Earnings forecast errors in IPO prospectuses and their associations with initial stock returns

Gongmeng Chen a, Michael Firth a,*, Gopal V. Krishnan b

a Department of Accountancy, The Hong Kong Polytechnic University, Hang Hom, Kowloon, Hong Kong, China
b Department of Accountancy, City University of Hong Kong, Kowloon Tong, Hong Kong, China

Received 25 January 2000; accepted 5 March 2000

Abstract

Companies making initial public offerings in Hong Kong often include a forecast of the next year’s profit in the new issue prospectus. The forecast is used by investors to help them value the company, decide whether to subscribe to the new issue, and decide whether to invest on the first day of trading. The accuracy of the forecast is crucial if the forecast is to be a credible signal. Our study uses a number of error metrics to examine forecast accuracy. In general, forecasts appear to be quite accurate and they are far better than the predictions derived from simple time series models. Cross-sectional models are derived to explain variations in accuracies but they have very weak results. Our results also suggest that investors are able to anticipate forecast errors at the time of listing. © 2001 Elsevier Science B.V. All rights reserved.

JEL classification: G12; G15

Keywords: Earnings forecasts; IPOs

1. Introduction

IPO prospectuses in Hong Kong typically provide a forecast of profits for the year in which the issue takes place. Although this is a voluntary act, virtually all
IPOs publish a forecast. Firth (1998) demonstrates that profit forecasts can be an extremely important signal of company valuation, and public disclosure of forecasts can reduce information asymmetry between managers and investors, and hence lower agency costs. However, in order for the profit forecast to be useful, it needs to be accurate. The purpose of this paper is to investigate the accuracy of IPO profit forecasts of companies listing in Hong Kong. The research is important as profit forecasts are the major valuation parameter for IPOs in Hong Kong and so knowledge of the general level of forecast accuracy is important for investors, regulators, and policy makers. Previous research in Hong Kong and elsewhere has yielded mixed findings on the accuracy of IPO profit forecasts and so additional studies are warranted to shed more light on the issue.

Our results show that the mean absolute forecast errors of IPO profit forecasts is 21.96%. This implies actual profits are 22% greater than forecast or 22% lower than forecast. While these errors are large when compared to the accuracy of analysts’ profit forecasts of mature companies, the results do compare favourably with other IPO studies and they are superior to forecasts generated by two time series models. A cross-sectional model is developed to explain the magnitude of errors but the explanatory power is low. Finally, we show that investors are able to at least directionally estimate forecast errors and use this in pricing shares on the first day of trading.

The next section of the paper reviews some of the research studies that have examined the accuracy of IPO profit forecasts. This leads on to a discussion of some of the factors that may influence the magnitude of errors. The institutional characteristics of the new issue process in Hong Kong are described in Section 3. Methodology and research designs are discussed in Section 4 and this is followed by a presentation and discussion of the results. Finally, a summary and conclusions are made.

2. Background and conceptual factors

2.1. Prior research

Firth and Smith (1992) and Mak (1989) reported large absolute forecast errors in New Zealand IPO prospectuses with means exceeding 100% (implying actual profits were double the forecast profits or actual profits were negative). The mean forecast errors are also large and reveal an over-prediction bias where forecasts exceed actuals. A later study by Hsu et al. (1999) found accuracy has improved in New Zealand with a mean absolute forecast error of 76% in the years 1987–1994. Lee et al. (1993) report large forecast errors in Australian IPOs. The mean (median) absolute forecast error was 1138% (42%); the mean forecast error was 994%. Firth and Smith (1992) found that company size had an unanticipated positive relationship with forecast errors and Mak (1989) and Lee et al. (1993) reported positive relationships between the time horizon of the forecast and absolute forecast errors.

---

1 The very large mean errors were due in part to small profit forecasts used to scale the errors (i.e. small denominator).
Keasey and McGuinness (1991) found that, on average, profit forecasts in British prospectuses were more accurate than in Australia and New Zealand. They concluded that the IPO profit forecast bias was not significantly different from the forecast bias of naive statistical models; however, the accuracy of IPO forecasts was found to be superior to those derived from the statistical models. Canadian evidence (Pedwell et al., 1994) shows that IPO forecasts, on average, exceed the actual profits with the mean absolute error being 88%. The authors found that a longer forecasting period was associated with bigger absolute forecast errors and Big Eight auditors were associated with larger errors.

Evidence from Malaysia (Mohamad et al., 1994; Jelic et al., 1998) and Singapore (Firth et al., 1995) reported comparatively small errors. Mohamad et al. found that leverage is negatively and statistically significantly related to the absolute forecast error; the negative sign is counter to expectations and implies that higher risk companies, as proxied by the debt to gross assets ratio, are easier to forecast. Firth et al. (1995) found a positive association between the forecast horizon and forecast errors.

Two studies using data from Hong Kong are Chan et al. (1996) and Jaggi (1997). They reported mean absolute forecast errors of 18% and 12.86%, respectively, and Jaggi found a mean forecast error of 3.10%. Similar levels of forecast accuracy have been reported for China (Chen and Firth, 1999). The errors are very small compared to the errors from Australia and New Zealand. Both studies used cross-sectional regressions to model the variability in absolute forecast errors. Chan et al. found that low profit variability and smaller changes in economic growth accompany small forecast errors. Jaggi found that older companies were associated with smaller errors. The present study extends the work of Chan et al. (1996) and Jaggi (1997) by using different measures of accuracy and by using a later sample period which allows us to include Chinese company initial public offerings that list in Hong Kong. We also test whether investors anticipate forecast errors at the time of listing; this issue was not addressed in prior research on IPOs in Hong Kong.

2.2. Factors influencing magnitude of forecast errors

Based on past research and on a priori reasoning we investigate the impact of company size, length of the forecast period, historical variability in profits, age, leverage, auditor, underwriter, ownership, Chinese companies, industry sector, and return on assets, on the absolute forecast error (AFE). The absolute forecast error is defined as the actual profit minus the forecast profit, scaled by forecast profit; the sign of the error is ignored when computing AFE. AFE represents the magnitude of the error while the average forecast error (inclusive of sign) measures the bias in forecasts.

Large companies are likely to have more influence over their market settings and they are more likely to be price-setters; this gives them more control over the level

---

of their profits. This suggests a negative relationship between size and the absolute forecast error. A priori, the longer the time period that is to be forecast, the greater the prediction error; this implies a positive relationship between the length of the forecast horizon and the absolute forecast error.

Profit forecasting is likely to be more difficult for risky companies and we therefore hypothesize positive relationships between AFE and the risk variables, variability in profits and leverage, and a negative relationship with the age of the company. Variability in profits and leverage are well accepted in the literature as measures of company risk. Older companies may be viewed as being less risky as they have more experience to draw on when making forecasts of their profits.

A number of theoretical studies have examined the role of advisers, principally auditors, bankers, and underwriters, in adding credibility to companies when raising capital. For example, the appointment of a ‘high quality’ auditor is argued to lower agency costs and lower the risk of a company; this in turn increases the market value of the company. High quality advisers invest heavily in building and enhancing their reputational capital and they are careful to avoid actions that might jeopardize their hard won reputation. Large forecast errors will damage advisers’ reputations and so they have incentives to closely monitor the profit forecasts. This oversight will lead to more accurate forecasts.

We expect a negative relationship between AFE and the percentage of shares held by outsiders. The argument is that while ‘insiders’ have other means to predict profits, outsiders have to rely on the prospectus forecast. In addition, the larger the number of outside shareholders, the greater the chance of litigation if the forecasts are inaccurate.

Some China-related companies are listed in Hong Kong and they are termed Red Chips and H-shares. The assets and operating activities of Red Chip and H-share companies are mainly located in China and so they are subject to the economic conditions in the PRC. China-related companies may be more risky, therefore making forecasts less accurate. On the other hand, the state authorities may allow and even encourage companies to ‘manage’ the profit numbers so as to ensure forecasts are achieved.

3. Profits forecasts in Hong Kong IPO prospectuses

Companies that make new issues of shares in Hong Kong and list the shares on the Exchange must comply with the provisions of the Companies Ordinances and satisfy and abide by the requirements and rules of the Stock Exchange of Hong Kong (SEHK). Initial public offerings, be they for Hong Kong companies, H-shares, or Red Chips, must be accompanied by a detailed prospectus which

---

3 H-shares and Red Chips are companies that list on the Stock Exchange of Hong Kong but have their principle operations and majority shareholders in China. Red Chips differ from H-shares in that they incorporate in Hong Kong and their senior management is often located there.
describes the terms of the share offer and discloses various prescribed pieces of information. Details of the offer that must be disclosed include the offer price, number of shares to be sold, and the dates for the opening and closing of subscriptions. Details about the company include the operating and financial history of the company, business activities, pro-forma balance sheets, management team, major contractual obligations, debts and liabilities, future plans, planned uses of the issue proceeds, and names of the asset and property appraisers, auditors, bankers, underwriters and other advisers. IPOs are typically made at fixed offer prices and for a fixed quantity of shares. As the offer price is disclosed in the prospectus, it is in effect fixed 2 or 3 weeks before the offer acceptance and share allocation takes place.

The offers are underwritten by financial institutions many of which are well known international firms. IPOs receive a lot of media coverage and are extensively reported in the popular press. Many IPO investors are non-professionals and it is very easy for the general public to subscribe for the new issue. The government as well as the stock exchange wants IPO shares to be sold to the general public so as to enhance market liquidity. This characteristic of wide public ownership is common in British Commonwealth countries. Issues are normally over-subscribed and companies have various schemes to allot the available shares. New issue shares generally start trading on the Stock Exchange of Hong Kong a day after the allotment of shares.

IPO prospectuses typically include a forecast of the current year’s profit. The profit forecast is made by the directors of the company and it is ‘audited’ by the reporting accountants to the issue (the reporting accountants are invariably the auditors). The ‘audit’ involves checking the calculations and ensuring the profit number is based on Hong Kong GAAP; the assumptions underlying the forecast are the sole responsibility of management. Although underwriters and other advisers (apart from the reporting accountants) are not directly involved with the profit forecast, they are, nevertheless, likely to assure themselves that the forecast has been adequately prepared and is free from deliberate bias. All the advisers to an IPO issue stand to damage their reputation and potentially incur litigation costs if the prospectus is found to contain material mis-statements or contain erroneous information; this gives advisers the incentive to monitor management’s profit forecasts.

The profit forecast is arguably the single most important valuation parameter given in the prospectus (Firth, 1998). IPO companies recognize this and promi-
nently display the prospective earnings per share and, more pertinently, the prospective price earnings ratio at the front of the prospectus. The prospective price earnings multiple is the issue price divided by forecast earnings per share. The news media and stockbrokers’ research reports focus on the prospective price earnings ratio. They compare the ratio with the ratios of already listed companies that are similar in industry, size, or other dimension, and then estimate a likely market price for the IPO. Based on the estimated market price (which is a function of the forecast profit), analysts and investors decide whether to subscribe to the new issue (or which IPO to subscribe to if there are several new issues occurring at the same time). Firth (1997, 1998) demonstrated empirically that investors rely on profit forecasts in pricing shares on the first day of trading and that deliberate underpricing of IPOs can be signalled via profit forecasts.

The IPO process is similar to the practices in Australia, Britain, Malaysia, New Zealand, and Singapore, but contrasts with the US. In the U.S. the precise offer price is not fixed in the prospectus but is instead set a day or so before share allocation and after the underwriter has measured the likely demand. American IPO shares are often sold to specific clients of the underwriter and to specialist investors rather than the general public. The company, the underwriter, and other sponsors of the issue can communicate privately to these select investors and so the prospectus is of relatively less importance than in Hong Kong, where the prospectus is the only communication between the company and investors. American IPO shares are sometimes initially listed on an OTC market whereas in Hong Kong the shares are listed on the full exchange board.

4. Methodology

4.1. Models

The forecast error for company \((i)\) for the year of the IPO \((t)\) is calculated as:

\[
FE_{it} = (AP_{it} - FP_{it}) / |FP_{it}|
\]

where \(FE\) is profit forecast error for the company; \(AP\), actual profit for the company; \(FP\), profit forecast as given in the IPO prospectus.

The mean forecast error (MFE) measures the bias in forecasts. A positive value for MFE implies that on average IPO companies have a pessimistic bias (firms under-forecast) while a negative value for MFE represents an optimistic bias (firms over-forecast).

Taking the absolute value of the forecast errors (FEs) gives the absolute forecast error (AFE) for each IPO. AFE is the major metric used to evaluate forecast accuracy. The mean of the absolute forecast errors, denoted as MAFE, represents the overall accuracy of IPO profit forecasts. AFEs vary quite significantly across companies. One reason for these differences will be the inherent difficulty in predicting a specific company’s earnings; this inherent difficulty is not, however, directly measurable. One proxy for inherent difficulty is the change in annual profits
measured from before the IPO to after it. We argue that the greater the change in profit, the more difficult it will be to forecast the profit.\textsuperscript{6}

Brown et al. (1987) developed a statistic that measures the superiority of financial analysts in forecasting profits relative to the actual change in profits. Their measure is adapted here, for the IPO market. The statistic is:

\[
SUP = \ln\left(\frac{(AP_t - AP_{t-1})}{(AP_t - FP_t)}\right)^2. \tag{2}
\]

In is the natural logarithm operator. The denominator measures the error in the IPO forecast while the numerator is the change in profit from year \( t - 1 \) to year \( t \). The numerator can also be regarded as the forecast error from a simple time series forecasting process where \( AP_{t-1} \) is a random walk model estimate of the profit in year \( t \). By construction, a positive value for \( SUP \) means the IPO profit forecast is more accurate than a forecast based on the random walk model; a negative value implies the IPO forecast is inferior to a random walk forecast. We hypothesize that the mean of the \( SUP \) scores will be greater than zero.

Instead of using \( AP_{t-1} \) in Eq. (2), we can use growth in historical profits. This makes more use of information given in the prospectus. The growth model forecast is given as:

\[
GFP = AP_{t-1} \frac{(AP_{t-1})^{1/2}}{(AP_{t-3})}, \tag{3}
\]

where \( GFP \) is growth model forecast profit; \( AP_t \) actual profit in year \( t \) \((t - 1, t - 3); year t - 1 \) is the profit for the last year before the IPO and year \( t - 3 \) is the profit for the third year prior to the IPO.

The forecast, \( GFP \), takes the profit in \( AP_{t-1} \) and multiplies it by one plus the growth rate of profits over the previous 2 years. The modified version of the \( SUP \) measure, named \( MSUP \), is calculated thus:

\[
MSUP = \ln\left(\frac{(AP_t - GFP)}{(AP_t - FP_t)}\right)^2. \tag{4}
\]

We hypothesize that, on average, \( MSUP \) will be positive, indicating superior forecasting ability of the IPO management (vis-à-vis) the growth model.

Absolute forecast errors (AFEs), \( SUPs \), and \( MSUPs \) vary across companies and we construct cross-sectional models to help explain the variations. We base our models on a priori reasoning and on the methodologies and results from previous studies (see Section 2). The model for \( AFE \) is:\textsuperscript{7}

\[
AFE = \beta_0 + \beta_1 SIZE + \beta_2 HORIZON + \beta_3 PROFVAR + \beta_4 AGE + \beta_5 LEV + \beta_6 AUDIT + \beta_7 UNW + \beta_8 OWN + \beta_9 RED + \beta_{10} IND + \beta_{11} ROA, \tag{5}
\]

\textsuperscript{6}A large change in an IPO’s profit may signify a rapid change in the company’s size, strategies, and investment opportunities and-or changes in the business and economic conditions of the production factors and product markets in which the IPO operates.

\textsuperscript{7}SUP and \( MSUP \) are also modelled as functions of the same independent variables. We illustrate AFE first because other studies modelled absolute forecast errors and we compare our results with those from previous research.
where, SIZE is log of total assets after the IPO. Size is measured in millions of Hong Kong dollars. HORIZON, length of the forecast period. This is the number of months between the prospectus date and the next fiscal year end. PROFVAR, standard deviation in profit growth during the 3 years immediately prior to the IPO date. AGE, the number of years from the date of the company’s incorporation to the IPO date. LEV, total debt/total assets. AUDIT, a dummy variable taking the value one (1) if the auditor is one of the Big Six firms; otherwise AUDIT is coded zero (0). UNW, a dummy variable taking the value one (1) if the underwriter is Bear Stearns, Credit Lyonnais, Goldman Sachs, Merrill Lynch, Warburg, Schroders, Smith Barney, Nomura, Peregrine, Sun Hung Kai, HSBC, Jardine Fleming, and Crosby; otherwise UNW is coded zero (0). Firms coded one (1) are the major underwriters operating in Hong Kong. The selection of these firms was made after consultation with investment professionals in Hong Kong. OWN, proportion of shares sold in the new issue. RED, a dummy variable taking the value one (1) if the IPO is a Red Chip or H-share; otherwise RED is coded zero (0). IND, a dummy variable taking the value one (1) if the company is a public utility, or in the industries of transportation, banking, and finance; otherwise IND is coded zero (0). ROA, return on assets given by net profit divided by total assets.

Regression analysis is used to examine whether investors can at least partially anticipate the forecast errors at the time of listing. The initial returns (underpricing) are hypothesized to be a positive function of the signed forecast errors (Firth, 1998). In order to test the hypothesis, the following model is constructed:

\[
\text{RET} = \alpha + \beta_1 \text{FE} + \beta_2 \text{SIZE} + \beta_3 \text{RED} + \beta_4 \text{PROFVAR} + \beta_5 \text{LEV} + \beta_6 \text{ROA},
\]  

where, RET is percentage stock return on the IPO on the first day of listing. It is calculated as (price at the end of the first trading day-issue (offer) price)/issue (offer) price; FE, actual profit minus forecast profit, divided by forecast profit, and multiplied by 100; SIZE, RED, PROFVAR, LEV, and ROA are as described earlier (see Eq. (5)) and they are added as control variables; FE is the focus of attention. We hypothesize a positive coefficient on forecast error (FE).

4.2. Data

Our sample data come from all Hong Kong and Chinese company IPO listings on the Stock Exchange of Hong Kong during the period 1993–1996. These listings include China domiciled H-shares and China-affiliated Red Chip stocks. IPOs that do not have an explicit forecast of profit or earnings per share for the year ending after the prospectus date are omitted from the sample. The data are hand

---

8 If profits are greater than forecast, and if investors anticipate this immediately, then initial returns should be positive (as the issue price is based on the profit forecast).

9 Foreign companies that list in Hong Kong are excluded from the sample.

10 A few IPOs give a range of profits for the forecast. These companies are excluded from the sample. There are no cases of Hong Kong companies not giving a profit forecast.
collected from IPO prospectuses, annual accounts (for the actual profit numbers), and from the Stock Exchange of Hong Kong (SEHK) for share prices. A total of 162 initial public offerings are identified that meet our data requirements. Approximately 76% of companies are local, 14% are H-shares, and 10% are Red Chips. Most IPOs (55%) are classified by the SEHK as being ‘industrials and manufacturing’; remaining companies are spread across the utility, finance, property, and conglomerate sectors. Descriptive statistics of the independent variables used in the cross-sectional regressions are reported in Table 1.

5. Results

Distributional statistics of forecast errors, absolute forecast errors, and forecasting superiority measures, are shown in Table 2. The means, medians, and standard

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIZE ($ million)</td>
<td>1704.97</td>
<td>361.41</td>
<td>4120.04</td>
</tr>
<tr>
<td>HORIZON (months)</td>
<td>3.86</td>
<td>3.13</td>
<td>2.56</td>
</tr>
<tr>
<td>PROFVAR</td>
<td>1.51</td>
<td>0.85</td>
<td>2.29</td>
</tr>
<tr>
<td>AGE (years)</td>
<td>18.29</td>
<td>13.46</td>
<td>15.24</td>
</tr>
<tr>
<td>LEV</td>
<td>0.65</td>
<td>0.68</td>
<td>0.18</td>
</tr>
<tr>
<td>AUDIT</td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UNW</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OWN</td>
<td>0.27</td>
<td>0.25</td>
<td>0.07</td>
</tr>
<tr>
<td>RED</td>
<td>0.24</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>0.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>0.11</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>RET</td>
<td>0.19</td>
<td>0.04</td>
<td>1.12</td>
</tr>
</tbody>
</table>

*This table shows descriptive statistics of variables used in the cross-sectional regressions. The variables are as follows: SIZE, total assets after the IPO (in Hong Kong dollars); HORIZON, length of the forecast period. This is the number of months between the prospectus date and the next fiscal year end; PROFVAR, standard deviation in profit growth during the 3 years immediately prior to the IPO date; AGE, the number of years from the date of the company’s incorporation to the IPO date; LEV, total debt/total assets; AUDIT, a dummy variable taking the value one (1) if the auditor is one of the Big Six firms, otherwise AUDIT is coded zero (0); UNW, a dummy variable taking the value one (1) if the underwriter is Bear Stearns, Credit Lyonnais, Goldman Sachs, Merrill Lynch, Warburg, Schroders, Smith Barney, Nomura, Peregrine, Sun Hung Kai, HSBC, Jardine Fleming, and Crosby, otherwise UNW is coded zero (0). Firms coded one (1) are the major underwriters operating in Hong Kong. The selection of these firms was made after consultation with investment professionals in Hong Kong; OWN, proportion of shares sold in the new issue; RED, a dummy variable taking the value one (1) if the IPO is a Red Chip or H-share, otherwise RED is coded zero (0); IND, a dummy variable taking the value one (1) if the company is a public utility, or in the industries of transportation, banking, and finance, otherwise IND is coded zero (0); ROA, return on assets given by net profit divided by total assets; RET, percentage stock return on the IPO on the first day of listing. It is calculated as the price at the end of the first day of trading minus the IPO on the first day of listing. It is calculated as the price at the end of the first day of trading minus the issue price and scaled by the issue price.
Table 2
Summary statistics of IPO profit forecast accuracy

<table>
<thead>
<tr>
<th></th>
<th>Red chip (16 firms)</th>
<th>H-share (23 firms)</th>
<th>Local (123 firms)</th>
<th>Total (162 firms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Median</td>
<td>σ</td>
<td>Mean</td>
</tr>
<tr>
<td>FE(%)</td>
<td>-0.38</td>
<td>2.19</td>
<td>48.52</td>
<td>-4.19</td>
</tr>
<tr>
<td>AFE(%)</td>
<td>26.57b</td>
<td>9.45</td>
<td>40.01</td>
<td>21.75b</td>
</tr>
<tr>
<td>SUP</td>
<td>3.73b</td>
<td>3.53</td>
<td>2.97</td>
<td>1.65b</td>
</tr>
<tr>
<td>MSUP</td>
<td>3.15b</td>
<td>2.93</td>
<td>3.37</td>
<td>2.23b</td>
</tr>
</tbody>
</table>

\[ \text{FE} = (\text{AP} - \text{FP}) / \text{FP}; \]
\[ \text{AFE} = |\text{AP} - \text{FP}| / \text{FP}; \]
\[ \text{SUP} = \ln\left(\frac{(\text{AP} - \text{FP}_{t-1})}{(\text{AP} - \text{FP}_t)^2}\right); \]
\[ \text{MSUP} = \ln\left(\frac{(\text{AP} - \text{GFP})}{(\text{AP} - \text{FP}_t)^2}\right). \]

\[ \text{GFP} = \text{AP}_{t-1} \times (1 + \text{growth rate of profits over the previous 2 years}). \]

\[ \text{AFE} \text{ is statistically different from zero (0) at the 0.01 level of significance.} \]
deviations of errors are disaggregated with reference to Red Chip, H-share, and local issuers. Except for the forecast error (FE) for Red Chips and H-shares, all the mean statistics reported in Table 2 are statistically different from zero at the 0.01 level of significance. The mean forecast error for the total sample is 9.94% with a median of 5.79%. The positive signs indicate that, on average, the forecast profits are less than the actuals and so the forecasts are said to be conservative or pessimistic. Breaking down the forecast errors by type of issue reveals that Red Chips and H-shares have negative means although in both cases the medians are positive. The mean forecast errors for Red Chips (−0.38%) and H-shares (−4.19%) are not significantly different from zero, however, implying that there is no bias in the forecasts. Cross-issue type comparisons indicate that the mean error for H-shares is significantly different from the mean error for local IPOs.11 The mean forecast errors for local companies are higher than those reported by Jaggi (1997). Mean absolute forecast errors are higher than the errors reported in Chan et al. (1996) and Jaggi (1997). The distributional statistics of the AFEs are similar across all types of issuer.

Positive values are observed for the means and medians of the SUP and MSUP scores. This demonstrates that IPO forecasts are more accurate than the two time series models we investigate. The H-shares have the smallest SUP and MSUP scores but nevertheless they still have positive signs. Cross-issue type comparisons indicate the SUP score for H-shares is significantly less than the SUP score for Red Chip shares and significantly less than the SUP score for local shares; in contrast, the difference between the SUP scores for Red Chips and local shares is not statistically significant. MSUP statistics are less than the SUP averages which indicates the growth model is a more accurate predictor of profits than the pure random walk process. The MSUP score for H-shares is significantly less than the MSUP score for local IPOs; differences in MSUP scores for other issue type comparisons are not significant.

As indicated in Table 2, the standard deviations of forecast errors are quite high. Although not shown in tabular form, about one quarter of the Red Chips and about 30% of H-shares have negative forecast errors which indicates the forecasts are too optimistic. In contrast, just 6% of local Hong Kong issuers have negative forecast errors.

Results from regression Eq. (5) are shown in Table 3. Panel A relates to the AFE dependent variable while panels B and C relate to SUP and MSUP, respectively. In common with the findings from other studies, the explanatory powers of the models are low with adjusted R squares ranging from 0.115 for panel B to 0.016 for panel A.

SIZE is negatively related to the error measures in all three panels. The negative signs accord with our hypothesis and the coefficients are marginally significant in Panels A and B.12 HORIZON is statistically significant in explaining SUP and

---

11 The t-statistic is 1.912. There are no significant differences between the mean forecast errors for other issue type comparisons.

12 Statistical significance is achieved if the P-values are 0.10 or less (two-tail tests).
Table 3  
Cross-sectional regression results of AFE, SUP, and MSUP$^{a,b}$

<table>
<thead>
<tr>
<th>Variable</th>
<th>Panel A</th>
<th>Panel B</th>
<th>Panel C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AFE</td>
<td>SUP</td>
<td>MSUP</td>
</tr>
<tr>
<td>SIZE</td>
<td>-5.937 (-1.82, 0.070)</td>
<td>-0.438 (-1.85, 0.066)</td>
<td>-0.247 (-0.90, 0.372)</td>
</tr>
<tr>
<td>HORIZON</td>
<td>1.491 (1.07, 0.286)</td>
<td>-0.250 (-2.46, 0.016)</td>
<td>-0.365 (-3.02, 0.002)</td>
</tr>
<tr>
<td>PROFVAR</td>
<td>1.900 (1.31, 0.192)</td>
<td>-0.001 (-0.01, 0.990)</td>
<td>0.214 (1.76, 0.080)</td>
</tr>
<tr>
<td>AGE</td>
<td>0.196 (0.77, 0.444)</td>
<td>0.014 (0.73, 0.468)</td>
<td>-0.005 (-0.21, 0.834)</td>
</tr>
<tr>
<td>LEV</td>
<td>0.687 (0.04, 0.972)</td>
<td>1.078 (0.76, 0.450)</td>
<td>1.339 (0.79, 0.430)</td>
</tr>
<tr>
<td>AUDIT</td>
<td>9.562 (0.72, 0.476)</td>
<td>0.998 (1.03, 0.306)</td>
<td>1.483 (1.32, 0.188)</td>
</tr>
<tr>
<td>UNW</td>
<td>-6.726 (-0.94, 0.350)</td>
<td>-0.313 (-0.60, 0.550)</td>
<td>-0.846 (-1.38, 0.170)</td>
</tr>
<tr>
<td>OWN</td>
<td>129.423 (1.96, 0.050)</td>
<td>-6.709 (-1.40, 0.164)</td>
<td>-1.010 (-0.18, 0.856)</td>
</tr>
<tr>
<td>RED</td>
<td>-26.559 (-1.83, 0.070)</td>
<td>-0.406 (-0.38, 0.702)</td>
<td>0.243 (0.28, 0.844)</td>
</tr>
<tr>
<td>IND</td>
<td>-8.522 (-0.74, 0.462)</td>
<td>0.578 (0.69, 0.982)</td>
<td>1.922 (1.98, 0.100)</td>
</tr>
<tr>
<td>ROA</td>
<td>-26.940 (-0.65, 0.519)</td>
<td>1.422 (0.47, 0.638)</td>
<td>3.616 (1.01, 0.314)</td>
</tr>
<tr>
<td>Intercept</td>
<td>-142.732 (-1.90, 0.060)</td>
<td>13.269 (2.43, 0.016)</td>
<td>7.281 (1.14, 0.256)</td>
</tr>
<tr>
<td>$R^2$ adjusted</td>
<td>0.016</td>
<td>0.115</td>
<td>0.093</td>
</tr>
<tr>
<td>$F$-statistic (P-value)</td>
<td>1.208 (0.288)</td>
<td>2.614 (0.005)</td>
<td>2.244 (0.016)</td>
</tr>
</tbody>
</table>

$^a$ This table reports regression results explaining absolute forecast error (AFE), forecast superiority (SUP), and modified forecast superiority (MSUP). The independent variables are: SIZE, log of total assets after the IPO (in Hong Kong dollars); HORIZON, length of the forecast period. This is the number of months between the prospectus date and the next fiscal year end; PROFVAR, standard deviation in profit growth during the 3 years immediately prior to the IPO date; AGE, the number of years from the date of the company’s incorporation to the IPO date; LEV, total debt: total assets; AUDIT, a dummy variable taking the value one (1) if the auditor is one of the Big Six firms, otherwise AUDIT is coded zero (0); UNW, a dummy variable taking the value one (1) if the underwriter is Bear Stearns, Credit Lyonnais, Goldman Sachs, Merrill Lynch, Warburg, Schroders, Smith Barney, Nomura, Peregrine, Sun Hung Kai, HSBC, Jardine Fleming, and Crosby, otherwise UNW is coded zero (0). Firms coded one (1) are the major underwriters operating in Hong Kong. The selection of these firms was made after consultation with investment professionals in Hong Kong. OWN, proportion of shares sold in the new issue; RED, a dummy variable taking the value one (1) if the IPO is a Red Chip or H-share, otherwise RED is coded zero (0); IND, a dummy variable taking the value one (1) if the company is a public utility, or in the industries of transportation, banking, and finance, otherwise IND is coded zero (0); ROA, return on assets given by net profit divided by total assets.  

$^b$ $t$-statistics, two-tail $P$-values in parentheses ($t$-statistic, $P$-value).
none are significant. Our hypothesis is for a negative relationship. In contrast, the negative coefficients on the UNW variable are consistent with expectations although they are not significant. The results provide no real support for the adviser hypothesis; the quality or prestige ranking of auditors and underwriters have no significant impact on forecast accuracy. OWN has a positive sign in modelling AFE, which conflicts with our hypothesized relationship, and it is statistically significant. OWN is not significant in the other panels. RED is negative and significant in panel A.

The explanatory powers of our models are low and most of the independent variables do not achieve statistical significance. These disappointing findings mirror those of other research including studies conducted on Hong Kong data. Successfully explaining cross-sectional differences in forecast errors appears elusive. In order to see if the poor results are due to collinearity, we show the correlation matrix for the Eq. (5) variables in Table 4. As can be seen, the correlations are low to moderate. Variance inflation factors (VIFs) are also calculated; the VIFs are low. Based on correlations and VIF scores, the independent variables used in Eq. (5) are not severely affected by collinearity problems and so standard interpretations of the regression coefficients can be made.

The model coefficients and t-statistics (in parentheses) for the Eq. (6) regression are:

\[
\text{RET} = -1.078 + 0.372\text{FE} + 0.053\text{SIZE} - 0.145\text{RED} + 0.074\text{PROFVAR} \\
-0.372\text{FE} - 0.654 \\
+ 0.172\text{LEV} - 0.311\text{ROA} \\
+ 0.053\text{SIZE} + 0.690 \\
- 0.311\text{ROA} - 0.512 \\
+ 0.074\text{PROFVAR} + 1.689 \\
- 0.145\text{RED} - 0.512 \\
\]

adjusted $R^2 = 0.025$, $F = 1.667$.

Our main focus is on the FE variable. Forecast errors are shown to be a statistically significant explanator of initial returns and the positive sign is consistent with our expectation. We assume IPO companies set their issue price based on the forecast profit. If the forecast is initially adjudged by investors to be optimistic (pessimistic) they will reduce (increase) the market valuation and so initial returns will be lower (higher) than for an IPO whose profit forecast is adjudged to be accurate. These results suggest that investors’ initial judgements of optimistic and pessimistic forecasts are at least directionally correct. Correlations and VIF diagnostics indicate that multicollinearity is not a problem.

6. Conclusions

Most IPO prospectuses in Hong Kong contain a forecast of the next year’s profit. From the forecast, management calculates a prospective price earnings ratio by
Table 4
Correlation matrix: pearson correlations

|       | SIZE  | HORIZON | PROFVAR | AGE   | LEV   | AUDIT | UNW   | OWN   | RED   | IND   | ROA  |
|-------|-------|---------|---------|-------|-------|-------|-------|-------|-------|-------|------|------|
| SIZE  | 1.000 | 0.192*  | 0.140   | 0.133 | 0.050 | 0.015 | 0.398**| 0.040 | 0.394**| 0.106 | −0.441**|
| HORIZON| 1.000 | 0.070   | 0.074   | −0.029| 0.018 | 0.040 | −0.096| 0.066 | 0.147 | 0.198**|
| PROFVAR| 1.000 | −0.138  | −0.049  | −0.065| −0.101| −0.050| 0.061 | −0.078| −0.170*|
| AGE   | 1.000 | 0.088   | −0.051  | 0.080 | 0.069 | 0.290**| −0.008| −0.050 |       |       |      |
| LEV   | 1.000 | 0.004   | −0.023  | −0.026| −0.045| 0.033 | −0.283**|
| AUDIT | 1.000 | 0.077   | −0.228**| −0.064| 0.105 | −0.030 |       |       |       |      |      |
| UNW   | 1.000 | 0.051   | 0.210** | 0.033 | 0.090 |       |       |       |       |      |      |
| OWN   | 1.000 | 0.600** | −0.134 | 0.012 |       |       |       |       |       |      |      |
| RED   | 1.000 | −0.082  | −0.131  |       |       |       |       |       |       |      |      |
| IND   | 1.000 | 0.019   |       |       |       |       |       |       |       |      |      |
| ROA   | 1.000 |         |       |       |       |       |       |       |       |      |      |

*a* This table lists the correlations among variables used in the cross-sectional regressions. The variables are: SIZE, log of total assets after the IPO (in Hong Kong dollars); HORIZON, length of the forecast period. This is the number of months between the prospectus date and the next fiscal year end; PROFVAR, standard deviation in profit growth during the 3 years immediately prior to the IPO date; AGE, the number of years from the date of the company's incorporation to the IPO date; LEV, total debt/total assets; AUDIT, a dummy variable taking the value one (1) if the auditor is one of the Big Six firms, otherwise AUDIT is coded zero (0); UNW, a dummy variable taking the value one (1) if the underwriter is Bear Stearns, Credit Lyonnais, Goldman Sachs, Merrill Lynch, Warburg, Schroders, Smith Barney, Nomura, Peregrine, Sun Hung Kai, HSBC, Jardine Fleming, and Crosby, otherwise UNW is coded zero (0). Firms coded one (1) are the major underwriters operating in Hong Kong. The selection of these firms was made after consultation with investment professionals in Hong Kong; OWN, proportion of shares sold in the new issue; RED, a dummy variable taking the value one (1) if the IPO is a Red Chip or H-share, otherwise RED is coded zero (0); IND, a dummy variable taking the value one (1) if the company is a public utility, or in the industries of transportation, banking, and finance, otherwise IND is coded zero (0); ROA, return on assets given by net profit divided by total assets.

*Statistically significant at the 0.05 level.
**Statistically significant at the 0.01 level.
dividing the issue price of the IPO by the predicted earnings per share. The prospective price earnings multiple is highlighted near the front of the prospectus. Previous research has shown that the profit forecast is the most important valuation parameter for the market price of a newly listing stock (Firth, 1998). The accuracy of the forecast is a crucial attribute of the forecast, however, as significant, and unexpected, errors will destroy the credibility of the prediction. This study seeks to examine the accuracy of profit forecasts in Hong Kong. It extends prior research by using a number of metrics to examine accuracy and it includes China affiliated companies in the data sample.

The mean forecast errors and mean absolute forecast errors are quite small compared to results from Australia, Canada, and New Zealand, and they are similar to the findings from Malaysia and Singapore. Forecasts are less biased for China companies (in the form of Red Chips and H-shares) when compared to local companies, which tend to underforecast the profits of IPOs. Earnings forecasts are more accurate than the forecasts generated by a random walk model and by a growth model.

Cross-sectional regression equations are used to model absolute forecast errors and the forecast superiority measures. Model fits are poor although this characterizes other research in this area. Surprisingly, IPOs with large outside ownership have poorer forecast accuracy (AFE). A negative sign is found on the forecasting horizon variable when modelling the two superiority measures. A short horizon gives an IPO little time to invest the proceeds of the new issue and this may result in greater errors. Coefficients on the auditor and underwriter variables are not statistically significant. Our results provide no support for ‘prestige’ advisers being associated with more accurate forecasts.

Profit forecasts are an integral part of prospectus information for most IPOs in Hong Kong. This study demonstrates that the forecasts are relatively accurate and so investors can place faith in them. Although errors, in general, are small, there is quite a lot of variability across companies. Unfortunately explaining the variability is difficult and no systematic patterns are observable. Red Chips and H-share companies have similar forecast error magnitudes and patterns to local Hong Kong companies. The evidence presented here suggests China affiliated companies do not represent greater investment risk in the sense that prospectus information is less credible. Examining forecast accuracy is important as IPO earnings forecasts are a major signalling device used by companies to convey market value. Our evidence indicates that forecast errors appear to be anticipated by investors when they price the new issue in the market place.

Acknowledgements

The authors acknowledge the helpful comments and suggestions of the reviewer and the editor, Ike Mathur, and the very capable research assistance of Lu Jian and Gao Ning. Chen also acknowledges financial support for this project from The Hong Kong Polytechnic University Central Research Grant.
References


