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SIGNALING AND THE VALUATION OF UNSEASONED NEW ISSUES

by

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SIGNALING AND THE VALUATION OF
UNSEASONED NEW ISSUES

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I. INTRODUCTION

The valuation of new ventures is a complex task that, nevertheless, is done routinely by venture capitalists and investment bankers. When entrepreneurs are willing or required to raise new equity capital they must reveal certain information about their ventures. This information set includes such characteristics as the size of the venture, the line of business in which it is involved, the present form of financing, and evidence of past performance (sales, earnings, etc.). These observable characteristics are used by outsiders to estimate expected future cash flows and the uncertainty associated with these flows. However, there are other characteristics of the venture that cannot be easily reported or observed but which might be useful in valuing the venture. Such characteristics would include the quality and dedication of the venture's management, the possibility of the entrepreneur developing valuable products that are the property of this venture in the future, etc. Obvious entrepreneurial incentives for misrepresentation prevent outsiders from believing entrepreneurs' claims. Thus entrepreneurs must revert to the use of actions that attempt to signal to outsiders their "insider" knowledge and expectations for the future of the venture. Outsiders not only must evaluate the observable characteristics but must interpret these signals in order to reach a decision on the "true" value of a new venture.

This paper is an attempt to identify the set of observable characteristics and signals that was used in valuing one sample of new
ventures: first public offerings of common equity. Our focus is on two specific signals that have been proposed in the finance literature as useful in determining the underlying value of a firm. Part II briefly outlines the theory behind these two signaling mechanisms; Part III describes our research methodology and the data that we employ. Part IV is a discussion of our empirical results, and Part V contains our conclusions.

II. THE THEORY

We wish to study a one-period model of assumed informational asymmetries in the new, unseasoned equity capital market. In particular, firms new to the public equity market require additional, external, equity financing; the firms are assumed to know the distribution of their uncertain end-of-period value, \( \tilde{P}_1 \), but are unable to convince potential investors of their knowledge since firms may misrepresent their expectations in public statements.

One mechanism to transmit firms' unobservable beliefs to the market is through a costly signal, i.e., "actions speak louder than words." After adjusting for each firm's observable characteristics, potential investors use the signals to set current price, \( P_0 \), thereby also determining the firm's return distribution, \( 1 + \tilde{r} = \tilde{P}_1 / P_0 \), where \( \tilde{P}_1 \) includes all intermediate distributions by the firm.

The basic valuation tool to be used to examine the signaling mechanism follows the spirit of the work of Beaver, Kettler, and Scholes [1970] and Rosenberg and Marathe [1975]. Given \( \tilde{P}_1 \), both \( P_0 \) and \( \tilde{r} \)
are assumed to be functions of "descriptors"; these descriptors, whether from market-related or fundamental data, can be used to predict the risk and value of a firm's equity. Since the firms we are studying have no market history, all descriptors are fundamental, as defined by Rosenberg and Marathe.

For expository purposes, we classify descriptors into two categories, following Spence [1973]. First, indices are observable firm characteristics that are largely outside the control of the firm at the time of the equity issue; examples are the firm's industry group and measures of its size. Second, signals are observable firm features that are directly controllable by the firm at equity issue time and are hypothesized to be costly signaling tools. This paper examines two potential signals: (1) the fraction of equity ownership retained by the insiders, and (2) stated dividend policy.

Leland and Pyle [1977] construct a project valuation model which is a function of , the fraction of equity in the project retained by the entrepreneur. They assume the entrepreneur knows the project's expected return and potential investors do not. By retaining a larger proportional claim to the project's end-of-period cash flow, i.e., a higher , the entrepreneur is signaling his expectation of higher expected returns. The signal is costly since the entrepreneur must reduce his portfolio diversification to provide the signal. Furthermore, entrepreneurs with lower-quality projects will find it more costly to use this signaling device. In a simple model utilizing a CAPM valuation rule, Leland and Pyle find the market value of the project , as:

\[
V(\alpha) = \left(-\frac{bZ}{1+r}\right)[\alpha + \log(1-\alpha)] + K
\]  

(1)
where: \( r \) = the riskless interest rate

\( b \) = the risk aversion parameter in the entrepreneur's mean-variance utility function

\( K \) = the amount of the investment required to undertake the project

\[
Z = \frac{\sigma_x^2 \sigma_m^2 - [\text{cov}(\bar{x}, \bar{m})]^2}{\sigma_m^2}
\]

with \( \sigma_x^2 \) and \( \sigma_m^2 \) representing the variance of the project returns (\( \bar{x} \)) and the market returns (\( \bar{m} \)), respectively.

Note that \( Z \) can be interpreted as the specific risk of the project and that \( r, b, \) and \( Z > 0 \). A key existence condition, common to most signaling models, is to avoid the "unraveling" problem described by Riley [1977]. Basically there must be fewer projects with high expected return and a large number of projects whose true value is less than their cost.

Both Bhattacharya [1979] and Heinkel [1978] construct asymmetric information models using dividend policy as the costly signal. Both models indicate higher value firms will pay larger dividends in equilibrium. Bhattacharya takes the firm's investment decision as given and assumes a cost, common to all firms, for financing any shortfall of ending cash flow to the promised dividend payment. Another signaling cost shared by all firms is the tax disadvantage of dividend income compared to capital gains. In an example with firm intrinsic value uniformly distributed, Bhattacharya finds that the equilibrium expected payout ratios for all firms are equal; firms with higher expected returns pay larger dividends. Bhattacharya points out the importance of the dividend tax disadvantage
in making equity value sensitive to dividend policy. Presumably, the existence of the signaling equilibrium might be questioned in the dividend tax-irrelevant world of Miller and Scholes [1978].

Alternatively, Heinkel [1978] assumes frictionless markets, with no taxes or transactions costs, so that costly dividends occur only when paid out of funds otherwise intended for profitable investment. Furthermore, sufficient information to disclose previously unobservable firm characteristics with certainty is assumed to come into the market sometime during the period. This asymmetry resolution insures that ending equity value truthfully reflects each firm's intrinsic value and the value lost by foregoing investments at the start of the period, when the dividend was paid. Again, the result is that firms with higher expected returns pay larger dividends. The key existence condition, typically, is that there be fewer firms with high expected returns relative to the number of firms with average or low expected returns.

III. THE METHODOLOGY

Following the descriptive single-period model used by Heinkel [1978] outlined above, we assume that the unobservable firm feature, expected return, is revealed to investors between the initial equity offering and the end of the period. All experiments are repeated for various holding period lengths to test for sensitivity to this assumption. The asymmetry resolution assumption insures, for example, that if signals are misinterpreted by investors, then price adjustments will occur during the
A cross-sectional regression of $r_{tj}$ on the firms' indices and signals (equation (3)) reveals partial information about firms' signaling attempts and the market's receptivity to the signals. If, when estimating equation (3), we find one or both of the coefficients on the signals, $d_1$ and $d_2$, to be significant, then we would be unable to reject the hypothesis:

$H_2$: Initial market values, as described by the indices, do not correctly reflect firm values at $t = 0$; the signals may be used as risk surrogates or may be used to obtain abnormal holding period rates of return.
period as the market discovers the firm's true characteristics. In our model these adjustments would be reflected in a firm's market return for the period.

Specifically, we build a predictive model that uses the firm's descriptors to predict either the initial market value of the firm or its subsequent market performance:

\[ V_j = a_1 I_{1j} + a_2 I_{2j} + \ldots + a_k I_{kj} + b_1 \hat{\alpha}_j + b_2 \gamma_j \]  \hspace{1cm} (2)

\[ r_{tj} = c_1 I_{1j} + c_2 I_{2j} + \ldots + c_k I_{kj} + d_1 \hat{\alpha}_j + d_2 \gamma_j \]  \hspace{1cm} (3)

where: \( I_{1j}, \ldots, I_{kj} \) = the \( k \) indices for the \( j^{th} \) firm

\( \hat{\alpha}_j \) = a function of the Leland-Pyle signal, the fraction of equity ownership retained by the entrepreneur of the \( j^{th} \) firm

\( \gamma_j \) = the dividend signal

\( V_j \) = the market value of the \( j^{th} \) firm's equity at \( t = 0 \)

\( r_{tj} \) = the holding period (of length \( t \)) rate of return for firm \( j \), in excess of the market rate of return, calculated from the date of the new issue offering.

Capital Asset Pricing Theory states that holding period returns, \( r_{tj} \), are linearly related to a firm's systematic risk measure. We assume that investors in new issues use some combination of the set of indices, \( I_{kj} \), to estimate the systematic risk of firm \( j \). We are not arguing that all of the indices included in our tests are used by the market in assessing a firm's risk. Rather, we are controlling only for those descriptors available at the time of the initial offering in explaining subsequent returns. Obviously, the longer the holding period, the less useful some of those index values should be.
If the indices inadequately define how the market judges the risk of firm \( j \), the signals \( \hat{\alpha}_j \) and \( \gamma_j \) may be risk surrogates; thus, significance of \( d_1 \) and \( d_2 \) in equation (3) is consistent with the use of \( \hat{\alpha}_j \) and \( \gamma_j \) as risk descriptors. Alternatively, the set of indices, \( I_{kj} \), may adequately describe risk and the signaling mechanism may fail at \( t = 0 \) due to investors misinterpreting the firms' signals. In either case, \( r_{tj} \) will be significantly related to \( \hat{\alpha}_j \) and/or \( \gamma_j \).

Suppose, alternatively, that the cross-sectional regression on equation (3) has insignificant coefficients on the two signaling variables. This would be consistent with the two hypotheses:

\[ H_0: \quad \text{Firms signal and these signals are correctly interpreted at } t = 0 \text{ by investors; no price adjustment is necessary during the period when the firm's true features are revealed.} \]

\[ H_1: \quad \text{Firms do not signal, but the market is able, using the indices, to correctly price the new issues; thus, no intermediate price adjustment is required and signals are unnecessary.} \]

Assuming \( H_2 \) is rejected, we wish to test \( H_0 \) against \( H_1 \). We can reject \( H_1 \) in favor of \( H_0 \) if we are able to detect an effect on \( \gamma_j \), the market value of the equity at the time of the initial offering, attributable to one or both of the signals. A finding that both \( b_1 \) and \( b_2 \) in equation (2) are zero can be interpreted as evidence that firms do not signal or that the attempts to signal are of no importance, given the availability of the other descriptors. A finding that \( b_1 \) or \( b_2 \) is significant does not necessarily imply that firms signal. It is possible that the alleged signal is correlated with some descriptor that is used by the market in valuing the venture but is omitted from the regression.
The data base to be used to test the hypotheses \( H_0 \) through \( H_2 \) was created as part of a study of the investment performance of unseasoned new equity issues; Downes [1975] constructed a data base on some 2,650 firms that went public during the period 1960 to 1970. This data base contains end-of-quarter wealth relatives, including all intermediate cash flows, for each issue from the date of the offering through December 31, 1972. The initial offering prospectuses were obtained for 449 of the firms in the Downes [1975] data base covering the years between 1965 and 1969. These sources allowed us to construct a data base combining corporate accounting and demographic data as of the offering date with subsequent stock market performance data. All of the issues were registered with the SEC and underwritten by one or more investment banking firms; no "Regulation A" or "best efforts" underwritings were included.

The selection of the descriptors used in equations (2) and (3) was based on our interpretation of what other studies have found to be important (see, for example, Rosenberg and Marache [1975]) as constrained by our limited data sources. Unfortunately, the best single risk descriptor, the historical beta, is obviously not available. The indices used and the descriptions of how they were computed follow.

\[ I_1 \equiv \text{the ratio of total debt to total assets after the equity issue} \]

\[ I_2 \text{ and } I_3 \equiv \text{measures of the firms' past growth in earnings and the predictability of future earnings. For those firms for which three or more years of earnings data were available, an exponential smoothing model with linear trend was applied to each firm's entire reported annual EPS stream. The growth rate, } I_2, \text{ was computed as the natural logarithm of the ratio of the predicted EPS, } P_{t+1}, \text{ for the next} \]
year divided by the latest reported EPS, $A_L$. Thus, $I_{2} = \ln(P_{t+1} / A_L)$. The measure of predictability of earnings is the root mean square of the percent error of the predictions from the exponential smoothing model. Thus,

$$I_3 = \left[ \frac{1}{n-1} \sum_{t=2}^{n} \left( \frac{P_t - A_t}{P_t} \right)^2 \right]^{1/2}$$

where $n$ is the number of years of reported EPS available in the prospectus.\(^4\)

$I_4 \equiv$ the size of the firm classified by the number of employees (seven SBA classifications).\(^5\),\(^6\)

$I_5 \equiv$ a dummy variable representing managing underwriter prestige—$I_5 = 0$ for prestigious underwriters and $I_5 = 1$ for all others.\(^7\)

$I_6 \equiv$ a dummy variable representing the industry classification of the issuer, with $I_6 = 1$ if the three-digit SIC code is between 357 and 372 (electronics manufacturing) or 730 and 739 (computer services).\(^8\) For all other SIC codes $I_6 = 0$.

$I_7 \equiv$ a dummy variable representing the "hot new issue market" that began during 1967 and continued throughout 1969. $I_7 = 1$ for those issues offered on or after July 1, 1967, and $I_7 = 0$ for all issues prior to that date. This variable is included to allow for unusual pricing differences that arise in hot new issue markets, as demonstrated by Ibbotson and Jaffee [1975] and Downes [1975].

The signals included in the model, as described in section II, are:

(1) $\hat{\alpha} \equiv [\alpha + \ln(1-\alpha)] = \text{the Leland-Pyle signal of the firm's true quality, as a function of } \alpha$, where

$$\alpha = (N_0 - N_s)/N$$

$N \equiv$ the total shares outstanding after the issue

$N_p \equiv$ the number of primary shares offered by the firm
\( N_0 \equiv N - N_p \) = the number of shares allocated to the original ("insider") owners

\( N_s \equiv \) the number of secondary shares offered by the original owners for resale (out of \( N_0 \))

(2) \( \gamma \equiv \) dividend policy, as measured by the declared intent to pay a cash dividend (\( \gamma = 1 \) if a dividend is declared in the prospectus as to the amount and date payable; \( \gamma = 0 \) otherwise)

From equation (1), \( \partial \hat{\alpha} / \partial \alpha = -b_{22}/(1+r) < 0 \), thus the coefficient of \( \hat{\alpha} \) in equation (2) is hypothesized to be negative; the coefficient of \( \gamma \) is hypothesized to be positive.

The preferable valuation measure to serve as the dependent variable in equation (2) would be the ratio of market to book value of equity. Unfortunately, this ratio is directly proportional to the definition of the Leland-Fyle signal, \( \hat{\alpha} \).

Two alternatives were used as dependent variables in estimating equation (2): the price-earnings (P/E) ratio and the market value of equity to sales (M/S) ratio. In using the P/E ratio, our model resembles some earlier common stock valuation models (e.g., Bower and Bower [1969]). The earnings number used in the denominator of the ratio is an exponentially smoothed estimate of "normal" earnings for the most recent year prior to the offering. The second form of equation (2) uses the total market value of the firm's equity scaled by the most recent annual gross sales.

Firms that did not have even one year of sales (earnings) were dropped when M/S (P/E) was the dependent variable. Furthermore, many firms had negative earnings or earnings of only a few cents per share,
causing the P/E ratio to be suspect as a measure of value. Thus, an arbitrarily selected maximum P/E of 40 was set as a criterion for inclusion in the sample. The number of firms available under each of these sets of conditions are:

prospectuses available: 449
firms for which all required data were available: 363

\[ 0 < \frac{P}{E} \leq 40: \quad 271 \]

Rates of return for four holding periods—\( r_{2j}, r_{4j}, r_{8j}, \) and \( r_{12j} \)—are used in estimating equation (3). The first subscript represents the number of quarters from the quarter of issue in the holding period. The rate of return for each firm \( j \) is adjusted for the overall market performance during the same period in a naïve manner; in the absence of security betas, the rate of return for the market, defined as the value weighted NYSE index from the CRSP monthly returns tape, is subtracted from the security's return. This procedure is equivalent to assuming a beta of one for all firms.\(^{13}\)

IV. RESULTS

The results of regressing the rates of return for the four holding periods, adjusted for the market performance, on the descriptors introduced above are shown in columns 2 through 5 of table 1. The first column, headed \( r_{0j} \), contains the results of a regression in which the dependent variable is the rate of return on security \( j \) computed from the offering date through the last day of the quarter during which the
offering occurred. Thus, this holding period varies in length from one
day to ninety days, depending upon when the offering occurred during the
quarter, and no adjustment for the overall market has been made.

None of the coefficients are significant across all of the holding
periods. The explanatory power of the set of descriptors is rela-
tively low, explaining between 3 and 10 percent of the total variance of
the holding period returns. The following descriptors were statistically
significant at the 5 percent level in one or more of the regressions.

Debt to total capital ($I_1$). If, on average, firms with higher
leverage immediately after the equity offering tended to maintain higher
debt ratios over time, then their systematic risk is higher and subse-
quent market returns should be higher. All five of the coefficients are
positive, although only two are significant, which is consistent with
extant capital market theory.

Underwriter prestige ($I_5$). Logue [1973] provides evidence that
the average market-adjusted rate of return for the first few weeks after
the offering is significantly less for those first public offerings under-
written by prestigious investment banking firms than by nonprestigious
firms. Whether this phenomenon is attributable to greater underpricing
by nonprestigious underwriters or to higher levels of risk inherent in
the firms using nonprestigious underwriters is not clear. Nevertheless,
our finding that these "excess" returns are eliminated within at least
four quarters is consistent with Logue's.

Industry dummy ($I_6$) and hot new issues market dummy ($I_7$). High-
technology stocks (for which $I_6 = 1$) are generally high beta stocks,
thus the coefficient should be positive when the average market return is positive (given that the adjustment mechanism for the market used here assumes a beta of 1.0). The average market returns for most of the holding periods represented in these regressions were positive. However, the dominant factor in the longer (8 and 12 quarter) holding period regressions appears to be the large loss in value that was realized by 1972 on the set of new issues that went public in the "hot" market of 1967-1969 (for which \( I_7 = 1 \)). Further evidence of this phenomenon is provided by Downes [1975], who concludes that the market returns on new issues cannot be explained by a single index market model, where the index is based upon the NYSE population.

The coefficient of the Leland-Pyle variable, \( \hat{\alpha} \), is significantly different from zero only for one holding period (two quarters). However, in three of the other four regressions, the t-values of the coefficients are greater than one, and in all five cases the coefficients are negative. None of the coefficients of the dividend signal are significant.

Thus, based upon the results in table 1 we are able to reject \( H_2 \) for all holding periods except the two-quarter case. One possible explanation is that the offering prices, which are set through a negotiation process between the issuing firm and the underwriters, do not correctly incorporate the Leland-Pyle signal, but that the market quickly perceives this signal and adjusts the firms' market values accordingly. However, the longer the holding period the more likely the magnitudes of these market price adjustments will be swamped by the subsequent market and firm-specific developments.
Table 2 contains the results from the cross-sectional estimates of three versions of equation (2). Two different valuation measures were employed as the dependent variable in equation (2): price-earnings ratio (P/E), and market value of equity to gross sales (MV/Sales). Columns (1) and (2) show the regression results from the sample of 271 issues for which at least three years of past EPS data are available, whereas column (3) contains the results from the sample of 363 firms for which the minimum data requirement is one year of sales.

For the seven indices, the signs of the coefficients are generally consistent with extant valuation theory:

*Debt to total capital* ($I_1$).--Greater leverage implies greater systematic risk, thus the market value of equity is reduced.

*Measures of growth and predictability of earnings* ($I_2$ and $I_3$).--The coefficient of the past growth in EPS is surprisingly not statistically significant. The coefficient of the predictability measure is significant and positive. The higher the value of this variable, the greater the prediction error inherent in the past EPS series. Thus the positive sign of the coefficient implies that the less predictable the earnings, the greater the value of the equity. One explanation of this apparently inconsistent logic is that investors in new issues do not want a steady stream of earnings (after all, they could always invest in NYSE stocks), but want upside potential and are willing to pay a premium for it. Interestingly, neither measure ($I_2$ or $I_3$) is significant when MV/Sales replaces P/E as the dependent variable.
Firm size \( (I_1) \). -- Larger firms tend to be more mature and further along their growth cycle, thus their growth potential is less than smaller firms.

Underwriter prestige \( (I_2) \). -- As documented by Logue [1973], nonprestigious underwriters generally value a new offering lower than prestigious underwriters.

Industry dummy \( (I_3) \). -- The market during the period 1965-1969 apparently was willing to pay a premium for high-technology stocks.

"Hot new issue market" dummy \( (I_4) \). -- The period July 1, 1967, through 1969 was very receptive to unseasoned new issues of common stock.

The Leland-Pyle (\( \hat{\alpha} \)) and dividend policy (\( \gamma \)) signals. -- The coefficients of \( \hat{\alpha} \) in the three regressions are negative, which is consistent with the Leland and Pyle [1977] model, and significant at the 0.01 level. Table 3 contains the simple correlation coefficients between the nine descriptors used here, and it shows that both \( \hat{\alpha} \) and \( \gamma \) are relatively uncorrelated with the risk indices, as well as each other.\(^{14}\) Of course, it is still possible that \( \hat{\alpha} \) is highly correlated with an omitted variable and is serving as its proxy. The coefficient of the dividend policy signal is not statistically significant, and even has the wrong sign when the dependent variable is the P/E ratio. The \( R^2 \) value of 0.27 is in the range of values observed by Bower and Bower [1969] in their cross-sectional tests on one hundred NYSE firms.
V. CONCLUSIONS

This paper examines two signaling devices offered in the finance literature as a means by which entrepreneurs convey information to the market on their intentions and beliefs. Leland and Pyle [1977] argue that the fraction of ownership retained by the entrepreneurs increases proportionally with their assessment of the true value of the venture. Bhattacharya [1979] and Heinkel [1978] demonstrate that higher value firms will pay out higher cash dividends.

By adding variables representing these two signals to a set of variables designed to represent observable firm characteristics, we attempt to explain the market's valuation of a sample of unseasoned new issues. We find that neither signal is consistently useful in predicting holding period returns and thereby reject the hypothesis that abnormal holding period returns are available by employing either the Leland-Pyle or dividend signals.

The significance of the Leland-Pyle signal across the two valuation measures in table 2 is consistent with accepting hypothesis $H_0$ over $H_1$; firms use Û as a signal and the market values of firms appear to reflect the signal correctly. The market appears to reward entrepreneurs for their unwillingness to share their projects with outsiders.

Neither the stated intent to pay a cash dividend nor the dividend payout ratio serves as a significant explanatory variable in the valuation models tested. Interestingly, in the regression with the P/E ratio as the dependent variable the coefficient of the dividend policy variable was
even of the wrong sign. Thus, the results of our study are consistent with those of almost all other empirical studies of dividend policy—there appears to be no valid reason why a firm with growth opportunities pays cash dividends.
FOOTNOTES

1 Although Leland and Pyle formulated their model in the context of project valuation, it is directly applicable to the valuation of firms making their first public offering of equity.

2 The prospectuses were borrowed from Cornell University, and we wish to acknowledge Ms. Betsy Ann Olive, Librarian at the Graduate School of Business and Public Administration, for her cooperation and willingness to make long-term, long-distance loans.

3 The exponential smoothing weights were chosen to minimize the sum of squared errors over all firms; the error was defined as the difference between the exponential forecast for the firm's final annual earnings number prior to its equity issue and the actual earnings reported.

4 Two other measures of the predictability of earnings that were tried were the variance and range of past reported earnings. Both were highly correlated with the level of earnings, which led to spurious relationships in the regressions that used price/earnings ratios as the dependent variable.

5 The employee classifications are:

<table>
<thead>
<tr>
<th>Value of ( I_4 )</th>
<th>Number of Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1-4</td>
</tr>
<tr>
<td>2</td>
<td>5-19</td>
</tr>
<tr>
<td>3</td>
<td>20-99</td>
</tr>
<tr>
<td>4</td>
<td>100-249</td>
</tr>
<tr>
<td>5</td>
<td>250-499</td>
</tr>
<tr>
<td>6</td>
<td>500-999</td>
</tr>
<tr>
<td>7</td>
<td>1000 plus</td>
</tr>
</tbody>
</table>
These are the size classifications recommended in the Report on Small Business Data Needs Workshop (1978).

6 The log of the book value of equity was also available and had a simple correlation with $I_4$ of .70; in all regressions, $I_4$ appeared to be consistently superior to book value as a predictor, so that the book-value index was omitted.

7 The classification of prestigious versus nonprestigious managing underwriters uses the investment banking industry's own classification methods as described in S. L. Hayes, III [1971]. Prestigious firms include all those firms classified as "majors," "majorettes," or "majors out-of-order," and "submajors." All others are classified as nonprestigious.

8 As many as eight different dummy variables based upon industry classifications were tried, based on the prior belief that the industry class would be a highly significant explanatory variable. However, statistically insignificant coefficients led us eventually to aggregate all of the industry groups except for the set representing the high-technology industries (SIC 357-372 and 730-739).

9 For many firms, there was a problem in determining who were the "entrepreneurs" in the Leland-Pyle context. Some firms, prior to going public, had issued stock to some combination of employees, venture capital firms, insurance companies, and other private investors. It was simply not possible to learn from the prospectus the extent of the involvement of many of these investors. We make the assumption that all
parties owning the firm's stock prior to the public offering were insid-ers, or, in the Leland–Pyle model, entrepreneurs.

10 A second measure of dividend policy that was tried was the pay-out ratio, defined as the declared dividend divided by the most recent smoothed annual earnings. The regression results from substituting this variable for the one described in the paper were almost identical to the results reported in tables 1 and 2 and, thus, are not reported here.

11 Market-to-book \((M/B) = P_0 N/(F + (1 - \alpha)P_0 N_p)\), where \(F\) is the amount invested in the firm by the entrepreneur prior to the offering, and the other variables are as previously defined. If \(F\) is small, relative to \((1 - \alpha)P_0 N_p\), and if \(N_p\) equals or is close to \(N\) (i.e., the offering is all or almost all primary), then the \(M/B\) ratio approaches \(1/(1 - \alpha)\).

12 The choice of the market-value-to-sales ratio as the dependent variable was based upon the belief that firms going public would be tempted to apply "creative accounting" to their latest balance sheet and income statement. In general, sales are less subject to manipulation than earnings, and investors who are aware of this might base their valuations more on sales numbers than earnings numbers.

13 The sensitivity of the results to this assumption was tested by repeating the cross-sectional regressions using constant betas of 1.5 and 2, and the general results were unchanged.
In fact, the only two variables for which the correlation coefficient exceeds 0.5 are the two earnings measures, which possibly explains the low t-values of the earnings growth rate.
BIBLIOGRAPHY


TABLE 1
RESULTS FROM CROSS-SECTIONAL ESTIMATES OF EQUATION (3)

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>(1) $r_{0j}$</th>
<th>(2) $r_{2j}$</th>
<th>(3) $r_{4j}$</th>
<th>(4) $r_{8j}$</th>
<th>(5) $r_{12j}$</th>
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<td>Mean</td>
<td>0.33</td>
<td>0.41</td>
<td>0.51</td>
<td>0.55</td>
<td>0.72</td>
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<td>Std. Dev.</td>
<td>1.08</td>
<td>1.34</td>
<td>2.12</td>
<td>1.82</td>
<td>2.55</td>
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</tbody>
</table>

**Descriptor**  

<table>
<thead>
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<th>Descriptor</th>
<th>Coefficients$^a$</th>
<th>Coefficients$^b$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\hat{\alpha}$</td>
<td>-0.26</td>
<td>-0.64$^b$</td>
</tr>
<tr>
<td></td>
<td>(1.00)</td>
<td>(1.99)</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.06</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>(0.31)</td>
<td>(0.45)</td>
</tr>
<tr>
<td>$I_1$</td>
<td>0.24</td>
<td>0.69</td>
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<tr>
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<td>(0.66)</td>
<td>(1.54)</td>
</tr>
<tr>
<td>$I_2$</td>
<td>1.77</td>
<td>2.53</td>
</tr>
<tr>
<td></td>
<td>(1.59)</td>
<td>(1.86)</td>
</tr>
<tr>
<td>$I_3$</td>
<td>-0.12</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>(1.42)</td>
<td>(0.89)</td>
</tr>
<tr>
<td>$I_4$</td>
<td>-0.00</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.58)</td>
</tr>
<tr>
<td>$I_5$</td>
<td>0.36$^b$</td>
<td>0.48$^b$</td>
</tr>
<tr>
<td></td>
<td>(2.26)</td>
<td>(2.36)</td>
</tr>
<tr>
<td>$I_6$</td>
<td>0.41$^b$</td>
<td>0.55$^b$</td>
</tr>
<tr>
<td></td>
<td>(2.45)</td>
<td>(2.70)</td>
</tr>
<tr>
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<td>0.08</td>
<td>-0.32</td>
</tr>
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<td>(1.67)</td>
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<tr>
<td>Constant</td>
<td>-0.59</td>
<td>-0.59</td>
</tr>
<tr>
<td></td>
<td>(0.91)</td>
<td>(1.07)</td>
</tr>
<tr>
<td>$R^2$ adj.</td>
<td>0.03</td>
<td>0.06</td>
</tr>
<tr>
<td>no. obs.</td>
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<td>271</td>
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</tbody>
</table>

$^a$Numbers in parentheses are t-values.

$^b$Coefficient is statistically significant at the five percent level.
\begin{table}
\centering
\caption{Results from Cross-Sectional Estimates of Equation (2)}
\begin{tabular}{lccc}
\hline
& (1) & (2) & (3) \\
\hline
\textbf{Dependent Variable} & P/E & MV/Sales & MV/Sales \\
\textbf{Mean} & 19.32 & 1.38 & 1.92 \\
\textbf{Std. Dev.} & 7.79 & 1.16 & 1.81 \\
\hline
\textbf{Descriptor} & \textbf{Coefficients}\textsuperscript{a} & & \\
$\delta$ & $-10.54$\textsuperscript{b} & $-1.39$\textsuperscript{b} & $-2.02$\textsuperscript{b} \\
& (6.43) & (5.77) & (6.99) \\
$\gamma$ & $-1.17$ & 0.10 & 0.13 \\
& (0.98) & (0.58) & (0.51) \\
$I_1$ & $-2.75$ & $-0.45$ & $-0.78$ \\
& (1.20) & (1.35) & (1.90) \\
$I_2$ & $-3.48$ & 0.42 & - \\
& (0.50) & (0.41) & - \\
$I_3$ & $1.62$\textsuperscript{b} & 0.07 & - \\
& (3.18) & (0.97) & - \\
$I_4$ & $-1.08$\textsuperscript{b} & $-0.38$\textsuperscript{b} & $-0.52$\textsuperscript{b} \\
& (2.99) & (7.20) & (7.92) \\
$I_5$ & $-3.28$\textsuperscript{b} & $-0.48$\textsuperscript{b} & $-0.25$ \\
& (3.31) & (3.29) & (1.26) \\
$I_6$ & $3.28$\textsuperscript{b} & $0.54$\textsuperscript{b} & $0.89$\textsuperscript{b} \\
& (3.14) & (3.54) & (4.66) \\
$I_7$ & $3.11$\textsuperscript{b} & 0.28 & $0.56$\textsuperscript{b} \\
& (3.17) & (1.95) & (2.76) \\
\textbf{Constant} & 19.20\textsuperscript{b} & 2.40\textsuperscript{b} & 2.81\textsuperscript{b} \\
& (6.76) & (5.78) & (6.71) \\
$R^2$ adj. & 0.27 & 0.30 & 0.33 \\
\textbf{No. obs.} & 271 & 271 & 363 \\
\hline
\end{tabular}
\textsuperscript{a}Numbers in parentheses are t-values.
\textsuperscript{b}Coefficient is statistically significant at the five percent confidence level.
TABLE 3

CORRELATION COEFFICIENTS BETWEEN THE DESCRIPTORS

<table>
<thead>
<tr>
<th></th>
<th>$\gamma$</th>
<th>$I_1$</th>
<th>$I_2$</th>
<th>$I_3$</th>
<th>$I_4$</th>
<th>$I_5$</th>
<th>$I_6$</th>
<th>$I_7$</th>
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<tbody>
<tr>
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<td>.05</td>
<td>.09</td>
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<td>.23</td>
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<td>-.08</td>
<td>-.05</td>
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<td>-.10</td>
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<td>.18</td>
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<td>.17</td>
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<td>-.07</td>
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<td>$I_5$</td>
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