

---

*Joseph Lim*  
*National University of Singapore*

*Anthony Saunders*  
*New York University*

# **Initial Public Offerings: The Role of Venture Capitalists**



The Research Foundation of  
The Institute of Chartered Financial Analysts

# The Research Foundation of The Institute of Chartered Financial Analysts

## Board of Trustees

### *Chairman*

James R. Vertin, CFA  
Alpine Counselors

### *Vice Chairman*

Alfred C. Morley, CFA  
Association for Investment  
Management and Research

### *Vice Chairman*

George W. Noyes, CFA  
Standish, Ayer & Wood, Inc.

### *President*

Darwin M. Bayston, CFA  
Association for Investment  
Management and Research

### *Research Director*

Charles A. D'Ambrosio, CFA  
University of Washington

Thomas A. Bowman, CFA  
Association for Investment  
Management and Research

Gary P. Brinson, CFA  
Brinson Partners, Inc.

Charles D. Ellis, CFA  
Greenwich Associates

Frederick L. Muller, CFA  
Atlanta Capital Management

William F. Sharpe  
Sharpe-Tint, Inc.

Eugene C. Sit, CFA  
Sit Investment Associates, Inc.

Walter P. Stern, CFA  
Capital Research Co.

Donald L. Tuttle, CFA  
Indiana University

## Review Board

Gerald O. Bierwag  
University of Arizona

Charles A. D'Ambrosio, CFA  
University of Washington

Joanne M. Hill  
PaineWebber, Inc.

Mark P. Kritzman, CFA  
Windham Capital Management

Richard Roll  
UCLA  
Roll & Ross Asset Management

Gary G. Schlarbaum, CFA  
Miller, Anderson & Sherrerd

## Research Foundation Officers

Darwin M. Bayston, CFA  
*President*

Thomas A. Bowman, CFA  
*Executive Vice President*

Katrina F. Sherrerd  
*Vice President*

© 1990 The Research Foundation of the Institute of Chartered Financial Analysts

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright holder.

This publication is designed to provide accurate and authoritative information in regard to the subject matter covered. It is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional service. If legal advice or other expert assistance is required, the services of a competent professional should be sought.

*From a Declaration of Principles jointly adopted by a Committee of the American Bar Association and a Committee of Publishers.*

ISBN 10-digit: 0-943205-06-9 ISBN 13-digit: 978-0-943205-06-9

Printed in the United States of America

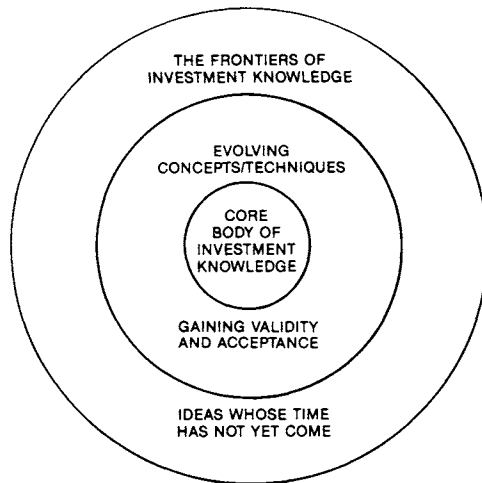
Joni L. Tomal, *Editor*  
Nina D. Hutchinson, *Typography/Layout*

July 1990

## **Mission**

The mission of the Research Foundation is to identify, fund, and publish research material that:

- expands the body of relevant and useful knowledge available to practitioners;
- assists practitioners in understanding and applying this knowledge; and
- enhances the investment management community's effectiveness in serving clients.



*The Research Foundation of  
The Institute of Chartered Financial Analysts  
P.O. Box 3668  
Charlottesville, Virginia 22903  
(804) 977-6600*

## **Table of Contents**

Acknowledgements . . . . .	ix
Foreword . . . . .	xi
Introduction . . . . .	xiii
Chapter 1. Theory and Evidence of IPO Underpricing . . . . .	1
Chapter 2. Venture Capital Firms . . . . .	13
Chapter 3. Venture-Backed Versus Nonventure-Backed IPOs: The Hypotheses . . . . .	21
Chapter 4. Description of Data and Variables Employed in the Study . . . . .	23
Chapter 5. Discussion of Results . . . . .	33
Chapter 6. Summary and Conclusion . . . . .	49
References . . . . .	51

## **ACKNOWLEDGEMENTS**

We acknowledge the financial support of the Research Foundation of the Institute of Chartered Financial Analysts, and the Center for Entrepreneurial Studies, Stern School of Business, New York University.

Joseph Lim would like to acknowledge support from the Stern School, New York University, in completing his dissertation, "Initial Public Offerings: A Venture Capital Perspective," on which this monograph is partly based.

Anthony Saunders would like to acknowledge financial support from a Yamaichi Research Fellowship.

We would like to thank Kose John and Paul Wachtel for helpful comments.

Joseph Lim  
National University of Singapore

Anthony Saunders  
New York University

## FOREWORD

Lim and Saunders investigate two interrelated topics, initial public offerings (IPOs) and venture capitalists. They analyze the seemingly elementary notion of whether venture capitalists add value to the IPO process. The not-unexpected answer is yes. But the answer to how, why, and when value is created is less obvious; this is the study's analytical focus. The authors' contribution to our understanding of both investment analysis and corporate financing is a very welcome addition to the Research Foundation's publications.

The authors begin their study by filling theoretical and policy gaps vacated by the paucity of scholarly literature. They guide us through a description of the offering process and present the results of prior empirical IPO return studies. They describe the characteristics of IPO issues and explain the commonplace but not well-understood practice of underpricing.

In the analytical part of the study, the authors introduce their Dynamic Strategy Model. This three-step method for analyzing IPOs consists of the IPO, aftermarket, and seasoned issue stages. The model is attractive because of its ability to probe concurrently all three stages of the process; prior studies focused on only one of the three steps.

The authors use the model to test several hypotheses regarding the role of venture capitalists in each of the IPO stages. They find that: (1) underpricing is greater for venture-capital-backed issues than for nonventure-capital-backed ones; (2) seasoned issues are offered earlier for venture-backed firms than for those which are not so backed; and (3) good firms follow the Dynamic Strategy Model. Inferentially, the study suggests that the venture capitalist's presence at the IPO stage may be a useful screen for seasoned issues.

For investment professionals, this study is must reading. Before long venture-backed IPOs will find their proper niche in the asset allocation process. Better to travel with the compass and sextant that Lim and Saunders provide than to go into these waters ill-equipped.

Charles A. D'Ambrosio, CFA  
The Research Foundation of the  
Institute of Chartered Financial Analysts

## INTRODUCTION

Initial public offerings (IPOs) play an important role in the American capital-formation process. Going public provides access to a source of financing that is critical to the growth and profitability of many small firms. For the firm's owners, a public offering means a broader market for their shares and increased liquidity for their personal portfolios.

An important participant in this capital-formation process is the venture capitalist, a financial intermediary with special skills in financing, monitoring, and managing new firms. Venture capitalists risk their capital and invest considerable time monitoring and managing growing companies. The obvious question is: Do venture capitalists add value for the company? We address that question in this study.

There is well-documented evidence that new issues are underpriced. Although the underpricing of IPOs persists across time and across markets, its existence cannot be explained. A number of alternative (and often conflicting) theories have been proposed to explain why underpricing occurs. There are two types of models: static models, which ignore the potential for strategic behavior by the investment banker in bringing new issues to market, and dynamic models, which incorporate the potential for strategic behavior. This study goes beyond the static question of relative underpricing to investigate the extent to which the initial pricing is related to aftermarket performance and the time to secondary issue by venture-backed firms.

Because of the specialized skills that a venture capitalist brings, one might expect that the average firm brought to market by a venture capitalist is in some sense better than a firm brought to market without a venture capitalist. The value, however, is hard to measure. Using a model based on optimal, dynamic, new-issue strategies adopted by "good" firms relative to "bad" firms, we show that venture capitalists do add value. We argue that good firms follow a three-stage dynamic strategy in entering the market for new issues. The strategy involves good firms underpricing new issues more frequently than bad firms, thereby attracting greater investor and analyst attention in the secondary market, and then bringing out a seasoned issue to cash-in on the full (revealed) value of the firm in the aftermarket. That is, good firms seek to offset losses on underpricing by gains from seasoned issues. Bad firms are not able to offset losses on initial underpricing.



In this study, we review the literature on IPOs, describe the potentially value-adding activities of a venture capital firm, examine theories of underpricing within the context of a venture capital intermediary, and test hypotheses regarding the price behavior of venture-backed IPOs versus nonventure-backed IPOs. Specifically, we address several questions. Are venture-backed issues more or less underpriced than nonventure-backed issues? Do their prices appreciate more in the early aftermarket? Are these stocks followed by more analysts and institutional investors? Are the IPOs followed up with relatively quick secondary issues?

The results are generally consistent with the Dynamic Strategy Model's hypotheses. We find that venture-backed new issues are, on average, more underpriced than nonventure-backed new issues, significantly so for secondary IPOs. Venture-backed IPOs attract more institutional and analyst attention and generate greater abnormal returns in the early aftermarket than nonventure-backed IPOs. Finally, venture-backed firms offer seasoned issues earlier and at higher dollar amounts than nonventure-backed firms, although the differences are not statistically significant. Overall, the behavior of venture-backed issues appears to mimic the optimal new-issue behavior implied by the Dynamic Strategy Model.

# 1. Theory and Evidence of IPO Underpricing

## **The Initial Public Offering Process**

For the purpose of this study, a firm (the issuer) goes public when the sale of its equity is made under the Securities Act of 1933. To do this, the firm must file with the Securities and Exchange Commission (SEC) a *prospectus* that complies with the provisions of the Securities Act.<sup>1</sup> This prospectus is a document that discloses, among other things, information regarding the issue offering price, the number of shares to be issued, and the use of the proceeds from the IPO. It also contains various financial statements and historical information about the company's operations. The specialized task of compiling the information required and filing the requisite documents is usually beyond the capability of the officers of the firm. Further, even if the firm were able to accomplish the registration process itself, there is the additional step of marketing the securities. For these reasons, an *investment banker* is employed.<sup>2</sup> The investment banker facilitates the registration process and also has an ability to market the securities directly to outside investors.

The issue's *offer price* is the price at which investors may subscribe to the new issue. A range of prices within which the offer price may fall is given in

---

<sup>1</sup>In addition, the securities must comply with state laws (so-called "Blue Sky" laws) that regulate offerings of securities in the state.

<sup>2</sup>The terms *investment banker* and *underwriter* are used interchangeably. Sometimes more than one investment banker is involved in managing an issue (the lead underwriter). Further, a new issue may involve many other underwriters (the sub-underwriters) and firms that only sell the securities. We shall not make any distinctions about these categories, hence the term *investment banker* or *underwriter* refers to the lead underwriter who represents the whole group.

the preliminary prospectus issued by the firm and filed with the SEC. The preliminary prospectus is called a “red herring” because of a disclaimer printed in red on the cover.<sup>3</sup> On the basis of information in this preliminary prospectus, investors indicate their interest to the investment banker regarding the number of shares to which they would like to subscribe. Indications of interest and the range of expected offer prices are usually non-binding. The actual offer price is set at the final “price meeting” between the issuer and the investment banker, a meeting that is usually held the day before the issue becomes effective. Only then is the investment banker obligated to pay the company the total proceeds of the issue less his underwriter spread.

The *underwriter spread* is the difference between the offer price and the price per share received by the company. It is often stated as a percentage of the offer price, and it consists of three components. The first is allocated to the investment banker that serves as the manager of the issue. The investment banker is paid a management fee for services such as facilitating the registration process and organizing a syndicate consisting of the underwriting group and the selling group. The second component is allocated to investment bankers that are invited to participate in the underwriting syndicate or group. These investment bankers are paid an underwriting commission for bearing the underwriting risks. The third component goes to less-prominent investment bankers and brokers with strong retailing channels. They form a selling group and receive a selling commission. Typical allocations of the underwriter spread are 20 percent for the management fee, 20 percent for the underwriting fee, and 60 percent for selling commissions.

New issues are made on either a *firm-commitment* or a *best-efforts* basis. On a firm-commitment basis, the investment banker purchases the entire issue from the company and seeks to resell the issue at a higher offer price to outside investors. In this case, the investment banker bears the risk that the issue may not be fully subscribed if the price is set too high. In best-efforts underwriting, the investment banker undertakes to sell the issue on an agency basis and receives a fee for the number of shares sold. In this case, the risk of overpricing is borne by the issuing company.

---

<sup>3</sup>The disclaimer states that a registration statement has been filed but has not become effective, and that the securities are not offered for sale and orders are not being solicited prior to the effective date of the offer.

The *initial return* of an IPO is the difference between the offer price and the first traded price observed in the secondary market divided by the offer price. This return may be used as a measure of the degree of underpricing (or overpricing) of an issue. *Underpricing* or *overpricing* occurs when the first traded price is higher (lower) than the offer price. Because the first traded price may not be available, the closing bid price of the day or the closing price of the week is often used by researchers. The term *aftermarket* refers to the sequence of prices observed in the secondary market once the issue starts trading. *Seasoning* is the process by which the new issue gains a price history in the secondary market.

### Empirical Evidence on IPO Pricing

Several methods may be used to analyze the pricing of IPOs.

#### Initial Returns

The degree of underpricing (overpricing) may be measured by the extent to which the first observed price ( $P$ ) in the secondary market for the stock is above (below) the offer price ( $OP$ ) of the stock. For example,

$$\begin{aligned} [(P - OP)/OP] \times 100 > 0 & \text{ indicates underpricing, and} \\ [(P - OP)/OP] \times 100 < 0 & \text{ indicates overpricing.} \end{aligned}$$

Both returns are adjusted for changes in market returns ( $R_m$ ), that is, systematic risk.

Table 1 presents the initial raw returns and market-adjusted returns from various studies on IPO pricing. It is evident that IPOs are on average underpriced, whether the initial return is measured from the date of issue to one day, one week, or one month later, or whether raw returns or market-adjusted returns are used. Further, the underpricing of IPOs extends across all sample periods. Considering only the firm-commitment offerings, initial returns range from a low of 5.9 percent (Block and Stanley 1980) to a high of 28.5 percent (McDonald and Fisher 1973). The McDonald and Fisher study covered a relatively short period (about a year), so their results may be more indicative of the market conditions existing at that time. Nonetheless, the results indicate average underpricing of about 10 to 20 percent.

**TABLE 1**

**Summary of IPO Study Results: Initial Returns**

<i>Study</i>	<i>Sample Period</i>	<i>Sample Size</i>	<i>Initial Returns (%)</i>		
			<i>1 Week</i>	<i>1 Month</i>	
Reilly & Hatfield (1969)	1963-65	53	9.9	8.7	
McDonald & Fisher (1973)	1969-70	142	28.5	34.6	
Logue (1973)	1965-69	250	—	41.7	
Reilly (1973)	1966	62	9.9		
Neuberger & Hammond (1974)	1965-69	816	17.1	19.1	
Ibbotson (1975)	1960-71	128	—	11.4	
Ibbotson & Jaffe (1975)	1960-70	2,650	16.8		
Reilly (1978)	1972-75	486	10.9	11.6	
Block & Stanley (1980)	1974-78	102	5.9	3.3	
Ibbotson (1982)	1971-81	N/A	—	2.9	
Neuberger & LaChapelle (1983)	1975-80	118	27.7	33.6	
Ritter (1984)	1960-82	5,162	18.8	—	
	1977-82	1,028	26.5	—	
	1980-81	325	48.4	—	
Giddy (1985)	1976-83	604	10.2	—	
John & Saunders (1986)	1976-82	78	—	8.5	
Beatty & Ritter (1986)	1981-82	545	14.1	—	
Chalk & Peavy (1986)	1974-82	440	13.8		
Ritter (1987)	1977-82				
		Firm commitment	664	14.8	—
		Best efforts	364	47.8	—
Miller & Reilly (1987)	1982-83	510	9.9	—	
Muscarella & Vetsuypens (1987)	1983-87	1,184	—	7.6	

*Source:* Lim (1989).

**Aftermarket Returns**

By analyzing the aftermarket returns of an IPO, we may gain insights into the seasoning behavior of prices for new issues and, in particular, market efficiency. Although profit opportunities may exist in the early days of trading of a

new issue, any excess returns tend to disappear as more information becomes available regarding the stock. Table 2 reports the results of studies analyzing the profitability of buying IPOs on the first day of trading and reselling them one month, six months, and one year later. These results suggest that by the twelfth month of trading (if not earlier) abnormal returns from investing in IPOs tend to disappear.

**TABLE 2**

**Summary of IPO Study Results: Aftermarket Returns**

<i>Study</i>	<i>Sample Period</i>	<i>Sample Size</i>	<i>Change From First Market Price (%)</i>			
			<i>1 Month</i>	<i>6 Months</i>	<i>12 Months</i>	<i>Adj*</i>
Reilly & Hatfield (1969)	1963-65	53	-1.8		11.0	OTC1
McDonald & Fisher (1973)	1969-70	142	6.1		-18.1	OTC1
Reilly (1973)	1966	62	-0.8		7.1	OTC1
Neuberger & Hammond (1974)	1965-69	816	2.1			OTC1
Ibbotson (1975)	1960-71	128		3.5		NYSE
Bear & Curley (1975)	1969-71	140			25.0	OTC2
Reilly (1978)	1972-75	486	1.5		-11.6	NAS1
Block & Stanley (1980)	1974-78	102	-2.3		-3.1	NAS1
Neuberger & LaChapelle (1983)	1975-80	118	8.3		38.6	NAS1
John & Saunders (1986)	1976-82	78	11.1			NYSE

Notes:

\* Risk Adjustment

OTC1 OTC Index assuming beta of 1.

OTC2 Same as OTC1 except the beta is obtained from regressing the individual stock return against the OTC Index.

NAS1 NASDAQ Index assuming beta of 1. (The NASDAQ Index is based on 2,000 OTC stocks, whereas the OTC Index is based on 35 blue-chip OTC stocks).

NYSE Index uses equally weighted NYSE stocks. Beta is calculated using Ibbotson's (1975) method.

Source: Lim (1989).

### **Issue Characteristics**

Given the prevalence of underpricing, a number of authors sought to identify factors or characteristics that explain different degrees of underpricing.

**Firm commitment versus best efforts.** Chalk and Peavy (1986), Ritter (1987), and Muscarella and Vetsuypens (1987) found higher initial returns (greater underpricing) for best-efforts compared to firm-commitment contracts. The results were 36.06 percent versus 19.63 percent for the Chalk and Peavy study, 47.78 percent versus 14.80 percent for the Ritter study, and 35.00 percent versus 6.99 percent for the Muscarella and Vetsuypens study. These studies also noted that best-efforts contracts are generally associated with smaller firms; firms using firm-commitment contracts are larger in terms of sales, book value, and offering size.

**Underwriter prestige.** Several studies document an inverse relation between the “prestige” of the principal underwriter and the initial return on an IPO. Logue (1973) found the initial return to be 52.1 percent for IPOs with less-prestigious underwriters versus 20.8 percent for more-prestigious ones. Similar results were found by Block and Stanley (1980), 10.1 percent versus -4.2 percent, and Tinic (1988), 14.27 percent versus 4.89 percent. Neuberger and LaChapelle (1983) divided the underwriters into three prestige tiers. They found that the initial returns were strongly and negatively related to underwriter prestige. Finally, Carter (1987) developed an ordinal ranking for underwriters based on their positions in tombstone advertisements of public security offerings. He found the mean initial return (underpricing) for IPOs marketed by nonprestigious underwriters to be significantly greater than those marketed by prestigious underwriters. One difficulty with interpreting these studies lies in the notion of underwriter prestige itself; it may be a close proxy for firm size.

**Age of firm.** A firm’s age may be a good proxy for the availability of information regarding it. Muscarella and Vetsuypens (1987) found a significant negative relation between initial returns and the age of the firm. Young and Zaima (1986) found an insignificant relation in their regression of initial returns against a set of independent variables, one of which was age. Carter (1987), using age as a proxy for the information availability about a firm, found a significantly positive relation between the age of the firm and the prestige of the underwriter.

**Industry Group.** Ritter (1984), in analyzing the very large degree of underpricing in 1980-81 (48.4 percent on average), found there was a

predominance of oil and gas industry-related new issues during that period. This suggests that firms in some industries may experience higher degrees of underpricing than firms in other industries; for example, IPOs in high-technology industries may have different average degrees of underpricing than firms in bio-medical research.

**Other Characteristics.** A number of other IPO characteristics have been studied. Ibbotson and Jaffee (1975), for example, found no significant relation between the number of offerings and past market performance. Nanda (1988) found a statistically significant positive relation between IPOs and the percentage change in the index of industrial production, which was used as a proxy for the business cycle. Beatty and Ritter (1986) found a significant positive relation between IPOs and the usage of proceeds. Finally, Ritter (1984) and Miller and Reilly (1987) found a significant relation between IPOs and the standard deviation of aftermarket returns.

### **Why Are New Issues Underpriced on Average?**

One of the continuing puzzles of finance is not only why underpricing occurs, but also why it persists across markets and across time. Indeed, as Table 1 documents, the underpricing of IPOs is an empirical regularity. To gain insights into why underpricing occurs, a number of alternative (and often conflicting) theories have been proposed. Here we review four recent explanations: The Rock model, signaling models, legal liability model, and dynamic strategy models.

#### **The Rock Model**

The literature has paid a great deal of attention to a theory first advanced by Rock (1986) and extended by Beatty and Ritter (1986) and McStay (1987), among others. This theory views underpricing as a competitive outcome in an IPO market in which some investors are better informed than others. As a result, underpricing is directly related to the degree of information imperfection—or, more specifically, information asymmetry—in the capital market and to the costs of collecting information.

In Rock's model, there are two types of IPOs: good issues and bad issues. Informed investors, defined as those who expend resources collecting information on IPOs, will bid only for those issues that are good. (This search effort is assumed to allow the informed investor to assess exactly the true value of the IPO.) Uninformed investors will not engage in expensive search, but



rather will bid randomly across all issues, good and bad. It is further assumed that informed investors never constitute a sufficiently large group to be able to purchase an entire issue.

In the case of a good issue, both informed and uninformed investors will bid for the issue (the uninformed in a random manner). Because both groups bid for the issue, it is likely to be oversubscribed so that any single *individual* bidder (informed or uninformed) will get fewer shares than he bid for. Thus, for good issues, uninformed investors get only partial allotments.

In the case of a bad issue, informed investors will not bid at all. The only bidders will be the uninformed. Moreover, owing to the absence of competing informed bidders, any individual bidder will more likely achieve his full allotment (or there will be a higher probability of an allotment). That is, the uninformed bidder suffers from the problem of the “winner’s curse”: he achieves a large allotment for bad IPOs and a small allotment for good IPOs.

Rock’s argument is this: Because of the winner’s curse, IPOs have to be underpriced on average to produce an expected return for the uninformed investor that is high enough to attract investment in IPOs regardless of whether the issue is good or bad; that is, they must generate a return at least as high as the risk-free rate for the uninformed investors.

### **Signaling Models**

In the Leland and Pyle (1977) model, the fraction of equity retained by inside shareholders serves as a signal of their expectation of the firm’s future cash flows. The larger the fraction retained by the insiders, the larger the expected cash flows signaled—and the more valuable the firm. The credibility of this signal results from the cost sustained by the insiders whose portfolios are less diversified when their holding of the firm’s equity is high. This model is consistent with the prediction that IPOs should be less underpriced when insiders retain a larger percentage stake than when insiders sell out (to the extent legally permissible).

The Leland and Pyle model assumes that insiders know both the expected value and variance of the project that gave rise to the IPO, whereas investors know only the variance. The fraction of equity retained by insiders signals the expected value of the project and, hence, firm value. If investors know neither the variance nor the expected return, then the signal—the fraction of equity retained—is inadequate to estimate either. Grinblatt and Hwang (1989) have overcome this problem by introducing a second signal—the degree of under-

pricing of a new issue. In addition to the empirical implications consistent with the Leland and Pyle model, their model raises four additional implications, two of which are of interest to this study: (1) the degree of underpricing is an increasing function of the variance, given the issuer's fractional holding (consistent with Beatty and Ritter 1986), and (2) given the variance of the firm, the degree of underpricing is positively related to the issuer's fractional equity holding.

### **Legal Liability Model**

Tinic (1988) developed a hypothesis that underpricing is a form of insurance against legal liability and reputational damage for investment bankers. Investment bankers are required to exercise due diligence in their investigation of a firm before they bring an IPO to market. Poor performance of a new issue could prompt investors who purchased the issue to bring lawsuits on the grounds that insufficient or incorrect information was disclosed or that the investment banker failed to conduct due diligence. As a result, the investment banker has an incentive to underprice IPOs to avoid such problems.

### **Dynamic Strategy Models**

The above three models—Rock's information asymmetry, signaling, and legal liability models—are static theories of underpricing. They ignore the potential for strategic behavior by the investment banker when new issues are brought to market. Such strategic behavior may offer different predictions as to the types of firms (i.e., good or bad) whose IPOs are the most underpriced. In three recent studies, Allen and Faulhaber (1989), Welch (1988), and Chemmanur (1988), dynamic or strategic models of underpricing are developed. Although the technology and assumptions of these models differ, they appear to offer predictions similar to those of the static theories. Most importantly, they predict that good firms are more likely to underprice *more* (not less) than bad firms. Specifically, Allen and Faulhaber propose that high-quality IPO firms are underpriced more so that investors will interpret future dividends more favorably. Low-quality firms are less likely to imitate because they are less likely to experience high future cash flows and, hence, pay high future dividends.

The model developed by Welch (1988) suggests that IPO underpricing results in higher proceeds for high-quality firms in future sales of seasoned equity issues. In his scheme, high-quality firms underprice new issues to

obtain a higher price for a future seasoned offering. Underpricing serves as a signal that is sufficiently costly to deter imitation by low-quality firms that face some probability of having their true (bad) quality revealed before the seasoned offering.

Using a rational expectations framework, Chemmanur (1988) developed a model where good-firm insiders underprice more than bad-firm insiders to induce outside investors to gather information about the firm, thus reducing the information asymmetry between insiders and outsiders. The result is that the good firm's secondary market price is higher and closer to the true valuation. This allows the good-firm insiders to sell off some of their shares at higher prices, or the firm to raise additional funds at a higher firm valuation.

From these models, the IPO process may be viewed as a three-stage strategy. Taken together, the three stages represent an IPO strategy that we call the Dynamic Strategy Model (DSM). The DSM is the basis for hypothesis formulation regarding the relative degree of underpricing of venture-backed IPOs versus nonventure-backed IPOs.

**The IPO Stage.** Good firms underprice more than bad firms to attract investors and market attention. Implicitly, underpricing is viewed as a cost to the firm's insiders. It is incurred to persuade investors to collect or aggregate information about the firm and thereby establish its true value in the secondary market. Moreover, the better the firm (a good issue), the more it will be underpriced relative to the bad issue. By comparison, bad firms, those known by insiders to be bad, have the opposite incentive: Either there is no incentive or it is too costly to mimic the good firm. In particular, a bad firm will price its IPO as high as possible because it knows that once investors collect information and discover that it is a bad firm, its stock price will fall on the secondary market.

**The IPO Aftermarket Stage.** If underpricing attracts more interest (e.g., large institutions) and more analysts, then good information should be dissipated quicker and price should rise to its true market value quicker for a good firm than a bad firm, which is less underpriced. That is, the seasoning process in the aftermarket for good issues should be quicker and their aftermarket returns in the seasoning process should be greater than for bad issues.

**The Seasoned Issue Stage.** Once the secondary market establishes the true value of the good firm's equity, insiders can "cash in" with a seasoned issue. Thus, the cost of underpricing the IPO new issue is dynamically offset

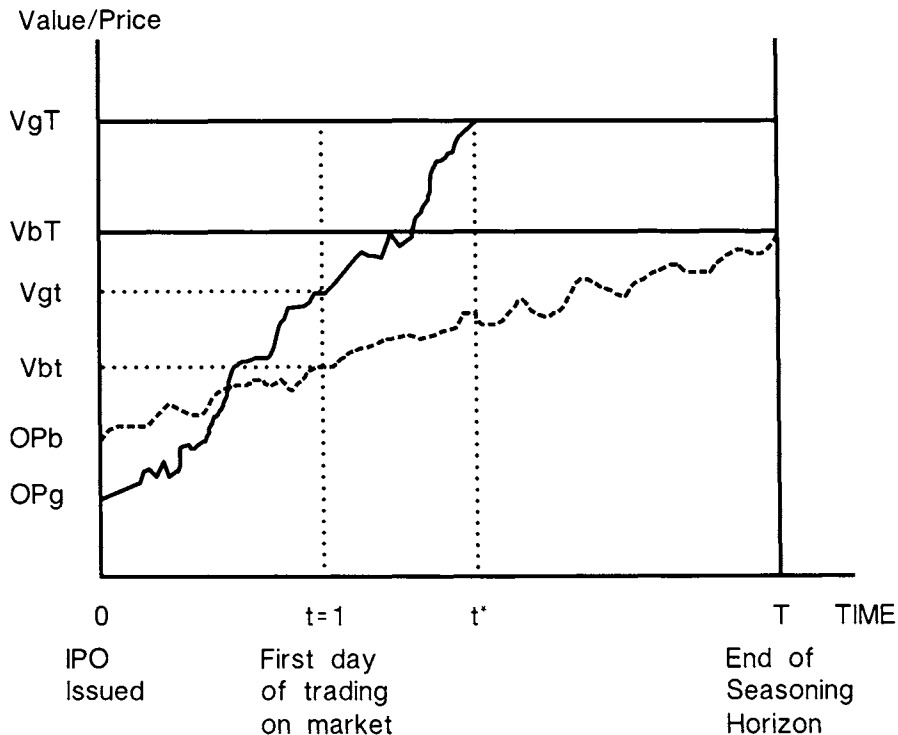
by profits from the seasoned issue. Note that this strategy also implies that good firms should come to the market again, this time with a seasoned issue, sooner than bad firms. That is, the more underpriced the IPO, the shorter the time interval between an IPO and a seasoned offering by the same firm. A *hypothetical* example is shown in Figure 1.

The offer price of the good issue ( $OP_g$ ) is set so that the absolute degree of underpricing is greater than for the relatively bad issue ( $OP_b$ ). That is, at time  $t = 1$ , the first day of trading, the underpricing relation is:

$$(V_{gt} - OP_g) / OP_g > (V_{bt} - OP_b) / OP_b.$$

FIGURE 1

Three-Stage Dynamic IPO Strategy



If this strategy works and greater investor and analyst attention is attracted to the good issue, its price in the aftermarket should rise to its true value ( $V_{gt}$ ) quicker than for the relatively bad issue. In Figure 1, the good issue becomes fully seasoned by time  $t^*$ , whereas the relatively bad issue becomes fully seasoned at time  $T$ . If this occurs, then stockholders or insiders of the good firm have an incentive to sell a secondary issue of stock at the price  $V_{gt}$  at any time after  $t^*$ .

## 2. Venture Capital Firms

Scholarly literature on venture capital is scant. There are several reasons for this. First, venture capital investments in aggregate are small compared to investments in the equity of publicly traded firms. For example, the venture capital pool totalled about \$2.5 billion at the end of 1977. Although this had grown to over \$30 billion total in 1988 (Henderson 1989:64), it is overshadowed by the market capitalization of NASDAQ stocks of \$350.5 billion in 1988. Second, venture capital has a brief history.<sup>1</sup> Many of the venture funds started in the late 1950s and early 1960s did not live up to expectations. This, coupled with the imposition of a 49 percent capital gains tax in 1969, caused the pool of available venture capital to shrink dramatically. It was only with the reduction in the capital gains tax in 1978 that venture capital experienced a resurgence. Finally, there are not enough data with which to assess the activities of venture capitalists.<sup>2</sup> Because most venture funds are private, they are exempt from the usual financial reporting requirements of public corporations.

Despite these early experiences, the venture capital industry has received more attention since the early 1980s. This is reflected by a tenfold increase in the venture capital pool since 1977. Three events sparked the interest. First, the capital gains tax was reduced from 49 percent to 28 percent and then to 20 percent. Second, in July 1979 the U.S. Department of Labor changed its regulations governing the investments of pension funds with the Employee

---

<sup>1</sup>The institutionalization of the venture investment process came mainly from the passage of the Small Business Investment Company Act in 1958. It provided for the creation of small business investment companies (SBICs) as vehicles for small business financing (Pratt 1988).

<sup>2</sup>The terms *venture capitalist* and *venture capital firm* are used interchangeably.

Retirement Income Security Act (ERISA). The Department took the view that “the relative riskiness of an investment does not preclude its use by fiduciaries in the overall context of a diversified investment portfolio” (Perez 1986:35). This enabled pension funds to participate in venture capital investments and resulted in the vast increase in new venture offerings (see Table 3). By 1988 pension funds accounted for 46 percent of committed venture capital (Henderson 1989). Third, venture capitalists who invested in Apple Computer and Genentech realized spectacular returns in 1980 when these firms went public. Not only did the success stories of the venture capitalists bring an influx of funds into the industry, but they also emphasized the role of venture capital in nurturing companies at the forefront of new technologies. The greater flow of information about venture capital is a result of this attention and interest: Venture capitalists are more willing to talk about their successes, the increased number of new public venture funds add to data availability, and more financial data service firms now track the venture capital industry.

## **The Venture Capital Process**

### **Definition**

There are several definitions of venture capital. One is that venture capital is “used to cover a broad range of transactions from the infusion of a few thousand dollars in a family enterprise to the placement of millions of dollars in a high-potential venture” (Ibbotson and Brinson 1987:99). Carleton (1986) is more specific. He defines venture capital investment as “investment in new, small and risky companies (especially those based on commercial application of technological innovations).” In this study, venture capital is defined as the combination of early-stage financing of new and young companies’ investment projects through equity participation, and the provision of ongoing expertise and advice to the management of those companies. Thus, what distinguishes venture capital from traditional investment is not just where funds are invested, but rather the monitoring and management of investments after they are made. In particular, venture capital is identifiable by three key characteristics: equity participation, long-term investment orientation, and ongoing active involvement in the company.

TABLE 3

**Venture Capital in Relation to External  
Finance for Corporations, 1975 to Present  
(In Billions of Dollars)**

	<i>New Issues of Corporate Debt and Equity<sup>a</sup></i>				<i>Disbursements by Venture Capital Firms to Portfolio Companies</i>	<i>Total Initial Public Equity Offerings<sup>c</sup></i>	<i>Initial Public Offerings Of Companies Backed by Venture Capital</i>
	<i>Total Gross</i>	<i>Total Net<sup>b</sup></i>	<i>Equity Gross</i>	<i>Equity Net<sup>b</sup></i>			
1975	45.3	39.7	9.0	9.9	0.3	0.12	NA
1976	42.7	35.8	9.6	10.5	0.3	0.16	NA
1977	41.5	32.3	9.8	2.7	0.4	0.15	NA
1978	35.3	28.7	8.0	-0.1	0.6	0.28	0.10
1979	37.9	19.5	9.3	-7.8	1.0	0.53	0.10
1980	56.5	51.5	14.8	12.9	1.1	1.25	0.42
1981	48.3	24.7	15.9	-11.5	1.4	3.16	0.75
1982	52.4	40.2	18.1	6.4	1.8	1.54	0.54
1983	84.2	48.9	35.1	23.5	2.8	7.55	3.03
1984	92.0	-7.9	12.1	-74.5	3.0	3.53	0.75
1985	135.2	14.9	23.7	-81.5	2.6	5.58	0.84
1986	232.1	30.6	42.4	-80.8	2.9	11.27	2.11
1987	196.0	22.5	42.8	-76.5	3.9	11.89	1.84
1988	109.8	-33.0	28.7	-130.5	3.0	3.77 <sup>d</sup>	0.79
1975-79	202.7	156.2	45.7	15.2	2.6	1.24	NA
1980-88	1006.5	192.4	233.6	-412.5	22.5	49.54	11.07

Notes:

<sup>a</sup> U.S. corporations only. Issues are for nonfinancial corporations only except for gross equity issues. It was not possible to exclude gross equity issues of financial corporations from the total. Debt-to-equity conversions, dividend reinvestments, and private placements of equity issues are included in net new equity issues, but not in gross new equity issues.

<sup>b</sup> Equal to gross issues less retirements and repurchases.

<sup>c</sup> Excludes closed-end funds and limited partnerships.

<sup>d</sup> Closed-end funds were approximated using data from IDD Information Services.

Source: Henderson (1989).



### **Type of Venture Capital Funds**

Venture capital investments are made by four main groups.<sup>3</sup> At the beginning of 1987, of the approximately 590 total venture capital funds, the four groups consisted of 328 private venture capital firms, 94 small business investment companies (SBICs), 73 corporate venture funds, and 92 venture capital subsidiaries of financial institutions (*Venture Capital Journal*, 1987). We briefly describe the characteristics of each below.

**Private venture capital firms.** These firms are partnerships of two or more venture capitalists. The venture capital firm typically organizes and manages one or more funds which are also organized as partnerships. This type of fund usually operates for a period of seven to ten years. Each fund consists of passive limited partners, which invest from \$25,000 or \$100,000 to tens of millions of dollars, and a general partner (the venture capital firm) that usually puts up 1 percent of the fund's capital. The general partner earns an annual management fee of 2 to 3 percent of the value of the fund. The general partner is also compensated by a carried interest of 20 percent or more in the ultimate capital gains earned by the fund. Putting up 1 percent of the equity of the fund and receiving a 20 percent share when it is liquidated is a powerful incentive for venture capitalists to seek out and nurture high-growth companies.

**Small business investment companies (SBICs).**<sup>4</sup> The Small Business Investment Company Act of 1958 was created to enable small businesses to obtain long-term financing. This resulted in the creation of SBICs, which are privately owned and managed but licensed and regulated by the Small Business Administration (SBA). For each \$1 of equity, an SBIC may borrow up to \$3 from the SBA, although such borrowing has been constrained by Federal budgeting pressures. In line with the goal of helping small businesses, the

---

<sup>3</sup>This discussion is restricted to formal venture capital: that is, organized venture funds in the form of partnerships, subsidiaries of firms, and incorporated companies. The discussion does not include an important source of venture financing consisting of funds from wealthy individuals, or so-called "angels." Gaston (1989) describes the nature of informal venture capital investment.

<sup>4</sup>A counterpart to the SBIC is the Minority Enterprise Small Business Investment Company (MESBIC). The MESBIC is similar to the SBIC except that its purpose is to provide long-term funding and management assistance to new ventures started by minorities and the disadvantaged.

companies in which an SBIC may invest must have a net worth not exceeding \$6 million and average after-tax net income for the preceding two years of no more than \$2 million. The amount that can be invested is restricted to 20 percent of the paid-in capital of the SBIC. Further, the SBIC is precluded from taking a controlling interest in any company.

What distinguishes an SBIC from the other venture capital firms is the leveraged nature of the SBIC resulting from the SBA loans. To service its SBA loans, an SBIC must receive regular income from its investments. Thus, it usually ends up giving loans rather than taking an equity participation. Further, this need to service its loans dictates, to some extent, the type of investments it makes. Because start-ups and companies in the early stages of growth normally experience negative cash flows, the SBIC avoids such firms and, instead, invests in more mature firms that are about to go public.

**Corporate venture capital funds.** These are subsidiaries or divisions of major corporations. They operate as a private venture firm does except that their goals and methods of compensation are different. Whereas private venture firms invest to achieve a high return on investment and are concerned about growing companies, corporate venture funds invest in companies mainly as windows to new technology. Further, a corporate venture fund may invest in a company with the ultimate aim of acquiring it later. With regard to compensation, corporations often treat the corporate venture capitalist as they do other employees. Consequently, a corporate venture capitalist has less of an incentive to perform well compared to his counterpart, the private venture capitalist, who shares the profits from venture investments. This lack of incentive has often accounted for the high turnover of staff as well as the mediocre performance of corporate venture capital funds.

**Venture capital subsidiaries of major financial institutions.** Many banks started SBICs in the 1960s, but poor performance led them to withdraw from venture capital investing in the 1970s. Banks came back again in the 1980s. Specifically, the number of bank-owned SBICs doubled between 1978 and 1983 (Wilson 1985). In addition to the potential for profit from equity investments in new companies, banks have another reason to be involved in venture capital. By getting in on the ground floor of new companies and industries, they expect to build future customers for the commercial side of the bank. Similarly, many investment banks have started their own venture capital funds. An investment in a new company provides the investment bank with the opportunity to manage the financing needs of the company as it grows.

The investment bank hopes to earn fees from managing and underwriting public or private placements of equity as well as debt issues.

### **Stages of Venture Financing and Activities of the Venture Capitalist**

Venture capital investing occurs in many stages. Each stage is related to a phase of growth of the firm. In the *first* stage, called seed or start-up financing, venture capital is used to fund the development of an idea or concept and turn it into a prototype (in the case of a product). *Second-* and *third-*stage financing involve the commercialization of the product or service and the addition of working capital or new facilities as the firm expands its activities. *Bridge*, or *mezzanine*, financing is the last stage before the firm goes public.

When an entrepreneur approaches a venture capitalist at the start-up stage, the venture capitalist usually performs due diligence by studying the proposal's feasibility and potential. If the venture capitalist is interested in funding the project but does not wish to fund the full amount required, he would organize a syndicate consisting of other venture capitalists. In this case, the venture capitalist who originates the deal is considered the lead venture capitalist and sits on the board of directors. The lead venture capitalist is responsible for monitoring the performance of the firm and providing management advice, as well as putting together a management team in cases in which the entrepreneur does not have the requisite management skills.

Not all venture financing for a firm begins at the start-up stage. Regardless of the stage, the venture capitalist must always perform due diligence by studying the proposal and investigating the firm and its management. Obviously, the managerial advice and technical expertise provided by the venture capitalist is less critical in later stages of financing. In other words, there is less value added by the venture capitalist when he invests at the later stage.

### **Venture Capital Theory**

As noted above, the scholarly literature on venture capital is sparse. The rationale for the existence of venture capitalists as financial intermediaries was first explored theoretically by Chan (1983). Chan first looked at a capital market with imperfect information, where entrepreneurs select the qualities of their projects and their consumption of perquisites. Investors had positive search costs, and as a result, entrepreneurs had an incentive to offer inferior projects. The result is the "lemons" problem described by Akerlof (1970): The

direct capital market breaks down. In Chan's study, financial intermediation is shown to evolve as venture capitalists emerge to serve as informed agents; they tend to induce an allocation that results in greater welfare for investors.

Through their actions, venture capitalists induce entrepreneurs to offer better projects. What the venture capitalists may do, however, is limited by search costs. In equilibrium, the higher the search costs to investors, the lower the average returns of the projects offered by entrepreneurs. Chan also shows that a competitive intermediation equilibrium cannot exist with very high institutional holdings. Although Chan's study shows the advantages of an "informed" intermediary, the characteristics of venture capitalists that produce their "value-added" are not modeled.

Venture capitalists often step in to take over the management of a firm from the entrepreneur when the firm has performed poorly. Chan, Siegel, and Thakor (1987) constructed a model of this aspect of venture capital activity and attempted to explain why venture capital contracts between the entrepreneur and the venture capitalists take their peculiar form, namely a combination of a risky claim for the venture capitalists with a disproportionately large control feature.

The Chan, Siegel, and Thakor model consists of two periods. Both the entrepreneur and the venture capitalists have the skill to run the firm. The skill level of each is unknown, however, and is learned only through the arrival of information at the end of the first period. This enables the parties to decide whether the venture capitalist should take over the firm in the second period. The incorporation of this value-added aspect approximates better the function of venture capitalists who are not mere financial intermediaries. Further, this model highlights the active monitoring role of venture capitalists who stand ready to replace inept management.

### **Empirical Evidence on Venture Capital Firms**

Although a few studies, most notably Martin and Petty (1983) and Chiampou and Kellett (1988), have analyzed the return performance of venture capital funds, only one study has analyzed the underpricing of venture-backed IPOs versus nonventure-backed IPOs. In particular, Barry, Muscarella, Peavy, and Vetsuypens (1988) found that after controlling for a number of firm-specific characteristics, there was no evidence of a significant difference in the degree of underpricing between venture-backed and nonventure-backed IPOs.

In this study, we go beyond the static question of relative venture capital underpricing to investigate the extent to which venture-backed issues mimic (or represent) the good issues of the Dynamic Strategy Model. That is, not only do we ask questions regarding the relative initial returns on venture-backed versus nonventure-backed IPOs, but also we analyze the value added of venture-backed IPOs via the aftermarket performance (abnormal returns) and the time to secondary issue of venture-backed firms, as implied by the three-stage process underlying the Dynamic Strategy Model. Thus, we address several questions. Are venture-backed issues more or less underpriced than nonventure-backed issues? Do their prices appreciate more in the early aftermarket? Are these companies followed by more analysts and institutional investors? How quickly are the initial offerings followed by secondary issues?

### 3. Venture-Backed Versus Nonventure-Backed IPOs: The Hypotheses

The Dynamic Strategy Model (DSM) consists of two types of firms: firms with good prospects (good firms) and firms with bad prospects (bad firms.) The good firm underprices to signal that it is a good firm and receives a high valuation for its shares when its type is revealed in the aftermarket. Once its true value is revealed, it can sell more of its shares (make a seasoned offering) to a receptive market, recouping the cost of underpricing at the IPO. The bad firm cannot imitate the good firm. The cost of underpricing incurred by the bad firm at the IPO cannot be recouped in the aftermarket when its true value is revealed, because the bad firm is accorded a lower market valuation.

In the DSM framework, the venture-backed firm is construed as a good firm because of the value added, which consists of monitoring, financing, and certification provided by the venture capital firm. By contrast, the nonventure-backed firm is a relatively bad firm. Given its good prospects, the venture-backed firm would rationally adopt a strategy that distinguishes it from the bad firm. The actions and outcomes of the strategy adopted by the venture-backed firm versus the strategy of the nonventure-backed firm may be summarized by a three-stage process.

- Stage 1.** At the IPO, the venture-backed firm underprices more.
- Stage 2.** The venture-backed firm gets better market reception. This is evidenced by more analysts tracking the stock, as well as higher institutional ownership. Its shares also appreciate faster toward their true market value in the aftermarket.
- Stage 3.** The venture-backed firm comes to the market with new (seasoned) offerings of stock at an earlier date and raises larger amounts.

## **Hypotheses**

In accordance with the *first* stage of the DSM of a venture-backed firm, a hypothesis regarding the relative underpricing of venture-backed IPOs versus the nonventure-backed IPOs may be stated as:

**Hypothesis 1.** The underpricing of venture-backed IPOs is greater than the underpricing of nonventure-backed IPOs.

In accordance with the DSM's *second* stage, the following three hypotheses may be stated as:

**Hypothesis 2.** Venture-backed firms have greater analyst coverage than nonventure-backed firms.

**Hypothesis 3.** Venture-backed firms have higher institutional holdings compared with nonventure-backed firms.

**Hypothesis 4.** Venture-backed firms have higher excess (abnormal) returns in the aftermarket during the seasoning period.

With respect to the *third* stage we may state:

**Hypothesis 5.** Venture-backed firms come to the market sooner and raise larger amounts of capital than nonventure-backed firms.

## 4. Description of Data and Variables Employed in the Study

### Sample Selection

Our data consist of initial public offerings made between January 1, 1980 and December 31, 1986. The set of venture-backed IPOs was obtained from the February 1985, 1986, and 1987 issues of the *Venture Capital Journal* published by Venture Economics. The set of nonventure-backed IPOs was collected from the *Five Year Directory of Corporate Financing* for the years 1980-84, and from the semi-annual issues of the *Directory of Corporate Financing* for the years 1985 and 1986. Both sources listed only IPOs that had a minimum offer price of \$5.00 and a minimum offering size of \$3 million. Further, only firm-commitment IPOs were included.

The minimum offer price of \$5.00 tends to exclude the highly speculative penny stocks, generally defined as stocks selling below \$5.00, but sometimes literally stocks with offer prices in the pennies. A similar requirement of a minimum offering size of \$3 million excludes the IPOs mainly sold by the smaller regional investment banks. Because few venture-backed IPOs fail to meet these requirements, the restrictions of minimum offering price and size make the nonventure sample more comparable to the venture sample.<sup>1</sup>

Our sample is restricted to firm-commitment IPOs. Compared with firm-commitment offerings, best-efforts offerings are smaller in offering size and lower in price. Few venture-backed IPOs are offered on a best-efforts basis. Having all firm-commitment IPOs in our IPO sample allows us to abstract from any adverse signals conveyed by a best-efforts offering. For example, best-ef-

---

<sup>1</sup>As an indication, of the 101 venture-backed IPOs in 1986, only five failed to meet these requirements (*Venture Capital Journal*, February 1987).



forts offerings tend to be sold by smaller, less-prestigious investment banks. An offering based on best efforts may result in investors perceiving that such an offering is a signal of a more risky offering than a firm-commitment offering. Hence, initial returns of venture-backed firms versus nonventure-backed firms would reflect any differences in the proportions employed in the two types of offerings.<sup>2</sup>

In addition, we imposed several other requirements on the sample. First, the offering had to be made by a domestic issuer. Offerings by foreign issuers may not be unseasoned if the issuing company is already listed on a foreign stock exchange. There may also be difficulties in comparing information about such firms with domestic firms if little is known about the foreign market in which they operate. Accounting policies may also differ, and there is an element of sovereign or political risk.

Second, there could not be a concurrent debt issue or warrants attached to the equity issue. Differences in initial performance may be attributable to the presence of the debt issue and changing leverage. Similarly, initial performance may be affected by the presence of warrants, which may result in a complex set of options that are not easily valued.

Third, stock prices had to be reported in the *S&P OTC Daily Stock Price Record*. The requirement of “listing” on the Over-The-Counter (OTC) excludes the very large IPOs that are listed directly on the American Stock Exchange (AMEX) or the New York Stock Exchange (NYSE) and the very illiquid IPOs, which will not be listed on the OTC. Further, IPOs listed on either the NYSE or the AMEX could contain more favorable information to investors because of the stringent listing requirements of those exchanges.

Our final requirement was that the offering not be made by a financial institution. In recent years the majority of IPOs by financial institutions have been savings and loan (S&L) institutions that were taken public. Because these financial institutions are required to furnish substantial information to the regulatory bodies—whether they are publicly traded or not—there is considerable publicly available information about the performance of such firms at the time of the IPO. Because information collection and release is an issue in this study, as well as the role of venture capitalists as financial intermediaries, we exclude issuers such as banks, S&Ls, or investment banks

---

<sup>2</sup>Ritter (1987) documents the higher initial returns of best-efforts offerings.

that are equally as sophisticated—if not more sophisticated—than venture capitalists.

From the *Directory of Corporate Financing* and the *Venture Capital Journal*, we obtained an initial sample of 925 nonventure-backed IPOs and 382 venture-backed IPOs. For 335 nonventure-backed IPOs and 101 venture-backed IPOs, data were unavailable on one or more of the following variables: (1) the underwriter rank, (2) assets and sales, (3) the date of incorporation, and (4) the SIC code. Exclusion of the IPOs with missing data resulted in a final sample of 871 IPOs. Of these, 590 had no venture backing and 281 had venture backing. Table 4 shows the distribution of IPOs by year as well as venture backing. Venture-backed IPOs accounted for approximately one-third of all IPOs in each year.

**TABLE 4**

**Distribution of IPOs by Year:  
Venture-Backed and Nonventure-Backed**

<i>Year</i>	<i>Venture-Backed</i>	<i>Percent Of All IPOs In The Year</i>	<i>Nonventure-Backed</i>	<i>Percent Of All IPOs In The Year</i>	<i>Total</i>
1980	17	32.7	35	67.3	52
1981	30	30.6	68	69.4	98
1982	18	31.6	39	68.4	57
1983	87	30.4	199	69.6	286
1984	39	41.5	55	58.5	94
1985	35	33.3	70	67.7	105
1986	55	30.7	124	69.3	179
Total	281	32.3	590	67.7	871

**Data Sources**

The *Directory of Corporate Financing* provided pertinent details on each IPO: the issue price; the issue size (dollar amount as well as number of shares offered); the shares sold in this same offering by the old shareholders (insiders), called secondary shares; the name(s) of the lead underwriter(s); and the date of the offering.

For other issue characteristics, we used the SEC *Registered Offering Statistics* (ROS) tape, which contains information on all corporate offerings registered with the SEC from 1970 to 1986, inclusive. From the tape we obtained information on the date of incorporation, assets, sales, and number of outstanding shares.

The information described above, with the exception of date of incorporation, was supplemented and verified from issues of *Going Public: The IPO Reporter* (1980-86).

We obtained a listing of ordinal ranks for 117 underwriters from Carter (1987), who compiled them from tombstone advertisements of IPOs made between January 1, 1979 to August 31, 1983.

The first available bid price used for the computation of the initial return was obtained from the *S&P Daily OTC Stock Price Record*. Other prices and the OTC Composite Index used for computing the first-week, first-month, and first-year adjusted returns were obtained from the same publication.

For the number of analysts, the number of institutions, and their percentage holdings of the firm after it has gone public, we used Nelson's *Directory of Wall Street Research*.

The information regarding the identity of the venture capitalist(s) involved with a firm's IPO was obtained from the *Venture Capital Journal* and a list from Venture Economics. Consequently, the extent of the venture capitalist's involvement in a firm, namely the equity ownership, was determined from the initial public offering prospectus.

The size, in terms of capital under management, and the type—for example, private, SBIC, and so forth—of the venture capitalist, were obtained from various editions of *Pratt's Guide to Venture Capital Sources* and *Venture's Guide to International Venture Capital*, published by Venture Magazine, Inc.

## **Description of Variables**

### **Initial Returns**

The measure of raw initial returns (IR) that is most widely used is given by:

$$IR = [(P - OP)/OP] \times 100, \quad (1)$$

where OP is the offering price and P is defined as the first available market price. P reflects the valuation the market puts on the shares of the firm when

it begins trading. Because the first traded price was not usually available, the closing bid price was used instead. Even if the first traded price were available, it may not have been indicative of the equilibrium daily price. Studies of transaction data, albeit on NYSE and AMEX stocks (e.g., Wood, McNish, and Ord 1985), indicate that the variance at the start of the trading day is much higher than over the rest of the day.

Sometimes, stock prices are not reported until several days after the initial public offering date. If the initial return is computed in the usual manner (equation 1), it would then consist of two components, the underpricing and the return over the period from the IPO date to the date of the first reported price. For our sample of 871 IPOs, the first reported secondary market price was on the day of the IPO for all but 54. Table 5 presents a distribution of the 871 IPOs in terms of the number of trading days from the IPO date to the date of the first reported price.

### Aftermarket Returns

We compute one-week, one-month, and one-year aftermarket returns using the first-day closing price and the closing price one week, one month, or one year later. Closing-bid prices are used where closing prices are not available.

---

**TABLE 5**

**Distribution of the Number of Days to the First Available Price from the Date of the IPO for the Sample of 871 IPOs**

<i>Number of Days from the IPO Date to the First Available Price</i>	<i>Number of IPOs</i>
0	817
1	40
2	4
3	4
4	4
8	1
15	<u>1</u>
	871

---

Our definitions for the periods of one week, one month, and one year are 7, 28, and 364 ( $52 \times 7$  days) calendar days from the first trading day, respectively. The periods would be equivalent to 5, 20, and 260 trading days, respectively. If the last day of the period falls on a holiday, the price for the next day is used. If the holiday is on a Friday, the price on the following Monday is used. Adjustments are not made for holidays that occur during the period.

An adjustment for market movement during the seasoning period is made by subtracting the return on the NASDAQ OTC Composite Index from the stock's return for the corresponding period. This essentially assumes that each stock has a beta of one.

### **Standard Deviation of Aftermarket Returns**

This is computed using aftermarket prices obtained from the *S&P OTC Stock Price Record*. This variable serves as a proxy for the risk of each IPO.

### **Age**

This is the number of years between a firm's incorporation and its IPO. The *Registered Offering Statistics* (ROS) tape provides the date of incorporation. Age is computed on a calendar-year basis; for example, a firm that was incorporated in 1978 and went public in 1980 has an age of two years. Age is a measure of the operating history of the firm. It is a proxy for the availability of information about the firm (Barry and Brown 1985 and Muscarella and Vetsuypens 1987).

### **Assets, Sales, and Market Capitalization**

These variables are used to control for the effects of firm size. Although it is generally preferable to use assets as a measure of firm size, for firms that lease or are in the service industry, sales may be a better indication of its relative size. Market capitalization is the total number of shares outstanding after the IPO, multiplied by the first day's closing (or closing-bid) price. Whereas assets and sales are based on book value, market capitalization reflects the market's assessment of the firm's future opportunities.

### **Offering Size**

This is the gross dollar amount raised in the IPO. The size of an offering is often a measure of the impact the IPO has on the capital market.

### Offer Price

We follow the argument of Tinic (1988), who cites Graham, Dodd, and Cottle (1962) in asserting that conventional wisdom in the investment community is that low-priced stocks tend to be issued by highly speculative firms. Empirical support for this notion, according to Tinic, is found in Osborne (1969), whose study indicates that lower-priced stocks are more volatile than higher-priced stocks. Further, Blume and Husic (1973) and Miller and Scholes (1982) report that the reciprocals of share prices are equally good compared to the beta coefficients in predicting subsequent returns.

### Percentage of Equity Retained by Insiders

This variable is computed as:

$$\%EQUITY = [(TSOA - SOI)/TSOA] \times 100, \quad (2)$$

where TSOA is the total number of shares outstanding after the initial public offering and SOI is the number of shares sold in the initial public offering.

### Underwriter Rank

Carter (1987) assigns ranks to 117 underwriters on the basis of their position in the tombstone advertisements of IPOs made between 1979 and 1983. The most prestigious underwriters are assigned a rank of nine, and the least prestigious ones a rank of zero. Carter's list is used to assign ranks to the underwriters of the IPOs in our sample (see Table 6). If there were two or more co-lead underwriters of an issue, the most prestigious underwriter was chosen for the assignment of underwriter rank. An underwriter prestige dummy variable, UR8, is used to denote whether the underwriter is in the high-prestige category (zero if the rank is below eight and one if the rank is eight or higher).

### Secondary Offerings

When new shares are issued and sold at the IPO, the offering is called a *primary offering*. When the shares are sold by existing shareholders, the offering is called a *secondary offering*. An initial public offering may consist of just a primary offering, just a secondary offering, or both. For example, the initial public offering of Apple Computer was 4,600,000 shares. Of these, 4,000,000 were new shares issued by the company and 600,000 were shares sold by

TABLE 6

**Underwriter Prestige Ranks for 871 IPOs  
During the Period 1980-86**

<i>Underwriter<sup>a</sup> Rank UR</i>	<i>Venture- Backed IPOs</i>	<i>Percent of all Venture- Backed IPOs (%)</i>	<i>Nonventure- Backed IPOs</i>	<i>Percent of all Nonventure- Backed IPOs (%)</i>	<i>Total IPOs</i>
0.0	0	0.0	6	1.0	6
0.5	0	0.0	0	0.0	0
1.0	0	0.0	2	0.3	2
1.5	2	0.7	5	0.8	7
2.0	2	0.7	35	5.9	37
2.5	0	0.0	1	0.2	1
3.0	3	1.1	29	4.9	32
3.5	2	0.7	9	1.5	11
4.0	10	3.6	24	4.1	34
4.5	0	0.0	2	0.3	2
5.0	30	10.7	127	21.7	157
5.5	8	2.8	23	3.9	31
6.0	18	6.4	14	2.4	32
6.5	0	0.0	9	1.5	9
7.0	14	5.0	37	6.3	51
7.5	22	7.8	38	6.4	60
8.0	115	40.9	180	30.5	295
9.0	55	19.6	49	8.3	104
Total	281	100.0	590	100.0	871
UR < 8 <sup>b</sup>	111	39.5	361	61.2	472
UR ≥ 8	170	60.5	229	38.8	399

Notes:

<sup>a</sup> These are ordinal ranks of underwriter prestige based on Carter (1987).<sup>b</sup> The underwriter prestige rank of eight provides a convenient partitioning of the sample into prestigious and nonprestigious underwriters.

existing shareholders. A dummy variable is used to denote whether an IPO includes a secondary offering (zero if it does not and one if it does). Where the IPO consists solely of a primary offering, the secondary offering as a percentage of the IPO is equal to zero.

**Venture Capital Backing**

This dummy variable is zero if the IPO is not venture backed and one if the IPO is backed by venture capital.





## 5. Discussion of Results

### Initial Returns of Venture-Backed Versus Nonventure-Backed IPOs

Hypothesis 1 states that the underpricing of venture-backed IPOs is greater than the underpricing of nonventure-backed IPOs. This may be restated as the following null hypothesis:

$$H_0: IR(VC) - IR(NON-VC) \leq 0,$$

where  $IR(VC)$  and  $IR(NON-VC)$  are the mean initial returns of venture-backed and nonventure-backed IPOs, respectively.

### Comparison of Initial Returns of Venture-Backed Versus Nonventure-Backed IPOs

The data in Table 7 show that the sample consisting of all 871 IPOs is significantly underpriced on *average*, with initial returns (IR) of 7.61 percent. Both the sub-sample of 281 venture-backed IPOs and the sub-sample of 580 nonventure-backed IPOs also show a significant degree of underpricing: 8.22 percent and 7.31 percent, respectively. Although venture-backed IPOs are more underpriced than nonventure-backed IPOs, the difference between the mean levels is statistically insignificant ( $t$ -value = 0.904). Thus, whereas venture-backed IPOs are more underpriced, they are not significantly more underpriced at reasonable confidence levels. One possible reason for this is that issue characteristics mask any impact of the venture capital firm on underpricing. That is, when we control for different issue characteristics, it

**TABLE 7**

**Comparison of the Mean Initial Returns of  
871 IPOs from 1980-86 Classified by Whether  
Venture Capital Backing Was Received**

<i>Sample</i>	<i>Number</i>	<i>Mean Initial Returns (%)</i>	<i>Test of Difference from Zero of Mean Initial Returns (t-statistic)</i>
All IPOs	871	7.61	14.331
Venture-backed	281	8.22	8.948
Nonventure-backed	590	7.31	11.249

---

might be possible to identify the independent effect of venture capital backing on new-issue underpricing.

Table 8 presents means of important issue characteristics of venture-backed and nonventure-backed IPOs. In general, venture-backed firms have shorter operating histories, larger market capitalizations, higher offer prices, and higher standard deviations of aftermarket returns. Venture-backed firms also tend to retain a higher percentage of the equity and use more prestigious underwriters. It is clear from Table 8 that venture-backed IPOs are different from nonventure-backed IPOs in terms of a number of IPO characteristics; a meaningful comparison of the mean initial returns between these two groups should control for these differences. Ordinary Least Squares regression (OLS) is used to test the idea. Table 9 shows the results of three regressions of initial returns versus IPO characteristics. A different measure of issue size is used in each of the three regressions: log of market capitalization, log of assets, and log of sales, respectively.

The hypothesized sign of the venture capital dummy variable is positive (i.e., venture capital backing should produce a higher degree of underpricing if it mimics the good issue of the Dynamic Strategy Model). In all three cases, the venture capital dummy variable has the expected positive sign, but it is

TABLE 8

**Venture-Backed Versus Nonventure-Backed  
IPO Characteristics: Comparison of Means**

<i>Characteristic</i>	<i>All IPOs</i>	<i>Venture- Backed</i>	<i>Nonventure- Backed</i>	<i>Difference Between Means Venture-Backed and Nonventure- Backed (t-values)</i>
Years since incorporation	13.3	9.4	15.2	4.528
Assets (\$,000)	31,181	20,427	36,303	1.478
Sales (\$,000)	55,483	64,005	51,425	0.498
Market capitalization (\$,000)	75,814	95,613	66,384	3.044
Offering size (\$,000)	18,720	20,535	17,855	0.827
Offering price (\$)	11.8	12.3	11.6	1.953
% Equity retained	70.71	73.12	69.56	4.166
Underwriter rank	6.5	7.3	6.2	7.622
Standard deviation				
aftermarket returns	2.91	3.081	2.828	2.513
Secondary offering (% of IPO)	22.99%	17.02%	25.83%	4.992

insignificantly different from zero at reasonable confidence levels. The variables that appear to offer the strongest explanatory power for IPO underpricing are aftermarket volatility (a proxy for new-issue risk), the underwriter dummy variable (a measure of underwriter quality), and the firm's market capitalization (a measure of its market impact).

As further checks on the strength of these results, we split the sample by (1) industry, (2) hot and cold markets, and (3) primary and secondary nature of the IPO.

### **Industry Effects**

There has been a tendency for venture capital to be concentrated in certain industries, such as high technology. These industries may be more risky *ex ante* than other, more established industries. Table 10 presents summary statistics for IPO initial returns from venture- and nonventure-backed groups,

**TABLE 9**

**Results of Regressions of Initial Returns Against IPO Characteristics for 871 IPOs**

	<i>Regression 1</i>	<i>Regression 2</i>	<i>Regression 3</i>
R <sup>2</sup>	0.104	0.092	0.09
F	15.349	13.614	13.348
Intercept	-21.358	3.696	-0.476
Venture dummy	0.007 (0.006)	0.55 (0.482)	0.604 (0.527)
Age of firm	-0.039 (-1.312)	-0.021 (-.686)	-0.032 (-1.034)
% Equity retained	-0.082 (-1.644)	0.014 (0.302)	0.001 (0.021)
% Secondary	0.001 (0.056)	0.016 (0.709)	0.013 (0.58)
Aftermarket standard deviation	3.298 (8.907)*	3.17 (8.347)*	3.26 (8.586)*
Underwriter prestige dummy	-4.919 (-3.97)*	-2.336 (-2.015)**	-2.802 (-2.485)**
Log of market capitalization	2.608 (3.556)*		
Log of assets		-0.586 (-1.299)	
Log of sales			-0.027 (-.084)

Notes:

( ) Indicates *t*-statistics.

\* Significant at 1 percent level.

\*\* Significant at 5 percent level.

broken down by industry groupings according to two-digit SIC codes.<sup>1</sup> There are differences in mean initial returns between venture-backed and nonventure-backed IPOs within a number of SIC codes, but *t*-tests of differences in mean returns did not reveal statistical significance.

### Hot and Cold Market Effects

Could the larger underpricing of venture-backed IPOs be the result of a concentration of offerings in a particularly exuberant year for IPOs? Table 11 contains the year-by-year breakdown of IPOs divided into venture- and nonventure-backed groups. Venture-backed IPOs had lower initial returns in 1984 and 1985, but higher initial returns in the other years. Only in 1981 did venture-backed IPOs have significantly higher underpricing compared to nonventure-backed IPOs. But 1981 was not a hot year: The mean underpricing for all IPOs of 5.55 percent is lower than all the other years except 1984.

### Primary Versus Secondary Offerings

An IPO may comprise completely new (or additional) shares offered to the public (a primary offering) or may contain a partial component of existing privately held shares that the current owners wish to sell along with some new shares (a secondary offering). Because this “insider-selling-out” effect of secondary IPOs may have negative connotations for new public investors, a good firm may have to underprice more with a secondary offering than with a primary offering. That is, we might expect the venture capital underpricing effort that signals it is a good firm, to be more evident in the secondary than in the primary IPO market.

For primary issues, 313 IPOs are divided into 117 venture-backed issues and 196 nonventure-backed issues. The venture-backed sample has a lower mean initial return (6.44 percent) than the nonventure-backed sample (9.12 percent). A *t*-test reveals, however, that this difference is not statistically significant ( $t = 1.251$ ). For secondary IPOs, there are 558 issues, 164 venture-backed and 394 nonventure-backed. In this case, secondary venture-backed issues are significantly *more* underpriced than nonventure-backed issues, 9.496 percent versus 6.424 percent, which is confirmed by an OLS regression

---

<sup>1</sup>Clarke (1989) shows that firms classified with higher-digit SIC codes are not any more homogeneous than firms with lower-digit SIC codes.

**TABLE 10**

**Number of IPOs and Initial Returns Statistics  
by SIC Two-Digit Codes**

<i>SIC 2 Digit</i>	<i>Description</i>	<i>No.</i>	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Standard Deviation</i>
<i>Venture IPOs</i>							
28	Chemicals	18	5.19	0.90	-7.69	54.17	13.45
35	Industrial and commercial machinery, computers	66	8.36	3.04	-7.41	50.00	13.37
36	Electronic, electrical equipment except computer equipment	30	7.02	2.50	-7.50	34.38	10.43
38	Measuring, analyzing, and controlling instruments	26	12.59	3.48	-5.00	54.17	16.69
73	Business services	56	8.49	4.72	-33.93	86.96	16.98
<i>Others</i>		85	7.68	1.79	-34.78	103.57	17.26
<i>Nonventure IPOs</i>							
13	Oil and gas extraction	24	6.87	0.00	-8.75	63.33	17.97
28	Chemicals	20	2.99	1.62	-7.29	15.38	6.98
35	Industrial and commercial machinery, computers	42	14.41	2.61	-6.25	106.67	21.80
36	Electronic, electrical equipment except computer equipment	51	8.89	2.00	-14.06	65.00	17.03
38	Measuring, analyzing, and controlling instruments	38	12.08	2.01	-10.42	112.50	24.61
50	Wholesale-durable goods	23	8.45	2.50	-10.00	61.11	17.66
58	Eating and drinking places	27	9.29	0.00	12.50	63.33	17.53
73	Business services	99	5.69	2.08	-9.43	58.70	10.91
80	Health services	26	10.28	3.69	-9.52	83.33	18.68
<i>Others</i>		240	5.42	0.90	-15.63	116.67	13.28

TABLE 11

## Initial Performance of IPOs by Year (1980-86)

Year	Venture-Backed		Nonventure-Backed		All IPOs		Test of Difference Between Means (Venture/Nonventure) t-Statistic
	No.	Mean (%)	No.	Mean (%)	No.	Mean (%)	
1980	17	23.84	35	13.06	52	16.59	1.598
1981	30	9.92	68	3.61	98	5.55	2.446*
1982	18	11.25	39	10.44	57	10.69	0.168
1983	87	9.43	199	8.85	286	9.02	0.245
1984	39	2.59	55	2.81	94	2.72	0.147
1985	35	3.73	70	8.03	105	6.6	1.499
1986	55	6.42	124	5.89	179	6.06	0.266
Total	281	8.22	590	7.31	871	7.61	0.795

Note:

\* Significant at 5 percent level.

of secondary IPO returns on a venture capital dummy variable ( $\beta = 3.072$ ,  $t = 2.381$ ). These results are consistent with a greater underpricing signaling effort by venture-backed (good-firm) issues when insiders partially sell out to offset the negative signal of the reduction in the insider's stake.

### Summary of Results for Hypothesis 1

Stage 1 of the Dynamic Strategy Model implies that if venture-backed issues are good issues, they will be more underpriced than nonventure-backed (relatively bad-firm) issues. The results show that all venture capital issues are, *on average*, more underpriced than all nonventure-backed issues, but the difference in underpricing is not statistically significant. Moreover, when controlling for such issuer characteristics as industry and hot and cold market conditions, no apparent effect is evident. When the sample is split into



secondary and primary IPOs, evidence is found that secondary venture-backed IPOs *are* more underpriced than nonventure-backed secondary IPOs. This is consistent with the Dynamic Strategy Model, which states that good firms must underprice even more with a secondary IPO to offset the bad signal of a partial dilution of the original owners' shares.

### **Test of the Second Stage of the Dynamic Strategy Model**

Hypothesis 2 states that by underpricing more, good firms seek to attract greater analyst coverage. This may be restated as the following null hypothesis:

$$H_0: A(\text{VC}) - A(\text{NON-VC}) \leq 0,$$

where  $A(\text{VC})$  denotes the mean number of analysts following the venture-backed firms, and  $A(\text{NON-VC})$  denotes the mean number of analysts following the nonventure-backed firms.

As illustrated in Table 12, analyst coverage averaged 5.2 analysts per firm for venture-backed firms compared to 2.9 analysts for the nonventure-backed firms. A  $t$ -test of the difference between the two means is significant at the 1 percent level. Greater analyst coverage of the venture-backed firms could, however, be attributed to several firm-specific characteristics correlated to venture capital backing. We control for these characteristics by running the regressions shown in Table 13.

As can be seen from Table 13, the effect of the venture capital dummy variable on the number of analysts following the firm is quite robust to the inclusion of other control variables. Moreover, the results for secondary IPOs alone are very similar to those for the entire sample (i.e., greater analyst coverage of venture-backed issues).

Hypothesis 3 of the Dynamic Strategy Model states that greater underpricing of the IPOs of good issues attracts greater institutional interest. The null hypothesis may be stated as:

$$H_0: IH(\text{VC}) - IH(\text{NON-VC}) \leq 0,$$

where  $IH(\text{VC})$  and  $IH(\text{NON-VC})$  are the mean institutional holdings of the venture-backed and nonventure-backed firms, respectively.

TABLE 12

## Analyst Coverage and Institutional Interest

	<i>All IPOs</i>	<i>Venture-Backed</i>	<i>Nonventure-Backed</i>	<i>t-test of Difference Between Means (Significance Level)</i>
Average number of analysts covering firm	2.9	5.2	2.9	1%
<i>Institutional Ownership</i>				
Average number of institutions (Based on 428 firms)	15.8	21.3	13	1%
Percent of outstanding shares held by institutions (Based on 397 firms)	18.09%	22.22%	13.18%	1%

Data on institutional holdings could be obtained for only 397 firms (147 venture-backed and 250 nonventure-backed firms). As shown in Table 12, the mean percentage of the outstanding shares of venture-backed firms held by institutions is 22.22 percent. The corresponding figure for the nonventure-backed firms is 13.18 percent. A *t*-test of the statistical difference between the two means is significant at the 1 percent confidence level. We also examined the strength of this result by running regressions to control for other factors that may impact institutional holdings. As illustrated in Table 14, the significantly positive effect of the venture capital dummy variable on institutional holdings is robust (as indicated by the highly significant *t*-values) to the inclusion of these other variables. Moreover, when the secondary IPOs were separated out, the venture capital dummy variable again was significantly positive. Interestingly, for the primary group alone, the venture capital dummy variable was insignificant.

**TABLE 13**

**Results of Regressions of  
Number of Analysts Following Firm  
Against Characteristics of the Firms for 871 Firms**

<i>Variable</i>	<i>Regression 1</i>	<i>Regression 2</i>
Intercept	2.247	-14.612
Venture dummy	2.048 (9.135)*	1.252 (6.391)*
Age of firm		-0.019 (-3.814)*
Underwriter prestige		-0.249 (-1.163)
% Equity retained		-0.038 (-4.429)*
Log of market capitalization		1.869 (14.78)*
% Secondary		0.001 (.34)
Initial returns		0.019 (3.371)*
One-year aftermarket returns <sup>a</sup>		0.015 (10.643)*
Adjusted R <sup>2</sup>	0.087	0.384
F	83.456	68.852

Notes:

<sup>a</sup> One-year aftermarket returns are for a period of one year from the offering date of the IPO. It excludes the initial return.

( ) Indicates *t*-statistics.

\* Significant at 1 percent level.

---

TABLE 14

**Results of Regressions of Institutional Holdings in the Firm  
Against Characteristics of the Firms**

<i>Variable</i>	<i>Regression 1</i>	<i>Regression 2</i>
Intercept	15.66	-2.898
Venture dummy	6.564 (4.549)*	6.101 (4.082)*
Age		0.097 (2.261)**
Underwriter prestige dummy		-2.768 (-1.755)
% Equity retained		-0.344 (-4.882)*
Log of market capitalization		3.736 (3.358)*
Secondary offering dummy		0.93 (0.611)
Initial returns		0.045 (0.922)
One-year aftermarket returns		0.036 (3.273)*
Number of analysts		0.472 (1.849)
Adjusted R <sup>2</sup>	0.05	0.169
F	20.694	9.96

Notes:

These statistics cover 397 firms.

( ) Indicates *t*-statistics.

\* Significant at 1 percent level.

\*\* Significant at 5 percent level.

The fourth hypothesis states that good issues should exhibit positive abnormal returns in the period following the first day of trading and full seasoning. Because it is not possible theoretically to identify the exact time at which a given new issue or IPO becomes fully seasoned in the secondary market, three different aftermarket horizons are defined to analyze the relative aftermarket return performance between venture-backed and nonventure-backed issues. These horizons are one week, one month, and one year. The Dynamic Strategy Model is consistent with greater abnormal returns for venture-backed (good) issues in the immediate aftermarket (pre-seasoning) period. This hypothesis may be restated as:

$$\begin{aligned}H_0: & \text{ARWEEK(VC)} - \text{ARWEEK(NON-VC)} \leq 0, \\H_0: & \text{ARMONTH(VC)} - \text{ARMONTH(NON-VC)} \leq 0, \\H_0: & \text{ARYEAR(VC)} - \text{ARYEAR(NON-VC)} \leq 0,\end{aligned}$$

where  $\text{ARWEEK(VC)}$  is the mean one-week return for the venture-backed IPOs, and  $\text{ARWEEK(NON-VC)}$  is the mean one-week return for the nonventure-backed IPOs. The other variables are similarly defined, with  $\text{ARMONTH}$  and  $\text{ARYEAR}$  denoting the mean one-month aftermarket return and the mean one-year aftermarket return, respectively.

The aftermarket returns for each period are computed using the closing price of the first day of trading and the closing price at the end of the period for each IPO. Thus, initial (first-day) returns are *not* included. Where there is no indication otherwise, the aftermarket returns reported have been adjusted for OTC market returns, with the NASDAQ Composite Index being used as the market portfolio. Such an adjustment consists of subtracting the return on the market from the raw return of the firm over the same period. Note that the aftermarket returns in this section are *not* annualized returns. Rather, they are returns for the period in question, whether it is one week, one month, or one year.

Table 15 summarizes the results. Note that in the immediate aftermarket (i.e., one week and one month), the returns of venture-backed firms are significantly higher than those of nonventure-backed firms (at the 10 percent confidence level). By the end of a one-year horizon, however, there is no statistically significant difference. This finding suggests that in the period prior to a stock's full secondary-market seasoning, the venture-backed IPOs outperformed the nonventure-backed IPOs.

TABLE 15

**Summary of Aftermarket Performance of 871 IPOs  
During the Period 1980-86**

	<i>All IPOs</i> (%)	<i>Venture- Backed</i> (%)	<i>Nonventure- Backed</i> (%)	<i>t-test of Difference Between Means (Significance Level)</i>
<i>Returns</i>				
Initial returns	7.61	8.22	7.31	Not significant
Aftermarket adjusted returns:				
One week	-0.06	0.79	-0.47	10
One month	0.81	2.11	0.19	10
One year	-1.09	-0.95	-1.25	Not significant
<i>Volatility</i>				
Standard deviation of aftermarket adjusted returns	2.91	3.08	2.83	5

### Summary of Results for Stage 2 of the Dynamic Strategy Model

In general, the results for hypotheses 2, 3, and 4 are consistent with the Dynamic Strategy Model for good (venture-backed) firms. Specifically, the issues of venture-backed firms appear to have more analyst coverage, to be held to a greater extent by institutional investors, and to earn higher abnormal returns in the early aftermarket.

### Tests of the Third Stage of the Dynamic Strategy Model

Hypothesis 5 states that venture-backed firms will come to the market with another issue of stocks *earlier* than nonventure-backed firms with a *seasoned* issue. That is, good firms bear the cost of greater underpricing of the IPO to cash-in with a seasoned offering later on at the first true seasoned market value. This hypothesis may be restated as the following *null* hypothesis:

$$H_0: T(\text{VC}) \geq T(\text{NON-VC}) ,$$

where T is the time elapsed (measured in months) between a firm's IPO and its first secondary-equity issue. Table 16 presents the summary statistics of seasoned offerings made by the sample of 871 IPOs. Data on the seasoned offerings were collected from the *Directory of Corporate Financing*. Only 186 of the firms in the sample made a seasoned offering of equity. Of these, 72 were venture-backed and 112 were nonventure-backed firms.

In Table 16 we have compiled the yearly number of IPOs and the number of subsequent seasoned-equity offerings. Only the first seasoned offering made by the firm is considered. The column for months needs some explanation. The first line indicates the average time elapsed in months from the IPO date to the seasoned-offering date; the second line indicates the range in which the first number corresponds to the shortest period and the second number the longest period; and the third line indicates the standard deviations. The amounts raised in the seasoned offerings are similarly presented.

Overall, as shown in Table 17, venture-backed IPOs come to the market earlier (17.5 months versus 19.9 months) and raise larger amounts (\$21.4 million versus \$20.2 million) than nonventure-backed firms. The differences, however, are not statistically significant.

Table 18 shows a nonparametric test of the number of firms with and without seasoned offerings, divided into whether venture capital was received or not. It can be seen that the proportion of venture-backed firms with seasoned offerings is higher than the proportion of nonventure-backed firms with seasoned offerings. Moreover, a Chi-square test rejects the null hypothesis of independence between venture capital backing and seasoned issue. Thus, at best, there is some weak evidence in support of the third stage of the Dynamic Strategy Model; that is, venture capital insiders cash in at the seasoned-issue stage, not at the IPO stage. As the sample of seasoned issues increases over time, more data will be available to test the third stage of the DSM.

TABLE 16

## Summary Statistics of Seasoned Offerings for 184 Firms

Year	<i>Venture-Backed Firms</i>				<i>Nonventure-Backed Firms</i>			
	<i>No. Of IPOS</i>	<i>No. Of Seasoned Offerings</i>	<i>Months</i>	<i>Amount (\$ Millions)</i>	<i>No. Of IPOS</i>	<i>No. Of Seasoned Offerings</i>	<i>Months</i>	<i>Amount (\$ Millions)</i>
1980	17	8	20.8	18	35	10	31.8	26.1
			4...40	5.5...62.7			5...85	2.8...72.9
			12.5	18.8			30.1	22.4
1981	30	13	16.9	18	68	16	21.3	17.9
			8...82	5.7...33.4			5...50	0.4...59.0
			7.99	8.8			13.5	15.8
1982	18	6	22.3	17.8	39	6	20.7	18.7
			7...48	4.8...37.5			7...46	2.8...49.4
			15.6	11.3			14.8	16.4
1983	87	12	26	23.6	199	34	22.1	20.4
			4...40	4.6...50			8...48	2.7...90.0
			10.4	11.8			10.5	19.5
1984	39	13	17.2	23.7	55	18	22.1	14.6
			7...27	8.2...53.5			5...41	2.3...34.7
			7.5	15.7			10.8	8.4
1985	35	8	9.1	25.5	70	17	11.5	25.1
			6...11	6.3...73.7			3...24	1.8...107.8
			1.89	22.5			5.8	26.4
1986	55	14	10.9	23.4	124	11	9.1	23.8
			7...14	4.2...50.5			5...15	7.6...42.7
			2.1	13.9			2.7	13.5
Total	281	74			590	112		

Note:

The columns "Months" and "Amount" for each year give the mean, the range, and the standard deviation on the first, second, and third lines, respectively.



**TABLE 17**

**Seasoned Offerings Comparison**

	<i>Venture- Backed</i>	<i>Nonventure- Backed</i>	<i>Difference of Means (t-statistic)</i>
Number	74	112	
Time to first seasoned offering (months)	17.54	19.86	-1.22
Amount offered (\$ millions)	21.36	20.15	0.48

**TABLE 18**

**Nonparametric Test of Number of Firms With Seasoned Offerings**

	<i>Venture- Backed</i>	<i>Nonventure- Backed</i>	<i>Total</i>
Firms with seasoned offerings	74 (26.33)	110 (18.98)	186 (21.35)
Firms without seasoned offerings	207 (73.67)	480 (81.02)	687 (78.65)
Total	281	590	871

Notes:

( ) Indicates percent.  
 The Chi-square statistic equals 6.125.  
 The p value equals 0.013.

## 6. Summary and Conclusion

This study examines the link between venture capitalists and the new-issue market. It was argued that venture capitalists, as financial intermediaries, add value to a firm and its investment projects through financing, screening, monitoring, and management. To date, little empirical evidence exists on the nature of this value added. Using a model based on optimal dynamic new-issue strategies adopted by good firms relative to bad firms, it is possible to investigate the extent to which venture-backed firms mimic the hypothesized behavior of good firms. It was argued that good firms should consider a three-stage dynamic strategy in entering the market for new issues. This dynamic strategy argues that good firms should underprice new issues more than bad firms, thereby attracting greater investor and analyst attention in the secondary market, and then sell a seasoned issue to cash-in on the full revealed value of the firm in the aftermarket. That is, good firms seek to offset losses on underpricing by gains from seasoned issues.

In general, the results of this study are consistent with the predictions of the Dynamic Strategy Model. Specifically, venture-backed new issues are, on average, more underpriced than nonventure-backed ones, significantly so for secondary IPOs. Venture-backed IPOs attract more institutional and analyst attention and generate greater abnormal returns in the early aftermarket compared to nonventure-backed IPOs. Finally, venture-backed firms offer seasoned issues earlier and at higher dollar amounts than nonventure-backed firms, although the differences are not statistically significant. Overall, the behavior of venture-backed issues appears to mimic to some extent the optimal new-issue behavior implied by the DSM.

This study contains several implications for investment professionals. First are the tactical implications for investing in the IPO market. This study provides evidence that IPOs are underpriced on average; investing in IPOs yielded average excess returns of 7.6 percent. In addition, it is possible to identify venture-backed IPOs as investment possibilities. Spectacular returns may be earned by investing in a venture capital partnership, but there are other alternatives. For example, the fund manager may also invest in the initial public offering of the venture-backed firm. For the period studied, this tactic would have earned an average excess return of 9.5 percent for a secondary venture-backed IPO. This is a very handsome return because the holding period may be as short as one day. Further, a fund manager does not have to worry about liquidating holdings immediately when the shares begin to trade. This analysis suggests that he can wait up to one full month before selling and earn an extra 2.1 percent over the initial return. The fund manager may not wish to hold the shares beyond the one-month period, because the returns over one full year from the date of the IPO average -1.0 percent.

Second, this research supports the notion that venture capitalists add value to the firms in which they invest. The evidence is indirect, but it emphasizes that the emergence of the venture capital industry is not a result of reduced capital gains tax rates, but rather the special skills of the venture capitalist.

The third implication to be drawn from this research is the idea of strategic considerations in financial decision-making. For the financial manager, the IPO represents the first and one of the most significant events in the interaction of the firm with the investment community. If, as in most business and social transactions, the first impression is the impression that lasts, then the financial manager ought to have a strategy in coming out with an IPO and not view the exercise merely as a means of raising funds. The Dynamic Strategy Model may then serve as an appropriate guide to action.

---

## REFERENCES

- Akerlof, G.A. 1970. "The Market for 'Lemons': Quality Uncertainty and the Market Mechanism." *The Quarterly Journal of Economics* 84: 488-500.
- Allen, F. and G.R. Faulhaber. 1989. "Signaling by Underpricing in the IPO Market." *Journal of Financial Economics* 23 (August): 303-23.
- Barry, C.B. and S. Brown. 1985. "Differential Information and Security Market Equilibrium." *Journal of Financial and Quantitative Analysis*: 407-422.
- Barry, C.B., C.J. Muscarella, J.W. Peavy and M.R. Vetsuypens. 1988. "Venture Capital and Initial Public Offerings." Working Paper, Southern Methodist University.
- Bear, R.M. and A.J. Curley. 1975. "Unseasoned Equity Financing." *Journal of Financial and Quantitative Analysis*: 311-325.
- Beatty, R. and J. Ritter. 1986. "Investment Banking, Reputation, and the Underpricing of Initial Public Offerings." *Journal of Financial Economics*: 213-232.
- Block, S. and M. Stanley. 1980. "The Financial Characteristics and Price Movement Patterns of Companies Approaching the Unseasoned Securities Market in the Late 1970s." *Financial Management*: 30-36.
- Blume, M.E. and F. Husic. 1973. "Price, Beta, and Exchange Listing." *Journal of Finance* 28: 283-299.
- Brown, S.J. and M.P. Kritzman. 1990. "Quantitative Methods for Financial Analysis." Homewood, Illinois: Dow Jones-Irwin.
- Carleton, W.T. 1986. "Issues and Questions Involving Venture Capital." In *Advances in the Study of Entrepreneurship, Innovation and Economic Growth*. Vol. 1. Greenwich, Connecticut: JAI Press: 59-70.
- Carter, R.B. 1987. "Initial Public Offerings and the Underwriter Signal." Doctoral dissertation, University of Utah.

- Chalk, A.J. and J.W. Peavy. 1986. "Understanding the Pricing of Initial Public Offerings." Working Paper 86-072, Southern Methodist University.
- Chan, Y.S. 1983. "On the Positive Role of Financial Intermediation in Allocation of Venture Capital in a Market with Imperfect Information." *Journal of Finance* 38: 1543-1568.
- Chan, Y.S., D. Siegel and A.V. Thakor. 1987. "Learning, Corporate Control and Performance Requirements in Venture Capital Contract." Working Paper No. 36, Department of Finance, Northwestern University.
- Chemmanur, T.J. 1988. "The Pricing of Initial Public Offerings: A Dynamic Model with Information Production." Mimeo, New York University.
- Chiampou, G.F. and J.J. Kallett. 1989. "Risk/Return Profile of Venture Capital." *Journal of Business Venturing* 4: 1-10.
- Clarke, R.N. 1989. "SICs as Delineators of Economic Markets." *Journal of Business* 62: 17-31.
- Gaston, R.J. 1989. "Finding Private Venture Capital for Your Firm: A Complete Guide." New York: John Wiley.
- Giddy, I. 1985. "Is Equity Underwriting Risky for Commercial Bank Affiliates?" In I. Walter ed. *Deregulating Wall Street*. New York: John Wiley.
- Graham, B., D.L. Dodd and S. Cottle. 1962. *Security Analysis*, 4th Edition. New York: McGraw-Hill.
- Grinblatt, M., and C.Y. Hwang. 1988. "Signaling and the Pricing of New Issues." *Journal of Finance* 44: 393-420.
- Henderson, Y. 1989. "The Emergence of the Venture Capital Industry." *New England Economic Review* (July/August): 64-79. Federal Reserve Bank of Boston.
- Ibbotson, R.G. 1975. "Price Performance of Common Stock New Issues." *Journal of Financial Economics* 3: 235-272.

- . 1982. "Common Stock New Issues Revisited." Working Paper No. 84, Graduate School of Business, University of Chicago.
- Ibbotson, R.G. and J.J. Jaffe. 1975. "Hot Issue Markets." *Journal of Finance* 30: 1027-1042.
- Ibbotson, R.G. and G.P. Brinson. 1987. *Investment Markets*. New York: McGraw-Hill.
- John, K. and A. Saunders. 1986. "The Efficiency of the Market for Initial Public Equity Offerings: U.S. Experience 1976-1983." Unpublished.
- Leland, H.E. and D.H. Pyle. 1977. "Informational Asymmetries, Financial Structure, and Financial Intermediation." *Journal of Finance* 32: 371-387.
- Lim, J. 1989. "Initial Public Offerings: A Venture Capital Perspective." Doctoral dissertation, Stern School of Business, New York University.
- Logue, D.E. 1973. "On the Pricing of Unseasoned New Issues, 1965-1969." *Journal of Financial and Quantitative Analysis*: 91-103.
- Martin, J.D. and J.W. Petty. 1983. "An Analysis of the Performance of Publicly Traded Venture Capital Companies." *Journal of Financial and Quantitative Analysis* 18 (September): 401-410.
- McDonald, J.G. and A.K. Fisher. 1972. "New-Issue Stock Price Behavior." *Journal of Finance* 27: 97-102.
- McStay, P.K. 1987. "The Efficiency of New Issue Markets." Doctoral Dissertation, University of California.
- Miller, M.H. and M.S. Scholes. 1982. "Dividends and Taxes: Some Empirical Evidence." *Journal of Political Economy* 90: 1118-1141.
- Miller, R.E. and F.K. Reilly. 1987. "An Examination of Mispricing, Returns and Uncertainty for Initial Public Offerings." *Financial Management*: 33-38.

Muscarella, C.J. and M.R. Vetsuypens. 1987. "Initial Public Offerings and Information Asymmetry." Unpublished, Edwin L. Cox School of Business, Southern Methodist University.

Nanda, V. 1988. "Why Firms Go Public." Unpublished manuscript, University of Chicago.

Neuberger, B.M. and C.T. Hammond. 1974. "A Study of Underwriters' Experience with Unseasoned New Issues." *Journal of Financial and Quantitative Analysis* 9: 165-177.

Neuberger, B.M. and C.A. LaChapelle. 1983. "Unseasoned New Issue Price Performance on Three Tiers: 1975-1980." *Financial Management*: 23-28.

Osborne, M.F.M. 1969. "Periodic Structure in the Brownian Motion of Stock Prices." In P.H. Cootner, ed. *The Random Character of Stock Market Prices*. Cambridge, Massachusetts: MIT Press.

Perez, R.C. 1986. *Inside Venture Capital*. New York: Praeger Publishers.

Pratt, S. 1988. "Overview and Introduction to the Venture Capital Industry." In J.K. Morris ed. *Pratt's Guide to Venture Capital Sources*. Wellesley Hills, Massachusetts: Venture Economics.

Reilly, F.K. 1973. "Further Evidence on Short-Run Results for New Issue Investors." *Journal of Financial and Quantitative Analysis*: 83-90.

———. 1978. "New Issues Revisited." *Financial Management*: 28-42.

Reilly, F.K. and K. Hatfield. 1969. "Investor Experience with New Stock Issues." *Financial Analysts Journal* (September/October): 73-80.

Ritter, J. 1984. "The 'Hot Issue' Market of 1980." *Journal of Business* 57: 215-240.

———. 1987. "The Costs of Going Public." Working Paper #487, University of Michigan.

Rock, K. 1986. "Why New Issues are Underpriced." *Journal of Financial Economics* 15: 187-212.

Tinic, S.M. 1988. "Anatomy of Initial Public Offers of Common Stock." *Journal of Finance* 43: 789-822.

*Venture Capital Journal*. 1987. "Venture Capital Industry Resources Growth in 1986 Brings Capital Pool to \$24 Billion." (April): 9-17.

Welch, I. 1988. "Seasoned Offering, Imitation Costs and the Underpricing of Initial Public Offerings." *Journal of Finance* 44: 421-449.

Wilson, J.W. 1985. "The New Venturers: Inside the High-Stakes World of Venture Capital." Reading, Massachusetts: Addison-Wesley.

Wood, R.A., T.H. McInish and J.K. Ord. 1985. "An Investigation of Transactions Data for NYSE Stocks." *Journal of Finance* 40: 723-38.

Young, J.E. and J.K. Zaima. 1986. "Does it Pay to Invest in Small Business IPOs?" *Journal of Small Business Management* (April): 39-50.