

The usefulness of accounting fundamentals and other prospectus information in the valuation of IPO firms[†]

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We empirically examine the usefulness of (i) forward-looking accounting fundamentals, and (ii) ‘other prospectus information’ variables that prior literature suggests are value drivers, in the valuation of Australian Initial Public Offer (IPO) firms. We begin by examining the extent to which IPO offer price and first-day closing price is captured by accounting fundamentals. We find that on average, accounting fundamentals explain 57% of the prospectus offer price and 50% of the closing price on the initial day of trading. The strong association between IPO prices and accounting fundamentals is robust to controlling for scale effects and also the inclusion of variables that correlate with continuing values and potential measurement errors. In addition, we also show that some of these other information variables provide incremental explanatory power in the valuation of IPOs. We find strong support for growth proxies, but only weak support for measures of information asymmetry and signals of quality through affiliations (i.e., choice of auditors and underwriters).

JEL classification: G12.

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1. Introduction

In this study, we empirically examine the association between accounting fundamentals provided in prospectuses and the valuations of Initial Public Offers (IPO). We further seek to identify factors that have incremental explanatory power over forward-looking accounting fundamentals in explaining Initial Public Offer (IPO) prices. We examine value drivers suggested by prior literature such as retained ownership, signals of quality through affiliations, growth proxies, firm size, and age (hereafter, other information). We use a sample of fixed-price offerings where management forecasts of earnings, other prospectus information, and the fixed offer price are all made available together within the prospectus. This allows us to gain further insight into whether accounting fundamentals and other information are priced differently by the issuers and the initial-day investors.

The use of firm-specific accounting information fundamentals in estimating the ‘intrinsic value’ of an IPO firm is a relatively unexplored issue. One method commonly used to link fundamental accounting information to IPO value is to use the comparable firms’ price-multiples approach (Kim and Ritter, 1999; How, Lam and Yeo, 2006). Users of the comparable firm approach, however, are often left to wonder how different price estimates based on different price-multiples can be reconciled. More importantly, IPO valuation should take into account the uniqueness of each IPO firm. Unlike prior studies that examine the association between IPO prices and comparable firms’ price multiples, we have chosen to examine the valuation of firm-specific accounting and other information instead of comparable firm or industry information in our research design.

We use the residual income valuation model to derive our measure of accounting fundamentals. When additional funds raised in the IPO are used to grow the business,

historical earnings may not capture the expected growth from investing these funds in positive net present value projects. As share prices are based primarily on future expectations of the firm's performance, management's assessment of the firm's future prospects in the form of management earnings forecasts are valued by investors. The combination of trailing information (book-values) and forward information using the residual income model allows us to take into consideration both the financial position at the time of IPO (i.e., the pro-forma book value of equity including issue proceeds) and expected payoffs (i.e., forecast of earnings) at the time of IPO. In the same manner that returns need to be interpreted with reference to the amount of investment in place, forecasts of earnings subsequent to the IPO need to be interpreted with reference to book value of equities at the time of the IPO.

For firms with limited forward-looking accounting information, a continuing value will become an important part of estimating value (Penman, 1998). With a shorter horizon of forward-looking information, the importance of a continuing value is more prominent for IPO firms than established firms. Understanding the factors that are associated with the portion of IPO prices not captured by forward-looking financial information is crucial in understanding the valuation of IPO firms. We therefore seek to identify factors that have incremental explanatory power over accounting fundamentals in explaining IPO prices. These factors, in turn, provide insights into what issuers/investors consider to be signals of long-term growth for IPO firms.

Our sample consists of Australian firms that went public between 1993 and 2000. We have chosen the Australian capital market for the following reasons. First, the Australian setting provides an advantage in investigating the valuation implications of voluntary earnings forecasts. In a more litigious environment such as

the United States, firms are less likely to issue voluntary earnings forecasts (Baginski, Hassel, and Kimbrough, 2002). In Australia, How and Yeo (2001) report that almost 80% of IPO firms report forecast earnings and pro-forma book values in their prospectus.

Second, whilst earnings forecasts are commonly provided in the prospectus, they tend to be short-term in nature (Brown, Clarke, How and Lim, 2000). The relatively short-term nature of forward information provided in the prospectus allows us to question the importance of accounting fundamentals contained in prospectuses in the setting of IPO prices. We are then able to identify factors that are associated with the portion of IPO prices that are not captured by accounting fundamentals.

Third, IPOs are more often taken to market using fixed-price offerings in Australia relative to the US. In contrast to the book building process, where the assessment of demand for the issue and pricing implications are made explicit through the use of a “road-show”, the offer price is included within the prospectus in a fixed price offer.¹ In contrast to the book building mechanism, where the offer price is finalized close to the initial day of trading, the offer price is fixed for a significant period of time (from the release of the prospectus until the listing of the IPO) in Australia. We have no indication as to whether this pricing mechanism is any more or less efficient than the book-building mechanism in terms of the pricing of the offer, but the distinction between the participants in the formation of the offer price versus the first-day closing price enables us to provide further insights into how IPOs are priced by the issuers relative to the participants in the market.

¹ Prior to the offer, a modified road show is conducted before the prospectus is registered. The modified road show is likely to only price in the demand of major institutional clients of the underwriter. See How and Yeo (2000).

Our results show that offer and first-day closing prices are strongly associated with accounting fundamentals. This association is robust to controlling for variables correlated with continuing values and potential measurement errors (such as the forecast horizon and forecast errors). Since forward-looking accounting information provided in prospectuses is relatively short-term in nature, we predict that signals of long-term growth should also be priced. Confirming this prediction, we find some evidence of an incremental role for other information contained in the prospectus, relative to forward-looking accounting fundamentals in explaining IPO prices. Specifically, we find strong support for growth proxies, but only weak support for measures of information asymmetry and signals of quality through affiliations (i.e., choice of auditors and underwriters).

The remainder of the study is organized as follows. In section 2, we relate accounting fundamentals and other prospectus information to the offer and first-day closing IPO prices. Section 3 outlines our sample and descriptive statistics. Results are presented in Section 4 with conclusions provided in Section 5.

2. Relating accounting fundamentals and other prospectus information to IPO offer and first-day closing prices

In this section, we model the relation between accounting fundamentals, other information, and the offer price or the first-day closing price. Using the residual income valuation model, our research question considers the value relevance of forward-looking accounting information disclosed (i.e., management earnings forecasts), trailing accounting information (i.e., pro-forma book value), and other prospectus information at IPO.

2.1 Incorporating management forecasts into the residual income model

Under the residual income valuation model, the value of the firm can be expressed as the sum of book value and future residual income:

$$P_t = B_t + \sum_{\tau=1}^T \rho^{-\tau} E_t(\tilde{X}_{t+\tau} - (\rho-1)\tilde{B}_{t+\tau-1}) \quad (1)$$

where, X refers to earnings, B refers to book value, and ρ refers to the discount rate (one plus the adjusted rate of return).

Assuming a continuing value in T periods beyond the current period t , equation (1) can be expressed as follows:

$$P_t = B_t + \sum_{\tau=1}^T \rho^{-\tau} E_t(\tilde{X}_{t+\tau} - (\rho-1)\tilde{B}_{t+\tau-1}) + \rho^{-T} E_t(\tilde{P}_{t+T} - \tilde{B}_{T+t}) \quad (2)$$

Equation (2) relates finite period residual income to market prices (Penman, 1998).

The term $\rho^{-T} E_t(\tilde{P}_{t+T} - \tilde{B}_{T+t})$ refers to the present value of the difference in the price of the security subsequent to the forecasting period and the end of period book value. Where the forecast horizon (T) is small, it is common to estimate a continuing value to approximate this term (e.g. Courteau, Kao and Richardson, 2001). In equation (2), it is clear that the residual income model is the combination of three specific components. Specifically, (i) the book value of the company, (ii) the within horizon residual income flows and (iii) the post-horizon or continuing value.

2.2 Decomposing value into within and post horizon segments

In this study, we examine IPO valuation by decomposing value into specific within and post horizon segments. The within horizon segment of value is calculated as the sum of book value and residual income flows which are estimated using management forecasts of earnings. The ‘implied’ continuing values are then the segment ‘left over’ that relates the sum of book value and forecast residual income to

the offer value. Specifically, using book values and management forecasts available in the prospectus, we calculate the within horizon residual income value as:

$$WHRIV_t = B_t + \sum_{\tau=1}^T \rho^{-\tau} (MFX_{t+\tau} - (\rho-1)B_{t+\tau-1}) \quad (3)$$

where, $WHRIV$ refers to within horizon residual income value, book value, B , is adjusted for the expected proceeds raised from the issue, included in the prospectus as pro-forma book-value², MFX refers to the management forecasts of earnings, and future book values are calculated by applying the clean surplus relationship, $B_t = B_{t-1} + MFX_t - D_t$, using management forecasts of earnings and dividends.³ Equation (3) is an empirical implementation of equation (2) but excludes the continuing value for periods after the forecast horizon (T).⁴

We then relate the IPO price (P_{it}) of interest, being either the offer price (*offer*) or the first-day closing price of equity (*price*), to the within horizon residual income value for time t and firm i as:

$$P_{it} = WHRIV_{it} + ICV_{it} \quad (4)$$

where ICV_{it} is the “implied continuing value” term which equates the within horizon value to the offer price or the first-day closing price. This identity is derived simply by construct. Accordingly, we interpret this term as the portion of the price that is not captured by the finite-horizon value estimate. The empirical price-level relation that is analogous to equation (4) is outlined in equation (5) where an intercept and a disturbance term ε_{it} are added in a linear relation.

² Taken as pro forma book value assuming the full subscription is obtained.

³ See appendix for further details on the implementation of the within-horizon residual income model and our estimation of the discount rates.

⁴ For most firms, T is equal to either 1 or 2 years due to the limited number of forecasts. As a sensitivity check, we considered only one-period ahead forecasts in the model, the results are not changed qualitatively.

$$P_{it} = \alpha_0 + \alpha_1 WHRIV_{it} + \varepsilon_{it} \quad (5)$$

In the equation 5 (the price-level regression specification), α_0 represents the sample mean of the ‘implied continuing value’ and the error term ε_{it} represents the firm specific deviation of the firms’ implied continuing value from the mean. The association between price and the fundamentals available in the IPO prospectus is contained in α_1 . The expected value of the coefficient α_1 is unity assuming that the within horizon residual income value inputs are fully utilized in the price-setting process. However, if the information in *WHRIV* is positively correlated with the implied continuing values, the coefficient on *WHRIV* will be upwardly biased above unity. That is, investors use finite horizon forecast information to infer the implied continuing values or long-term growth. Alternatively, the coefficient could be less than unity if the market does not fully incorporate all of the information in accounting fundamentals, discounts the forecast information disclosed in the prospectus, or if there is measurement error in *WHRIV* (i.e., estimation of the discount rate, annualizing earnings forecasts).

The empirical implementation of the price-level relation outlined in equation (5) potentially suffers from cross-sectional differences in scale leading to incorrect inference. Scale problems likely result in the residual being heteroscedastic. In our case, we are examining variation in the price per share of the firm, for which prior research has highlighted the issue of scale effect (Akbar and Stark, 2003; Easton and Sommers, 2003). In addition to our price-level analysis, we also follow Easton and Sommers (2003) by employing price as a deflator. Even though our equations may look odd at first; essentially, the deflator transforms our empirical specification into weighted least squares where the weight is chosen to allow for deflation by price. The estimates of the coefficients and the *t*-statistics are still interpreted in the usual fashion

for weighted least squares regressions. Deflating all of the variables in equation (4) by P_{it} yields:

$$\frac{P_{it}}{P_{it}} = \frac{WHRIV_{it}}{P_{it}} + \frac{ICV_{it}}{P_{it}} \quad (6)$$

As ICV_{it} is expected to be positive, and is expected to vary in cross-sectional samples around a non-zero mean, similar to equation (5), we include an intercept in the empirical model of equation (6) in equation (7). Specifically, including an intercept deflated by $P_{i,t}$ and a disturbance term ε_{it} yields the following linear relation:

$$\frac{P_{it}}{P_{it}} = \alpha_0 \frac{1}{P_{it}} + \alpha_1 \frac{WHRIV_{it}}{P_{it}} + \varepsilon_{it} \quad (7)$$

2.3 Incorporating other information into the IPO value framework

To ensure that our interpretations of the association between accounting fundamentals and IPO prices are not subject to problems with omitted variables and measurement errors, we further develop our price-level model and weighted least squares model in equations (8) and (9).

$$P_{it} = \beta_0 + \beta_1 WHRIV_{it} + \beta_2 FCERR_{it} + \beta_3 HORZ_{it} + OINF_{jit}' \boldsymbol{\beta} + u_{it} \quad (8)$$

$$\frac{P_{it}}{P_{it}} = \beta_0 \frac{1}{P_{it}} + \beta_1 \frac{WHRIV_{it}}{P_{it}} + \beta_2 \frac{FCERR_{it}}{P_{it}} + \beta_3 \frac{HORZ_{it}}{P_{it}} + \left(\frac{OINF_{jit}}{P_{it}} \right)' \boldsymbol{\beta} + u_{it} \quad (9)$$

Where, $FCERR$ refers to the management earnings forecast error (relative to future realized earnings), $HORZ$ is the number of calendar days from the date of prospectus registration to the date of the forecasted financial statements, $OINF$ refers to other prospectus information variables (such as growth proxies, affiliations and information asymmetry variables which we discuss in detail below) and $\boldsymbol{\beta}$ refers to a vector of slope coefficients, relating the other information variables to IPO prices.

One potential measurement error is the forecast bias inherent in management earnings forecasts. The large forecast error documented in the literature questions the relevance of forecast information in the valuation process adopted by potential investors. Nevertheless, investors may still perceive earnings forecasts as highly relevant information. Therefore, we include management forecast error, *FCERR*, as a control for measurement error in *WHRIV* (as management forecasts are used in our intrinsic value calculation) in equations (8) and (9). The empirical implementation of the use of one-year ahead earnings forecasts require annualizing forecasts that span part of the year and/or forecasts over two or more years. As forecasts are harder to make accurately over a longer period of time, we include the number of calendar days from the date of prospectus registration to the date of the forecasted financial statements (*HORZ*) as a further potential control for measurement error in the forecast component in *WHRIV*.

We employ only short-term earnings forecasts in the value model above. Given the relatively short-term nature of these forecasts, the growth prospects of the IPO firms are not expected to be completely captured in the short-term forecasts of earnings. We therefore seek to identify what signals of growth are associated with the component of price that is not captured by the short-term value measure. As we are interested in the cross-sectional variation in the pricing of accounting fundamentals and other information, we are interested in variables that have incremental explanatory power over accounting fundamentals in explaining IPO prices.

For our other information variables (*OINF*), we use a selection of variables that are commonly associated with underpricing in the literature (see for example, Lee, Taylor and Walter, 1996). We focus on variables that are publicly available in the prospectus. These variables include growth proxies, information asymmetry

measures, and signals of quality through affiliations. For our growth measure, GROW, we use one minus net tangible assets backing per share divided by the offer price. For information asymmetry, we examine the size of the firm (TA), the age of the firm (AGE) and the amount of retained ownership held by insiders (OWN). We measure the size of the firm using the total assets in place at the time of IPO. We calculate the age of the firm using the number of calendar days from incorporation to the date of prospectus and retained ownership as one minus the proportion of shares offered to the public to the total shares outstanding. For signals of quality through affiliation, we consider the affiliation of the IPO firm with prestigious auditor (AUDIT) and underwriting firms (UW). We consider prestigious auditors to be the Big 5 (Big 6) audit firms, and underwriter reputation we calculate in-sample as the weighted issue proceeds underwritten by the IPO underwriter divided by the total issue proceeds over the sample period.

In equations (8) and (9), the intercept term, β_0 , is no longer the sample mean of the continuing value, as it is now conditioned on ‘other prospectus information’ variables. The inclusion of new variables (measurement errors and correlated variables) will change the coefficient of our estimates of the association of IPO prices with our measure of accounting fundamentals (*WHRIV*). This method helps to ensure that our results (i.e., the slope coefficients on *WHRIV* and *WHRIV/P*) in equations 5 and 7 are not simply due to the omission of variables associated with continuing values or measurement errors.

3. Sample and descriptive statistics

Our sample comprises Australian IPO firms that went public between 1993 and 2000. We exclude firms that are foreign-owned or affiliated companies and

companies that have either been previously listed or registered on a foreign stock exchange before becoming listed on the Australian Stock Exchange (ASX). In addition, we exclude companies formed through a scheme of arrangement, trust companies, privatizations and demutualizations. We gathered firm-specific data directly from the prospectus using the Connect4 database, and share prices and return information from the AGSM-CRIF database.

The final sample includes 219 IPO firms that provided forecasts of earnings. Of these firms 131 provide forecasts for at least one full year. The remaining firms provide forecasts that span part of the year rather than a full year. Some of the firms in our sample provide forecasts over two or more years, while some only provide forecasts for a period of less than one year, we annualize partial year forecasts. Our results however, are similar if we restrict our sample to only firms with at least one full year of forecast information.

See TABLE I

We present descriptive statistics for the sample of 219 firms in Table I. On average, first-day underpricing is 25% (median of 11.6%), which is consistent with recent Australian studies (e.g. Chan and Curtis, 2006). The average first-day market capitalization is \$83.86 million (median of \$37.25 million). The average (median) IPO raises proceeds of \$29.31 million (\$12.00 million) and retains ownership over 55.9% (59.4%) of voting shares post IPO.

In fixed price offerings, the delay between the registration of the prospectus and the listing date represents a period of time where significant new information can reach the market. In our sample, the median delay period is 49 days. The median

expected subscription period set by the issuer, the number of calendar days were shares can be subscribed as printed in the IPO prospectus, is 21 days. Forecasts are voluntarily disclosed in the prospectus, on average the number of days between prospectus registration and the end of the first forecast financial year end is 216 days. The median firm was incorporated roughly 5.3 years (1,928 days) before registering its prospectus.

We measure growth potential by taking unity less the ratio of net tangible assets per share to offer price. Using this measure, the average firm's growth potential is 54%. The 40-day post listing return volatility has a mean (median) of 10 percent (4 percent). The reputations of the auditor and the underwriter may impact the accuracy of voluntary disclosed forecast earnings. The majority of IPOs (60.3%) use premium audit companies (Big 6 prior to the PriceWaterhouseCoopers merger, and Big 5 thereafter). We consider the reputation of the underwriter to be reflected in their proportional market share. The average IPO underwriter underwrites 2.8% of the total issue proceeds in our sample.

4. Results

4.1 Descriptive analysis of value to price ratios

We begin by examining the proportion of the offer price that can be explained by the trailing and forward financial information contained in the prospectus. It is important to note that our within-horizon residual income model differs from prior research that includes an explicit estimate of the continuing value. Accordingly, we do not consider the ratio as able to identify any mispricing of accounting information on fundamental value (e.g., Chan and Curtis, 2006). Instead, we consider the interpretation of the ratio as the proportion of IPO prices that are captured by

accounting fundamentals in the prospectus and IPO prices that are not captured by the accounting fundamentals (i.e., $1 - WHRIV/P$).⁵

See TABLE II

In Panel A of Table II, we report the ratio of the within-horizon residual income model to the offer price. The average ratio is 0.567, suggesting that the financial information in book-value plus one period ahead residual earnings captures 56.7% of the offer price on average. The median is slightly lower at 0.490. Overall, we observe the average and the median ratios decline over the sample period. The decline in ratios suggests that IPO prices incorporated a larger component of continuing value (and a smaller component of accounting fundamentals) over the sample period. This decline is also consistent with late 1990's prices being more divergent from fundamentals – a phenomenon that is well documented for listed firms (Penman, 2003; Curtis, 2006).

In Panel B we report the ratio of the within-horizon residual income model to the market price at the close of the initial-day of trading. Since underpricing is, on average, positive, we expect that the ratio will be lower than the *WHRIV*-to-Offer. This is true of all years in the sample. Overall, the average within horizon residual income value to first-day trading price ratio is 0.501 and the median ratio is 0.422. These descriptive results highlight that the continuing value is substantial within the IPO context, which is important for our study as we wish to investigate what other

⁵ We leave the possible case where the forecast information can be priced in a biased manner for future research. For robustness, we control for forecast bias in our examination of the association between IPO prices and the within-horizon residual income value.

information commonly provided in the prospectus is associated with the portion of IPO pricing that is not explained by financial information.

4.1 Regression analysis

The above descriptive analysis of *WHRIV*-to-price ratios does not control for systematic biases that can be captured using the intercept and the slope coefficient in regression analysis. Accordingly, we perform regression analysis with our residual income value estimate as the independent variable and the offer price multiplied by the number of (post IPO) shares issued as the dependent variable. As outlined above, we conduct our regression analysis using two complementary methods. First, we consider an undeflated price-level analysis. Second, we also report weighted least squares using price as a deflator (i.e., a method similar to that of Easton and Sommers (2003)) to assess the sensitivity of our results to scale effects.

A large literature documents a significant underpricing bias at the IPO (see for example the review provided by Ritter and Welch, 2003). The documentation of underpricing suggests that either managers allow for a discount to ‘fair value’ at the offer, or that the market pays a premium over ‘fair value’ for IPO firms when they first list on the market. Until recently, the majority of the literature has attributed this bias to the building in of a discount in the offer price. Recent literature however, has considered the case where the market price can stray from ‘fair value’ in the short-run and revert towards ‘fair value’ in the long-run (e.g., Purnanandam and Swaminathan, 2004; How, Lam and Yeo, 2006). The comparison between the association of accounting fundamentals with offer price and listing price therefore provides further insights into how accounting fundamentals are priced differently by the issuers versus initial-day investors.

See TABLE III

In Panel A of Table III, we report the coefficient estimates of our price-level analysis. Our focus in this section is only on the association of IPO prices with the accounting fundamentals with the analysis of the other information signals to be considered in the following section. As expected, given the relative short-term nature of *WHRIV*, the intercept is statistically different to zero at a value of 0.54. This indicates that on average, there is still a significant component of the offer price which could potentially be explained by factors other than short-term forecasts of financial information.

The coefficient α_1 represents the proportion of the within-horizon residual income model incorporated into the offer price, controlling for the average continuing value (captured in α_0). If accounting fundamentals are priced without bias, the coefficient on accounting fundamentals should be unity. For our sample we find that the coefficient on the within-horizon accounting fundamentals is 0.85. The *t*-tests associated with this parameter suggest that accounting fundamentals are significantly associated with offer price (*t*-statistic of 9.94 for the test of $\alpha_1=0$) as expected. The coefficient is significantly below one, however, with a marginally significant *t*-statistic of 1.82 (for the test of $\alpha_1=1$). This result supports the contention that the firm and their affiliates incorporate the short-term financial information in *WHRIV* into their offer prices, however, it is possible that measurement error or scale effects cause the association to lie below unity.

We also present the association between first-day market prices and fundamental accounting information. The intercept increases to a value of 0.82 and shows an

increase in the average continuing value. The increase in the intercept can be partially explained by the positive underpricing in our sample. The association between the scaled initial-day market price and the scaled within-horizon residual income value decreases to 0.74, again the coefficient is statistically different to unity. We examine two possible econometric explanations for the coefficient being below unity in the following sections.

4.2 Controlling for scale effects

In Panel B of Table III we present the results of the regression of scaled offer and first-day closing price with the within-horizon residual income model scaled by offer and first-day closing price respectively. When we use the weighted least squares (WLS) models we do not find reliable evidence that the slope coefficient on *WHRIV/P* differs from unity. While there is some debate over the appropriateness of this specification, the intuition behind using the WLS specification is that scale based heteroscedasticity will cause the coefficient estimates to be inefficient (e.g. Easton and Sommers, 2003). While we use the White Estimator for our price-level regressions it is still possible that some form of scale-based heteroscedasticity will impact our coefficient estimates as our sample size is not large (see Greene, 2003 p 220). We report these results to complement the price-level regressions, noting that where the square of price is considered an appropriate weight for the residuals of the model, then the combination of WLS and the White Estimator should lead to a better model (see Greene, 2003 pp 225-227).

Taken together the price-level and the weighted results provide support the use of *WHRIV* as a measure of fundamental value available at the prospectus. In the following analyses we control for potential measurement errors by included variables

that are potentially correlated with the measurement error in our within-horizon residual income value.

4.3 Value-relevance of other prospectus information

Our analysis above suggests that while the accounting fundamentals presented in the prospectus partially explains the variation in IPO prices, there is still, however, a significant proportion that remains unexplained (both the systematic and unsystematic proportions of the implied continuing value). In this section, we attempt to identify factors that have explanatory power in explaining IPO prices over accounting fundamentals.

The variables that we consider in this section are taken from the IPO prospectus. We consider the following multivariate regression model which includes a selection of other information variables considered in prior literature as signals of growth, measures of information asymmetry and signals of quality. Again, we present in Panel A and Panel B both the price-level and the weighted least squares analysis, respectively. The definitions of the variables can be found in the previous section and in the notes to Table IV. We delete variables that have one or more missing variables reducing our sample to 185.

See TABLE IV

In the first two columns of Panel A, we present results using the price-level specification for both the offer price and the initial-day closing market price. In both columns, the accounting fundamentals in *WHRIV* are consistently priced, with similar coefficients at 1.15 and 1.14, for the offer and market prices respectively. In both

cases the slope coefficient on *WHRIV* is not found to be reliably different to unity, which contrasts the opposite results presented in Table III. The significant associations documented between accounting fundamentals and IPO prices show that accounting fundamentals provided in the prospectus are priced by both the issuer and the market, and the association is robust to controlling for potential correlated variables.

In Panel B, however, we find a slightly different result when we specify the model using the WLS specification, here the accounting fundamentals in *WHRIV/P* are associated with the offer and market prices with coefficients at 1.14 and 1.23 respectively. Both coefficients are significantly different from unity in this specification, and in a similar direction as in Table III (with the estimated association on the fundamentals being larger for the market price than the offer price). Our finding that these coefficients are significantly higher than unity is consistent with *WHRIV* containing information that investors perceive as correlated with the long-term value of the firm, conditional on the other information available at the prospectus.

In both specifications, we include horizon and forecast errors as controls for the measurement errors associated with the use of management forecasts in *WHRIV*. The variable Horizon controls for the expectation that as the forecast horizon increases the possible measurement error in the managers' forecasts of earnings increases. We also include an ex-post variable to control for the actual measurement error in the managers' earnings forecasts. Dropping the forecast error variable does not change the qualitative conclusions we reach in this paper.

Given the relatively short-term nature of accounting fundamentals contained in the prospectus, which we use to construct *WHRIV*, we find, as predicted, a strong positive

relationship between IPO prices and our growth measure. In Panel B, we show that the coefficients are consistent between the offer and the market, with the coefficients being (0.541, $p < 0.001$) and (0.587, $p < 0.001$) respectively.⁶ This result is consistent with IPO prices incorporating expected growth in fundamentals into the continuing value.

Based on the argument that IPOs suffer from a high amount of information asymmetry, we employ proxies that measure information asymmetry to capture risk factors at the time of IPO. We included a proxy for size, measured as the total assets of a firm, as larger firms are assumed more informationally efficient. We include the age of the firm as younger firms are assumed to have a higher level of asymmetric information. Also, we include retained ownership as it is assumed to be a signal used by insiders to lower information asymmetry. We find mixed results for these proxies when controlling for accounting fundamentals (*WHRIV*). First, we do not find significant associations of the offer or market prices with either the size or age of the firm. Second, we find that while there is a positive and significant association of the offer price with the level of retained ownership, this association is lower in magnitude and not significantly different to zero when using the market price. Second, in the price-level regression specification, the association between IPO prices and the level of retained ownership is not significantly different to zero. These results provide some support (albeit weak) for asymmetric information predictions when controlling for accounting fundamentals and growth information at the IPO.

Prior literature also suggests that costly signals of quality can be made with prestigious affiliations, such as with a big audit firm or a more recognized underwriter. We include indicator variables in the regression to examine whether

⁶ For the remainder of this section, we focus our discussion of the reported results on the weighted least squares regression model and mention the differences with the price-level specification.

these variables are significantly priced as other information. We find that the underwriter variable is positive and significantly associated with the offer price (3.416, $p < 0.001$), and the auditor variable is positive but only marginally statistically associated with offer price (0.059, $p < 0.1$). When we consider the market price both of the associations deteriorate statistically, with prestigious auditors not being significantly related to market price and prestigious underwriters only being marginally significantly related to market price (2.341, $p < 0.1$). These results do not provide strong support for the use of auditors and underwriters as costly signals, when controlling for accounting fundamentals and growth information at the IPO.

We also included a measure of the subscription period as a proxy for expected underpricing. The subscription variable is based on higher demand pushing prices for the offer upwards. We find evidence consistent with this expected demand being priced consistently and negatively at both the offer and the market price. The economic significance of this effect however, is doubtful, as the coefficient is very small. The association does not hold in the price-level specification, casting further doubt on whether this factor is priced by IPO investors.⁷

In summary, we find a strong association between accounting fundamentals and IPO prices. The association is robust after controlling for potential omitted variable and measurement problems. We also find that our growth proxy, measured using net tangible assets backing, has incremental explanatory power in explaining IPO prices

⁷ Although not reported, we also try a specification with both market price and offer price as the dependent variable. Specifically, by setting market price as the dependent variable but deflating by offer price yields:

$$\frac{Market_{it}}{Offer_{it}} = \lambda_0 \frac{1}{Offer_{it}} + \lambda_1 \frac{WHRIV_{it}}{Offer_{it}} + \lambda_2 \frac{FCERR_{it}}{Offer_{it}} + \left(\frac{OINF_{jit}}{Offer_{it}} \right)' \lambda + v_{it}$$

where $\left(\frac{Market_{it}}{Offer_{it}} - 1 \right)$ provides a measure of underpricing.

We find a significant association between accounting fundamentals and IPO prices. Results are quantitatively similar to those reported in Table 4.

over accounting fundamentals. Conditional on accounting fundamentals, we find mixed support for measures of information asymmetry and signals via affiliation as ‘other prospectus information’ factors that are expected to help explain IPO prices.

5. Conclusion

Our study addresses several issues that are of potential interest to both academics and practitioners. We provide evidence of the usefulness of firm-specific trailing and forward accounting information in valuing IPOs. The use of offer and the initial-day market price in our analysis provides further insight into how IPOs are priced by the issuers and the market. In addition, we identify measures of ‘other prospectus information’ that explain IPO prices in addition to accounting fundamentals. These variables provide further insights into what issuers/investors consider as factors that capture growth prospects of IPO firms (in addition to those contained in accounting fundamentals provided in trailing and forward financial statements in prospectuses).

We address our research question by first examining the association between accounting fundamentals and IPO offer/first-day market prices. Second, we investigate the association of ‘other prospectus information’ variables with the portion of IPO offer price and first-day closing price that are not captured by financial information (termed as ‘implied continuing values’). We focus on the role of information that is publicly available in the prospectus; specifically, growth proxies, information asymmetry measures, and signals of quality through affiliations.

As we control for the short-term estimate of residual income value, we expect that signals of long-term growth should also be priced. We find that conditional on accounting fundamentals, growth proxies (measured using net tangible assets backing) are the main determinants of value at the IPO. In addition, we find that

information asymmetry measures, such as retained ownership, and signals of quality through affiliations such as auditor and underwriter are not consistently priced in the market when controlling for fundamentals. In sum, we find strong support for growth proxies, but only weak support for measures of information asymmetry and signals of quality through affiliations (i.e., choice of auditors and underwriters).

Our results are subject to some limitations and should be interpreted accordingly. First, we limit our study to only those firms that provide forecasts in their prospectus. While the majority of firms issue forecasts, it is possible that our results are biased towards larger and possibly more successful IPOs. Second, our sample is drawn from Australian IPOs, where the institutional setting has historically led the majority of IPOs to be offered using the fixed-price mechanism, whether other prospectus information is incrementally useful given the differing information environment created by using the book-building mechanism is beyond the scope of this paper.

Appendix

Further details on the implementation of the within-horizon residual income model

We take a practical approach to the construction of the within-horizon residual income model by including all information that is available to investors in the prospectus. The results we report in Table III use a mixture of the number of forecasts used in the construction of the residual income model. In further analysis (not reported here) we find similar results using (1) only one-year ahead forecasts, (2) running the analysis separately for firms according to the number of forecasts that they provide.

Discount rates

In estimating the discount rates, three alternative methods in line with prior literature are employed (Penman and Sougiannis 1998, Frankel and Lee 1998, D'Mello and Shroff 2000). The first method is the five-year T-Bill rate in the month prior to listing plus a premium. The premium we use is a constant 3%⁸.

A second approach estimates the cost of capital for each firm using the capital asset pricing model. This model is as follows:

$$r_{it} = r_{ft} + \beta_i (R_{mt} - R_{fT}) + \varepsilon \quad (\text{CAPM})$$

This model estimates a firm's return on equity, r_{it} , as a function of the risk-free rate of return, r_{ft} , plus the individual firm's sensitivity, β , to the market risk premium, $R_{mt} - R_{fT}$. Once again, the market premium will be a fixed 3%. The risk free rate in this study is the 5-year T-Bill rate.

⁸ Premiums of 4%, 5% and 6% are used as sensitivity.

To ensure the most accurate betas (β) are calculated, regressions will be run using 50 months of returns data (or what ever data is available). The data used to calculate β will be ex-post realizations for obvious practical reasons.⁹

The use of actual realisations in calculating firm-specific betas raises two problems. The first is that given the time frame and the nature of IPO firms, it is not possible to ensure that all firms have the full amount of observations. Secondly given that the focus of this study is on the valuation of IPOs at the time of prospectus, it is more logical to use an ex ante discount rate. Therefore a third method of calculating discounts will be used.

Francis, Olsson and Oswald (2000) use an industry specific one-factor model that can be defined as:

$$r_E = r_{ft} + \beta_E (R_{mt} - R_{fT}) + \varepsilon \quad (\text{ICAPM})$$

where r_E is the return on the industry. This model employs industry returns based on 24 ASX industry codes for 50 months prior to listing. This overcomes the time frame problem from the firm-specific CAPM and also provides as ex-ante measure of risk.

Adjustment of Management forecasts

The forecasted earnings figures provided in a prospectus are not for the first full year. Rather they cover from the time of prospectus to the end of financial year. However, to operationalise the residual income model, we require a full year's future earnings. We adjust the earnings figures in two ways. The first method (which we label the weighted adjustment), considers only those firms who have enough information available to construct a full one or two years earnings forecast are included in the analysis. The earnings number therefore, is made up of partly of the

⁹ Because the IPO firms have no operating history, we are unable to acquire the inputs required to calculate betas. This we use actual data as a proxy for the relevant operating history.

remaining time between prospectus and the fiscal year end and partly of the time after the fiscal year end up until a full year after prospectus.

In the second adjustment (known as the partially weighted adjustment), the same process as the first adjustment is conducted but any data for partial years is annualised. This second method enables us to consider more firms than the first method. We conduct all analysis using both adjustments, we report the second method, however, the use of the first does not affect the results qualitatively.

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Table I: Descriptive Statistics

	n	Mean	Median	Std. Dev.
<i>UND</i>	219	0.250	0.116	0.485
<i>MVE</i> (\$'000)	219	83,856	37,245	126,000
<i>AUDIT</i>	219	0.603	1	0.490
<i>Proceeds</i> (\$'000)	219	29,310.5	12000.0	46549.9
<i>Delay</i>	219	51.15	49	15.99
<i>FC Horizon</i>	219	216.19	232	115.04
<i>Subscription</i>	219	874.14	21	5498.81
<i>AGE</i> (days)	219	3,626.32	1928	5848.07
<i>GROW</i>	219	0.544	0.594	0.299
<i>UWFee</i> (\$)	219	650,326	326,369	1,022,068
<i>UW</i>	219	0.028	0.021148	0.025
<i>OWN</i>	219	0.559	0.598021	0.220
<i>Risk</i>	219	0.102	0.035975	0.153
<i>FE</i>	219	-4.382	-0.174521	50.568

Notes:

UND refers to the level of underpricing, being the initial day market return over the prospectus price, *MVE* refers to the market capitalisation on the initial day of trade. *AUDIT* takes the value of one if the firm employs a Big 5 (Big 6) auditor, zero otherwise. *Proceeds* refers to the product of the offer price and the number of ordinary shares offered at the IPO. *Delay* is the number of calendar days from the date of prospectus registration to the date of listing. *FC Horizon* is the number of calendar days from the date of prospectus registration to the date of the forecasted financial statements. *Subscription* is the number of calendar days where shares can be subscribed for the IPO. *AGE* is the number of calendar days from incorporation to the date of prospectus. *GROW* is one minus (net tangible assets backing per share divided by the offer price). *UWFee* refers to the underwriting fee as a proportion of the proceeds raised. *UW* is the weighted number of IPOs underwritten by the IPO underwriter divided by the total weighted number of underwritings. *OWN* refers to the level of retained ownership, defined as one minus the proportion of shares offered to the public to the total shares outstanding. *Risk* is defined as the standard deviation of the first 40 days' returns, excluding the initial return. *FE* is the un-scaled forecast error calculated using reported earnings minus managers' forecast of those earnings.

Table II: Descriptive statistics by year of the ratio of book-value plus one-year ahead residual income to IPO offer and market prices

Panel A: Within horizon residual income value to the offer price					
Year	n	Mean	Median	Standard Dev.	
1993	40	0.710	0.695	0.272	
1994	26	0.728	0.659	0.346	
1995	7	0.522	0.454	0.363	
1996	14	0.658	0.498	0.348	
1997	16	0.647	0.677	0.329	
1998	16	0.473	0.390	0.305	
1999	71	0.462	0.382	0.274	
2000	29	0.456	0.378	0.283	
All	219	0.567	0.490	0.316	
Panel B: Within horizon residual income value to the first-day market price					
1993	40	0.603	0.577	0.255	
1994	26	0.692	0.683	0.250	
1995	7	0.485	0.310	0.367	
1996	14	0.589	0.475	0.330	
1997	16	0.571	0.558	0.321	
1998	16	0.430	0.297	0.308	
1999	71	0.381	0.288	0.298	
2000	29	0.446	0.376	0.301	
All	219	0.501	0.422	0.309	
Notes:					
Ratios are calculated as $WHRIV_i/P_i$, where <i>WHRIV</i> refers to the within forecast residual income value, it is calculated using pro-forma book values and management forecasts of earnings contained in the prospectus. The horizon of the forecast is allowed to vary depending on the number of forecasts provided. Forecast earnings figures used in the residual income value estimates are adjusted either as: (1) weighted forecasts, where forecasts for fiscal periods less than 12 months are excluded, or (2) partially weighted forecasts, where forecasts for fiscal periods less than 12 months are converted by annualizing the forecast to reflect a 12 month estimate.					

Table III: Summary of the association between within horizon residual income and IPO valuation

This table presents a summary of the results from the linear regression of IPO valuations at the offer and initial day market prices, with the within horizon residual income value estimate. Panel A presents the results of our price-level analysis : $P_{it} = \alpha_0 + \alpha_1 WHRIV_{it} + \varepsilon_{it}$; while Panel B presents the results of our weighted least square analysis: $P_{it} / P_{it} = \alpha_0 (1 / P_{it}) + \alpha_1 (WHRIV_{it} / P_{it}) + \varepsilon_{it}$. P refers to (i) offer value, that equals the product of the offer price and the number of shares outstanding, and (ii) the market value of equity using the closing price on the initial day of trade, WHRIV refers to the within horizon residual income value is the sum of pro-forma book value and discounted residual income flows based on management forecasts of earnings.

	α_0 (t-statistic)	α_1 (t-statistic)	n	Model-Fit
Panel A: Price-Level Analysis				
(i) Tests of association using the offer value				
	0.54	0.85	219	0.33
t-test $\alpha_0 = 0$	(9.95)**	(9.94)**		
t-test $\alpha_1 = 1$		(1.82) ^δ		
(ii) Tests of association using the initial-day market value				
	0.82	0.74	219	0.11
t-test $\alpha_0 = 0$	(8.20)**	(5.80)**		
t-test $\alpha_1 = 1$		(2.04)*		
Panel B: Weighted Least Square Analysis				
(i) Tests of association using the offer value				
	0.17	0.97		
t-test $\alpha_0 = 0$	(9.88)**	(17.18)**		
t-test $\alpha_1 = 1$		(0.55)	219	0.43
(ii) Tests of association using the initial-day market value				
	0.21	1.03		
t-test $\alpha_0 = 0$	(7.02)**	(13.93)**		
t-test $\alpha_1 = 1$		(0.02)	219	0.46

Notes:

WHRIV refers to the within forecast residual income value, it is calculated using pro-forma book values and management forecasts of earnings contained in the prospectus. The horizon of the forecast is allowed to vary depending on the number of forecasts provided. Forecast earnings figures used in the residual income value estimates are adjusted either as: (1) weighted forecasts, where forecasts for fiscal periods less than 12 months are excluded, or (2) partially weighted forecasts, where forecasts for fiscal periods less than 12 months are converted by annualizing the forecast to reflect a 12 month estimate.

** p<0.001, *p<0.05, ^δp<0.1

Table IV: Multivariate analysis of the IPO pricing of accounting fundamentals and other prospectus information

Panel A: Price-level Analysis

$$P_{it} = \beta_0 + \beta_1 WHRIV_{it} + \beta_2 FCERR_{it} + \beta_3 HORZ_{it} + \beta_4 SUBS_{it} + \beta_5 GROW_{it} + \beta_6 OWN_{it} + \beta_7 AUDIT_{it} + \beta_8 UW_{it} + \beta_9 TA_{it} + \beta_{10} AGE_{it} + \varepsilon_{it}$$

Panel B: Weighted Least Square Analysis

$$P_{it}/P_{it} = \beta_0(1/P_{it}) + \beta_1(WHRIV_{it}/P_{it}) + \beta_2(FCERR_{it}/P_{it}) + \beta_3(HORZ_{it}/P_{it}) + \beta_4(SUBS_{it}/P_{it}) + \beta_5(GROW_{it}/P_{it}) + \beta_6(OWN_{it}/P_{it}) + \beta_7(AUDIT_{it}/P_{it}) + \beta_8(UW_{it}/P_{it}) + \beta_9(TA_{it}/P_{it}) + \beta_{10}(AGE_{it}/P_{it}) + \varepsilon_{it}$$

	Panel A		Panel B	
	Offer Price Coefficient (t-statistic)	Market Price Coefficient (t-statistic)	Offer Price Coefficient (t-statistic)	Market Price Coefficient (t-statistic)
β_0	-0.31 (-1.63)	-0.26 (-0.60)	-0.36 (-3.16)**	-0.15 (-1.53)
β_1 (WHRIV)	1.15 (9.06)**	1.14 (4.98)**	1.14 (14.12)**	1.23 (13.10)**
t-test $\beta_1=0$	(1.20)	(0.62)	(1.73) ^δ	(2.45)*
t-test $\beta_1=1$	(1.20)	(0.62)	(1.73) ^δ	(2.45)*
β_2 (FCERR)	-0.19 (-1.28)	0.01 (0.07)	-0.27 (-1.68) ^δ	0.28 (1.56)
β_3 (HORZ)	-0.001 (-1.67)	-0.001 (-0.52)	-0.001 (-0.28)	-0.001 (-0.77)
β_4 (SUBS)	0.001 (0.12)	-0.001 (-0.22)	-0.001 (-2.04)*	-0.001 (-2.35)*
β_5 (GROW)	1.04 (5.97)**	1.31 (5.27)**	0.54 (5.58)**	0.59** (5.28)
β_6 (OWN)	0.09 (0.61)	0.07 (0.18)	0.22 (2.03)*	0.03 (0.40)
β_7 (AUDIT)	0.05 (0.94)	-0.04 (-0.40)	0.06 (1.97) ^δ	0.02 (0.34)
β_8 (UW)	4.88 (3.81)**	8.77 (3.36)**	3.41 (3.52)**	2.34 (1.81) ^δ
β_9 (TA)	-0.001 (-0.06)	-0.001 (-1.38)	0.001 (1.21)	-0.001 (-0.73)
β_{10} (AGE)	0.001 (0.51)	0.001 (0.28)	-0.001 (-0.02)	0.001 (0.42)
Model fit	0.59	0.28	0.35	0.40
n	185	185	185	185

Notes: *WHRIV* refers to the within forecast residual income value, it is calculated using pro-forma book values and management forecasts of earnings contained in the prospectus. The horizon of the forecast is allowed to vary depending on the number of forecasts provided. Forecast earnings figures used in the residual income value estimates are adjusted either as: (1) weighted forecasts, where forecasts for fiscal periods less than 12 months are excluded, or (2) partially weighted forecasts, where forecasts for fiscal periods less than 12 months are converted by annualizing the forecast to reflect a 12 month estimate. Forecast error (*FCERR*) is the signed management earnings forecast error (relative to future realized earnings), Forecast horizon (*HORZ*) is the number of calendar days from the date of prospectus registration to the date of the forecasted financial statements. Subscription (*SUBS*) is the number of calendar days where shares can be subscribed for the IPO. Growth (*GROW*) is one minus (net tangible assets backing per share divided by the offer price). Retained Ownership (*OWN*) refers to the level of retained ownership, defined as one minus the proportion of shares offered to the public to the total shares outstanding. Auditor Reputation (*AUDIT*) takes the value of one if the firm employs a Big 5 (Big 6) auditor, and zero otherwise. Underwriter Reputation (*UW*) is the weighted number of IPOs underwritten by the IPO underwriter divided by the total weighted number of underwritings. Age (*AGE*) is the number of calendar days from incorporation to the date of prospectus. We delete variables that have one or more missing variables (n=185). ** $p < 0.001$, * $p < 0.05$, ^δ $p < 0.1$

