Determinants of Price Premiums: A Study of Initial Public Offerings in the Medical Diagnostics and Devices Industry*

by Abdul M.A. Rasheed, Deepak K. Datta, and Ravi R. Chinta

Based on IPOs in the medical diagnostics and devices industry, this study examined factors that influence the extent of price premium over book value in initial public offerings. Findings indicate that while there are positive relationships between IPO price premiums and the number of uses of proceeds specified in the prospectus, firm leverage and reduction of management ownership have negative influences on such premiums. However, no association was found between the premium and underwriter reputation or the company's stage of development. Implications of the findings and directions for future research are discussed.

Initial Public Offerings (IPOs) represent a common way by which emerging firms finance their growth. This is especially true when the resources required for such growth can neither be provided by the entrepreneurs nor secured through debt financing due to increased costs and risks associated with higher levels of debt. The active market for initial public offerings (IPOs) in recent years has raised several issues. For example, initial returns exceeding 200 percent for IPOs of companies such as Boston Chicken and Netscape have sparked considerable interest in IPO pricing. Such extraordinarily high returns to investors immediately after the IPO seem to suggest that in a number of cases IPOs are priced at a significant premium over their book value. This leads to the obvious questions, "Why do some IPOs command a high premium over book price while other do not? What factors are responsible?" These questions have important implications from the perspective of the issuer who has a self-interest in maximizing the share price.

This study addresses the issue of IPO pricing and investigates the factors that influence the price premiums in initial public offerings. Because industry conditions are likely to influence IPO pricing and price premiums, we control for industry effects. We focus on IPOs in a single industry — the medical diagnostics and devices industry. This industry has

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been characterized by significant change and a relatively large number of IPOs.

This article is structured as follows. In the next section, we discuss issues related to IPO motivations, pricing, and price premiums. We also discuss the factors likely to influence price premiums and identify the specific hypotheses examined in this study. In the next section, we discuss the research methodology, including sample identification and selection, measures, and the analytic technique adopted. In the final section, we present the results, discuss the implications, and suggest possible directions for future research.

Theoretical Overview and Research Hypotheses

IPOs: Motivations, Pricing, and Price Premiums

What motivates the decision to go public? The literature suggests several factors. A public offering provides a firm the resources required to pursue aggressive growth strategies. Since an IPO increases the amount of equity, it also enables the firm to borrow more. An initial public offering gives the firm an excellent opportunity to restructure its balance sheet. Once the shares are publicly traded, the firm can acquire new businesses by issuing new stock to the sellers (James 1989). A public issue also brings greater name recognition to the company. Moreover, the company may be able to motivate and retain high-quality management by initiating stock-compensation plans (Lauer and Zeune 1987).

Besides these benefits to the firm, a public offering also provides benefits to the individual owners. First, it provides the owners a more liquid investment. Second, it aids in the estate planning of the firm’s principals (Steck 1984). Third, it is a way to answer the dream of becoming wealthy. The story of Bill Gates becoming a billionaire overnight as a result of Microsoft’s IPO is the stuff of legend (Uttal 1986). In addition, going public also feeds the desire to become the CEO of a publicly-traded corporation (Young and Zaima 1988). At the very least, going public provides a means for entrepreneurs to harvest and venture capitalists to exit from their investments (Timmons 1985).

Overall, an IPO can be viewed as an event shaped by the motivations, decisions, and actions of three sets of players: the issuer, the underwriter(s), and the investors. They are guided by different and, often conflicting, sets of objectives at the time of an IPO. For example, issuers like to maximize the offering price per share to enhance their returns. In contrast, investors would like the lowest offering price, so that they can earn above-market returns when they subscribe to the issue. Underwriters, on the other hand, seek to

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td>Pricing of IPOs: Players and Motivations</td>
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<table>
<thead>
<tr>
<th></th>
<th>Issuer</th>
<th>Underwriter</th>
<th>Investor</th>
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</thead>
<tbody>
<tr>
<td><strong>High price</strong></td>
<td>(+) Maximize wealth</td>
<td>(+) Maximize income</td>
<td>(-) Lower returns</td>
</tr>
<tr>
<td></td>
<td>(-) Under subscription</td>
<td>(-) Under subscription</td>
<td></td>
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<td></td>
<td></td>
<td>(-) Investor alienation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(-) Obligation to meet underwriting commitments</td>
<td></td>
</tr>
<tr>
<td><strong>Low price</strong></td>
<td>(-) Ownership transfer at below market prices</td>
<td>(+) Insurance against legal liability</td>
<td>(+) High returns</td>
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<tr>
<td></td>
<td></td>
<td>(-) Low commission income</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(+) Low Risk</td>
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maximize their income from the issue while reducing potential losses, including loss of prestige. The motivations of these three sets of players involved in an IPO are summarized in Table 1.

If the price is too high, an issue may remain undersubscribed. Realistically, an overpriced issue may even fail to find a willing underwriter. On the other hand, if the issue is priced too low, the ownership of the firm is transferred to outsiders at low prices, penalizing the issuer. In this case, it is the new investors, instead of the entrepreneurs and venture capitalists, who end up realizing high returns. However, recent theoretical analysis suggests that under certain circumstances the owners may underprice an issue to minimize tax liabilities (Dandapani et al. 1992).

On the other hand, underwriters face a different set of constraints in maximizing their income from the IPO. Because an underwriter's income from an issue is generally a fixed percentage of the per share price, the underwriter has an interest in keeping the price as high as possible. However, if the price is too high, the issue may be undersubscribed. In such cases, underwriters, who may have made a firm commitment to the issue at the offer price, face costly alternatives. They either subscribe to the issue themselves or sell the shares at a significantly discounted price. Thus, sometimes it may actually be in the best interest of the underwriter to keep the issue price relatively low. Tinic (1988) suggests that underwriters may be motivated to underprice as a form of insurance against legal liability and potential damage to their reputation. However, empirical evidence since Tinic's study suggests that law suits are triggered more by large after-market price declines than by initial overpricing (Drake and Vetsuypens 1993).

From the standpoint of investors, IPOs should be priced as low as possible. This allows investors to maximize their returns from the investment. The price that investors are willing to pay in an IPO is affected by several factors, including: (1) the amount of information available about the stock of a company that is already listed; (2) the cost that investors incur in collecting information about a new company (Rock 1986); and (3) the risk of investing in a company with a limited or no track record. For equities of existing corporations, investors typically have a wealth of information from sources such as annual reports, 10-K statements, and industry analysts' reports and recommendations. Investors in new issues have only limited information. In the case of a company that has been in existence for only a very short period, the financial information in the prospectus may be inadequate for making any meaningful inferences about the firm's future earnings potential. In addition, the products of the firm may have been in the market for a very short period or may still be in the developmental stage. Thus, the lack of information about the past and the inability to make projections about the future greatly increase the investors' perceived risk. Understandably, such an investor expects to be rewarded by an above-normal rate of return for his willingness to accept the high risk.

The pricing of initial public offerings has been the subject of several studies, primarily in finance and accounting. The consensus that emerges from these studies is that IPOs, in general, tend to be underpriced in comparison to the prices that prevail immediately after the issue (Chalk and Peavy 1987; Dark and Carter 1993; Ibbotson 1975; Miller and Reilly 1987; Ritter 1984; Weiss 1988). Similar underpricing has been documented in Canada (Clarkson and Merkley 1994; Jog and Riding 1988), as well as in Singapore, Hong Kong, and Malaysia (Dawson 1987). Various explanations have been offered for such underpricing, some of which will be examined later in this section.

Price Premiums

Almost all studies on IPOs in finance and accounting have examined the impact of hypothesized factors on the extent of underpricing or overpricing, defined as the offering price relative to the price prevailing in the stock market immediately after an IPO. From a manager-
ial perspective, however, there are certain limitations associated with this stream of research. First, the owners or the underwriters can only find out whether the issue was under- or over-priced after a market price is established through the trading of securities. In addition, the extent of under- or over-pricing can vary substantially based on the time period in which prices are examined. There is strong evidence that IPO shares trade at significantly higher prices in the days immediately after the issue date. However, this result does not hold up if prices over a longer time period are examined (Eysell and Kummer 1993). Ritter (1991) found that the widely documented phenomenon of underpricing is essentially very short-run in nature. If longer time frames are used, IPOs stocks actually underperform those of comparable firms in the market. Second, recent empirical research indicates that the high prices prevailing immediately after the issue date may not necessarily be the result of underpricing. Aggarwal and Rivoli (1990) found that this phenomenon may be more a result of overvaluation or fads in the after market, since prices declined substantially in the subsequent period. Even when high prices may not be attributable to market fads, they may be the result of deliberate underwriter price support. As this support is withdrawn, prices begin to decline (Ruud 1993). Additional evidence of overpricing in the early market is provided by Schultz and Zaman (1994). Third, it has been argued that the initial return (IR) measure widely used in past literature is overly simplistic, as it overestimates the initial returns available to the investor and the costs of underpricing to the issuer (McGuinness 1993).

Alternatively, to determine whether a particular issue is under- or over-priced, one may look at the pricing decision strictly in terms of discounted cash flow analysis (Zent 1990). However, this approach is often unrealistic, because it is impossible to determine the future income streams of companies which do not have a long earnings history or even commercialized products or services. The only information readily available to all three players (issuer, investor, and underwriter) at the time of an IPO is the book value of the shares as stated in the audited financial statements of a company. By focusing on price premium (issue price over book value) instead of issue price relative to subsequent market price, this study emphasizes the entrepreneur's decision making on the basis of available information, rather than any post-facto analysis of why the IPO was underpriced.

When going public, issuers typically expect to get from investors a price per share that is significantly higher than the book value of the stock. Therefore, it is not the absolute price at which a share is issued to the public that is important to us, but, rather, the premium that investors are willing to pay over and above the book value of that share. There is considerable variability in the extent of the premium. Some IPOs are made at prices which are several times the book value of the shares, while others are made at prices close to book value. This study focuses on the factors which help explain this variability.

While the use of book values in the IPO pricing literature is new (prior research having almost exclusively focused on underpricing), there have been several investigations of the relationship between the book value and the market value of firms in the finance and accounting literatures. For example, Rosenberg, Reid, and Lanstein (1985) report that an investment strategy based on buying stocks with a high ratio of book value to stock price produces positive abnormal returns. In addition, Fama and French (1992) report that book-to-market equity is a powerful predictor of stock returns. Moreover, authors such as Ohlson (1995) and Feltham and Ohlson (1995) have also used book value as an important aspect of their theoretical models of firm value. Given the increasing attention paid to book value in firm valuation in both the theoretical and empirical literatures, the use of book value of shares would seem appropriate to the study of IPOs as well.
Determinants of Price Premiums: Research Hypotheses

Factors affecting IPO price premiums can be broadly divided into two categories. The first set of factors relates to a potential investor's perceptions of risk. Generally speaking, investors may be willing to pay higher premiums for firms that offer lower levels of risk. This study examines the relationships between price premiums and four risk-related factors: debt-equity ratio, underwriter reputation, the number of risk factors mentioned in the prospectus, and the amount of stock retained by management.

The second set of factors relates to the costs a potential investor has to incur in collecting and analyzing information about the issuing firm. Because a relatively young firm going public typically has neither years of published financial reports nor the benefit of reporting by Wall Street analysts, potential IPO investors have to rely on their own efforts to collect and analyze information before making investment decisions. In his information-theoretic model of IPO pricing, Chemmanur (1993) argues that IPOs may be deliberately underpriced to generate publicity, hoping to help investors learn more about the firm. In other words, investors are induced to engage in information production, and, underpricing is the reward for producing information. In the following paragraphs, we develop the specific hypotheses linking factors related to both risk and the cost of information gathering to price premiums in IPOs.

Leverage. Leverage refers to the financing provided by creditors relative to the amount provided by the owners of the business. The extent of leverage in the capital structure is often viewed as a measure of risk. These risks arise from the fact that highly leveraged firms may fail to meet the fixed payments of interest and principal during periods of declining sales and profits, and may be forced into bankruptcy. Leveraging may benefit a firm if the firm is able to invest such funds at a rate in excess of the cost. However, a highly leveraged firm could suffer considerably if the realized return on its investments turns out to be lower than the borrowing rate. Moreover, high leverage can make earnings more variable (that is, risky). This is particularly true in the case of small ventures, because of the uncertainty regarding the rate of return on investment. For these reasons, investors usually prefer a judicious mix of debt and equity, which maximizes the returns on a per share basis without substantially increasing the level of risk.

The uncertainty and risk that accompany high debt in the capital structure of a firm involved in an IPO are likely to have a negative impact on the price of the IPO, and therefore on the price premium. Conversely, IPOs that have a higher component of owners' equity are more highly valued by investors. Investors have greater confidence in such IPOs when current owners have been willing to risk their own capital in the venture. This is likely to be particularly true in IPOs of companies with a limited history of sales and financial performance. These arguments lead to the first hypothesis examined in this study.

H1: The price premium over book value in an IPO will be negatively associated with the debt-equity ratio at the time of the IPO.

Underwriter Reputation. Several prior studies have shown that prestigious underwriters price IPOs more fully than fringe underwriters (Dark and Carter 1993; Johnson and Miller 1988; Tinic 1988). Prestigious investment banking firms avoid underwriting smaller or highly speculative issues (Carter and Manaster 1990; Wolfe, Cooperman, and Ferris 1994). Such issues put the underwriter's capital and reputation at risk and expose the underwriter to subsequent legal action by dissatisfied investors. Prestigious underwriters prefer to sell to investors who have longer time horizons (Carter and Dark 1993) and tend to market lower-risk IPOs so that investors will have more confidence in subsequent offerings (Carter 1992). A prestigious investment banker collects considerable information about the past and future prospects of the firm before making a commitment to underwrite an issue. Under-
writers are in a sense certifying the untested management of a young firm, because of their obligation to "due diligence." The prestige of the underwriter reduces uncertainty for investors and elicits a higher price relative to the book value of stocks. Thus, we hypothesize that:

\[ H_2: \text{There will be a positive relationship between underwriter reputation and the price premium at the time of the IPO.} \]

Stage of development. In this context, a company's stage of development is based on whether the firm's products have been commercially introduced into the market or not. In many IPOs, the products are not commercially produced. At times, they are not even in a developmental stage. From the perspective of potential investors, the prospects of a company whose products have been commercially introduced are more easily assessed than those of a company whose products are still under development. Generally speaking, the longer a firm has been in existence, the more likely it is to have a record of sales. Longevity in a firm, in turn, reduces information asymmetries between insiders and potential investors (Muscarella and Vetsuypons 1989; Young and Zaima 1988). When market evaluation of the products is absent, the investor is forced to rely on information provided by the issuer and the underwriter. The risks associated with IPOs of firms whose products have not been tested in the marketplace are obviously higher. Consequently, such firms are likely to command a lower price premium. The investors expect to pay a lower price for assuming greater risks. Therefore, we can hypothesize that:

\[ H_3: \text{Firms with a sales history will be able to charge higher premiums than firms in the development stage.} \]

Number of uses of proceeds. In addition to risk factors, IPO prospectuses provide information about the number of uses of proceeds from the IPO. It can be argued that such information reduces both the uncertainty and the information gathering costs for the investor. However, the reverse is more likely to be true—a high number of uses of proceeds can actually generate uncertainty among potential investors. A long list of intended uses leaves the investor unsure about the future direction of a firm and the appropriateness of the multiple uses of the IPO proceeds. Beatty and Ritter (1986), for example, used the number of uses of proceeds disclosed in the prospectus as a measure of uncertainty. They found a positive relationship between the number of proceeds listed and the degree of underpricing. It can also be assumed that the higher the number of the uses of proceeds, the higher will be the investors' cost in investigating the potential returns from them. Consequently, investors will be less willing to pay a substantial premium for issues with multiple uses. Therefore, the gap between the IPO price and the book value will be smaller. This leads to the fourth hypothesis:

\[ H_4: \text{There will be a negative relationship between the number of uses of proceeds and the premium that a firm is able to charge in an IPO.} \]

Stock retained by management. Although IPOs are a means by which insiders can harvest their investment in the company, the percentage of ownership retained by them sends a powerful signal to potential investors. If the management and other insiders retain a significant stake, they communicate a positive outlook on the future of the firm. The retention of stock by management as a positive signal has been demonstrated both theoretically and empirically. Grinblatt and Hwang (1989), for example, propose a signaling model in which the fraction of the new issue retained by the issuer conveys to investors the intrinsic value of the firm and the variance of its cash flows. Gale and Stiglitz (1989) have also demonstrated theoretically that the sale of equity in an IPO by insiders is an important piece of information. In an empirical study, McBain and Krause (1989) showed that the offering price in an IPO is relatively high when it appears that the insiders are not "bailing out" as the company goes public. Similarly, Eysell and Kummer (1993) have shown empirically that
there is an inverse relationship between initial returns and the proportion of insider shares being offered. It has also been argued that agency costs may be perceived to be high when insiders sell a significant portion of their equity holdings (Fama and Jensen 1985). The above theoretical and empirical findings lead us to the fifth and final hypothesis:

\[ H_5: \text{There will be a negative relationship between extent of reduction in stock ownership by existing management and the price premium at the time of the IPO.} \]

**Research Methodology**

**Sample and Data Collection**

Studies in the areas of finance and accounting have typically used large, multi-industry, heterogeneous samples. However, this study uses a sample drawn from a single industry—the medical diagnosis and devices industry. We decided to limit the sample to a single industry for two reasons. First, there has been increasing awareness in recent years of the need to control for industry effects in management research (Dess, Ireland, and Hitt 1990). Secondly, there is often a significant association between industry affiliation and initial returns in IPOs (Ritter 1984). However, this choice did limit the sample size.

The choice of the medical diagnosis and devices industry was driven by the fact that this industry has several interesting characteristics which make it a good candidate for a single industry study of IPOs. The industry is highly fragmented with relatively low average sales per company and is also characterized by significant technological change. This provides opportunities for many start-ups and, consequently, a relatively large number of IPOs (Galant 1992). Typically, these small companies go through a stage of being funded by private placements from venture angels (rich individuals), followed by venture capital funding, and eventually IPOs. The industry is characterized simultaneously by prospects for high profits, as well as significant downside risk due to regulatory and legal uncertainties.

A preliminary search using the *Investment Dealers' Digest* (IDD) database for the period 1984-89 (a period of relatively uniform economic growth) identified 70 IPOs in this industry; however, missing values on independent variables reduced the usable sample size to 57. We consider the period covered by the study appropriate because it does not contain any of the "hot periods" for new issues documented in prior studies (Allen and Faulhaber 1989; Tinic 1988). Thus, the choice of the time period helped to control for the impact of macroenvironmental variables, such as economic growth, which might influence the pricing of IPOs.

The data used in this study were collected from the prospectuses issued at the time of the IPO. Corporate prospectuses have been considered as an excellent source of valid information for publicly-held firms (Marino, Castaldi, and Dollinger 1989; Young and Zaima 1988; Pratt 1992).

**Variable Operationalization**

*Underwriter reputation* (UNDREP) was measured as a categorical variable, with reputable firms being assigned a value of "1" and less reputable firms a value of "0." Underwriter reputation was obtained from the study by Carter and Manaster (1990), which provides a measure of underwriter prestige based on tombstone announcements from *Investment Dealer's Digest* and the *Wall Street Journal*. Support for the validity of this measure, in comparison to other measures of underwriter reputation, is provided by Carter and Dark (1992). Underwriters with a reputation score greater than the median score of 5 were classified as "reputable." *Leverage* (DEBEQ) was assessed using the debt/equity ratio based on the information provided in the prospectus of each firm. The *reduction in stock ownership by management* (MGMRED) was calculated as the difference between the ownership before and after the IPO. The *number of uses of proceeds* (NOUOP) was directly obtained from the
previously discussed, sometimes they are not even in a developmental stage.

**Data Analysis**

Given a continuous dependent variable (PRIPREM), OLS multiple regression analysis was used to examine Hypotheses 1-5. The following model was utilized:

\[
PRIPREM = \beta_0 + \beta_1(UNDREP) + \beta_2(DEBEQ) + \beta_3(NOUOP) + \beta_4(MGMRED) + \beta_5(STADEV) + \epsilon
\]

where,

- \(PRIPREM\) = Price premium paid by the investors in an IPO
- \(UNDREP\) = Reputation of the underwriter
- \(NOUOP\) = Number of uses of proceeds stated in the prospectus

\[
B_{\epsilon \epsilon}^{\leq 0.05,0.001,0.01,0.05}
\]

In those cases where the number of uses of proceeds were not numbered, they were counted by the authors. To avoid errors resulting from subjectivity in counting, two of the three authors did the counting independently, and the results were compared. In the three cases where the results differed, the authors arrived at the final number through discussion and clarification.

1 Ideally, we should have included the sales figure itself, because from the point of view of an investor, a firm with sales of $10 million is very different from one with sales of only $500,000. However, the use of the sales figure would have resulted in a very skewed sample given the number of firms with no sales at all.

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**Table 2**

Means, Standard Deviations, and Intercorrelations of Study Variables

\[(n = 57)\]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>S.D.</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<tbody>
<tr>
<td>1. Price premium</td>
<td>0.7</td>
<td>0.09</td>
<td>----</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Number of uses</td>
<td>4.49</td>
<td>1.6</td>
<td>0.32*</td>
<td>----</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3. Leverage</td>
<td>0.21</td>
<td>1.94</td>
<td>-0.24*</td>
<td>0.13</td>
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<tr>
<td>4. Reduction in ownership</td>
<td>15.84</td>
<td>10.69</td>
<td>-0.27*</td>
<td>0.31*</td>
<td>0.31</td>
<td>----</td>
<td></td>
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<tr>
<td>5. State of development</td>
<td>0.57</td>
<td>0.50</td>
<td>-0.09</td>
<td>-0.07</td>
<td>0.13</td>
<td>0.11</td>
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</tr>
<tr>
<td>6. Underwriter reputation</td>
<td>0.33</td>
<td>0.47</td>
<td>-0.05</td>
<td>-0.16</td>
<td>-0.03</td>
<td>-0.21</td>
<td>0.16</td>
<td>----</td>
</tr>
</tbody>
</table>

*** \(p < .001\)  
** \(p < .01\)  
* \(p < .05\)
Table 3

Results of Regression Analysis: Price Premiums

<table>
<thead>
<tr>
<th>Variables</th>
<th>Estimate</th>
<th>$t$-statistic</th>
<th>Tolerance</th>
</tr>
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<tbody>
<tr>
<td>Leverage (DEBEQ)</td>
<td>-0.011</td>
<td>-3.958***</td>
<td>0.921</td>
</tr>
<tr>
<td>Underwriter reputation (UNDREP)</td>
<td>-0.014</td>
<td>-0.547</td>
<td>0.916</td>
</tr>
<tr>
<td>Number of uses of proceeds (NOUOP)</td>
<td>0.025</td>
<td>3.145**</td>
<td>0.847</td>
</tr>
<tr>
<td>Reduction in ownership (MGMRED)</td>
<td>-0.003</td>
<td>-2.386*</td>
<td>0.835</td>
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<tr>
<td>Stage of development (STADEV)</td>
<td>0.014</td>
<td>0.651</td>
<td>0.943</td>
</tr>
<tr>
<td>Model F-value</td>
<td>6.220***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model $R^2$</td>
<td>0.379</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model Adjusted $R^2$</td>
<td>0.318</td>
<td></td>
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</tr>
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</table>

Standard errors are in parentheses.

*** $p < .001$

** $p < .01$

* $p < .05$

DEBEQ = Debt/Equity ratio
MGMRED = Reduction in stocks ownership by management
STADEV = Stage of development

Results and Discussion

The means, standard deviations, and the zero-order correlation coefficients among the variables are provided in Table 2. As can be seen from Table 2, there was considerable variability in the price premiums paid among IPOs in the sample. Significant variability was also observed in the explanatory variables in the study.

The results of the regression analysis are presented in Table 3. The table presents the unstandardized parameter estimates (beta) associated with each of the independent variables, the relevant $t$-statistic, and its significance level. As indicated in Table 3, the model is significant with an $F$-statistic of 6.220 ($p < .001$). The models also explain significant variability in the price premiums paid by investors ($R^2$ of 0.379 and adjusted $R^2$ of 0.318). Tests indicate that multicollinearity was not a problem.

We had expected the variance in price premiums to be influenced by those factors that increase or decrease the level of uncertainty in the venture and its value. Specifically, we had hypothesized that the reputation of the underwriter and the
firm's stage of development would be positively related to the size of the price premium, and that leverage, the number of uses of funds, and the extent of management's reduction in stock holdings would be negatively related to the premium. The parameter estimate associated with leverage (DEBEQ) was significant at the 0.001 level and negative in sign, providing strong support to Hypothesis 1. In addition, the reduction in stock ownership by existing management following the IPO was, as expected, negatively associated and statistically significant (p < .05) with IPO price premiums. Finally, although the parameter estimate associated with number of uses of proceeds was significant at the 0.01 level, it was in the direction opposite to that hypothesized. Two of the other hypothesized relationships were not significant (that is, Hypotheses 2 and 3 were not supported). In other words, the firm's stage of development and the lead underwriter's reputation did not have a significant impact on the price premiums associated with IPOs in the sample.

Study Implications

Our results indicate that the leverage of the firm, the retention of equity by management, and number of uses of proceeds are all significantly related to the price premium. As hypothesized, higher levels of debt raise questions regarding a firm's ability to meet its interest payment obligations in the post-IPO period. The resulting uncertainty reduces its ability to command premiums. These findings suggest that it is very important for the issuer to reduce, to the extent possible, the component of debt in the capital structure. A lower debt component reduces the investors' uncertainty about the firm's ability to service the debt and become a viable and profitable entity. In addition, lower debt and higher owner's equity signal to potential investors greater commitment and involvement on the part of the current owners. The relationship between leverage and price premium was, therefore, as expected. Similarly, the retention of significant stock by management increases a potential investor's confidence in the stock. A signal of greater commitment from the current owners (those most familiar with the firm) is a valuable source of information for investors. Quite likely, investors expect greater appreciation of shares when insiders retain a significant stake in the firm and investors are therefore willing to pay a higher premium during the IPO, as indicated by our results.

However, contrary to expectations, IPOs that listed a greater number of "uses of proceeds" tended to command higher price premiums. A possible explanation for this unexpected finding is that, although a high number of uses of proceeds increases investors' cost of evaluation, the amount of detail provided by these uses serves to enhance confidence in the firm and in the IPO. This higher level of confidence may lead investors to pay higher premiums for the IPO. These results seem to indicate that, for the investor, the costs associated with evaluating the alternate uses of the funds are exceeded by the value of the information.

Surprisingly, our results do not indicate a statistically significant relationship between underwriter reputation and price premium. While there are compelling theoretical arguments supporting such a relationship, no empirical evidence was found in our study. One possible explanation for these results might be the often-observed tendency among "reputable" underwriters to underprice IPOs to avoid potential damage to their reputation arising from "overpricing." A high initial price can reduce post-IPO returns to investors and can thus trigger damaging litigation. As Drake and Vetters (1993) argue, the possibility of lawsuit and adverse judgement often causes underwriters to underprice their offerings.

Directions for Future Research

Our exploratory study, based on 57 IPOs in the medical diagnostics and devices industry, provides interesting insights on factors influencing price premiums. However, its limitations must be considered in interpreting the results. An important limitation of the study relates to
the relatively small sample size. The study sample was limited to IPOs in a single industry. (The rationale underlying our sample selection has already been discussed). However, the small size and single industry do limit the generalizability of the findings. To overcome this limitation, future research can extend this study in multiple ways. For example, future studies can examine whether relationships identified in this study hold good for other industries (both manufacturing and service). In addition, it would be interesting to determine whether the observed relationships hold up in other time periods as well. Second, additional insights may be provided by studies using a “fine-grained” approach, that is, studies involving qualitative assessment of the risk factors or the types of uses of proceeds. Our approach can be described as “coarse-grained,” in that it used numerical counts of the number of uses. Third, alternative operationalizations of the dependent variable would help in building more robust models of IPO pricing based on multiple criteria. Some possible operationalizations would be IPO price to current earnings, IPO price to gross profits, and IPO price to predicted earnings. This would also mitigate to some extent the problems inherent in a cross-sectional comparison of book value. The differences in accounting choices in terms of inventory valuation, depreciation methods, valuation of patents and trademarks, etc. make the accounting statements of firms within even a single industry difficult to compare. Fourth, the nature of management contracts and other monitoring arrangements in place (Beatty and Zajac 1994) may signal to investors information that is valuable in deciding whether to invest. Therefore, it is important to investigate the impact of management contracts on pricing decisions. Fifth, although this study included a measure of leverage, it does not distinguish between different types of debt. Recent research findings (Fama 1985; James and Weir 1988; Slovin and Young 1990) indicate that bank lending is often a signal of quality, to which the market responds positively. The market perceives bankers as having better judgement about a firm’s future viability than the ordinary investor, because of the bankers’ access to more information. Sixth, additional variables should be examined. Examples include the fees paid to underwriters (Pugel and White 1988), and the revenue growth of the firm immediately preceding the issue. In conclusion, we believe there are significant opportunities for meaningful research on the determinants of price premiums in IPOs. Further studies would complement this effort and help improve our understanding of pricing in IPOs.

References


