IPOs and Subsequent IPO-Related Securities-Fraud Class Action Lawsuits

The table contains an overview of IPO-related securities-fraud class action lawsuits experienced by firms going public from 01/01/1996 to 12/31/2001. The incidence of a lawsuit (for violations of Sections 11 or 12 of the Securities Act of 1933, or Rule 10b-5 of the Securities Exchange Act of 1934) is observed until 3/31/2002. IPO-related litigation may occur up to 3 years after the IPO. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price.

	Uncensored observations (only IPOs issued before January 1999)		All observations (IPOs between January 1996 and December 2001)	
	Number of IPOs	Percentage of IPOs	Number of IPOs	Percentage of IPOs
All IPOs	1411	100.0	2282	100.0
IPO firms sued in connection with their IPO	57	4.0	327	14.3
Lawsuits by type of litigation (multiple filings are possible)				
Section 11	51	3.6	293	12.8
Section 12	39	2.8	219	9.6
Rule 10b-5	29	2.1	271	11.9
Lawsuits alleging excessive commissions and laddering (ECL)	6	0.4	253	11.1
IPO-related lawsuits not alleging ECL	51	3.6	74	3.2

Table 4.2

IPOs and IPO-Related Class-Action Lawsuits by Year

The table shows initial public offerings from 01/01/1996 to 12/31/2001 and the frequency of IPO-related securities-fraud class action lawsuits by year of issuance and lawsuit filing. The incidence of a lawsuit (for violations of Sections 11 or 12 of the Securities Act of 1933, or Rule 10b-5 of the Securities Exchange Act of 1934) is observed until 3/31/2002. IPO-related litigation may occur up to 3 years after the IPO. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price.

Year of IPO	1996	1997	1998	1999	2000	2001		Total
Number of all IPOs	658	460	293	454	341	76		2282
IPOs as % of total new issues from 1996 to 2001	28.9	20.2	12.8	19.9	14.9	3.3		100.0
% of IPOs sued in connection with IPO by issue year	3.3	3.3	6.8	36.8	29.3	4.0		14.3
% of IPOs sued for ECL by issue year	0.0	0.0	2.1	34.4	26.7	0.0		11.1
% of IPOs sued, except for ECL, by issue year	3.3	3.3	4.8	2.4	2.6	4.0		3.2

Year of lawsuit	1996	1997	1998	1999	2000	2001	2002 (first 3 months)	Total
Number of all IPO-related lawsuits	4	14	20	11	13	262	3	327
Number of Section-11 lawsuits	4	13	18	9	12	234	3	293
Number of Section-12 lawsuits	4	7	14	8	6	179	1	219
Number of Rule 10b-5 lawsuits	0	6	9	7	8	239	2	271
Number of ECL lawsuits	0	0	0	0	0	252	1	253

clustering of class actions during 2001, again, most of them belonging to the category of ECL lawsuits. In fact, ECL lawsuits occurred in 2001 only. We take this into account in our empirical analysis by repeating all tests with and without ECL lawsuits.

Table 4.3 presents the lawsuit categories by industry. Between 1996 and 2001, the industries with the most new issues are Computers and Office Equipment and Personal and Business Services. Not surprisingly, IPOs in hitech industries (Computers, Office Equipment and Related Services; Electric, Electronic, and Telecommunication Equipment; and Telecommunication, Radio and Television Broadcasting Services) experienced the highest proportion of lawsuits (and ECL lawsuits), between 9 and 50 percent of total IPO-related lawsuits, followed by IPOs in Personal and Business Services (8.6 percent). There are relatively more securities-fraud class actions than new issues in these industries. No lawsuits were filed against IPOs in Rubber, Plastic, Machinery, Food, Tobacco, Construction, Agriculture, Forestry, and Fishing.

Table 4.4 illustrates differences in IPO characteristics between sued and non-sued new issues. We compare medians for continuous variables, and means otherwise. Sued IPOs are significantly larger in terms of market capitalization (calculated as shares outstanding after the IPO times the closing price at the end of the first trading day) and obtain greater proceeds (computed as shares issued times offer price). Sued IPOs are also underwritten by more prestigious underwriters, more often backed by one of the "big 5" auditors (Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche), and more often backed by venture capitalists. The underwriter reputation ranks are updated Carter-Manaster (1990) ranks and are obtained from Jay Ritter's website (<http://bear.cba.ufl.edu/ritter/Rank.HTM>, see also Loughran and Ritter (2001)). The

Table 4.3

IPO-Related Securities-Fraud Class Action Lawsuits by Industry

The table shows the percentage of IPO-related securities-fraud class action lawsuits for new issues from 01/01/1996 to 12/31/2001 by industry. Lawsuits (for violations of Sections 11 or 12 of the Securities Act of 1933, or Rule 10b-5 of the Securities Exchange Act of 1934) are observed until 3/31/2002. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price.

	Issuers sued in connection					ECL
	All IPOs	with IPO	Section 11	Section 12	Rule 10b-5	lawsuits
Agriculture, Forestry, Fishing	0.5	0.0	0.0	0.0	0.0	0.0
Construction	0.7	0.0	0.0	0.0	0.0	0.0
Chemicals, Petroleum, Drugs, Cosmetics	5.3	1.8	2.1	2.3	1.1	1.6
Computers, Office Equipment and Related Services	27.2	48.9	47.8	49.3	50.9	53.0
Electric, Electronic, and Telecommunication Equipment	7.5	13.7	13.3	14.6	15.9	16.2
Finance, Insurance, Real Estate	8.2	3.4	3.8	3.7	3.0	0.8
Food, Tobacco	1.3	0.0	0.0	0.0	0.0	0.0
Hotels, Recreation	2.1	1.2	1.0	0.9	0.7	0.8
Health Services	2.6	1.5	1.7	1.4	0.0	0.8
Mining	1.6	0.6	0.7	0.5	0.0	0.0
Machinery	1.5	0.0	0.0	0.0	0.0	0.0
Measuring, Analyzing, and Controlling Instruments; Photographic, Medical and Optical Goods	5.8	2.1	2.1	1.4	1.5	1.6
Metal, Metal Products	1.0	0.0	0.0	0.0	0.0	0.0
Other Services	1.5	0.0	0.0	0.0	0.0	0.0
Other Manufacturing	0.7	0.6	0.7	0.9	0.0	0.0
Printing, Publishing	0.8	0.6	0.7	0.9	0.7	0.4
Public Utilities	1.3	0.3	0.3	0.0	0.4	0.0
Retail trade	6.0	3.4	3.8	2.7	2.6	2.8
Rubber, Plastic	0.4	0.0	0.0	0.0	0.0	0.0
Personal and Business Services (Excluding Computer-related Services)	10.3	8.6	8.9	8.7	9.2	9.5
Textile, Apparel	0.8	0.6	0.7	0.5	0.7	0.0
Telecommunication, Radio and Television Broadcasting Services	6.2	9.5	9.9	10.5	10.3	10.7
Transportation, Shipping, Air (Equipment and Services)	2.8	0.9	1.0	0.5	0.7	0.8
Wholesale Trade	3.0	1.2	1.0	0.5	1.1	1.2
Wood, Paper, Leather, Stone, Glass, Concrete	0.9	0.9	0.7	0.9	1.1	0.0
	100.0	100.0	100.0	100.0	100.0	100.0

Table 4.4

Characteristics of IPOs by Occurrence of IPO-Related Securities-Fraud Class-Action

Lawsuits

The table shows offering and aftermarket characteristics of IPOs from 01/01/1996 to 12/31/2001 by type of a subsequent IPO-related securities-fraud class action lawsuit (Section 11 and 12 of Securities Act of 1933, Rule 10b-5 of Securities Exchange Act of 1934). Our sample consists of 2282 IPOs from 01/01/1996 to 12/31/2001. Some of the means and medians are calculated based on fewer observations due to data availability problems. Lawsuits are observed until 3/31/2002. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. Proceeds are shares sold in the IPO times the offer price, market capitalization are shares outstanding after the IPO times the closing price on the first trading day. Initial return is measured from the offer price to the closing price on the first trading day, price update is the percentage change of the midpoint of the filing range with respect to the offer price. % sold by insiders are the percentage of shares outstanding prior the IPO sold by insiders in the offer. Underwriter ranks are Carter-Manaster (1990) ranks. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, communications services, and software. HPRs are raw IPO holding period returns, starting from the first day of trading. HPERs are IPO holding period

returns starting from the first trading day, adjusted by the holding period return on the value-weighted CRSP index. Wilcoxon tests for differences in medians and t-tests for differences in means, where appropriate, between variables for IPOs that have been sued and IPOs that have not been sued subsequently are reported. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

	Issuers sued for IPO	Test	Issuers not sued for IPO	Section 11	Section 12	Rule 10b-5	Issuers sued for ECL
	Wilcoxon test of equal medians						
<i>Panel A: Medians</i>							
Proceeds in US\$ mil	70.4	***	40.0	70.4	71.6	72.0	72.0
Market capitalization in US\$ mil	837.0	***	182.4	826.7	914.5	954.8	1056.3
Initial return in %	83.6	***	10.0	83.0	84.4	89.7	109.4
Price update in %	25.0	***	0.0	25.0	24.0	27.3	30.8
Offer price in \$	16.0	***	12.0	16.0	16.0	16.0	16.0
% Sold by insiders	10.2	***	16.2	10.3	10.1	9.7	9.4
Age in years	4.0	***	8.0	4.0	5.0	4.0	4.0
Underwriter rank (Carter-Manaster)	9.1	***	8.1	9.1	9.1	9.1	9.1
Prior std. dev. matched firms in %	5.1	***	4.0	5.2	5.2	5.2	5.3
Prior daily turnover matched firms in %	0.9	***	0.5	0.8	0.9	0.9	0.9

<i>Panel B: Percentage variables</i>		T- test of equal means					
% of IPOs with secondary shares	16.2	***	29.5	15.4	14.2	12.2	9.1
% Venture-capital backed	70.3	***	39.1	69.3	69.0	74.2	77.5
% Big-5 auditor-backed	95.7	***	82.6	95.6	95.9	98.2	99.6
% Listed on NASDAQ	93.6	***	82.8	93.9	93.2	95.2	98.4
% Hitech industry	50.2	***	23.8	50.2	51.6	53.5	54.9
<i>Panel C: Long-run returns, medians</i>		Wilcoxon test of equal medians					
HPR over 252 days after IPO in %	-70.0	***	-17.0	-73.0	-72.0	-66.0	-66.0
HPR over 504 days after IPO in %	-87.0	***	-28.0	-88.0	-87.0	-88.0	-90.0
HPR over 756 year after IPO in %	-81.0	***	-33.0	-82.0	-85.0	-82.0	-74.0
HPER over 252 days after IPO in % vw	-67.0	***	-34.0	-69.0	-66.0	-64.0	-62.0
HPER over 504 days after IPO in % vw	-82.0	***	-66.0	-83.0	-82.0	-81.0	-79.0
HPER over 756 days after IPO in % vw	-122.0	***	-95.0	-122.0	-121.0	-121.0	-84.0

results are consistent with Jones and Weingram (1996a), Bohn and Choi (1996), and Lowry and Shu (2002) and suggest that securities-fraud litigation indeed targets issuers and potential underwriter, auditor, and venture-capitalist defendants who are likely to be able to pay large settlement amounts.

Sued IPOs are priced higher, underpriced substantially more (median of 84 versus 10 percent) and experience a greater price update (median of 25 versus 0 percent). Initial return (underpricing) is measured as the return from the offer price to the closing price on the first day of trading, and price update is the return from the midpoint of the initial filing range to the offer price. The larger initial return experienced by sued IPOs appears to be inconsistent with Tinic's (1988) insurance hypothesis and the evidence in Lowry and Shu (2002). However, this relationship may also be due to the endogeneity problem mentioned above. We will return to this issue below. Compared to the sample used by Lowry and Shu (2002), the sued IPOs in our sample are underpriced more (84 versus 6.7 percent). This is not surprising since our sample includes the 'bubble' years that were characterized by unprecedented initial returns.

To approximate the fraction of the IPO sold by insiders, we follow Lowry and Shu (2002) and use a dummy variable that equals one if secondary shares have been offered at the IPO and zero otherwise. We find that secondary shares are significantly less likely in sued IPOs. This is in contrast to Lowry and Shu (2002) and is not consistent with the hypothesis that insider holdings are a signal of firm quality.

Sued firms are also significantly younger (median of 4 versus 8 years), significantly more likely to go public on Nasdaq (94 versus 83 percent), and belong significantly more often to hitech industries. We follow Ljungqvist and Wilhelm (2001)

and label firms 'hitech' if they belong to one of the following industries: computer hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, communications services, or software. These results are consistent with sued IPOs being riskier and more difficult to price than non-sued IPOs.

The standard deviation of daily raw returns and average daily turnover (shares traded over shares outstanding) of size- and industry-matched firms, measured over the year prior to the IPO, are significantly higher for sued IPOs. This is consistent with Weingram and Jones (1996a, 1996b) and Lowry and Shu (2002), suggesting that stock market variables enter shareholder damage formulas and are a factor in explaining the incidence of securities-fraud lawsuits. We also calculate holding period returns (HPRs) and holding period excess returns (HPERs, adjusted by returns on the value-weighted CRSP index) for 252, 504, and 756 trading days after the IPO. Sued IPOs indeed perform much worse in the aftermarket than non-sued IPOs. For example, sued IPOs experience a negative two-year holding period return of 87 percent versus a negative return of 28 percent for non-sued IPOs.

Finally, in table 4.5 we present some summary statistics on the time after the IPO until a securities-fraud lawsuit is filed. The duration of the time to lawsuit is calculated as the number of weeks from the first trading day to the filing date. Mean and median duration are not far apart, about 86 and 88 weeks, respectively. The maximum time that elapsed between an IPO and the filing of a suit is almost 3 years, the minimum is 18 days.

4.5 Determinants of IPO-Related Securities-Fraud Lawsuits - Multivariate Analysis

In this section, we investigate determinants of litigation risk. To facilitate a comparison with previous studies, we first estimate static models following Lowry and

Table 4.5

Distribution of Duration from First Trade Date to the Filing of an IPO-
Related Securities-Fraud Lawsuit

This table shows the distribution of the duration between the IPO and the filing of an IPO-related lawsuit alleging violations of Section 11 or 12 of the Securities Act of 1933, or Rule 10b-5 of the Securities Exchange Act of 1934. The occurrence of a lawsuit is observed until 03/31/2002. The sample consists of 2282 IPOs from 01/01/1996 to 12/31/2001.

	Weeks since IPO
Mean	85.5
Minimum	2.6
25th percentile	67.3
Median	88.1
75th percentile	109.0
Maximum	155.9

Shu (2002). Then we estimate the duration model to understand the relative importance of post-IPO performance for changes in litigation risk. In both approaches we address the potential endogeneity of underpricing and the possible differences between ECL and non-ECL suits.

4.5.1 Probit Regression of Lawsuits and Simultaneous-Equations Estimation

We estimate a probit model of the likelihood of an IPO-related lawsuit. This is the method employed by most of the studies that examine determinants of securities-fraud class actions, both IPO- and non-IPO related. We closely follow the specification in Lowry and Shu (2002) with additional a dummies for big-5 auditor backing and the offer-years 1997 and 1998. Our regression further includes underpricing, log of market capitalization, log of underwriter rank, log of firm age, a hitech, secondary-shares, Nasdaq-listing, and venture-capital dummy, and daily average standard deviation and turnover of matched firms during the year prior to the IPO. Because IPO-related lawsuits can be filed until three years after the firm went public, we only use the portion of our sample firms that went public between 1996 and 1998 to avoid censored observations.

Table 4.6 presents the results. The regression including ECL cases delivers some marginally significant parameter estimates. Firms in hitech industries, with a larger initial return, and firms that went public in 1998 appear to be sued more often. The positive coefficient on initial returns is not surprising, because high underpricing (which allegedly is distributed to favorite clients) is a major trigger of such suits. Without ECL cases, none of the variables has predictive power. This contrasts to the results using earlier data analyzed by Lowry and Shu (2002), who find that sued firms have lower underpricing,

Table 4.6

Probit Regression of IPO-Related Securities-Fraud Lawsuits

The table shows coefficient estimates for a probit regression of IPO-related lawsuit occurrence. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. The sample consists of IPOs from 01/01/1996 to 12/31/1998. Market capitalization are shares outstanding after the IPO times the closing price on the first trading day. Initial return is measured from the offer price to the closing price on the first trading day, price update is the percentage change of the midpoint of the filing range with respect to the offer price. Secondary shares is a dummy variable with a value of 1 if secondary shares have been sold in the IPO, 0 otherwise. Underwriter ranks are Carter-Manaster (1990) ranks. Age is the age of the firm from its inception. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. The big-5 auditor dummy is equal to 1 if the IPO auditor belongs to one of the big-5 auditors. The Nasdaq dummy is equal to 1 if the IPO is listed on Nasdaq, 0 otherwise. Venture capital is a dummy variable with a value of 1 if the IPO is backed by venture capital, 0 otherwise. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, communications services, and software. The hitech dummy equals 1 if the IPO is belonging to a hitech industry, 0 otherwise. We include dummy variables for the offer year 1997 and 1998. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variable: Lawsuit	Regression 1: no ECL lawsuits		Regression 2: all lawsuits	
	Coefficient estimate	p value	Coefficient estimate	p value
Intercept	-3.314 *	0.07	-4.025 **	0.02
Initial return	-0.003	0.37	0.003 *	0.10
Log(market capitalization)	0.072	0.45	0.098	0.30
Log(underwriter rank)	0.074	0.73	0.047	0.82
Log(age)	-0.025	0.69	-0.024	0.70
Dummy: hitech	0.255	0.13	0.280 *	0.08
Dummy: big-5 auditor	-0.049	0.76	0.001	1.00
Dummy: secondary shares	0.200	0.14	0.217	0.10
Dummy: venture-capital backing	-0.047	0.76	-0.039	0.79
Dummy: Nasdaq	-0.245	0.17	-0.240	0.18
Standard deviation matched firms	0.067	0.41	0.097	0.22
Price update	0.003	0.43	-0.001	0.82
Turnover matched firms	-0.097	0.75	-0.093	0.73
Dummy: 1997	-0.009	0.95	0.002	0.99
Dummy: 1998	0.167	0.30	0.262 *	0.09
Number of Observations	1380		1385	
Log likelihood	-210.7 ***		-221.7 ***	

are more often venture-capital backed, have a higher price update, and higher matched-firm turnover. The insignificant coefficient on initial returns is consistent with the results of Drake and Vetsuypens (1993), and does not lend support for the insurance-effect hypothesis of underpricing (Tinic (1988), Hughes and Thakor (1992), Hensler (1995)). However, as pointed out by Lowry and Shu (2002), the probit specification may not be appropriate because of the endogeneity problem between lawsuit incidence and underpricing.

Next we use the uncensored portion of our sample (1996-1998) to re-estimate the simultaneous equations proposed by Lowry and Shu (2002). To incorporate the possible endogeneity between lawsuit risk and first-day IPO return, we estimate instruments for litigation risk and underpricing as the fitted values of two first-stage regressions. Litigation risk is modeled as a probit model with the following predetermined variables: log of market capitalization, log of underwriter rank, log of firm age, a hitech, big-5 auditor, secondary-shares, Nasdaq-listing, and venture-capital dummy, daily average standard deviation and turnover of matched firms during the year prior to the IPO, the file update, the market return during the 15 days prior to the IPO (using the value-weighted CRSP index), and offer-year dummies. Utilizing ordinary least squares, initial return is regressed on the same variables. In the second stage, we again use a probit model of litigation risk, regressed on the underpricing instrument and all first-stage variables except prior market return. Similarly, underpricing is regressed on the lawsuit instrument and all first-stage variables except turnover of matched firms.

Estimates for the second-stage regressions are presented in Table 4.7. Our results for the lawsuit risk in panel A differ from those found by Lowry and Shu (2002).

Table 4.7

Simultaneous-Equations Estimation

The table shows coefficient estimates for the second stage of a simultaneous-equations regression. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. Panel A presents coefficient estimates of a probit regression of IPO-related lawsuit occurrence. Panel B shows coefficient estimates of an OLS regression of initial returns. The sample consists of IPOs from 01/01/1996 to 12/31/1998. Market capitalization are shares outstanding after the IPO times the closing price on the first trading day. Initial return is measured from the offer price to the closing price on the first trading day, price update is the percentage change of the midpoint of the filing range with respect to the offer price. Prior market return is the holding period return on the value-weighted CRSP index during the 15 days prior to the IPO. Secondary shares is a dummy variable with a value of 1 if secondary shares have been sold in the IPO, 0 otherwise. Underwriter ranks are Carter-Manaster (1990) ranks. Age is the age of the firm from its inception. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. The big-5 auditor dummy is equal to 1 if the IPO auditor belongs to one of the big-5 auditors. The Nasdaq dummy is equal to 1 if the IPO is listed on Nasdaq, 0 otherwise. Venture capital is a dummy variable with a value of 1 if the IPO is backed by venture capital, 0 otherwise. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications equipment, electronics, navigation equipment, measuring and

controlling devices, communications services, and software. The hitech dummy equals 1 if the IPO is belonging to a hitech industry, 0 otherwise. We include dummy variables for the offer year 1997 and 1998. The initial return instrument consists of fitted values from an OLS regression of initial returns on all predetermined variables in the system. The lawsuit instrument consists of fitted values from a probit regression of lawsuit occurrence on all predetermined variables. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

<i>Panel A</i>	Regression 1: no ECL lawsuits		Regression 2: all lawsuits	
	Coefficient			
Dependent variable: Lawsuit	estimate	p value	Coefficient estimate	p value
Intercept	5.570	0.28	1.985	0.67
Initial return instrument	0.120 *	0.07	0.061	0.13
Log(market capitalization)	-0.559	0.12	-0.294	0.32
Log(underwriter rank)	0.791 *	0.08	0.432	0.20
Log(age)	0.231	0.13	0.120	0.33
Dummy: hitech	-0.067	0.78	0.170	0.33
Dummy: big-5 auditor	0.192	0.36	0.099	0.57
Dummy: secondary shares	0.380 **	0.02	0.327 **	0.04
Dummy: venture-capital backing	0.056	0.73	0.073	0.67
Dummy: Nasdaq	-1.266 **	0.03	-0.839 *	0.07
Standard deviation matched firms	0.035	0.67	0.045	0.61
Price update	-0.055 *	0.08	-0.026	0.14
Turnover matched firms	-0.569	0.14	-0.334	0.30
Dummy: 1997	0.024	0.88	0.012	0.94
Dummy: 1998	-0.133	0.57	-0.010	0.97
Number of Observations	1380		1385	
Log likelihood	-209.44 ***		-221.93 ***	
<i>Panel B</i>	Regression 1: no ECL lawsuits		Regression 2: all lawsuits	
	Coefficient			
Dependent variable: Initial Return	estimate	p value	Coefficient estimate	p value
Intercept	-58.176	0.36	-307.849	0.28
Lawsuit instrument	8.117	0.69	-42.916	0.50
Log(market capitalization)	5.199 ***	0.00	12.503	0.11
Log(underwriter rank)	-6.701 ***	0.01	-5.270 *	0.08
Log(age)	-1.986 ***	0.00	-4.299 *	0.09
Dummy: hitech	0.992	0.86	14.616	0.43
Dummy: secondary shares	-3.038	0.50	6.653	0.61
Dummy: venture-capital backing	-0.335	0.82	-4.196	0.27
Dummy: Nasdaq	10.776 *	0.06	2.403	0.85
Standard deviation matched firms	0.333	0.77	5.268	0.36
Price update	0.468 ***	0.00	0.418 ***	0.00
Prior market return	-0.020	0.98	1.741	0.37
Dummy: 1997	-0.419	0.75	-0.747	0.66
Dummy: 1998	1.057	0.77	17.134	0.36
Number of Observations	1380		1385	
Adj. R squared	0.28 ***		0.21 ***	

Litigation is significantly more likely when the underwriter has a higher reputation, when previous owners sell shares in the IPO, and when the file update is lower. Further, litigation risk is lower when the firm is listed on Nasdaq. Most importantly, higher underpricing increases the lawsuit risk which is not consistent with Tinic (1988) and different from the results on earlier IPOs documented by Lowry and Shu (2002). The results for regressions including ECL lawsuits show less significant estimates than those excluding ECL lawsuits.

Panel B shows the estimates for the initial-return model. The findings for the underpricing regression are mostly in line with previous research. Lawsuit risk does not appear to have a significant impact on the choice of underpricing, again not supporting Tinic's (1988) lawsuit-avoidance hypothesis of underpricing. Issuers do not appear to underprice significantly more when they perceive the litigation risk as high, as implied by the lawsuit-avoidance hypothesis of underpricing. To further examine this question, we also estimate a simple OLS regression of initial return on the same variables as before but including a dummy for the incidence of an IPO-related lawsuit. This approach does not take into account potential endogeneity issues. Table 4.8 shows the coefficient estimates on this regression. Again, lawsuit risk does not appear to play a significant role in the underpricing decision. When we include ECL lawsuits, the coefficient on lawsuits turns significantly positive but this may be due to the fact that ECL lawsuits are brought against issuers with high initial return as explained earlier.

4.5.2 Duration Analysis

We believe that duration analysis is more suitable to determine the factors that play an important role in the litigation incidence for IPOs than probit models. Duration

Table 4.8

OLS Regression of Underpricing

The table shows coefficient estimates for an OLS regression of initial returns. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. The sample consists of IPOs from 01/01/1996 to 12/31/1998. Lawsuit is a dummy variable equal to 1 if the firm has been sued in an IPO-related lawsuit according to Sections 11 or 12 of the Securities Act of 1933 or Rule 10-5 of the Securities Exchange Act of 1934. Market capitalization are shares outstanding after the IPO times the closing price on the first trading day. Initial return is measured from the offer price to the closing price on the first trading day, price update is the percentage change of the midpoint of the filing range with respect to the offer price. Prior market return is the holding period return on the value-weighted CRSP index during the 15 days prior to the IPO. Secondary shares is a dummy variable with a value of 1 if secondary shares have been sold in the IPO, 0 otherwise. Underwriter ranks are Carter-Manaster (1990) ranks. Age is the age of the firm from its inception. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. The big-5 auditor dummy is equal to 1 if the IPO auditor belongs to one of the big-5 auditors. The Nasdaq dummy is equal to 1 if the IPO is listed on Nasdaq, 0 otherwise. Venture capital is a dummy variable with a value of 1 if the IPO is backed by venture capital, 0 otherwise. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications equipment, electronics, navigation

equipment, measuring and controlling devices, communications services, and software. The hitech dummy equals 1 if the IPO is belonging to a hitech industry, 0 otherwise. We include dummy variables for the offer year 1997 and 1998. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively.

Dependent variable: initial return	Regression 1: no ECL lawsuits		Regression 2: all lawsuits	
	Coefficient estimate	p value	Coefficient estimate	p value
Intercept	-82.806 ***	0.00	-115.656 ***	0.00
Lawsuit dummy	-3.352	0.27	9.942 ***	0.01
Log(market capitalization)	5.579 ***	0.00	7.239 ***	0.00
Log(underwriter rank)	-5.890 ***	0.00	-6.535 ***	0.00
Log(age)	-2.076 ***	0.00	-2.577 ***	0.00
Dummy: hitech	3.068 *	0.05	1.987	0.31
Dummy: secondary shares	-1.261	0.31	-2.116	0.17
Dummy: venture-capital backing	-0.542	0.69	-1.804	0.28
Dummy: Nasdaq	8.599 ***	0.00	11.085 ***	0.00
Standard deviation matched firms	0.692	0.28	1.321 *	0.10
Price update	0.476 ***	0.00	0.432 ***	0.00
Prior market return	0.305 *	0.09	0.440 *	0.05
Dummy: 1997	-0.573	0.66	-0.617	0.71
Dummy: 1998	2.357	0.13	4.406 **	0.02
Number of Observations	1387		1391	
Adj. R squared	0.27 ***		0.21 ***	

analysis can easily incorporate time-varying covariates, censoring, and information about the timing of the lawsuits.

The dependent variable is the time from the first trading day of the IPO until the IPO-related securities-fraud lawsuit is filed. We measure both the duration and the independent variables in weeks, although conceptually the regression could also be conducted using day increments. We choose the coarser weekly approach, because it is not likely that plaintiffs make the lawsuit decision within a time span of less than one week. In that case, daily observations would just add noise to the estimation and the estimates would become less precise.

Each sample firm remains at risk to experience a lawsuit until three years after its IPO. It exits the sample if either a lawsuit occurs, or calendar reaches December 2001, when our data ends. The latter cases are explicitly treated as censored observations. Some of the sample firms delist before reaching the three-year mark. Because twenty of these delisted firms experience a lawsuit after the delisting, we treat all delisting as being at risk until three years after the IPO, just like the firms that remain publicly traded.

As explanatory variables we include most of the variables from the static model: market capitalization in US dollars, initial return and file update in percent, underwriter rank, firm age in years, and hitech, big-5 auditor, secondary-shares, Nasdaq-listing, venture-capital, and offer-year dummies. We also include the daily average standard deviation (in percent) and turnover (in percent of shares outstanding) of matched firms during the year prior to the IPO.

In addition, we now include several time-varying covariates.²⁶ These are lagged weekly observations, so that for example the fifth week after the IPO has only observations up to (and including) the fourth week as explanatory variables. Specifically, we use the following measures:

- the holding-period return of the IPO firm during the last four weeks, or, alternatively, the holding-period return from the first trading day,
- the holding-period return of the value-weighted CRSP index during the last four weeks, or, alternatively, the holding-period return from the first trading-day of the IPO,
- the daily average standard deviation of the IPO raw returns over the last four weeks,
- the daily average standard deviation of market returns over the last four weeks,
- the daily average turnover for IPO-firm shares over the last four weeks, measured as traded shares over shares outstanding,
- a delisting indicator, assuming a value of one if the IPO firm was delisted during the previous week, zero otherwise.

Once a firm has delisted, we keep recording market and control-firm measures, but set the own return, standard deviation, and turnover to zero. All time varying variables are measured in percent. We repeated all regressions using the respective

²⁶ We also estimate the duration model without time-varying covariates. Since the results are very similar to the results including the time-varying variables, we do not report these estimates to save space.

control-firm variables instead of market variables. We do not report these results because they are qualitatively identical.

Results are presented in table 4.9. Panel A shows estimates for the sample excluding ECL lawsuits. In addition to parameter estimates and p values, we report hazard ratios (the exponential of the coefficient estimate). The hazard ratio can be interpreted as the relative increase in the likelihood of a lawsuit, given a one-unit increase in the covariate. For example, litigation of a Nasdaq IPO is only 39.4% as likely as litigation of an exchange-listed firm. This result is significant at the one-percent level. Litigation is more likely when the price update is larger and when secondary shares are issued. New issues where previous owners (which very likely include firm insiders) sell shares in the IPO seem to be more at risk for litigation than issues where no secondary shares are sold. This is consistent with the signaling of firm quality through the retention of shares by parties close to the firm. IPOs are more often subject to litigation when the underwriter is more reputable, consistent with the hypothesis that class actions target defendants that are able to pay larger settlements. However, this relation is only marginally significant and is questionable in light of the insignificant coefficient on market capitalization. If class actions target firms according to their ability to pay settlements, we should see a relation between firm size and litigation risk. Overall, these findings are not dramatically different from the simultaneous-equations results. One exception is that price update now has a positive impact on litigation risk. It appears that issues that are priced more aggressively are sued more often thereafter. Also note that the amount of underpricing does not appear to be related to litigation risk.

Table 4.9

Duration Analysis: Time to Filing of an IPO-Related Securities-Fraud Lawsuit

The table shows coefficient estimates for duration analysis of the time from the first trading day of an IPO until the filing of an IPO-related lawsuit, measured in weeks. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. The sample consists of IPOs from 01/01/1996 to 12/31/2001. Market capitalization are shares outstanding after the IPO times the closing price on the first trading day. Initial return is measured from the offer price to the closing price on the first trading day, price update is the percentage change of the midpoint of the filing range with respect to the offer price. Secondary shares is a dummy variable with a value of 1 if secondary shares have been sold in the IPO, 0 otherwise. Underwriter ranks are Carter-Manaster (1990) ranks. Age is the age of the firm from its inception. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. The big-5 auditor dummy is equal to 1 if the IPO auditor belongs to one of the big-5 auditors. The Nasdaq dummy is equal to 1 if the IPO is listed on Nasdaq, 0 otherwise. Venture capital is a dummy variable with a value of 1 if the IPO is backed by venture capital, 0 otherwise. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, communications services, and software. The hitech dummy equals 1 if the IPO is belonging to a hitech industry, 0 otherwise. We include dummy variables for IPO years 1997, 1998, 1999, 2000, and 2001.

***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. IPO return, cum 20 days, and IPO firm return, cum, from IPO are the cumulative return of the IPO firm during the last four weeks, measured as holding-period return, and the cumulative return of the IPO firm from the first trading day until the previous week, measured as holding-period return. Market return, cum 20 days, and Market returns, cum, from IPO are the cumulative market return during the last four weeks, measured as holding-period return of the value-weighted CRSP index, and the cumulative market return from the first trading-day of the IPO until the previous week, measured as holding-period return of the value-weighted CRSP index. IPO return std. dev., 20 days, is the daily average standard deviation of the IPO raw returns over the last four weeks. Market return std. dev., 20 days, is the daily average standard deviation of market returns over the last four weeks. IPO firm turnover, average 20 days, is the daily average turnover for IPO-firm shares over the last four weeks, measured as traded shares over shares outstanding. Delisting indicator assumes a value of one if the IPO firm was delisted during the previous week, zero otherwise.

<i>Panel A: no ECL lawsuits</i>						
	Model 1			Model 2		
	Coefficient estimate	p-value	hazard ratio	Coefficient estimate	p-value	hazard ratio
Underwriter rank	0.08	0.26	8.7%	0.15 *	0.05	16.1%
Initial return	0.00	0.25	0.3%	0.00	0.44	0.2%
Dummy: hitech	0.29	0.32	34.3%	0.32	0.30	37.9%
Age	-0.01	0.27	-0.8%	0.00	0.72	-0.3%
Dummy: big-5 auditor	-0.03	0.93	-3.2%	-0.04	0.91	-3.8%
Dummy: Nasdaq	-0.93 ***	0.01	-60.6%	-1.11 ***	0.00	-66.9%
Dummy: venture-capital backing	0.12	0.67	12.8%	-0.01	0.98	-0.8%
Market capitalization	0.00	0.93	0.0%	0.00	0.61	0.0%
Price update	0.01 **	0.02	0.9%	0.01 *	0.08	0.9%
Dummy: secondary shares	0.59 **	0.02	81.0%	0.59 **	0.02	80.0%
Standard deviation matched firms	-0.05	0.72	-4.8%	-0.03	0.82	-3.2%
Turnover matched firms	0.22	0.59	24.4%	0.20	0.64	22.5%
IPO return, cum 20 days	-0.03 ***	0.00	-2.9%			
IPO firm return, cum from IPO				-0.05 ***	0.00	-4.9%
Market return, cum 20 days	0.06 **	0.02	6.4%			
Market returns, cum from IPO				0.01	0.51	0.7%
IPO return std. dev., 20 days	0.11 ***	0.00	11.1%	0.07 ***	0.00	6.9%
Market return std. dev., 20 days	-0.05	0.88	-4.6%	-0.17	0.55	-15.8%
IPO firm turnover, average 20 days	-0.07	0.54	-6.9%	0.00	0.94	0.1%
Delisting indicator	-0.22	0.75	-19.7%	0.04	0.94	4.5%
Dummy: 1997	0.03	0.93	3.4%	0.06	0.87	6.1%
Dummy: 1998	0.39	0.30	47.0%	0.23	0.57	26.2%
Dummy: 1999	-0.20	0.67	-18.2%	-0.65	0.21	-47.7%
Dummy: 2000	-0.01	0.99	-0.6%	-1.06 *	0.09	-65.3%
Dummy: 2001	1.39 *	0.08	301.5%	0.71	0.39	103.7%
Number of observations	2029.00			2029.00		
-2(log likelihood)	948.49 ***			868.22 ***		

Panel B: all lawsuits

	Model 1			Model 2		
	Coefficient estimate	p value	hazard ratio	Coefficient estimate	p value	hazard ratio
Underwriter rank	0.06 *	0.07	6.4%	0.08 **	0.02	8.6%
Initial return	0.00 ***	0.00	0.4%	0.00 ***	0.00	0.3%
Dummy: hitech	0.23 *	0.06	26.3%	0.25 **	0.05	28.8%
Age	-0.02 **	0.01	-1.7%	-0.01	0.10	-1.1%
Dummy: big-5 auditor	0.34	0.26	40.7%	0.28	0.35	32.7%
Dummy: Nasdaq	-0.26	0.34	-22.8%	-0.42	0.12	-34.4%
Dummy: venture-capital backing	0.38 ***	0.01	46.5%	0.41 ***	0.01	50.8%
Market capitalization	0.00	0.33	0.0%	0.00	0.13	0.0%
Price update	0.00 ***	0.01	0.4%	0.00 ***	0.01	0.5%
Dummy: secondary shares	0.09	0.59	9.3%	0.16	0.33	17.3%
Standard deviation matched firms	0.01	0.80	1.2%	-0.01	0.84	-0.8%
Turnover matched firms	0.30 **	0.04	35.4%	0.23	0.13	25.3%
IPO return, cum 20 days	-0.01 ***	0.00	-0.7%			
IPO firm return, cum from IPO				-0.02 ***	0.00	-1.6%
Market return, cum 20 days	0.08 ***	0.00	8.3%			
Market returns, cum from IPO				-0.06 ***	0.00	-5.7%
IPO return std. dev., 20 days	0.05 ***	0.00	5.0%	0.02	0.16	1.9%
Market return std. dev., 20 days	-1.31 ***	0.00	-73.0%	-1.50 ***	0.00	-77.8%
IPO firm turnover, average 20 days	-0.07	0.29	-6.9%	0.00	0.51	0.3%
Delisting indicator	-1.04 ***	0.00	-64.5%	-1.10 ***	0.00	-66.8%
Dummy: 1997	0.39	0.25	48.1%	0.12	0.73	13.0%
Dummy: 1998	1.15 ***	0.00	217.2%	-0.14	0.71	-12.6%
Dummy: 1999	2.76 ***	0.00	1482.7%	-0.51	0.14	-40.2%
Dummy: 2000	3.79 ***	0.00	4333.4%	-0.62	0.12	-46.1%
Dummy: 2001	4.36 ***	0.00	7700.5%	0.69	0.37	99.6%
Number of observations	2282.00			2282.00		
-2(log likelihood)	3409.21 ***			3186.85 ***		

Of the time-varying covariates, both the firm's return and daily standard deviation seem to have a significant impact on the risk of an IPO-related lawsuit. Consistent with evidence from the literature on general securities-fraud lawsuits, class actions seem to target firms that experience stock price declines and have more volatile returns. For example, the hazard ratio of 0.971 implies that a 100 basis point increase in 20-day returns reduces litigation risk by 2.9 percent. In addition, stock performance in relation to overall market performance appears to play a role in triggering IPO-related lawsuits: the higher the returns on the market portfolio, the more likely it is that the IPO will be sued. This illustrates the importance of information - both company specific and unrelated to the company - that arrives after the IPO for the occurrence of IPO-related lawsuits. Furthermore, the significant impact of time-varying variables that are not observed at the time of the IPO casts some doubt on the ability of issuers and underwriters to insure themselves adequately against IPO-related litigation by setting the offer price. At the time the firm is going public, even with inside information about the company, it is impossible to predict subsequent overall market performance.

Results for ECL lawsuits in panel B are generally similar except that more variables are significant. For example, hitech IPOs, IPOs that are backed by venture-capital backed, younger firms, and firms that are not delisted have a higher risk of litigation. Not surprisingly, as explained previously, lawsuit risk increases with underpricing. In addition to IPO returns, their standard deviation, and market return, the standard deviation of market returns during the last four weeks appears to have a significant impact on the incidence of an ECL lawsuit. The smaller the overall market

volatility, the more likely the firm is sued. Note that the higher the firm's own return volatility, the more likely it is that an ECL suit occurs.

To account for potential endogeneity problems between initial return and lawsuit risk, we estimate the same duration model but with an instrument in place of the initial return. We use the fitted values from an OLS regression of initial returns on all static exogenous variables we use in the duration models, and add pre-offering market returns as an identifying variable. It is measured as the buy-and-hold return on the CRSP value-weighted index over the fifteen days before the IPO.

We report the results from the duration analysis with the underpricing instrument in table 4.10. While the results are generally similar to the results without accounting for endogeneity, except for price update, we find that the coefficient on the underpricing instrument is significantly positive, however marginally so.²⁷ For non-ECL suits, a 100 basis-point increase in underpricing implies a 15.5% increase in litigation risk. This result contrasts with the findings of Lawry and Shu (2002). Taken together with the simultaneous-equations results, our results suggest that at least for the time period from 1996 to 2001, there is no evidence of support for the lawsuit-avoidance hypothesis of

²⁷ Panel B contains estimates for the sample including all IPOs subject to an ECL lawsuit. For model 1 we had to use the Breslow approximation for the handling of tied data because the exact method was not available due to computation capacity. This results in less significant coefficient estimates.

Table 4.10

Duration Analysis With Endogenous Underpricing: Time to Filing of an IPO-Related
Securities-Fraud Lawsuit

The table shows coefficient estimates for duration analysis of the time from the first trading day of an IPO until the filing of an IPO-related lawsuit, measured in weeks. ECL lawsuits are alleging excessive commissions to underwriters in an IPO and laddering of the aftermarket price. The sample consists of IPOs from 01/01/1996 to 12/31/2001. Market capitalization are shares outstanding after the IPO times the closing price on the first trading day. The underpricing instrument consists of the fitted values from an OLS regression of initial return on all static exogenous variables in the duration model plus the 15-day pre-IPO market return. Initial return is measured from the offer price to the closing price on the first trading day. Price update is the percentage change of the midpoint of the filing range with respect to the offer price. Secondary shares is a dummy variable with a value of 1 if secondary shares have been sold in the IPO, 0 otherwise. Underwriter ranks are Carter-Manaster (1990) ranks. Age is the age of the firm from its inception. Prior standard deviation and turnover of matched firms is calculated over one year prior to the IPO, averaged over each IPO's size-and industry-matched firms. The big-5 auditors are Arthur Andersen, Ernst & Young, KPMG, Pricewaterhouse, and Deloitte & Touche. The big-5 auditor dummy is equal to 1 if the IPO auditor belongs to one of the big-5 auditors. The Nasdaq dummy is equal to 1 if the IPO is listed on Nasdaq, 0 otherwise. Venture capital is a dummy variable with a value of 1 if the IPO is backed by venture capital, 0 otherwise. Hitech IPOs belong to one of the following industries, similarly to Ljungqvist and Wilhelm (2001): computer hardware, communications

equipment, electronics, navigation equipment, measuring and controlling devices, communications services, and software. The hitech dummy equals 1 if the IPO is belonging to a hitech industry, 0 otherwise. We include dummy variables for IPO years 1997, 1998, 1999, 2000, and 2001. ***, **, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. IPO return, cum 20 days, and IPO firm return, cum, from IPO are the cumulative return of the IPO firm during the last four weeks, measured as holding-period return, and the cumulative return of the IPO firm from the first trading day until the previous week, measured as holding-period return. Market return, cum 20 days, and Market returns, cum, from IPO are the cumulative market return during the last four weeks, measured as holding-period return of the value-weighted CRSP index, and the cumulative market return from the first trading-day of the IPO until the previous week, measured as holding-period return of the value-weighted CRSP index. IPO return std. dev., 20 days, is the daily average standard deviation of the IPO raw returns over the last four weeks. Market return std. dev., 20 days, is the daily average standard deviation of market returns over the last four weeks. IPO firm turnover, average 20 days, is the daily average turnover for IPO-firm shares over the last four weeks, measured as traded shares over shares outstanding. Delisting indicator assumes a value of one if the IPO firm was delisted during the previous week, zero otherwise.

<i>Panel A: no ECL lawsuits</i>						
	Model 1			Model 2		
	Coefficient			Coefficient		
	estimate	p-value	hazard ratio	estimate	p-value	hazard ratio
Underwriter rank	0.15 *	0.08	15.9%	0.20 **	0.02	22.5%
Underpricing instrument	0.14 *	0.06	15.5%	0.13 *	0.10	14.0%
Dummy: hitech	-0.57	0.31	-43.5%	-0.50	0.40	-39.2%
Age	0.00	0.99	0.0%	0.01	0.56	0.5%
Dummy: big-5 auditor	-0.01	0.97	-1.3%	0.00	1.00	0.0%
Dummy: Nasdaq	-1.83 ***	0.00	-84.0%	-1.98 ***	0.00	-86.2%
Dummy: venture-capital backing	-0.47	0.28	-37.6%	-0.55	0.21	-42.0%
Market capitalization	0.00	0.24	0.0%	0.00	0.47	0.0%
Price update	-0.09 *	0.10	-8.3%	-0.08	0.14	-7.5%
Dummy: secondary shares	0.99 ***	0.00	169.9%	0.96 ***	0.01	160.3%
Standard deviation matched firms	0.30	0.21	35.4%	0.29	0.23	34.3%
Turnover matched firms	-1.87	0.13	-84.6%	-1.72	0.17	-82.0%
IPO return, cum 20 days	-0.03 ***	0.00	-2.9%			
IPO firm return, cum from IPO				-0.05 ***	0.00	-5.0%
Market return, cum 20 days	0.06 **	0.02	6.4%			
Market returns, cum from IPO				0.01	0.41	0.8%
IPO return std. dev., 20 days	0.10 ***	0.00	10.7%	0.07 ***	0.00	6.8%
Market return std. dev., 20 days	-0.02	0.95	-2.0%	-0.15	0.61	-13.5%
IPO firm turnover, average 20 days	-0.05	0.68	-4.5%	0.00	0.95	0.1%
Delisting indicator	-0.18	0.80	-16.2%	0.05	0.94	5.1%
Dummy: 1997	-0.15	0.68	-14.1%	-0.07	0.85	-7.0%
Dummy: 1998	-0.17	0.73	-15.5%	-0.24	0.63	-21.3%
Dummy: 1999	-1.82 *	0.07	-83.9%	-2.14 **	0.05	-88.2%
Dummy: 2000	-1.27	0.15	-71.9%	-2.23 **	0.02	-89.2%
Dummy: 2001	1.28	0.11	258.6%	0.57	0.50	76.0%
Number of observations	2029			2029		
-2(log likelihood)	946.22 ***			865.98 ***		

<i>Panel B: all lawsuits</i>						
	Model 1			Model 2		
	Coefficient			Coefficient		
	estimate	p value	hazard ratio	estimate	p value	hazard ratio
Underwriter rank	0.00	0.87	0.2%	0.11 ***	0.00	11.1%
Underpricing instrument	0.01	0.46	0.8%	-0.02	0.43	-1.6%
Dummy: hitech	-0.01	0.93	-1.0%	0.45 **	0.04	56.5%
Age	0.00	0.95	0.0%	-0.01 **	0.04	-1.4%
Dummy: big-5 auditor	0.02	0.73	2.4%	0.30	0.33	34.7%
Dummy: Nasdaq	-0.09	0.50	-8.2%	-0.21	0.54	-18.9%
Dummy: venture-capital backing	0.03	0.74	2.7%	0.57 ***	0.00	77.7%
Market capitalization	0.00	0.73	0.0%	0.00	0.12	0.0%
Price update	0.00	0.79	-0.3%	0.03	0.23	2.6%
Dummy: secondary shares	0.00	0.99	0.1%	0.00	0.98	0.5%
Standard deviation matched firms	0.02	0.57	1.8%	-0.04	0.45	-4.3%
Turnover matched firms	0.00	0.99	0.2%	0.67	0.13	94.8%
IPO return, cum 20 days	0.00	0.21	-0.1%			
IPO firm return, cum from IPO				-0.02 ***	0.00	-1.7%
Market return, cum 20 days	0.02 ***	0.00	1.7%			
Market returns, cum from IPO				-0.06 ***	0.00	-5.7%
IPO return std. dev., 20 days	0.01 *	0.05	1.3%	0.02	0.18	1.8%
Market return std. dev., 20 days	-0.30 ***	0.00	-26.2%	-1.50 ***	0.00	-77.6%
IPO firm turnover, average 20 days	0.00	0.88	-0.5%	0.00	0.41	0.3%
Delisting indicator	-0.02	0.73	-2.4%	-1.17 ***	0.00	-69.0%
Dummy: 1997	0.13 *	0.06	14.3%	0.22	0.53	24.8%
Dummy: 1998	0.06	0.55	6.4%	0.10	0.80	10.1%
Dummy: 1999	2.40 ***	0.00	1001.6%	0.03	0.97	2.7%
Dummy: 2000	3.60 ***	0.00	3549.2%	-0.37	0.42	-31.2%
Dummy: 2001	3.63 ***	0.00	3658.2%	0.66	0.40	93.6%
Number of observations	2282			2282		
-2(log likelihood)	23273.61 ***			3207.53 ***		

underpricing as proposed by Tinic (1988), consistent with the results of Drake and Vetsuypens (1993).

4.6 Conclusions

In this study, we examine the determinants of IPO-related securities-fraud class actions. On average, 3 to 5 percent of firms that went public are sued for a material untruth or omissions in the IPO prospectus or registration statements. Shareholder litigation is associated with large expenses for the firm, both direct costs in the form of settlements as well as indirect costs including legal expenses and management resources.

While there are a number of studies examining determinants of general securities-fraud lawsuits that allege violation of Rule 10b-5 of the Securities Exchange Act of 1934, relatively little is known about the factors that predict IPO-specific litigation. In contrast to previous studies that model litigation risk in a probit framework, we employ duration analysis that explicitly takes into account information that arrived subsequent to the IPO and the timing of IPO-related lawsuits. We are also able to use more recent data including IPOs that occurred in 2001 since duration analysis easily incorporates censored observations.

Our results suggest that time-varying variables - firm specific and related to overall market conditions - are important predictors of IPO-related lawsuits. The more the IPO firm's return declines and the higher overall market returns the more likely it is that a lawsuit occurs. In addition, the firm's return volatility has a significant positive effect on the filing of a lawsuit. This suggests that lawsuits are not merely filed after the stock price declines but after the stock price declines in relation to the overall market.

Of the variables known at the time of the IPO, Nasdaq listing, the sale of secondary shares and price update, which may be a proxy for aggressiveness of pricing, and the reputation of the underwriter appear to predict subsequent lawsuits. There is some evidence for more aggressive pricing (higher file update) leading more likely to the filing of a lawsuit. When previous owners, and thus, potentially, firm insiders, sell shares in the offer, it is also more likely that the IPO will be sued subsequently. This is consistent with insiders / owners signaling firm quality with the retention of shares. It is also consistent with previous owners attempting not to disclose important information in prospectus and registration statements when they intend to cash out to obtain a high price for their shares. The negative effect of Nasdaq listing on lawsuit occurrence is somewhat puzzling since we would expect that riskier issues are harder to price. However, issuers listing on Nasdaq may be particularly careful in their registration filings and prospectus to avoid litigation. IPO-related litigation seems to be more likely when the offer is issued by a more reputable underwriter, consistent with class actions targeting defendants potentially able to pay large settlements.

When we include lawsuits that allege excessive commissions to underwriters and laddering of the aftermarket price, we find in addition that hitech firms, younger firms, and IPOs with venture-capital backing are prone to be sued subsequently. However, we believe that these lawsuits are not directly comparable to the typical IPO-related class action because they were clustered in 2001, had a very specific and unusual set of allegations and were an aftermath of the "dot-com bubble".

In general, we find that the factors that have an impact on the filing of an IPO-related lawsuit are somewhat different than those identified by previous studies. We

believe this is due to the different time period covered by our data. Predictors of IPO-related securities-fraud litigation may not be constant over time, making it more difficult for issuers and their underwriters to avoid lawsuits by other means than due diligence and caution in prospectus and registration statements. Note that the importance of stock-market variables, in particular the overall market performance, for subsequent lawsuit filings appears to question the merits of IPO-related class actions. We are cautious, however, to interpret these results as supporting strike-suit theories of securities-fraud litigation since we do not observe the correlation between true fraud or neglect in prospectus and registration statements and these variables.

Utilizing different and more recent data than previous studies, we also provide an additional test of Tinic's (1988) model of IPO underpricing. It hypothesizes that issuers and their underwriters underprice new issues to avoid subsequent litigation. Evidence to date has been scarce and inconclusive. Our duration analysis, even when accounting for a potential endogeneity problem between underpricing and lawsuit occurrence, and re-estimation of Lowry and Shu's (2002) simultaneous equations regressions with new data, fail to deliver any evidence in favor of the lawsuit-avoidance theory of underpricing. On the contrary, when we adjust for simultaneity, IPOs with larger initial return appear significantly more likely to be subject to an IPO-related lawsuit, however marginally so.

In addition, we believe that the importance of information that becomes available after the IPO for the filing of an IPO-related lawsuit poses a major complication for assessing the true lawsuit risk by issuers and their underwriters, thus questioning the feasibility of using underpricing as an insurance against lawsuits.

CHAPTER 5

CONCLUSIONS

This dissertation investigates two different aspects of initial public offerings of equity securities: whether institutions obtain more valuable initial allocations, and the determinants of IPO-related lawsuits. More specifically, in Chapter 3 we investigate the aftermarket performance of IPOs and relate it to the allocations of shares received by institutional and retail investors. For this purpose, we employ ordinary least squares and Fama-French (1993) time-series regressions and use a unique database of initial allocations in 441 IPOs issued between May 1997 and June 2001. Our empirical evidence shows that institutional relative to retail allocations, and also institutional allocations as a percentage of total shares offered, are significantly positively related to six-months, one, two, and three-year risk-adjusted holding period returns. If allocations are in proportion to the quantity of IPO shares applied for, this suggests that institutional investors as a group indeed appear to be able to identify high-quality IPOs. We are also able to confirm previous empirical evidence showing that institutional investors receive significantly more allocations in IPOs with positive first-day returns than retail investors. Due to data availability restrictions, direct evidence on this issue is very scarce. Our results are consistent with models of bookbuilding where informed investors truthfully reveal their information to the underwriter to receive favorable allocations of IPO shares. For the first time, we show that institutions receive significantly more shares relative to retail investors in issues with both superior initial and long-term performance.

Furthermore, we combine the longer-term perspective with information on reported flipping to assess whether informed investors reveal all relevant information to underwriters at the time of the IPO. To investigate this question, we examine how flipping is related to subsequent returns. We find a rarely significant, but non-negative relationship between institutional or retail flipping and various measures of holding period excess returns. These results support the view that informed investors reveal all private information to underwriters, who use it to make discretionary allocations. This is contrary to the evidence in previous studies that use approximative measures for flipping and find a negative relation to performance.

Chapter 4 examines variables that predict the filing of an IPO-related securities-fraud class-action lawsuit. We employ duration analysis to identify variables known at the time of the IPO and variables that change thereafter that are related to the risk of a lawsuit. For this purpose, we believe that duration analysis is more suitable than probit or logit regression, used previously to examine the determinants of securities-fraud lawsuits. Information generated between the IPO and the lawsuit (or until three years after the IPO, if no lawsuit occurs) is likely to contain important information about a firm's litigation risk. In contrast to logit or probit models, survival analysis takes into account the relative timing of IPO-related lawsuits and allows explanatory variables to vary over time.

Our results suggest that time-varying variables - firm specific and related to overall market conditions - are important predictors of IPO-related lawsuits. For example, the more the IPO firm's return declines and the higher overall market returns are the more likely it is that a lawsuit occurs. Of the variables known at the time of the IPO, Nasdaq

listing, the sale of secondary shares, the price update, and the reputation of the underwriter appear to predict subsequent lawsuits.

Utilizing different and more recent data than previous studies, we also provide an additional test of Tinic's (1988) model of IPO underpricing. Evidence to date has been scarce and inconclusive. Our duration analysis, even when accounting for a potential endogeneity problem between underpricing and lawsuit occurrence, and re-estimation of Lowry and Shu's (2002) simultaneous equations regressions with new data, fail to deliver any evidence in favor of the lawsuit-avoidance theory of underpricing. In addition, we believe that the importance of information that becomes available after the IPO for the filing of an IPO-related lawsuit poses a major complication for assessing the true lawsuit risk by issuers and their underwriters, thus questioning the feasibility of using underpricing as an insurance against lawsuits.

REFERENCES

- Affleck-Graves, John, Shantaram Hegde, and Robert E. Miller, 1996, Conditional Price Trends in the Aftermarket for Initial Public Offerings, *Financial Management* 25, 25-40.
- Aggarwal, Reena, 2000, Stabilization Activities by Underwriters after Initial Public Offerings, *Journal of Finance* 55, 1075-1103.
- Aggarwal, Reena, 2002, Allocation of Initial Public Offerings and Flipping Activity, *Journal of Financial Economics*, forthcoming.
- Aggarwal, Reena, and Pat Conroy, 2000, Price Discovery in Initial Public Offerings and the Role of the Lead Underwriter, *Journal of Finance*, 2903-2922.
- Aggarwal, Reena, N. Prabhala, and Manju Puri, 2002, Institutional Allocation in Initial Public Offerings: Empirical Evidence, *Journal of Finance* 57, 1421-1442.
- Alexander, Janet C., 1991, Do the Merits Matter? A Study of Settlements in Securities Class Actions, *Stanford Law Review* 43, 498-598.
- Allen, Franklin, and Gerald R. Faulhaber, 1989, Signaling by Underpricing in the IPO Market, *Journal of Financial Economics* 23, 303-324.
- Allison, Paul D., 1995, Survival Analysis Using the SAS System, SAS Institute, Cary, NC.
- Bajaj, Mukesh, Sumon C. Mazumdar, and Atulya Sarin, 2000, Securities Class Action Settlements: An Empirical Analysis, Working Paper, University of California-Berkeley.

- Barber, Brad M., and John D. Lyon, 1997, Detecting Long-Run Abnormal Stock Returns, *Journal of Financial Economics* 43, 341-372.
- Baron, David P., 1982, A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues, *Journal of Finance* 37, 955-976.
- Baron, David P., and Bengt Holmstrom, 1980, The Investment Banking Contract for New Issues Under Asymmetric Information: Delegation and the Incentive Problem, *Journal of Finance* 35, 1115-1138.
- Barry, Christopher B., and Robert H. Jennings, 1993, The Opening Price Performance of Initial Public Offerings of Common Stock, *Financial Management* 22, 54-63.
- Barry, Christopher B., Chris J. Muscarella, John W. Peavy, and Michael R. Vetsuypens, 1990, The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-Public Process, *Journal of Financial Economics* 27, 447-472.
- Beatty, Randolph P., 1989, Auditor Reputation and the Pricing of Initial Public Offerings, *Accounting Review* 64, 693-709.
- Beatty, Randolph P., and Jay R. Ritter, 1986, Investment Banking, Reputation, and the Underpricing of Initial Public Offerings, *Journal of Financial Economics* 15, 213-232.
- Beatty, Randolph P., and Ivo Welch, 1996, Legal Liability and Issuer Expenses in Initial Public Offerings, *Journal of Law and Economics* 39, 545-603.
- Beck, James D., and Sanjai Bhagat, 1997, Shareholder Litigation: Share Price Movements, News Releases, and Settlement Amounts, *Managerial and Decision Economics* 18, 563-586.

- Benveniste, Lawrence M, and Walid Y. Busaba, 1997, Bookbuilding vs. Fixed Price: An Analysis of Competing Strategies for Marketing IPOs, *Journal of Financial and Quantitative Analysis* 32, 383-403.
- Benveniste, Lawrence M. and P.A. Spindt, 1989, How Investment Bankers Determine the Offer Price and Allocation of Initial Public Offerings, *Journal of Financial Economics* 24, 343-362.
- Benveniste, Lawrence M., and William J. Wilhelm, 1990, A Comparative Analysis of IPO Proceeds under Alternative Regulatory Environments, *Journal of Financial Economics* 28, 173-208.
- Benveniste, Lawrence, Walid Busaba, and William Wilhelm, 1996, Price Stabilization as a Bonding Mechanism in New Equity Issues, *Journal of Financial Economics* 42, 223-255.
- Bhagat, Sanjai, James A. Brickley, and Jeffrey L. Coles, 1994, The Costs of Inefficient Bargaining and Financial Distress: Evidence from Corporate Lawsuits, *Journal of Financial Economics* 35, 221-248.
- Bhagat, Sanjai, John M. Bizjak, and Jeffrey L. Coles, 1998, The Shareholder Wealth Implications of Corporate Lawsuits, *Financial Management* 27, 5-27.
- Bizjak, John M., and Jeffrey L. Coles, 1995, The Effect of Private Antitrust Litigation on the Stock-Market Valuation of the Firm, *American Economic Review* 85, 436-461.
- Boehmer, Ekkehart, and Raymond P.H. Fishe, 2001, Do Underwriters Encourage Stock Flipping? A New Explanation for the Underpricing of IPOs, Working Paper, University of Miami.

- Bohn, James, and Stephen Choi, 1996, Fraud in the New-Issues Market: Empirical Evidence on Securities Class Actions, *University of Pennsylvania Law Review* 144, 903-982.
- Bradley, Daniel, Bradford Jordan, and Jay R. Ritter, 2002, The Quiet Period Goes Out With a Bang, *Journal of Finance*, forthcoming.
- Brav, Alon, 2000, Inference in Long-Horizon Event Studies: A Bayesian Approach with Applications to Initial Public Offerings, *Journal of Finance* 55, 1979-2016.
- Brav, Alon, and Paul A. Gompers, 1997, Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-Backed Companies, *Journal of Finance* 52, 1791-8121.
- Brav, Alon, Christopher Geczy, and Paul A. Gompers, 2000, Is the Abnormal Return Following Equity Issuances Anomalous?, *Journal of Financial Economics* 56, 209-249.
- Brennan, Michael, and Julian Franks, 1997, Underpricing, Ownership, and Control in Initial Public Offerings of Equity Securities in the U.K, *Journal of Financial Economics* 45, 391-413.
- Carter, Richard, and Steven Manaster, 1990, Initial Public Offerings and Underwriter Reputation, *Journal of Finance* 45, 1045-1067.
- Carter, Richard B., Frederick H. Dark, and Alan K. Singh, 1998, Underwriter Reputation, Initial Returns, and the Long-Run Performance of IPO stocks, *Journal of Finance* 53, 285-311.
- Chen, Hsuan-Chi, and Jay R. Ritter, 2000, The Seven Percent Solution, *Journal of Finance* 55, 1105-1131.

- Cornelli, Francesca and David Goldreich, 2001, Bookbuilding and Strategic Allocation, *Journal of Finance* 56, 2337-2369.
- Cox, D., 1972, Regression Models and Life Tables, *Journal of the Royal Statistical Society* 34, 187-220.
- DeLong, Dave M., Georges H. Guirguis, and Ying C. So, 1994, Efficient Computation of Subset Selection Probabilities with Application to Cox Regression, *Biometrika* 81, 607-611.
- Doukas, John A., and Halit Gonenc, 2001, Long-Term Performance of New Equity Issuers, Venture Capital, and Reputation of Investment Bankers, Working Paper, New York University.
- Drake, Philip D., and Michael R. Vetsuypens, 1993, IPO Underpricing and Insurance against Legal Liability, *Financial Management* 22, 64-73.
- Ellis, Katrina, Roni Michaely, and Maureen O'Hara, 2000, When the Underwriter is the Market Maker: An Examination of Trading in the IPO Aftermarket, *Journal of Finance* 55, 1039-1074.
- Ellis, K Katrina, Roni Michaely, and Maureen O'Hara, 2002, The Making of a Dealer Market: From Entry to Equilibrium in the Trading of Nasdaq Stocks, *Journal of Finance* 57, forthcoming.
- Fama, Eugene F., 1998, Market Efficiency, Long-Term Returns, and Behavioral Finance, *Journal of Financial Economics* 49, 283-306.
- Fama, Eugene F., and Kenneth R. French, 1993, Common Risk Factors in the Returns on Stocks and Bonds, *Journal of Financial Economics* 33, 3-56.

- Field, Laura C., 1995, Is Institutional Investment in Initial Public Offerings Related to Long-Run Performance of these Firms?, Working Paper, Pennsylvania State University.
- Francis, Jennifer, Donna Philbrick, and Katherine Schipper, 1994a, Shareholder Litigation and Corporate Disclosures, *Journal of Accounting Research* 32, 137-164.
- Francis, Jennifer, Donna Philbrick, and Katherine Schipper, 1994b, Determinants and Outcomes in Class Action Securities Litigation, Working paper, University of Chicago.
- Francis, Jennifer, Donna Philbrick, and Katherine Schipper, 1998, Earnings Surprises and Litigation Risk, *Journal of Financial Statement Analysis* 3, 15-27.
- Griffin, Paul A., and Joseph A. Grundfest, 2000, Economic Properties of Companies Subject to Securities Fraud Litigation, Monograph, Securities Class Action Clearinghouse.
- Griffin, Paul A., Joseph A. Grundfest, and Michael A. Perino, 2000, Stock Price Response to News of Securities Fraud Litigation: Market Efficiency and the Slow Diffusion of Costly Information, Working Paper, Stanford University.
- Grinblatt, Mark, and Chuan Yang Hwang, 1989, Signalling and the Pricing of New Issues, *Journal of Finance* 44, 393-420.
- Grundfest, Joseph A., and Michael A. Perino, 1997, Securities Litigation Reform: The First Year's Experience, Working Paper, Stanford University.
- Hanley, Kathleen Weiss, 1993, The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon, *Journal of Financial Economics* 34, 231-250.

- Hanley, Kathleen Weiss and William J. Wilhelm, Jr., 1995, Evidence on the Strategic Allocation of Initial Public Offerings, *Journal of Financial Economics* 37, 239-257.
- Hanley, Kathleen Weiss, A. Arun Kumar, and Paul J. Seguin, 1993, Price Stabilization in the Market for New Issues, *Journal of Financial Economics* 34, 177-198.
- Hansen, Robert, 2001, Do Investment Banks Compete in IPOs? The Advent of the "7% plus" Contract, *Journal of Financial Economics* 59, 313-346.
- Hayn, Carla, 1995, The Information Content of Losses, *Journal of Accounting and Economics* 20, 125-153.
- Hegde, Shantaram P., and Robert E. Miller, 1989, Market-Making in Initial Public Offerings of Common Stocks: An Empirical Analysis, *Journal of Financial and Quantitative Analysis* 24, 75-90.
- Hensler, Douglas A., 1995, Litigation Costs and the Underpricing of Initial Public Offerings, *Managerial Decision Economics* 16, 111-128.
- Houge, Todd, Tim Loughran, Gerry Suchanek, and Xuemin Yan, 1999, Divergence of Opinion in IPOs, Working Paper, University of Iowa.
- Hughes, Patricia J., and Anjan V. Thakor, 1992, Litigation Risk, Intermediation, and the Underpricing of Initial Public Offerings, *Review of Financial Studies* 5, 709-742.
- Ibbotson, Roger G., Jody L. Sindelar, and Jay R. Ritter, 1994, The Market's Problems With the Pricing of Initial Public Offerings, *Journal of Applied Corporate Finance* 7, 66-74.
- Jain, Bharat A., and Omesh Kini, 1994, The Post-Issue Operating Performance of IPO Firms, *The Journal of Finance* 49, 1699-1726.

- Jegadeesh, Narasimhan, Mark Weinstein, and Ivo Welch, 1993, An Empirical Investigation of IPO Returns and Subsequent Equity Offerings, *Journal of Financial Economics* 34, 153-175.
- Jenkinson, Tim, and Howard Jones, 2002, Bids and Allocations in IPO Bookbuilding, Working Paper, Oxford University.
- Johnson, Marilyn F., Ron Kasznik, and Karen K. Nelson, 2000, Shareholder Wealth Effects of the Private Securities Litigation Reform Act of 1995, *Review of Accounting Studies* 5.
- Jones, Christopher L., and Seth E. Weingram, 1996a, The Determinants of 10b-5 Litigation Risk, Working Paper, Stanford University.
- Jones, Christopher L., and Seth E. Weingram, 1996b, Why 10b-5 Litigation Risk is Higher for Technology and Financial Services Firms, Working Paper, Stanford University.
- Kalbfleisch, John D. and Ross L. Prentice, 1980, The Statistical Analysis of Failure Time Data, J. Wiley & Sons, New York.
- Kandel, Shmuel, Oded Sarig, and Avi Wohl, 1999, The Demand for Stocks: An Analysis of IPO Auctions, *Review of Financial Studies* 12, 227-247.
- Keloharju, Matti, 1993, The Winner's Curse, Legal Liability, and the Long-Run Price Performance of Initial Public Offerings in Finland, *Journal of Financial Economics* 34, 251-277.
- Keloharju, Matti, and Sami Torstila, 2002, The Distribution of Information Among Institutional and Retail Investors in IPOs, *European Financial Management Journal*, forthcoming.

- Kim, Moonchul, and Jay R. Ritter, Jay, 1999, Valuing IPOs, *Journal of Financial Economics* 53, 409-437.
- Klement, Alon, 2001, Private Monitoring in Common Fund Class Actions, Working Paper, Harvard University.
- Koh, Francis, and Terry Walter, 1989, A Direct Test of Rock's Model of the Pricing of Unseasoned Issues, *Journal of Financial Economics* 23, 251-272.
- Kothari, S.P., and Jerold B. Warner, 1997, Measuring Long-Horizon Security Price Performance, *Journal of Financial Economics* 43, 301-339.
- Krigman, Laurie, Wayne H. Shaw, and Kent L. Womack, 1999, The Persistence of IPO Mispricing and the Predictive Power of Flipping, *Journal of Finance* 54, 1015-1044.
- Krigman, Laurie, Wayne H. Shaw, and Kent Womack, 1999, Why Do Firms Switch Underwriters?, *Journal of Financial Economics* 60, 245-284.
- Lee, Philip J., and Terry S. Walter, 1996a, Australian IPO Pricing in the Short and Long Run, *Journal of Banking and Finance* 20, 1189-1210.
- Lee, Philip J., and Terry S. Walter, 1996b, Expected and Realized Returns for Singaporean IPOs: Initial and Long-Run Analysis, *Pacific-Basin Finance Journal* 4, 153-180.
- Lee, Philip J., Stephen L. Taylor, and Terry S. Walter, 1999, IPO Underpricing Explanations: Implications from Investor Application and Allocation Schedules, *Journal of Financial and Quantitative Analysis* 34, 425-444.

- Levine, David M., and Adam C. Pritchard, 1998, The Securities Litigation Uniform Standards Act of 1998: The Sun Sets on California's Blue Sky Laws, *The Business Lawyer* 54, 1-54.
- Levis, Mario, 1993, The Long-Run Performance of Initial Public Offerings: The UK Experience 1980-1988, *Financial Management* 22, 28-41.
- Linck, J.S., M. Hertzel, M. Lemmon, and L. Rees, 2002, Long-Run Performance Following Private Placements of Equity, *Journal of Finance* , forthcoming.
- Ling, David, and Michael Ryngaert, 1997, Valuation Uncertainty, Institutional Involvement, and the Underpricing of IPOs: The Case of REITs, *Journal of Financial Economics* 43, 433-456.
- Ljungqvist, Alexander P., and William J. Wilhelm, Jr., 2001, IPO Pricing in the Dot-com Bubble, Working paper, New York University.
- Ljungqvist, Alexander, and William J. Wilhelm, 2002, IPO Allocations: Discriminatory or Discretionary?, *Journal of Financial Economics* 65, 167-201.
- Logue, Dennis E., Richard J. Rogalski, James K. Seward, and Lynn Foster-Johnson, 2002, What's Special about the Role of Underwriter Reputation and Market Activities in IPOs?, *Journal of Business* 75.
- Loughran, Tim, and Jay R. Ritter, 1995, The New Issues Puzzle, *Journal of Finance* 50, 23-51.
- Loughran, Tim, and Jay R. Ritter, 2000, Uniformly Least Powerful Tests of Market Efficiency, *Journal of Financial Economics* 55, 361-389.
- Loughran, Tim, and Jay R. Ritter, 2001, Why Has IPO Underpricing Increased over Time?, Working paper, University of Florida.

- Loughran, Tim, and Jay R. Ritter, 2002, Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?, *Review of Financial Studies* 15, 413-444.
- Loughran, Tim, Jay R. Ritter, and Kristian Rydqvist, 1994, Initial Public Offerings: International Insights, *Pacific-Basin Finance Journal* 2, 165-199.
- Lowry, Michelle, and G. William Schwert, 2002, Is the IPO Pricing Process Efficient?, Working Paper, University of Rochester.
- Lowry, Michelle, and Susan Shu, 2002, Litigation Risk and IPO Underpricing, *Journal of Financial Economics* 65, 309-335.
- Lyon, John D., Brad M. Barber, and Chih-Ling Tsai, 1999, Improved Methods for Tests of Long-Run Abnormal Stock Returns, *Journal of Finance* 54, 165-201.
- Mauer, David C., and Lemma W. Senbet, 1992, The Effect of the Secondary Market on the Pricing of Initial Public Offerings: Theory and Evidence, *Journal of Financial and Quantitative Analysis* 27, 55-80.
- Meggison, William L., and Kathleen A. Weiss, 1991, Venture Capitalist Certification in Initial Public Offerings, *Journal of Finance* 46, 879-904.
- Michaely, Roni, and Wayne H. Shaw, 1994, The Pricing of Initial Public Offerings: Tests of Adverse-Selection and Signaling Theories, *Review of Financial Studies* 7, 279-319.
- Michaely, Roni, and Wayne H. Shaw, 1998, Underwriter Choice, Institutional Holdings, and Future IPO Performance, *Advances in Quantitative Analysis of Finance and Accounting* 6, 137-150.
- Michaely, Roni, and Kent Womack, 1999, Conflict of Interest and the Credibility of Underwriter Analyst Recommendations, *Review of Financial Studies* 12, 653-686.

- Mikkelson, Wayne, Megan Partch, and Kshitij Shaw, 1997, Ownership and Operating Decisions of Companies that Go Public, *Journal of Financial Economics* 44, 281-307.
- Miller, Edward M., 1977, Risk, Uncertainty, and Divergence of Opinion, *Journal of Finance* 32, 1151-1168.
- Mitchell, Mark L., and Erik Stafford, 2000, Managerial Decisions and Long-Term Stock Price Performance, *Journal of Business* 73, 287-329.
- Muscarella, Chris J., and Michael R. Vetsuypens, 1989a, The Underpricing of 'Second' Initial Public Offerings, *Journal of Financial Research* 12, 183-192.
- Muscarella, Chris J., and Michael R. Vetsuypens, 1989b, A Simple Test of Baron's Model of IPO Underpricing, *Journal of Financial Economics* 24, 125-136.
- Niehaus, Greg, 1999, Insider Trading, Equity Issues, and CEO Turnover in Firms Subject to Securities Class Action, *Financial Management* 28.
- Pagano, Marco, Fabio Panetta, and Luigi Zingales, 1998, Why Do Companies Go Public? An Empirical Analysis, *Journal of Finance* 53, 27-64.
- Peavy, III, John W., 1990, Returns on Initial Public Offerings of Closed-End Funds, *Review of Financial Studies* 3, 695-709.
- Perino, Michael A., 2002, Did the Private Securities Litigation Reform Act Work?, Working Paper, Columbia University.
- Rajan, Raghuram, and Henri Servaes, 1997, Analyst Following of Initial Public Offerings, *Journal of Finance* 52, 507-529.
- Ritter, Jay R., 1984, The Hot Issue Market of 1980, *Journal of Business* 57, 215-240.

- Ritter, Jay R., 1987, The Costs of Going Public, *Journal of Financial Economics* 19, 269-281.
- Ritter, Jay R., 1991, The Long-Run Performance of Initial Public Offerings, *Journal of Finance* 46, 3-27.
- Ritter, Jay R., and Ivo Welch, 2002, A Review of IPO Activity, Pricing, and Allocations, *Journal of Finance* 57, 1795-1828.
- Rock, Kevin, 1986, Why New Issues are Underpriced, *Journal of Financial Economics* 15, 187-212.
- Ruud, Judith S., 1993, Underwriter Price Support and the IPO Underpricing Puzzle, *Journal of Financial Economics* 34, 135-151.
- Schultz, Paul H., and Mir A. Zaman, Mir A., 1994, Aftermarket Support and Underpricing of Initial Public Offerings, *Journal of Financial Economics* 35, 199-219.
- Sherman, Ann E., 2000, IPOs and Long-Term Relationships: An Advantage of Book Building, *Review of Financial Studies* 13, 697-714.
- Sherman, Ann E. and Sheridan Titman, 2002, Building the IPO Order Book: Underpricing and Participation Limits With Costly Information, *Journal of Financial Economics* 65, 3-30.
- Skinner, Douglas J., 1994, Why Firms Voluntarily Disclose Bad News, *Journal of Accounting Research* 32, 38-60.
- Skinner, Douglas J., 1997, Earnings Disclosures and Stockholder Lawsuits, *Journal of Accounting and Economics* 23, 249-282.

- Spatt, Chester, and Sanjay Srivastava, 1991, Preplay Communication, Participation Restrictions, and Efficiency in Initial Public Offerings, *Review of Financial Studies* 4, 709-726.
- Spiess, Katherine D., and Paula A. Tkac, 1997, The Private Securities Litigation Reform Act of 1995: The Stock Market Casts its Vote..., *Managerial and Decision Economics* 18, 545-561.
- Teoh, Siew Hong, Ivo Welch, and T. J. Wong, 1998, Earnings Management and the Long-Run Performance of Initial Public Offerings, *Journal of Finance* 53, 1935-1974.
- Tinic, Seha M., 1988, Anatomy of Initial Public Offerings of Common Stock, *Journal of Finance* 43, 789-822.
- Titman, Sheridan, and Brett Trueman, 1986, Information Quality and the Valuation of New Issues, *Journal of Accounting and Economics* 8, 159-172.
- Wang, Ko, Su Han Chan, and George W. Gau, 1992, Initial Public Offerings of Equity Securities: Anomalous Evidence Using REITs, *Journal of Financial Economics* 31, 381-410.
- Welch, Ivo, 1989, Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings, *Journal of Finance* 44, 421-450.
- Welch, Ivo, 1992, Sequential Sales, Learning, and Cascades, *Journal of Finance* 47, 695-732.