AN ANALYSIS OF ACCOUNTING-BASED VALUATION MODELS USING AUSTRALIAN INITIAL PUBLIC OFFERINGS

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Declaration

I hereby declare that this thesis represents my own work and is in accordance with The University of Sydney's policy related to academic honesty.

Signature:____

Date:____

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Abstract

An Initial Public Offering (IPO) represents an interesting juncture in a corporation's life. The event is marked by heightened levels of uncertainty compared with ordinary offers and everyday trading. In this environment it is interesting to consider valuation and role that accounting information plays in determining it. This study investigates two broad classes of accounting-based valuation models – the comparable firm multiples approach and the Edwards-Bell-Ohlson (EBO) models – in an Australian IPO setting, and assesses their respective performance in explaining the value of IPO firms. As a subsidiary concern the study also investigates the value relevance of management earnings forecasts for Australian IPOs. The study consisted of 227 IPO firms from July 2002 to June 2006. The approach taken in this thesis involved establishing empirical versions of the accounting-based valuation models and assessing their ability to explain offer or first day price using ordinary least squares regression. The results generally indicated that both models listed above have empirical validity in explaining IPO price – both offer and first day price. Results for the subsidiary theme of this paper indicated that management earnings forecasts are value relevant. This follows a series of ambivalent studies in Australia on the subject, and thus provides up-to-date evidence on this matter.

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1 Introduction

There are several important events in the archetype firm's life. There is the initial start-up, mergers and acquisitions and periods of financial distress. Another important event is if and when a firm goes to the public for funds and subsequently lists on the stock exchange. Such an event is labelled an Initial Public Offering (IPO) in this thesis[1]. Such a time is marked by a large degree of uncertainty. In this setting it is interesting to look at the how such firms are valued. This study, as a main theme, investigates two accounting-based valuation models that offer an explanation of the equity value of a firm and does so with respect to Australian IPOs. A subsidiary theme of this thesis is to investigate the value relevance of management earnings forecasts which are commonly disclosed by IPO firms. The apparent frequent disclosure of such forecasts makes the Australian market relatively distinct to other primary markets.

Theoretically the value of a firm is widely accepted as the present value of future distributions from the company. If one had knowledge of such future distributions there would be no problem. That there is a vast and still developing literature across three disciplines – accounting, economics and finance – in this area is however testament to the fact that valuation is difficult. Consequently a number of models have been developed that seek to explain value using contemporaneously observable numbers. Many such models have subsequently relied on accounting information as inputs into the valuation process. This is

[1] Alternatively such events have been called a public float. However the IPO terminology seems to have become the accepted term in Australia and so that term is adopted and used throughout this thesis.

natural as accounting information purports to reflect the accumulation of value of a firm through time.

In reviewing the IPO related literature it is apparent that a particular method for valuation is favoured above to value IPO firms – the comparable firm multiples approach. This approach is reviewed at length in chapter two (literature review). The essential points from that discussion are that whilst the comparable firm multiples approach has relatively strong theoretical support it nevertheless is subject to quite severe assumptions. To the extent that a suitably comparable firm may be found then these assumptions are finessed and the comparable approach would be expected to work very well. However, where a suitable firm cannot be found, then there are doubts as how well the comparable firm multiples approach might perform. There is good reason to suppose that such a circumstance arises in an IPO setting. This would be expected to be exacerbated in Australia where the capital markets are relatively smaller than markets in other countries.

A more sophisticated model – the Edwards-Bell-Ohlson (EBO) model – is reviewed as a potential alternative. The specifics of the EBO model are complex and one might make the comment that even the relatively extensive discussion in chapter two on the subject is a fairly limited one, mainly discussing the intuition of the models rather than the intricate details. Nevertheless the essential feature of the EBO type model is that it impose a specific (linear) information dynamic on earnings and in so doing create a specific link between accounting information and valuation. Whilst current research has had difficulty establishing the validity of the model, the strong theoretical support and it's superficially appealing properties make testing the model appropriate and worthwhile in the context of Australian IPOs.

With these two models established as alternatives to value an IPO firm a methodology was required in order to assess their performance. An indirect approach was chosen over a more direct approach due to time constraints imposed on this thesis. The direct method would have involved calculating the value of a selection of IPO firms using the various valuation models and comparing the relative precision of estimates. The indirect method used entailed specifying empirical versions of the valuation models and assessing whether the results were consistent with expectations.

For the comparable multiples approach, validity was indicated by finding positive and significant parameter estimates on the value driver of the model. For the EBO model however, the process was slightly more complex. A dual requirement needed to be satisfied whereby the relevant parameter estimates on the regression are significant and also that persistence parameters are within an expected range. These persistence parameters are variables within the EBO model – specifically within the information dynamic referred to earlier – and are discoverable from the regression model by algebraically manipulating the parameter estimates according to predefined formulas, presented in chapter two. Further details of the methods employed and hypotheses driving those decisions are contained in chapters three (hypothesis development) and four (method).

The data used to examine hypotheses are discussed in chapter five (data). In brief, the sample consisted of 227 IPO firms from July 2002 to June 2006. Tests performed in chapter six appeared to confirm the empirical validity of both the comparable firm multiples approach and the EBO approach.

Additional analysis in chapter seven found in one instance additional support for the EBO model by running the regression model on a more restrictive sub-sample. In chapter seven, a specification test was performed on the current and forecasted earnings iterations of the comparable firm multiples approach and the EBO model. This test generally did not find particularly supportive results for either of the models. However, it is important to point out that the specification test used (the J-test) does not determine the 'best' model as such and it must be interpreted in that light. At this time it is also worth invoking the caveat employed by Kaplan and Ruback (1995), that due to nature of the empirical test conducted in this thesis, a series of assumptions need to be made in order to make the analysis manageable. In practice a higher level of precision would be expected. To the extent that is true then perhaps the 'real' performance of these models is in fact greater than what is presented here. And of course the converse may be true.

The second theme of this thesis, as indicated above, was concerned with the value relevance of management earnings forecasts. The results are largely consistent with the more recent evidence in this area and can be seen as an update. Additional hypotheses within the same theme included testing the relationship between retained ownership and management earnings forecasts. An expectation of a moderating relationship was formed, which was not supported by the results presented in chapter six. Another extension of that theme was to investigate the importance of the change in earnings between periods and the impact on valuation. Tests conducted and presented in chapter six confirmed that the market found the direction of earnings to be important in establishing value.

The subsequent chapter explores the literature relevant to the research task and draws on three interrelated areas in valuation, disclosure and IPOs. Chapter three develops hypotheses that were tested and the method used to do so is presented in chapter four. Chapter five discusses the collection and the summary statistical properties of the data used in this empirical investigation. The results of the tests are presented in chapter six, whilst additional analysis is presented in chapter seven. The results presented in chapter seven were ideas that developed during and subsequent to the testing the initial testing. Chapter eight concludes this thesis along with a discussion of future research opportunities.

2. Literature Review

The focus of this thesis is the valuation of Initial Public Offerings using accounting information. This immediately identifies one area of literature that must be discussed with reference to the focus of this thesis – valuation. Valuation is a topic that has attracted substantial research interest, which is to be expected given that accounting is fundamentally concerned with presenting the financial position and performance of a given entity. It is notable that despite the apparent breakthroughs in the academic literature it appears as if practice has lagged behind in these developments. The first section (2.1) of the literature review will review various accounting based valuation methods that have been proposed.

Initial Public Offerings, as the title would suggest, describes a circumstance in which an entity first approaches the general public with the object of raising funds through the general public's participation in a share offer. This definition reveals a particular information dynamic between the firm offering shares, and the members of the general public assessing the offer – there is a large degree of information asymmetry. Certainly this level of information asymmetry is greater than what one would expect in a general secondary market transaction. Thus a second broad grouping of literature that would appear to be relevant in assessing the valuation of IPOs is the disclosure literature. The relevant literature is profiled in section two (2.2) of this chapter. The final section (2.3) will consolidate the previous two sections into a discussion of how they relate specifically to IPOs.

2.1 Valuation

The valuation of equity securities is the subject of a vast literature in accounting as well as in finance and economics, and there is considerable overlap between the three disciplines in this area. Generally the theoretical value of a firm as the discounted value of future distributions is undisputed; however the ongoing debate surrounds attempts to proxy this process using identifiable and accessible figures. Popular approaches that are reviewed in this section include comparable firm multiples as well as the abnormal earnings model. Another model that is reviewed is the Edwards-Bell-Ohlson (EBO) type models.

As mentioned in the previous paragraph, the valuation of a firm is generally regarded as the discounted value of future distributions in the form of dividends or share buy-backs. Thus valuing a firm would be a simple task if forecasting dividends and other distributions was an uncomplicated process. However, this is not the case. Forecasting is necessarily an uncertain task, which is compounded in the case of forecasting dividends in that only the expectation of distribution is made without regard to the underlying generation of value. For this reason many valuation methods utilise accounting information as indicators of a firm's ability to create value.

The approach taken in this review of the valuation literature will be an iterative one, starting with more basic valuation models before discussing the more sophisticated models.

2.1.1 Comparable firm multiples

Perhaps the most prominent model for predicting equity valuation using accounting is the comparable firm multiples method[2]. These models are used widely due to their simplicity. The Price-Earnings (PE) is a common comparable multiple used and a firm specific PE ratio is usually provided by financial information services and in newspapers. Alongside the PE multiple, other popular multiples include the Market-to-Book (MB) and the sales-to-price multiple. Forecast information is typically used with the earnings and sales multiples, and the increased precision of such information is supported in the literature (e.g. Kim and Ritter 1999; Liu, Nissim, and Thomas 2002). Valuation using comparable multiples avoids complex issues that surround more complex models as comparable multiples avoids the *explicit* forecasting of a series of future earnings and growth and the calculation of an appropriate discount rate. Such methods are also characterised by an uncanny level of accuracy and robustness given the relatively unsophisticated assumptions made (Liu, Nissim, and Thomas 2002; Richardson and Tinaikar 2004).

The comparable firm approach consists of a number steps as discussed by Palepu, Healy, and Bernard (2004). The first of which is identifying the valuation base of the comparable firm analysis, be it earnings, book value, sales or potentially any other figure reported by the company or in the general public forum[3]. The second step is to identify a suitable comparable firm or group of comparable firms. This is typically done with reference to industry grouping, although it has been noted

[2] Dukes, Peng and English (2006) for instance, in a USA setting, reported a high level of use of the PE multiple approach amongst practitioners.
[3] Amir and Lev (1996) for instance imply that a comparable multiple based on population size served by telecommunications firms might be suitable.

that such classifications are arbitrary and in individual circumstance more suitable comparable firms may be obtained by looking beyond such classifications (Kim and Ritter 1999). Using the comparable firm or firms a multiplier is obtained by dividing the price or market value of the comparable firm or firms by the relevant base. The third step involves finding the value of the target firm by calculating the product of the multiplier described above and the comparable multiple base for the target firm.

Theoretically the use of the comparable multiple approach is predicated on the idea that the ratio captures the market's assessment of both the risk and growth prospects (Zarowin 1990). Thus applying the multiplier to a similar firm should bring about a reasonably accurate valuation of the firm. However there is good reason to suppose why this might not necessary be the case. In the opening paragraph of this sub-section the word explicit was stressed using italics. This was done so to highlight that whilst the comparable firm approach certainly does not explicitly require the forecasting of a series of earnings and growth rates and the calculation of a discount rate, these assumptions are *implicit* in this valuation method. In order to investigate this assertion in more detail it is necessary to go beyond the general comparable multiple approach and define a specific base. For this purpose the PE multiple is used due to its popularity as indicated above.

With a small amount of algebraic manipulation it can be shown that a theoretical PE multiple is based on the assumption that valuation may be obtained by the discounted value of future earnings. The foundation of this method, as foreshadowed in the introduction to this section, is the Present Value of Expected

Dividends (PVED) model defined by Gordon and Shapiro (1956)[4]. From this it is apparent that earnings are used as a proxy for expected dividends – effectively assuming a constant payout ratio for dividends of one hundred percent. Notwithstanding this very broad assumption, it is important to note that this model allows for a particular discount rate, a particular growth rate, and inherently a particular pattern in earnings through time. This is notable as by choosing a comparable firm or group of comparable firm the analyst is effectively making certain assumptions about these items.

Thus to the extent that truly suitable comparable firms are identified the comparable firm approach may well perform reasonably well. However to the extent that this is not the case, questions may be raised about the confidence that is placed in such a method for estimating the value of a firm. Without meaning to pre-empt subsequent sections of this thesis, it is worth considering how well one might expect such a method to capture the valuation process in a market as diverse as the primary share market.

Further problems appear to present themselves beyond the theoretical interpretation of the comparable firm multiple approach. This mainly concerns the issue of selecting suitable comparable firms. As indicated earlier in this sub-section, the choice of comparable firms is integral to the approach, and this is usually done on the basis of industry membership. It has been noted that industry groupings can be fairly arbitrary[5] and that practitioners hence consider choosing

[4] The PVED model simply states that equity value is the discounted value of expected dividends over an infinite horizon.
[5] An interesting exercise is to select a group of firms from the ASX All Ordinaries index and assign to them a GICS code with reference only to the firm's annual report. Such an exercise

comparable firms as something of an art form (Bhojraj and Lee 2002). This necessarily introduces an even greater amount of subjectivity into the valuation process than is already present. Another relatively minor concern with the comparable firm approach is that it necessarily assumes that the comparable firms have been priced efficiently. Whilst there is a very large literature on apparent pricing inefficiencies and arbitrage opportunities it does seem to be the case that on average the market is sufficiently efficient.

It is also worth expanding further on the study by Zarowin (1990) listed above. It sought to explore whether the underlying assumptions of the comparable multiples approach were born out empirically by establishing a regression equation with the PE multiple as the dependent and various risk and growth factors as independent variables. The empirical data presented by Zarowin however appeared to conflict with the theory, failing to consistently find a significant relation between his proxy for risk, beta, and the PE multiple. The evidence on growth was more positive. Zarowin made the comment that the failure to find the proxy for risk significant at statistical levels may simply be due to an inappropriate proxy for risk in beta. This is not inconsistent with studies undertaken in the intervening period which have found beta to be an insufficient statistic (Fama and French 2004)[6]. An earlier study, Beaver and Morse (1978), did not find significance on either growth or risk variables, however Zarowin (1990) commented that Beaver and Morse (1978) used realised growth. Prices are

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reveals that there appears to be significant scope for firm's to be classified into industry groups with quite dissimilar firms.

[6] Whilst Fama and French (2004) note that the Sharpe (1964)- Lintner (1965) beta does have pedagogical value, it's practical properties are perhaps lacking.

formed contemporaneously so such a proxy might not accurately represent the conditions present at the time when beliefs about prices were established.

Various studies that have investigated the comparable multiples approach to valuation have explored the effects of different mechanisms for identifying suitable comparable firms (Alford 1992; Kim and Ritter 1999; Bhojraj and Lee 2002; How, Lam, and Yeo 2007), choosing between various multiples (Liu, Nissim, and Thomas 2002) and choosing between various valuation bases (Liu, Nissim, and Thomas 2002). In general, minimal research effort exists towards assessing the relative performance of the comparable multiples approach against other valuation models. Given the documented lag between practice and theory this absence does seem odd. A summary of the key literature in this area is given in Table 2.1.1.1.

Table 2.1.1.1 Summary of the key literature concerning comparable firm multiples[7]

Paper	Subject	Comment
Beaver and Morse (1978)	Determinants of the PE multiple	Fail to find significance for proxies of risk and growth with respect to the PE multiple. Beaver and Morse use realised growth to proxy for the growth in their regression equations which is suggested later by Zarowin (1990) to have effected the results.
Zarowin (1990)	Determinants of the PE multiple	Similar design to Beaver and Morse. Using expectations of growth Zarowin finds growth proxies to be statistically significant. However risk proxies are still found to be statistically insignificant. It is suggested that the proxy for risk is responsible for this particular result.
Alford (1992)	Selecting suitable comparable firms	Investigate alternative methods of selecting comparable firms; industry, risk and growth. Found support for discriminating on industry membership and only qualified support for selecting on the basis of risk and growth.
Bhojraj and Lee (2002)	Selecting suitable comparable firms	Propose an alternative method for selecting comparable firms – warranted multiples, which includes an allowance for firm-specific adjustment – and conclude that this method is superior to previous methods.
Liu, Nissim and Thomas (2002)	Selecting suitable comparable firms and choosing between valuation bases	Refute assertion that different industries groups have a different 'best' multiple. Also provide support for the intuitive statement that forecasted comparable bases perform better than current comparable bases.

2.1.2 The Edwards-Bell-Ohlson (EBO) models

The Edwards-Bell-Ohlson (EBO) models are an explicit attempt to link accounting information to equity valuation through a specific dynamic. These models start from the same base as the comparable firm multiples approach presented in the previous chapter – i.e. the PVED model – however additional assumptions are made that give the EBO style models additional sophistication over the comparable firm approach. The term 'EBO' was coined by Bernard

[7] Kim and Ritter (1999) and How, Lam and Yeo (2007) discuss comparable multiples with respect to IPOs and are discussed in greater detail later in this paper (section 2.3)

(1995) and it is used here for convenience. The models are so named after the contribution of the respective authors; Edwards and Bell (1961) who reintroduced the foundation of what are now called the EBO models[8] – the abnormal earnings model – and Ohlson (1995) who greatly expanded upon Edwards and Bell and again reintroduced the underlying concepts after they had been virtually forgotten in the intervening period. The EBO model has proved to be quite an important model in the accounting literature, with many studies – particularly the value relevance type studies – using the insights that the model provides.

Before discussing the EBO model in great depth it is necessary to investigate the precursor of that model – the abnormal earnings model. Following that review the additional features of the EBO model will be explored in more detail as well as the various theoretical and empirical issues associated with the model.

2.1.2.1 The abnormal earnings model

The abnormal earnings model[9], as indicated above, may be viewed as a precursor of the EBO model as it is from this model that additional assumptions are made which characterise the EBO models. In addition it will be discussed later that under certain assumptions it is possible to reduce the EBO model to the abnormal earnings model. Thus it is important to understand the abnormal earnings model before progressing to the EBO model.

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[8] Bernard (1995) notes that it is possible to trace the abnormal earnings model back to at least the 1920s, where it was apparently used by the United States of America's Internal Revenue Service to assess the impact of prohibition on the value of breweries.

[9] Alternatively the abnormal earnings model is called the residual income model. Whilst the terms are equivalent the abnormal earnings terminology has been chosen as it complements the later discussion of the EBO model, which relies on the idea of a mechanical decay in earnings eventually returning to normal earnings.

The abnormal earnings models, as with the comparable multiple approach profiled above, starts with the PVED. To this model an assumption of clean surplus accounting is made. Clean surplus accounting describes a condition whereby a change in the book value of equity of a firm is wholly explained by the firm's earnings and distributions to shareholders. This definition necessarily conflicts with the current accounting standards promulgated by the International Accounting Standards Board (IASB) through the Australian Accounting Standards Board (AASB). However it has been noted that this assumption can be seen to be less restrictive if interpreted as all holding gains and losses having a significant impact so as to be reflected within the statement of financial performance (Peasnell 1982) i.e. all reductions in value are reflected by a loss item and all gains being sold off with the resultant gain being again reflected in the statement of financial performance. Assuming the clean surplus relation allows the following value relation to be stated:

$$V_t = bv_t + \sum^{\infty}_{t=1} E(x^a_t).\ (R)^{-r} \qquad (2.1)$$

Where: V = market value of the firm

bv = book value of equity

x^a = abnormal earnings

R = one plus the discount rate, and

t = time period

The working out necessary to arrive at model 2.1 is not shown here. However the proof is not difficult and simply requires a rearrangement of the clean surplus relation so that dividends are isolated and then substituted into the PVED model as well as the definition of abnormal earnings. As the number of time periods approaches infinity the concluding dividend of the firm becomes inconsequential and is omitted from the model above.

At this point it is important to note an important property of the PVED and by extension the abnormal earnings model. Previously it was suggested that the PVED model was theoretically undisputed as a means of calculating the value of a firm and that it was only practical restraints that necessitated alternative approaches. This has the consequence that it is difficult to design an appropriate investigation to test the abnormal earnings model. It is then of no particular surprise that there are few papers that investigate the abnormal earnings model from this perspective (Lo and Lys 2000).

2.1.2.2 Basic EBO

It has been hinted at in the preceding paragraphs of this sub-section that the EBO model possesses some additional feature that distinguishes it from the other models reviewed so far that makes this model an important and novel contribution to the literature (Bernard 1995; Lo and Lys 2000; Kothari 2001; Richardson and Tinaikar 2004). That defining characteristic is the linear information dynamic. An interesting feature of the abnormal earnings model presented above in model 2.1 is that it does not in fact require book value or abnormal earnings at all. As with the comparable firm approach it is possible to substitute any information as bv and x^a (Peasnell 1982), although one might expect those values to at least be somewhat related to financial information. The linear information dynamic introduced by Ohlson (1995) however explicitly considers accounting information.

The linear information dynamic makes assumptions about the relationship between earnings of different periods and it is presented below:

$$x^a_{t+1} = \omega x^a_t + v_t + \varepsilon_{1t+1} \qquad (2.2a)$$

$$v_{t+1} = \gamma v_t + \varepsilon_{2t+1} \qquad (2.2b)$$

Where: x^a = abnormal earnings
ω = persistence term for abnormal earnings
v = 'other information', and
γ = persistence term for 'other information'

The equations jointly describe current abnormal earnings as a function of the previous period abnormal earnings plus 'other information' and an error term. Both equations are autoregressive one processes, which in practice would be calculated across an extended time period (Myers 1999 e.g. uses at least fifteen years to estimate the parameters). The understanding is that ω reflects the persistence of the previous periods abnormal earnings, which would be expected to be less than one and greater than zero, exclusive. This expectation follows economic intuition as a firm would not be expected to earn a constant abnormal return – that is having abnormal persistence of one. As time progressed it would be expected that new entrants would erode the firm's economic profit, in time leaving only a normal profit. Dechow, Hutton, and Sloan (1999), inter alia, provide empirical support for this assertion. Similarly the persistence term on 'other information' is expected to have limits placed on it.

Whilst the 'other information' component was not defined precisely in the original conception of the model, later papers have discussed possible solutions to measuring this variable. These will be discussed in a subsequent part of this sub-section as part of a larger discussion of that particular term (2.1.2.3). It is however important at this stage to point out that the 'other information' component need not be a monetary variable, nor is it necessary for the 'other information' component to be distilled into one variable. Whilst typical analysis and review of EBO type models employ only one 'other information' variable, Myers (1999) demonstrated that it is possible to add such additional variables, albeit with increasing complexity. The other information component is important to the EBO model and its omission necessarily would be expected to diminish the serviceability of the model (Callen and Segal 2005).

The assumption of the linear information dynamic together with the assumptions necessary to state the abnormal earnings model (PVED and clean surplus relation) allow the following closed-form value relation to be stated:

$$V_t = bv_t + \alpha_1 x^a_t + \alpha_2 v_t \qquad (2.3)^{10}$$

Where: V = equity value of firm

bv = book value

x^a = abnormal earnings

v = 'other information'

$\alpha_1 = \omega/(R - \omega)$, and

$\alpha_2 = R/(R-\omega).(R-\gamma)$

[10] See Ohlson (1995) for more detailed working out.

An interesting point worth mentioning is that the EBO model does not represent a theory of measurement nor a theory of information (Beaver 2002). Whilst the models rely on summary information produced by accounting systems, the models say nothing about the use of any particular method over another. Whilst it is expected that individual line items would be expected to have information content, in order to provide a parsimonious model of valuation specific attention to this has been eschewed. Furthermore the application of the clean surplus relation assumption renders any change in accounting policy irrelevant, provided that this assumption remains intact. However, it would appear that this element may be incorporated into 'other information'.

2.1.2.3 Linear information dynamics

The linear information dynamic originally proposed by Ohlson (1995) was introduced above, however it is worth mentioning that this dynamic need not be linear (Christensen and Feltham 2003). The linear information dynamic has come under increased scrutiny since its inception and there appears to be significant evidence to suggest that it is not a valid assumption. Following this evidence there have been several attempts to develop a model utilising non-linear information dynamics. Alternatively some authors do not view this area of development of fundamental concern (e.g. Kothari 2001).

Whilst the linear information dynamics allows for a parsimonious accounting valuation to be modelled, many authors have apparently struggled with its constrictive nature leading to modifications that have created internal inconsistencies (Myers 1999). An example of this is the paper by Dechow, Hutton, and Sloan (1999). Whilst Dechow *et al* (1999) provided an excellent review of the EBO model and provide empirical support for the decay of abnormal earnings, their implementation of the EBO model potentially harms the subsequent empirical tests of the model they perform.

Dechow *et al* (1999) began their analysis by building up several iterations of the EBO model by changing assumptions about the persistence parameters, ω and γ. For example Dechow *et al* demonstrated that under certain assumptions about these two parameters and 'other information' (namely that $\omega = 1$ and $\gamma = v = 0$) the EBO model is reducible to the abnormal earnings model as indicated above in section 2.1.2.1. In another iteration of the linear information dynamics Dechow *et al* calculate a conditional value for ω, based on equation 2.2a whilst adding several additional conditioning variables such as industry membership, magnitude of abnormal earnings, special items and operating accruals and the dividend payout policy. Dechow *et al* then take the coefficient on abnormal earnings, whilst ignoring the other coefficients. It is argued by Myers (1999) that this creates an internal inconsistency which makes interpretation of the results difficult.

Another issue which is held in common with much of the research in this area is that Dechow *et al* (1999) use a flat discount rate of twelve percent. Whilst they note that empirical tests they perform are robust for discounts rates in the range of nine to fifteen percent it is commented by Beaver (2002) that given it is known that risk varies by firm, a more realistic representation of risk would be reflected by using firm-specific risk. Furthermore, given that risk has such a pivotal role in the EBO model, as can be seen in model 2.3, it appears to be an oversight not to attempt a more accurate representation. Notwithstanding these criticisms, Dechow *et al* found very limited support for the linear information dynamics.

Myers (1999) attempted to address the first of these issues above and tests four different iterations of the EBO model. Two of these models are based on the original Ohlson (1995) specification whilst the two remaining models are based on Feltham and Ohlson (1995; 1996)[11]. In testing these four models, Myers did not find support for linear information dynamics as the estimated coefficients of an empirical version of equation 2.3 were significantly different from the implied values of the coefficients (α_1 and α_2 in equation 2.3 above), obtained by running autoregressive equations similar to equations 2.2a and 2.2b to find ω and γ and using a time-varying discount rate. Myers also commented that tests appear to reject linear information dynamics in the EBO model for book value alone as an explanation of value. However this comment arose from comparing adjusted R^2 and it is questionable whether this approach is sufficient for such a comment to be made[12].

Morel (2003) also took issue with the approach taken by previous research in this area. The concerns of Morel included the aforementioned issues with Dechow *et al* (1999) – fixed discount rate and the use of the conditional ω term without the

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[11] Ohlson (1995) was the original paper that introduced the linear information papers. Later papers refined this concept and expanded it to include an allowance for conservative information as well as further exploration of 'other information' (Feltham and Ohlson 1995, 1996, 1999; Ohlson 1999). Whilst these additional models are interesting, they will not be reviewed in this thesis as they are not necessary for hypotheses to be developed and the tests thereof. The general theme of this thesis is valuing IPOs using accounting information. Generally firms seeking public finance would take steps to ensure that, for instance, their statement of financial position looked strong and hence it is not expected that conservatism would be as much of an issue with this group of firms.

[12] The appropriateness of the adjusted R^2 metric for assessing goodness of fit will be discussed later in chapter three of this thesis as it informs the discussion there of particular inferences from the various statistical tests that will be performed.

necessary adjustments to the EBO model – as well as additional concerns that the method used by Dechow *et al* and Myers (1999) resulted in internal inconsistencies despite the best efforts of Myers to avoid this. In particular Morel explained that the time-series data that Myers was dealing with was most likely non-stationary, which bias Ordinary Least Squares regression. Morel also took issue with assuming an exogenous discount rate. Nevertheless, whilst adjusting for these perceived oversights Morel did not find support for linear information dynamics.

Another paper that specifically tests the linear information dynamic was Callen and Segal (2005). They noted that something missing from the previous studies reviewed so far is that they lack a realistic operationalisation of the 'other information' variable. Dechow *et al* (1999) do use the definition provided by Ohlson (2001) for 'other information', however as discussed above the way in which they have operationalised the concept makes the results they reported difficult to interpret. The other two papers use 'other information' variables which, whilst would be expected to affect abnormal earnings, would not perhaps reflect the most informative variable for this purpose. Correcting for this, Callen and Segal find more positive support for the EBO model.

As suggested earlier the definition for 'other information' was left undefined in the original paper introducing linear information dynamics. Since then Liu and Ohlson (2000) and Ohlson (2001) expanded upon this definition. They explained that some estimate of future earnings may be used to derive this variable. A definition of the adjusted 'other information' variable as well as the resulting value relation is presented below:

$$v_t = E(x^a_{t+1}) - \omega x^a_t \qquad (2.4a)$$

$$V_t = bv_t + (\alpha_1 - \alpha_2\omega)x^a_t + \alpha_2 E(x^a_{t+1}) \qquad (2.4b)$$

Where: v = 'other information'
V = equity value of firm
ω = persistence on abnormal earnings
x^a = abnormal earnings
$\alpha_1 = \omega/(R - \omega)$, and
$\alpha_2 = R/(R-\omega).(R-\gamma)$

An interesting implication of this specification is that it implies a negative coefficient for current abnormal earnings[13]. This is similar to the expectations of Begley and Feltham (2002), where one- and two-period ahead earnings forecasts are modelled. Begley and Feltham suggested that the signs on the coefficients are related to persistence and growth of earnings.

Given the apparent weak support for the linear information dynamic there have been a number of attempts to develop non-linear information dynamics. Much of this work stems from Burgstahler and Dichev (1997) who introduced the idea into the accounting literature that investors may value different components of value – a recursive element which is defined as the discounted value of earnings using current production technology, and an adaptive element defined as the value of

[13] Where the product of the two persistence terms ω and γ is positive the coefficient on current abnormal earnings is predicted to be negative. This can be confirmed by expanding the term $(\alpha_1 - \alpha_2\omega)$ with respect to α_1 and α_2. This yields the equation $-\omega\gamma/((R-\omega).(R-\gamma))$.

current book value of equity – depending on the circumstances. It was theorised that the adaptive element of value would be more highly weighted where earnings were poor, as investors would be interested in how the business may adapt and pursue more profitable ventures in the future. Burgstahler and Dichev found evidence consistent with this theory. Specifically they found value to be a convex function of earnings (book value) holding book value (earnings) constant. Recent attempts to model this process include Zhang (2000), Yee (2000), Biddle, Chen, and Zhang (2001) and Ashton, Cooke, and Tippett (2003). Whilst there certainly does seem to be an issue here, it has been questioned to what extent developments in this area can add to the underlying model (e.g. Kothari 2001). This effectively becomes a question of how content a researcher is with the ability of the linear information dynamic to accurately describe first-order effects. For this thesis the decision is made to largely put these studies to one side for the time being.

Despite the apparent shortcomings of the EBO model it would still seem to be worth pursuing. The EBO model, as discussed above, has very strong theoretical roots and that would seem to warrant further investigation into the model. Table 2.1.2.1 below provides a summary of some of the EBO model literature that has been covered in the preceding paragraphs.

2.1.2.4 Historical and forecasting aspects and implementation issues of the EBO models

This sub-section covers two remaining issues associated with the EBO model: historical versus forecasting information for the purposes of valuation and the practical issue of implementing the EBO model.

Table 2.1.2.1 Summary of key papers in the EBO literature

Paper	Description
Ohlson (1995)	Introduced the linear information dynamic, explicitly linking accounting information to valuation.
Dechow, Hutton and Sloan (1999)	Performed an empirical test on the linear information dynamic. Found very limited support for the dynamic, although was later criticised for introducing internal inconsistencies into EBO model with uncertain effect on inferences.
Myers (1999)	Performed empirical tests regarding the linear information dynamic proposed in the EBO models. Found evidence that questioned the appropriateness of such linearity of the dynamic.
Liu and Ohlson (2000)	In response to concerns that the other information component was being ignored in empirical tests the authors formulated a way to incorporate analyst forecasts into the Feltham and Ohlson (1995) model.
Ohlson (2001)	Similar to the above paper, Ohlson, reformulated the original Ohlson (1995) model to incorporate other information in the form of analyst forecasts.
Begley and Feltham (2002)	In responding to the concern expressed by Liu and Ohlson (2000) and Ohlson (2001) above, formulated a model based on Feltham and Ohlson (1996) that incorporated one- and two-year ahead forecasts to incorporate other information. Find empirical evidence consistent with expectations concerning the persistence and growth of earnings.
Morel (2003)	Criticised two previous authors for introducing internal inconsistencies. In a complicated analysis to address these criticisms did not find results in support of the linear information dynamic.
Callen and Segal (2005)	Effectively provide an extension on both Liu and Ohlson (2001) and Begley and Feltham (2002) and find relatively positive support for the EBO model.

Begley and Feltham (2002) noted that they extend their model to accommodate three period ahead earnings forecasts in an unpublished appendix. This leaves open the question of how many periods ahead must be used before the researcher can be satisfied that all relevant 'other information' is captured. It has been noted that the original intention of the EBO model was to provide a parsimonious relation between the value of equity and currently available accounting information (Richardson and Tinaikar 2004). As forecasting information is increasingly added to the model, the role of accounting information – which is to a greater or lesser extent, historical information – and any explicit link between accounting information and value as represented by the information dynamic diminishes to the extent that in the limit it might not be needed at all. This would clearly go against the spirit of the original model. To some extent one might make the comment that the literature seems stuck between trying to keep the roots in accounting information, whilst trying to join a 'forecasting game'.

The second issue follows on from the previous point and concerns how practical the EBO model is to implement. Of the few studies that have investigated the EBO model directly it is a striking feature that they require vast amounts of data in order to operationalise the EBO model. Myers (1999) and Morel (2003) each use in excess of fifteen years of data to estimate the persistence parameters. Clearly then, given current technology processes and data access, this does not seem to be a tool that an ordinary retail investor might use. However it is likely that larger investors would have access to the necessary data and that the calculation of the model would be relatively straight forward. By extension a question may be raised then of how relevant this model would then be for valuing IPOs which of course do not have anywhere near that extensive history on the market. Without meaning to pre-empt subsequent sections of this thesis it is sufficient to say that clearly some surrogation process would be necessitated by these circumstances. Whilst comparisons then would be easy to make between this method and comparable firm multiples, it is important to emphasise that such a method would retain the benefit of having a more detailed definition of how value is created.

It has been suggested that the EBO model may be of use purely in a pedagogical capacity. This can be demonstrated with respect to section 2.1.2.3 where it was pointed out that the EBO model can be reduced the abnormal earnings model, and is thus useful in illustrating the assumptions that underline that particular model. However surely if such a model has pedagogical value, then it must also have some practical value, if only as a stepping off point for more advanced models.

2.1.2.5 Beyond EBO

It is interesting to note that whilst James Ohlson initiated the literature that has been discussed in this section, his current research essentially argues against the EBO model as it is presented above. Ohlson (2000) and Ohlson and Juenttner-Nauroth (2005) present an discussion that argues that the book value component of the EBO models presented so far is unnecessary for valuation purposes. The model they present relies on expected earnings per share as well as the growth rate in earnings per share. No further discussion will be entered into concerning this model. It was decided to limit the discussion of the EBO type models to models based on the original Ohlson (1995) specification.

2.1.3 Other valuation models and methods

There are of course many other valuation models other than the ones covered in the two preceding sub-sections. Discounted Cash Flow (DCF) analysis for instance has only been mentioned in passing thus far. It also should be noted that no discussion has been entered into about any alterations analysts or investors may make to reported financial data in order to obtain a ‘truer’ picture of the entity. In the case of the former it was assessed that such a method, whilst relying to a certain extent on accounting information, resulted in a lot of adjustments that could not feasibly be done on a large sample. As it is the object of this thesis to test accounting-based valuation models on a fairly large sample it was felt that little benefit would be derived from evaluating a model that would not ultimately be tested. A similar case may be made for testing the dividend discount model, notwithstanding issues in assessing its overall worth (see section 2.1.2.1 on the abnormal earnings model for a discussion). Similarly various ad hoc adjustments to summary accounting information as part of a fundamental analysis are ignored as it is difficult to replicate this on a large sample.

2.1.4 Conclusion

In this section a series of related accounting based valuation models were introduced; the comparable multiples approach and the EBO models. It can be seen from this discussion that the models differ considerably in modelling sophistication. The EBO models utilise a larger number assumptions, some of which are quite restrictive. This can be strength and weakness of such models. It is suggested here that the more sophisticated models should perform better than the less sophisticated models, notwithstanding the effects of the restrictive assumptions. This is suggested due to the relatively simple assumptions made by the comparable multiples approach.

2.2 Disclosure

Disclosure is a vast area of literature that is again spread across three disciplines in accounting, finance and economics. The market is characterised by various states of information asymmetry between buyers and sellers and this is especially pronounced in the capital markets. Through costly, voluntary disclosure decisions by firms may reduce information asymmetry and may result in some benefit in terms of the price they receive for the shares. Thus voluntary disclosure literature is an important stream of research in capital markets research, and especially for any study investigating IPOs, where one might expect information asymmetry to be significantly higher than in the secondary market. For the purpose of this section the disclosure literature is split up into two parts –voluntary disclosure and signalling – where the classification of signalling is essentially given to the group of research that looks at non-financial signals and disclosures, opposed to the voluntary disclosure literature which will be taken to mean financial disclosure.

2.2.1 Voluntary disclosure

There are two types of disclosure that a firm can make; mandatory and voluntary or discretionary disclosure. Mandatory disclosures are required by either the Corporations Law or by the listing authority e.g. the Australian Stock Exchange (ASX). Voluntary disclosures are disclosures in excess of these mandatory requirements.

As will be discussed in more detail in section 2.2.2, firms seeking to raise public funds such as through an IPO are required to disclose all information that investors would reasonably expect of them in order to make an informed assessment of whether or not to participate in the offer[14]. Whilst there is no formal requirement under Australian law that a firm disclose forecasts of earnings, or anything else for that matter, this practice appears to be a de facto standard for non-mining IPOs to do so (Lee, Taylor, and Taylor 2006)[15]. That there is no formal requirement effectively brings the decision of whether to make earnings forecasts under the umbrella of the voluntary disclosure literature.

Under a scenario of no costs to disclose firms would be expected to disclose all information to the market through an unravelling process (Grossman 1981; Milgrom 1981). Under this process, if the manager of a firm withheld information from the market, the market would reduce the price of equity until such time that it would be in the firm's interest to disclose the information. Of course this reasoning relies on the market in aggregate possessing a good understanding of the industry and conditions faced by the firm, in order to develop reasonably accurate expectations with which to shape price.

However information is not costless to produce and disseminate. The costs faced by the firm in order to disclose information does not arise purely from the costs of employing someone to collate the data and cost to distribute it by whatever means necessary to the market. Costs also include a group of costs named proprietary costs, which essentially capture the cost to the firm of revealing information to

[14] The regulatory body, the Australian Securities and Investment Commission (ASIC), has issued guidance on the provision of forecast information; however this decision remains entirely at the discretion of the particular firm.

[15] At the high end How and Yeo (2001) for instance found the number of firms disclosing forecast around seventy-five percent, whilst Chapple, Clarkson, and Peters (2005) found a forecast disclosure rate of around seventy percent. Other studies in Australia have found proportions generally within this range, or higher.

existing and potential competitors and also to other stakeholders that may seek to extract value from the firm as a result of the disclosure. Initial modelling of this phenomenon in the accounting literature was performed by Verrecchia (1983)[16].

Generally the benefits that a firm might expect from disclosing additional information are the disclosure might influence the market's assessment of the company leading to a reduced cost of capital for the firm, although empirical evidence on this has not been supportive of this. Whilst it has been found that this relation holds for smaller firms with small investor following, this relationship was not found amongst larger firms with larger following in one empirical test (Botosan 1997). It was speculated by Leuz and Verrecchia (2000) that previous mixed findings arose from studying disclosure in an already information rich environment, where any tests are subject to much noise, limiting the ability to find the hypothesised result. By analysing bid-ask-spreads and trading volumes as proxies for information uncertainty around the change from accounting standards that produce less information to standards that produce more, they are able to support this assertion. In an IPO environment Schrand and Verrecchia (2005) found that increased disclosure does appear to be significantly associated with less underpricing i.e. disclosure mitigates the adverse selection problem apparent with IPOs as will be discussed in the next sub-section.

Furthermore, due to the existence of proprietary costs, investors are uncertain whether a firm fails to disclose certain information due to expected negative

[16] Other key early studies in the accounting literature on this subject include Diamond (1985), Dye (1986), Waganhofer (1990) and Skinner (1994). Verrecchia (2001) together with the discussion paper (Dye 2001) provide a very detailed analysis and discussion of the current state of the voluntary disclosure literature.

effects vis-à-vis competitors, or whether they simply do not want to disclose bad or inconvenient news about the firm. Thus investors must make a probabilistic assumption about the reason for nondisclosure or perceived partial disclosure and price on this assumption. Thus where information is costly it is not expected that management will disclose information in excess of mandatory requirements unless they believe that doing will serve some marginal benefit to the firm. Generally, the models in this area indicate that disclosure should be more frequent in Australia compared to the USA, where legal recourse for misled investors are more harsh on the firm, and this does seem to be borne out by evidence[17].

2.2.2 Signalling

Signalling is an important component of information pioneered most notably by Akerlof (1970) and Spence (1973)[18]. Akerlof envisioned a market where buyers and sellers could not distinguish between the quality of a product and where the sellers could. Due to this information asymmetry, buyers set their demands at a level informed by their beliefs about the levels of good and bad sellers. In this process they effectively push the high quality sellers out of the market as the price they are willing to pay – adjusted for an expectation about quality – is insufficient for high quality sellers to achieve a normal profit. Thus the market collapses to a market of the lower quality products, the market for lemons, from which the article takes its name. Spence (1973) expanded on this idea with reference to the job market. Spence demonstrated that more productive job applicants could

[17] Both Mak (1996) and How and Yeo (2001) comparing the USA's legal regime to the one in place in New Zeeland and Australia respectively, made the comment that the later two have less harsh regimes resulting in more voluntary disclosure than in the former country.
[18] Riley (2001), in a review of the signaling and screening literature, discussed Akerlof and Spence alongside other notable contributors that have had a significant influence on this literature.

differentiate themselves from less productive applicants by undertaking certification that would be too costly for less productive applicants to replicate. Other contracting mechanisms provide other ways to distinguish participants in the market.

This concept can easily be localised to the equity offer setting, and in particular an IPO. The problem faced by the promoter selling shares in the company is that they have superior information to potential shareholders. The promoters are insiders, having a relatively more comprehensive understanding of the industry in which the firm operates than the average market participant. Thus the promoters would have a better understanding of the firm's prospects. Thus it may be difficult to an investor to distinguish between two otherwise similar companies, one of which might in actual fact be a good future prospect and the other a bad future prospect. The research initiated by Akerlof and Spence discussed above, indicates that the promoters must find a credible signal in order to distinguish themselves from other sellers in the market. For a signal to be credible it must be costly for would-be imitators to replicate.

In a general case looking at signals vis-à-vis a firms' everyday stock price Healy and Palepu (1993) discussed a range of signals a firm can use to indicate value. These signals include dividend policy and acquiring private debt. Announcing an increase in dividends for instance commits the firm to higher payouts in future years as firms are typically reluctant to reduce dividends due to the corresponding negative signal that would be attributed to the firm. Similarly acquiring private debt signals is said to signal to the market that the firm is able to handle the debt repayments in the future and also has the benefit of allowing the firm to avoid disclosing proprietary information to competitors.

Non-financial factors can also signal information to the market. Other signalling factors that have been examined include choice of auditor (big versus small-medium firms), choice of consultant (e.g. where firm is financial distress) and so forth. As will be discussed in the next section, IPOs are characterised by an increased level of uncertainty and so the value of signalling to the market takes on an increased importance in such an environment.

2.2.3 Conclusion

In this section the literature on disclosure was reviewed. This literature is particularly relevant to the case of IPOs due to the larger than normal levels of information asymmetry present in such cases. In the preceding sections it was discussed that managers disclose information to the market due to a function of costs and risks associated with that disclosure. The clear implication of this is that managers that disclose earnings forecast information to the market clearly believe that such information is relevant. Thus it would seem sensible for any valuation model to contemplate such information. Reflecting on the first section of this literature review, valuation, it is worth noting that of the two models reviewed there it appears that only the EBO model is capable of incorporating such signalling information in a way that is not ad hoc.

2.3 Initial Public Offerings

An Initial Public Offering (IPO) is where an entity first goes to the public to raise funds. These funds are typically used to increase drastically the scale of the operation. An IPO is characterised by a higher level of uncertainty than seasoned equity offerings and other events in the proverbial life-time of a firm such as mergers, acquisitions, and management buyouts. This increased uncertainty is a result of increased information asymmetry between the firm and potential investors. IPO firms, prior to the offering, in almost all cases would not be followed by analysts or otherwise demand large coverage and thus their previous financial and operating records would have been less scrutinised. Thus investors are generally less certain about the future of the IPO firm than they would for a firm that has been listed for some time. This makes IPOs an interesting event to study with regards to how accounting information is used alongside other disclosures and signals. The purpose of this section is to contextualise the discussion from the previous two sections into an IPO setting. As such the section will progress in a similar pattern as this chapter, first discussing valuation in an IPO setting before moving on to review IPO related disclosure and signalling research.

2.3.1 IPO Valuation

As identified a number of times previously the valuation of an IPO is expected to be more difficult than the valuation of seasoned equity given the high degree of information asymmetry. By definition the IPO does not have a history of exposure to the market and so it is difficult to form expectations about the future performance of the firm – the valuation exercise similar to valuing other closely held assets. It is then of no surprise that analysts look to comparable firms in order to base their assumptions about the IPO firm. This is an obvious starting point in all valuations in any case. At the same time the industry practice that is favoured for valuing IPOs is the comparable firm approach that was discussed above (section 2.1.1) due to its simplicity and the accessibility of the required data (Kim and Ritter 1999; How, Lam, and Yeo 2007). However given the discussion in section 2.1, doubt is cast on how useful one might expect such an approach to be, acting as the primary method for valuing an IPO.

One of the key disadvantages noted about the comparable firm approach is that the method hinges very much so on the selection of a suitable comparable firm, with one observer stating that this process was something of an art form (Bhojraj and Lee 2002). Even in larger capital markets there can be difficulty in selecting such a comparable firm (Kim and Ritter 1999). This situation is expected to be more acute in the Australian setting due to a smaller capital market and this does in fact appear to be what other researchers have discovered (e.g. How, Lam, and Yeo 2007).

A recent study that investigates the valuation of IPOs is Kim and Ritter (1999). Kim and Ritter investigate a number of commonly used multiple drivers such as earnings, sales, book value, cash flow, and forecasted versions of some of these. The study is set in the United States of America and so Kim and Ritter are afforded a larger data set then would be available in Australia. As a result Kim and Ritter are able to use the set of recent IPOs from which to select a comparable firm, which is done through an algorithm that selects firms on the basis of common SIC codes that are ranked on proximity to the target firm's sales. In order to test the comparable multiple an Ordinary Least Squares (OLS) regression is set up with the target firm multiple as the dependent and the comparable firm or firms multiple on the right-hand side amongst other factors. Whilst the test value produced statistically significant results, Kim and Ritter found very large prediction errors[19]. In exploring this issue further they turn to a private investment company and use dossiers provided by that firm to identify comparable firms. In addition Kim and Ritter investigated the different properties of the IPOs and assess whether this impacts on the apparent accuracy of the multiples method. In one instance they found that older firms had reported a noticeably smaller prediction error than newer IPO firms. Overall however, the use of expert comparable firm selection did not appear to improve results significantly.

An Australian study by How, Law and Yeo (2007) however, was not able to use recent IPOs as comparable firms and instead turned to the secondary market. How *et al* selected a sample of 275 Australian firms from 1993 to 2000. They then set up a system of selection criteria, selecting either on industry membership and size, industry and growth, or industry, growth and size. The reported results indicate that none of the selection criteria appears to dominate the others. In another Australian study Cotter, Goyen, and Hegarty (2005) found that prices based on the PE multiple were significantly different to the actual offer price at a

[19] Kim and Ritter (1999) measure error by finding the log ratio of predicted multiple to actual multiple.

five percent level of significance[20]. Cotter *et al* used industry as a grouping device from which to select comparable firms.

Outside of these studies there does not appear to be any attempt at assessing alternative valuation approaches. Whilst Cotter *et al* (2005) do calculate value for their sample of IPOs using the abnormal earnings model profiled in section 2.1, they do so in order to estimate the intrinsic value of the firm in order to assess whether IPOs are systematically under- or over-valued[21].

2.3.2 IPO management earnings forecasts

It was indicated in section 2.2 that the provision of management earnings forecasts is historically very common in Australia – the amount of disclosing firms typically ranges between seventy and eighty percent. It was suggested that the legal environment promoted this level of disclosure in contrast to more strict legal regimes such as in the United States of America. The following paragraphs will discuss the current requirements of Australian law with respect to forecasts as well as review the relevant research in this area.

Under Australian Corporations Law[22], IPO promoters are required to disclose information that investors would reasonably require in order to make an informed decision about whether or not to participate in the IPO. ASIC – the market regulator – has also issued Policy Statement 170 (PS170), which discusses when a

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[20] Cotter et al (2005) establish the level of significance one tenth of a percent and hence they are able to claim no significant result for this test. The p-value reported is 0.043.

[21] Cotter et al (2005) reported that "while Australian industrial IPOs are underpriced, they are not systematically undervalued" (p95). They also do find evidence of systematic overvaluation.

[22] And in particular s710 of the Corporations Act 2001

firm should and should not disclose prospective information in fundraising documents[23]. In general PS170 advises that promoters must have a reasonable basis for including a forecast in the fundraising document, with precedent established in various common law cases. This option has been increasingly scrutinised by ASIC and it has been suggested that such disclosures are becoming less common amongst the media. A recent study by Chapple, Clarkson, and Peters (2005) suggested that the CLERP 2 changes to the Corporations Act also resulted in less frequent disclosure by firms. This paper is reviewed in more detail later in this sub-section.

The discussion in section 2.2 on voluntary disclosure would suggest that as earnings forecasts are being provided there must be some incremental benefit of doing so. An assumption is made that this incremental benefit is detectable in the price of the shares being offered. However the evidence on this is relatively ambiguous. The international evidence on the value relevance of management earnings forecasts appears to be consistent with expectations. However the Australian evidence is inconsistent.

In a Canadian setting, Clarkson, Dontoh, Richardson, and Sefcik (1992) find that the provision of earnings is valued by the market. They also examined whether the market adjusts for any bias within the earnings forecasts. They do this by splitting the difference between the firm's forecast and the market's prior expectation into information and bias components. The information component comprises the difference between posterior and prior expectation, and the bias

[23] PS170 was issued in 2002, replacing Practice Note 47

component is calculated as the difference between the forecast and the posterior estimate. Using this method, Clarkson *et al* found that that the market did not appear to value the bias component of earnings forecasts, whereas the coefficient on the information component was significant. This is an interesting result in light of papers that will be discussed in subsequent paragraphs.

Investigating the impact of earnings forecasts for Singaporean IPOs prior to that country mandating earnings forecasts, Firth (1998) also found that the earnings forecasts provided by firms had a significant impact on firm value. Firth used a model similar to that of Clarkson *et al* (1992), although he conceptualises retained ownership as a modifying effect on earnings forecasts as well as a separate effect. Retained ownership is often considered a viable signal for IPOs as a certain level of retained ownership gives would-be shareholders comfort that existing shareholders believe that the firm will perform well for the time being (Leland and Pyle 1977). Firth argued that retained ownership is likely to become less of a factor beyond a certain threshold. The empirical results bear out this argument with Firth finding that retained ownership alone was not significant, although interacting with management earnings forecasts did result in a significant result.

Contrarily, in an Australian setting, How and Yeo (2001) did not find evidence that earnings forecasts of IPOs are relevant in ascertaining the value of the firm. How and Yeo included a range of risk factors that appear to mitigate the impact of the earnings signal. They cited the apparent bias in forecasts found by Brown, Clarke, How, and Lim (2000) as a possible explanation for this finding. This is an interesting conclusion given the results of Clarkson *et al* (1992) that indicated the market is capable of discriminating the bias component of forecasts. Forecast bias will be discussed briefly in the following paragraph. How and Yeo also suggested that their result may be that due to the high number of firms disclosing forecasts, the incremental value of forecasting is reduced or that other signalling information contaminates the earnings forecast signal[24]. This may well be the case as the problem with designing tests to capture a signalling effect is that often such effects are quite subtle (Boyle 1989).

One of the earlier studies investigating IPO earnings forecast bias in Australia – Lee, Taylor, Yee, and Yee (1993) – found that the earnings forecasts were of questionable accuracy given the apparent optimistic bias exhibited. Intuitively they found that forecast horizon to be significantly associated with forecast error. Clearly the longer a forecast is made for the greater the chance that an unforseen event will disturb the assumptions upon which the forecast was made. In a more recent study, Hartnett and Romcke (2000) investigated absolute forecast error with respect to a number of factors and find forecast error to be significantly associated with the forecast interval, age, industry, economic conditions, float motive (expansion versus restructuring), and audit quality. Hartnett and Romcke also reported that around forty percent of forecast errors were within ten percent of actual results.

Moreover, forecasts are inherently uncertain, with any attempt to predict the future profitability of the firm never likely to be consistently accurate[25]. An

[24] How and Yeo (2001) report 75.3 percent of their sample as providing earnings forecasts. The sample period was between 1991 and 1997.
[25] And where forecasts are particularly accurate then this is likely to raise questions about earnings management

interesting result found by Keasey and McGuinness (1991) was that management forecasts were not significantly more biased than naïve forecasts (based on random walk and random walk drift models), although management forecasts were found to be significantly more accurate than the naïve ones. There does not appear to be a similar study performed on Australian data, although similar results might be expected[26].

Returning now to the value relevance of management earnings forecasts, a more recent Australian study than How and Yeo (2001) reported results more consistent with the expected results and with previous international studies (Chapple, Clarkson, and Peters 2005). Chapple *et al* investigated the impact of Corporate Law Economic Reform Program (CLERP) 2 on management earnings forecasts provided by IPO firms[27]. As such they chose a sample period two years either side of the implementation of the CLERP 2 commencement (13 March 2002) – How and Yeo (2001) performed their analysis on a data sample from 1991-1997. Chapple *et al* tested the frequency, accuracy and bias, and value relevance of management earnings forecast in the period before and after the commencement of the CLERP 2 act to assess whether there had been any significant difference. Importantly they found – in a similar test to How and Yeo (2001) – that management earnings forecasts were statistically significant either side of the legislation change. Although the results for the earnings signal before CLERP 2 were fairly weak. In other results Chapple *et al* found that the frequency of

[26] Keasey and McGuinness (1991) conduct their study using data from the Britain's Unlisted Securities Market, which they explained consists largely of small firms with short business histories. Nevertheless it would still appear that the results are generalisable.
[27] CLERP 2 was introduced to, inter alia; clarify legal liability for inadequate disclosure of information. It also introduced a less onerous oversight role for ASIC (Chapple, Clarkson, and Peters 2005).

management earnings forecasts had decreased significantly around the introduction of CLERP 2, and observed that such a drop may have contributed to the increase in value relevance found between the corresponding intervals. That is, the firm's that continue to forecast are those firms that have a stronger argument to do so.

Table 2.3.2.1 Summary of key IPO management earnings forecast papers

Paper	Setting	Sample Period	Sample Size[27]	Forecasts relevant?	Other findings
Clarkson *et al* (1992)	Canada	1984-1987	121 (70)	Y	Market appears to be aware of bias in forecast and prices accordingly
Firth (1998)	Singapore[28]	1977-1992	116	Y	Modifying relationship between management earnings forecasts and retained ownership.
How and Yeo (2001)	Australia	1991-1997	158 (119)	N	Contrary to the first two papers in this table, the authors include in the value relevance regression a set of risk factors which seem to mitigate the effect of disclosing the forecast.
Chapple, Clarkson and Peters (2005)	Australia	1998-2002	310 (214)	Y	In addition to finding that management earnings forecasts were value relevant, also found that this had increased significantly around the introduction of CLERP 2. Found that the frequency of management earnings forecast disclosure had decreased significantly around the introduction of CLERP 2.

[27] Numbers in parenthesis are the firms out of the sample that disclosed at least one year forward management earnings forecasts. The study by Firth included only firms that provided such forecasts.
[28] As noted within the text, this study is conducted in the period before Singapore made management earnings forecasts mandatory.

In any case the apparent discrepancy between the two studies is curious. Whilst certainly the results of Chapple *et al* (2005) are weak there is nonetheless a noticeable difference between the results[29]. There is potentially an issue with the event study performed by Chapple *et al* (2005) in that the introduction was not a clear cut event, however this does not explain the discrepancy between the two studies[30]. The How and Yeo (2001) appears to include both 'hot' and 'cold' markets[31], although the Chapple study does take place during a particularly 'hot' market – the technology boom. It is possible that this is a partial explanation of the inconsistency.

2.3.3 Signalling and IPOs

It was discussed briefly in section 2.2 that Akerlof's (1970) market for lemons concept could be localised to an IPO market. It was discussed that in the absence of credible signals a market characterised by information asymmetry would collapse. There are many signals a firm may send, one of which was discussed above in management earnings forecasts. The following paragraphs will discuss other signalling devices at the disposal of IPO firms.

The role of signalling has been acknowledged within the IPO literature for some time. Leland and Pyle (1977) provide one of the first investigations into

[29] How and Yeo (2001) report a t-statistic of 0.0366 (p-value of .4721) whereas Chapple et al (2005) reported a p-value of 0.096 for earnings before CLERP 2 and a p-value of 0.014 afterwards.
[30] The CLERP 2 discussion paper was released in April 1997. The Corporate Law Economic Reform Program Act 1999 was passed on 24 November 1999. As stated above, the act commenced on 13 March 2000. There is thus ample time for firms to respond to proposed changes. The lag between the passing of the law and commencement generally makes such event studies complicated, notwithstanding tests for robustness of the time period selection by Chapple et al (2005).
[31] IPO offers are documented to be cyclical, ranging from a high level of activity in some years whereas in others there is a very low amount of offers.

signalling and IPOs. They discuss that direct dissemination of information (in absence of costs associated with incorrect disclosure) are unlikely to restore the market due to the moral hazard of the promoter. A possible action proposed that might signal to investors that the investment is a good one was for those parties with insider knowledge to invest or retain some interest in the entity. The intuition behind this is that insiders know the business better than external investors and putting their money on the line gives some assurance to outside potential investors. This is a case of action speaking louder than words. Thus increasing levels of retained ownership is suggested to be inversely related to the cost of capital and therefore a more favourable price from the promoter's perspective. Similar cases have been made for the role of auditor, underwriter and investment bank associated with the IPO. These instances will be discussed briefly in the following paragraphs.

Krinsky and Rotenberg (1989) discuss a number of signalling factors that would be expected to influence the valuation of IPOs. Whilst looking at other signalling devices such as Leland and Pyle's (1977) retained ownership signal, audit and investment bank quality, Krinsky and Rotenberg are particularly interested the role a prestigious underwriter plays in the valuation of an IPO firm. A prestigious or high quality underwriter was deemed so if they appeared in the top ten of a third party list of investment dealers i.e. underwriter variable is dichotomous rather than a continuum. Using Canadian data they find that the underwriter dummy variable is significant, at five percent, in explaining value. Interestingly they do not find any significance on Leland and Pyle's (1977) retained ownership signal.

The role of auditors has also been investigated as a possible signal for the valuation of IPO firms. Feltham, Hughes, and Simunic (1991) perform such a test using a dummy variable for audit quality. Large audit firms are used as proxies for high quality firms. The idea is that larger firms have access to greater resources and are able to therefore provide a more rigorous review. Furthermore, larger auditors are perceived to have a greater incentive to ensure that audit is undertaken in a very thorough manner. It has been well documented, for instance that poor quality audits can have very serious repercussions for audit firms[32]. Whilst Feltham *et al* fail to find support for their hypothesis that there is a relation between audit quality and firm specific risk, they argue that this result is largely due to supply-side firm risk differences. They cite a study conducted in Canada, a lower litigation environment, where due to lower cost of higher audit quality, auditor choice was explained by some of the risk factors considered by Feltham *et al*.

Lee, Stokes, Taylor, and Walter (2003) however, whilst finding some support for Feltham *et al*'s (1991) argument, find that the relationship between auditor quality and firm-specific risk is more complex. In the less litigious environment of Australia – and thus reducing some of the supply-side constraints that Feltham *et al* argue confound their own results – Lee *et al* find that when excluding IPOs

[32] The accounting firm Arthur Anderson is the obvious example of this. Whilst the big accounting firms are involved in corporate collapses and other misdeeds with surprising regularity (see e.g. Clarke, Dean, and Oliver 2003), the involvement of Arthur Anderson in the collapse of WorldCom and Enron in the United States of America produced a domino effect such that Arthur Anderson virtually no longer exists (it is understood that the firm still operates mainly to attend to various remaining legal claims). Of course those cases were not ordinary collapses. It nevertheless illustrates the importance of keeping the appearance of quality and the consequences of damaging an auditor's brand.

with prestigious underwriters (that might be expected to demand high quality auditors) and large issue sizes (which might be expected to be highly correlated to high quality auditors by virtue of their size) demand for audit quality is associated with firm-specific risk. Nevertheless the auditor can still perform a signalling role in valuation.

2.3.4 Conclusion

This section has consolidated the two previous sections of this chapter into a discussion of how they relate specifically to IPOs. The most common model for IPO valuation, as with most other valuation exercises, is the comparable firm multiples method. However in both section 2.1.1 and 2.3.1 it was discussed that the underlying assumptions of the comparable firm multiple may not be particularly well supported, certainly less supported than they are in other valuation exercises. This is due to difficulty in obtaining a suitable comparable firm. It was further discussed that IPOs were an event in a corporation's life that is marked with a higher than usual level of uncertainty. This leaves room for a range of signalling phenomena to emerge as important points of differentiation between firms.

The next chapter elaborates on the themes explored in this chapter and formulates testable hypotheses

3 Hypothesis Development

The previous chapter reviewed three broad areas of research related to the valuation of IPOs. From this review two key issues emerged. The first issue, and the main focus of this thesis, was the expected performance of various accounting-based valuation models. Another issue that emerged was curious evidence on the value relevance of management earnings forecasts in Australia, with weaker than expected results found. In this chapter, these issues will be elaborated on and relevant hypotheses stated. The models for testing these hypotheses will be developed in chapter four.

3.1 Performance of accounting-based valuation models

In the previous chapter, and in particular section 2.1, two models were reviewed that offer a method to calculate the value of a firm's equity. Both of the models are ultimately grounded in the same theoretical base – the PVED model – however the way in which they describe the valuation process varies considerably in sophistication. The first task that must be performed in this section is to argue that the later of these two models, the EBO model, is in fact a feasible option for the valuation of firms, and in particular IPO firms. It has been noted that the EBO model would appear to be quite a difficult model to implement. The second task is then to present hypotheses that test the performance of the two valuation models. As will be explained, there is a seemingly obvious path, that despite being appealing in its simplicity, would not appear to be an appropriate method to assess the performance of the respective models. The approach that will be employed will then be defended.

3.1.1 Practical feasibility of the EBO model

It was noted previously that from past empirical studies the EBO model would appear to be quite a difficult model to implement relative to the simple to use comparable multiple approach. Recall that the EBO model requires, assuming just the one 'other information' variable is employed, six variables to be defined – book value of equity, earnings, the discount rate, and persistence terms for abnormal earnings and 'other information', ω and γ. The first four of these are relatively easily observable; however the persistence parameters are not. Both Myers (1999) and Morel (2003) required at least fifteen years of data in order to estimate the persistence parameters ω and γ. Clearly this depth of information is not available for IPO firms and some kind of surrogation is required. There are two issues related to this proposal; firstly whether the use of surrogates is appropriate and secondly the extent to which this approach differs from the comparable firm approach that has been profiled previously. The two points are interrelated.

The first issue necessitates a review of what ω and γ mean within the context of the EBO model. It was discussed in section 2.1.2.2 that ω and γ were persistence terms on abnormal earnings and 'other information' respectively. Omega then represents the expected decay in abnormal earnings, which would be expected as new competitors enter the market[33]. Gamma, under the interpretation given by Ohlson (2001), takes on a similar meaning. Both for instance are restricted to values between zero and one exclusive. Thus it is apparent that what is important is choosing a contemporaneously comparable firm or group of firms that have similar competitive pressures upon them. Note that this is different from selecting comparable firms in the comparable firm multiples approach. In the comparable firm approach, selecting a comparable firm entailed attempting to find a firm that represented, as closely as possible, a match for cash flow patterns, risk and growth. In selecting surrogate firms for the purposes of estimating ω and γ, an assumption is made only on the expected similarity of competitive pressures. Thus the comparable firm multiples approach might reasonably be expected to increase the chances of selecting a firm that is not sufficiently comparable relative to the EBO model approach. Given this reasoning, it would appear to be appropriate to use surrogate data to estimate the persistence parameters and apply them to the target firm.

Another point worth mentioning is that such an analysis would require relatively extensive data processing capacities and is clearly beyond the typical so-called retail investor. However for a carefully maintained database, this would not pose too many problems. Thus it is considered that the EBO model is a feasible candidate for valuing IPOs and thus presents as an appropriate model for testing.

[33] This may be verified by finding the Nash equilibrium of a Cournot oligopoly game with n participating firms. It can be seen that as n approaches infinity, profit approaches normal levels. See for example Osborne (2004) for a more detailed introduction of this concept.

3.1.2 Assessing the performance of accounting-based valuation models

As suggested in the opening paragraph of this section (3.1), there would appear to be an obvious way to assess the performance of the respective valuation models. This approach, used frequently in the value relevance literature, is to compare the respective adjusted R^2 of the regression equations (Holthausen and Watts 2001). However an inspection of the econometric literature on this topic would suggest that this approach is not appropriate for the purposes of choosing between the various models. This discussion takes place in this chapter as it informed the formulation of hypotheses that are presented below.

R^2 is a measure of the variation in the dependent variable that is explained by the variation of the independent variables. An adjusted R^2 is normally used as the basic measure, R^2, suffers under restrictive assumptions about the number of regressors in the regression equation, which is typically not satisfied in empirical analysis[34]. However, the adjusted measure also has several problems that make it problematic as the sole or even complementary determinant of model suitability. Whilst the unadjusted R^2 is a non-decreasing function of the number of regressors, the adjusted measure does not fully solve this problem (Gujarati 1995). As Griffiths, Hill and Judge (1993) noted, the adjusted R^2 will still increase if the incremental regressor has a t-statistic greater than the absolute value of one[35].

[34] Unadjusted R^2 requires the number of regressors to be the same for the models being compared. Other assumptions include that the dependent variable is the same between the models being compared and that an intercept is included in those models.
[35] An elaboration on this may be found in Dhrymes (1970). Also see Haitovsky (1969) and Edwards (1969).

Thus it would appear that the adjusted R^2 is perhaps not the best determinant of model suitability.

There are of course other methods to assess the goodness of fit of a regression model. Alternatives include the Akaike Information Criterion (AIC) and the Amemiya's Prediction Criteria. The AIC for instance is similar to the adjusted R^2 in that it introduces a penalty for additional regressors added to the equation. However the concern AIC, Amemiya's Prediction Criteria and adjusted and unadjusted R^2 is that it leads to a data snooping game i.e. experimenting with variables to ascertain the 'best' score. Statisticians frown upon this approach as it leads to problems in statistical inference (see e.g. Potscher 1991; Kabaila 1995).

The recommendation given by most econometric textbooks consulted stress the fundamental role of underlying theory in regression analysis. That is, a good indicator or an appropriate model is where the parameter estimates – derived with respect to particular theory – are statistically significant and in the direction predicted. It is suggested that a good R^2 is something of a bonus in a regression analysis rather than a key determinant of the model's worth (Gujarati 1995). The results that are presented in chapter six follow the recommendation of Cameron (1993) by reporting simply the unadjusted R^2 as well as the degrees of freedom and the F-statistic for the regression. Interested readers are then free to calculate adjusted R^2 at their leisure[36].

[36] Adjusted $R^2 = 1 - (((N - 1)/(N - K))*(1 - R^2))$, where N = sample size and K = number of regressors.

With this preliminary issue discussed it is now possible to turn to the actual presentation of hypotheses concerning the performance of the accounting-based valuation models – the comparable firm multiples approach and the EBO model. It was discussed in section 2.3.1 that the comparable firm multiples approach hinges on the selection of a sufficiently appropriate comparable firm. To the extent that there exists a firm that does not materially differ from the target firm in particular characteristics, then this approach would be expected to work very well, notwithstanding the permanent assumptions of the model e.g. the PE multiple, as discussed in section 2.1.1, effectively assumes a full and constant dividend payout ratio. However as indicated in section 2.3.1 there is good reason to suppose that this is not the case. Thus there is an impetus to investigate other methods that might perform better. A model that is proposed in this thesis that might perform better is the EBO model. Whilst subject to restrictive assumptions of its own, the EBO model does have the advantage of a more sophisticated modelling of valuation than the comparable firm approach. Furthermore, for implementation in an IPO environment, the assumptions about the qualities of the comparable firm do not seem as onerous as the comparable firm approach.

As well as the core models, a number of additional conditioning factors will be included in the regression equations. These factors will be elaborated on in the subsequent chapter and will include additional factors for growth and risk as well as factors such as audit and underwriter quality, tying into the discussion in section 2.2 and 2.3 about various signalling effects that are known to be present in the market.

The first hypothesis concerns the comparable multiples approach. Five value drivers that were chosen to test the comparable multiples approach – book value of equity, earnings, sales, and forecasted amounts of both earnings and sales. In formulating the hypothesis presented below it was expected that positive and significant parameter estimates would be found on the value driver variables. The formal hypothesis, in alternate form[37], is presented below:

> **H1:** *Selected value drivers are positively and significantly related to IPO offer and end of first day trading prices*

Tests required to assess the EBO model are less straight forward. It is not enough that the parameter estimates on the variables supported by the underlying model are significantly different from zero as for the test of H1. Recall the discussion in section 2.1.2.2 where the value relation for the basic EBO model was stated (model 2.3). In that model ω and γ, the persistence terms on abnormal earnings and 'other information', as well as the firm-specific discount rate were required to calculate the parameter estimates on current abnormal earnings and 'other information', with the implied parameter estimate on book value of equity of one. Thus it is expected that, in an empirical representation of the EBO model, the parameter estimates will be different from zero whether or not the underlying theoretical model has empirical validity or not. A priori it is possible to set limits for the implied persistence terms for abnormal earnings and 'other information',

[37] The remaining hypotheses stated in this chapter are also expressed in alternate form.

namely that they should be between zero and one exclusive. Two iterations of the EBO model were tested; a model that included the 'other information' component and one that did not. The formal hypothesis is stated below:

> **H2:** *Parameter estimates on abnormal earnings and 'other information' imply persistence factors for abnormal earnings and 'other information' that fall between zero and one exclusive.*

Should both hypotheses be supported by empirical models then there still remains the problem of determining which model is ultimately the better and more 'true' model. It was already discussed above that comparing R^2s or AICs are not satisfactory. A potential candidate is the J-test. This approach essentially involves inserting the predicted dependent variable from one of the specifications into the regression equation of the other specification. The null hypothesis is that this variable will return a non-significant estimator. The intuition behind this approach is that the prediction of the specification against which the modified regression is to be compared should not add new information to the later regression model. However, if the null hypothesis is rejected, this indicates that the model is miss-specified[38]. It is important to note that this approach is not a substitute for the aforementioned model selection criterions. In the deployment of this test the researcher must be prepared for the possibility that the J-test will reject *all* of the models under analysis (MacKinnon 1983).

[38] For a more detailed discussion of the J-test and other specification tests for non-nested models, see MacKinnon (1983) or Doran (1989) . Also see Davidson and MacKinnon (1981) for a more complex analysis.

Another alternative would be to evaluate the two models in a real life setting – i.e. to calculate the various parameters and carry out the approaches on IPO companies to produce a valuation figure – and compare the relative precision of each method. In this way the marginal benefits of each model would be able to be compared to the marginal costs. Clearly an assessment would then be made about the whether the additional complexity of the EBO model results in significantly greater precision in valuation estimates.

3.2 The value relevance of management earnings forecasts

In chapter two a section was dedicated to exploring briefly the literature concerned with voluntary disclosure (section 2.2). This literature has explored the circumstances under which firms disclose information that they are not otherwise compelled by law to disclose. As discussed in section 2.3.2, management earnings forecasts are frequently disclosed in prospectuses, although there is a suggestion that this has decreased somewhat due to regulatory changes. As these disclosures are not strictly required by corporations law, this disclosure decision falls under the voluntary label.

In any case the voluntary disclosure literature profiled in section 2.2 provides formal support for the intuition that for a firm to disclose information that is not otherwise required there must be some incremental benefit. However it was discussed previously that the evidence on this, whilst generally strong internationally, in an Australian setting tends towards being more uncertain. How and Yeo (2001) found that management earnings forecasts were not value relevant in a surprising finding given that Australia's disclosure laws are often said to be less restrictive than, for instance the United States of America, where disclosure costs of such information would be prohibitive. Australia is often said to have environmental conditions closer to Canada in which a paper reported that management earnings forecasts were value relevant. The more recent study in Chapple, Clarkson, and Peters (2005), however, found significant results both sides of a legislative change that was suggested to change the environment significantly around management earnings forecasts. However it was also noted that support for the significance of the earnings forecasts before the legislative change were quite weak. These results nevertheless raise the issue of the value relevance of management earnings forecasts currently. The studies cited in this paragraph use data from 1991-1997 and 1998-2002 respectively. The formal hypothesis is stated formally below:

> **H3:** *Management earnings forecasts provided in prospectuses are value relevant for Australian IPOs*

The paper by Firth (1998) was also discussed in section 2.3.2. Firth investigated the value relevance of earnings management forecasts in a Singaporean setting. What is interesting about this particular study is Firth's argument concerning the retained ownership signal. It was argued that such a signal may not be relevant of and by itself as many IPO firms may already be beyond the threshold at which an incremental change in retained ownership may effect valuation decisions. Consequently Firth argued that the retained ownership signal would have a modifying effect on the management earnings forecast signal. Firth found evidence of this in resulting empirical tests. Interestingly both of the Australian studies mentioned in the previous paragraph find highly significant parameter estimate on the retained ownership signal. Notwithstanding these results it would still be interesting to investigate whether there is in fact a moderating impact present with respect to management earnings forecasts and retained ownership. The formal hypothesis that was tested is stated below:

> **H4:** *Retained ownership acts as a significant modifier to the management earnings forecast signal*

It is interesting to note that in the two of the three papers listed above – How and Yeo (2001) and Chapple, Clarkson, and Peters (2005) – introduced the management earnings signal as a zero-one variable (zero for absence and one for presence). By doing so, the change between the forecast and the current or previous forecasted earnings is omitted. It has been demonstrated within the literature that investors do appear to price varying levels of earnings differently (e.g. Hayn 1995; Burgstahler and Dichev 1997). It was therefore proposed that the value relevance of management earnings forecasts will differ depending on whether the changes between the relevant earnings numbers are positive or negative. This is stated formally in the following hypothesis:

H5: *The relevance of management earnings forecasts are modified by the change from the previous forecast or actual result*

The remainder of this study presents the methods used to test hypotheses stated above and the subsequent results and associated analysis.

4 Method

This chapter provides the method to be used to test hypotheses stated in the previous chapter. As much econometric detail will be entered into as possible when discussing the models, however there is one issue, scaling, that will be left until the end as it affects all of the models developed in this chapter.

Before defining the various models to test hypotheses stated in the previous chapter it is necessary to draw attention to an important caveat. Following Kaplan and Ruback's (1995) own cautionary note it is important to stress that the models specified in this chapter make a number of assumptions about key variables that are necessary in order to make the empirical analysis manageable. Clearly in a 'live' operationalisation of the various models such assumptions can be improved upon with the effect of making the models more precise than they can be in this thesis where a large number of firms are under analysis. Specification of the models in this chapter will follow the same pattern as the previous chapter; working through the various hypotheses stated in that chapter. Following that a discussion about scaling will be entered into.

4.1 The performance of accounting-based valuation models

The first set of hypotheses developed in the preceding chapter concerned testing various accounting-based valuation models – specifically the comparable firm multiples approach and the EBO model. There are two ways in which an evaluation of the two approaches may be undertaken – a direct and an indirect method. The direct method has already been alluded to in section 3.1.1. This approach involved the direct calculation of the EBO model – and for the purposes of comparing it with the comparable firm multiples approach – and a range of comparable multiples based on different value drivers. Such an approach would not be particularly difficult for the comparable multiples approach as there is certainly a well established method of calculating such multiples in an empirical setting (e.g. Alford 1992; Kim and Ritter 1999). However it was touched on in the previous chapter that, at least to begin with, the process for calculating the EBO model valuation for a firm is more onerous.

As can be observed from hypotheses developed in chapter three it has been decided to pursue the indirect option. Two reasons underpin this decision. The first and more obvious one was that the time necessary to collect the required data was simply not available at hand for the completion of this thesis in the time allotted. A second and ultimately more important reason was that the indirect method as it is labelled here was expected to be just as effective in terms of rejecting or not rejecting the viability of the EBO model – the fact that the comparable multiples approach is used in practice would seem to lend some empirical validity towards this model at least to begin with. This is an important first step that would have had to be undertaken in any event. As has been suggested towards the end of section 3.1.2, should the first two hypotheses be supported then additional tests may then be warranted. Such tests are therefore held over for future research.

4.1.1 Method to test the comparable firm multiples model – H1

As has been discussed previously the comparable firm multiples approach to valuation involves the selection of a suitable comparable firm or firms. A ratio is obtained from the comparable firm or firms, which is then applied to the target firm. The particular ratio applied depends on which value driver the analyst selects. This process may be represented in a statistical model as below:

$$V = \alpha_1 + \alpha_2 M + \varepsilon \qquad (4.1)$$[39]

Where: V = equity value of the firm, and
M = relevant value driver

In this representation α_2 – the coefficient on the value driver – effectively becomes the multiplier, which in practice would be derived as described above. Model 4.1 is not however sufficient for testing the comparable firm multiples approach to valuation. There are two reasons for this assessment. The first reason is that it is an implicit assumption of the comparable firm multiples approach that not all firms within the population are suitable for comparison and that there are various subgroups based on risk, growth, and cash flow behaviour that provide a more accurate base for calculating the multiplier than the group as a whole. In section 2.1.1 various studies that investigated the selection of suitable comparable firms were reviewed. Generally they pointed towards selecting comparable firms on industry groupings- although it is clear that such a technique would be able to be refined on a case by case basis. Thus it is apparent that α_2 must be allowed to

[39] Note that in this model as well as all remaining models the firm subscripts have been omitted.

vary with industry membership if it is capture this particular valuation process and so that results are useful for evaluating the statistical significance of the approach.

The obvious tool with which to achieve such distinction amongst industry groups is the Global Industry Classification Scheme (GICS) code assigned to the firm upon listing on the Australian Stock Exchange (ASX). Presently there are twenty-four GICS industry groups although the classifications have changed over time. It was assessed as unlikely that the sample collected over the time frame contemplated by this research (2002-2006) would cover these twenty-four groups sufficiently to use all those groups as dummy variables. Even the ten sector groups defined by GICS were thought unlikely to be useful for the purpose of constructing dummy variables for industry membership. Thus, using the GICS codes as a base, five broadly similar groups were established. These groups and their definition are displayed below in figure 4.1.1.

Secondly it has been noted previously that practitioners using the comparable firm approach take many other factors into account alongside the value driver. Various studies have suggested for instance that additional growth potential indicators and signalling factors play an important role in guiding the choice of a comparable firm (e.g. Cotter, Goyen, and Hegarty 2005). As such a range of conditioning variables were added to model 4.1 in order to accommodate these factors and ensure that the empirical model better reflected practice.

Figure 4.1.1 Assignment of GICS industry groupings to test industry groups[40]

Energy, Materials, Industries, and Utilities (E)
- Energy (1010)
- Materials (1510)
- Capital goods (2010)
- Commercial services and supplies (2020)
- Transportation (2030)
- Utilities (5510)

Health (H)
- Health care equipment and services (3510)
- Pharmaceuticals, biotechnology, and life sciences (3520)

Financials (F)
- Banks (4010)
- Diversified financials (4020)
- Insurance (4030)
- Real estate (4040)

Consumer (C)
- Automobiles and components (2510)
- Consumer durables and apparel (2520)
- Consumer services (2530)
- Media (2540)
- Retailing (2550)
- Food and staples retailing (3010)
- Food, beverages and tobacco (3020)
- Household and personal products (3030)

Technology (T)
- Software and services (4510)
- Technology, hardware and equipment (4520)
- Semiconductors and semiconductor equipment (4530)
- Telecommunications services (5010)

In section 2.1.1 it was discussed that the apparent success of the comparable firm multiples approach is heavily contingent on finding a suitable comparable firm. This comparable firm or group of comparable firms were required to have similar

[40] Numbers in parenthesises adjacent to the various categories indicate GICS four digit industry code.

levels of growth, risk and cash flow patterns. Despite studies showing that industry was sufficient for selecting comparable firms empirically (e.g. Alford 1992) in practice it appears to be the case that additional factors for growth potential are used to further refine comparable firm choice (Cotter, Goyen, and Hegarty 2005). Thus variables for short- and medium-term growth were included in the empirical model to accommodate this factor. Short-term growth is measured as the change between one year forward earnings forecasts and current earnings divided by current earnings. Whilst medium-term growth is measured in a similar fashion with two-year forward and one-year forward earnings respectively.

Section 2.2.3 was dedicated to discussing various signalling phenomena apparent in the IPO environment. One of the key signalling mechanisms identified was the quality of the IPO firm's auditor in the valuation process. In establishing a signal for audit quality, generally the larger auditors are regarded as such high quality firms i.e. the big four/five firms – Arthur Anderson[41], Deloitte Touché Tohmatsu, Ernst and Young, KPMG and PricewaterhouseCoopers. This is both due to the resources that they are able to command and also due to the greater perceived risk they face in undertaking larger audits. It was expected that investors place higher reliance on the accounts of IPO firms audited by high quality firms. Therefore a positive relationship was predicted between an audit dummy variable – one for high quality auditor and zero otherwise – and value.

[41] Arthur Anderson was still active for a small window during the sample period. The details of sample selection will be discussed in the subsequent chapter.

A similar case may be made for the underwriter of the issue, who by guaranteeing the issue, provides a level of assurance about the viability of the IPO firm (Hughes 1986). More prestigious underwriters are again preferred to less prestigious underwriters. A prestigious underwriter is one which has bank backing and/or is a national firm, with identical reasoning as to the big versus small-medium distinction between auditors. A positive relation was also expected between an underwriter quality dummy – one for a prestigious underwriter and zero otherwise – and value.

The level of retained ownership has also been suggested to influence investors' appraisal of value through a signalling mechanism (Leland and Pyle 1977). The intuition behind this statement is that investors will perceive a degree of retained ownership as a sign that the owners prior to the float believe the firm has yet more improvement in future periods. This is obviously tempered by the fact that one of the reasons for an IPO is for initial shareholders to realise their investment. The retained ownership signal as devised by Leland and Pyle was used in the model that is specified below. The expected sign of the coefficient on this variable was negative due to the design of the retained ownership signal.

Another factor identified by Cotter, Goyen, and Hegarty (2005) that practitioners take into account when choosing comparable firms is the leverage of the IPO firm, being an approximate alternative measure for risk. Firms with greater amounts of leverage are after all a more risky proposition to investors than firms with lower leverage. Therefore an inverse relationship was expected between leverage and value. Leverage was measured by dividing total liabilities by total shareholders' equity.

IPO markets have been observed to move in 'waves', with distinct periods of high and low IPO activity. These phases have been labelled 'hot' and 'cold' markets respectively, with the implication that the market behaves differently in the different phases of the market. This particular characteristic of IPOs was therefore identified as a potentially important factor in the valuation of IPOs. There does not appear to be any particular technique for identifying a 'hot' market from a 'cold' one. How and Yeo (2001) do not specify how they define the 'hot' market in their sample period. However they do provide a table with the distribution of IPOs over their sample period and the identification of 'hot' markets appears to be a visual fit, with the period identified corresponding with the largest peak of IPO activity within the sample. That approach was taken to identify the 'hot' market in the sample collected for this research. The details of which will be discussed in the subsequent chapter. A positive relation was expected on this variable also.

The operating history of a firm indicates that firm's ability to operate with a degree of success over a period of time and provides a potentially important signal to prospective investors. Importantly this signal is difficult to replicate fully, which is characteristic of a good signal. It is also important to point out that operating history includes the history of a firm before any consolidation into an ultimate holding company. This is quite common amongst IPOs in order to undertake certain capital arrangements in the vicinity of the IPO. The operating history variable was included as a dummy variable taking a value of one for operating history greater than five years and zero otherwise.

The final variables that were used measure the disclosures made by the IPO firm in its prospectus. The first measure is a variable that captures the extent of disclosure in the prospectus. This self-defined measure was defined to capture the extent of forecast disclosure in the prospectus. The measure comprised a score – one for presence and zero for absence – of eight indicators of forecast detail: detailed revenue, detailed expense, multi-year earnings, capital expenditure schedule, financing details, cash flow, dividend, and sensitivity analysis. This forecast detail metric was only intended to be superficially representative of earnings forecast detail and clearly does not account for the 'true' quality of the disclosure as such.

The second measure concerned the number of risk factors that the IPO firm had identified that it would face in the short-medium term. Almost all prospectus documents contained a section dedicated to these specific risks. The extent to which an IPO firm discloses the risks faced by the business may help in assuring investors about the viability of the firm i.e. it may give investors confidence that management is aware of risks and is capable of devising strategies to mitigate them. A simple count of risk factors identified could have been used, however it was felt that after a certain threshold identification of risk factors would have incrementally smaller impact on value. To allow for this the variable that was used to represent risk factors was the log of the number of risk factors identified in the prospectus plus one. As with the previous variable, the risk factor variable is only capable of superficially capturing the quality of risk. Some of these disclosures can be quite informative about the risks faced by the business whereas other disclosures are very restricted and legalistic and as a consequence are perhaps less useful to investors. In defining the risk factor variable as a quantity measure these characteristics are necessarily omitted from analysis.

A full empirical specification of the comparable firm multiples approach is given below:

$$V = \beta_1 + \beta_2 M_j + \gamma_E D_E M_j + \gamma_C D_C M_j + \gamma_H D_H M_j + \gamma_F D_F M_j + \beta_3 SEG + \beta_4 MEG + B_5 AUD + \beta_6 UND + \beta_7 RETAIN + \beta_8 LEV + \beta_9 HOT + \beta_{10} HIST + B_{11} FDETAIL + \beta_{12} RISKF + \varepsilon \qquad (4.2)$$

Where: V = equity value of the firm

M_j j = E, EF, S, SF, BV = relevant value driver where E = Earnings, EF = Earnings Forecast, S = Sales, SF = Sales Forecast, and BV = Book value. Forecasts are one year forward.

D_x, x = E, C, H, F = dummy variables for four industry groupings where E = Energy, Materials, Industrials, and Utilities C = Consumer, H = Health, and F = Financials. The Technologies category is implied as the 'base case' in β_2.

SEG = Short-term Earnings Growth, measured as one year forward earnings less current earnings divided by the absolute value of current earnings

MEG = Medium-term Earnings Growth, measured as two year forward earnings less one year forward earnings divided by the absolute value of one year forward earnings
AUD = one for quality auditor and zero otherwise
UND = one for quality underwriter and zero otherwise
RETAIN = (η + log(1 − η)) and η = proportion of entrepreneurs post issue ownership of shares
LEV = total liabilities divided by total residual equity
HOT = one for hot market and zero otherwise.
HIST = one for greater than 5 years and zero otherwise
FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items: detailed revenue, detailed expense, multi-year earnings, CAPEX, financing details, cash flow, dividends, and sensitivity analysis, and
RISKF = log(1+ count of risk factors identified in prospectus)

Given the steps involved in calculating the comparable firm multiple, industry was interacted with the multiplier itself. Industry was not interacted with the intercept, as this estimate was not expected to be economically significant. In practice an intercept is not used as this would appear to defy common sense – a firm's equity is not a constant plus a variable factor. However the intercept possesses valuable econometric properties and so it is retained, not only in the model specified above, but also in the remaining models that were used in this research.

4.1.2 Method to test the EBO model – H2

The EBO model was discussed in relatively extensive detail in chapter two of this thesis. The model introduced a more sophisticated dynamic than present in other accounting-based valuation models and it has had a profound impact on the literature. Despite this however there is only limited support for the model from empirical research. As explained in section 3.1.2, testing the EBO model requires a slightly different approach than the comparable firm multiples. It is not sufficient that the different test variables prove to be statistically significant. In section 3.1.2 it was discussed that it is possible to estimate a viable range prior to the execution of the regression equation with which to compare estimated coefficients. The actual calculation of the range will take place in the subsequent chapter. The estimated range is calculated with respect to the models presented in chapter 2, corresponding to the models specified below.

Two versions of the EBO model were selected as candidates for testing the second hypothesis: the EBO model without the 'other information' component and the EBO model with one-year forward earnings forecasts as proxy for the 'other information' component. The no 'other information' model was specified as, whilst disclosure of forecast information is relatively frequent in Australia according to previous research, it is not complete. In the initial planning stages of this thesis a third iteration of the EBO model was considered based on the Begley and Feltham (2002) model. However in collecting the data necessary for the empirical analysis it was felt that two year forward forecasts were too rare for such an analysis to be worthwhile at this stage[42].

[42] Data collection and input was undertaken throughout the writing of chapters two-four. It is important to stress that all empirical tests were run *after* those three chapters were virtually finalised.

The empirical specification of the EBO model used is fairly straight forward and represents the economic model plus an error term[43]. The model that does not include the 'other information' variable is model 4.3a. The second model (4.3b), which does include the 'other information' element is based on the definitions similar to those variable given by Lui and Ohlson (2000) and Ohlson (2001). The exact definition used by those authors is specified in section 2.1.2.3 (equations 2.4a and 2.4b). From those equations it should be noted that they require ω to be known in order to calculate 'other information'. Clearly ω is not known a priori in this instance[44]. However, it does not appear that ω is critical to an operationalisation of the 'other information' variable. For this research, equation 2.4a has been modified to define 'other information' as the difference between current abnormal earnings and forecasted abnormal earnings. This retains most of the of properties associated with the Lui and Ohlson (2000) and Ohlson (2001) specification[45].

$$V = \beta_1 + \beta_2 bv + \beta_3 x^a + B_4 AUD + \beta_5 UND + \beta_6 RETAIN$$

$$+ \beta_7 LEV + \beta_8 HOT + \beta_9 HIST + B_{10} FDETAIL$$

[43] It also includes an intercept term that was not included in the chapter two models. The EBO model in fact does accommodate an intercept although it is frequently omitted by researchers, presumably as an intercept does not appear to make much sense in the economic model. This is a similar point to the one made at the conclusion of section 4.1.1.
[44] Strictly ω is known by the 'market' in order to calculate the value of the entity. However for research purposes ω is unobservable a priori.
[45] In some instances one might expect a positive coefficient with this adjusted measure of 'other information' (opposed to the equation specified in equation 2.4a where if ω and γ were positive then the coefficient on current abnormal earnings would be negative in all instances). This would occur where both omega and gamma are relatively high. Ohlson (2001) suggested that the summation of ω and γ would be expected to be close to one and so it was still expected that the coefficient on abnormal earnings would be negative.

$$+ \beta_{11}RISKF + \varepsilon \tag{4.3a}$$

$$V = \beta_1 + \beta_2 bv_t + \beta_3 x^a_t + \beta_4 \Delta x^a_{t+1} + B_5 AUD + \beta_6 UND +$$

$$B_7 RETAIN + \beta_8 LEV + \beta_9 HOT + \beta_{10} HIST +$$

$$B_{11} FDETAIL + \beta_{12} RISKF + \varepsilon \tag{4.3b}$$

Where: bv = book value

x^a = abnormal earnings

Δx^a_{t+1} = change between current abnormal earnings and forecasted abnormal earnings

AUD = one for quality auditor and zero otherwise

UND = one for quality underwriter and zero otherwise

RETAIN = $(\eta + \log(1 - \eta))$ and η = proportion of entrepreneurs post issue ownership of shares

LEV = total liabilities divided by total residual equity

HOT = one for hot market and zero otherwise.

HIST = one for greater than 5 years and zero otherwise

FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items: detailed revenue, detailed expense, multi-year earnings, CAPEX, financing details, cash flow, dividends, and sensitivity analysis, and

RISKF = log(1+ count of risk factors identified in prospectus)

It is important to distinguish the theoretical model from the empirical model with respect to model 4.3b. In the theoretical model a negative coefficient would be expected on abnormal earnings. However in the empirical model a positive coefficient would be expected to the specification of the empirical model. It is not feasible to operationalise the theoretical model of 4.3b as it would be expected that there would be a large collinearity problem as current earnings and forecasted earnings would overlap considerably in explaining the dependent variable. As a result of regressing the difference between forecasted abnormal and current earnings, the coefficient β_3 was expected to be positive. The empirical model may be reconciled with the theoretical model by subtracting the coefficient β_4 from β_3 and inserting the abnormal forecasted earnings for the difference as it appears in model 4.3b. By doing so it was expected that a negative figure would result in front of current abnormal earnings. This would be consistent with Begley and Feltham's (2002) argument about the persistence and growth of abnormal earnings.

Conditioning variables were once again introduced into the regression models (variables on the coefficients 4(5) to 11(13) in models 4.3a and 4.3b respectively). These variables were explained in section 4.1.1. It is also worthwhile to note that there was no need to assign dummy variables for industry firm risk and persistence profiles are incorporated into the estimates of the coefficient parameters.

4.1.3 Cost of capital

The models presented in section 4.1.2 required abnormal earnings to be calculated. Abnormal earnings are calculated by subtracting the product of the firm's discount rate and the beginning book value of equity from the firm's earnings. This is less of a concern on a case by case basis. However on a large scale such as this research it becomes a greater issue. This situation is accentuated in the case of IPOs, as much of the data required to estimate traditional estimates of cost of capital are absent, resulting in the need for surrogates. The following paragraphs review this problem in greater detail.

The most popular method of calculating the firm cost of capital in the accounting literature appears to be the Capital Asset Pricing Model (CAPM)[46]. Notwithstanding the popularity of the model there appears to be considerable empirical evidence against the model[47]. Various modifications have been suggested over time including Fama and French's (1993; 1995) three factor model and the arbitrage pricing model – another multifactor model. In any case these models rely on some measure of the target firm's return variation with the market portfolio. In CAPM this takes a central role whereas in multifactor models other variables take on importance also. This highlights the first issue when assessing the cost of capital for an IPO. IPOs are where the firm initially raises public funds and thus these firms simply do not have the history necessary to calculate the cost of capital as it is traditionally calculated. This necessitates the use of either estimates or surrogates.

It is common in the accounting literature, and especially in the EBO literature, to use a blanket cost of capital across the entire sample. For example Dechow, Hutton, and Sloan (1999) and Begley and Feltham (2002) both use a discount rate

[46] There are of course other capital asset pricing models. However the model developed by Sharpe (1964) and Lintner (1965) is the most widely known and is a cornerstone of modern finance.
[47] See for example Fama and French (2004)

of twelve percent. Several authors have pointed out that such an approach is inappropriate as clearly firms do vary in risk profiles cross-sectionally (Beaver 2002). Furthermore it has been pointed out that the absence of variation in the discount rate is not a correct empirical interpretation of the theoretical EBO model (Lo and Lys 2000). That risk varies between firms is implicitly recognised within the EBO framework. Whilst the studies do typically perform a sensitivity analysis to determine whether different levels of discount rate effect inferences – with such analysis answering in the negative – it does seem an important oversight not to allow for at least some variation.

Despite the research by Fama and French (2004) it was decided to use the CAPM in order to calculate the cost of capital for the sample IPO firms. As an indicative measure of risk that varies with firm and time is required, this approach is appropriate. Another consideration in this decision was data availability. The underlying cash rate set by the Reserve Bank of Australia was used to proxy the risk-free rate. The market premium adopted was six percent. Kothari (2001) noted that the historical premium is around eight percent although some studies have indicated that the premium is in fact far lower (e.g. Claus and Thomas 1999)[48]. A six percent equity premium was used in a fairly recent Australian study – Cotter, Goyen, and Hegarty (2005). Industry level historical betas were used to proxy for the beta of each of the sample IPO firms. This is not inappropriate as it has been suggested that industry betas contain less noise than individual betas (Brealey, Myers, and Allen 2006).

[48] See Kothari (2001) for a more detailed discussion of this issue – in particular section 4.3.3.4 of that paper.

4.2 The value relevance of management earnings forecasts

This section will present the models required to test the remaining hypotheses established in the previous chapter. These models are distinct from the models that have been presented so far in this chapter in that they are designed to test a specific test variable – in this case management earnings forecasts – and are less concerned with the performance of other variables.

The third hypothesis essentially sought to clarify the value relevance of IPO management earnings forecasts in Australia after potentially conflicting results in past research. In order to assess the value relevance of the forecasts a similar approach to the two previous Australian models was used[49]:

$$V = \beta_1 + \beta_2 bv_t + \beta_3 x^a_t + \beta_4 EF1 + \beta_5 EF2 + \beta_7 AUD + \beta_9 UND + \beta_6 RETAIN$$
$$+ \beta_{11} LEV + \beta_8 HOT + \beta_8 HIST + \beta_{10} FDETAIL$$
$$+ \beta_{10} RISKF + \varepsilon \qquad (4.4)$$

Where: bv = book value

x^a = abnormal earnings

EF1 and EF2 = presence (1) or absence (0) of management earnings forecasts for one and two year forward periods respectively

AUD = one for quality auditor and zero otherwise

[49] The two Australian studies referred to here are How and Yeo (2001) and Chapple, Clarkson, and Peters (2005).

UND = one for quality underwriter and zero otherwise
RETAIN = (η + log(1 − η)) and η = proportion of entrepreneurs post issue ownership of shares
LEV = total liabilities divided by total residual equity
HOT = one for hot market and zero otherwise.
HIST = one for greater than 5 years and zero otherwise
FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items: detailed revenue, detailed expense, multi-year earnings, CAPEX, financing details, cash flow, dividends, and sensitivity analysis, and
RISKF = log(1+ count of risk factors identified in prospectus)

The expectation was that the coefficient on EF1 would return a positive and significant result. It was also expected that EF2 should be positive and significant. However given earlier comments about the apparent rarity of such forecasts that was sensed in the data collection stages of the research, it was not clear whether enough observations would be found for a statistically significant result to be found on this variable.

The fourth hypothesis concerned the argument by Firth (1998). Firth argued that the retained ownership signal has a moderating effect on earnings. Testing this model involved establishing an interaction term between the retained ownership variable and the management earnings forecast variable. For this model, two years forward earnings forecasts were omitted.

$$V = \beta_1 + \beta_2 bv_t + \beta_3 x^a_t + \beta_4 EF1 + \delta_1 EF1.RETAIN + \beta_5 AUD + \beta_6 UND + B_7 RETAIN + \beta_8 LEV + \beta_9 HOT + \beta_{10} HIST + \beta_{11} FDETAIL + \beta_{12} RISKF + \varepsilon \quad (4.5)$$

Please refer to the definitions of variables accompanying model 4.4 for an explanation of the variables specified above.

The fifth and final hypothesis developed in the preceding chapter drew attention to the fact that many previous studies that have sought to investigate the value relevance of management earnings forecasts have not tested for the presence or absence of those forecasts whilst ignoring changes. Dummy variables were inserted in the 'base' model (4.4) which attracted a value of one where the change between two adjacent periods of earnings were greater than or equal to one and zero otherwise. The model is presented below:

$$V = \beta_1 + \beta_2 bv_t + \beta_3 x^a_t + \beta_4 EF1 + \delta_1 EF1.EF1\Delta + \beta_5 EF2 + \delta_2 EF2.EF2\Delta + B_7 AUD + \beta_8 UND + B_9 RETAIN + \beta_{10} LEV + \beta_{11} HOT + \beta_{12} HIST + \beta_{13} FDETAIL + \beta_{14} RISKF + \varepsilon \quad (4.6)$$

Where:

$EF1\Delta$ = one if one year forward forecasted earnings over the absolute value of current earnings is greater than or equal to one and zero otherwise

EF2Δ = one if two year forward forecasted earnings over the absolute value of one year forward earnings is greater than or equal to one and zero otherwise.

For all other variables please refer to the definitions of variables accompanying model 4.4

4.3 Scaling and related issues

Scale is an econometric issue that concerns all of the models that have been presented in this chapter, and it is a key issue throughout the capital markets literature. As researchers attempt to isolate effects using large data sets it becomes apparent that size appears to be a driver in a large amount of events. Therefore the presence of scale effects can result in incorrect inferences. The following paragraphs will expand upon the issue of scale before concluding that dividing the relevant regressors and dependent variable by the number of post-listing shares should mitigate the scaling issues sufficiently. However it appears that this solution introduces a new problem that will be discussed subsequent to the discussion on scale issues.

There are five scaling factors that have received recognition in the literature; multiplicative and additive scale factors, scale-varying coefficients, survivorship and heteroscedasticity (Barth and Clinch 2007). Barth and Clinch found that none of the commonly cited metrics for detecting scale issues are particularly effective in doing so. In a different approach they find that scaling by shares performs relatively well in mitigating the scale effects listed above, although this method did not dominate other variations tested. Importantly for this study, the per-share specification performed well in mitigating additive scale issues, which would appear to be the primary concern in studying IPOs. Additive scale issues arise where differences between firms' market value and book value of equity are due partially to an issue of new equity. In this circumstance it is no surprise that book value would be strongly associated with equity value.

Barth and Clinch (2007) explain that whilst, prima facie, the use of scaling by the number of shares (post-listing shares in this case) might seem odd in that issued shares are not immediately recognisable economic phenomena in and of itself, there are valid reasons for doing so. Generally the number of shares on issue seems to be highly correlated with the market value of equity and there is also a trend towards larger firms splitting shares and smaller firms reverse splitting shares resulting in shares being correlated with scale. Additionally, the per-share specification appears to be less noisy compared with other specifications tested by Barth and Clinch. For example they note that deflating by book value of equity for instance introduces an element of noise as book value changes with respect to factors that are not reflective of scale differences.

However there is a potential problem in using a deflator to mitigate a scaling effect in a regression equation. The problem is that due to the dependent and at least one of the independent variables being divided by a common factor it is to be expected that there might be some correlation between the two variables, leading to spurious inferences[50]. Kim (1999) refined the work of Pearson (1897) by providing an exact formula for the point of no connection in terms of correlation. Barraclough, Foster, Smith, and Whaley (2007) extended this idea to where common divisors are used in multivariate OLS regression analysis, which is the approach taken for the models presented above. The common divisors issue is also recognised by authors in accounting research (e.g. Brown, Lo, and Lys 1999; Gu 2005; Barth and Clinch 2007)[51].

Despite this problem the analysis performed by Barth and Clinch (2007) provides more comforting results. Their analysis indicates that whilst for some specifications of the EBO model – which they specifically test with respect to scale issues – the coefficients on the regression model are significantly different from where no divisor is used, it does not appear to be the case for the per-share specification elaborated on above. Therefore it was decided to select the per-share specification as the measure by which to deflate the models presented above. A secondary analysis was also performed that used unscaled data, which is presented in the appendices.

With the method established the next chapter discusses the data to be used to implement this method.

[50] That is if we define three independent variables X, Y, and Z and scale the first two variables by the third than we would expect a higher correlation between X/Z and Y/Z than without the common divisor. This higher correlation is driven by the common divisor.

[51] However both the Brown, Lo and Lys (1999) and Gu (2005) papers discuss the effects of common divisors on R^2, which was discussed in section 3.1.2 as not being particularly useful for present purposes.

5 Data

This chapter concerns the details of the sample data necessary to test hypotheses and corresponding models from previous chapters. The source of the various categories of data, the method of collection, as well as summary information about such data will be presented in the following paragraphs.

5.1 Sample selection

The initial criterion for selection into the sample group was IPO firms that became active in the four years from July 2002 till June 2006. Such firms were obtained from the ASX new listings announcement published in an investment journal[52]. Mining firms were removed from the sample as such firms have different characteristics due to their speculative nature. Specifically such firms do not typically disclose management forecasts for earnings, which is a key focus of this research. Furthermore, trusts, pooled development funds, and debt securities were excluded from the sample set. Again this was due to different distinct characteristics from remainder of sample set. The definition of IPOs that was used to screen firms defined IPOs as firms that had raised capital publicly for the first time and had as a result listed on the Australian Stock Exchange. This excluded firms that used the prospectus to purely offer existing shares on the behalf of those existing shareholders. The initial sample selection procedure is displayed below in table 5.1.1.

[52] AFR Smart Investor, formally known as SHARES

Table 5.1.1 Sample selection

Selection of sample IPO firms from July 2002 to June 2006. The entire sample of 227 firms is rarely used and so various breakdowns that are used for different specifications are also displayed.

IPOs - Financial years 2003-2006		
Criteria	**Number**	**Percentage of IPOs**
New listings excluding rights and withdrawals	631	
Mining or extractive companies	227	
Trusts	89	
Other exclusions including debt securities, pooled development funds, funds, compliance listings, issue not corresponding to set definition of an IPO, and missing prospectuses.	88	
IPOs	227	100%
IPOs that disclosed current earnings	176	77.5%
IPOs that reported positive revenue	165	72.7%
IPOs that reported positive current earnings	115	50.7%
IPOs that reported positive one year forward earnings	93	41.0%
IPOs that reported positive one year forward sales	100	44.1%
IPOs that reported current earnings and one year forward earnings	97	42.7%

Most information unique to individual IPOs was hand collected from the prospectuses lodged with the ASX[53]. Items that were collected from the prospectus included numbers from the statements of financial performance and position, risk factors, forecast detail, number of shares offered and the offer price, and operating history. Post-listing shares and GICS codes were obtained from SHARES, or its newer incarnation, AFR Smart Investor magazine. Other sources of information are discussed below.

Data from the prospectuses were recorded by hand onto data sheets. The data from these data sheets were then entered twice – by the author and an assistant –

[53] Prospectuses were sourced alternatively from the Connect4 database or the ASX website itself.

to reduce the risk of entry error. Subsequent to the data entry a number of computerised logic checks were employed to identify potential errors, which were then double checked to mitigate errors in the collection of the data e.g. a logic check was set up to ensure that book value of equity equalled net assets.

Cost of capital

In section 4.1.3 it was concluded that the CAPM, despite its apparent drawbacks, would be used as an indicator of the firm's cost of equity capital. This approach was said to be superior to assuming a flat discount rate. To calculate the cost of capital under CAPM three items are necessary: the risk-free rate, the market premium, and beta. The cash rate serves as a proxy for the risk-free rate in this instance. The historical cash rates were collected from the Reserve Bank of Australia's website[54]. The market premium, as indicated in section 4.1.3 was assumed at a rate of six percent. The final item, beta, was obtained from the Thomson One Banker database. The betas obtained were industry average betas, corresponding to the groups defined in section 4.1.1 in the ASX All Ordinaries index[55].

The calculation of the capital charge was undertaken by finding the product of the discount rate corresponding to the industry of which the target firm was a member and the current book value of equity. This charge is then subtracted from earnings in order to obtain abnormal earnings. The same capital charge is used for one-

[54] The RBA website: <http://www.rba.gov.au/>

[55] Some adjustments were made to the list extracted from Thomson's One banker. For the first industry group – Energy, Materials, Industries, and Utilities – mining firms were excluded from the calculation of the group's beta. Also for the Financials group, Real Estate Investment Trusts were excluded. This was done so that betas would be more relevant to the sample group, which excluded both mining/extractive firms as well as all trusts.

and two-year forward abnormal earnings also as it was assessed that the change in capital charge would not be significant.

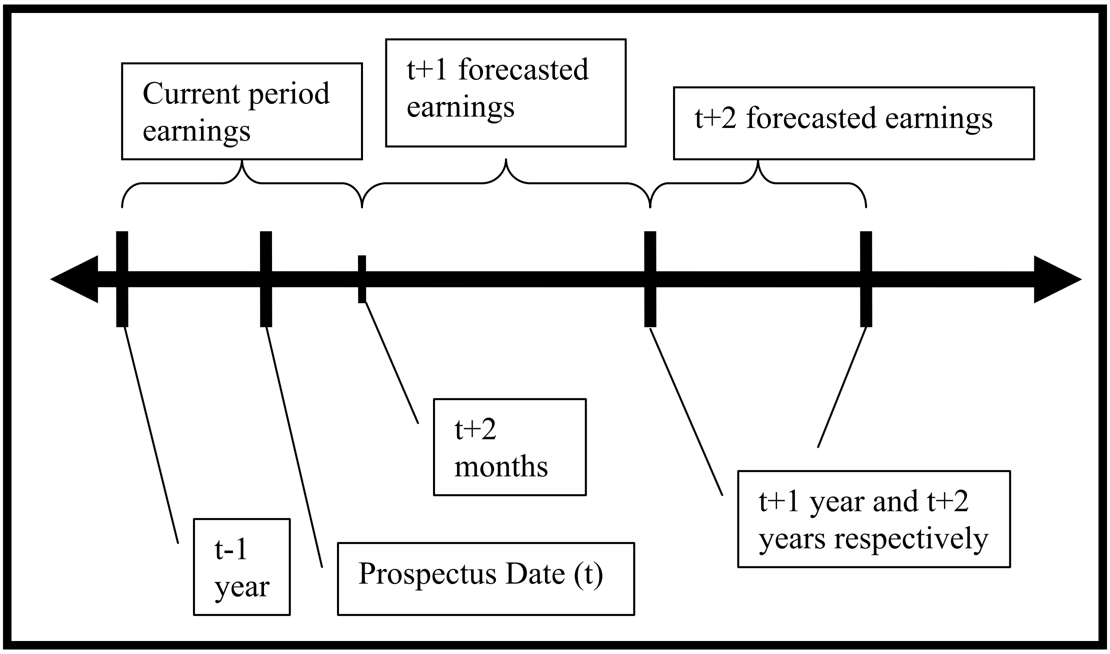
Earnings and earnings forecasts

A standard definition for what constituted a forecast was adopted as there is some inconsistency over this between prospectuses. Figure 5.1.1 illustrates the rules adopted for identifying which period earnings numbers belonged to. The same schema applied to identifying period membership for sales figures.

As other researchers have observed (e.g. Hartnett 2006), obtaining the earnings forecast number for an IPO firm is perhaps less straight forward than might be anticipated. IPO firms typically do not report a ‘bottom line’ number such as Net Profit After Taxation (NPAT). This is due to the fact that IPO firms operate under a different capital structure subsequent to the issue and thus it is difficult to assess how the new structure will effect taxation and interest payments. Instead Earnings Before Interest and Taxation (EBIT) or Earnings Before Interest, Taxation, Depreciation and Amortisation (EBITDA) are usually reported. It was decided to collect EBIT information across the sample. Consequently EBIT numbers were also collected for the current period.

It is important to note that EBIT did not only encompass instances where an earnings number was labelled as EBIT. In some instances it was possible to obtain the EBIT figure by careful examination of the financial information e.g. where net profit before tax and an itemised expense list was given it was possible to obtain EBIT by subtracting net borrowing costs from the net profit before tax figure. Table 5.1.1 indicates where such adjustments were not able to be made.

Figure 5.1.1 Classification of current and forecasted earnings



'Hot' market

In section 4.1.1 the cyclical nature of IPO markets was discussed. Two distinct phases in the market were labelled hot and cold. Where hot markets are a time of high IPO activity, cold markets are conversely periods of low IPO activity. In order to establish how the sample should be split according to this dichotomy, a distribution of IPOs was drawn – the graph is replicated below in figure 5.1.2. The graph illustrates a marked increase in IPO activity in the second half of 2003. Whilst there is a distinct drop in IPO activity in the first half of 2006. Based on this the hot market was said to be present from the 1st of July 2003 until the 31st of December 2005.

Table 5.1.2 shows the industry and industry-year distribution of IPOs over the sample period. The bottom row of that table provides the data that is illustrated in Figure 5.1.2. It can be seen that the first group – Energy, Materials, Industries and Utilities – was the largest group during the sample period, which is perhaps unsurprising given the number of individual GICS industry groups under that classification.

Figure 5.1.2 Six-Monthly distribution of IPOs – active date

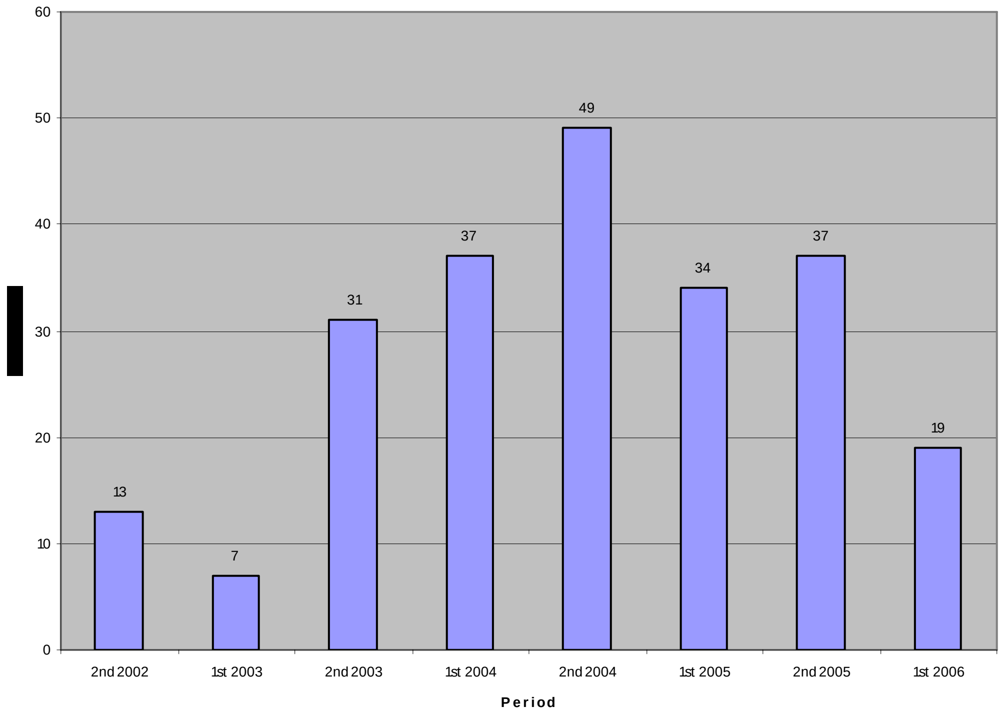


Table 5.1.2 Industry and industry-time distribution of IPOs – active date

The numbers in parenthesis are the proportion of total sample. Numbers in brackets are the proportion of the corresponding time period. Numbers outside of parenthesis and brackets are the count of firms corresponding to a particular time period and industry.

	2nd 2002	1st 2003	2nd 2003	1st 2004	2nd 2004	1st 2005	2nd 2005	1st 2006	Total
Energy, Materials, Industries and Utilities	9 (4%) [69%]	3 (1%) [42%]	5 (2%) [16%]	9 (4%) [24%]	12 (5%) [24%]	12 (5%) [35%]	12 (5%) [32%]	8 (4%) [42%]	70 (31%)
Consumer	4 (2%) [30%]	1 (0%) [14%]	4 (2%) [12%]	8 (4%) [21%]	7 (3%) [14%]	6 (3%) [17%]	8 (4%) [21%]	3 (1%) [15%]	41 (18%)
Health	0 (0%) [0%]	0 (0%) [0%]	9 (4%) [29%]	10 (4%) [27%]	10 (4%) [20%]	6 (3%) [17%]	9 (4%) [24%]	2 (1%) [10%]	46 (20%)
Financials	0 (0%) [0%]	3 (1%) [42%]	10 (4%) [32%]	9 (4%) [24%]	9 (4%) [18%]	7 (3%) [20%]	6 (3%) [16%]	2 (1%) [10%]	46 (20%)
Technology	0 (0%) [0%]	0 (0%) [0%]	3 (1%) [9%]	1 (0%) [2%]	11 (5%) [22%]	3 (1%) [8%]	2 (1%) [5%]	4 (2%) [21%]	24 (11%)
Total	13 (6%)	7 (3%)	31 (14%)	37 (16%)	49 (22%)	34 (15%)	37 (16%)	19 (8%)	227

Price data

End of first day trading price data was obtained largely from Securities Institute Research Centre Asia-Pacific's (SIRCA) Core Research Data (CRD) database. For some companies, the required data was not available from SIRCA and Yahoo Finance[60] or Thomson's One Banker was used to obtain prices. All pricing data was adjusted for splits and other dilutions.

Determination of high quality auditors and underwriters

In section 4.1.1 it was explained that firms in the 'big four/five' were deemed to high quality auditors. Those firms were Arthur Anderson[61], Deloitte Touché Tohmatsu, Ernst and Young, KPMG and PricewaterhouseCoopers. For the underwriters it was discussed that high quality underwriters were deemed to be those firms that had a national presence and/or were bank-backed. This was ascertained by visiting the websites of each of the underwriters involved with the sample IPOs. A national presence was assessed as being present in at least three state capital cities of Australia, or being active in both Sydney and Melbourne – being the two largest financial centres in Australia.

5.2 Summary Statistics

The following tables present the summary statistics of the sample group discussed above. Table 5.2.1 presents the descriptive statistics for the sample. Management earnings forecasts are presented according to industry grouping and

[60] Yahoo Finance website: <http://au.yahoo.com/finance>
[61] Arthur Anderson was still active for a small window during the sample period.

time-industry groupings in table 5.2.2. A short discussion of the data follows each table.

A feature of Table 5.2.1, and indeed Table 5.1.1, which makes an immediate impression is the low level of earnings forecasts disclosed in prospectuses in the sample period (forty-four percent). As noted in section 2.3.2, past research on Australian IPOs have recorded earnings forecast frequencies above seventy percent. However the most recent study found a significant drop subsequent to the introduction of the CLERP 2 legislation (Chapple, Clarkson, and Peters 2005 found the proportion of forecasters at sixty percent post CLERP2). A χ^2 test and subsequent Marascuilo procedure (to determine pair-wise significance) was performed, comparing the portions found by How and Yeo (2001) and Chapple et al against the proportion of forecasters reported in this thesis. With the results from Chapple et al pooled, the difference between the two published studies findings and the current numbers were found to be significant. With the results reported by Chapple et al separated into pre and post CLERP 2 forecasters and non-forecasters a clear trend of decreasing forecast proportions can be detected over the periods covered by the two published studies and the present one at the five and one percent significance levels. The results of this analysis are presented in Table 5.2.2, which follows Table 5.2.1.

Table 5.2.1 Descriptive statistics

The following table presents selected descriptive statistics of the sample. Descriptions of the variables follow.

	N	Mean	Std.Dev.	Min.	25th %	Median	75th %	Max.
Offer price	227	0.88	0.85	0.20	0.25	0.50	1.00	6.00
Implied MVE, pre (IMP_MVE)	227	130,413,504	351,220,698	2,900,000	16,323,835	39,052,001	100,000,001	2,650,000,000
End of first day listing price	227	0.95	0.88	0.09	0.28	0.80	1.21	7.98
Implied MVE, post (IMP_MVEP)	227	129,709,728	378,366,618	254,575	12,708,759	31,531,043	95,230,000	2,703,000,000
Current Revenue (CUR_REV)	180	111,567,190	334,665,404	-	1,111,000	12,356,400	59,514,000	2,411,400,000
Total book value of equity (EQ_TOTAL)	227	65,581,308	212,495,677	- 11,255,000	6,299,500	16,914,000	39,934,000	2,027,000,000
Current Earnings (CUR_EBIT)	176	10,084,697	34,656,085	- 20,033,000	- 472,300	1,785,000	8,351,000	322,200,000
Retained ownership (RET_OWNE) (%)	227	50.4	28	0	31	56	74	95
History (HIST)	227	14	21	0	2	5	17	147
Risk factors (RISK_FAC)	227	16	6	0	12	16	19	34
Leverage	227	0.66	1.43	-1.84	0.02	0.18	0.79	11.13
Forecast detail (FOR_DET)	227	1.22	1.59	0.00	0.00	0.00	2.00	6.00
Value of issued shares (ISS_VAL)	227	72,524,979	223,471,182	1,000,000	5,000,000	13,200,000	40,500,000	2,120,000,000
One year forward earnings forecast (F1_EBIT)	101	22,698,064	51,690,262	- 5,431,000	3,363,000	8,291,000	17,820,000	355,600,000
Two year forward earnings forecast (F2_EBIT)	23	32,512,348	82,621,425	- 1,006,000	7,171,000	10,100,000	25,800,000	405,600,000
One year forward sales forecast (F1_SALES)	103	216,888,020	445,171,350	1,068,000	20,801,000	54,199,000	146,200,000	2,524,500,000
Two year forward sales forecast (F2_SALES)	25	238,510,680	508,260,537	2,222,000	47,970,000	71,116,000	169,800,000	2,538,600,000
Total Assets (ASS_TOTA)	224	129,985,711	619,364,212	2,026,253	8,264,800	24,306,000	72,562,000	8,342,000,000
Short-term Earnings Growth (SEG) (%)	97	4.27	32.35	-1.71	0.15	0.34	0.88	319
Medium-term Earnings growth (MEG) (%)	23	1.54	3.25	0	0.13	0.28	0.58	12.5

Offer price = the offer price listed in the prospectus. Where a range of offer prices were given, the price was taken to be the highest of the indicative range

Implied MVE, pre = Number of shares expected to be issued multiplied by the offer price. Where a share issue range was given the maximum figure was used
Leverage was defined as total liabilities over total residual equity
History = identified operating history of the firm
Risk factors = count of risk factors identified in prospectus
Forecast detail = one/zero values for presence/absence of the following items: earnings, detailed revenue, detailed expense, multi-year earnings, capital expenditure schedule, financing details, cash flow, dividend, segment data, expert attestation, listed forecast assumptions, sensitivity analysis, and other attestation
Number of shares issued: the number of shares expected to be issued at the time of the prospectus. Where there was a range the number of shares issued the maximum figure was taken in lieu.
Value of issued shares was defined as the multiplication of the number of shares issued and the offer price.
The temporal location of forecast information was discussed above in section 5.1 along with the accompanying figure 5.1.1.
Short-term earning growth was defined as the difference between one year forward earnings forecast and current earnings divided by the absolute value of current earnings.
Medium-term earnings growth was defined as the difference two year forward earnings forecast and one year forward earnings forecast divided by the absolute value of one year forward earnings forecast.
Note that in Table 5.2.1 above the number of observations recorded for SEG and MEG are less than the full sample of 227. For the descriptive statistics table above and again for the correlations table presented in Table 5.3.1, only those values for which the denominator was found are reported. Otherwise it was felt that particularly for the descriptive statistics table; there would be too many zeroes for SEG and MEG.

Table 5.2.2 χ^2 test for proportion of forecasters in present sample compared with past Australian studies

Panel A presents the χ^2 test for differences in proportions. Panel B presents the Marascuilo procedure for comparing between particular pairings.

Panel A: χ^2 test for proportion

Study	How and Yeo (2001)	Chapple et al (2005)		Current Study
Abbreviation	H	C1	C2	S
Forecasters as proportion of sample (N)	0.7532	0.7895	0.5949	0.4449
N	158	152	158	227
χ^2 test statistic	**(60.5944)*** **	Proportions are significantly different		

Panel B: Marascuilo procedure for pair-wise significance

Absolute difference in proportions of forecasters		Critical range at 5% level of significance	Critical range at 1% level of significance
|H - C1|	0.036309	0.1332	0.1605
|H - C2|	0.158228	**0.1453****	0.1751
|H - S|	0.308231	**0.133****	**0.1603*****
|C1 - C2|	0.194537	**0.1431****	**0.1724*****
|C1 - S|	0.34454	**0.1306****	**0.1573*****
|C2 -S|	0.150003	**0.1429****	0.1722

** and *** denotes significance at the 0.05 and 0.01 levels of significance (one-tailed).

Significance with respect to the Marascuilo procedure is assessed as when the absolute difference between proportions is greater than the critical range. Significant differences between proportions have been marked by asterisks against the critical range.

C1 and C2 refer to pre -and post-CLERP 2 forecaster proportion in the Chapple et al (2005) study. 'Current study' refers to the results of this thesis.

The variables listed in Table 5.2.1 generally have the same distributional properties as has been found in past Australian research on IPOs. Although what is clear from reviewing those past studies is that the present sample is generally more skewed due to several very large offers within the sample time-frame.

Table 5.2.3 reveals that the first industry grouping – Energy, Materials, Industries, and Utilities – are the most frequent disclosers of management earnings forecasts. Given that firms in these industries tend to have more readably predictable earnings this is again not surprising. Nor is it surprising that the Health industry group were not frequent disclosers of management earnings forecasts. Many of the firms within this category have expended a large sum of money on researching a particular idea and use an IPO in order to capitalise on that idea. The product is usually quite uncertain, and the extent of capitalisation very much depends on the outcome of the offer amongst many other factors.

Table 5.2.3 Management earnings forecasts – industry and industry-time distribution

The numbers in the parenthesis are the forecast count as a proportion of the forecasting group. The numbers in the brackets are the forecast count as a proportion of that time periods total forecasts. The numbers in the stylised brackets report the proportion of the total sample.

	2nd 2002	1st 2003	2nd 2003	1st 2004	2nd 2004	1st 2005	2nd 2005	1st 2006	Total
Energy, Materials, Industries and Utilities	7 (7%) [64%]	2 (2%) [50%]	4 (4%) [29%]	4 (4%) [33%]	5 (5%) [23%]	6 (6%) [55%]	7 (7%) [41%]	6 (6%) [60%]	41 (41%) {18%}
Consumer	4 (4%) [36%]	1 (1%) [25%]	3 (3%) [21%]	7 (7%) [58%]	5 (5%) [23%]	3 (3%) [27%]	6 (6%) [35%]	1 (1%) [10%]	30 (30%) {13%}
Health	0 (0%) [0%]	0 (0%) [0%]	1 (1%) [7%]	0 (0%) [0%]	3 (3%) [14%]	0 (0%) [0%]	0 (0%) [0%]	0 (0%) [0%]	4 (4%) {2%}
Financials	0 (0%) [0%]	1 (1%) [25%]	5 (5%) [36%]	0 (0%) [0%]	2 (2%) [9%]	2 (2%) [18%]	3 (3%) [18%]	1 (1%) [10%]	14 (14%) {6%}
Technology	0 (0%) [0%]	0 (0%) [0%]	1 (1%) [7%]	1 (1%) [8%]	7 (7%) [32%]	0 (0%) [0%]	1 (1%) [6%]	2 (2%) [20%]	12 (12%) {5%}
Total	11 (11%) {5%}	4 (4%) {2%}	14 (14%) {6%}	12 (12%) {5%}	22 (22%) {10%}	11 (11%) {5%}	17 (17%) {7%}	10 (10%) {4%}	101

5.3 Correlations

Pearson's correlations were performed on selected variables collected for the sample group of IPOs. These are presented in Table 5.3.1 below. Several particular correlations are noticeable at first glance. For instance, current earnings are highly correlated with forecasted earnings amounts. As discussed in section 4.1.2 this observation highlights a useful property of specifying 'other information' as the changes the difference between abnormal earnings of two adjacent periods rather than their absolute amount. Such a design avoids a multicollinearity problem with the EBO models. There is also a high correlation between sales of different periods and contemporaneous earnings and sales.

Other noticeable correlates are that current earnings, book value of equity as well as forecasted earnings are highly correlated with both pre and post listing implied market value of equity. This is unsurprising.

The table that follows (5.3.1) concludes the discussion on data collection and summary statistics. The next chapter will present the results of the empirical analysis.

Table 5.3.1 Correlations

Pearson correlations for selected variables in data set

	S_ISSUE2	IMP_MVE	FIRSTPRI	IMP_MVEP	CUR_REV	EQ_TOTAL	CUR_EBIT	RET_OWNE	YEARS_OP	RISK_FAC
S_ISSUE2	1 227									
IMP_MVE	0.54115 <.0001 227	1 227								
FIRSTPRI	0.84018 <.0001 227	0.54547 <.0001 227	1 227							
IMP_MVEP	0.48385 <.0001 227	0.98088 <.0001 227	0.55634 <.0001 227	1 227						
CUR_REV	0.49222 <.0001 180	0.80393 <.0001 180	0.43265 <.0001 180	0.79645 <.0001 180	1 180					
EQ_TOTAL	0.41914 <.0001 227	0.80333 <.0001 227	0.3153 <.0001 227	0.74185 <.0001 227	0.85043 <.0001 180	1 227				
CUR_EBIT	0.52412 <.0001 176	0.9415 <.0001 176	0.54744 <.0001 176	0.93198 <.0001 176	0.80751 <.0001 174	0.77053 <.0001 176	1 176			
RET_OWNE	-0.25306 0.0001 227	-0.08508 0.2016 227	-0.15613 0.0186 227	-0.04907 0.4619 227	-0.23399 0.0016 180	-0.17931 0.0068 227	-0.19091 0.0111 176	1 227		
YEARS_OP	0.28983 <.0001 227	0.1271 0.0559 227	0.32238 <.0001 227	0.14552 0.0284 227	0.31318 <.0001 180	0.18283 0.0057 227	0.05149 0.4973 176	-0.03799 0.569 227	1 227	
RISK_FAC	0.22697 0.0006 227	0.24498 0.0002 227	0.24228 0.0002 227	0.24233 0.0002 227	0.15322 0.04 180	0.20561 0.0018 227	0.24515 0.001 176	-0.01283 0.8475 227	0.11663 0.0795 227	1 227

Table 5.3.1 Cont…

	S_ISSUE2	IMP_MVE	FIRSTPRI	IMP_MVEP	CUR_REV	EQ_TOTAL	CUR_EBIT	RET_OWNE	YEARS_OP	RISK_FAC
LEVERAGE	0.24107	0.20093	0.24066	0.21953	0.3336	0.06522	0.23215	-0.11531	0.3743	0.07656
	0.0002	0.0024	0.0003	0.0009	<.0001	0.3279	0.0019	0.083	<.0001	0.2506
	227	227	22	227	180	227	176	227	227	227
FOR_DET	0.34726	0.24574	0.43216	0.28119	0.29571	0.14497	0.25266	-0.06761	0.49997	0.20252
	<.0001	0.0002	<.0001	<.0001	<.0001	0.029	0.0007	0.3105	<.0001	0.0022
	227	227	227	227	180	227	176	227	227	227
ISS_VAL	0.50995	0.87838	0.42211	0.81872	0.80682	0.8476	0.91896	-0.24614	0.07025	0.20431
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.0002	0.292	0.002
	227	227	227	227	180	227	176	227	227	227
F1_EBIT	0.53185	0.96504	0.5384	0.95364	0.75583	0.76994	0.98423	-0.06657	0.00904	0.22182
	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.5083	0.9285	0.0258
	101	101	101	101	100	101	97	101	101	101
F2_EBIT	0.26032	0.98634	0.23819	0.9766	0.97246	0.98119	0.99595	-0.18915	-0.21072	0.01868
	0.2303	<.0001	0.2738	<.0001	<.0001	<.0001	<.0001	0.3874	0.3345	0.9326
	23	23	23	23	22	23	21	23	23	23
F1_SALES	0.45066	0.82097	0.36638	0.8141	0.91606	0.82049	0.77056	-0.12305	0.23297	0.18145
	<.0001	<.0001	0.0001	<.0001	<.0001	<.0001	<.0001	0.2156	0.0179	0.0666
	103	103	103	103	103	103	99	103	103	103
F2_SALES	0.27552	0.89641	0.19804	0.86493	0.99707	0.94465	0.9035	-0.26443	-0.17394	-0.06489
	0.1825	<.0001	0.3426	<.0001	<.0001	<.0001	<.0001	0.2015	0.4057	0.758
	25	25	25	25	24	25	23	25	25	25
ASS_TOTA	0.26885	0.68548	0.2341	0.64402	0.73047	0.87763	0.63358	-0.14217	0.15201	0.22675
	<.0001	<.0001	0.0004	<.0001	<.0001	<.0001	<.0001	0.0323	0.022	0.0006
	227	227	227	227	180	227	176	227	227	227
SEG	-0.03479	-0.03994	-0.04929	-0.04518	-0.05614	-0.03163	-0.04768	0.06209	-0.10176	-0.06122
	0.7351	0.6977	0.6316	0.6604	0.5849	0.7584	0.6428	0.5457	0.3213	0.5514
	97	97	97	97	97	97	97	97	97	97
MEG	-0.28583	-0.13718	-0.24939	-0.1568	-0.15616	-0.09673	-0.13195	-0.01574	-0.39644	0.42363
	0.1861	0.5325	0.2512	0.4749	0.4877	0.6606	0.5686	0.9432	0.0611	0.044
	23	23	23	23	22	23	21	23	23	23

Table 5.3.1 cont…

	LEVERAGE	FOR_DET	ISS_VAL	F1_EBIT	F2_EBIT	F1_SALES	F2_SALES	ASS_TOTA	SEG	MEG
LEVERAGE	1									
	227									
FOR_DET	0.03731	1								
	0.7042									
	106	227								
ISS_VAL	0.22066	0.17501	1							
	0.0008	0.0082								
	227	227	227							
F1_EBIT	0.1485	0.1512	0.91355	1						
	0.1383	0.1312	<.0001							
	101	101	101	101						
F2_EBIT	0.07084	0.13216	0.99179	0.99633	1					
	0.7481	0.5478	<.0001	<.0001						
	23	23	23	23	23					
F1_SALES	0.26847	0.14496	0.74005	0.80451	0.98068	1				
	0.0061	0.144	<.0001	<.0001	<.0001					
	103	103	103	99	21	103				
F2_SALES	0.16282	0.16238	0.97765	0.901	0.97698	0.9993	1			
	0.4368	0.438	<.0001	<.0001	<.0001	<.0001				
	25	25	25	24	23	23	25			
ASS_TOTA	0.18771	0.09763	0.78255	0.8554	0.98865	0.87769	0.95527	1		
	0.0045	0.1426	<.0001	<.0001	<.0001	<.0001	<.0001			
	227	227	227	101	23	103	25	227		
SEG	-0.07121	-0.05797	-0.03934	-0.03491	-0.06231	-0.05454	-0.08588	-0.04232	1	
	0.4883	0.5727	0.702	0.7343	0.7884	0.5977	0.7039	0.6807		
	97	97	97	97	21	96	22	97	97	
MEG	-0.27172	-0.5281	-0.14656	-0.16385	-0.09715	-0.141	-0.15466	-0.11264	-0.18202	1
	0.2098	0.0096	0.5046	0.455	0.6592	0.5421	0.4811	0.6089	0.4297	
	23	23	23	23	23	21	23	23	21	23

Offer price = the offer price listed in the prospectus. Where a range of offer prices were given, the price was taken to be the highest of the indicative range
Implied MVE, pre = Number of shares expected to be issued multiplied by the offer price. Where a share issue range was given the maximum figure was used

Leverage was defined as total liabilities over total residual equity
History = identified operating history of the firm
Risk factors = count of risk factors identified in prospectus
Forecast detail = one/zero values for presence/absence of the following items: earnings, detailed revenue, detailed expense, multi-year earnings, capital expenditure schedule, financing details, cash flow, dividend, segment data, expert attestation, listed forecast assumptions, sensitivity analysis, and other attestation
Number of shares issued: the number of shares expected to be issued at the time of the prospectus. Where there was a range the number of shares issued the maximum figure was taken in lieu.
Value of issued shares was defined as the multiplication of the number of shares issued and the offer price.
The temporal location of forecast information was discussed above in section 5.1 along with the accompanying figure 5.1.1.
Short-term earning growth was defined as the difference between one year forward earnings forecast and current earnings divided by the absolute value of current earnings.
Medium-term earnings growth was defined as the difference two year forward earnings forecast and one year forward earnings forecast divided by the absolute value of one year forward earnings forecast.
Note that in table presented above, the number of observations recorded for SEG and MEG are less than the full sample of 227. For this table only those values for which the denominator was found are reported. Otherwise it was felt that such a presentation would not adequately record the correlations between items. In the empirical tests that follow it is assumed where one year forward earnings are not reported that this number is identical to current earnings. This allows SEG and MEG to comprise a larger part of the sample.

6 Results and Analysis

This chapter presents the results of the tests undertaken with respect to hypotheses formed in chapter three. T-statistics reported in this chapter are White (1980) adjusted to mitigate heteroscedasticity concerns. Section 6.1 discusses the tests of various accounting-based valuation models. This is followed by the presentation and discussion of the value relevance tests. Validity threats are reviewed in section 6.3 before the results of this chapter are summarised in section 6.4.

6.1 The performance of the accounting-based valuation models

The following sub-sections will present and discuss the results concerned with the first two hypotheses of this thesis. These two hypotheses tested the comparable firm multiples and the EBO model respectively.

6.1.1 Comparable firm multiples approach – tests of H1

The first hypothesis was concerned with the significance of the comparable firm multiples approach. Regression results with the full specifications given in section 4.1.1 are tabulated in Table 6.1.1.1. The statistics of interest are the t-statistics on the various value drivers. Generally the results support the use of comparable firm multiples as a method to determine the value of IPOs both with respect to the offer price and the market price. Results are stronger for the earnings and forecast earnings than revenues, forecasted revenues and book value of equity multiples.

Prima facie the breakdown of the value driver according to industry grouping does not appear to be particularly successful. A "u-test" was conducted (the results of which are presented in Table 6.1.1.2), comparing the unrestricted model (with the industry breakdown) with a restricted model, which only included a single value driver metric. In the majority of instances the null hypothesis of gammas one to four equal to zero was rejected at a 0.01 level of significance. Thus industry effects are observable and this would seem to vindicate specification of the multiplier-industry interaction term.

The lack of statistical significance on some of the industry-multiplier interaction variables is perhaps more reflective of the industry dummy rather than the multiplier itself. A restricted model was also run, which did not include the industry interaction. In this model (presented in Appendix A) the various multipliers were all significantly related to value. This of itself would lend support to the partitioning of the sample into various industry groupings, as the significance of the various drivers is apparently different across the industry.

Table 6.1.1.1 Regression analysis of comparable firm multiples

The following table presents the OLS regressions for comparable firm multiples

Multiplier	Earnings		Revenue		Book value of equity	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price	Offer price	End of first day listing price
N	115	115	165	165	174	174
Intercept (β1)	-0.48883	-0.6744	0.2003	0.17159	-0.6026	-0.4563
	(-1.1664)	(-1.344)*	(0.574)	(0.4126)	(-2.719)***	(-1.396)*
Multiplier (β2)	**5.94502**	**4.011**	0.1058	0.02814	**0.5766**	0.0331
	(6.3181)* **	**(3.215)*** **	(0.659)	(0.1749)	**(1.303)***	(0.068)
Energy, Materials, Industrials, and Utilities (γE)	-1.0597	**-1.7879**	0.1158	0.10681	0.1134	0.2715
	(-1.2342)	**(-1.617)***	(0.752)	(0.6859)	(0.309)	(0.67)
Consumer (γC)	-0.13913	1.0377	-0.0335	0.03775	0.4407	0.6332
	(-0.1382)	(0.776)	(-0.212)	(0.2364)	(1.043)	(1.335)*
Health (γC)	1.14704	**3.8374**	**1.1227**	**1.709**	0.4429	0.4598
	(1.2223)	**(2.608)*** **	**(3.477)*** **	**(3.9702)*** **	(1.033)	(1.109)
Financials (γC)	0.81448	1.8691	**1.1185**	**1.29412**	0.1842	0.4721
	(0.7305)	(1.111)	**(2.852)*** **	**(2.247)** **	(0.427)	(1.004)
SEG (β3)	0.06554	0.0678	0.0011	0.00073244	0.0005	0.0001
	(1.7993)*	(1.478)*	(3.002)***	(1.5173)*	(1.205)	(0.115)
MEG (β4)	0.0156	0.0025	0.009	-0.00217	0.0074	0.0177
	(0.5921)	(0.09)	(0.272)	(-0.0663)	(0.427)	(0.65)
AUD (β5)	0.25294	0.2864	0.2929	0.30023	0.2517	0.3633
	(2.6502)***	(2.189)**	(3.330)***	(2.7646)***	(2.428)***	(2.414)***
UND (β6)	0.00656	0.0355	0.0416	0.05841	-0.0227	0.0116
	(0.0605)	(0.253)	(0.381)	(0.4562)	(-0.200)	(0.069)
RETAIN (β7)	0.00292	0.0416	-0.0877	0.06586	-0.1889	-0.0274
	(0.0256)	(0.197)	(-0.676)	(0.4121)	(-1.606)*	(-0.210)
LEV (β8)	-0.02899	-0.0712	-0.0049	-0.04771	0.0978	0.066
	(-0.9851)	(-1.384)*	(-0.089)	(-0.7074)	(2.597)***	(1.465)*
HOT (β9)	0.03714	0.0933	-0.067	-0.00855	0.0551	0.1112
	(0.4643)	(0.67)	(-0.770)	(-0.0758)	(0.773)	(1.074)
HIST (β10)	0.0334	0.1305	-0.0508	0.03961	-0.0566	-0.0172
	(0.3008)	(0.821)	(-0.498)	(0.2897)	(-0.597)	(-0.114)
FDETAIL (β11)	0.06283	0.0874	0.1387	0.16688	0.1189	0.1568
	(2.2588)**	(2.093)**	(3.794)***	(3.3617)***	(3.375)***	(2.976)***
RISKF (β12)	0.22715	0.3494	0.054	0.08699	0.2526	0.2445
	(1.6659)**	(2.252)**	(0.475)	(0.6495)	(2.992)***	(1.901)**
F-Statistic	16.61	9.88	9.05	7.85	11.09	5.36
P-value for F statistic	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
SSE	22.68378	47.74095	52.74611	81.77235	50.20323	99.07508
R-Squared	0.7157	0.5995	0.4768	0.4415	0.5129	0.3373
K	16	16	16	16	16	16

Table 6.1.1.1 Cont…

Multiplier	Forecasted earnings		Forecasted sales	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price
N	93	93	100	100
Intercept (β1)	-0.4393	-0.3176	0.3433	0.2711
	(-1.639)*	(-0.829)	(-0.82)	(-0.494)
Multiplier (β2)	**6.7183**	**3.0835**	-0.0635	**-0.2551**
	(8.084)* **	**(2.120)** **	(-0.482)	**(-1.755)** **
Energy, Materials Industrials, and Utilities (γE)	-0.8034	-0.9363	**0.2703**	**0.3956**
	(-1.047)	(-0.757)	**(2.019)** **	**(2.691)*** **
Consumer (γC)	-0.2331	1.4893	0.1254	**0.3113**
	(-0.284)	(-1.116)	(-0.955)	**(2.128)** **
Health (γC)	1.2491	**5.2346**	**1.097**	**1.7009**
	(-1.142)	**(3.140)*** **	**(4.160)*** **	**(4.913)*** **
Financials (γC)	-0.0681	1.3894	**1.1131**	**1.1778**
	(-0.067)	(-0.754)	**(2.983)*** **	**(1.995)** **
SEG (β3)	-0.0017	-0.0065	0.0001	-0.0019
	(-3.617)***	(-6.431)***	(-0.24)	(-2.354)**
MEG (β4)	0.0558	0.0057	0.0215	0.0112
	(2.738)***	(-0.243)	(-1.017)	(-0.368)
AUD (β5)	0.3816	0.5388	0.4389	0.5017
	(4.050)***	(3.403)***	(3.237)***	(2.916)***
UND (β6)	-0.137	-0.2209	-0.1543	-0.2011
	(-1.315)*	(-1.439)*	(-1.044)	(-1.126)
RETAIN (β7)	-0.0219	0.2434	0.1081	0.1469
	(-0.171)	(-0.751)	(-0.544)	(-0.4)
LEV (β8)	-0.0543	-0.0771	0.0039	-0.0422
	(-1.936)**	(-1.561)*	(-0.07)	(-0.630)
HOT (β9)	0.1996	0.2227	0.0288	0.1541
	(2.690)***	(1.451)*	(-0.22)	(-0.805)
HIST (β10)	-0.0392	0.0535	-0.0397	-0.0013
	(-0.404)	(-0.332)	(-0.239)	(-0.005)
FDETAIL (β11)	0.0015	(-0.0338)	0.0667	0.0113
	(0.042)	(-0.601)	(1.450)*	(-0.175)
RISKF (β12)	0.1655	0.3482	0.078	0.2214
	(1.756)**	(2.713)***	(-0.536)	(-1.098)
F-Statistic	18.91	6.61	3.75	2.65
P-value for F statistic	<.0001	<.0001	<.0001	0.0025
SSE	14.76446	45.4876	42.96015	73.82913
R-Squared	0.7865	0.5628	0.4008	0.3215
k	16	16	16	16

*, **, and *** correspond to statistical significance at 0.10, 0.05 and 0.01 levels respectively (one-tailed).
Numbers without parenthesis are the coefficients, whilst numbers in the parenthesis are White (1980) adjusted t-statistics.
The term multiplier on the left-hand side refers to value driver listed above the regression results. Industry groups listed along the left-hand side indicate the interaction term of membership of that particular industry group with the particular value driver multiple.
SEG = Short-term Earnings Growth (difference between one year forward earnings forecasts and current earnings over the absolute value of current earnings) and MEG = Medium-term Earnings Growth (difference between two year forward earnings and one year forward earnings forecasts over the absolute value of one year forward earnings forecast). Note that where a value for one year forward earnings forecasts was not reported it was assumed that this figure was the same as current earnings. AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

Table 6.1.1.2 U-test for significance of categorical variables – industry group

Rejection of the null hypothesis indicates that categorical variables are significant in aggregate in explaining the dependent variable

Multiplier	Earnings		Sales		Book value of equity	
Unrestricted SSE	22.68378	47.74095	52.74611	81.77235	50.20323	99.07508
Restricted SSE	23.18795	58.36938	66.09586	107.45666	51.20349	100.95313
N	115	115	165	165	174	174
k	16	16	16	16	16	16
df1	4	4	4	4	4	4
df2	99	99	149	149	158	158
u	0.550093834	5.510021114	9.427769887	11.70004956	0.787006533	0.748755136
Null hypothesis	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero
Critical F	3.51	3.51	3.45	3.45	3.44	3.44
Statistical decision	DO NOT REJECT NULL	**REJECT NULL**	**REJECT NULL**	**REJECT NULL**	DO NOT REJECT NULL	DO NOT REJECT NULL

Multiplier	Forecasted earnings		Forecasted sales	
Unrestricted SSE	14.76446	45.4876	42.96015	73.82913
Restricted SSE	15.24025	54.25755	53.71439	92.03956
N	93	93	100	100
k	16	16	16	16
df1	4	4	4	4
df2	77	77	84	84
u	0.62033813	3.711374913	5.256942539	5.179785134
Null hypothesis	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero	Gamma's are equal to zero
Critical F	3.57	3.57	3.55	3.55
Statistical decision	DO NOT REJECT NULL	**REJECT NULL**	**REJECT NULL**	**REJECT NULL**

The u-test is calculated as: u = ((Restricted SSE – Unrestricted SSE)/df1)/(Unrestricted SSE/(N – K)). Where df1 = number of hypotheses being tested i.e. H_0: $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$ so df1 = 4. N = number of observations and K = number of regressors and the difference between these two items is df2. SSE = Sum of Squares of Error.

Generally the F-statistics of the models regressed on offer price are stronger than with the models regressed on end of first day market price. This may be indicative of two effects. Firstly it may point to the prominence of comparable multiples approaches in the evaluation of the firm by the promoters. If this particular method is the one favoured by analyst then it would be expected that such a method would be strongly supported empirically. The most recent evidence at hand certainly suggests that this is the case (Dukes, Peng, and English 2006). This in turn would suggest a great deal of institutional influence in establishing the offer market. Given the stake that various institutions have in the offers this is perhaps less surprising. Secondly it may indicate that the market, in aggregate uses an alternate method to arrive at firm value i.e. rational expectations cause price to become closer to some alternative valuation methodology, potentially not a method that has been profiled in this thesis e.g. an option style framework.

The results in Table 6.1.1.1 and 6.1.1.2 are results for scaled regressions. Similar regressions were run without scaling and are presented in Appendix B. However it is important to note that any inferences drawn from those regressions are mitigated by the scale issue. Such inferences may not therefore be particularly useful. Generally however it can be said that the first hypothesis is supported by the empirical results presented in this section.

6.1.2 EBO model – tests of H2

The object of the second hypothesis test was to explore the empirical validity of the EBO type models for valuing Australian IPOs. As indicated in chapters three and four, it is not sufficient to simply cite positive and significant parameter estimates on the relevant variables. The EBO model places a strict information dynamic on earnings and it is necessary to assess whether this process is present in practice. Table 6.1.2.1 presents the results of regressing models 4.3a and 4.3b from chapter four. The difference between these two models was that 4.3b included 'other information' whereas model 4.3a did not. Table 6.1.2.2 presents the implied values of persistence on abnormal earnings and 'other information.

Using the average cost of capital across the sample group it was possible to manipulate the regression parameter estimates on abnormal earnings and 'other information' component (the difference between current abnormal earnings and forecasted abnormal earnings was used to proxy 'other information') using the equations in section 2.1.2.2 – specifically model 2.3 of that section. Such an analysis indicates that the implied values of persistence on abnormal earnings and 'other information' are within expected limits ($0 < \omega < 1$ and $0 < \gamma < 1$)[58].

[58] Where ω represents the persistence factor for abnormal earnings and γ represents the persistence factor for 'other information'.

Table 6.1.2.1 EBO model with and without 'other information'
The following table presents the OLS regressions for the EBO models

Dependent Variable	Offer price		End of first day listing price	
Model	4.3a	4.3b	4.3a	4.3b
N	176	97	176	97
Intercept	-0.4748	-0.7482	-0.4428	-0.7198
	(-2.000)**	(-2.174)**	(-1.196)	(-1.369)*
Book value or equity	**2.5391**	**3.5306**	**2.6606**	**3.2824**
	(3.099)* **	**(3.496)*** **	**(2.788)*** **	**(2.462)*** **
Abnormal Earnings	**0.1787**	**0.279**	**0.2176**	**0.2746**
	(2.037) **	**(2.670)*** **	**(2.217)** **	**(2.030)** **
Forecasted abnormal earnings, one year forward		**3.6894**		1.5895
		(2.201) **		-0.94
AUD	0.2448	0.4267	0.3433	0.5864
	(2.499)***	(2.728)***	(2.427)***	(2.408)***
UND	-0.0236	-0.2456	0.0045	-0.2456
	(-0.211)	(-1.511)*	(0.027)	(-1.034)
RETAIN	-0.1463	0.1132	-0.0071	0.1456
	(-1.249)	(0.661)	(-0.055)	-0.528
LEV	0.0721	0.0607	0.0382	0.0234
	(1.874)**	(1.644)*	(0.881)	(0.498)
HOT	0.03	0.1465	0.0821	0.2091
	(0.411)	(1.121)	(0.819)	(1.045)
HIST	-0.0496	-0.0862	-0.0192	-0.1248
	(-0.542)	(-0.543)	(-0.135)	(-0.518)
FDETAIL	0.133	0.04	0.1717	0.0088
	(3.753)***	(0.963)	(3.228)***	(0.159)
RISKF	0.2373	0.4118	0.261	0.5277
	(2.664)***	(3.192)***	(1.918)**	(2.603)***
F-Statistic	16.76	6.65	8.87	3.04
P-value for F statistic	<.0001	<.0001	<.0001	0.0018
R-Squared	0.5039	0.4624	0.3496	0.2822
k	11	12	11	12

*, **, and *** denote significance at the 0.10, 0.05, and 0.01 level of significance respectively (one-tailed).
AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of

five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

Table 6.1.2.2 Implied values of persistence on abnormal earnings and 'other information'

This table manipulates the parameter estimates for abnormal earnings and 'other information' (in the above regression analysis the difference between forecasted earnings and current earnings was used to proxy this item) to establish the implied persistence factors for those two figures. The equations used to derive persistence values are the same as from section 2.1.2.2.

Dependent Variable	Offer		End of first day	
Model	4.3a	4.3b	4.3a	4.3b
Average cost of capital	1.104134	1.104134	1.104134	1.104134
Implied persistence of abnormal earnings	0.24024	0.427259	0.30708	0.41797
Implied persistence of 'other information		0.661997		0.091779

Average cost of capital was obtained by calculating the arithmetic mean of cost of capital for the sample.

With respect to the model that incorporates 'other information', it can readily be seen that subtracting the parameter estimate for abnormal earnings from the parameter estimate for 'other information' yields a negative figure, consistent with the theoretical model and Begley and Feltham's (2002) argument about the persistence and growth of abnormal earnings. This would then seem to indicate that the EBO model is a viable alternative to use in valuing IPOs, offering support for the second hypothesis.

However the analysis is not complete without some comment on the other variables that are within the EBO model's domain. In particular the book value of equity is well in excess of the predicted value of unity. There is no immediately obvious reason for this occurrence. An explanation may be possible through recourse to the Ohlson (2000) and Ohlson and Juenttner-Nauroth (2005) papers, which were profiled briefly in section 2.1.2.5. These two authors argued that book value of equity is not necessary for valuation. It may therefore be possible that book value of equity is absorbing some of the statistical significance of earnings at the expense of the other items i.e. there might be a collinearity problem in the model presented above with respect to book value of equity and abnormal earnings. It is unclear how this result affects the second hypothesis. However given that the persistence factors are within the tolerable range support would tend to remain behind the EBO model and hence in support of the second hypothesis.

Although it is important to note that this analysis does not specifically address the issue of finding the 'best' model, it can nevertheless be seen that F-statistics of the EBO model are somewhat weaker than the comparable multiples model. This would seem to indicate better performance of comparable multiples versus the EBO type models.

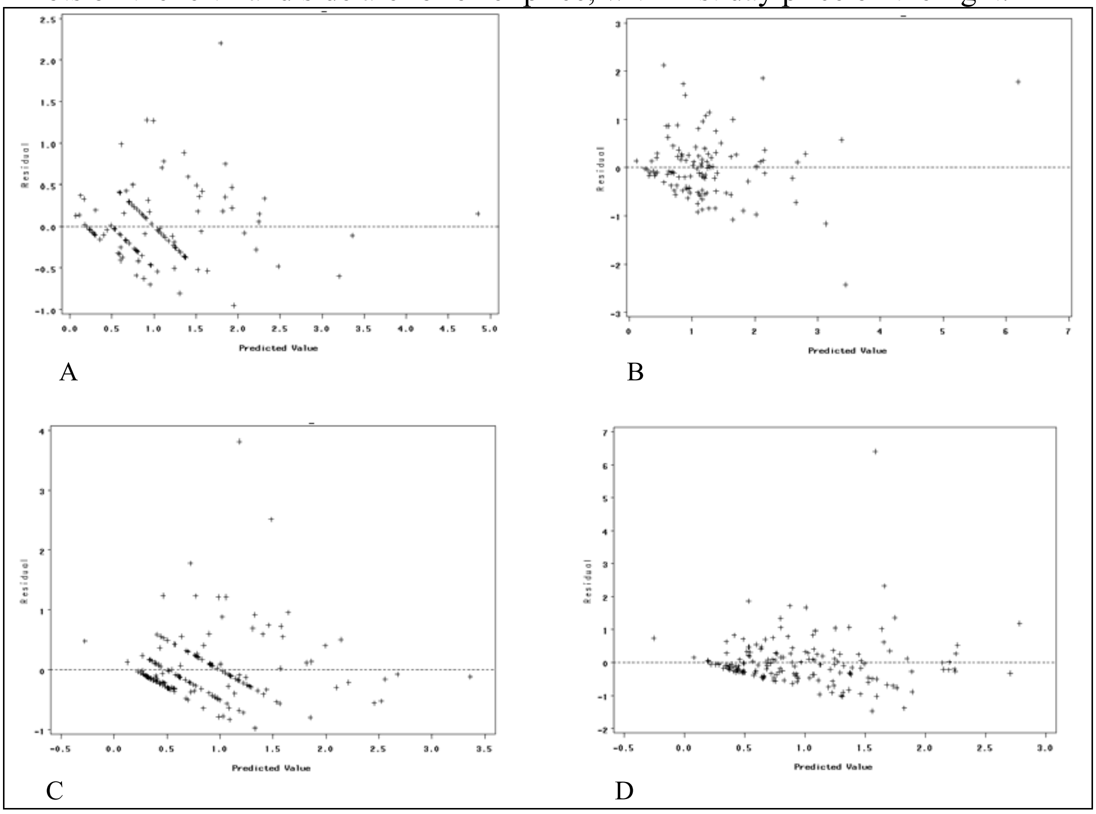
6.1.3 Residual analysis

In the course of analysing the models presented thus far residual plots were constructed. An interesting feature developed with respect to offer prices. In contrast to the residual plots (residual versus predicted) for first day price, similar plots with respect to offer prices showed a distinct relationship between the residual and the predicted value. An example of this is displayed below in Figure 6.1.3.1.

In particular the plots on the left-hand side show a curious pattern of quite distinct diagonal lines. This is in contrast to the right-hand side, which is modelled on first day price, and features a more random distribution of residuals. These are just two examples drawn from the set of fourteen that were run for hypotheses one and two. However a similar pattern is present for all of the remaining models also.

Figure 6.1.3.1 Residual plots on selected IPO valuation models

Plots on the left-hand side are for offer price, with first day price on the right.



A = Comparable multiple – Earnings – with respect to offer price, unrestricted and scaled
B = Comparable multiples – Earnings – with respect to first day price, unrestricted and scaled.
C = EBO model, no ‘other information’. Offer price, unrestricted and scaled
D = EBO model, no ‘other information’. First day price, unrestricted and scaled

Given that this particular phenomena occurs most prominently with offer prices this would seem to support the idea that the offer market is quite different from the ordinary secondary market. The distinct patterns apparent in the residuals would seem to indicate that the promoters of the issue have quite a lot of control and influence over the offer price. This is certainly consistent with previous research that have commented over the great degree of influence over the IPO process that various institutions seem to wield e.g. Kim and Ritter (1999) and How and Yeo (2001).

6.2 Value relevance of management earnings forecasts

The second group of hypotheses were concerned with the value relevance of management earnings forecasts. The first hypothesis was formed to address an apparent discrepancy within the literature and to update research in this area, whilst the subsequent hypotheses were concerned with various additions to the basic model.

6.2.1 Value relevance of management earnings forecasts – tests of H3

The results for the test of value relevance of management earnings forecasts are given in Table 6.2.1.1. As can be seen from the table, management earnings forecasts are value relevant for both the offer price and the first day price, indicated by significant t-statistics on the earnings forecast variables. The levels of statistical significance found recorded in Table 6.2.1.1 is consistent with the most recent study that has investigated the value relevance of management earnings forecasts – Chapple, Clarkson, and Peters (2005). There is hence support for the third hypothesis that management earnings forecasts are value relevant.

Table 6.2.1.1 Value relevance of management earnings forecasts

Dependent Variable	Offer price		End of first day listing price	
N	176	176	176	176
Intercept	-0.59796	-0.60259	-0.72117	-0.72166
	(-2.2423)**	(-2.254)**	(-1.7572)**	(-1.763)**
Book value	2.46117	2.50565	2.32664	2.31307
	(3.0242)***	(3.1655)***	(2.5914)***	(2.5615)***
Abnormal Earnings	0.17494	0.17814	0.18775	0.18575
	(1.9909)**	(2.0812)**	(2.0457)**	(2.0052)**
EF1	**0.26034**	**0.25245**	**0.59198**	**0.58993**
	(1.9402)**	**(1.8626)****	**(3.7104)*****	**(3.6844)*****
EF2	0.20212		0.07704	
	(1.1319)		(0.3959)	
AUD	0.26535	0.26139	0.37353	0.3715
	(2.624)***	(2.5863)***	(2.6466)***	(2.6214)***
UND	-0.03498	-0.03275	-0.01682	-0.01532
	(-0.3154)	(-0.2913)	(-0.1025)	(-0.0926)
RETAIN	-0.13034	-0.13856	0.00654	0.00473
	(-1.0937)	(-1.1472)	(0.0531)	(0.038)
LEV	0.07079	0.06794	0.03354	0.03288
	(1.8662)**	(1.7666)**	(0.8088)	(0.7914)
HOT	0.04463	0.05339	0.13507	0.13933
	(0.5972)	(0.7125)	(1.3246)*	(1.4008)**
HIST	-0.05038	-0.04982	-0.02397	-0.02412
	(-0.5561)	(-0.5517)	(-0.1709)	(-0.1722)
FDETAIL	0.05057	0.07115	0.01687	0.02418
	(1.1423)	(1.7406)**	(0.2802)	(0.4606)
RISKF	0.26721	0.26473	0.31604	0.31407
	(2.7548)***	(2.7419)***	(2.182)**	(2.157)**
F-Statistic	14.6	15.66	8.4	9.2
P-value for F statistic	<.0001	<.0001	<.0001	<.0001
R-Squared	0.5181	0.5124	0.3822	0.3817
k	13	12	13	12

*, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels respectively (one-tailed)
AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX,

financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

Interestingly two year forward earnings are not statistically significant with respect to either the offer price or first day listing price. Perhaps such forecasts are deemed too unreliable in valuation. Another alternative is that there may not have been enough two year forward earnings forecasts in order to generate a statistically significant parameter estimate for this variable.

6.2.2 Interaction between management earnings forecasts and the retained ownership signal – tests of H4

The next hypothesis stated in chapter three was concerned with a proposition by Firth (1998) that there was an interaction effect between the earnings forecast signal and the retained ownership signal. The central idea was that retained ownership is only significant beyond a certain threshold. The results of the test are presented below in Table 6.2.2.1.

In both instances it can be seen that interacting the retained ownership signal with the management earnings forecast signal results in a significantly lower level of statistical significance compared with the management earnings forecast alone. However in both instances the results do not meet expectations formed prior to the tests being performed. The expectation was that retained ownership would only be significant when interacted with the management earnings forecast signal, resulting in a moderating relationship between the two variables. A case may be made that that is the case for offer price, however it can clearly be seen that this is not the case for first day price.

Table 6.2.2.1 Value relevance and the interaction between the retained ownership signal and the management earnings forecast signal

Dependent variable	Offer price	End of first day listing price
N	176	176
Intercept	-0.70961	-0.73823
	(-2.358)***	(-1.6374)*
Book value	2.46141	2.30474
	(3.2125)***	(2.5921)***
Abnormal Earnings	0.1739	0.18494
	(2.0957)**	(2.0271)**
EF1	0.43793	0.61927
	(2.2364)**	(2.4732)***
EF1.RETAIN	**0.32606**	0.05114
	(1.4438)*	(0.181)
AUD	0.27	0.37277
	(2.6562)***	(2.5933)***
UND	-0.04616	-0.01739
	(-0.4024)	(-0.1025)
RETAIN	-0.26686	-0.01535
	(-1.7025)**	(-0.1069)
LEV	0.06831	0.03297
	(1.8347)***	(0.7981)
HOT	0.05944	0.14029
	(0.8041)	(1.3898)*
HIST	-0.05408	-0.02479
	(-0.5976)	(-0.1752)
FDETAIL	0.05414	0.02141
	(1.3226)*	(0.3967)
RISKF	0.27725	0.31595
	(2.7209)***	(2.0942)**
F-Statistic	14.62	8.39
P-value for F statistic	<.0001	<.0001
R-Squared	0.5183	0.3818
k	13	13

*, **, and *** denote significance at the 0.10, 0.05 and 0.01 levels respectively (one-tailed)
AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX,

financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

With these results, only very limited support may be attached to the fourth hypothesis. As has been seen in results already presented, the offer market does appear to be quite distinct and so it is not clear how much can be taken from Table 6.2.2.1 with respect to offer price.

6.2.3 Direction of management earnings forecasts – tests of H5

The fifth and final hypothesis was concerned with how the direction of the earnings forecast might affect the apparent value relevance of the forecast disclosure.

The results presented in Table 6.2.3.1 indicate that the directions of earnings changes are significant in the setting of the offer price of the IPOs, whilst this factor is less the case for first day price. The results for first day price do appear to show the Begley and Feltham (2002) type relationship. One year ahead forecasted earnings are very strongly significant but a positive change is not statistically significant – an indicator that the market does not consider this change particularly important in setting value. Conversely positive changes on two period ahead earnings are statistically significant. That this relationship does not seem to be the case for offer price again points to the different structural features of that market.

Table 6.2.3.1 Value relevance of direction of management earnings forecasts

Dependent variable	Offer price	End of first day listing price
N	176	176
Intercept	-0.60943	-0.73087
	(-2.2581)**	(-1.7617)**
Book value	2.57751	2.40599
	(3.0792)***	(2.5583)***
Abnormal Earnings	0.18357	0.19539
	(2.0575)**	(2.0425)**
EF1	0.06818	**0.54913**
	(0.5162)	**(2.6922)*** **
EF1.EF1Δ	**0.24501**	0.03664
	(1.6833) **	(0.1543)
EF2	0.1363	-0.40069
	(0.5367)	(-1.0568)
EF2.EF2Δ	0.10797	**0.50262**
	(0.4834)	**(1.6023)* **
AUD	0.2485	0.36471
	(2.5807)***	(2.6699)***
UND	-0.03991	-0.02603
	(-0.3586)	(-0.157)
RETAIN	-0.11537	0.00892
	(-0.9665)	(0.0711)
LEV	0.06963	0.03114
	(1.8347)**	(0.7381)
HOT	0.04672	0.1382
	(0.6231)	(1.3433)*
HIST	-0.07966	-0.02532
	(-0.8424)	(-0.1701)
FDETAIL	0.04179	0.02319
	(0.8904)	(0.365)
RISKF	0.27842	0.32151
	(2.7817)***	(2.1577)**
F-Statistic	12.68	7.17
P-value for F statistic	<.0001	<.0001
R-Squared	0.5244	0.384
k	15	15

*, **, and *** denote significance at the 0.10, 0.05, and 0.01 levels respectively (one-tailed)
AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for

absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). EF1Δ = one year forward earnings over the absolute value of current earnings. EF2Δ = two year forward earnings over the absolute value of one year forward earnings. Where firms did not report one year forward earnings it was assumed that this number was the same as current earnings, implying a change of zero. For full details of variable definitions see chapter four.

The results in Table 6.2.3.1 would seem to be sufficient to support the fifth hypothesis that the relevance of management earnings forecasts are modified by the change from the previous forecast or result. However this support is only apparent for the first day price.

6.3 Validity threats

As is the case with any empirical analysis there are a number of threats to the validity of the analysis. The degree to which certain variables and in particular FOR_DET and RISKF capture the desired construct may be questioned. Much of this discussion takes place in Chapter Four; however it is worth reflecting on this again now that the results of the empirical tests have been presented.

The FOR_DET metric was designed to capture the depth of disclosure about forecasted earnings. In establishing such a metric it is implicitly assumed that firms that disclose increasing amounts of the items comprising the metric are in fact disclosing higher quality information. As a broad device to gauge forecast quality the metric is probably adequate. However it should not be taken to be particularly precise and was not designed to be such.

A similar argument may be put forward for the second variable mentioned above – RISKF. As a measure of risk, the metric is again probably not particularly precise. However on aggregate the measure would be expected to broadly represent risk. Other definitions such as auditor and underwriter quality, and the retained ownership signal are fairly well accepted metrics within the accounting literature. As such, additional discussion to that presented in chapter four will not be entered into here with respect to those variables.

However these are not the only variables that may suffer construct validity issues. In most instances the results that are reported using current accounting standards do not measure those factors which they purport to[59]. This is so notwithstanding that most IPO firm's disclose pro forma statement's of financial performance and position that omit some elements of the formal framework. Many IPOs for instance are holding companies that were established to acquire the firm that actually trades. Subsequently goodwill represents a potentially large part of total assets, and hence the book value of equity. Consequently the book value of equity is likely overstated whilst the earnings are overstated.

Another issue with this particular analysis is an issue that is held in common with all econometric research. It is one of sample size. Whilst the total observations of 227 are theoretically enough for statistically significant inferences to be made, non-experimental data such as the data used for this analysis, is well known to possess certain peculiarities not present in experimental data. Specifically non-experimental data, as its label suggests is obtained not as a result of an experimental process – there is only one set of market data for any particular time frame. Consequently there is a potential for underlying factors to enter the

[59] See Edwards and Bell (1961) and/or Chambers (1966) for more detail on this proposition.

analysis undetected. This necessitates the use many years of data if looking at time-series data. As recorded in Chapter Five, the present sample was collected over a four year period from July 2002 to June 2006. It is not clear whether this window is sufficiently long enough to reveal any underlying factors within the market. Certainly under less restrictive time constraints it would be desirable to collect around ten years of data. This would ensure that a number of cycles could be assessed instead of the current analysis, in which a ‘hot’ market is present for much of the sample period (sixty-seven percent of the time).

However a larger sample may also suffer problems of a different kind. It has been demonstrated through the results presented by Chapple, Clarkson and Peters (2005) that market conditions can change quite rapidly around a legislative change for instance. Thus care would have to be taken to account for such factors over a longer time scale i.e. diligent use of dummy variables.

Another related issue is the power of the tests performed in this chapter. Whilst the overall sample numbers 227 observations, the sub-sets used to test various hypotheses are smaller (as low as 93). This becomes a concern when assessing the power of the regression results i.e. the ability to correctly reject the null hypothesis. In smaller samples, variances are larger, which diminishes the power of statistical tests. The data presented in Table 5.2.1 (Descriptive Statistics) indicates a high degree of variability in selected variables. It is not clear at this point how much of concern this is with respect to the results presented.

6.4 Summary of research results

This chapter has presented the results of analysis performed with respect to hypotheses stated in chapter three and elaborated on in chapter four. The first hypothesis concerned the comparable multiples model. Regression equations were established to test five iterations of the comparable multiples model; earnings, sales, book value of equity, forecasted earnings and sales. The results find support for the comparable multiples model, although comparable multiple models that used current or forecasted earnings as value drivers appeared to perform incrementally better than other iterations. The analysis indicated that comparable multiple models were more strongly significant in explaining offer price then they were explaining first day price. This is perhaps another indicator of the power and influence of various institutions in the IPO process.

The second hypothesis was concerned with the EBO models. The analysis revealed that parameter estimates were strongly significant in most instances and positive. Importantly, manipulations of the parameter estimates on abnormal earnings, and where appropriate, the 'other information' variable, indicated that implied persistence factors for abnormal earnings and 'other information' fell within the expected range. This would seem to suggest that the EBO model has some empirical validity in an Australian IPO context. However it was noted that the F-statistics for the EBO models were relatively low and that the parameter estimate for the book value of equity was well outside the expected value.

The next set of hypotheses was concerned with the value relevance of management earnings forecasts. Regressions performed were able to support the third hypothesis that management earnings forecasts were relevant in determining value. Additional analysis was unable to find strong support for the fourth hypothesis that there is a moderating relationship between retained ownership and management earnings forecasts. Furthermore it was found that the direction earnings change (between current and expected) was statistically significant in determining offer and first day prices.

These conclusions however are mitigated by a number of limitations. The key concern seems to be a potential lack of length of the data i.e. the sample time frame may not be enough for broad statistical inferences to be made. Furthermore questions about the power of the empirical tests were raised. Both of these issues ultimately hinge on the individual's judgement. Nevertheless it is worth expressing caution over making too broad inferences from the current data set.

7 Further Analysis

In performing the analysis in chapter six a number issues arose that were assessed as needing to be addressed immediately rather then leaving aside for future research. The first concerns conducting the EBO test with a more restricted sample. The second issue picks up from the discussion in chapter three concerning the J-test. Results of these tests are performed and the results are presented below.

7.1 EBO excluding firms with negative current earnings

In analysing the data collected from the sample group it was noted that a large portion of firm's report negative current earnings (in fact just over a third of firms that disclosed current earnings information reported negative earnings). It was felt that this might adversely affect the performance of the EBO model. That is, including the negative earnings results in compromised parameter estimates as the least squares rule attempts to find a linear fit over figures that have potentially different qualities. Table 7.1.1 presents the summarised results of an analysis that excludes firms from the test sample that recorded negative current earnings, whilst Table 7.1.2 shows the difference between Table 7.1.2 and Table 6.2.2.2 (the implied values of persistence terms on the unadjusted data set) as well as the difference in the F-statistics between the two models.

Table 7.1.1 Implied values of persistence on abnormal and 'other information' excluding firms that recorded negative current earnings

Dependent Variable	Offer		End of first day	
Model	4.3a	4.3b	4.3a	4.3b
Average R	1.1041	1.1041	1.1041	1.1041
Parameter estimate on abnormal earnings	0.2348	0.3156	0.2748	0.3214
Implied persistence of earnings	**0.3388**	**0.5091**	**0.4184**	**0.5229**
Parameter estimate on 'other information'		5.0686		3.0206
Implied persistence of 'other information		**0.738**		**0.4752**
F-Statistic	9.14	5.99	4.52	2.77

Table 7.1.2 Difference between Tables 7.1.1 and 6.1.2.2

Dependent Variable	Offer		End of first day	
Model	4.3a	4.3b	4.3a	4.3b
Implied persistence of earnings	0.0986	0.0818	0.1113	0.1049
Implied persistence of 'other information		0.0760		0.3834
F-Statistic	-7.62	-0.66	-4.35	-0.27

The parameter estimates are significant at the same levels as presented in Table 6.2.2.1. As such they are omitted as they are not strictly the variables of interest. From Table 7.1.1 it can be seen that again the implied persistence factors are within the expected range, which is again consistent with the alternate form second hypothesis. Table 7.1.2 shows that the persistence terms for the adjusted data sample are distinctly higher then their counterparts in chapter six. Notwithstanding this however the F-statistics for the restricted data set regression are lower – and for offer price markedly so – than the regressions presented in chapter six. Nevertheless the results presented the in the two tables above remain supportive of the second hypothesis.

7.2 J-test for specification

The J-test was introduced in chapter three as a specification test. It is important, yet again, to stress that particular phrasing as it is important with respect to the placement of this particular section within this thesis. The J-test is not a model selection test, as explained in chapter three, as there is always a potential to reject both of the models that are being compared in such an analysis. Thus in performing such an analysis the researcher must be prepared to reject both of the tests. For this reason this test is presented under the banner of further analysis. It was desirable to present the results of the regression analysis separately in order to concentrate on the inferences possible from those regressions individually.

The J-test was performed with respect to the EBO models (both with and without 'other information') and the current and forecasted earnings comparable firm multiples models. The earnings comparable multiples models were selected for comparison as these are the models that appear to be used most in valuing IPOs. These particular models also appeared to perform well as can be seen in section 6.2.1. Table 7.2.1 below presents the test results of the J-test.

Table 7.2.1 J-test results

A significant White's (1980) adjusted t-statistic indicates that the alternate model adds explanatory power to the null model. This in turn indicates that the null model is miss-specified. The J-test compares the EBO models with the Comparable multiples models (earnings and forecasted earnings).

			Offer price		First day price	
Null model	Alternate Model	N	White's t	Decision	White's t	Decision
EBO, no 'other information'	Comparable multiples, earnings	115	**(9.7543)###**	**REJECT NULL**	**(3.8509)###**	**REJECT NULL**
"	Comparable multiples, forecast earnings	85	**(13.1621)###**	**REJECT NULL**	**(2.904)###**	**REJECT NULL**
EBO, with 'other information'	Comparable multiples, earnings	115	**(14.4918)###**	**REJECT NULL**	**(3.9284)###**	**REJECT NULL**
"	Comparable multiples, forecast earnings	85	**(14.4402)###**	**REJECT NULL**	**(3.9639)###**	**REJECT NULL**
Comparable multiples, earnings	Comparable multiples, forecast earnings	85	**(3.9068)###**	**REJECT NULL**	(-0.6581)	DO NOT REJECT NULL
"	EBO, no 'other information'	115	**(1.7993)#**	**REJECT NULL**	(-0.0392)	DO NOT REJECT NULL
"	EBO, with 'other information'	115	**(3.9961)###**	**REJECT NULL**	(0.2072)	DO NOT REJECT NULL
Comparable multiples, forecasted earnings	Comparable multiples, earnings	85	(-0.3928)	DO NOT REJECT NULL	**(2.8011)###**	**REJECT NULL**
"	EBO, no 'other information'	85	**(2.2022)##**	**REJECT NULL**	(0.1415)	DO NOT REJECT NULL
"	EBO, with 'other information'	85	**(2.811)###**	**REJECT NULL**	(-0.2499)	DO NOT REJECT NULL

#, ##, and ### denote significance at the 0.10, 0.05, and 0.01 levels respectively (two-tailed)

Before discussing the results it is worth to review what is involved in a J-test. The J-test is a non-nested specification test[60]. Essentially the test involves substituting the predicted values from one model specification (model A) into a second specification (model B) as a regressor. Should the parameter estimate be significantly associated with the dependent variable then this indicates that model A can significantly improve the explanatory power of model B. In this instance doubt would be cast upon model B as a sufficient model to explain the dependent variable[61].

From table 7.2.1 something that is immediately obvious is that the EBO model specification does not perform well. In fact it is rejected in all instances as the null model, indicating that it is a poor explanation for both offer and first day prices. However the rejection is not complete as both iterations of the EBO model present as significant factors in explaining the dependent variable when inserted into other specifications. Nevertheless the empirical evidence presented here certainly seems to cast doubt on the EBO model as a suitable explanation of IPO value in Australia.

The only model that dominates other models is the comparable multiples model with respect to current earnings and first day price. This is surprising. If any

[60] This is why such a test cannot be performed comparing the EBO model without 'other information' to the model that does model 'other information'. The EBO model without 'other information' is effectively a restricted version of the EBO model with 'other information' and hence a nested test is required, similar to that performed with respect to the comparable multiples models and the industry interaction.
[61] More extensive discussions of the J-test may be founding Davidson and MacKinnon (1981), MacKinnon (1983) and Doran (1989). Incidentally the J-test is so named as it tests the two models *jointly*.

model would be expected to dominate the others it might have been expected to be the forecasted earnings comparable multiples model.

With this in mind it is again worth stressing that the limitations discussed in section 6.4 also apply here. In fact some of the issues brought up in section 6.4 might be expected to be more of an issue with the comparatively smaller observation set utilised for the J-test (N = 85/115). Thus caution must again be exercised in interpreting the results of this test.

Another point that is worth making is that the J-test may reveal the inherent limitations of a large scale empirical investigation of valuation. In the introduction to chapter four a caveat was placed upon this thesis – similar to Kaplan and Ruback's (1995) own cautionary note – to the effect that it should be borne in mind that the analysis undertaken here makes a number of assumptions that could be improved upon in a case-by-case basis. Thus it is possible that the results of the J-test reflect this caveat and the 'real' performance of these models is better than presented here.

7.3 Summary of further analysis

This chapter provided further analysis on certain issues that, on completion of the initial tests, were felt to be necessary to complete the discussion of various accounting-based valuation models. The first of the two issues that were investigated in more depth was restricting the sample size for the test of the EBO model to firms that reported positive current earnings. The results from this test are essentially parallel to those found in chapter six. The relevant variables were still found to be statistically significant and the implied persistence terms were still within the expected range, albeit slightly higher than the results presented in chapter six. The second hypothesis of this thesis was still supported in this particular iteration of the model.

The second issue comprised establishing a specification test with respect to selected accounting-based valuation models – the J-test. Such a test did not provide particularly strong support for any of the models that have been profiled in this thesis. This is perhaps a property of the J-test, which does not chose the 'best' model per se. As such it is unclear where the results of the J-test leave the results presented in chapter six. The comment made about the inherent limitations of large scale empirical may be quite important here, as may be the comment about the strength of statistical inferences off a relatively small set of observations.

This chapter brings to a close the statistical analysis of this thesis. The next chapter will conclude this research.

8 Conclusions and directions for future research

The title of this thesis is ‘An analysis of accounting-based valuation models using Australian IPOs’. This title is descriptive of the main thrust of this thesis, which was to analyse various accounting-based valuation models and test their empirical validity in an Australian IPO setting. A secondary theme of the research was to provide updated evidence on the value relevance of management earnings forecasts.

Two accounting-based valuation models were chosen as candidates in the comparable firm multiples model and the EBO model. The comparable firm multiples approach has a long history of use not only in valuing IPOs but also in regular valuation activities. It was shown in chapter two that the comparable firm multiples method operated under relatively simplistic assumptions about the distribution of dividends. However notwithstanding this, it was established that should a suitable comparable firm be found then the comparable firm multiple approach would be expected to perform quite well.

The EBO model was set up as the challenger of sorts. A brief review of the underlying theory was again presented. This review showed that the EBO model relied on more sophisticated assumptions about earnings dynamics. Notwithstanding the potential restrictive nature of the assumptions the EBO model was noted to be intuitively appealing. It was also noted that the assumptions involved in the model required a large quantity of data to be collected for a practical implementation to be attempted. Whilst this procedure would certainly be more onerous than comparatively simpler approaches it was reasoned that once a database had been set up, maintenance would be fairly straightforward, and contingent on the performance of the EBO model may be worth the additional cost. A quite straight forward statement was made that the more sophisticated model ought to perform better than the more simplistic model notwithstanding the effects of the restrictive assumptions on the more sophisticated model. However the hypotheses established did not directly compare the two models against each other. Although a rejection of one of the models would have necessarily implied that one of the models was better than the other.

The next stage of the analysis involved establishing a procedure to assess the performance of the two models. Comparable firm multiples approaches were assessed by analysing the direction and significance of the relevant value driver with respect to either offer or first-day listing price. These tests provided support for the current and forecasted earnings multiple approaches, although support for the other multiples was more ambivalent.

It was noted that to test the EBO empirically it was not enough that the relevant variables should record positive and significant parameter estimates – the implied persistence terms for abnormal earnings and 'other information' must also be shown to be within the expected range. The results indicated that the EBO had some empirical validity, with persistence terms within the expected range and parameter estimates positive and significant.

A J-test was performed with respect to the EBO models and the current and forecast earnings comparable firm multiple models. The J-test was explained to be different from model selection criteria such as the R^2 or the Akaike Information Criterion (AIC). And in fact it was stressed several times that the J-test was not a model selection criterion at all, but a specification test. The results of this test appeared to reject the EBO model as a suitable explanation of offer or first day price. However the J-test did not promote the comparable multiples approach as the superior option either, with the earnings iteration of that model also being rejected in some instances as a suitable explanation of offer and first day prices. Furthermore concerns were expressed that the small number of observations for the J-test may have affected results.

The other thrust of this thesis was to evaluate the value relevance of management earnings forecasts. It was discussed in chapter two that the Australian evidence on this area is somewhat uncertain. Tests performed in chapter six support the notion that management earnings are value relevant, providing updated evidence on this matter. Further tests indicated that the direction of the management earnings forecast compared with current earnings or a previous forecast is important in valuation.

It is worth again to mention some of the limitations of this thesis. The size of the sample size was the prominent limitation noted. The sample consisted of 227 IPOs firms from July 2002 to June 2006. It was not clear whether this length of sample compromises the ability to make statistical inferences about the population of IPOs. A second related concern was that with such a relatively small sample, some of the tests performed (particularly the J-test) might not possess a desirable level of power.

Future Research

In chapter three it was noted that should both the comparable firm multiples approach and the EBO model prove to be empirically valid it would be necessary to take a more case-study type approach to determine which model in fact performed better. Whilst, as noted above, the initial tests seemed to support both models, the J specification test provided evidence contrary to that, indicating that the EBO model was a poor explanation of offer and first day price. Whether or not such a further study is necessary then seems to be a matter of judgement. Given that the implied persistence factors were in line with expectations however it would seem that further research in the manner described above is worthwhile.

Aside from this there are still many other potential research avenues in this particular area. As noted in chapter two, an IPO represents a unique circumstance in a corporation's life. In an IPO a firm must try to persuade potential investors that it is a suitable investment. In collecting the data necessary to complete the empirical portion of this thesis it was noted that almost all IPO firms display pro-forma financial information – i.e. management is explicitly given the opportunity to present information different from that imposed on it ordinarily. It would therefore be interesting to analyse the form of such financial information to assess what information promoters believe is necessary to encourage potential shareholders to invest.

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Appendix A – Restricted comparable firm multiples, scaled

Table A1 – Comparable firm multiples, restricted

Multiplier	Earnings		Sales		Book value of equity	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price	Offer price	End of first day listing price
N	115	115	165	165	174	174
Intercept (β1)	-0.2408	-0.5109	-0.0286	-0.05699	-0.4178	-0.2721
	(-1.184)	(-0.946)	(-0.076)	(-0.1253)	(-1.994)**	(-0.758)
Multiplier (β2)	5.9931	4.6022	0.0686	0.06512	0.818	0.4878
	(11.100)***	(3.118)***	(2.005)**	(1.7928)**	(9.467)***	(3.489)***
SEG (β3)	0.0518	0.0635	0.0009	0.000423	0.0007	0.0001
	(1.926)**	(1.15)	(2.023)**	(0.6838)	(1.992)**	(0.262)
MEG (β4)	0.0018	-0.0263	0.0035	-0.01212	0.0043	0.0091
	(0.081)	(-0.919)	(0.121)	(-0.4172)	(0.231)	(0.337)
AUD (β5)	0.2223	0.2345	0.3911	0.39828	0.2499	0.3409
	(2.420)***	(1.779)**	(3.660)***	(2.8908)***	(2.592)***	(2.481)***
UND (β6)	-0.0353	0.053	-0.0538	-0.04178	0.0039	0.0424
	(-0.357)	(0.367)	(-0.432)	(-0.2444)	(0.035)	(0.262)
RETAIN (β7)	-0.0021	0.095	-0.0641	-0.00893	-0.1695	0.0042
	(-0.021)	(0.47)	(-0.452)	(-0.0637)	(-1.429)*	(0.03)
LEV (β8)	-0.0261	-0.0471	0.0455	0.0244	0.1033	0.0774
	(-0.928)	(-1.004)	(1.152)	(0.5633)	(2.829)***	(1.753)**
HOT (β9)	0.1139	0.211	-0.0649	-0.01105	0.0619	0.1069
	(1.316)*	(1.412)*	(-0.695)	(-0.0955)	(0.871)	(1.063)
HIST (β10)	-0.003	-0.0178	-0.0145	0.00416	-0.0662	-0.0267
	(-1.503)*	(-0.109)	(-0.124)	(0.024)	(-0.694)	(-0.178)
FDETAIL (β11)	0.0715	0.0594	0.146	0.16838	0.1156	0.1471
	(2.513)***	(1.214)	(4.095)***	(3.4104)***	(3.413)***	(2.869)***
RISKF (β12)	0.0248	0.3072	0.1597	0.1945	0.1863	0.1796
	(2.692)***	(1.935)**	(1.258)	(1.2288)	(2.569)***	(1.426)*
F-Statistic	22.85	9.76	7.31	5.04	14.92	7.08
P-value for F statistic	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
SSE	23.18795	58.36938	66.09586	107.45666	51.20349	100.95313
R-Squared	0.7093	0.5104	0.3444	0.266	0.5032	0.3247
k	16	16	16	16	16	16

Multiplier	Forecasted earnings		Forecasted sales	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price
N	93	93	100	100
Intercept (β1)	-0.4403	-0.0967	0.1912	0.1507
	(-1.644)*	(-0.203)	-0.442	-0.282
Multiplier (β2)	6.5393	3.6572	0.0546	0.0551
	(14.710)***	(2.602)***	(2.032)**	(1.729)**
SEG (β3)	-0.0011	-0.0028	0.0004	-0.0007
	(-4.200)***	(-2.391)***	(0.551)	(-0.607)
MEG (β4)	0.0527	-0.0156	0.007	-0.0019
	(2.453)***	(-0.540)	(0.288)	(-0.053)
AUD (β5)	0.3618	0.4909	0.5394	0.5688
	(3.904)***	(3.223)***	(3.283)***	(2.666)***
UND (β6)	-0.1221	-0.1604	-0.1841	-0.2
	(-1.239)	(-1.011)	(-1.101)	(-0.873)
RETAIN (β7)	-0.0233	0.3011	0.0475	-0.0822
	(-0.171)	(0.946)	(0.224)	(-0.289)
LEV (β8)	-0.0559	-0.0494	0.0401	0.0104
	(-1.941)**	(-0.957)	(0.986)	(0.235)
HOT (β9)	0.2481	0.3749	-0.0005	0.0885
	(2.915)***	(2.029)**	(-0.003)	(0.458)
HIST (β10)	-0.0619	-0.0362	-0.0222	-0.0702
	(-0.681)	(-0.183)	(-0.110)	(-0.226)
FDETAIL (β11)	-0.0022	-0.0839	0.0595	0.0136
	(-0.059)	(-1.094)	(1.23)	(0.223)
RISKF (β12)	0.1568	0.2947	0.1784	0.2895
	(1.825)**	(1.982)**	(1.093)	(1.296)*
F-Statistic	26.05	6.76	2.68	1.46
P-value for F statistic	<.0001	<.0001	0.0052	0.162
SSE	15.24025	54.25755	53.71439	92.03956
R-Squared	0.7796	0.4786	0.2508	0.1542
k	16	16	16	16

*, **, and *** correspond to statistical significance at 0.10, 0.05 and 0.01 levels respectively (one-tailed).

Numbers without parenthesis are the coefficients, whilst numbers in the parenthesis are White (1980) adjusted t-statistics.

The term multiplier on the left-hand side refers to value driver listed above the regression results. Industry groups listed along the left-hand side indicate the interaction term of membership of that particular industry group with the particular value driver multiple.

SEG = Short-term Earnings Growth (difference between one year forward earnings forecasts and current earnings over the absolute value of current earnings) and MEG = Medium-term Earnings Growth (difference between two year forward earnings and one year forward earnings forecasts over the absolute value of one year forward earnings forecast). Note that where a value for one year forward earnings forecasts was not reported it was assumed that this figure was the same as current earnings. AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

Appendix B – Unscaled Results

Table B1 Comparable Multiples – Unrestricted

Multiplier	Earnings		Revenue		Book value of equity	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price	Offer price	End of first day listing price
N	115	115	165	165	174	174
Intercept (β1)	-70603980	-100155015	-277511542	-316765137	-100758071	-120156605
	(-1.2446)	(-1.819)**	(-2.205)**	(-2.279)**	(-1.417)*	(-1.404)*
Multiplier (β2)	10.9564	12.1003	0.3342	0.4258	1.696	1.9088
	(7.7735)***	(7.638)***	(1.237)	(1.469)*	(1.212)	(1.235)
Energy, Materials, Industrials, and Utilities (γE)	4.00285	5.1142	0.8006	0.9105	2.2103	2.4981
	(2.5084)***	(3.216)***	(2.682)***	(2.734)***	(1.616)*	(1.659)**
Consumer (γC)	-2.45456	-3.2524	0.5724	0.5127	-0.1504	-0.3304
	(-1.6915)**	(-2.007)**	(2.039)**	(1.708)**	(-0.110)	(-0.220)
Health (γC)	0.42686	1.6301	1.6142	1.975	-0.3281	-0.4472
	(0.2593)	(0.846)	(2.347)***	(3.048)***	(-0.324)	(-0.397)
Financials (γC)	-1.14787	-1.6477	0.7694	0.693	-0.7704	-0.9949
	(-0.615)	(-0.912)	(2.498)***	(2.031)**	(-0.556)	(-0.651)
SEG (β3)	16467518	19882484	-178053	-245531	-49019	-112716
	(2.8524)***	(3.114)***	(-1.307)*	(-1.632)*	(-0.473)	(-0.929)
MEG (β4)	7668692	6045523	4513158	-1748473	-7605266	-10739888
	(1.2261)	(-0.93)	(0.621)	(-0.423)	(-1.938)**	(-2.408)***
AUD (β5)	19927434	2503670	72359568	61094511	50471743	43184739
	(1.0652)	(0.124)	(1.883)**	(1.459)*	(1.526)*	(1.124)
UND (β6)	-23787375	-8049042	-70339789	-57698625	-51843794	-44689251
	(-0.9844)	(-0.291)	(-1.710)**	(-1.215)	(-1.435)*	(-1.006)
RETAIN (β7)	900586	-7793452	-73522789	-77778553	5449334	10545462
	(0.0401)	(-0.344)	(-2.042)**	(-1.888)**	(0.194)	(0.307)
LEV (β8)	1648075	2756050	-23617825	-22780252	33801199	39695517
	(0.367)	(0.45)	(-2.680)***	(-2.307)**	(2.371)***	(2.183)**
HOT (β9)	8423484	29866681	33931212	51729288	15592566	26368321
	(0.4792)	(1.670)**	(1.116)	(1.513)*	(0.648)	(0.901)
HIST (β10)	11484311	20212263	-92334748	-89745235	-68038631	-68336754
	(0.4822)	(0.918)	(-2.118)**	(-1.871)**	(-1.838)**	(-1.591)*
FDETAIL (β11)	-3629391	-5296952	23186942	24365542	6969171	6800197
	(-0.4456)	(-0.646)	(2.020)**	(1.816)**	(0.626)	(0.505)
RISKF (β12)	18012745	21604252	102898456	111015649	40949268	45189124
	(0.9341)	(1.187)	(2.416)***	(2.399)***	(1.490)*	(1.434)*
F-Statistic	137.47	142.58	20.23	18.52	39.94	31.81
P-value for F statistic	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
R-Squared	0.9542	0.9558	0.6706	0.6389	0.7913	0.7512
k	16	16	16	16	16	16

Table B1 cont…

Multiplier	Forecasted earnings		Forecasted sales	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price
N	93	93	100	100
Intercept (β1)	-53404228	-52898070	-99504345	-125781480
	(-2.167)**	(-2.358)**	(-1.296)*	(-1.438)*
Multiplier (β2)	8.35874	9.45312	0.1764	0.1979
	(7.3176)***	(8.3021)***	(1.537)*	(1.600)*
Energy, Materials, Industrials and Utilities (γE)	1.88208	1.9523	1.1492	1.306
	(1.5811)*	(1.7021)*	(6.768)***	(7.749)***
Consumer (γC)	-0.66516	-1.53313	0.6132	0.6286
	(-0.5682)	(-1.2989)*	(3.081)***	(2.965)***
Health (γC)	0.41626	1.71603	2.2007	2.5958
	(0.2826)	(1.0532)	(4.419)***	(5.484)***
Financials (γC)	-1.37553	-1.63949	2.8192	3.1945
	(-1.2352)	(-1.4844)*	(6.378)***	(6.264)***
SEG (β3)	-110481	-247351	-316079	-432722
	(-3.3901)***	(-6.6455)***	(-2.526)***	(-3.224)***
MEG (β4)	7691549	7195861	8827894	6700168
	(1.8672)**	(1.5603)*	(1.917)**	(1.356)*
AUD (β5)	35106841	31877074	51464945	34473071
	(2.1716)**	(1.6699)*	(1.192)	(0.701)
UND (β6)	-26512162	-31408017	-77071862	-62170947
	(-1.5404)*	(-1.2901)	(-1.908)**	(-1.209)
RETAIN (β7)	-32082867	-22416727	-100653045	-122130021
	(-1.604)*	(-1.0246)	(-2.080)**	(-2.020)**
LEV (β8)	-7341000	-4906215	-39871166	-40988711
	(-1.927)**	(-1.1365)	(-3.165)***	(-3.229)***
HOT (β9)	48935866	60341010	69103934	97334340
	(3.8589)***	(4.3589)***	(1.978)**	(2.363)***
HIST (β10)	2229932	916838	-103824813	-96805878
	(0.1657)	(0.0613)	(-2.595)***	(-2.116)**
FDETAIL (β11)	2376312	1150827	32459199	25485196
	(0.5173)	(0.1688)	(1.959)**	(1.288)
RISKF (β12)	1050014	1837250	14442179	20963529
	(0.1193)	(0.2112)	(0.485)	(0.629)
F-Statistic	249.31	205.31	27.47	25.36
P-value for F statistic	<.0001	<.0001	<.0001	<.0001
R-Squared	0.9798	0.9756	0.8307	0.8191
k	16	16	16	16

Table B2 Comparable multiples – restricted

Multiplier	Earnings		Sales		Book value of equity	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price	Offer price	End of first day listing price
N	115	115	165	165	174	174
Intercept (β1)	-120781831	-162851463	-313884595	-349100826	-130121264	-159892072
	(-1.2668)	(-1.498)*	(-2.388)***	(-2.380)***	(-1.237)	(-1.297)*
Multiplier (β2)	9.78719	10.4852	0.9888	1.0379	1.2701	1.2919
	(8.5152)***	(7.753)***	(13.390)***	(11.632)***	(5.504)***	(5.019)***
SEG (β3)	18261441	21910835	-138600	-216363	-224339	-309785
	(2.5118)***	(2.717)***	(-1.088)	(-1.560)*	(-1.657)**	(-2.021)**
MEG (β4)	7485641	5528314	5127674	-2645491	-4138883	-6603812
	(1.378)*	(0.995)	(0.754)	(-0.604)	(-1.148)	(-1.631)*
AUD (β5)	38567744	26178076	78014758	69138355	77780968	75854790
	(2.0012)**	(1.171)	(1.934)**	(1.587)*	(2.224)**	(1.836)**
UND (β6)	-31328932	-16993501	-74723124	-64573982	-72474583	-69277510
	(-1.5631)*	(-0.587)	(-1.714)**	(-1.306)*	(-1.831)**	(-1.385)*
RETAIN (β7)	-14460436	-27256135	-69456169	-72112511	-20201995	-19514165
	(-0.4539)	(-0.690)	(-1.947)**	(-1.752)**	(-0.510)	(-0.402)
LEV (β8)	7419237	10180981	-21301311	-18422513	31300048	37190014
	(0.7601)	(0.732)	(-2.308)**	(-1.664)**	(1.592)*	(1.512)*
HOT (β9)	8976187	30965738	25315730	39732319	16631776	27959389
	(0.3276)	(0.935)	(0.85)	(1.186)	(0.494)	(0.694)
HIST (β10)	762173	5373826	-89836398	-89881239	-93569014	-96710841
	(0.0279)	-0.16	(-2.066)**	(-1.865)**	(-1.999)**	(-1.772)**
FDETAIL (β11)	-10543159	-13996522	19829562	21784886	26790931	29034974
	(-1.2034)	(-1.355)*	(1.912)**	(1.779)**	(2.001)**	(1.845)**
RISKF (β12)	44377053	55214482	118615874	127167822	54490154	63078932
	(1.4894)*	(1.760)**	(2.635)***	(2.576)***	(1.642)*	(1.677)**
F-Statistic	84.06	66.54	27.03	24.15	27.28	20.98
P-value for F statistic	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
R-Squared	0.8998	0.8766	0.6603	0.6227	0.6494	0.5875
k	16	16	16	16	16	16

Table B2 cont…

Multiplier	Forecasted earnings		Forecasted sales	
Dependent Variable	Offer price	End of first day listing price	Offer price	End of first day listing price
N	93	93	100	100
Intercept (β1)	-51070141	-57413507	-198013570	-241085245
	(-1.1684)	(-1.0857)	(-1.835)**	(-1.908)**
Multiplier (β2)	8.22702	8.80798	0.8742	0.9387
	(12.1683)***	(10.2062)***	(5.657)***	(5.585)***
SEG (β3)	-122017	-252122	-400885	-549318
	(-2.1363)**	(-3.9073)***	(-1.659)**	(-2.027)**
MEG (β4)	7118450	5286625	1634233	-2288148
	(1.6854)**	(1.1121)	(0.237)	(-0.294)
AUD (β5)	45832587	45568002	122956987	119683700
	(2.7478)***	(2.2721)**	(1.982)**	(1.689)**
UND (β6)	-32629307	-39726280	-119998500	-116144929
	(-2.0565)**	(-1.8085)**	(-2.121)**	(-1.704)**
RETAIN (β7)	-38965360	-29427894	-81115750	-99038348
	(-1.3017)*	(-0.8471)	(-1.180)	(-1.164)
LEV (β8)	-3293179	-50062	-28653887	-27654522
	(-0.7408)	(-0.0068)	(-2.450)***	(-2.219)**
HOT (β9)	40499929	56075598	58083251	85467274
	(1.7652)**	(2.1091)**	-1.264	(1.579)*
HIST (β10)	-6066814	-12776791	-148228129	-152224499
	(-0.3944)	(-0.6928)	(-2.262)**	(-2.000)**
FDETAIL (β11)	-6075441	-11127630	24131958	14660112
	(-0.7781)	(-0.9825)	(1.316)*	(0.645)
RISKF (β12)	11116379	19550241	78513932	98641622
	(0.7155)	(1.0858)	(1.940)**	(2.132)**
F-Statistic	152.75	117.81	19.8	16.85
P-value for F statistic	<.0001	<.0001	<.0001	<.0001
SSE	8.24E+17	1.24E+18	5.20E+18	6.95E+18
R-Squared	0.954	0.9412	0.7122	0.6781
k	16	16	16	16

*, **, and *** correspond to statistical significance at 0.10, 0.05 and 0.01 levels respectively (one-tailed).
Numbers without parenthesis are the coefficients, whilst numbers in the parenthesis are White (1980) adjusted t-statistics.
The term multiplier on the left-hand side refers to value driver listed above the regression results. Industry groups listed along the left-hand side indicate the interaction term of membership of that particular industry group with the particular value driver multiple.

SEG = Short-term Earnings Growth (difference between one year forward earnings forecasts and current earnings over the absolute value of current earnings) and MEG = Medium-term Earnings Growth (difference between two year forward earnings and one year forward earnings forecasts over the absolute value of one year forward earnings forecast). Note that where a value for one year forward earnings forecasts was not reported it was assumed that this figure was the same as current earnings. AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

Table B3 EBO models

Dependent Variable	Offer price	First day price
Model	4.3a	4.3a
N	176	176
Intercept	-65521061	-80940534
	(-0.791)	(-0.828)
Book value	-5.0939	-6.5533
	(-0.996)	(-1.190)
Abnormal Earnings	-0.685	-0.8444
	(-1.238)	(-1.418)*
Forecasted abnormal earnings, one year forward		
AUD	58188913	52418415
	(1.592)*	-1.219
UND	-65100011	-60074807
	(-1.611)*	(-1.192)
RETAIN	-6418798	-3331007
	(-0.214)	(-0.089)
LEV	30034982	35823747
	(1.762)**	(1.692)**
HOT	16026464	27627366
	-0.549	-0.799
HIST	-88145661	-89487206
	(-2.043)**	(-1.789)**
FDETAIL	28270901	30639434
	(2.064)**	(1.914)**
RISKF	27062807	28937377
	-0.87	-0.817
F-Statistic	35.93	28.61
P-value for F statistic	<.0001	<.0001
R-Squared	0.6853	0.6343
k	11	11

Table B4 Implied persistence of abnormal earnings

Dependent Variable	Offer	End of first day
Model	4.3a	4.3a
Average cost of capital	1.104134361	1.104134361
Implied persistence of earnings	-0.448861743	-0.505492873
Implied persistence of 'other information		

*, **, and *** correspond to statistical significance at 0.10, 0.05 and 0.01 levels respectively (one-tailed).

Numbers without parenthesis are the coefficients, whilst numbers in the parenthesis are White (1980) adjusted t-statistics.

AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four.

NB: only the results for the no 'other information' EBO model are shown here. A programming error resulted in those regressions not being run for unscaled data. This error was unfortunately discovered too late to contribute to this thesis.

Table B5 Value relevance of management earnings forecasts

Dependent Variable	Offer price		End of first day listing price	
N	176	176	176	176
Intercept	-112683536	-112345643	-138108221	-137770300
	(-1.2155)	(-1.2106)	(-1.3042)*	(-1.3009)*
Book value	-4.85601	-4.79571	-6.25173	-6.19142
	(-0.9518)	(-0.9438)	(-1.1385)	(-1.1326)
Abnormal Earnings	-0.65885	-0.65299	-0.81149	-0.80563
	(-1.1935)	(-1.1877)	(-1.367)*	(-1.3629)*
EF1	77219662	76835194	93637357	93252857
	(1.5029)*	(1.498)*	(1.5276)*	(1.5232)*
EF2	32410828		32413526	
	(0.6157)		(0.5123)	
AUD	62668501	62190719	57753124	57275302
	(1.6533)**	(1.6334)*	(1.2942)	(1.2786)
UND	-68860203	-68242864	-64506595	-63889205
	(-1.6581)*	(-1.6339)*	(-1.2421)	(-1.2263)
RETAIN	-4713369	-6144999	-1566956	-2998705
	(-0.1543)	(-0.1988)	(-0.0411)	(-0.0783)
LEV	29375778	28869650	34915585	34409415
	(1.778)**	(1.7453)**	(1.7056)**	(1.6825)**
HOT	22549981	24134230	35883169	37467549
	(0.7393)	(0.8215)	(1.017)	(1.102)
HIST	-89669592	-89310391	-91260039	-90900809
	(-2.0677)**	(-2.0529)**	(-1.8132)**	(-1.8016)**
FDETAIL	6062118	9173144	4349702	7460988
	(0.3956)	(0.6084)	(0.2336)	(0.3996)
RISKF	38261253	37450376	42355442	41544497
	(1.1254)	(1.0828)	(1.0976)	(1.0604)
F-Statistic	30.18	33.02	24.09	26.37
P-value for F statistic	<.0001	<.0001	<.0001	<.0001
R-Squared	0.6896	0.6889	0.6394	0.6388
k	13	12	13	12

Table B6 Value relevance and the interaction of the retained ownership signal and the provision of management earnings forecasts

Dependent variable	Offer price	End of first day listing price
N	176	176
Intercept	-156399604	-189708192
	(-1.5675)*	(-1.6549)**
Book value	-4.90816	-6.324
	(-0.9651)	(-1.1558)
Abnormal Earnings	-0.66515	-0.81996
	(-1.2083)	(-1.3855)*
EF1	150768458	180417276
	(1.8011)**	(1.8305)**
EF1.RETAIN	131586059	155134805
	(1.7433)**	(1.7004)**
AUD	65083792	60686122
	(1.6781)**	(1.3361)*
UND	-73496869	-70083471
	(-1.6932)**	(-1.3107)*
RETAIN	-57981377	-64111763
	(-2.3775)***	(-1.8395)**
LEV	28875855	34416729
	(1.8142)**	(1.7417)**
HOT	26587780	40360189
	(0.9172)	(1.1999)
HIST	-91033784	-92932621
	(-2.092)**	(-1.8436)**
FDETAIL	2581034	-310852
	(0.1583)	(-0.0154)
RISKF	42772307	47818845
	(1.188)	(1.1696)
F-Statistic	30.72	24.59
P-value for F statistic	<.0001	<.0001
R-Squared	0.6934	0.6442
k	13	13

Table B7 Value relevance of direction of management earnings forecast

Dependent variable	Offer price	End of first day listing price
N	176	176
Intercept	-105087390	-129981774
	(-1.1393)	(-1.2348)
Book value	-4.83261	-6.22688
	(-0.9703)	(-1.1613)
Abnormal Earnings	-0.65549	-0.80788
	(-1.216)	(-1.3931)*
EF1	-30967192	-24615185
	(-0.9281)	(-0.597)
EF1.EF1Δ	149783051	162405877
	(2.9021)***	(2.6825)***
EF2	163452393	137148919
	(1.6749)**	(1.1632)
EF2.EF2Δ	-107933728	-78297174
	(-1.1878)	(-0.6963)
AUD	59908572	54204521
	(1.6447)*	(1.26)
UND	-69597011	-65955798
	(-1.6961)**	(-1.2776)*
RETAIN	8271889	12573112
	(0.2543)	(0.3079)
LEV	29479625	34916832
	(1.8024)**	(1.7245)**
HOT	20581698	33987536
	(0.6794)	(0.9644)
HIST	-106676115	-109481240
	(-2.2508)**	(-1.9833)**
FDETAIL	-2899208	-4836231
	(-0.1731)	(-0.2361)
RISKF	41579640	46043167
	(1.2095)	(1.1835)
F-Statistic	26.75	21.3
P-value for F statistic	<.0001	<.0001
R-Squared	0.6994	0.6494
k	15	15

*, **, and *** correspond to statistical significance at 0.10, 0.05 and 0.01 levels respectively (one-tailed).
Numbers without parenthesis are the coefficients, whilst numbers in the parenthesis are White (1980) adjusted t-statistics.
AUD = auditor quality; UND = underwriter quality; RETAIN = Leland and Pyle measure of retained ownership; LEV = leverage measured as total liabilities divided by total assets; HOT = whether or not the firm issued during a 'hot' market; HIST; one for operating history in excess of five years and zero otherwise; FDETAIL = composite metric comprising zero/one scores for absence/presence of the following items; detailed revenue, detailed expense, >1 forecast, CAPEX, financing details, cash flow details, dividend and sensitivity analysis; RISKF = log(1 + count of risk factors in prospectus). For full details of variable definitions see chapter four. EF1Δ = the quotient of one year forward management earnings forecast and the absolute value of current earnings. EF2Δ = the quotient of two year forward management earnings forecast and the absolute one year forward management earnings forecast.