This study examines a sample of 108 initial public offerings in Singapore between 1987 and 1993, and documents the effects of four channels of entrepreneurial communication, that is, retained ownership, audited report, auditor choice and underwriter choice on the valuation of new issues. Our results indicate that retained ownership and book value of equity are significantly and positively associated with the valuation of initial public offerings in Singapore. Underwriter choice and auditor choice are not significant in explaining the valuation of initial public offerings. Issues listed on the Main Board are valued higher than those on Sesdaq (Stock Exchange of Singapore Dealing and Automated Quotation). Firms choosing the auction system are valued higher than those choosing the fixed system.

This paper provides evidence on the valuation of new issues in an emerging market in the Asia-Pacific region. The results are of interest to investors, investment bankers and companies seeking a listing on the Singapore Stock Exchange. We provide some insights on how new issues in the Singapore market are valued.

1. Introduction

Initial public offerings are characterized by a situation of information asymmetry between the entrepreneur and potential investors from whom the entrepreneur seeks to raise capital. The entrepreneur has private information regarding the expected future cash flows of his firm that he would like to communicate to potential investors so that they may correctly value his firm. Extant literature discusses avenues that the entrepreneur may use to communicate his private information. In Leland and Pyle (1977), the entrepreneur may signal the value of his firm through the percentage of retained ownership. Balvers et al. (1988) derive the
proposition that investment banker and auditor reputations help to decrease underpricing of new issues. Datar et al. (1991) demonstrate that the entrepreneur may communicate the value of his firm via audit quality choice and the resulting audited report.

Empirical tests of these propositions have been carried out on samples of initial public offerings in the United States and Canada (for example, Feltham et al., 1991 and Clarkson and Simunic, 1994). These papers find that valuation is positively related to retained ownership, the audited report, and auditor quality. However, there are differences observed between initial public offerings in the United States and Canada in the relation between audit quality and risk. Tests results based on the Canadian sample indicate a positive relation between audit quality and risk.¹ In contrast, the U.S. sample indicates that high-risk firms tend to use lower-quality auditors.² Clarkson and Simunic (1994) suggest that differences in the results of the U.S. and Canadian samples may be due to the United States having a more litigious environment than Canada. Further evidence of the relation between auditor choice and firm-specific risk is provided in Douthett and Copley (1996) and Stokes and Taylor (1995) on U.S. and Australian initial public offerings, respectively. Like Feltham et al. (1991), they find that the demand for auditor reputation is inversely related to a measure of firm-specific risk.

The purpose of this paper is to study the relation between valuation of initial public offerings and the entrepreneur’s private information in an emerging stock market.³ There are several institutional features peculiar to Singapore that may contribute further to our understanding of the valuation of initial public offerings. First, the present environment in Singapore may be considered as not very litigious. Singapore, like Canada and Australia, is a less litigious environment for auditors and underwriters than their counterparts in the United States. In a less litigious environment, high quality auditors and underwriters may take in risky (or low quality) firms because there is a low probability of being sued. Second, the underwriting of initial public offerings in Singapore is dominated by one local bank, the Development Bank of Singapore (DBS). Due to its high reputation in the local community, we consider DBS to be a prestigious underwriter in our paper. Third, shares in Singapore are listed on one of two boards, the Main Board or Sesdaq (Stock Exchange of Singapore Dealing and Automated Quotation). The Main Board has more stringent listing criteria than Sesdaq. We examine whether board listing is associated with the valuation of initial public offerings. Fourth, IPO firms in Singapore may choose to price their issue at a fixed price or accept the auction price
determined by the market. The auction price reflects the market’s perception of the value of the IPO and allows us to obtain a better measure of valuation. These additional features of the Singapore market provide more information about the company to prospective investors. We aim to provide insight on whether this information, in addition to that traditionally provided, helps investors in Singapore value the firm.

Our sample consists of 108 initial public offerings in Singapore between 1987 and 1993. In the basic model, we document the effects of four types of entrepreneurial information, that is, retained ownership, audited report, auditor and underwriter choice on the valuation of new issues. In the extended model, we include two institutional variables, choice of board listing and whether the firm uses the auction system. We use both value of the firm’s share and underpricing as dependent variables. The specification of value as the dependent variable allows for comparison with Feltham et al. (1991) and Clarkson and Simunic (1994). The alternative specification of underpricing as the dependent variable is used in Balvers et al. (1988) and Beatty (1989).

First, we posit that a higher percentage of shares retained is indicative of a higher value, and expect a positive relationship between percentage of shares retained and the value of the firm. Second, the entrepreneur may reveal his private information regarding the firm in the audited report contained in the prospectus. We use the book value of equity to proxy for information in the audited report, and predict a positive relationship between book value of equity and the value of the firm. Third, we predict that the entrepreneur of a high quality firm would use a high quality auditor to signal the value of his firm. We consider a Big Six auditor a high quality auditor, and a non-Big Six auditor a low quality auditor. Fourth, we predict that the entrepreneur would use a prestigious underwriter to signal the value of his firm. We do not have a ranking of underwriters in Singapore. However, DBS is the leading underwriter and is a well-known name in Singapore. Hence, we consider DBS as a proxy for underwriter prestige. In the extended model, we predict that firms applying for a listing on the Main Board are valued higher than those applying for a listing on Sesdaq. We also predict that firms that use the auction system are valued higher than those that use the fixed system.

Our results indicate that retained ownership and book value of equity are significantly and positively associated with the valuation of initial public offerings in Singapore. Contrary to our hypothesis, we find that underwriter choice is not associated with the valuation of initial public offerings. Auditor choice is also not significant in explaining the valuation
of initial public offerings. This may be due to the fact that 80 per cent of the sample firms are audited by a Big Six auditing firm. The lack of significance for underwriter and auditor quality is, however, consistent with Singapore’s less litigious environment. Additionally, we find that issues listed on the Main Board are valued higher than those on Sesdaq. Firms that chose the auction method are valued higher than those that chose the fixed system.

The magnitude of underpricing for initial public offerings is higher in Singapore than in the United States. For our sample, the average amount of underpricing is 35 per cent. In comparison, the level of underpricing in the United States ranges from seven to 11 per cent (Balvers et al., 1988). Our analysis with underpricing as the dependent variable shows that higher ownership retention ratio is associated with lower underpricing on day +1 after listing. Market sentiment is positively associated with underpricing. First-day returns are not significantly associated with the other signals; book value of equity, auditor choice and underwriter choice. One-year returns are, however, significantly higher for issues underwritten by DBS and marginally higher for issues audited by a Big-Six auditor.

The remainder of the paper is organized as follows. Section 2 reviews prior research that presents models of how the entrepreneur may communicate his private information regarding the firm to potential investors. We also review empirical studies on the relation between valuation and the information signals provided by the entrepreneur. In Section 3, we describe the institutional arrangements for initial public offerings in Singapore. Section 4 contains the hypotheses and our regression models. The empirical tests and results are contained in Section 5. The final section summarizes the study.

2. Prior Research

Leland and Pyle (1977) model a situation in which entrepreneurs seek to raise financing for their projects whose true qualities are known only to them. Due to moral hazard, the entrepreneur is not able to directly convey this information to investors. The entrepreneur then communicates his information through his actions. Leland and Pyle demonstrate that the percentage of equity retained by the entrepreneur is a signal of the quality of his project. Their results indicate that the value of the firm increases with the percentage of equity held by the entrepreneur.

Datar et al. (1991) extend the model in Leland and Pyle (1977) to examine the role of auditor choice and the audited report in addition to
percentage of retained ownership in signaling the entrepreneur’s private information. Companies making an offer of their shares to the public are required to issue a prospectus. The entrepreneur may choose a high- or low-quality auditor to attest to the financial statements contained in the prospectus. The audited financial statement is another means by which the entrepreneur may reveal his private information. Datar et al., show that auditor choice provides information about the entrepreneur, but the primary information is the audited report and the percentage of shares retained by the owner. Extending the argument that underwriters may also influence the content of a prospectus, information may also be conveyed by the choice of underwriter.

The interaction between underwriter and auditor is modeled in Balvers et al. (1988). Their model examines underpricing instead of the valuation of initial public offerings. Similar to Rock (1986), they assume that the investment banker must maintain an equilibrium level of underpricing, and they further assume that the investment banker signals his reputation through the reputation of the auditor retained in the underwriting coalition. Hence, they posit that both investment banker and auditor reputations help to reduce underpricing.

The relation between valuation or underpricing and information signals has been empirically examined in several papers. Beatty (1989) finds that auditor and underwriter reputation is associated with lower initial returns for investors for a sample of initial public offerings in the United States from 1975 to 1984.6 He also finds that a higher percentage of ownership offered (in other words, lower retained ownership) is associated with higher initial returns. Two papers, Feltham et al. (1991) and Clarkson and Simunic (1994), test the prediction of Datar et al. (1991) that IPO firms are more likely to choose a high-quality auditor and retain a lower level of ownership as firm-specific risk increases. Feltham et al. (1991) examine a sample of new issues offered in the United States in 1981 while Clarkson and Simunic (1994) examine a sample of Canadian initial public offerings from the period 1984 to 1987. Both papers find that retained ownership and audited report7 are positively related to value of the firm for sub-samples of firms audited by high or low quality auditors.8 Kim et al. (1995) examine the association between information disclosed in the prospectus and the valuation of initial public offerings in Korea. They find that market price is affected by earnings per share, offer size, industry-wide prospects, and offer type. However, they find no evidence that ownership retention and underwriter quality are associated with valuation of Korean initial public offerings.
The relation between auditor reputation and firm-specific risk is modeled in Titman and Trueman (1986) and Datar et al. (1991). While Titman and Trueman predict that the demand for auditor reputation is inversely related to firm-specific risk, Datar et al. predict a positive association. Empirical evidence on this relation is mixed. Clarkson and Simunic (1994) find a positive relation between audit quality and risk for the Canadian sample, but U.S. data suggest that high-risk firms tend to use lower-quality auditors (Feltham et al., 1991, and Douthett and Copley, 1996). Stokes and Taylor (1995) also report a negative relation for initial public offerings in Australia.

3. Institutional Arrangements

The initial public offerings process in Singapore is described in Koh and Walter (1989) and Lee, Taylor and Walter (1996). The Stock Exchange of Singapore imposes quite stringent requirements on firms seeking listing in Singapore. These firms must have a minimum operating history of five years, and show profits in the last three years. They should show increasing profits and earnings per share. They have to disclose past and future dividends. They should have a healthy financial position with no shortfall in working capital, a debt-equity ratio that is comparable to industry, and the net tangible assets per share should be greater than the par value per share. The company and underwriter should justify and explain the basis for arriving at the price-earnings multiple used in arriving at the issue price. These requirements mean that firms seeking listing have relatively low risk.

The underwriting method that is used in Singapore is the firm commitment method.9 Share issues in Singapore follow the general principles of British law in that the offer price must be set and stated in the prospectus prior to a formal invitation to the public to apply for shares. When over-subscription occurs, shares are allocated evenhandedly, unlike the “book-building” approach used in the United States where offer prices are conditioned on nonbinding pre-offer indications of interest, and shares in an initial public offering are allocated in a discriminatory fashion (Hanley and Wilhelm, 1995). In Singapore, all applications are subject to balloting when an issue is oversubscribed. All applicants for a particular number of shares in an initial public offering have an equal probability of receiving an allocation. Listing rules of the Stock Exchange of Singapore require at least 30 per cent of the shares in a new issue to be allocated to “small” applicants, that is, those who apply for 500 to 10,000 shares. Details of the
rationing process, which is conducted by way of a public ballot, are publicly disclosed.

In 1991, the Stock Exchange of Singapore introduced the Dutch auction system as an alternative method of allowing companies to raise funds in public flotations. Applications for the tender portion for new shares will be ranked according to the price from highest to the lowest and allotted in full starting from the highest price downwards until all the shares are allotted. This allows for professional investors to focus their attention on pricing their applications on the required number of shares they are comfortable with. To cater for the small investors, a significant proportion of the issue is still available for subscription based on a predetermined price.

4. Hypotheses

Similar to Feltham et al. (1991) and Clarkson and Simunic (1994), the basic model in our study is derived from Datar et al. (1991). We examine a sample of firms making initial public offerings where the risk-averse entrepreneurs seek to raise capital from and share risks with investors in a competitive capital market. Investors realize that the entrepreneur has private information about the expected future value of his firm and they will undervalue his firm unless he convincingly communicates his information to them. The entrepreneur’s communication with investors takes four forms: a signal consisting of the percentage of retained ownership chosen by the entrepreneur (\( \alpha \)), the audited report (\( y \)), the entrepreneur’s audit quality choice (\( a \)), and his underwriter choice (\( u \)).

The signal for retained ownership is measured by the percentage of shares retained by the owner. The audited report is proxied by the book value of equity prior to the issue plus proceeds from the issue. Auditor quality choice is measured by an indicator variable. A Big Six auditor is considered a high quality auditor and a non-Big Six auditor, a low quality auditor. Underwriter choice is also measured by an indicator variable. Since DBS underwrites a majority of the new issues in Singapore, we consider DBS a prestigious underwriter and all other investment bankers, non-prestigious underwriters. Furthermore, the government of Singapore is a major shareholder in DBS, and this increases the reputation of DBS in the local community. Our first four hypotheses in the alternative are as follows:

\[ H_1: \text{There is greater investor confidence when the entrepreneur retains more shares, and hence the value of the firm is positively} \]
associated with the percentage of shares retained by the entrepreneur.

**H₂**: The book value of equity is a measure of the audited report, and hence the value of the firm is positively associated with the book value of equity.

**H₃**: Due to greater investor confidence in reports approved by high quality auditors, the value of the firm is positively associated with auditor quality.

**H₄**: Due to greater investor confidence in issues underwritten by prestigious underwriters, the value of the firm is positively associated with underwriter prestige.

To test the hypotheses above, we regress the value of the firm on the four information variables, that is, percentage of shares retained by the owner, book value of equity, an indicator variable for auditor choice, and an indicator variable for underwriter choice. The value of the firm is measured by the offer price multiplied by the total number of shares outstanding after the offer. The ownership signal is similar to the measure in Datar et al. (1991) and Feltham et al. (1991), that is, we take \(-\ln(1 - \alpha) + \alpha\), where \(\alpha\) = percentage retained by the owner. Book value of equity is measured as the value of equity prior to the offer plus proceeds from the offer. Auditor choice is measured by an indicator variable: one if the firm was audited by a Big Six auditor, and zero otherwise. Underwriter choice is measured by an indicator variable: one if the offer was underwritten by DBS, and zero otherwise. Ritter (1991) finds that issuers successfully time new issues to take advantage of “windows of opportunity”. In this paper, we control for this “window of opportunity” by observing the general market sentiment ten days before listing of this issue. We measure this by an indicator variable: one if the market index (SES All-share) was trending up, zero if the market index was flat, and negative one if the market index was trending down.

This leads us to formulate the following regression model:

\[
\text{Value} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market Sentiment} + \varepsilon
\]  

(1)

where

- **Value** = the offer price times the total shares outstanding after the new issue,
- **Ownership signal** = \(-\ln(1 - \alpha) + \alpha\); \(\alpha\) = percentage retained by the owner,

Equity \( \equiv \) the book value of the firm’s equity after the new issue (i.e., the book value of equity prior to the issue plus the proceeds from the primary offering),

Auditor \( \equiv 1 \) if the firm’s auditor is a Big Six auditor, and 0 otherwise,

Underwriter \( \equiv 1 \) if the lead underwriter is DBS, and 0 otherwise,

Market \( \equiv 1 \) if the SES All-share index was trending up, 0 if the SES All-share index was flat, and \(-1\) if the SES All-share index was trending down ten days before listing.

The ownership signal variable indicates the fraction of shares retained by the owner, and reflects the entrepreneur’s risk aversion and the firm-specific risk that he faces. Ownership retention is therefore positively associated with quality of the firm; the coefficient, \( \beta_1 \), should be positive. The book value of equity variable is a measure of the prospectus information upon which investors base their “pessimistic” beliefs about the entrepreneur’s expectations. Book value of equity is expected to be positively associated with market value of the firm. The coefficient \( \beta_2 \), should be positive. The auditor variable indicates whether the sample firm was audited by a high or low quality auditor. A high quality auditor is represented by one of the Big Six firms. We assume that a high quality auditor is important to investors in interpreting the prospectus, and so \( \beta_3 \) should be positive. The underwriter variable indicates whether the IPO was underwritten by DBS or not. We consider DBS to be the prestigious underwriter in Singapore, and that underwriter prestige is important to investors. The coefficient \( \beta_4 \), should be positive. The market sentiment variable is a control variable to measure whether the value of the firm is influenced by market sentiment during the offer. This variable controls for the “window of opportunity” exploited by issuers.

Equation (1) measures information as reflected in the price of the issue. This is based on the assumption that the role of the underwriter is to best estimate the demand curve for the issue and set a price that will match supply. The issue price is the worth the market attaches to the firm. However, under a firm-commitment contract, controlling interest in the issue belongs to the underwriter whose incentive is to pre-sell the whole offering. This incentive promotes underpricing (Benveniste and Spindt, 1989). In this case, underpricing is related to the marginal value of private information. We also run our analysis above using underpricing as the dependent variable.
We next expand the basic model in equation (1) to capture the influence of two institutional features of the initial public offerings market in Singapore. Stocks in Singapore are traded on one of two boards: the Main Board or Sesdaq. Requirements for listing on the Main Board are more stringent than those for Sesdaq. The second board, Sesdaq was formed in February 1987 to enable small and medium-sized companies without the requisite record to qualify for the Main Board to tap long-term funds from the public. We hypothesize listing on the Main Board to be a signal of quality and consequently a higher valuation for the firm.

**H₅:** Main Board firms are of a higher quality than Sesdaq firms, and hence the value of Main Board firms is higher than that of Sesdaq firms.

Under the firm commitment method, the underwriter tends to fix the price of the issue lower in order to gain a better subscription rate. In 1991, the Dutch auction system for initial public offerings was introduced. Henceforth, firms seeking listing in Singapore can choose the Dutch auction system to raise funds. For a quality firm whose value is recognized by the market, the auction system has the benefit of raising more funds for issuers than the fixed price system. However, the firm risks getting less funds if the market fails to recognize its value. We hypothesize that the auction method would be preferred by a quality firm to signal its value.

**H₆:** Firms that choose the auction system have low risks and are of good quality, and hence the value of the firms that choose the auction system is higher than that of firms that choose the fixed system.

These hypotheses lead us to formulate a second regression model:

\[
\text{Value} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market sentiment} + \beta_6 \text{Board} + \beta_7 \text{Auction} + \epsilon
\]  

(2)

where

- Board \( \equiv 1 \) if the firm is listed on the Main Board, and 0 otherwise,
- Auction \( \equiv 1 \) if the firm chose the auction system, and 0 otherwise.

The other variables are as defined in equation (1).
5. Empirical Tests and Results

5.1 Sample

We examine Singaporean firms that applied for listing in the years 1987 through 1993. Our sample consists of 108 initial public offering firms whose prospectus are available in the Financial Database of the Faculty of Business Administration, the Hon Sui Sen Memorial Library of the National University of Singapore, or the library of the Stock Exchange of Singapore. Of these, 57 issues (53 per cent) were for listing on the Main Board and 51 (47 per cent) were for listing on Sesdaq.

Descriptive statistics of the sample firms are presented in Table 1. The sample firms have a mean asset value of S$91 million (median S$44 million). The mean value of proceeds of the new issues amounts to S$25 million (median S$8 million). The mean value of the firm measured by capitalization of the firm is S$126 million (median S$73 million). The mean percentage of shares retained is 71 per cent (median 75 per cent). The mean of the ownership signal is 0.64 (median 0.64). The ownership retention ratio is relatively high compared with the U.S. sample. Feltham et al. (1991) report that the mean retained ownership percentage ranges from 44 per cent to 46 per cent for their various subsamples, and the mean ownership signal ranges from 0.188 to 0.222. The average book value of equity is S$70 million (median S$33 million). Leverage of the firms measured as the ratio of long-term debt to market value is 0.11 (median 0.05). The initial public offerings are, on the average, underpriced by 35 per cent (median 24 per cent) if we use the fixed offer price. The magnitude of underpricing for the Singapore sample is higher than that in the

Table 1. Descriptive Statistics for a Sample of 108 Singapore Initial Public Offerings between 1987 and 1993

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets(^a) = book value of prior assets</td>
<td>91</td>
<td>44</td>
<td>123</td>
</tr>
<tr>
<td>Proceeds(^a) = value of primary offerings</td>
<td>25</td>
<td>8</td>
<td>43</td>
</tr>
<tr>
<td>Value(^a) = offer price \times total shares outstanding</td>
<td>126</td>
<td>73</td>
<td>150</td>
</tr>
<tr>
<td>Retained ownership percentage = (\alpha)</td>
<td>0.71</td>
<td>0.75</td>
<td>0.15</td>
</tr>
<tr>
<td>Ownership signal = (-\ln(1 - \alpha) + \alpha)</td>
<td>0.64</td>
<td>0.64</td>
<td>0.32</td>
</tr>
<tr>
<td>Audited report(^a) = book value of equity</td>
<td>70</td>
<td>33</td>
<td>122</td>
</tr>
<tr>
<td>Leverage = long term debt/market value</td>
<td>0.11</td>
<td>0.05</td>
<td>0.23</td>
</tr>
<tr>
<td>Underpricing = (first day closing price – offer price)/offer price</td>
<td>0.35</td>
<td>0.24</td>
<td>0.41</td>
</tr>
</tbody>
</table>

\(^a\) Amounts are in millions of Singapore dollars
United States; Balvers et al. (1988) report the average level of underpricing for their sample ranges from seven to 11 per cent.

We present a cross-tabulation of the auditor and underwriter reputation classifications in Table 2. Forty-four (41 per cent) of the issues were underwritten by DBS and 64 (59 per cent) were underwritten by other investment banks.¹³ The choice of auditors was largely in favor of the Big Six firms; 86 (80 per cent) of the sample firms were audited by a Big Six auditor, and only 22 (20 per cent) were audited by a non-Big Six auditor.¹⁴ We are not able to reject the null hypothesis of independence between the choice of auditor and underwriter (chi-square statistic = 2.181, p-value = 0.14).

### 5.2 Valuation Analysis

Twenty firms in our sample had fixed-cum-auction price tranches; 18 adopted a uniform auction system for their tranches, and two adopted a discriminatory auction system. In a uniform auction, the auction shares are priced at the lowest successful bid, and in a discriminatory auction, the shares are priced according to the investor’s bid. For auction firms, we define auction price as the lowest successful bid, and value of the firm as the auction (offer) price times the total number of shares outstanding. For

<table>
<thead>
<tr>
<th>Auditor¹⁸</th>
<th>Non DBS</th>
<th>DBS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Big Six</td>
<td>10 (9.26%)</td>
<td>12 (11.11%)</td>
<td>22 (20.37%)</td>
</tr>
<tr>
<td>Big Six</td>
<td>54 (50.0%)</td>
<td>32 (29.63%)</td>
<td>86 (79.63%)</td>
</tr>
<tr>
<td>Total</td>
<td>64 (59.26%)</td>
<td>44 (40.74%)</td>
<td>108 (100%)</td>
</tr>
</tbody>
</table>

Chi-square²⁴ = 2.181, p-value = 0.140

¹ The sample firms are categorized according to whether they are audited by a Big Six auditor or not. The Big Six auditors are: Arthur Andersen, Coopers and Lybrand, Deloitte and Touche, Ernst and Young, KPMG Peat Marwick, and Price Waterhouse.

² The initial public offerings are categorized according to whether they are underwritten by DBS or not. DBS is the single most frequent underwriter of initial public offerings in Singapore.

³ The Development Bank of Singapore.

⁴ Test for independence.
the remaining 88 firms that issued a fixed price offering, we define offer price as the fixed price quoted by the offering firm. Results of the regression with valuation of the firm as the dependent variable are presented in Table 3.\footnote{Table 3. Sample of Singapore initial public offerings between 1987 and 1993. Regression results with valuation as the dependent variable (t-statistics are in parentheses)

\[
\text{Value} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market sentiment} + \epsilon
\] (1)

\[
\text{Value} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market sentiment} + \beta_6 \text{Board} + \beta_7 \text{Auction} + \epsilon
\] (2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Predicted sign</th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept ( (\beta_0) )</td>
<td>21.073</td>
<td>–33.824</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.688)</td>
<td>(–1.126)</td>
<td></td>
</tr>
<tr>
<td>Ownership signal ( (\beta_1) )</td>
<td>+ 47.317</td>
<td>63.696</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.717\footnote{a})</td>
<td>(2.537\footnote{a})</td>
<td></td>
</tr>
<tr>
<td>Equity ( (\beta_2) )</td>
<td>+ 1.050</td>
<td>0.945</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(14.707\footnote{a})</td>
<td>(13.515\footnote{a})</td>
<td></td>
</tr>
<tr>
<td>Auditor ( (\beta_3) )</td>
<td>+ 8.987</td>
<td>14.533</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.423)</td>
<td>(0.752)</td>
<td></td>
</tr>
<tr>
<td>Underwriter ( (\beta_4) )</td>
<td>+ –18.422</td>
<td>–2.573</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(–1.074)</td>
<td>(–0.163)</td>
<td></td>
</tr>
<tr>
<td>Market sentiment ( (\beta_5) )</td>
<td>+ 5.194</td>
<td>9.756</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.496)</td>
<td>(1.022)</td>
<td></td>
</tr>
<tr>
<td>Board ( (\beta_6) )</td>
<td>+ 57.082</td>
<td>52.179</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.211\footnote{a})</td>
<td>(2.576\footnote{a})</td>
<td></td>
</tr>
<tr>
<td>Auction ( (\beta_7) )</td>
<td>+ 52.179</td>
<td>57.082</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.576\footnote{a})</td>
<td>(3.211\footnote{a})</td>
<td></td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.6798</td>
<td>0.7389</td>
<td></td>
</tr>
<tr>
<td>Number of observations</td>
<td>105</td>
<td>105</td>
<td></td>
</tr>
</tbody>
</table>

Note: Three observations have missing values.
Value = the offer price times the total shares outstanding after the new issue,
Ownership signal = \(-\ln(1 – \alpha) + \alpha\); \(\alpha\) = percentage retained by the owner.
Equity = the book value of the firm’s equity after the new issue (i.e., the book value of equity prior to the issue plus the proceeds from the primary offering).
Auditor = 1 if the firm’s auditor was a Big Six auditor, and 0 otherwise,
Underwriter = 1 if the lead underwriter was DBS (the Development Bank of Singapore), and 0 otherwise,
Market = 1 if the SES All-share index was trending up, 0 if the SES All-share index was flat, and \(-1\) if the SES All-share index was trending down ten days before listing.
Board = 1 if the firm was listed on the Main Board, and 0 otherwise,
Auction = 1 if the firm chose the auction system, and 0 otherwise.

\footnote{a} Significant at the 1% level, one-sided t-test;
\footnote{b} Significant at the 5% level, one-sided t-test.
Column 3 presents results using regression model (1). The intercept term is positive but not significant ($\beta_0 = 21.073$, t-statistic = 0.688). First, we hypothesize that the percentage of shares retained by the entrepreneur should reflect the entrepreneur’s aversion to risk and the firm-specific risk that he faces. A higher percentage of retained shares signals the entrepreneurial information on quality of the firm. Hence, we predict that $\beta_1$, the coefficient on ownership signal to be positive. The sign of the coefficient is significantly positive as predicted; the ownership signal is significant in explaining the value of the firm ($\beta_1 = 47.317$, t-statistic = 1.717).

Second, we hypothesize that the audited report reveals information to the investors. We use book value of equity to proxy for information in the audited report. We predict that book value of equity is positively associated with value of the firm and hence, $\beta_2$, the coefficient on book value to be positive. $\beta_2 = 1.050$ (t-statistic = 14.707) is significantly positive at the 1 per cent level.

Third, we hypothesize that auditor choice signals quality of the IPO firm. A Big Six auditor is considered a high quality auditor, and a non-Big Six auditor a low quality auditor. We expect $\beta_3$, the coefficient on the auditor indicator variable to be positive. The sign of the coefficient is in the direction predicted, but is not significant ($\beta_3 = 8.987$, t-statistic = 0.423).

Fourth, we hypothesize that choice of underwriter signals quality of the IPO firm. DBS is considered a prestigious underwriter, and other investment bankers to be less prestigious. We expect $\beta_4$, the coefficient on the underwriter variable to be positive. Contrary to our hypothesis, $\beta_4 = -18.422$ (t-statistic = -1.074) but is not significant. The market sentiment variable is positive but not significant ($\beta_5 = 5.194$, t-statistic = 0.496).

In equation (2) we include board listing and auction or fixed system as additional variables to explain valuation of initial public offerings. The results are in Table 3, Column 4. Listing requirements are more stringent for Main Board firms. Hence, we hypothesize listing on the Main Board to be a signal of quality, and consequently higher valuation. We expect $\beta_6$, the coefficient on the board variable to be positive. As expected, $\beta_6 = 57.082$ (t-statistic = 3.211) is significantly positive at the 1 per cent level. The auction system is more risky but brings more funds for the issuers should the market recognize its value. We expect $\beta_7$, the coefficient on the auction variable to be positive. As expected, $\beta_7 = 52.179$ (t-statistic = 2.576) is significantly positive at the 1 per cent level. The results for the four information signals remain unchanged from those of the basic model in equation (1).
There are some interesting comparisons between the results obtained here and those from the studies of initial public offerings in the United States and Canada. The explanatory power of this model for the Singaporean sample is similar to that for the U.S. sample; adjusted R-squared for the basic model in this study is 68 per cent compared with a range of 62 to 86 per cent in the various subsamples in Feltham et al. (1991). Similar to prior studies in the United States and Canada, this study finds that ownership signal and audited report are positively related to valuation of the IPO firm. The contrasting results are that auditor choice and underwriter reputation are not significant in explaining the valuation of initial public offerings in Singapore. The sign of the coefficient on auditor choice is positive as predicted but not significant. Auditor choice may not be significant in explaining valuation of initial public offerings in Singapore because 80 per cent of the sample firms has a Big Six auditor. This does not allow for within sample variations with respect to auditor choice. The sign of the coefficient on underwriter choice is negative, contrary to prediction but is not significant. It appears that there are no differences in pricing of new issues between the underwriters in this sample. Both the results for underwriter choice and auditor choice are consistent with (and may partially be explained by) the less litigious business environment in Singapore.

We further analyze whether the quality of auditor is associated with the riskiness of the issues. We regress auditor choice on size of the firm measured by assets of the firm, its leverage, its underwriter choice and firm-specific risk. We propose the following regression model:

$$\text{Auditor} = \beta_0 + \beta_1 \text{Asset} + \beta_2 \text{Leverage} + \beta_3 \text{Underwriter} + \beta_4 \text{Risk} + \epsilon$$ (3)

where

- \(\text{Auditor} \equiv 1\) if the firm’s auditor is a Big Six auditor, and 0 otherwise,
- \(\text{Asset} \equiv \) the book value of assets of the firm,
- \(\text{Leverage} \equiv \) the ratio of long-term debt to market value,
- \(\text{Underwriter} \equiv 1\) if the lead underwriter is DBS, and 0 otherwise,
- \(\text{Risk} \equiv \) the standard deviation of residuals of the regression of 60-day returns of the firm on the market returns.

The results (not reported) indicate that a Big Six auditor is more likely to be associated with a more risky firm. The coefficient, \(\beta_4\), is 6.346 (t-statistic = 1.443) marginally significant at the 10 per cent level. This result is similar to Clarkson and Simunic (1994).
We also analyze whether underwriter prestige is associated with the riskiness of the issues. We regress underwriter choice on size of the firm measured by assets of the firm, its leverage, its auditor choice and firm-specific risk using the specification:

$$\text{Underwriter} = \beta_0 + \beta_1 \text{Asset} + \beta_2 \text{Leverage} + \beta_3 \text{Auditor} + \beta_4 \text{Risk} + \varepsilon$$  \hspace{1cm} (4)

The variables are as defined above. The results (not reported) indicate that underwriter choice is not associated with riskiness of the firm. The coefficient, $\beta_4$, is 1.002 (t-statistic = 0.182).

5.3 Returns Analysis

We next run the analysis with underpricing or returns as the dependent variable. The results are presented in Table 4. We measure returns over two windows, at time $t = +1$ day and at $t = +365$ days after listing for the basic model (1a) and for the extended model (2a). The explanatory power of the model using returns is lower; the adjusted R-squared ranges from 2 to 7 per cent.

We expect the signals to be negatively associated with underpricing. Column 3 shows that at time $t = +1$, the ownership signal is negatively associated with underpricing at the 10 per cent level ($\beta_1 = -1.615$, t-statistic = -1.576). The other signals are not associated with underpricing. We do not make any predictions on the sign between market sentiment and underpricing. If market sentiment is high, the issuer may offer the issue at a high price relative to what the market is willing to pay on trading day in which case the underpricing is low. Conversely, the market riding high on sentiment may be willing to pay a much higher price on trading day in which case the underpricing is high. The results indicate that when market sentiment is positive, underpricing is higher ($\beta_3 = 0.161$, t-statistic = 3.283). The ownership signal is no longer significant in the extended model (2a) reported in Column 5. Market sentiment remains positively associated with underpricing.

We examine performance of these issues one year after listing. Results for the basic model (1a) are reported in Column 4. We find that one-year returns are higher for issues audited by a Big Six auditor significant at the 10 per cent level ($\beta_3 = 0.208$, t-statistic = 1.398), and those underwritten by DBS significant at the 1 per cent level ($\beta_4 = 0.290$, t-statistic = 2.326). The results remain basically unchanged in the extended model (2a) reported in Column 6.

Table 4. *Sample of Singapore Initial Public Offerings between 1987 and 1993 Regression Results with Returns (at $t = +1$ and $+365$ days after listing) as the dependent variable (t-statistics are in parentheses)*

$$\text{Returns} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market sentiment} + \varepsilon$$

(1a)

$$\text{Returns} = \beta_0 + \beta_1 \text{Ownership signal} + \beta_2 \text{Equity} + \beta_3 \text{Auditor} + \beta_4 \text{Underwriter} + \beta_5 \text{Market Sentiment} + \beta_6 \text{Board} + \beta_7 \text{Auction} + \varepsilon$$

(2a)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Predicted sign</th>
<th>Model 1a (price at $t = +1$)</th>
<th>Model 1a (price at $t = +365$)</th>
<th>Model 2a (price at $t = +1$)</th>
<th>Model 2a (price at $t = +365$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept ($\beta_0$)</td>
<td></td>
<td>0.358 (2.949)</td>
<td>0.127 (0.680)</td>
<td>0.277 (1.972)</td>
<td>0.051 (0.236)</td>
</tr>
<tr>
<td>Ownership signal ($\beta_1$)</td>
<td>$-$</td>
<td>$-$1.615 (–1.576)</td>
<td>0.172 (0.109)</td>
<td>$-$1.022 (–0.881)</td>
<td>0.784 (0.436)</td>
</tr>
<tr>
<td>Equity ($\beta_2$)</td>
<td></td>
<td>0.043 (0.370)</td>
<td>$-$0.067 (–0.375)</td>
<td>0.038 (0.308)</td>
<td>$-$0.102 (–0.529)</td>
</tr>
<tr>
<td>Auditor ($\beta_3$)</td>
<td></td>
<td>0.0017 (–0.173)</td>
<td>0.208 (1.398)</td>
<td>$-$0.012 (–0.123)</td>
<td>0.218 (1.446)</td>
</tr>
<tr>
<td>Underwriter ($\beta_4$)</td>
<td></td>
<td>0.015 (0.187)</td>
<td>0.290 (2.326)</td>
<td>0.030 (0.372)</td>
<td>0.303 (2.383)</td>
</tr>
<tr>
<td>Market sentiment ($\beta_5$)</td>
<td></td>
<td>0.161 (3.283)</td>
<td>0.097 (1.274)</td>
<td>0.166 (3.361)</td>
<td>0.102 (1.329)</td>
</tr>
<tr>
<td>Board ($\beta_6$)</td>
<td></td>
<td>$-$0.076 (0.750)</td>
<td>0.116 (0.739)</td>
<td>$-$0.012 (–0.075)</td>
<td>$-$0.012612 (–0.075)</td>
</tr>
<tr>
<td>Auction ($\beta_7$)</td>
<td></td>
<td>0.066405 (0.612)</td>
<td>$-$0.012612 (–0.075)</td>
<td>$-$0.012612 (–0.075)</td>
<td>0.0214 (0.733)</td>
</tr>
</tbody>
</table>

Adjusted $R^2$: 0.0659, 0.0353, 0.0604, 0.0214

Number of observations: 105, 105, 105, 105

Note: Three observations have missing values.

Returns = the market price at time $t$ less offer price scaled by offer price.

Ownership signal = $-\ln(1 - \alpha + \alpha)$ scaled by the book value of the firm’s equity after the new issue (i.e., the book value of equity prior to the issue plus the proceeds from the primary offering); $\alpha$ = percentage retained by the owner.

Equity = the book value of the firm’s equity after the new issue scaled by the number of shares,

Auditor = 1 if the firm’s auditor was a Big Six auditor, and 0 otherwise.

Underwriter = 1 if the lead underwriter was DBS, and 0 otherwise.

Market = 1 if the SES All-share index was trending up, 0 if the SES All-share index was flat, and $-1$ if the SES All-share index was trending down ten days before listing.

Board = 1 if the firm was listed on the Main Board, and 0 otherwise.

Auction = 1 if the firm chose the auction system, and 0 otherwise.

*a* Significant at the 1% level, one-sided t-test;

*a* Significant at the 10% level, one-sided t-test.
6. Summary

This study examines the relation between valuation and four factors that represent entrepreneurs’ private information for a sample of 108 initial public offerings in Singapore from the period 1987 to 1993. Initial public offerings are characterized by a situation of information asymmetry between the entrepreneur and potential investors regarding the expected future cash flows of the firm. Various theoretical models posit several avenues by which the entrepreneur may communicate his private information to potential investors so that they may correctly value his firm (for example, Leland and Pyle, 1977, Balvers et al., 1988 and Datar et al., 1991).

Our results indicate that the value of initial public offerings is positively related to book value of equity in the prospectus and the percentage of shares retained by the owner. Contrary to our hypothesis, we find that the value of initial public offerings is not associated with auditor quality. Neither is valuation of initial public offerings related to the choice of DBS as underwriter. Our results are similar to those in the U.S. and Canadian studies in that the audited report and retained ownership are positively associated with the valuation of initial public offerings. Our results differ from the other studies in that we find no association between auditor choice and valuation of initial public offerings, and no association between underwriter choice and valuation of initial public offerings. We attribute these differences to the fact that there is very little variation in auditor choice among our sample firms, and that underwriters in the sample do not differ in their pricing of new issues. The less litigious business environment in Singapore may also be a factor in our results for underwriter and auditor choices. In addition, we find that firms that are listed on the Main Board are valued higher than those on Sesdaq. We also find that firms that chose the auction system are valued higher than those that chose the fixed system.

Average underpricing for our sample is 35 per cent relative to 7–11 per cent in the United States (Balvers et al., 1988). For an alternative specification with underpricing as the dependent variable, we find that first-day return is marginally lower when the ownership retention is higher, and significantly higher when the market sentiment is positive. First-day return is not associated with book value of equity, auditor choice or underwriter choice. However, first-year return is marginally higher for firms with a Big Six auditor, and significantly higher for issues underwritten by DBS.

Notes

1. This supports the prediction in Datar et al. (1991) that high-risk firms will choose higher reputation auditors.
2. This result whilst not consistent with the prediction in Datar et al. (1991) is consistent with the prediction of Titman and Trueman (1986) that the demand for auditor reputation is inversely related to firm-specific risk.
3. Another paper that has studied this issue in an Asia-Pacific market is Kim et al. (1995) who examine the valuation of initial public offerings in Korea.
4. The Big Six auditors are Arthur Anderson, Coopers and Lybrand, Deloitte and Touche, Ernst and Young, KPMG Peat Marwick, and Price Waterhouse. We assume that large audit firms have greater incentives to provide higher quality services than small audit firms (DeAngelo, 1981).
5. DBS is the single most frequent underwriter of initial public offerings in Singapore. In our sample, 41 per cent of the initial public offerings were underwritten by DBS. In their study of Korean initial public offerings, Kim et al. (1995) classified the largest five investment banks (on the basis of their market shares) as prestigious underwriters. In Balvers et al. (1988) on U.S. initial public offerings, an investment banking firm is included in the prestigious category if it consistently appeared in the “Top 25” as reported annually by Institutional Investor.
6. Lower initial returns indicate less underpricing, or higher valuation.
7. Both Feltham et al. (1991) and Clarkson and Simunic (1994) measure audited report as the book value of the firm’s equity after the new issue.
8. In both papers, the high quality subsample consists of firms who hired one of the largest eight auditors, and the low quality subsample consists of firms whose auditors are not among the largest 14 auditors.
9. The other underwriting method is the best efforts method.
11. DBS is one of the Big Four local banks. The other three are Overseas-Chinese Banking Corporation (OCBC), Overseas Union Bank Ltd (OUB) and United Overseas Bank Ltd (UOB). As at January 1, 1996, DBS was the third largest Singapore bank in terms of market capitalization after OCBC and UOB.
12. As at March 13, 1995, government-linked corporations held 42.87 per cent of shares in DBS.
13. These 64 issues were underwritten by 19 other investment bankers.
14. Thirteen of the firms had both a Big Six auditor and a non-Big Six auditor. These firms are classified as having a high quality auditor. There are 11 non-Big Six auditors in the sample.
15. The regression results are based on 105 observations. Three observations have missing data.

References


