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SEASONED EQUITY OFFERINGS
BY NEW ECONOMY COMPANIES IN AUSTRALIA

by

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Seasoned Equity Offerings
by New Economy Companies in Australia

Abstract

Several recent papers present models to explain the probability and timing of seasoned equity offerings. Using a unique database of Australian new economy companies, we find no single model is adequate. The variables that are important in determining the probability of an SEO provide only limited support for explanations based on signalling models, market feedback and near-term liquidity needs. Similarly, the duration between an IPO and the first SEO is not explained by signalling or by near-term liquidity needs, and is only partially explained by market feedback.

1 Introduction

A number of models have been proposed to explain the relationship between Initial Public Offerings (IPOs) characteristics and the likelihood of subsequent Seasoned Equity Offerings (SEOs). In the various forms of the signalling hypothesis (Leland and Pyle, 1977; Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989), positive listing day returns (known as underpricing) are considered an important predictor of the relationship between the IPO and subsequent SEOs. Jegadeesh, Weinstein and Welch (1993) test the relationships between IPO underpricing (and aftermarket returns) and the probability of a seasoned equity offer. They find that their proposed market-feedback model provides a superior explanation of the U.S. data than do the various signalling models. A more recent study of U.S. SEOs (whether subsequent to a recent IPO or not) by DeAngelo, DeAngelo and Stulz (2007) concludes that SEOs are primarily determined by the firm's near-term liquidity needs.

The aim of this paper is to provide a test of the relevance of these three competing theories to the probability and the timing of equity re-issues by examining companies outside of the US equity markets using recent data. Our tests are based on the emerging new economy sector in Australia. For the purpose of this study, new economy business is any high-technology related services or manufacture activity, including internet service provision and infrastructure development, e-commerce, digital and multi-media, telecommunications (such as satellite and broadband communications), information technology, software development, advanced medical instruments and biotechnology.¹

We use publicly available information about new economy companies listed on the Australian Securities Exchange (ASX) between 1994 and 2002 to examine the relationships between the

¹ While some studies of new economy companies exclude the biotechnology sector, OECD (2001, p. 98) report on the new economy underlines the importance of biotechnology innovations and its influence on economic growth prospects. Therefore, we add biotechnology companies to the new economy sector.

characteristics of initial public offers and the likelihood and timing of seasoned equity offers. This period includes the development period of the new economy sector in Australia, as well as the hot-issue market before April 2000, and the subsequent cold-issue market following the fallout from the dot.com bubble burst in the USA.² Thus, the complete 'IPO cycle' of the new economy sector in Australia could be observed in this relatively short sample period.

During the study period, the total market value of the new economy stocks as a proportion of the ASX market capitalisation was relatively small. For example, the healthcare and biotechnology sector represented around 4.1 percent of ASX market capitalisation in 2001 (ASX Fact File 2002). Moreover, the information and communication technology sector accounted for about four percent of Australian GDP in 2001 and was also one of the fastest growing sectors of the economy (Holthuyzen, 2001). The Australian economy is still quite dependent on the resources sector and agriculture, exposing the whole economy (and the share market) to the cycles in droughts and in the prices of natural resources. Thus, while representing a relatively small fraction of the total Australian share market, a growing new economy sector provides a source of diversification for the Australian economy and for investors. The increasing influence of the new economy sector on product diversification and on efficiency improvements in the real economy warrants further research into equity offers by new economy companies.

New economy and old economy IPOs may be attractive to different types of investors (for example, investors in new economy stocks may have a greater tolerance for risk, or they may have additional motives for investing in new economy stocks, such as environmental and social conscientiousness). As IPO and SEO issuers adjust to these differences, then what

² Ibbotson and Jaffe (1975) define 'hot issue' markets as 'periods in which the average first month performance (or aftermarket performance) of new issues is abnormally high'. Ibbotson, Sindelar, and Ritter (1988) provide a brief overview of initial public offerings including the hot and cold issue markets.

determines the probability of a subsequent SEO may depend on whether or not the IPO is a new economy IPO or not. For example, IPO underpricing and aftermarket returns could have a greater or lesser role in the probability of a new economy SEO than in an old economy SEO.

In addition to the possibility that new economy investors may be different to old economy investors, it is important to note that new economy IPOs also differ from old economy IPOs. For example, high technology IPOs in Australia are found to have substantially shorter operating histories at listing than do old economy IPOs (Ho, Taher, Lee and Fargher, 2001; Lee, Taylor and Walter, 1996). Moreover, many new economy IPOs in the USA list with lower profitability and cash resources than traditional IPOs (Core, Guay and Buskirk, 2003; Schultz and Zaman, 2001; Ritter, 2006). Arosio, Bertoni and Giudici (2001) confirmed these trends were also present in Europe (during the period before January 2001) where around 40 percent of new economy companies reported negative earnings in their IPO prospectuses. These characteristics indicate that new economy IPOs would likely need further finance after public listing (probably in the form of seasoned equity offers). This is another reason to examine whether previous results from studies of seasoned equity issues by traditional IPO companies also apply to new economy stocks.

A further motivation for our study is that the evidence on new economy equity issuers publicly listed in markets other than in the USA is relatively scarce. In contrast to the USA, where public offers of equity generally dominate (Slovin et al., 2000), private placements and rights offers are frequently used methods to issue seasoned equity in Australia. For example, private placements and rights offers represented, respectively, 13.44 percent and 9.12 percent of the total value of equity capital raisings on the ASX during 2002. However, there is a lack

of empirical evidence on the probability and timing of these subsequent equity offers by new economy IPO firms. Specifically, the relationship between initial and subsequent equity offers should be examined from the perspective of the signalling model, the market feedback model and the near term liquidity needs model because each of these models has received some support from empirical research in the past. Moreover, it is important to evaluate any effects of publicly available information (contained in offer documents) on the probability of seasoned equity offers by recent new economy IPOs. This is because insights into the future funding needs of new economy entities (reflected in the probability and timing of SEOs) could be valuable to investors and the regulators. In particular, given that share prices are known to sometimes react dramatically to announcements of SEOs, many professional investors are interested in being able to determine the likelihood that a company will announce an SEO in the future.

Our results for the probability of seasoned equity offers provide limited support for IPO quality signalling by underpricing and by ownership retention. Aftermarket share returns, forecasted earnings and cash flows, and IPO market conditions are also important determinants of the probability of seasoned equity offers. Thus, the results lend some support to the market feedback model and to the near-term liquidity model. Overall, none of the three models provides an adequate explanation of the probability of a seasoned equity offer following a recent IPO. We also document that although public information can be used to explain the duration between the IPO and the first SEO, the empirical evidence on duration provides only limited support for one theory, the market feedback model.

The rest of this paper is structured as follows. The next section presents a brief review of prior research and the implications for this research. Section 3 outlines the data used in this study.

Section 4 presents descriptive statistics while results of the multiple regression models are provided in Section 5. The discussion and conclusion are contained in Section 6.

2 Prior studies and implications for this research

Many explanations for the sometimes extraordinary returns in the new economy sector (particularly before April 2000) and the subsequent downturn have been advanced, including investor irrationality and restrictions on short selling due to share lock-ups. For example, Cooper, Dimitrov and Rau (2001) document high announcement period abnormal returns related to internet associated corporate name change. Remarkably, even the firms with little or no internet involvement achieved significant positive excess returns (averaging 53 percent in the five day announcement period) through their decision to have their corporate names changed to include the words internet, .com or .net. Cooper et al.'s results also indicate that there was no negative drift in returns after the announcement (to +120 days), confirming that the effect on company share price is not just temporary.

In relation to IPOs, Ofek and Richardson (2003) offer a rational explanation for high short-term returns and subsequent underperformance. They argue that the substantial restrictions to short selling of U.S. IPOs between January 1998 and February 2000 were the underlying cause of the IPO returns performance in that period. Ofek and Richardson found that stock prices declined around 35 percent during the six months following the lockup expiration compared with internet index returns. Thus, the lockup period end marked the turning point where more 'pessimistic' investors gained the ability to sell IPO shares, resulting in subsequent returns' underperformance.

However, irrational investor behaviour and restrictions to arbitrage due to constraints on short selling may not necessarily be the only explanations for recent trends in stock returns and

equity funding activities by firms in the new economy sector. Therefore, in this research we explore whether two established theories (quality signalling and market feedback) and one more recently advanced model (near-term liquidity needs) are also valid in the new economy sector.

Chemmanur (1993) proposed that underpricing is used to induce informed investors to reveal their private information about the IPO. The greater the costs to investors of becoming informed, the greater would be the underpricing. Consequently, projects that have larger uncertainty and are more difficult to assess (such as projects of firms involved in high technology and biotechnology research and development) are predicted to have larger underpricing. However, issuers would underprice IPOs only if they believed that additional equity could be sold in a seasoned offer at a higher price. Thus, initial and seasoned equity offers should be viewed as related events because they are a part of the firm's long-term equity financing program.

Yet quality signalling might only be a part of the story on IPO returns. Recent evidence (Cooper et al., 2001; Ljungqvist and Wilhelm, 2003; Loughran and Ritter, 2004; Schultz and Zaman, 2001) also points to the fact that new economy firms have some unique characteristics. Examples of these characteristics may include the level of retained ownership and underpricing at IPO, association with venture capital, and company profitability (reflected in forecast earnings and cash flows). Therefore, these characteristics will be further explored in this research.

2.1 Quality signalling models

The signalling hypothesis (in its various forms) asserts that high quality firms will signal their superior quality using mechanisms which are difficult and costly to replicate by inferior

quality firms. Thus, firms going public may use the proportion of retained ownership in the IPO (Leland and Pyle, 1977) or the offer price discount (Welch, 1989) to signal high quality of the firm's future projects. Leland and Pyle (1977) apply the signalling model to valuation of projects, and state that retained ownership (project's organizers' investment in their own firm's equity) is a good signal of a project's (firm's) quality to outside investors. Moreover, Welch (1989) observes that seasoned equity offers are related in timing to IPOs, and that initial public offers usually involve the sale of a relatively small proportion of the closely held company than is the case in subsequent SEO (especially if underpricing in the IPO was substantial). The higher the general level of underpricing, the more likely it is that low quality firms will reveal their true value before listing. This is because a low quality firm's value will be revealed in the aftermarket, implying that underpricing and larger retained ownership do not result in higher prices at SEO, and therefore the low quality firm has no incentive to falsely signal high quality.

Grinblatt and Hwang (1989) combine the above two signals. They propose that underpricing is positively related to retained ownership by issuers, and that the value of the issuing firm is positively related to the degree of underpricing. Habib and Ljungqvist (2001) provide an extension to the quality signalling model and suggested that ownership dilution (which represents the proportion of new shares sold in the IPO) has explanatory power of listing day returns and wealth changes to original shareholders. Ownership dilution is therefore important in the IPO quality signalling context.

Signalling models have received support from studies of industrial company listings in many markets (see for example, How and Low, 1993; Ibbotson, 1975; Ibbotson and Jaffe, 1975; Jegadeesh et al., 1993; Loughran and Ritter, 2004; Ritter, 1984; Slovin, Sushka and Bendeck,

1994; Welch, 1996). However, this evidence is contradicted in more-recent research (Kennedy, Sivakumar and Vetzal, 2006), with IPO signalling by underpricing receiving least support. Kennedy et al. (2006) find that three regression coefficients are significant in the opposite direction to that predicted by the signalling model, while those that are supportive are also consistent with several other competing theories of IPO underpricing.

These mixed results provide us with the motivation to test for the presence of IPO quality signalling for new economy initial and seasoned equity offers. We use the following hypotheses to test the signalling models for new economy IPOs:

- H.1. Underpriced new economy IPOs are more likely to issue seasoned equity within three years after listing.
- H.1.a New economy IPOs with higher retained ownership are more likely to re-issue equity within three years.
- H.1.b New economy IPOs with lower ownership dilution are more likely to re-issue equity within three years.

2.2 Market feedback model

Jegadeesh et al. (1993) found that the relationship between IPO underpricing and the decision to make an SEO is relatively weak, and provides only modest support for signalling hypotheses. Further, not all underpriced IPOs issue seasoned equity. Jegadeesh et al. provided stronger support for the market feedback hypothesis, where favourable information about the IPO firm's market reception (reflected in the aftermarket price appreciation in the first 20 and 40 day windows) resulted in the management's decision to expand the firm's projects that apparently have higher marginal returns than initially estimated. In this research, we test the validity of the market feedback model in the context of new economy IPOs using the following hypothesis:

H.2. New economy IPOs with higher post-listing returns (aftermarket returns) are more likely to re-issue equity.

2.3 Near-term liquidity needs

Core et al. (2003) found that the new economy firms that list on NASDAQ are on average young firms with losses. This is confirmed by Ritter (2006) and Schultz and Zaman (2001), who documented that, in recent years, a large proportion of US internet and technology firms went public with negative earnings before listing. Thus, for new economy firms, near term liquidity needs could play an important role in the decision to re-issue equity.

Furthermore, Wilbon (2002) studied the survival rates of high technology firms in the USA after the IPO and found that, contrary to the hypothesized direction, that sample firms which invested less in research and development (relative to sales) experienced higher survival rates. This might indicate that the market viewed smaller, targeted investments that resulted in earlier positive cash flows more favourably.

Moreover, DeAngelo et al. (2007) document that without additional equity funding more than half of the companies in their sample of SEOs would be unable to implement investment and growth strategies due to low cash reserves. In this research we examine whether forecast cash flows and earnings have an effect on the probability of new economy SEOs where:

H.3. New economy companies forecasting cash shortages for the year following the IPO are significantly more likely to re-issue equity within three years of listing.

H.3.a New economy companies forecasting negative earnings for the year following the IPO are significantly more likely to re-issue equity.

2.4 Time to re-issue

Jegadeesh et al. (1993) find that the firms with higher returns at the time of the IPO are more likely to conduct seasoned equity offers and to wait a shorter time between the two offers. Subsequently, Welch (1996) develops a model in which he extends the signalling by underpricing from Welch (1989) to also include the waiting period between the IPO and the first SEO as an additional signal of firm' quality. In the underpricing equilibrium of Welch (1996) high quality firms raise the minimum required capital in the IPO to fund the operations. They also wait the optimal time for their true quality to be revealed before re-issuing equity. Therefore, the time to re-issue equity can be related to the predictions of the signalling models and the market feedback model, with some testable predictions about new economy IPOs presented below:

H.4. The more underpriced the IPO, the shorter the period to re-issue equity.

H.4.a The higher the retained ownership in the IPO, the shorter the period to re-issue equity.

H.4.b The lower the ownership dilution in the IPO, the shorter the period to re-issue equity.

H.5. The higher the aftermarket returns of the IPO, the shorter the period to re-issue equity.

Hypotheses 4 and 4a stem from the signalling models, while hypotheses 5 and 6 are derived from the predictions of the market feedback model and the near-term liquidity model, respectively. In addition, DeAngelo et al. (2007) argue that the issuing companies in their sample did not appear to sell equity in order to exploit opportunities due to appreciating share prices (market timing). That is, companies exhibiting 'market timer' characteristics (for example, firms with high M/B value of equity, and superior past returns) did not re-issue equity sooner than those companies lacking these characteristics. Instead, DeAngelo et al. (2007) find that the time to re-issue is driven by near-term liquidity needs. Therefore, we form

an additional hypothesis designed to examine the effect of the near-term liquidity needs on timing of SEOs by new economy firms, where:

H.6. The period to re-issue equity is expected to be shorter for companies forecasting cash shortages in the year after the IPO.

H.6.a The period to re-issue equity is expected to be shorter for companies forecasting negative earnings in the year after the IPO.

Explanatory variables, including variables designed to control for common IPO factors (for example, company age at listing and IPO market conditions) are defined in the following section.

3 Explanatory variables

The following explanatory variables constructed from publicly available information about equity offers by new economy companies are used in this study:

- UNDERPRICED IPOs (hypothesis 1 and 4) are IPOs with positive first day returns, and for aftermarket returns (hypothesis 2 and 5), we use POST_IPO_30 (the return over the first 30 trading days, excluding the listing day return). Consistent with Jegadeesh et al. (1993) and Chemmanur (1993), we predict that underpriced new economy IPOs (and those with superior aftermarket returns) have higher probability of a seasoned equity offer and re-issue equity sooner.
- Proportion of RETAINED OWNERSHIP (hypothesis 1a and 4a) and OWNERSHIP DILUTION (hypothesis 1b and 4b).³ Based on the theoretical predictions and findings of Leland and Pyle (1977) and Grinblatt and Hwang (1989) (for retained ownership)

³ Ownership dilution is the ratio of the new (primary) shares sold in the IPO to the number of pre-existing shares, while retained ownership is the ratio of primary and secondary shares sold in the IPO to the number of shares retained by the pre-IPO shareholders.

and Habib and Ljungqvist (2001) (for ownership dilution) we expect that greater proportion of shares retained and lower ownership dilution would result in an increased SEO probability and sooner equity re-issue.

- Forecasts of EARNINGS (hypothesis 3a and 6a) and CASH FLOWS from operating and investing activities (hypothesis 3 and 6). Consistent with DeAngelo et al.'s (2007) predictions, we expect that new economy companies forecasting positive earnings and cash flows are significantly less likely to conduct seasoned equity offers and would wait significantly longer before re-issuing equity.
- Commitments Test Entities (CTE). Recent changes to ASX listing rules allowed unprofitable entities (that did not satisfy the ASX listing requirements under the net tangible assets or profit tests) to become quoted on the Stock Exchange based on commitments to spend the funds raised according to agreements made with the ASX.⁴ We expect that companies seeking quotation of their securities on ASX under the Commitments Test Entity rule would be more likely to re-issue equity.
- Company AGE at listing. Ho et al. (2001) found no effect of age on Australian technology IPO underpricing, while How (2000) found a negative relationship between mining' firm age and initial returns. We make no prediction on the effect of age on the probability of seasoned equity offers, but rather use the company age as a control variable for IPO riskiness.
- Venture capital (VC). Da Silva Rosa, Velayuthen and Walter (2003) found no significant difference in underpricing between VC and non-VC backed IPOs in Australia. To further the evidence on VC-backed IPOs in Australia, we examine this

⁴ The Commitments Test Entity clause was put in effect as a result of the Commonwealth Law Economic Reform Program Act 1999 (Cth). Commencing 13 March 2000, it introduced changes to the regulation of company financing in Australia (see Chapple, Clarkson, and Peters, 2005).

variable and predict that VC backed new economy IPOs are more likely to have a seasoned offer within three years after listing and wait significantly less to re-issue.

- **NEW_SHARES.** IPOs that include primary (new) shares enable companies to invest additional capital into a new economy firm. We posit that primary share offers proxy for growth new economy firms likely to need additional finance subsequent to IPO. Therefore, we expect that IPOs offering new shares are more likely to conduct seasoned offers and to wait less to re-issue equity.
- **PRE-CRASH** (a dichotomous variable taking the value one if the IPO was listed before April 2000, otherwise zero). Hot issue periods (such as the one before April 2000) are often concentrated in specific industries, such as the resources sector (Ritter, 1984), or the internet sector (Schultz and Zaman, 2001). We predict that new economy IPOs listed before April 2000 will be more likely to re-issue within three years after listing, and will re-issue equity sooner.

3.1 Regression models

We use a binary probit model to assess the ability of publicly available information (at around the time of public listing) to identify new economy companies which subsequently had seasoned equity offers. In the probit analysis, the independent variables (continuous or coded as binary variables) were used to explain the dichotomous (0,1) outcome; that is, whether a new economy company has a seasoned equity offer within the three years after listing.⁵

Explanatory variables were included in the probit regression model as indicated below:

⁵ The results and conclusions for the probability and timing of SEOs reported in this study based on a three-year window are not substantially different than those using a four-year window. Thus, the variables of interest are still providing significant contribution to explaining the probability and duration of equity re-issue. We thank an anonymous referee for raising this issue.

$$\begin{aligned} \text{Prob}(y=1) = & \Phi(\alpha_0 + \alpha_1 \text{PRE_CRASH} + \alpha_2 \text{CTE} + \alpha_3 \text{VC} + \alpha_4 \text{NEW_SHARES} \\ & + \alpha_5 \text{UNDERPRICED} + \alpha_6 \text{POST_IPO_30} + \alpha_7 \text{OWNERSHIP_DILUTION} \\ & + \alpha_8 \text{NEAR_TERM_LIQUIDITY} + \alpha_9 \text{AGE}) \end{aligned}$$

Explanatory variables are as defined above. Note that OWNERSHIP_DILUTION is either the DILUTION variable or the OWNERSHIP RETENTION variable, while NEAR_TERM_LIQUIDITY is either the EARNINGS or the CASH_FLOW variable.

Additionally, we use ordinary least squares regression model to estimate the explanatory power of variables used in this study to explain the duration between the initial public offer of shares and the first subsequent share offer, as presented below.

$$\begin{aligned} \text{TIME(IPO_SEO)} = & \alpha_0 + \beta_1 \text{PRE_CRASH} + \beta_2 \text{CTE} + \beta_3 \text{VC} + \beta_4 \text{NEW_SHARES} \\ & + \beta_5 \text{UNDERPRICED} + \beta_6 \text{POST_IPO_30} + \beta_7 \text{OWNERSHIP_DILUTION} \\ & + \beta_8 \text{NEAR_TERM_LIQUIDITY} + \beta_9 \text{AGE} + \varepsilon_i, \end{aligned}$$

where TIME(IPO_SEO) is the natural logarithm of the number of days between the IPO listing date and the first seasoned equity offer announcement date and ε_i is a regression error term. Explanatory variables are as defined above, except OWNERSHIP_DILUTION, which is either the DILUTION variable or the OWNERSHIP RETENTION variable, and the NEAR_TERM_LIQUIDITY, which is either the EARNINGS or the CASH_FLOW variable.

3.2 New economy sample

The sample consists of new economy companies that listed on the Australian Stock Exchange (ASX) between January 1994 and December 2002. We require three years of ASX company announcements' data after December 2002 (to end of December 2005). This is necessary in

order to establish how many new economy companies issue seasoned equity (in the form of rights issues and private placements) within three years after listing.⁶ Furthermore, the ASX rules specify (among other requirements) that a private placement of equity can be made to no more than 20 investors and should be no less than \$500,000. We impose this additional restriction on our sample.⁷ Data were obtained from various sources, such as the ASX company announcements, individual company websites, and the Connect4 database. The remaining prospectuses, which were not available from on-line databases or company websites, were obtained from the Australian Securities and Investments Commission (ASIC).⁸

Thus, in respect to existing research, our database contains extensive information about IPO companies in Australia for a comparatively recent period and in a new sector of the economy. This provides us with an opportunity to conduct tests of several theories purporting to explain the probability and timing of seasoned equity issues outside of the US equity markets. It is especially important to test the validity of those models that received limited support from recent data on equity re-issues (Kennedy et al., 2006), such as the quality signalling model and the market feedback model. Likewise, newly proposed models, such as the near-term liquidity needs model (DeAngelo et al., 2007), should be tested for IPOs in markets outside the USA and in sectors other than industrial firms.

⁶ Public seasoned equity offers by new economy companies listed in Australia were relatively infrequent during the sample period studied (two public SEOs were identified). We therefore examine only the two main SEO types (private placements and rights offers) in this research. Likewise, exercise of employee share options or conversion of preference shares or convertible notes into ordinary equity were not included in this study regardless of the offer type.

⁷ The minimum value restriction did not result in exclusion of relevant SEOs by smaller market capitalisation companies. This is due to the nature of small equity offers by new economy companies in Australia, which are frequently share compensations to experts, underwriters and other parties for their services, who accept part payment of dues in shares and share options. (We thank Balasingham Balachandran for pointing out this issue).

⁸ All companies raising finance from the Australian public must lodge a prospectus with ASIC. The Commission stores scanned copies of the original prospectuses lodged by issuing companies in their Docimage database. The authors wish to thank the staff at ASIC Brisbane Regional Office for providing this additional data.

During the sample period between January 1994 and December 2002, 300 companies with new economy related business activities attempted to list on the ASX of which 37 offers were withdrawn. Thus, 263 new economy initial public offers listed during the sample period (see Table 1).

{Insert Table 1 here}

New economy IPOs are spread across six main industries of the new economy sector (see Table 2). We form an additional group to include companies that were classified by the Global Industry Classification Standard (GICS) and the ASX in conventional industries but had their main business activities within the new economy sector during the sample period.⁹

{Insert Table 2 here}

New economy initial and seasoned equity offers in Australia are most frequently made by companies in the software and services industry group. The second largest group are the semi-new economy SEOs (see Table 2). In addition, internet related businesses represent 48.29 percent of the new economy IPO sample, while 55.67 percent of placements and 45.10 percent of rights issues are made by internet related companies.

4 Sample descriptive statistics

The sample of Australian new economy companies consists of diverse entities. Nevertheless, a description of an ‘average’ offer is provided below based on the information collected from

⁹ For example, Bigshop.com.au Limited, which is an online retailer, SeafoodOnline.com Limited, which is a fish farming business selling its products over the Internet to Asian markets, and Biotron Limited, a pooled development fund, which is involved in funding and management of intermediate and early-applied biotechnology research and development projects.

offer prospectuses, company announcements, and other publicly available information about the new economy entities.

4.1 New economy IPOs

New economy companies list on the ASX around five years after their incorporation on average, and have market capitalisation at offer price of around \$76million on average.¹⁰ New economy companies seek on average \$24.40 million in their initial equity offers. They wait 398 (335) days on average (median) after the IPO to conduct the first seasoned equity offer. For additional descriptive statistics about new economy IPOs see Table 3.

{Insert Table 3 here}

Australian new economy companies are on average not substantially smaller than Australian industrial IPOs (How and Yeo, 2000), and are also similar in size to Australian mining IPOs (How, 2000), and package (share and option) IPOs (How and Howe, 2001).

4.2 IPO underpricing and aftermarket returns

Initial raw returns, measured as the difference between the public offer price and the first trading day closing price are 38.67 (12.00) percent on average (median).¹¹ Initial (market adjusted) returns of new economy IPOs that conducted seasoned offers within three years after listing are on average 48.5 percent, compared to 33.87 percent for the remaining IPOs.

¹⁰ Company market values were adjusted for inflation, with 2002 as the base year (Consumer Price Index, Australian Bureau of Statistics). <http://www.abs.gov.au/ausstats/abs@.nsf/lookupresponses/dc7c73d0cda3e34cca2570a500802675?opendocument>

¹¹ For market index adjusted returns see Table 3.

Nevertheless, investing in IPOs is not without risk. Within the new economy IPO sample, 61 offers (23.19 percent) had a first day closing price below the offer price. This is comparable to Lee et al. (1996) who reported that around one third of Australian industrial IPOs had negative market index adjusted initial returns, and How (2000) who found that 19.23 percent of Australian mining IPOs had negative raw initial returns.

4.3 Seasoned equity offers

Within our new economy IPO sample there are 169 companies (or 64.26 percent) which had at least one seasoned equity offer (in the form of a private placement or a rights issue) within three years after listing. In comparison, Krigman, Shaw and Womack (2001) find that of 2,049 IPOs in the USA from 1993 to 1995, around 28 percent of issuing firms make the first SEO within three years after the IPO. More specifically, within three years of listing, sample new economy IPO companies had 379 private placements of equity and 51 rights issues that satisfy the ASX requirements on new issues (see Table 1). New economy companies in Australia which re-issue equity within three years after listing have their first SEO 1.09 (0.92) years after the IPO on average (median). This is similar to U.S. industrial firms, which waited an average (median) 1.43 (1.29) years to reissue equity (see Jegadeesh et al., 1993, p. 161). Moreover, new economy companies undertake rights offers not only less frequently than private placements (see Table 1), but also wait significantly longer after the IPO to have rights offers, as indicated by the *t*-test (*t*-stat. = -3.27, *p*-value = 0.002) and the Mann-Whitney-Wilcoxon test (*z* = -2.706, *p*-value = 0.007).

5 Results

Next we provide the results of multiple regression models used to explain the probability and the timing of seasoned equity offers by new economy companies. Multicollinearity between explanatory variables is controlled for by excluding collinear variables from regression models.¹² For example, given the relatively high correlation between the retained ownership and ownership dilution variables, these two variables would not be used in the same regression model. The same concern applies to forecast cash flows and earnings variables, which are therefore presented in separate regression models.¹³

5.1 Probability of new economy SEOs

The results in Table 4 indicate that the probit models correctly classify more than seventy percent of new economy companies, and that the McFadden R^2 likelihood ratio index range between eleven and thirteen percent.¹⁴ These goodness-of-fit statistics are comparable to those of Jegadeesh et al.'s (1993) logit models of seasoned equity issue probability.¹⁵

{Insert Table 4 here}

¹² While this approach may reduce the ability of a regression model to explain the dependent variable, it also results in a more parsimonious regression model where any effects of explanatory variables are easier to distinguish. Multicollinearity can be measured using the Tolerance statistic or its reciprocal the Variance Inflation Factor (VIF). Tolerance is a statistical measure of the overlap between explanatory variables. A tolerance level close to zero indicates that two explanatory variables might be explaining the same variation in the dependent variable, whilst a tolerance value of one indicates no overlap between explanatory variables.

¹³ The correlation coefficient between the retained ownership and ownership dilution variables is -0.787 (p-value < 0.001), and 0.351 (p-value < 0.001) for the forecasted cash flows and earnings variables.

¹⁴ The minimum Tolerance statistic between explanatory variables was 0.81 (Variance Inflation Factor 1.24) confirming that the probit regression models do not suffer from multicollinearity.

¹⁵ We repeated our analysis using the equivalent logit models and obtained substantially the same results as with the probit models (results not reported). Liao (1994) and Maddala (2001) indicate that logit and probit regressions should provide similar results if there is not a large proportion of extreme scores in the tails of the distributions in very large samples, in which case the logit model should be used.

The entries in Table 4 lend some support for the signalling hypothesis. In particular, the underpriced IPOs (offers with positive first day returns) are significantly more likely to have seasoned equity offers (hypothesis 1). The significance and direction of the ownership dilution and the retained ownership variables provide further support for the signalling model (hypothesis 1a). Probit models in Table 4 indicate that the lower the proportion of shares sold to outsiders in the IPO (lower the dilution or higher the percent of shares retained), the larger is the probability that additional equity would be sold within three years after listing. Thus, both of these closely-related ownership variables provide a valid signal of an increased probability of a seasoned equity offer by new economy companies within three years after listing.

New economy IPOs with superior aftermarket returns as reflected by POST_IPO_30 (which excludes the listing day return) are also significantly more likely to have an SEO, supporting the market feedback model (hypothesis 2). Specifically, in each regression model POST_IPO_30 is significant at the 5 percent level. These results are robust to the aftermarket window specification. That is, re-issuing companies have significantly higher post-listing returns in the first 20, 30, 50 and 100 trading day' windows. Market index returns in the equivalent windows before and after the IPO listing date have no predictive power of the incidence of seasoned equity offers. Thus, our probit model results confirm the findings of Jegadeesh et al. (1993) that post-IPO returns provide a valid signal about the probability of a seasoned equity offer.

We also find that companies that forecast positive earnings and cash flows for the post-offer year in their IPO prospectus are significantly less likely to have an SEO within three years after listing (providing support for hypothesis 3). This is consistent with findings by

DeAngelo et al. (2007) who argue that, in their sample, the primary reason for companies to conduct SEOs was low cash reserves. However, the forecast earnings variable in probit models I and II in Table 4 is only significant at the 10 percent level. Likewise, new economy companies listed on the ASX as Commitments Test Entities (CTE) are significantly more likely to sell seasoned equity. Together, these variables indicate some support for the near-term liquidity needs model of DeAngelo et al. (2007).

Table 4 also indicates that market conditions play a role in whether companies issue equity. In particular, new economy IPOs listed before April 2000 (PRE_CRASH) are significantly more likely to have a seasoned equity offer within the three years after listing compared to the post-March 2000 new economy listings.¹⁶ Nevertheless, contrary to our prediction, the two dichotomous variables representing proxies for risk (VC – denoting companies associated with venture capital investment or expertise, and AGE – denoting the company’ age at listing) do not significantly contribute to the model. Conversely, companies selling primary (new) shares in their IPO are more likely to have an SEO (probit model II in Table 4) indicating that offer type also plays some role in the probability to re-issue equity. However, this result should be viewed with caution because the variable is only significant at the 10 percent level.

In summary, the results in Table 4 provide only limited support for the signalling model, the market feedback model and the near-term liquidity model. Since the variables suggested by each of these models are significant in the each regression, each competing model is only providing a partial explanation of the probability of re-issue, at best.

¹⁶ However, note that this market conditions variable is no longer significant if a four-year re-issue window is used.

5.2 Timing of seasoned equity offers

In this section, we test the effectiveness of publicly available information about the new economy companies to explain the duration between the IPO and the first seasoned equity offer. The results reported in Table 5 show that the regression models described in Section 3.1 have a relatively low ability to explain the timing of the re-issue of equity by new economy IPOs.

{Insert Table 5 here}

New economy companies listed before April 2000 wait a significantly shorter time to have their first seasoned equity offer (t -stats. ≤ -2.334). Likewise, new economy companies listed on the ASX as Commitments Test Entities wait significantly less time before re-issuing equity (t -stats. ≤ -2.432). There is some indication that IPO companies that issue new (primary) shares re-issue equity earlier (regression model *I* only).¹⁷ In addition, IPOs with superior aftermarket returns (in the first 30 days after listing day) tend to sell seasoned equity sooner (the results are significant at the 10 percent level only for regression models *II* and *III*).

However, after controlling for other public information available around listing, we find no support for the prediction that more underpriced new economy IPOs re-issue earlier (hypothesis 4). Likewise, the retained ownership variable and the ownership dilution variable (as specified by Habib and Ljungqvist, 2001) have no effect on the duration between the IPO and the first seasoned equity offering, casting further doubt on the usefulness of the signalling models to explain time to re-issue by new economy firms (hypotheses 4a and 4b).

¹⁷ However, note that the NEW_SHARES control variable is no longer significant if a four-year re-issue window is used.

Thus, in relation to the timing of new economy SEOs, the results in Table 5 lend no support for the signalling hypotheses (hypotheses 4, 4a and 4b), while the market feedback hypothesis is only weakly supported (hypothesis 5). Furthermore, the near-term liquidity needs model (hypotheses 6 and 6a) is not supported because the cash flows and earnings forecasts variables have insignificant coefficients in Table 5. Finally, highly significant intercepts in all regressions models in Table 5 indicate that there are additional variable(s) not included in this research that could contribute to explaining the timing of new economy SEOs.

6 Discussion and conclusion

This study examines the ability of the signalling model, market feedback model and near-term liquidity needs model to explain the probability and timing of seasoned equity offers by new economy IPOs. Studying a subset of the population of ASX listed IPOs allowed us to consider the effects of explanatory variables without assuming that these effects are generalisable to the whole population of equity issuing companies.¹⁸

Our results provide some support for the near-term liquidity needs model of DeAngelo et al. (2007), where companies with negative forecast cash flows and earnings for the post-listing year are more likely to have SEOs within three years after listing. However, our results do not support DeAngelo et al.'s argument that the near-term liquidity concerns are the most important parameter in deciding the probability of seasoned equity offers. We find that variables proxying for IPO quality signalling and market feedback are at least as important in determining the probability of new economy SEOs as are the proxies for near-term liquidity needs. The divergence in results may be due to the fact that DeAngelo et al. did not consider

¹⁸ This approach has been followed in the past for resource sector IPOs (Ritter, 1984; How, 2000), biotechnology IPOs (Vitale, 2004) and high technology IPOs (Ho et al., 2001).

whether or not there has been a recent IPO in calculating the probability of SEOs. A recent IPO may increase the likelihood of an SEO dramatically.

Moreover, our findings indicate that the prior returns of re-issuing companies are relevant when it comes to the probability and timing of an SEO by new economy companies. In particular, we provide some support for the signalling model, where listing day returns (Allen and Faulhaber, 1989; Grinblatt and Hwang, 1989; Welch, 1989) and ownership retention at IPO (Leland and Pyle, 1977; Grinblatt and Hwang, 1989) contribute to explaining the likelihood of seasoned equity offers. Likewise, the market feedback model (Jegadeesh et al., 1993) is supported, with aftermarket returns explaining the likelihood of seasoned equity offers. However, listing day returns and ownership retention variables do not make a significant contribution to explanation of the duration between the IPO and the first SEO (Welch, 1996) in the new economy sector. Only the aftermarket returns (market feedback model) indicate some ability to explain the timing of new economy SEOs.

Overall, we find that signalling, market feedback and short-term liquidity needs each provide only partial explanations for the probability of seasoned equity offers. None of the models tested in this research has distinguished itself with its explanatory power, but rather the interaction of numerous factors seems to explain the probability and timing of seasoned equity offers by recent IPOs in the new economy sector in Australia.

Thus, our findings indicate that the publicly available information about the new economy IPOs could be used to construct a profile of an entity most or least likely to have a seasoned equity offer. This information could be valuable to investors and the regulators. Given that the announcement of an SEO often has a dramatic effect on the share price of the company

concerned, investors could certainly benefit from being able to estimate the likelihood of an SEO. When considering changes to listing rules, regulators may wish to take into account the likelihood that a recent IPO will have an SEO soon after listing. Regulators may also wish to consider whether they should require issuers to provide more information to the market at the time of their IPOs in order to enable investors to make more-informed decisions about those entities.

Ritter and Welch (2002) argue that the ability of rational models to explain why IPO firms go public is likely to be reduced following the dotcom bubble. Thus, it is possible that our models have omitted additional important factors that have the ability to explain the probability and timing of new economy SEOs. Therefore, expanding this research by examining the probability and timing of new economy SEOs in other developed economies as well as in emerging economies (possibly by using information not publicly available for ASX listed companies) would be the logical next step.

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Table 1 *New economy equity offers stratified by announcement year*

Offer year ^a	IPOs		Private Placements		Rights Offers	
	N	Percent	N	Percent	N	Percent
1994	14	5.32	0	0.00	0	0.00
1995	4	1.52	3	0.79	0	0.00
1996	11	4.18	7	1.85	0	0.00
1997	18	6.84	2	0.53	1	1.96
1998	17	6.46	7	1.85	3	5.88
1999	74	28.14	53	13.98	2	3.92
2000	98	37.26	132	34.83	5	9.80
2001	20	7.60	85	22.43	18	35.29
2002	7	2.66	45	11.87	12	23.53
2003			36	9.50	8	15.69
2004			7	1.85	2	3.92
2005			2	0.53		
Total	263	100.00	379	100.00	51	100.00

Notes Table includes new economy IPOs listed between 1994 and 2002, and private placements and rights offers of new economy IPOs within three years after listing; N is the number of offers; Percent is the number of offers in a particular year as a proportion of total IPOs, private placements or rights offers.

Table 2 *New economy equity offers stratified by industry*

New economy industry (GICS industry group)	IPOs		Private Placements		Rights Offers	
	N	Percent	N	Percent	N	Percent
Software and services	89	33.84	144	37.99	12	23.53
Semi-new economy	59	22.43	76	20.05	17	33.33
Pharmaceuticals and biotechnology	34	12.93	37	9.76	5	9.80
Technology hardware and equipment	22	8.37	36	9.50	2	3.92
Healthcare equipment and services	21	7.98	21	5.54	5	9.80
Telecommunications	20	7.60	36	9.50	5	9.80
Media	18	6.84	29	7.65	5	9.80
Total	263	100.00	379	100.00	51	100.00

Notes Table includes new economy IPOs listed between 1994 and 2002, and private placements and rights offers of new economy IPOs within three years after listing; GICS is the Global Industry Classification Standard used by ASX; Semi-new economy group represents entities with some business activities in the new economy sector, but not classified by the ASX in the GICS new economy industries; N is the number of offers; Percent is the number of offers in a particular industry group as a proportion of total IPOs, private placements or rights offers.

Table 3 *Descriptive statistics about the new economy IPOs*

Variables	N	Mean	Median	Standard deviation	Minimum value	Maximum value	Skewness	Kurtosis
Listing day returns	263	38.75	12.04	92.65	-74.91	731.35	25.27	64.28
Earnings per share	129	6.48	5.94	8.16	-14.3	64	12.42	45.20
Market capitalisation	262	75.80	30.15	195.20	3.01	2,515.66	59.92	332.54
Offer price	263	0.86	0.58	0.75	0.11	5.41	2.49	2.65
Offer size (percent)	262	35.45	31.90	20.70	0.00	100.00	8.52	6.82
Age at listing	262	5.04	2.43	5.68	0.15	32.59	10.41	8.28
Retained ownership	262	64.78	68.10	20.22	0.00	1.00	-8.41	6.95

Notes N is the number of IPOs for which the information was available in a prospectus; Skewness (Kurtosis) is calculated as Skewness (Kurtosis) statistic divided by the standard error of Skewness (Kurtosis); LISTING DAY RETURN (UNDERPRICING) is the return available to subscribing investors, which is the difference between listing day close price and offer subscription price, adjusted for market index return; EARNINGS PER SHARE are forecast earnings per share (in cents) for the year after offer as stated in IPO prospectus; MARKET CAPITALISATION is the total number of shares after the IPO multiplied by the share offer price, adjusted for the inflation (Consumer Price Index – Australian Bureau of Statistics); OFFER PRICE is the share subscription price for the public offer adjusted for the inflation; OFFER SIZE is the number of shares offered as proportion of total shares after listing; AGE AT LISTING is the number of years between incorporation of the company and listing date; RETAINED_OWNERSHIP is the percent of shares retained by original investors and is calculated as total number of shares at listing less the shares sold in the offer, divided by the total number of shares.

Table 4 *Probit analysis of the incidence of new economy SEOs within three years after the IPO by new economy companies listed on the ASX between January 1994 and December 2002*

Independent variable	I		II		III	
	Probit coefficient	z-statistic	Probit coefficient	z-statistic	Probit coefficient	z-statistic
Intercept	-0.859	-1.229	-1.087	-1.609	-0.914**	-2.211
PRE_CRASH	0.426**	2.261	0.411**	2.192	0.342*	1.847
CTE	0.377*	1.912	0.398**	2.030	0.441**	2.303
VC	0.309	1.324	0.356	1.545		
NEW_SHARES	0.965	1.497	1.092*	1.711		
UNDERPRICED	0.422**	2.040	0.413**	1.998	0.492**	2.337
POST_IPO_30	16.532**	2.211	16.677**	2.231	16.166**	2.236
DILUTION	-0.433***	-2.723	-0.417***	-2.624		
RETAINED_OWNERSHIP					0.922**	2.038
EARNINGS	-0.344*	-1.812	-0.365*	-1.939		
CASH_FLOW					-0.562**	-2.548
AGE	-0.019	-1.158				
<i>Likelihood-ratio index</i>		13.08***		12.67***		10.85***
<i>Percent correct predictions</i>		72.00		73.20		71.54

Notes Likelihood-ratio index (McFadden R^2) was calculated as $1 - (\log \text{likelihood of the estimated model} \div \log \text{likelihood of a model which includes intercept only})$; PRE_CRASH is unity for IPOs listed between January 1994 and March 2000, and zero otherwise; CTE is a dichotomous variable with unity representing new economy companies listed as Commitments Test Entities; VC is unity for new economy companies associated with venture capital investment and/or expertise prior to listing; NEW_SHARES is a dichotomous variable where unity represents primary (new) shares offered in the IPO; UNDERPRICED is a dichotomous variable where unity represents underpriced new economy listings (positive returns between the subscription price and the first trading day closing price); POST_IPO_30 is the aftermarket share return for the first 30 trading days (excluding the first day returns); DILUTION is the ratio of new shares sold in the offer divided by the number of old (pre-existing) shares; RETAINED_OWNERSHIP is the percent of shares retained by original investors and is calculated as total number of shares at listing less the shares sold in the offer, divided by the total number of shares; EARNINGS (CASH_FLOW) assigns unity if positive earnings (cash flows) were forecasted in the IPO prospectus for the post-offer year; AGE is a natural logarithm of the number of days between the company incorporation date and the ASX listing date; *Percent correct predictions* are calculated using a binary logistic model; *, **, *** significant at alpha 0.10, 0.05, respectively 0.01 level. Dependent variable is a dichotomous outcome, whether the new economy IPO company has a seasoned equity offer within three years after listing (1) or not (0).

Table 5 Multiple regression analyses of the duration between the initial public offer (IPO) and the first seasoned equity offer (SEO) for new economy companies listed on the Australian Stock Exchange between January 1994 and December 2002

Independent variable	I	II	III
Intercept	7.183 (14.947)***	6.361 (12.348)***	6.304 (5.336)***
PRE_CRASH	-0.458 (-2.334)**	-0.549 (-2.783)***	-0.559 (-2.801)***
CTE	-0.596 (-2.694)***	-0.516 (-2.570)**	-0.515 (-2.432)**
VC	0.130 (0.679)	0.254 (1.302)	0.230 (1.044)
NEW_SHARES	-0.499 (-2.129)**	-0.061 (-0.259)	-0.152 (-0.132)
UNDERPRICED	-0.313 (-1.532)	-0.162 (-0.732)	-0.162 (-0.655)
POST_IPO_30	1.347 (0.366)	-11.148 (-1.669)*	-11.325 (-1.698)*
DILUTION			0.176 (0.838)
RETAINED_OWNERSHIP	-0.083 (-0.121)	-0.101 (-0.131)	
EARNINGS	-0.281 (-1.348)		
CASH_FLOW		0.351 (1.539)	0.280 (1.028)
AGE	-0.075 (-0.970)		
Model F	1.783*	2.120**	2.107**
Adjusted R ²	4.10	5.40	5.40

Notes Cell values represent unstandardised regression coefficients for individual variables, with corresponding *t*-statistics in parenthesis; Dependent variable is the natural logarithm of the number of days between IPO listing date and the first seasoned equity offer announcement date; PRE_CRASH is unity for IPOs listed between January 1994 and March 2000, and zero otherwise; CTE is a dichotomous variable with unity representing new economy companies listed as Commitments Test Entities; VC is unity for new economy companies associated with venture capital investment and/or expertise prior to listing; NEW_SHARES is a dichotomous variable where unity represents primary (new) shares offered in the IPO; UNDERPRICED is a dichotomous variable where unity represents underpriced new economy listings (positive returns between the subscription price and the first trading day closing price); POST_IPO_30 is the aftermarket share return for the first 30 trading days (excluding the first day returns); DILUTION is the ratio of new shares sold in the offer divided by the number of old (pre-existing) shares; RETAINED_OWNERSHIP is the percent of shares retained by original investors and is calculated as total number of shares at listing less the shares sold in the offer, divided by the total number of shares; EARNINGS (CASH_FLOW) assigns unity if positive earnings (cash flows) were forecasted in the IPO prospectus for the post-offer year; AGE is a natural logarithm of the number of days between the company incorporation date and the ASX listing date; *, **, *** significant at alpha 0.10, 0.05, respectively 0.01 level. Regression models I and II have White (1980) heteroskedasticity consistent *t*-values while regression III has a homogenous variance of residuals.