EXPLAINING THE INFORMATION CONTENT AND COMPLETION RATES OF ON-MARKET REPURCHASE PROGRAMS CONDUCTED IN AUSTRALIA

by

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ABSTRACT

This dissertation investigates on-market repurchase programs conducted in Australia and explores whether conditions of transparency in the Australian environment are conducive to firms wishing to signal undervaluation of their shares. A sample consisting of 789 programs that are announced over the period 2000 – 2010 are identified and information contained in relevant repurchase disclosures to the market, including program announcements, completion notices and daily trading notices are hand collected for investigation.

In this study I examine the share price reaction around the period of a program announcement and the subsequent completion of a program as well as the number of shares repurchased. Share returns are examined by employing an event study methodology and the determinants of the share reaction is established using multiple regression analysis. Tobit regression analysis is employed to investigate the determinants of program completion rates.

Results demonstrate that program announcements are accompanied by positive abnormal returns and announcement returns are greater for 'initial' programs than for 'repeat' programs. Of interest, firms which indicate an unlimited duration earn a greater market response to announcements than firms indicating a fixed period duration. Examination of program completions reveal that completion notices are not accompanied by returns significantly different from zero, a result that is consistent with the notion that they do not impart new information to the market.

Examination of announcements demonstrate that the fraction of shares sought or repurchased in a program is not a determinant of announcement returns and firms do not earn a repurchase reputation from prior programs. This finding undermines the importance of program size as a potential cost of false signalling in the Australian environment. Instead, I find evidence that program duration is used by the market as a signal of firm quality. Results demonstrate a negative association between announcement returns and intended program length, consistent with the notion that the shorter the period of time a firm intends to execute a program the more credible a signal to the market that its shares are undervalued. Investigation of completion rates demonstrate that firms are more likely to achieve their repurchase targets if a shorter program length is indicated in an announcement and also the sooner a program is terminated ahead of time.

Evidence shows that completion rates are increasing with the range in price a firm pays for its shares and is consistent with the notion that firms repurchase shares out of management's disagreement with the market over the valuation of its shares rather than to arrest falling share prices. A concern that is often raised in connection with on-market repurchases is that stocks with volatile share prices are particularly suited to firms wishing to acquire shares at 'cheap' prices to the benefit of non-selling shareholders, however I find that the transparency of on-market repurchase programs conducted in Australia are effective in deterring firms from engaging in opportunistic behaviour.

DECLARATION

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G.P. GOULD

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CHAPTER 1: INTRODUCTION

The purpose of this chapter is to discuss the major objectives of the thesis, summarise the major results, to describe data sources and software packages used, and overview chapters two thru seven.

1.1 BACKGROUND

The ability of firms to repurchase their own shares was first introduced in Australia in 1989 but was not extended to on-market share buy-backs (repurchases) until 1991 after the Australian Stock Exchange (ASX) had made the necessary amendments to the Listing Rules to accommodate them.[1] Self-purchasing power for Australian companies had previously been prohibited on the grounds that it was seen as a way for shareholders to circumvent their lower ranking when a company is unable to honour its debts but was introduced in Australia to give companies greater flexibility over the control of their equity similar to that enjoyed in other countries, such as the US, the UK and Canada. [2] Other countries that have the ability to repurchase shares include France, Germany, Netherlands, Japan, China (Hong Kong), New Zealand Taiwan and Malaysia. Under Australian legislation five forms of share repurchases are permissible;[3]

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[1] Although referred to as 'share buy-back' under Australian Corporations law, the term 'share repurchase' is commonly used in the literature and, as such, will be used in this thesis.

[2] Legislation of the Australian Corporations Law and ASX Listing Rules for repurchases have evolved primarily from the recommendations of the Co-operative Scheme Legislation Amendment Act (CSLRC) following the recommendation of the CSLRC Report *'A Company's Purchase of Its Own Shares'* (1987) to the Ministerial Council.

[3] In the US, on-market, equal access and selective repurchases are referred to as open-market, off-Market or fixed-price self-tender offers, and targeted share repurchases, respectively. Dutch auction and accelerated share repurchases occur in the US for which there is not an Australian equivalent. In a Dutch auction, firms announce the number of shares they wish to repurchase and the shareholders specify the price at which they are willing to sell their shares to the firm. The firm then aggregates these asking prices into a supply schedule and calculates the price necessary to purchase the stated

- On-market,
- Equal access scheme, (previously referred to as 'off- market')
- Selective,
- Minimum holding (previously referred to as 'odd- lot'), and
- Employee share scheme (previously referred to as 'employee share').

All forms involve the purchase of shares by the company from its existing shareholders. On-market repurchases involve companies listed on the ASX purchasing shares directly on the share market via a broker typically at market price. Equal access or *pari passu* repurchase schemes involve a pro-rata invitation to all shareholders to participate and management designates the percentage of shares sought and the offer price which may be at a premium. Selective repurchases are negotiated between the firm and a particular shareholder or small group of shareholders at a specified price, normally at a premium. Minimum holding repurchases are offered to investors with small share holdings, and employee share scheme repurchases are offered to employee-shareholders.

Share repurchases first became a focus of attention in the literature due to the increasing volume of repurchase activity in the US, especially during the 1980s and 1990s (see Ikenberry et al., 1995; Grullon and Michaely, 2000). The popularity of on-market share repurchases has led to a branch of research where studies have examined them as a preferred cash payout to shareholders in substitution for dividends (see Jagannathan et al., 2000; Fenn and Liang, 2001; Guay and Harford, 2000; Grullon and

number of shares. It then pays the cut-off price to shareholders who tendered at this price or less. In an accelerated share repurchase, the firm enters into an agreement with an intermediary to repurchase an agreed amount of stock (Bargeron et al., 2011).

Michaely, 2002; Kahle, 2002; Moser, 2007; Brockman, Mortal and Howe, 2008; Skinner, 2008; Jiang et al., 2013).[4] On-market share repurchases are of particular interest to researchers since they allow firms to acquire shares on the open market in the normal course of trading on the stock exchange and are therefore seen as providing firms with the ability of "*speculating or trafficking*" in their own shares and "*may be open to substantial abuse or misuse*" (CSLRC, Appendix B, p. 46).

1.2 MAJOR OBJECTIVES

An overall motivation of this thesis is to see whether the conditions of transparency of the Australian capital market for on-market share repurchase programs enhance the ability of firms to signal undervaluation. While there does not appear to be a clear dominant motive for firms to repurchase their shares on-market (Grullon and Ikenberry, 2000), there seems to be a general consensus that empirical evidence best supports the 'signalling undervaluation' and to a lesser extent 'information signalling' hypotheses.

Research undertaken mainly in the US but also in other countries, such as Canada and the UK, has found that on-market repurchase announcements are generally accompanied by abnormal returns and are preceded by a period of negative abnormal performance, consistent with undervaluation as a motive for management to repurchase shares (see for example, Vermaelen, 1981; Comment and Jarrell, 1991; Ikenberry et al. 1995; Stephens and Weisbach, 1998; Ikenberry et al. 2000).

[4] For the period 1985 – 2004, the total amount spent on repurchase programs 'on-market' in the US was $US1.8 trillion (Banyi et al., 2008).

However, a major obstacle to signalling as an explanation is that announcements do not represent a definite commitment by firms to repurchase their shares, thus raising the question of their use as a credible signalling mechanism especially given that firms typically repurchase shares at market price (Vermaelen, 1981). In contrast, off-market repurchases commit firms to repurchase the number of shares stated in the announcement at a price that is normally at a premium to the market value, thereby making it prohibitively costly for firms to provide a false signal.[5] This problem is further exacerbated for on-market repurchases if firms are not required to make an announcement of its intention to the market in the first place or do not keep the market informed when shares are actually repurchased subsequently. For example, in the US where a majority of the research in this field has been conducted, firms are not required to make an announcement or, until recently, disclose their trading activity subsequent to an announcement.[6] Instead, US companies (since 1982) operate under the "safe harbor" rule (Rule 10-b)[7] which does not impose limitations on repurchase activity or until recently, require disclosure of actual trades, but in its place provides legal protection to firms against accusations of price manipulations as long as certain trade limits are followed.[8] Further, the seller of the stock is normally unaware that he or she is selling to the company and that acquired stock is held as treasury shares that can be later transferred to management in satisfaction of stock options.

[5] It has been observed that firms in Australia generally offer less than the market value for its stock in an off-market repurchase because part of the proceeds can be structured as a fully franked dividend, thereby lowering the effective cost to the firm (Brown and Norman, 2010).

[6] Although actual repurchases were not required to be disclosed, many firms provided this information in footnotes to their financial statements and allowed researchers to estimate the number of shares repurchased (Banyi et al., 2008).

[7] Prior to this, US firms had to comply with the anti-manipulation and anti-fraud provisions of the Securities and Exchange Act of 1934 (Vermaelen, 1981).

[8] Firms must now make quarterly disclosures of the number of shares repurchased and average prices paid in addition to providing program announcement dates, program size and the expiration date (Banyi et al., 2008).

Legislative requirements in other jurisdictions promote greater transparency than in the US but vary in execution. For example, in comparing requirements of the UK, Canada, Hong Kong (China), France and Japan, shareholder approval is required in the UK, Hong Kong and France whereas Canadian firms require approval from the stock exchange (Toronto Stock Exchange) and since 1997, provided firms have altered their articles, shareholder approval is not required in Japan. A formal announcement of intention to repurchase is required in Canada but not in the UK, Hong Kong, France or Japan. Further, in both the UK and Hong Kong firms must notify the exchange on the following day it has repurchased shares whereas periodic reporting of repurchase activity is only required in Canada, France and Japan. Since 2004, firms in the US are required to report trading activity on a quarterly basis.

In comparison with other jurisdictions, and in particular with that of the US, Australian shareholders are offered greater protection and the disclosure requirements for on-market repurchases can be regarded as transparent and comprehensive (Dharmawan and Mitchell, 2001). Australian firms must cancel shares that have been acquired and are restricted to buy back shares at a price which is not more than 5% above the market price. Although shareholder approval is only needed if more than 10% of the voting shares are to be acquired within a 12 month period (known as the 10/12 rule), Australian firms must also follow the disclosure requirements set out in the Listing Rules of the Australian Stock Exchange (ASX).[9] The ASX follows a regime of continuous disclosure which requires firms to immediately notify the

[9] Provision set out in the ASX relating to on-market repurchases are contained in Chapters 3, 4 and 7 of the ASX Listing Rules. The legal provisions relating to share repurchases are set out in Part 2J.1 of the Corporations Act. The requirement for acquired shares to be cancelled and the 10/12 rule are set out in sub-sections s 257H and s 257C respectively, of the Act. Price restrictions are set out in sub-sections 7.29 and 7.33 of the Listing Rules.

exchange of any price sensitive information.[10] Firstly, Australian firms are required to make a formal announcement of intention to repurchase, as is required in Canada. Secondly, they must notify the exchange on the following day if shares have been acquired, consistent with that of the UK and Hong Kong. In addition they must also notify the exchange when the program is completed and of any changes to conditions set out in the announcement during the program, such as, altering the end date of the program or the amount of shares to be repurchased.

Further, the ASX prescribes the content of information that must be disclosed in each of these notices, for example, as well as the number of shares intended to be repurchased and the number of shares outstanding at the time of the announcement, firms are required to disclose the name of the broker acting on the firm's behalf together with the motivation behind the repurchase and the intended duration of the program. Similarly, completion notices must disclose the highest and lowest price paid as well as the total number of shares repurchased and consideration paid. Likewise, daily repurchase notices must provide details of current acquisitions as well as progressive acquisitions. In all, full disclosure and transparency in a timely manner is thus ensured.

Although shareholder approval is required in the UK, Hong Kong and France, the market may be unaware of when firms enter the market to repurchase shares, for example in the UK, once shareholder approval has been obtained at an ordinary meeting the firm may purchase shares without revealing its identity. Consequently, the signalling properties and incentives in relation to undervaluation are potentially

[10] ASX Listing Rule 3.1 'Once an entity is or becomes aware of any information concerning it that a reasonable person would expect to have a material effect on the price or value of the entity's securities, the entity must immediately tell ASX that information.'

much greater in Australia than in other countries (Mitchell and Dharmawan, 2007). On the other hand, it could be argued that the continuous disclosure requirements of the ASX in general, go part of the way in removing information asymmetry (a pre-condition of signalling) between management and the market thereby negating the necessity for firms to engage in on-market repurchases for this purpose. It is therefore an empirical question whether on-market repurchases are a suitable mechanism for signalling firm undervaluation in the Australian context.

Several Australian studies have examined share repurchases and on-market repurchases in particular. Empirical studies have so far explored;

- the share market performance or valuation around announcements (Harris and Ramsay, 1995; Otchere and Ross, 2002; Lamba and Ramsay, 2005; Mitchell et al., 2006; Lamba and Miranda, 2010; Farrugia et al., 2011; Akyol and Foo, 2013),
- the share market performance around daily repurchase trading activity (Akyol and Foo, 2013)
- the common motivations stated in announcements (Mitchell and Robinson, 1999), and managements' view of why firms repurchase shares (Mitchell et al. 2001),
- the financial characteristics of announcing firms and completion rates (Mitchell and Dharmawan, 2007),
- the relationship between general economic conditions and the frequency of repurchase programs (Farrugia et al., 2011),

- the application of program announcements to maximise executive and employee option payoffs (Balachandran et al., 2008) and to neutralise dilution of earnings per share (Lamba and Miranda, 2010), and
- the choice between conducting an on-market or off-market repurchase (Brown and Norman, 2010).

A limitation with some of this research is that the period under examination includes an era in which the initial legal requirements for share repurchases were regarded as highly regulated and restrictive. It wasn't until December 1995 following legislative changes that considerably simplified repurchasing rules that repurchase activity increased.[11] As such, on-market share repurchases "were not seen by management as a useful instrument to inform investors about 'undervaluation'" (Lamba and Ramsay, 2005, p265) suggesting that firms may have been motivated for other reasons.[12] Legislation was subject to further minor changes in 1998 and therefore studies in Australia that included the period up to the end of 1995 in particular and, to a lesser extent up to 1998, may not be relevant in evaluating signalling of undervaluation as a motivation. [13] As such, findings of studies by Harris and Ramsay (1995), Otchere and Ross (2002), Lamba and Ramsay (2005), Mitchell et al. (2006), Mitchell and Dharmawan (2007) and Lamba and Miranda (2010) may provide only limited insight

[11] Legislation was revised subject to the First Corporate Law Simplification Bill (FCLSB) introduced in December 1995 to reduce the complexity and overtly costly and procedural nature of the repurchase legislation. In respect to on-market repurchases it removed (i) the previously mandatory requirements involving reports from auditors and experts, (ii) the need for advertising, (iii) solvency declarations and (iv), the 12 month buy-back limit of 10%. For a discussion of legislative changes, see Mitchell and Robinson (1999); Dharmawan and Mitchell (2001) and Lamba and Ramsay (2005).

[12] Lamba and Ramsay (2005) report 12 announcements occurring in the 5 year period prior to the legislative changes and 91 announcements in the 3 year period subsequent.

[13] Further changes were introduced by the Company Law Review Act 1998 effective 1 July 1998 and included the permission of redeemable preference shares to be repurchased and a new solvency test was introduced with the requirement that the repurchase does not materially prejudice the company's ability to pay creditors.

into this phenomenon,[14] whilst research by Balachandran et al. (2008), Brown and Norman (2010) and Farrugia et al. (2011) are primarily motivated by other concerns. For example, Balachandran et al. (2008) are concerned with the use of repurchases as a method of driving up share prices for firms with outstanding options, whilst Brown and Norman (2010) are concerned with the choice between conducting an off-market and on-market repurchase and Farrugia et al. (2011) are concerned with general market conditions surrounding the frequency of repurchase programs in addition to the market reaction to program announcements.[15] In a later study, Akyol and Foo (2013) examine the impact of repurchase announcements and share acquisitions for the period 1998 - 2008, thus minimising the impact of prior regulations on their results but focus their investigation on repurchase motivation.

A further limitation to Australian studies so far is the extent of which ASX repurchase notifications are incorporated into the research. Apart from Mitchell and Dharmawan (2007), Brown and Norman (2010) and Akyol and Foo (2013), studies are generally restricted to announcements only. Given that signalling arises from the existence of information asymmetry, the inclusion of other notices required by the ASX will provide a comprehensive examination of signalling and lead to far reaching conclusions that may not be available on other stock exchanges. As such, this thesis will incorporate information contained in completion notices and repurchase trading notices as well as in announcements and other ASX releases. To avoid the possible

[14] The following time periods are covered by these studies. Harris and Ramsay (1995) 1991- 1993; Otchere and Ross (2002) 1991 – 1999; Lamba and Ramsay (2005) 1991 – 1998; Mitchell et al. (2006) 1991 – 1998; Mitchell and Dharmawan (2007) 1996 – 2001; and Lamba and Miranda (2010) 1997 - 2000.

[15] A limitation to the findings of Farrugia et al. (2011) is the use of raw returns to measure abnormal returns around announcements.

impact of previous legislative requirements this thesis will examine repurchases that are announced between the years 2000 – 2010.

A second motivation of this study is to examine whether information contained in Australian announcements, that have not been studied elsewhere, is relevant in explaining the market reaction to announcements in the context of signalling undervaluation. Other studies have found that announcement returns are positively related to the fraction of shares sought (see Comment and Jarrell, 1991; Ikenberry et al. 1995, Ikenberry and Vermaelen, 1996; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Chan et al., 2004; Bonaimé, 2012) and negatively related to pre-announcement returns (Comment and Jarrell, 1991; Stephens and Weisbach, 1998; and Kahle, 2002). Also, evidence finds firms that have indicated undervaluation as a motivation in their announcements experience higher announcement returns and lower pre-announcement returns (Peyer and Vermaelen, 2009; Akyol and Foo, 2013). Since providing 'explicit' information in an announcement may serve as a strong indicator that a firm is committed to follow thru with its repurchase intentions (Andriosopoulos, et al., 2013), information that is required to be disclosed in Australian announcements in addition to the number of shares sought and motivation may also provide useful information to investors. For example, firms are required to indicate the commencement date and intended duration of the repurchase program. Given the fraction of shares sought, it is hypothesised that the shorter the expected program duration, the greater potential cost to the firm since they have less time to complete the transaction, and so other things being equal, the more credible the signal.

Stephens and Weisbach (1998) find a positive relationship between announcement returns and subsequent repurchases, consistent with the notion that the market identifies which firms are likely to repurchase. Similarly, Bonaimé (2012) identifies a positive relationship between completion rates of prior and subsequent programs, and further, that the announcement returns of subsequent programs are positively associated with these completion rates. This evidence suggests that firms gain a reputation for meeting announcement commitments and the market examines this reputation when evaluating current program announcements. This being the case, given that in Australia the market is aware of the intended program length and is informed when a program is completed, and to the extent that duration differs from intention, a reputation effect based on duration of past programs may exist and help explain the market reaction to current programs in the same way as prior completion rates. Further, given that the market is also informed when firms repurchase shares, the 'speed' upon which shares are repurchased during a current program may also add to a firm's reputation. For example, for a given fraction of shares sought and intended program duration, firms that repurchase shares earlier in the program rather than later may convey a greater commitment to repurchase shares, thereby adding credibility. As such, the third motivation of this thesis is to extend the basis upon which firms develop a reputation from previous programs to include prior program duration and repurchasing 'speed'.

The fourth motivation of this study is to examine whether the transparency of the Australian repurchase environment leads to a greater commitment of the firm to follow thru with its announcement intention and whether the market rewards (punishes) firms that exceed (disappoint) share repurchase expectations. Given that

firms are required to make a formal announcement of its intention to repurchase shares and the market is kept fully informed of its progress throughout the duration of a program it is expected that firms will make a greater attempt to meet their repurchase targets. Similarly, since investors are kept continually informed, they are in the position to assess whether their expectations have been met and reflect this in the firm's share price. As such, at the completion of a program the market will reconsider the quality of a firm according to the number of shares it has repurchased and the time taken do so in comparison to its original agreement and the market's expectation.

A final motivation of this study is to provide a comprehensive data set for on-market repurchases using Australian data that is not available in other studies or jurisdictions. Research, predominantly that of the US, has examined for on-market repurchases in a variety of contexts, however, the reliability of evidence collected in the US prior to 2004 has come into question since researchers were required to estimate the number of shares repurchased from indirect measures and information available from databases that are commonly used in these studies are unreliable (Stephens and Weisbach, 1998; Banyi et al., 2008). This highlights the need for reliable evidence to be collected to verify findings of earlier research.

In Australia, as in Hong Kong and the UK, companies are required to daily notify the stock exchange of shares repurchased, a feature that is not required in the US and in other countries. In France, firms are required to publicly report the number of shares repurchased on a monthly basis, similar to the requirement now in place in the US. Interestingly, firms in Hong Kong and the UK are not required to make an

announcement of its intention to repurchase shares to the market. The fact that Australian companies are required to make a formal announcement to the market and notify the exchange of their daily repurchase activity, in addition to notifying the market of amendments to repurchase conditions and when a program is completed means that the researcher has the ability to examine on-market share buy-backs in their entirety.

Apart from the initial announcement, each day that a buy back takes place, the daily amount and cumulative amount of repurchases (number and dollar amount) as well as the number of shares remaining to be repurchased must all be disclosed. Similarly, a formal notification of the termination of a program noting the total number of shares repurchased must be provided. All of the above must be communicated to the market opening the next day. In all, full disclosure and transparency in a timely manner is thus ensured. In the US, the first one is normally made aware of a firm's intention to repurchase shares is after the event. Also, there is an absence of disclosure requirements for program announcements, if one has occurred, and the reporting of repurchase activity following an announcement, apart from that required in order to comply with the 10b-18 safe harbour provisions. Detailed data on US repurchases are not disclosed to the public or SEC and cannot be observed at the time the transaction occurs or even directly and accurately measured after the repurchase. Most US data on actual repurchases is in aggregate form and sourced from the annual report. Consequently, given the transparent disclosure throughout the buy-back process in Australia, the signalling properties and incentives in relation to undervaluation are potentially much greater.

1.3 MAJOR RESULTS

This thesis identifies 789 on-market share repurchase announcements made between 1 January 2000 and 31 December 2010. The information content of announcements and completion notices together with repurchase trading notices are analysed. The market reaction to program announcements and completion notices are examined and multiple regressions are performed to find determinants of abnormal returns.

Of the announcements collected 769 are identified as 'completed' or 'closed' by 15 March 2012 resulting in over 5bn shares being repurchased for a total value of over A$18bn. Analysis of completion notices show that firms acquire on average 3% of shares outstanding and 39.3% of the shares targeted in an announcement. Programs last on average 9.9 months, which is lower than that indicated in an announcement, and that 75% or more shares repurchased are done so in the first half of the intended program.

Using an event study methodology, abnormal returns are determined for program announcements. Results demonstrate that program announcements are accompanied by positive abnormal returns and that these abnormal returns are greater for 'initial' announcements than for 'repeat' announcements. Using multiple regression analysis, it is then determined whether intended program length can explain announcement returns and whether firms then develop a reputation for program duration and the 'speed' with which shares are repurchased from prior programs. Results demonstrate that there is a negative association between announcement returns and intended program length, consistent with the notion of the market using it in assessing the

credibility of an announcement. Results do not demonstrate that the market considers a firm's reputation when evaluating the credibility of a 'repeat' program.

Completion rates are determined by comparing shares acquired from a completion notice with the fraction of shares sought in an announcement. Using tobit regression analysis, it is then determined whether firms repurchase shares at 'cheap' prices and if their repurchasing behaviour is influenced by program duration and their desire to repurchase shares in the initial stages of a program. Results reveal a negative association between program completion rates and share price volatility demonstrating that firms are not buying under-priced shares to the benefit of non-selling shareholders. Results also show that completion rates are negatively associated with both intended program length and program duration, indicating that firms are more committed to acquire shares the shorter the time period specified in an announcement and the sooner they conclude a program.

It is also determined whether a firm's buying behaviour is in response to undervaluation of its shares. Evidence shows a positive relationship between completion rates and the ratio of the highest to lowest price paid for shares, consistent with this view. It is then explored whether there is a pattern in repurchase behaviour between consecutive programs by comparing completion rates of current programs with program duration and completion rates of prior programs. Results show a positive association between the completion rates of current and prior programs but do not find an association between completion rates of current programs and the duration or repurchase 'speed' of prior programs.

Also using an event study methodology, abnormal returns are determined for program completion notices. Results demonstrate completion notices are not accompanied by a market reaction significantly different from zero. Using multiple regression analysis, it is then determined whether conduct during a program has an influence on completion returns and whether there is a connection with prior programs. Results demonstrate that program duration and completion rates as well as the 'speed' in which firms repurchase shares are not associated with completion returns but program announcement returns are. This finding demonstrates that the market reverses some of its original assessment of a firm made at the time a program is announced when the program is completed. Results do not support an association between lagged values of prior programs and completions returns of current programs consistent with signalling theory further undermining the importance of program reputation to the Australian market. Results also indicate that completion returns are influenced by the share price performance measured over the duration of a program.

1.4 CONTRIBUTIONS TO RESEARCH AND POLICY

This thesis makes the following contributions. Program duration is found to be important to Australian on-market repurchases. Intended program length explains announcement returns and together with program duration explains repurchasing behaviour of firms. Program size on the other hand does not determine announcements returns. This finding has implications to theory as it demonstrates that intended length is useful to Australian investors in assessing the credibility of repurchase announcements as a signal of undervaluation rather than program size, which is found in overseas studies. This finding also has important implications to policy makers in overseas jurisdictions, such as the US, where repurchased shares are

held as treasury stock and open to potential abuse. Evidence demonstrates that firms are still able to use on-market repurchase programs to credibly signal undervaluation of their shares without this provision.

This thesis finds that regulations of Australian on-market repurchases deter firms from buying shares at 'cheap' prices to the benefit of non-selling shareholders, and provides evidence that firms repurchase out of disagreement with the market over the valuation of its shares rather than to arrest falling share prices. This evidence demonstrates that the transparency of share repurchases in Australia not only enables firms to effectively signal undervaluation of their shares but also protects selling shareholders.

This thesis also contributes to the literature by examining the market reaction to completion notices, which is found not to be significantly different from zero and demonstrates that completion notices do not impart new information to the market.

Finally, this thesis makes a contribution to the literature by examining the role of new information such as; intended program length, partial completion rates, and the price range offered for shares that are provided in announcements and other repurchase notices in Australia which have not been subject to examination previously.

1.5 DATA AND SOFTWARE PACKAGES

For completeness of data only those firms listed on the Australian Stock Exchange (ASX) that have made on-market repurchase announcements from January 2000 to December 2010 for ordinary shares or stapled securities listed on the ASX are studied.

All repurchase announcements together with other ASX notices are hand collected and accessed thru the 'Connect 4 annual report collection' (Connect 4) available on-line from the Barr Smith Library of the University of Adelaide. All financial data are obtained from Thomson ONE and Connect 4 databases. Information of firm's issued capital and corporate history are accessed from Morningstar DatAnalysis database (Morningstar). Share price data and market index data are obtained from DataStream database. All databases are available on-line from the Barr Smith Library or from other database subscriptions of the Business School, University of Adelaide. All data entries and computations are performed on Microsoft Excel and statistical manipulations are performed on SAS Software 9.3.

1.6 OVERVIEW

This thesis is organised as follows. In Chapter 2 the major research questions that will motivate the empirical research will be formed, whilst in Chapter 3 the process in which information released to the ASX regarding on-market share repurchases is reviewed and a summary of information obtained from repurchase notices is provided. In Chapter 4 the first study on announcement returns will be discussed, whilst the second study on completion rates will be discussed in Chapter 5. In Chapter 6 the third study on completion returns will be discussed. Each study will entail a review of the theoretical and empirical literature concerning on-market share repurchases from a signalling context together with the development of testable hypothesis and appropriate research design. Finally, a summary of the key findings and the contributions to research will be provided in Chapter 7

CHAPTER 2: RESEARCH QUESTIONS

The purpose of this chapter is to develop research questions, consistent with the major objectives raised in Chapter 1, to guide the development of testable hypotheses and appropriate research design for three separate studies that will be the subject of Chapters 4 - 6.

An overall motivation of this thesis is to see whether the conditions of transparency of the Australian capital market for on-market share repurchases, enhance the ability of firms to signal undervaluation. In particular the aim of this thesis is to examine whether information contained in announcements and other repurchase notices are used by the capital market in assessing the credibility of a firm. As such, the market reaction to program announcements and completion notices will be examined in addition to program completions rates.

Share repurchases have the following potential effects on a firm (Ogden et al., 2003, p489- 490). Firstly, a firm's asset and equity base is reduced since cash is required to repurchase shares. Secondly, a firm's capital structure is increased if the firm has outstanding debt. Thirdly, since a firm becomes a buyer of its own stock it may cause upward pressure on share price. Fourthly, a firm may increase earnings per share (EPS) or net asset backing per share since the number of outstanding shares is reduced, and lastly, firms may provide liquidity to its stock by acting as a buyer that otherwise may be absent in the market. In addition to these impacts, other reasons have been offered in the literature to justify the use of on-market repurchase programs, such as, providing a substitution to dividends as a payout to shareholders

(Bagwell and Shoven, 1989; Grullon and Michaely, 2002), fending off takeovers (Dittmar, 2000) and removing agency costs of free cash flow (Grullon and Ikenberry, 2000).

While there does not appear to be a clear dominant motive for firms to buy back their shares on-market (Grullon and Ikenberry, 2000), there seems to be a general consensus that empirical evidence best supports the 'information signalling' and 'signalling undervaluation' hypotheses. Announcements are generally accompanied by positive abnormal returns of 2 – 4% and are normally preceded by a period of negative share market performance, which is interpreted as providing firms with the motivation to signal. Further, abnormal returns have been measured to persist for up to 3-4 years following announcements (Ikenberry et al., 1995 and 2000; Chan et al., 2004 and 2007; Peyer and Vermaelen, 2009) without being accompanied by a definite improvement in firm's operating performance (Jagannathan and Stephens, 2003), suggesting that management are signalling undervaluation rather than improved future performance, as well as questioning the efficiency of capital markets with respect to public information (Peyer and Vermaelen, 2009).

Interestingly, an on-market repurchase announcement does not represent a definite commitment by a firm to repurchase its shares thus raising a question of credibility as a signalling mechanism, given that theory suggests that it must be prohibitively costly for firms to give false signals. It has been conjectured by some researchers that companies do not follow thru with their commitments stated in an announcement and the necessity to buy back may even disappear if the announcement results in a correction of the share price (Grullon and Ikenberry, 2000). However, due to the fact

that until recently firms in the US were not required to disclose the number of shares repurchased, this evidence has mainly been anecdotal. Stephens and Weisbach (1998) estimate that a majority of shares targeted at the time of the announcement are subsequently repurchased. If companies are not committed to repurchasing shares pursuant to an announcement then it is an issue whether the repurchases are accepted as a positive signal and how the market penalises firms giving false signals. Given the lack of commitment it could be argued that managers will consider share repurchases as another mechanism with which to mislead investors and boost stock prices (Chan et al., 2010).

Similarly, if firms are motivated to signal that their shares are undervalued then it raises the question why companies find it necessary to engage in repeat announcements. Initial announcements by successful and unsuccessful firms may produce conflicting signals resulting in a pooling equilibrium across firms whereas repeat announcements may differentiate firm quality. An alternative explanation is that initial announcements resolve information asymmetries between investors and the firm, resulting in a greater potential to signal undervaluation to the market than for repeat announcements (Andriosopoulos and Lasfer, forthcoming). Whilst finding that announcement returns are also positive for repeat announcements, Andriosopoulos and Lasfer (forthcoming) find that announcement returns are greater for initial programs than repeat programs. Similarly, Jagannathan and Stephens (2003) find that announcement returns are smaller for firms that make frequent announcements compared to firms that make infrequent announcements. Further, they find firms that repurchase frequently experience higher market returns preceding an announcement

than firms that repurchase infrequently, suggesting that such firms are not motivated by undervaluation.

Despite the issue of commitment, evidence of a positive association between announcement returns and the fraction of shares sought exists (see Comment and Jarrell, 1991; Ikenberry et al., 1995, Ikenberry and Vermaelen, 1996, Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003) suggesting that the market at least takes into account the potential cost of false signalling. In a significant study, Bonaime (2012) finds a reputation effect, whereby the completion rates of prior programs are positively associated with completion rates of current programs and current announcement returns, suggesting that the market examines a firm's reputation when evaluating announcements. Together these findings imply that the market forms expectations about firms' repurchase commitments from previous programs and from relevant information contained in announcements. This raises the question of whether other information, such as motivation, contained in announcements is useful for the market in assessing firm type. Peyer and Vermaelen (2009) find that firms that have stated undervaluation as a motive have lower pre-announcement returns and higher long-run post-announcement returns suggesting that such firms are particularly undervalued by the market, whereas Bonaimé (2012) finds that 'enhance shareholder value' is significant in explaining announcement returns but completion rates are not significantly associated with any stated motive. On Australian data, Akyol and Foo (2013) find that firms which state undervaluation as a motive experience a greater positive market reaction to announcements and daily repurchase notices than firms motivated for other reasons. Further, they find that

undervaluation motivated firms perform better in the first year following repurchases.[16]

In overseas jurisdictions, such as in the US, Canada or the UK, firms are not required to make a formal announcement or if required to make a formal announcement, they are not required to disclose specific information beyond the number of shares to be repurchased. In Australia however, the ASX requires firms to make a formal announcement and disclose specific information including the intended program duration as well as the maximum number of shares intended to be bought back, the number of shares outstanding and the motivation for the repurchase.[17] Given the number of shares sought, the shorter the intended time period to repurchase these shares the greater the potential cost to the firm to fulfil this commitment and hence the more credible the signal. In addition, the intended period over which a program is conducted as well as the total number of shares repurchased can be confirmed by a program completion notice, which is also required by the ASX. Further, firms are required to notify the exchange, on the following day that it has repurchased shares, the number of shares repurchased and the consideration paid together with the cumulated number of shares repurchased and value paid to date. Therefore the market is not only able to confirm the period over which a program is conducted and the number of shares acquired, but also has the ability to observe a firm's repurchase behaviour progressively over the entirety of a program.

[16] The stated reason in a repurchase announced on the ASX has also been examined by Mitchell and Robinson (1999) and Otchere and Ross (2002).
[17] In addition the name of broker acting on the firm's behalf, conditions of the repurchase and any other information material to a shareholders' decision to accept the offer must be disclosed in the announcement.

Given the level of transparency in Australia raises a question of whether Australian firms are more committed to repurchase shares than overseas firms. Since expectations formed at the time of an announcement can be readily observed as the program unfolds, successful firms will strive to meet these expectations to avoid sending a negative signal of firm type to the market. As such, successful type firms should have higher completion rates and attempt to complete programs within the intended time period. Firms that meet expectations will not disappoint the market. However, firms that do will have their firm type revised downwards (penalised) and firms that exceed expectations will be revised upwards (rewarded).

Research Question 1

Does greater transparency of on-market share repurchase programs on the Australian capital market enhance the ability of firms to signal undervaluation when making a program announcement?

To answer this question, the market reaction to program announcements will be examined together with the influence of specific information that is required to be disclosed in an announcement. In particular, the intended length of a program, which has not been the subject of examination previously, will be investigated to see if it is used by the market to assess the credibility of a signal. The market reaction to announcements of repeat programs will also be examined to see if departure from this intention in a previous program assists the market in making this assessment. In addition to program length, the 'speed' with which firms repurchase shares in prior programs will also be examined for its influence on the market in assessing firm type.

Research Question 2

Does the transparency of the Australian repurchase environment lead to a greater commitment of the firm to follow thru with its announcement intention?

To answer this question, program completion notices will be examined to determine completion rates and whether firms attempt to uphold expectations that the market has formed at the time of an announcement. In particular, the intended length and program duration will be investigated to see if firms strive to meet its repurchase target within the time frame indicated in an announcement. In addition, the relationship between completion rates of current programs and the program duration and 'speed' with which firms repurchase shares in prior programs will be examined to see if firms attempt to uphold a repurchase reputation.

If transparency of the Australian market enhances the ability of firms to signal undervaluation then it is expected that the number of shares repurchased will be in proportion to the degree of share price undervaluation. To measure this association this thesis will incorporate the difference between the highest price and lowest price paid for its shares, which is required to be disclosed in the completion notice, as a proxy for undervaluation and measure its relationship to completion rates.

A secondary question of investigation is to examine whether transparency of the Australian repurchase environment deters firms from acquiring shares at 'cheap' prices to the benefit of non-selling shareholders. To answer this question the relationship between share price volatility and completion rates will also be examined.

Research Question 3

Are firms penalised (rewarded) that do not meet (exceed) expectations?

To answer this question, the market reaction to the release of completion notices will be examined together with information disclosed in the program announcement. In particular, program duration and completion rates will be investigated to see if departure from the targets set out in an announcement influences the market's reassessment of firm type upon the completion of a program. The influence of program announcement returns will also be examined to see if this reappraisal represents a correction to the market's original assessment. In addition, the relationship between completion returns of current programs and repurchase outcomes of prior programs will be examined to see if the market considers repurchase reputation in making this assessment.

In investigating these research questions, this thesis will conduct three separate studies. The first, being the examination of share prices around the announcement (Chapter 4), the second being an examination of completions rates (Chapter 5) and the third, being an examination of the share price performance at the completion of a program (Chapter 6). In the following chapter (Chapter 3) information contained in an announcement, completion notice and other repurchase notices will be examined and summarised.

CHAPTER 3: DATA COLLECTION OF REPURCHASE ANNOUNCEMENTS AND COMPLETION RATES

As discussed in Chapter 1, this thesis will examine on-market share repurchases that are announced over the period beginning January 2000 to end of December 2010. The purpose of this chapter is to review the process in which information released to the ASX pursuant to on-market share repurchases is identified and to provide a summary of the data obtained. Specifically, this chapter will discuss information contained in repurchase announcements and completion notices that mark the end of repurchase programs together with other relevant notifications. Section 3.1 will provide a brief discussion of the on-market repurchase notices required under the ASX Listing Rules and access to them. Section 3.2 discusses how announcements of intending programs are identified and descriptive statistics of information collated from announcements are provided in Section 3.3. A discussion of how the completions of repurchase programs are captured is offered in Section 3.4 with descriptive statistics on completions provided in Section 3.5 and a summary is provided in Section 3.6.

3.1 NOTICES REQUIRED UNDER ASX LISTING RULES

Under the Listing Rules of the ASX, in relation to on-market repurchases, firms are required to; [18]

- make an official announcement to the market of its intention to repurchase shares using an 'Appendix 3C: Announcement of buy-back' notice (3C notice),[19]

[18] Chapters 3, 4 and 7 of the ASX Listing Rules are relevant to the disclosure requirements pursuant to repurchases.

- notify the exchange of any changes relating to the repurchase using an 'Appendix 3D: Changes relating to buy-back' notice (3D notice),
- notify the exchange of daily repurchasing activity using an 'Appendix 3E: Daily share buy-back notice' notice (3E notice), and
- notify the exchange of the completion of a program using an 'Appendix 3F: Final buy-back notice' notice (3F notice).

All ASX notices are hand collected and accessed thru the 'Connect 4 annual report collection' (Connect 4) available on-line from the Barr Smith Library of the University of Adelaide. The Connect 4 database provides information on takeovers and mergers, capital raisings, annual reports, company (notices) announcements and other capital market information. The database allows for the search of company notices for a specified period and each search produces a list of matching firm notices that contain the date and time (to the hour and minute) each notice is processed by the exchange, and therefore accessible to investors, as well as the name and ASX code of each firm. Normal trading takes place between 10am and 4pm, Sydney time, so that notices processed by the ASX up to the close of trading may potentially be reflected in the share trading of that day. It can be expected that information contained in company notices processed after the close of trading will be reflected in share prices of the following business day. All company notices, including those pertaining to on-market share repurchases can be accessed under the 'Company Announcements' menu and downloaded in pdf format for inspection.[20] Each notice is in a prescribed

[19] To avoid confusion with the term 'announcement' as it is used elsewhere in this thesis (announcement of share repurchase) the term '3C notice' will be used when referring to the 'Appendix 3C: Announcement of buy-back' notice.

[20] All 3C notices, 3D notices and 3F notices are available under the 'Market Repurchase' sub-menu and 3E notices in the 'Daily Share Buy-Back Notice' sub-menu. Notices can be searched by date or by

format and requires particular information to be provided by the repurchasing firm as follows.

3C notice:[21]

- Name of entity
- Type of repurchase
- Class of shares/units which are the subject of the repurchase
- Voting rights
- Fully paid/partly paid
- Number of shares/units in the class on issue
- Whether shareholder/unitholder approval is required for repurchase
- Reason for repurchase
- Any other information material to a shareholder's/unitholder's decision to accept the offer (eg details of any proposed takeover bid)
- Name of broker who will act on the company's behalf
- Name of each director and related party of a director who reserves the right to sell shares, and number of shares in respect of which that director or related party reserves the right (no longer required as from 30/9/2001)
- If the company/trust intends to buy back a maximum number of shares – that number
- If the company/trust intends to buy back shares/units within a period of time – that period of time; if the company/trust intends that the repurchase be of unlimited duration- that intention

company or by combination of both. Recent changes to the database user interface now allow you to refine the search function by notice type.

[21] Other details are required if the repurchase is an 'Employee share scheme repurchase', 'Selective repurchase' or 'Equal access scheme'.

- If the company/trust intends to buy back shares/ units if conditions are met- those conditions

3D notice:

- Name of entity
- Date that an Appendix 3C or last Appendix 3D was given to ASX
- Information about the change
    - Name of broker who will act on the company's behalf
    - Name of each director and related party of a director who reserves the right to sell shares, and number of shares in respect of which that director or related party reserves the right (requirement deleted from 30/9/2001)
    - If the company/trust intends to buy back a maximum number of shares – that number
    - If the company/trust intends to buy back a maximum number of shares – that number remaining to be bought back
    - If the company/trust intends to buy back shares/units within a period of time – that period of time; if the company/trust intends that the repurchase be of unlimited duration- that intention
    - If the company/trust intends to buy back shares/units if conditions are met- those conditions
    - Any other change
    - Reason for change
    - Any other information material to a shareholder's/unitholder's decision to accept the offer (eg details of any proposed takeover bid)

3E notice:

- Name of entity
- Type of repurchase
- Date that an Appendix 3C was given to ASX
- Total of all shares/units bought back, or in relation to which acceptances have been received, before, and on, the previous day
    - Number of shares/units bought back
    - Total consideration paid or payable for the shares/units
    - Highest price paid and before previous day the highest price paid and date
    - Lowest price paid and before previous day the lowest price and date
- Participation by directors (requirement deleted from 30/9/2001)
- If the company/trust has disclosed an intention to buy back a maximum number of shares/units – the remaining number of shares/units to be bought back

3F notice:

- Name of entity
- Type of repurchase
- Number of shares/units bought back
- Total consideration paid or payable for the shares/units
- If repurchase is an on-market repurchase – highest and lowest price paid

The 3C notice and information contained therein are used to identify announcements to the market of intending on-market repurchase programs, whilst 3F notices are used to identify the completion of programs and details of shares repurchased. The 3E notices are used to provide evidence of repurchase trading activity and progressive trading details at key stages during the program, and finally, 3D notices are used to verify any changes to the repurchase arrangements if need be.

3.2 IDENTIFYING ANNOUNCEMENTS AND ANNOUNCEMENT DATES

Ordinarily, announcements of on-market share repurchase programs will be identified from 3C notices lodged with the ASX and the date upon which it is lodged and processed as the announcement date, however in some cases companies may inform the market of an impending on-market share repurchase prior to this notice. For example, some firms may indicate in the details of another notice to the ASX, such as the release of an annual report, that the firm intends to enter into a share repurchase program in the near future or that a program is currently under consideration by management with the release of a formal 3C notice to follow.[22] Not as common, in other situations a firm may release a notice of intent without using the formal notice but convey the same information in the release.[23] Some firms for example, have lodged a 'Notice of intention to carry out a share repurchase', a notice required by the Australian Securities and Investment Commission (ASIC) under section 257F of the

[22] For example, Ausdoc Group (ASX: AUD) announced its intention to enter into a share repurchase in the near future during the announcement of its half-yearly report to shareholders (31/1/2000) with the release of a formal 3C notice 2 weeks later (17/2/2000).
[23] For example, CVC LTD (ASX: CVC) announced its intention to repurchase shares in the results of a Annual General Meeting in which its resolution to buy back 20 million ordinary shares was approved (27/11/2006). A formal 3C notice was not released and a 3E notice was not released until 14/5/2007.

Corporations Act (2001), in place of the 3C notice with the ASX.[24] Since it is crucial for an event study to capture the date upon which the information under investigation first becomes available to the market, this thesis will record the date of lodgement of a ASX notice that first informs the market of a firm's intention to repurchase shares on-market as the announcement date and use the information disclosed therein together with that contained in the following 3C notice for analysis. To ensure that the announcement date is correctly identified, all company notices released around the 3C notice date are checked for verification.[25]

Identification of a repurchase announcement by a 3C notice allows the recognition of repurchase type, on-market or otherwise, the type of security and other information essential to this thesis, such as, the maximum number of shares sought and total number of shares outstanding, the reason for the repurchase, the intended period of time over which shares will be repurchased as well as the name of the repurchasing entity. A distinction will be made in this thesis between announcements of 'initial' and 'repeat' programs. 'Initial' programs represent on-market share repurchase agreements made by a firm for the first time, whereas 'repeat' programs represent those made by a firm that has made one previously. Firms are not required to indicate in an announcement whether it is an 'initial' or 'repeat' program, so that for each

[24]Australian firms are required to lodge a 'Notice of intention to carry out a share repurchase' (Form 280 or 281) with ASIC at least 14 days prior to making an announcement to the market (Corporations Act, s257F). For example, Australian Foundation Investment Company (ASX: AFI) released a form 281 on the ASX on 25/11/2005 in place of the 3C notice. This notice indicated that the firm wished to repurchase 10% of the outstanding shares in a 12 month period and the period over which the repurchase was to occur.

[25] At the suggestion of a staff member from the Business School, University of Adelaide, all ASX announcements identified from the Connect 4 database were cross-checked with the date upon which the 'Notice of intention to carry out a share repurchase' is first made publicly available by ASIC (Document Imaged Date) to verify that the ASIC notice does not pre-date the ASX notice and therefore becomes the effective announcement date. Upon request, ASIC produced a list of notifications for the period 2000 – 2010 together with the Document Image Date for all repurchase program notifications. It was confirmed by the author that the ASIC notification does not pre-date the ASX notification.

announcement identified, ASX notices must be searched for previous announcements in order to make this distinction. To capture potential announcements made prior to 2000, company notices are searched in the Morningstar DatAnalysis database (Morningstar) and the Connect 4 database in addition to examining the issued capital history of each company.[26] Morningstar database contains details of company announcements and annual reports as with Connect 4 database, but also contains details of each firm's corporate history and share price history.

3.3 DESCRIPTIVE STATISTICS ON ANNOUNCEMENTS

The following tables (Tables 3.1- 3.6) provide details of the selection process from which the final sample of program announcements is obtained and provide a summary of statistics of information taken from these announcements. Table 3.1 provides details of the selection process from which a final sample of on-market share repurchase program announcements is identified. As can be seen from the table a total number of 931 potential announcements are identified for the period 2000 - 2010. Of these, 73 announcements are for securities other than ordinary shares and staple securities, such as units, preference shares and convertible securities, for which security price data is not available and are therefore removed from the sample, whilst another 41 announcements are removed because they are for shares listed on an overseas exchange in addition to the ASX.[27]

[26] Connect 4 database provides copies of company notices dating back to 1 September 1998 whereas Morningstar database provides copies of notices dating back to 1989 (Signal G). Morningstar also provides corporate details, such as issued capital, dating back to the 1960s. As with Connect 4, Morningstar enables the user to search by type of ASX announcement back to 1 September 1998 but also allows the user to obtain older announcements by searching records of individual firms.

[27] For example, 5 announcements were identified for Singapore Telecommunications Ltd (ASX: SGT) which is listed on the Singapore and Australian stock exchanges. Observations of the 3E notice and 3F notice demonstrated that shares were repurchased on the Singapore Stock Exchange only.

TABLE 3.1

Details of the Final Sample Selection Process

Table 3.1 presents a summary of the filtering process used to select final sample.

Summary	Number
Total potential announcements identified	931
Announcements involving securities other than 'ordinary shares' and stapled securities	(73)
Announcements involving an overseas exchange	(41)
Regulated industries	(23)
Announcements lacking information	(5)
Total final sample of announcements	789

TABLE 3.2

Final Sample by Announcement Recognition

Table 3.2 presents the number of announcements that are identified from 3C notice or other ASX release.

Summary	Number
Announcements identified from 3C notices	743
Announcements identified from alternative notice with 3C notice to follow	31
Announcements identified from alternative notice without 3C notice to follow	15
Total final sample of announcements	789

TABLE 3.3

Final Sample by Shareholder Approval

Table 3.3 presents the number of announcements that require shareholder approval or not.

Summary	Number
Announcements requiring shareholder approval	60
Announcements not requiring shareholder approval	729
Total	789

A further 23 announcements are made by firms from regulated industries,[28] and are therefore removed together with another 5 announcements that have insufficient information to confirm that an announcement had officially taken place. A final sample consisting of 789 announcements are identified. From Table 3.2, it can be seen that of the 789 announcements, 743, representing 94.2% of the total number, are identified from the lodgement of 3C notice, whilst the remaining 46 announcements are identified from other ASX releases. Of these, 31 are followed later by the lodgement of a 3C notice, leaving 15 announcements not accompanied by a 3C notice. From Table 3.3 it can be seen that 60 (7.6%) announcements require shareholder approval since the fraction of shares sought exceed the 10/12 limit, which stipulates that shareholder approval is required if a firm intends to acquire more than 10% of the outstanding shares within a 12 month period.[29]

Table 3.4 reports year by year and overall, the number of announcements, the average fraction of shares sought, the average intended program length, the number of announcements indicating an unlimited duration, and the number of announcements that are of 'initial' or 'repeat' type. Firstly, it can be seen that the annual number of announcements is fairly constant over the initial years 2000 - 2004 with an increase in the 3 years following and peaking dramatically in 2008 to 141 announcements coinciding with the period of the Global Financial Crisis (GFC) and then abating to levels similar to the years prior to the crisis.

[28] These are firms with the GICS (Global Industry Classification Standard) code of 4010 (Banks) and 5510 (Utilities) and are therefore subject to government regulation.
[29] See sections 257B and 257C of the Corporations Act 2001.

TABLE 3.4

Announcements by Year

Table 3.4 presents the number of announcements identified by year, the average fraction of shares sought for that year, the average intended length of a program for that year, the number 'unlimited duration' programs for each year and whether the number of announcements are of an 'initial' or 'repeat' type.

Year	Number	Fraction of shares sought	Intended length	Unlimited duration programs	'Repeat' programs	'Initial' programs
2000	53	6.54%	13.8	10	23	30
2001	59	7.34%	12.4	14	25	34
2002	58	6.73%	12.6	13	25	33
2003	51	7.81%	13.1	6	33	18
2004	53	8.03%	15.1	10	31	22
2005	75	7.26%	14.8	13	45	30
2006	69	7.07%	13.5	8	47	22
2007	73	7.50%	13.2	7	49	24
2008	141	8.09%	14.3	19	65	76
2009	86	9.47%	12.9	6	63	23
2010	71	9.24%	12.4	4	53	18
Total	789	7.84%	13.9	110	459	330

Compared with Mitchell and Dharmawan, (2007) who studied Australian announcements for the period 1996 to 2001, the number of announcements is less than those reported for 2000 but is approximately the same for 2001.[30] It is worth noting that the number of announcements identified in this chapter (70) for the year 2000 is similar before removing announcements for the above stated reasons. Of note, the number of announcements found in this chapter is significantly higher than that identified by Akyol and Foo (2013) who identify 212 announcements made over a similar time period.[31]

The average fraction of shares sought over the entire sample period is 7.84%, and is fairly constant from year to year with the average increasing around the GFC. The average fraction of shares sought is similar but higher to that reported in Australia by Akyol and Foo (2013) and Mitchell and Dharmawan (2007) and in overseas studies (Ikenberry et al., 1995; Stephens and Weisbach, 1998; Bonaimé 2012). Akyol and Foo (2013) and Mitchell and Dharmawan (2007) report an average fraction of shares sought as 5.95% and 6.6% respectively for Australia, whereas for the US, Ikenberry et al. (1995), Stephens and Weisbach (1998), and Bonaimé (2012) measure an average of 6.6%, 7%, and 6.5% respectively and Ikenberry et al. (2000) reports an average of 5.2% for Canada and Rau and Vermaelen (2002) report 9.8% for UK announcements.

Table 3.4 also reports on the intended length of repurchase program and the number of announcements where unlimited duration is indicated. For the purpose of measuring the intended length, this thesis records 36 months as the intended program

[30] Mitchell and Dharmawan (2007) identify 76 announcements for the year 2000 and 57 announcements for the year 2001.
[31] The study by Akyol and Foo (2013) covers the period 1998 – 2008. This study identifies 141 announcements made in 2008 alone (see Table 3.4).

length for announcements indicating an unlimited duration, 'unlimited duration' programs. Repurchases on average have an intended duration of 13.9 months and 13.9% (110) of all announcements indicate an unlimited duration. Although the average length is fairly constant over the period, with the highest being 15.1 months for 2004 and the lowest being 12.4 months for 2001 and 2010, the number and percentage of announcements indicating an unlimited duration varies considerably from a high of 14 announcements, representing 23.7% of announcements for 2001 to a low of 4 announcements, representing 5.6% of announcements for 2010, even though the average intended length is the same for both years.

Also from Table 3.4 it can be seen that the number of 'repeat' announcements (459) is greater than 'initial' announcements (330) and that the number of 'repeat' announcements over time has generally increased, from being less than 'initial' announcements in the earlier periods, 2000 – 2002, to outnumbering them from 2003 onwards except in 2008, when initial announcements increased threefold. In comparison with Balachandran et al. (2008), who identify by firm rather than announcement, the number of 'initial' announcements identified in this chapter for the period 2000- 2002 is considerably higher whilst for the year 2003 the number is similar.[32] Overall, with the exception of 2008, this evidence suggests that the number of firms engaging on-market repurchases for the first time is decreasing over time but increasing for 'repeat' announcements as to be expected.

Table 3.5 reports on the fraction of shares sought, intended program length and number of 'unlimited duration' programs by 'initial and 'repeat' announcements.

[32] Balachandran et al. (2008) identify 19, 23, 21, and 22 announcing firms for the years 2000, 2001, 2002, and 2003 respectively.

Although there is no discernible difference in the fraction of shares sought under either type, 'repeat' announcements tend to indicate a longer duration on average despite the fact that the relative number of 'unlimited duration' programs is greater for 'initial' announcements, 24.2% (80) compare to 6.5% (30) for 'repeat' announcements, suggesting that firms that engage in 'repeat' announcements tend to indicate a longer fixed period duration. If intended length is a signal of firm quality, then this finding would indicate that 'initial' announcements are more likely to be associated with undervaluation than 'repeat' announcements. These results contrast with those of Jagannathan and Stephens (2003) who measure a higher fraction of shares sought for 'infrequent' repurchasers compared to 'frequent' repurchasers whereas and the fraction of shares sought measured here are almost identical between 'initial' and 'repeat' announcements.[33]

TABLE 3.5

Announcements by Type 'Initial' or 'Repeat'

Table 3.5 presents by program type- 'initial' or 'repeat' the number of announcements, the average fraction of shares sought, the average intended length of a program and the number of 'unlimited duration' programs.

Announcement type	Number	Fraction of shares sought	Intended length	Unlimited duration programs
Initial	330	7.9%	12.8	80
Repeat	459	7.8%	15.4	30
Total	789	7.8%	13.9	110

Table 3.6 reports on the motivations disclosed in announcements why firms undertake on-market share repurchase programs. Motivations are classified as belonging to

[33] Jagannathan and Stephens (2003) break up their sample according to frequency with which firms announce on-market repurchase programs. 'Infrequent' repurchases are the first program announced for last 5 years, 'occasional' repurchases are the second repurchase programs announced in the last 5 years and 'frequent' repurchases refer to the third or subsequent repurchase program announced in the last 5 years.

either ‘undervaluation’, ‘capital management’, ‘enhance shareholder value’, ‘excess cash’, ‘increase EPS’, ‘capital structure’, ‘liquidity’, or ‘other’. The distinction between some of these categories is somewhat arbitrary with a potential to misclassify some of the announcements and management themselves may do so unintentionally. The ‘undervaluation’ category includes announcements where management have indicated that they believe the firm’s shares are undervalued or that they represent a good investment. ‘Capital management’ is a commonly cited reason but is relatively vague as to management’s intention and could possibly encompass other reasons although not stated. ‘Enhance shareholder value’ represents announcements where management have indicated that the repurchase will improve shareholder return or improve shareholder value. ‘Excess cash’ represents firms with surplus cash holdings and is indicative of Jensen’s (1986) free cash flow hypothesis.

The category ‘increase EPS’, includes announcements where management have indicated that the reason for the repurchase is to increase EPS or net asset backing per share but also includes situations in which management have indicated that the repurchase is motivated by outstanding employee stock options or dividend re-investment plans, since both have a dilutive effect on a firm’s EPS or net asset backing per share. ‘Capital structure’ refers to situations where management have indicated the relative level of debt to equity as a reason to buy back shares. For announcements where management have indicated that they wish to provide liquidity for the firm’s shares or reduce share price volatility the motivation has been characterised as ‘liquidity‘, and the final category ‘other’ refers to any other stated reason or announcements where two or more of the above stated reasons are provided.

TABLE 3.6

Announcements by Year and Motivation

Table 3.6 presents the number of announcements by year and by motivation indicated in an announcement- undervaluation, capital management, enhance shareholder value, excess cash, increase EPS, capital structure, liquidity or other reasons.

Year	Number	Under-valuation	Capital manage-ment	Enhance shareholder value	Excess cash	Increase EPS	Capital structure	Liquidity	Other
2000	53	5	11	8	0	2	2	2	23
2001	59	7	15	5	0	6	2	1	23
2002	58	5	20	2	0	7	4	1	19
2003	51	7	16	3	1	5	2	1	17
2004	53	3	18	2	2	4	0	4	20
2005	75	4	27	3	3	6	1	3	28
2006	69	4	29	2	2	1	1	2	28
2007	73	7	37	1	2	3	0	0	23
2008	141	11	75	3	1	5	0	0	46
2009	86	4	51	4	2	1	0	2	22
2010	71	6	43	4	0	1	0	0	17
Total	789	63	342	37	13	41	12	16	265
Percentage		(8%)	(43%)	(5%)	(2%)	(5%)	(2%)	(2%)	(34%)

For example, if management have indicated the motivation as being for capital management and also believes that their firm's shares are under-priced then it is classified in the 'other' category.[34]

From Table 3.6 it is clear management do not provide a clear message as to a specific motive to repurchase shares since 'capital management' accounts for 43% of announcements and 'other' accounts for 34%, a combined total of almost 80% of all possible announcements. This result is similar to that of Bonaimé (2012) who finds around half of the announcements are associated with the vague code 'general corporate purposes'. 'Undervaluation' accounts for less than 10% of all announcement motivations as do the remaining motivations. This result is surprising since signalling undervaluation is recognised as a strong motive in the literature (see Baker et al., 1981; Wansley et al., 1989; Brav et al., 2005). In another Australian study, Akyol and Foo (2013) find 47 repurchase announcements that state undervaluation as a motive, representing over 20% of their sample, however, if the number of announcements where undervaluation is the sole motivation is considered then the sample is reduced to 31, representing approximately 15% of announcements, a number that is closer to the present study.[35] Although survey evidence indicates that management of Australian companies rank improvement of EPS or net asset backing per share as the most common motivations for on-market repurchases (Mitchell et al.,

[34] It is not unusual for management to provide up to three motivations in an announcement and in some cases four motivations have been found.

[35] The sample size of Akyol and Foo (2013) is 212 announcements. They classify undervaluation announcements as those where undervaluation is the sole stated motive or if it is provided together with one or two other motivations whereas this study classifies only those announcements that state undervaluation as the sole motive. On another point of difference Akyol and Foo (2013) define undervaluation announcements to include those that state either 'undervaluation' or 'increase shareholders' return' as a motive whereas this study defines announcements that indicate undervaluation or that their shares are considered a good investment as 'undervaluation' announcements and treats those motivated by increasing shareholder return under the category 'enhance shareholder value'.

2001), evidence from Table 3.6 shows only 5% of announcements express either as a definite motivation.

3.4 IDENTIFYING THE COMPLETION OF REPURCHASE PROGRAMS

Ordinarily the completion date will be the date upon which a 3F notice has been lodged and processed by the ASX. For all announcements matching 3F notices are searched and identified in the same manner as 3C notices until the 15th March 2012, which is the end date of this study. For purpose of classification such programs are categorised as '3F notice' programs. For announcements where matching 3F notices are not found the program would normally be regarded as being 'open' however, for some programs because of repurchase inactivity they are more appropriately classified as being 'closed' and therefore regarded as complete for further analysis. As such, this thesis will make a distinction for announcements that do not have a matching 3F notice as being categorised as 'closed' programs. To help differentiate between 'open' and 'closed' programs, any repurchase program for which no shares have been purchased by the repurchasing firm in the last 12 months are regarded as being inactive and therefore regarded as 'closed'. For programs where shares have been repurchased in the last 12 months are regarded as 'open'. For 'closed' programs the completion date will be the last date upon which a trade was recorded, otherwise 12 months from the date of announcement if no repurchases have occurred. For evidence of repurchase trading activity, if any, 3E notices are searched for each firm following an announcement and further cross checked with the firm's issued capital history found in the Morningstar database for verification. A key subject of interest in this thesis is the completion rates of repurchase programs, which is the percentage of shares sought in an announcement that are subsequently repurchased. Since it is

possible for firms to extend the duration of a repurchase program and therefore the number of shares sought to repurchase, this thesis will truncate completion rates to a maximum of 100% (Bonaimé, 2012).

3.5 DESCRIPTIVE STATISTICS ON COMPLETIONS

Tables 3.7 – 3.12 provide descriptive statistics on completions of repurchase programs. Table 3.7 records the total number of shares repurchased and consideration paid, the average fraction of shares repurchased, completion rates, the number of programs resulting in no shares being repurchased, the number of programs where all targeted shares have been repurchased, and the average duration for '3F notice', 'closed' and 'open' programs. The following observations of Table 3.7 are made. Firstly, of the 789 announcements made, almost all of the programs can be regarded as completed by the end date of this study, with only 20 programs remaining 'open'. Of the programs completed, most are identified as completed with '3F notice', 462 compared to 307 for 'closed' programs.[36] In all, a total of over 5bn shares have been repurchased for a consideration of over $18bn for the entire period, 1st January 2000 to 15th March 2012, representing an average price of over $3.50 paid per share. In comparing completed programs with '3F notice' to 'closed' programs it is noted that the total number of shares acquired (3,840.7m compared to 952.1m) and consideration paid ($15,365.2m compared to $2,879.1m) is substantially higher for '3F notice' programs.

[36] It is not clear to the author why a 3F notice could not be identified for so many inactive programs even though firms are required to lodge this notice with the ASX. Communications with the ASX were unable to resolve this issue.

TABLE 3.7

Shares Repurchased

Table 3.7 presents details of shares repurchased according to whether the program is completed or remains open – '3F notice' 'closed' and 'open' program. Following details by category include number of programs, total number of shares repurchased, total consideration paid, average percentage of shares repurchased, average completion rates, number of programs where no shares are repurchased, number of programs with 100% completion rates and average program duration.

Program type	Number	Total shares repur-chased (m)	Total consider-ation ($m)	% shares repur-chased	Average completion rates	Programs with no shares repur-chased	programs with 100% completion rates	Average duration (mths)
3F notice	462	3,840.7	15,365.2	3.5%	51.1%	44	104	9.9
Closed	307	952.1	2,879.1	1.8%	21.6%	97	12	10.0
Open	20	285.2	318.9	10.0%	47.1%	0	2	40.3
Total	789	5,078.0	18,563.2	3.1%	39.5%	141	118	10.7

Further, for '3F notice' programs both the percentage of shares outstanding that are acquired (3.5% compared to 1.8%) and the completion rate (51.1% compared to 21.6%) is around twice that of 'closed' programs which is reinforced by the fact that programs completed by '3F notice' have less than half the number of programs where no shares are acquired (44 compared to 97) and almost ten times the number of programs in which the completion rate is 100% (104 compared to 12). This evidence suggests that '3F notice' programs tend to be larger in terms of the number of shares repurchased, consideration paid and the fraction of shares acquired but in terms of program duration, '3F notice' and 'closed' programs are similar, 9.9 months compared to 10 months. When comparing 'open', programs with '3F notice' and 'closed' programs it is found that the average percentage of shares acquired (10%) and average duration (40.3 months) is substantially higher.[37] Overall, 17.9% (141) of announcements result in no shares being repurchased and 15% (118) result in 100% of targeted shares being repurchased.

Table 3.8 provides data for '3F notice' and 'closed' programs (769 programs) according to the year of announcement. As can be seen the total number of shares being acquired is highest for announcements made in 2008, which also corresponds to the year of most announcements made, but in all years, except for 2000- 2002 and 2004, programs result in greater dollar value than 2008

[37] The high percentage of outstanding shares purchased for 'open' programs is due to the impact of one particular program which resulted in over 75% of issued shares being acquired and ran for over 6 years (Hunter Hall Global Value Ltd: HHV). The firm had an agreement approved of by shareholders to acquire up to 20% of its issued capital in each period between any two consecutive Annual General Meetings.

TABLE 3.8

Details of Shares Repurchased by Year of Announcement

Table 3.8 presents details of programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information is provided for programs by year of announcement- number of announcements, number of completed programs, number of shares repurchased, total consideration paid, average percentage of shares repurchased, average completion rates, number of programs with no shares being repurchased, number of programs with 100% completion rates and average program duration. s.

Year	Number	Completed programs	Total shares repurchased (m)	Total consideration ($m)	Average % Shares repurchased	Average Completion rates	Programs with no shares repurchase	Programs with 100% completion rates	Average duration (mths)
2000	53	53	325.0	1,269.4	2.5%	39.1%	11	6	9.5
2001	59	58	335.1	737.9	2.8%	39.5%	14	10	9.8
2002	58	58	360.6	864.9	3.3%	55.4%	7	15	10.0
2003	51	50	374.8	1,693.3	2.4%	40.6%	10	7	11.4
2004	53	52	260.2	1,048.7	3.0%	43.7%	10	10	10.6
2005	75	75	390.9	2,094.4	3.5%	51.2%	7	18	9.8
2006	69	69	656.5	2,637.9	2.1%	38.9%	8	15	8.9
2007	73	72	567.3	2,586.6	2.8%	44.1%	13	13	9.2
2008	141	136	741.2	1,372.5	2.3%	30.9%	23	0	10.4
2009	86	81	358.6	2,246.6	2.6%	28.7%	20	8	9.7
2010	71	65	423.2	1,692.4	4.0%	34.7%	18	7	9.7
	789	769	4,793.4	18,244.5	3.0%	39.3%	141	116	9.9

The average percentage of shares outstanding being subsequently repurchased varies from 2.1% to 4% with the average being 2.8%. The average completion rate for the entire sample is 39.5% with highest being 55.4% for announcements made in 2002 and the lowest for 2009 (28.7%).

These figures are comparable with those of Mitchell and Dharmawan (2007) and Akyol and Foo (2013) who measure the average percentage of outstanding shares being acquired as 3% and 2.8% respectively, and average completion rates of 45% and 47% respectively, also for Australian repurchases, but contrasts strongly with completion rates measured in the US. Stephens and Weisbach (1998) and Bonaimé (2012) measure average completion rates of around 73%.[38] Stephens and Weisbach (1998) report that 57% of announcements have completion rates in excess of 100% and 10% of programs have completion rates of less than 5%. Bonaimé (2012) finds that 47% of programs have completion rates of 100% and around 10% of programs resulting in completion rates of less than 10%. Rau and Vermaelen (2002) find similar completion rates for UK programs (74.4%) whereas in another UK study, Andriosopoulos et al. (2013) find completion rates of only 31.4%.[39] Ikenberry et al. (2000) find average completion rates for Canadian programs is 28.6% for the 12 month period following an announcement.

In contrast, this chapter finds that completion rates are almost half that of the US and the UK at 39.5%, the number of programs resulting in completions rates of 100% is less than half (116 or 15.1% of programs) and the number of announcements resulting in no shares being repurchased at all is much higher (141 or 18.3% of programs). The

[38] Stephens and Weisbach (1998) measure completion rates of 73.8% and Bonaimé (2012) measures 72.6% for 'repeat' programs.
[39] Rau and Vermaelen (2002) report average shares sought of 9.8% and shares repurchased as 7.3%.

number of announcements resulting in no shares being repurchased is also more than that identified by Akyol and Foo (2013) who find less than 10% (20) of programs fit this category. Interestingly, the year with the highest number of announcements resulting in no shares being subsequently purchased (23) and for the least number of announcements resulting in completion rates of 100% is 2008, which given the GFC, is probably considered the year in which most firms' shares are considered undervalued. This contrasts with 2005 as having the highest number of announcements resulting in completion rates of 100% (18) and the equal lowest number of announcements resulting in no shares being repurchased (7). The average duration ranges from a low of 8.9 months (2006) to a high of 11.4 months (2003) and averages 9.9 months for the entire sample.

Table 3.9 reports data on program completions for 'initial' and 'repeat' announcements. From Table 3.9 it can be seen that completion rates are higher for 'initial' programs compared to 'repeat' programs, 40.7% compared to 38.4%, and that the number of programs resulting in 100% completion rates, expressed as a percentage of programs, is also higher for 'initial' programs, 15.7% (50) compared to 14.6% (66). Similarly, the number of programs resulting in no shares being repurchased, expressed as a percentage of programs, is lower for 'initial' programs, 15.7% (50) compared to 20.1% (90) for 'repeat' programs, suggesting that firms are more committed to acquire shares during 'initial' programs than subsequent 'repeat' programs. Jagannathan and Stephens (2003) on the other hand, find completion rates to be lower for 'infrequent' repurchases compared to 'frequent' repurchases (100.72% compared to 134.71%).

TABLE 3.9

Completions by Type 'Initial' or 'Repeat'

Table 3.9 presents details of programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information is provided for programs by announcement type, 'initial' or 'repeat'- number of programs, total number of shares repurchased, total consideration paid, average completion rates, number of programs with no shares being repurchased, number of programs with 100% completion rates and average program duration.

Program type	Number	Total shares repurchased (m)	Total consideration ($m)	Average completion rates	Programs with no shares repurchased	Programs with 100% completion rates	Average Duration (mths)
Repeat	451	2,427.6	12,194.7	38.4%	91	66	9.3
Initial	318	2,365.8	6,049.7	40.7%	50	50	10.5
Total	769	4,793.4	18,244.5	39.3%	141	116	9.7

From Table 3.9 it can also be seen that the total number of shares being acquired is similar between both programs however, the total dollar value paid on repurchased shares for 'repeat' programs is twice the amount paid for 'initial' programs, $12.2bn compared to $6.0bn. This together with the fact that the number of 'repeat' programs is greater than for 'initial' programs suggests that 'repeat' programs tend to be smaller on average in terms of the number of shares acquired, 5.38m compared to 7.44m, but for more expensive shares, $5.02 compared to $2.56. In terms of program duration, 'repeat' programs are performed over shorter time periods, 9.3 months compared to 10.5 months for 'initial' programs.

Since signalling undervaluation is a commonly cited motive, Table 3.10 presents data for program announcements that cite 'undervaluation' as a motive, compared to 'increase EPS', 'capital management' and category 'remaining' to capture all other announcement motives. From the table it can be seen that announcements motivated by 'undervaluation' tend to be smaller programs whether measured by number of shares repurchased or in dollar value but also have the lowest average completion rates as well as having a lower proportion of programs resulting in all targeted shares being acquired whilst also having a greater proportion of programs that result in no shares being acquired.

The average completion rate for programs motivated by 'undervaluation' is 21.8% compared to 64.8% for 'increase EPS', 37.3% for 'capital management' and 41.5% for 'remaining' announcements.

TABLE 3.10

Completions by Announcement Motivation

Table 3.10 presents details of programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information is provided for programs by motivation stated in announcement - number of completed programs, number of shares repurchased, total consideration paid, average completion rates, number of programs with no shares being repurchased, number of programs with 100% completion rates and average program duration.

Motivation	Number	Total Shares repurchased (m)	Total Consideration ($m)	Average completion rates	Programs with no shares repurchased	Programs with 100% completion rates	Average Duration (mths)
Undervalued	61	136.2	199.4	21.8%	23	4	10.0
Increase EPS	40	84.8	239.7	64.8%	4	16	5.6
Capital managements	329	2,674.1	10,877.7	37.3%	68	45	9.9
Remaining	339	1,897.8	6,927.4	41.5%	46	51	9.9
	769	4,793.4	18,244.5	39.3%	141	116	9.9

More than a third of programs motivated by ‘undervaluation’ result in no shares being acquired, 37.7% (23 programs), compared to 10% (4 programs) for ‘increase EPS’, 20.7% (68 programs) for ‘capital management’ and 13.6% (46 programs) for ‘remaining’ announcements. For programs resulting in all shares being acquired, the percentage of announcements motivated by ‘undervaluation’ is 6.6% (4 programs) compared to 40% (16 programs) for ‘increase EPS’, 13.7% (45 programs) for ‘capital management’ and 15% (51 programs) for ‘remaining’ announcements.

This evidence suggests that firms motivated by ‘undervaluation’ tend to have lower priced shares ($1.46 on average) and do not acquire as many shares to achieve a correction in share price. In contrast, firms motivated by ‘increase EPS’ have much higher completion rates than average and are performed over much shorter duration, 5.6 months compared to 10 months for ‘undervaluation’. This evidence corroborates with that of Akyol and Foo (2013) who find completion rates for undervaluation programs to be lower than for programs motivated by other reasons, 40.15% compared to 47.22%, but are considerably higher than that measured for this study.

Of particular importance to this thesis is the intended program length in differentiating firm type. As such, the following Tables 3.11 and 3.12 provide summary statistics regarding program duration as well as completion rates and mid-completion rates for all completed programs and for various sub-samples. Mid-completion rates are identified from trading activity reported in 3E notices and represent number of shares repurchased at the intended halfway point of a program expressed as a percentage of shares sought in an announcement.

TABLE 3.11

Completion Rates by Subgroups

Table 3.11 presents details of programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information on completion rates, mid-completion rates and program duration is provided- minimum, lower quartile, mean, median, upper quartile, maximum and standard deviation values for completion rates, mid-completion rates and program duration for completed programs. Panel A includes all completed programs. Panel B includes all programs completed by 3F notice, '3F notice' programs. Panel C includes all programs where no shares have been repurchased in the last 12 months, 'closed' programs. Panel D includes all completed programs that have indicated an unlimited duration in the announcement, 'unlimited duration' programs. Panel E includes all completed programs that have resulted in shares being acquired, 'non-zero' programs.

Panel A. All programs (n= 769)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.016	0.393	0.248	0.794	1.017	0.389
Mid-Completion Rate	0	0.001	0.299	0.136	0.529	1.000	0.350
Program duration	0.1	5.267	9.700	10.867	12.567	85.133	6.969

Panel B. '3F notice' programs (n = 462)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.113	0.512	0.494	0.987	1.004	0.394
Mid-Completion Rate	0	0.030	0.387	0.247	0.738	1.000	0.376
Program duration	0.1	5.633	9.655	11.250	12.667	61.233	6.238

Panel C. 'Closed' programs (n = 307)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0	0.216	0.051	0.335	1.017	0.306
Mid-Completion Rate	0	0	0.166	0.030	0.247	1.000	0.253
Program duration	0.667	4.8	9.768	10.700	12.167	85.133	7.953

Panel D. 'Unlimited duration' programs (n = 106)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.019	0.437	0.366	0.898	1.017	0.404
Mid-Completion Rate	0	0.015	0.397	0.257	0.782	1.000	0.391
Program duration	0.6	5.267	10.965	9.900	12.233	55.033	9.112

Panel E. 'Non-zero' programs (n = 627)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.113	0.483	0.403	0.922	1.017	0.378
Mid-Completion Rate	0	0.051	0.367	0.237	0.623	1.000	0.354
Program duration	0.1	4.200	9.286	9.100	12.633	85.133	7.478

TABLE 3.12

Completion Rates for Repeat Programs

Table 3.12 presents details of 'repeat' programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information on completion rates, mid-completion rates and program duration is provided- minimum, lower quartile, mean, median, upper quartile, maximum and standard deviation values for completion rates, mid-completion rates and program duration for completed programs. Panel A includes all completed programs. Panel B includes all programs completed by 3F notice, '3F notice' programs. Panel C includes all programs where no shares have been repurchased in the last 12 months, 'closed' programs. Panel D includes all completed programs that have indicated an unlimited duration in the announcement, 'unlimited duration' programs. Panel E includes all completed programs that have resulted in shares being acquired, 'non-zero' programs.

Panel A. All programs (n = 451)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.007	0.384	0.226	0.818	1.004	0.397
Mid-Completion Rate	0	0.000	0.290	0.121	0.529	1.000	0.351
Program duration	0.2	5.267	9.314	11.267	12.367	61.233	5.712

Panel B. '3F notice' programs (n = 271)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.104	0.513	0.492	0.988	1.004	0.401
Mid-Completion Rate	0	0.018	0.379	0.234	0.754	1.000	0.374
Program duration (months)	0.2	6.000	9.797	12.000	12.700	61.233	6.306

Panel C. 'Closed' programs (n = 180)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0	0.191	0.020	0.255	1.000	0.302
Mid-Completion Rate	0	0	0.156	0.012	0.203	1.000	0.262
Program duration	0.667	4.083	8.587	10.483	12.167	27.700	4.600

Panel D. 'Unlimited duration' programs (n = 47)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.015	0.384	0.231	0.791	1.000	0.396
Mid-Completion Rate	0	0.006	0.345	0.152	0.765	1.000	0.382
Program duration)	0.733333	5.633	10.245	11.400	12.267	33.100	6.947

Panel E. 'Non-zero' programs (n = 360)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.104	0.481	0.401	0.948	1.004	0.388
Mid-Completion Rate	0	0.040	0.363	0.231	0.624	1.000	0.358
Program duration	0.2	4.050	8.660	8.750	12.583	61.233	5.955

Summary statistics include minimum, lower quartile, mean, median, upper quartile, maximum and standard deviation values for completion rates, repurchase speed and program duration in months. Summary statistics are provided for all completed programs in Table 3.11 and for 'repeat' only programs in Table 3.12. Both tables report statistics for programs overall in Panel A, '3F notice' programs in Panel B, 'closed' programs in Panel C, 'unlimited duration' programs in Panel D and programs in which no shares are repurchased are excluded, 'non-zero programs', in Panel E.[40] In Table 3.13 summary statistics are provided for completed programs according to motivation.

Table 3.11 provides statistics for completed programs which includes '3F notice' and 'closed' programs only. From Panel A it can be seen that for the 769 completed programs the average completion rate is 39.3%, slightly lower than that recorded for all programs, 39.5%, which includes 'open' programs (see Table 3.7). A quarter of all completed programs result in completion rates of less than 2% and completion rates of almost 80% or more. The mean program duration is 9.7 months, with a quarter of all programs being completed within 6 months of announcement or taking in excess of 12 months duration with the longest program taking over 7 years to complete.[41] These numbers suggest that most programs are completed well in advance of the average 13.9 months intended in announcements (see Table 3.4). Mid-completion rates show that almost 30% of shares sought have been repurchased in the first half of the intended program representing three quarters of the shares repurchased over the

[40] These categories are not necessarily mutually exclusive. For example, whilst it is not possible for a program to be categorised as both '3F notice' and 'closed', it is possible for a program to be categorised as both 'unlimited duration' and '3F notice' if it is of intended unlimited duration and completed by way of a 3F notice.

[41] The average duration of 9.7 months for completed programs is lower than that recorded for all programs, 10.7 months, which includes 'open' programs (see Table 3.7).

entire program. Mid-completion rates are commensurate with completion rates reported by Akyol and Foo (2013) after 6 months duration.[42]

From Panel B it can be seen that in comparison with programs overall, '3F notice' programs have higher completion rates, 51.2% compared to 39.3%, are conducted over similar duration, 9.655 months compared to 9.70 months and result in higher mid-completion rates, 38.7% compared to 29.9%. This evidence suggests that firms of '3F notice' programs are more serious repurchasers than that of completed programs in general. For 'closed' programs, Panel C, completion rates are only 21.6%, well below that of '3F notice' programs with a quarter of the programs resulting in no shares being repurchased. This, together with the fact that the average program duration is similar to that of '3F notice' programs, 9.768 months compared to 9.655 months, reveals that firms of such programs are less serious repurchasers than those of '3F notice' programs.

For 'unlimited duration' programs, Panel D, although less than that for '3F notice' programs, completion rates are higher than for programs in general, 43.7% compared to 39.3%, and though program duration is longer, in excess of 10.9 months compared to 9.7 months for programs overall, duration of the lower quartile is the same, 5.267 months, whilst duration for the upper quartile is similar, 12.233 months compared to 12.567 months, suggesting that duration of 'unlimited duration' programs are similar to that for programs in general.

[42] Akyol and Foo (2013) report that 37.58% of shares sought are repurchased at end of 6 month period and represent 80% of total shares repurchased (they report completion rates of 46.65%) and is commensurable to that reported for mid-completion rates here, given the average intended program length of 13.9 months reported in Table 3.4.

Panel E provides statistics for 'non-zero' programs. Although higher than for completions in general, 48.3% compared to 39.3%, completion rates for 'non-zero' programs are below that for '3F notice' programs (51.2%), in addition to being lower than the completion rates recorded for US programs (see Stephens and Weisbach, 1998; and Bonaimé, 2012). Similarly, midpoint completion rates are higher than for completions in general, 36.7% compared to 29.9%, but lower than for '3F notice' programs, 38.7%. When considering program duration, 'non-zero' programs are of the shortest duration, 9.286 months on average, and also in terms of duration for the lowest quartile, 4.2 months, but not in terms of duration for the upper quartile, 12.633 months.

In summary, although some diversity exists in the mean completion rates between categories, completion rates are highest for '3F notice' programs, whilst 'closed' programs enjoy the lowest completion rates. Of note is the fact that the completion rate for 'unlimited duration' programs is comparatively high, inconsistent with the view that such firms are less committed. In terms of execution time, 'non-zero' programs are of the shortest duration, demonstrating that such firms are committed to repurchase shares over the shortest duration. Interestingly, results for mid-completion rates indicate that 75% or more of shares repurchased are done so in the first half of the intended program, suggesting that firms in general are committed to repurchase shares earlier rather than later in the program.

Table 3.12 replicates the summary statistics of Table 3.11, but for 'repeat' programs only. From Panel A it can be seen that the average completion rates for 'repeat' programs is marginally lower than that for completed programs in general (Table

3.11, Panel A), 38.4% compared to 39.3%, with a quarter of programs having completion rates of less than 1% and completion rates of 81.8% or higher. Similarly, mid-completion rates are 29% for 'repeat' programs compared to 29.9% completions overall. In terms of program duration, 'repeat' programs are of similar but shorter duration, 9.314 months compared to 9.7 months for completed programs in general, with a quarter of programs having being completed within 6 months, as with programs in general, and a quarter of programs taking in excess of 12 months but slightly shorter than for programs in general, 12.367 months compared to 12.567 months.

In comparing '3F notice' programs (Panel B), 'repeat' programs have similar statistics as programs in general (Table 3.11, Panel B), with completion rates, mid-completions rates and program duration of 51.3%, 37.9% and 9.797 months respectively compared to 51.2%, 38.7% and 9.655 months respectively for '3F notice' programs in general. Similarly, as with programs in general, completion rates and mid-completion rates of '3F notice' programs are greater than those for 'repeat' programs overall. However, unlike its measure for programs in general the average duration for '3F notice' programs is longer than 'repeat' programs in general, 9.797 months compared to 9.314 months. From Panel C it can be seen that for 'closed' programs, completion rates are lower than for programs in general (Table 3.11, Panel C), 19.1% compared to 21.6%, and with a quarter of the programs also resulting in no shares being repurchased. Similarly, mid-completion rates are lower for 'repeat' programs than for programs in general, 15.6% compared to 16.6%. In terms of duration for 'closed' programs, 'repeat' programs are conducted over a shorter period of time, 8.587 months, compared to 9.768 months for completed programs in general.

Upon comparing ‘unlimited duration’ programs (Panel D), completion rates for ‘repeat’ programs (n = 47) are much lower than for ‘unlimited duration’ programs for programs in general (Table 3.11, Panel D), 38.4% compared to 43.7%, and similarly, mid-completion rates are also lower, 34.5% compared to 39.7%, however average duration for ‘repeat’ programs is lower than that for programs overall, 10.245 months compared to 10.965 months. Lastly, statistics for ‘non-zero’ programs, Panel E, show similar completions rates and mid-completion rates for ‘repeat’ programs compared to the same category for completed programs in general (Table 3.11, Panel E), 48.1% and 36.3% respectively, compared to 48.3% and 36.7% respectively for programs overall. Program duration for ‘repeat’ programs is on average shorter than for programs in general, 8.66 months compared to 9.286 months.

In comparing ‘repeat’ programs with programs in general from Tables 3.11 and 3.12, it can be seen that completion rates are similar across categories except for ‘unlimited duration’ programs, and to a lesser extent ‘closed’ programs, where ‘repeat’ programs have lower completion rates and mid-completion rates. In comparing program duration, ‘repeat’ programs are mostly of shorter duration. Lastly, in comparing duration of ‘unlimited duration’ programs, results indicate that three quarters of programs do not go beyond 12.3 months, falling well short of the 3 year duration allocated to such programs in this thesis, and as such, may introduce potential bias in subsequent tests.

Table 3.13 replicates the summary statistics of Tables 3.11 and 3.12 but by motivation.

TABLE 3.13

Completion Rates by Motivation

Table 3.13 presents details of programs by motivation stated in an announcement for programs that are identified as being completed with a 3F notice or if no shares have been repurchased in the last 12 months. The following information on completion rates, mid-completion rates and program duration is provided- minimum, lower quartile, mean, median, upper quartile, maximum and standard deviation values for completion rates, mid-completion rates and program duration for completed programs. Panel A includes all completed programs motivated to repurchase shares because of undervaluation of its shares, 'undervaluation' programs. Panel B includes all programs motivated to repurchase shares to increase EPS, 'increase EPS' programs. Panel C includes all programs motivated to repurchase shares for general capital management purposes, 'capital management' programs.

Panel A Completion rates for 'undervaluation' programs (n = 61)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0	0.218	0.051	0.294	1.000	0.312
Mid-Completion Rate	0	0	0.171	0.031	0.217	1.000	0.276
Program duration	1.4	7.6	9.997	12.167	12.200	18.433	3.735

Panel B Completion rates for 'increase EPS' programs (n = 40)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.149	0.648	0.847	1.000	1.000	0.407
Mid-Completion Rate	0	0.028	0.484	0.440	1.000	1.000	0.415
Program duration	0.1	1.100	5.593	4.267	10.217	14.100	4.535

Panel C Completion rates for 'capital management' programs (n = 329)

Variable	Minimum	Lower Quartile	Mean	Median	Upper Quartile	Maximum	Std Dev
Completion Rate	0	0.006	0.373	0.237	0.738	1.004	0.381
Mid-Completion Rate	0	0	0.287	0.130	0.492	1.000	0.339
Program duration	0.6	6.2	9.942	12.100	12.633	36.467	5.167

Statistics for programs that are motivated by 'undervaluation' are presented in Panel A (n = 61), programs that are motivated by 'increase EPS' in Panel B (n = 40) and programs categorised as 'capital management' in Panel C. Interestingly, as noted previously in Table 3.10, 'undervalued' programs have completion rates of only 21.8%, almost identical to that of 'closed' programs, 21.6% (Table 3.11, Panel C), and also have a quarter of programs where no shares are repurchased. This provides preliminary evidence that firms citing 'undervaluation' as motivation are able to correct mispricing by repurchasing few shares, or that such firms are less committed to meet their repurchase targets. In contrast, completion rates for 'increase EPS' are 64.8%, the highest of all categories and are also of the shortest duration, 5.593 months, four months shorter than the average duration across all completions, 9.7 months (Table 3.11, Panel A). Further, 25% of 'increase EPS' programs are completed within 1.1 months and 75% of all programs are completed within 10.3 months, suggesting that such firms are committed repurchasers. Lastly, 'capital management' programs have similar completion rates and program durations to that of completed programs in general. In summary, 'increase EPS' programs have the highest completion rates and are conducted over the shortest duration suggesting that such firms are serious repurchasers compared to those of other categories.

3.6 SUMMARY AND CONCLUSIONS

This chapter has identified 789 announcements made between 1 January 2000 and 31 December 2010, of which 769 are identified as 'completed' or 'closed' by 15 March 2012, resulting in over 5bn shares being repurchased for a total value over A$18bn. Analysis of announcements reveal that the average fraction of shares sought is 7.8%, the intended duration is 13.9 months and approximately 14% (110) of announcements

indicate an unlimited duration. Management do not provide a clear motive for engaging in on-market repurchases with a most announcements indicating 'capital management' purposes or providing multiple reasons.

Examination of program completions reveal that on average 3% of shares outstanding are subsequently repurchased with an average completion rate of 39.3% and duration of 9.9 months. The number of programs resulting in completions rates of 100% is 116 (15.1%) compared to 141 (18.3%) for programs where no shares are subsequently repurchased. Examination of mid-completion rates reveal that 75% or more of shares repurchased are done so in the first half of the intended program, indicative that firms in general are committed to repurchase shares earlier rather than later in a program.

In terms of motivation, completion rates are highest for programs indicating a desire to increase EPS and lowest for programs prompted by undervaluation, suggesting that firms are able to correct mispricing without the need to acquire many shares. In terms of years covered, it is found that completions rates are relatively low for 2008, despite the number of announcements for that year being more than double than those for most other years. In considering 'unlimited duration' programs it is noted that three quarters of the programs do not go beyond 12.3 months duration suggesting that the 3 year duration allocated to such programs may be excessive as a true indicator.

Of the announcements identified, 459 are for 'repeat' programs and 330 are for 'initial' programs. Although the intended duration is longer for 'repeat' announcements the actual duration tends to be shorter than 'initial' announcements, whilst the fraction of shares sought and repurchased are also marginally smaller.

Lastly, in comparing ‘closed’ programs with ‘3F notice’ programs, ‘closed’ programs have lower completion rates, have less programs resulting in 100% repurchases and more programs resulting in no shares being repurchased, suggesting that firms of such programs are less committed to repurchasing shares.

This chapter makes a contribution to the literature of on-market share repurchases by providing an analysis of intended program length indicated in an announcement, the subsequent duration taken to complete a program and mid-completion rates compiled from repurchase trading notices, all of which have not been considered for analysis in the literature so far.

A further contribution is made by extending the number of Australian programs considered in other studies for analysis and further examination. In another study, Farrugia et al., (2011) collect 816 program announcements for the period 1996 – 2009, however their study does not entail an analysis of information disclosed in announcements and 121 of the announcements occur during the period 1996 – 1998 when legislative changes to repurchase requirements were introduced. This research also represents the largest sample of programs for which completion rates are measured and completion notices collected for Australian repurchases. Mitchell and Dharmawan (2007) collect completion rates for 315 programs whilst Akyol and Foo (2013) provide completion rates compiled from 3E notices for 212 programs.

CHAPTER 4: EXPLAINING THE IMPACT OF ON-MARKET SHARE REPURCHASE ANNOUNCEMENTS

The major objective of this chapter is to investigate the share market reaction to on-market share repurchase announcements in relation to the first research question: does greater transparency of on-market share repurchase programs on the Australian capital market enhance the ability of firms to signal undervaluation when making a program announcement?

Four hypotheses are developed to test changes in share price around announcement dates for on-market repurchases. Whilst the first two hypotheses are concerned with detecting abnormal share market performance, the remaining hypotheses are concerned with explaining the cross sectional variation. The first hypothesis predicts that a positive share price reaction will accompany an on-market repurchase announcement. The second hypothesis predicts that the market reaction to 'repeat' announcements will be less than for 'initial' announcements. The third hypothesis predicts that the share price reaction to an announcement will be negatively associated with the intended length of a repurchase program indicated in the announcement. The fourth and final hypothesis predicts that there is a negative association between announcement returns and prior repurchase duration and a positive association with prior repurchasing 'speed' for 'repeat' announcements.

This chapter relies upon the changes in share prices around the period of announcement to determine the information content of companies repurchasing shares on-market. Share price returns are examined using a standard event study

methodology in which changes to actual share price are compared to those generated using the market model. Abnormal returns for each security around the announcement are produced and then combined with other securities to determine the average response for the entire sample. To explain the market response multiple regressions are then run with announcement returns as the dependent variable and various repurchase and financial information as independent variables. Statistical tests are employed to test the level of significance of abnormal returns around announcements and coefficients of explanatory variables used in regression analysis to explain the abnormal returns. All share repurchase information is hand collected from ASX repurchase notices accessed thru the Connect4 database. Share price data and market index data are obtained from DataStream database and financial data are obtained from Thomson ONE and Connect4 databases.

Evidence presented in this chapter indicates that announcement of on-market repurchases are accompanied by positive abnormal returns on average and that the magnitude of returns is greater for 'initial' announcements than 'repeat' announcements. In terms of the relevance of information contained in announcements, the intended length of a repurchase program is significant in explaining abnormal returns for 'repeat' announcements as well as announcements in general, but firms do not appear to gain a reputation from prior program length or the 'speed' with which shares are repurchased. These results hold for tests under various conditions. Of note, firms that indicate unlimited program duration are looked upon more favourably by the market than firms which indicate a fixed period duration, suggesting that such firms are motivated to repurchase shares for different reasons.

Some support for undervaluation as a motivation is found for 'repeat' announcements with pre-announcement returns being significantly and negatively associated with announcement returns but not for programs in general. Of note, program size, whether measured as the fraction of shares sought or subsequently repurchased, is not important in explaining announcement returns and evidence of a reputation effect for completion rates is not found. Results indicate that the level of cash balance is important to investors in assessing the information content of an announcement, providing support for the notion that firms engage in repurchases to disgorge excess cash or afford some assurance to the market that a firm will meet its repurchase target. Results also indicate a positive association between share price volatility and announcement returns, suggesting the inherent flexibility of on-market repurchase programs is valued by the market. Support is also found that firms of 'repeat' programs use repurchase programs to achieve target debt/equity ratios.

The remainder of this chapter will review the relevant theoretical and empirical literature in Section 4.1, discuss the development of research hypotheses in Section 4.2, appropriate research methods to test them in Section 4.3, discuss descriptive statistics and empirical evidence in Section 4.4, and in the final section (Section 4.5) provide a summary of findings and conclusions.

4.1 LITERATURE REVIEW

This section will review past and present studies related to this chapter's proposed question for on-market repurchase announcements. Both theoretical and empirical studies advanced in the literature will be reviewed. Whilst several hypotheses have been advanced in the literature to explain the occurrence of on-market repurchases,

such as eliminating agency costs of free cash flow, manipulating earnings or adjusting a firm's capital structure, this review will concentrate on literature relevant to this thesis, namely, the signalling undervaluation hypothesis, that will contribute towards the formulation of hypotheses.[43]

Two forms of the signalling undervaluation hypothesis have been advanced in the literature to explain on-market repurchases. The first, 'information signalling', is based on the presence information asymmetry between management and investors, whilst the second, 'signalling undervaluation' is based on the divergence of opinion in the valuation of shares between management and the market. The announcement of a share repurchase may constitute a revelation by management of new information about a firm's future prospects and depending upon its nature, the disclosure of the information could conceivably either increase or decrease the value of the firm and may have differing price impacts across securities of the firm. Since firms do not disclose the nature of the information to be inferred by investors in an announcement, the impact of the information is not predictable. Although the announcement may convey good or bad news, no incentive exists for management to convey a negative signal (Dann, 1981, p.117). According to the signalling hypothesis the market will alter its perception of the firm upon the announcement of a repurchase and reflect this in the price of its securities. The 'information signalling' hypothesis is based upon the existence of information asymmetry, whereby management have monopolistic access to private information about the firm.[44] Share prices it is argued, do not reflect all information, especially that which is not publicly available. The 'information

[43] For overview of research see Grullon and Ikenberry (2000), Dittmar (2000) and Ogden et al. (2003).
[44] The concept of signalling was first studied by Akerlof (1970) and Spence (1973) in the product and labour markets. Signalling has since been introduced to finance by Ross (1977), Leland and Pyle (1977) and Bhattacharya (1979) and others incorporating financing decisions as signalling mechanisms (see Molho (1997) for a thorough discussion of information economics).

signalling' hypothesis implies that firms wish to correct mispricing of their securities on the basis of favourable inside information which should reflect 'abnormal' cash flow increases to the firm subsequent to the announcement (Vermaelen, 1981).

The problem with information asymmetry is that the market is unable to differentiate between firm types, for example, successful and unsuccessful firms, so that the market will treat all firms as if they were of the same firm type, unsuccessful firms. This is expected to persist until more information becomes public allowing the market then to differentiate between them, however company disclosures such as press releases and financial statements may be distrusted by investors. Management of successful type firms may have an incentive to fully disclose information to enable the market to differentiate it from unsuccessful type firms, but fully disclosing private information may reveal valuable information to its competitors and have a detrimental effect upon its own operating profitability.

Management of less successful type firms may also have the incentive to release favourable information, albeit false, leaving the market unable to differentiate between the firm types. This implies that signalling must be prohibitively costly for management of less successful type firms if a signal is to be accepted as credible by the market. It may be argued that management will be discouraged from releasing false information since when it is discovered managers run the risk of losing their jobs, although it becomes a question of how long it takes the market to realise the fact. If investors are unable to differentiate between successful and unsuccessful type firms, then the price response to a financial decision or signal cannot be positive on average, resulting in a 'pooling' equilibrium. On the other hand, if a successful firm is

able to devise a credible signal that unsuccessful firms find prohibitively expensive to mimic then it is possible that a 'separating' equilibrium is obtained (Ogden et al., 2003; p. 484).[45]

As with the 'information signalling' hypothesis, the 'signalling undervaluation' hypothesis argues that management wish to indicate that the firm's stock is undervalued but without implying improvement of future earnings. For example, statements such as 'prices don't reflect the underlying value of the firm' and represent a 'good buy', may be used by management when announcing a share repurchase programs without reference to future earnings and survey evidence supports this view (see Baker et al., 1981; Wansley et al., 1989; Brav et al., 2005). Whilst the 'information signalling' hypothesis implies that a firm's shares are undervalued with respect to managers' private information, the 'signalling undervaluation' hypothesis implies undervaluation with respect to public information. Firms may be motivated to support the share price during times of selling pressure, however under-pricing in the presence of selling pressures imply that shares are mispriced with respect to public information.[46]

Some aspects of on-market repurchases have been identified in the literature as not befitting signalling theory. Firstly, although firms may indicate their intention to repurchase shares they are not obligated to do so. For some firms the need to

[45] It has been argued that announcements may convey industry-wide information or changes in the competitive position of firms in the industry (see Hertzel, 1991; Erwin and Miller, 1998; Akhigbe and Madura, 1999; Otchere and Ross, 2002; and Massa et al., 2007). From the perspective of signalling, the signal must be at a cost to the signalling firm to be seen as credible and therefore it is not expected that rival firms will experience the same market reaction to on-market share repurchase announcements as the announcing firm.

[46] It can be also argued that selective repurchases are more suitable for removing a large block of shares since a company can negotiate with a substantial shareholder that is unable to liquidate their position on the market.

repurchase may even disappear if the share price increases following the announcement (Grullon and Ikenberry, 2000, p.45). Although it is generally conjectured by some researchers that companies do not follow thru with their commitments made during an announcement there is some evidence that a majority of the shares targeted are subsequently repurchased (Stephens and Weisbach, 1998).

Evidence provided in Chapter 3 indicates that Australian firms repurchase around 40% of targeted shares on average compared to over 70% for the US suggesting that Australian firms are less committed to follow thru with their repurchase intentions than US firms. Notwithstanding this, if firms mislead the market then it is expected that stock prices will fall and may also compromise any future attempts at signalling (Asquith and Mullins, 1986). A second criticism of signalling is that on-market repurchases typically involve no premium and therefore management does not bear costs of false signalling. However other potential costs can be associated with on-market repurchases, for example, repurchases involve a payout to shareholders which will require the firm to raise new equity or increase outstanding debt to replace the cash paid out or else to reduce its investment expenditure or dividend payout, which according to signalling theory will be associated with a negative share price response. To the extent that repurchases are financed with surplus cash or new debt, the riskiness of the firm is expected to increase either from the reduction in safe assets or because of the impact of increased leverage (Asquith and Mullins, 1986, p. 37).

A third concern questions how capital markets may interpret a share repurchase as a signal by management given that firms tend not to provide concrete disclosures regarding improvements to future cash flows or details of why stock is mispriced in

their motivations to repurchase. Miller and Rock (1985) argue that repurchase announcements need not represent a deliberate attempt by management to convey their views about future earnings to the market but indirectly provide information to investors about the firm's unobserved current earnings, which in turn serves as the basis for estimating future earnings.[47] The market uses the announcement in light of its understanding of the firm's financing policies to form a new estimate of expected earnings. Thus, it is the revision of current earnings resulting from the announcement of a share repurchase rather than the repurchase itself that conveys information (see also Dann, 1992).[48] Alternatively, Vermaelen (1981) argues that since firms predominantly reissue acquired shares (treasury shares) to insiders in satisfaction of share option plans or share compensation plans, on-market repurchases will generally be perceived as transferring shares from outsiders to insiders and therefore convey a good signal to the market since they will bear an increased share in the costs associated with false signalling.

Finally, on-market repurchase programs are typically for a small fraction of shares, say 5%, and may take several years to complete the program (Grullon and Ikenberry, 2000) whilst other firms may initiate on-market repurchase programs frequently, questioning the likelihood that a firm could credibly signal that its stock is undervalued on a regular basis (Jagannathan and Stephens, 2003) or over a large duration. However, evidence of excess returns is found to persist several years

[47] Although Miller and Rock (1985) specifically address dividend announcements, the intuition, it could be argued, applies to share repurchases also.

[48] This argument is akin to that of Modigliani and Miller (1961) who in their seminal article on dividend policy irrelevance reason that "… where a firm has adopted a policy of dividend stabilization with a long-established and generally appreciated 'target payout ratio,' investors are likely to (and have good reason to) interpret a change in the rate as a change in management's view of future profit prospects for the firm. The dividend change, in other words, provides the occasion for the price change though not its cause, the price still being solely the reflection of future earnings and growth opportunities" (p. 430).

following an announcement (see for example, Ikenberry et al., 1995; Ikenberry et al., 2000; Chan et al., 2004; Chan et al., 2007; Peyer and Vermaelen, 2009) particularly among value firms (firms with low market-to-book ratios), suggesting that such firms are undervalued by the market and that the market's initial reaction to the repurchase announcement is incomplete (Ikenberry et al., 1995 and 2000; Peyer and Vermaelen, 2009). It may also justify why some firms need to engage in repeat announcements or conduct programs over extended periods of time.

Grullon and Michaely (2004) argue that the 'information signalling' hypothesis has three immediate implications: firstly, repurchase announcements should be accompanied by positive price changes; secondly, repurchase announcements should be followed by positive news about profitability or cash flows; and thirdly repurchase announcements should be immediately followed by positive changes in the market's expectation about future profitability. Although a positive announcement return is also expected under the 'signalling undervaluation' hypothesis, subsequent improvement in earnings and market expectations of it are not.

Consistent with expectations, positive abnormal announcement returns of 2 - 4% have been reported in numerous studies (see for example, Vermaelen, 1981; Comment and Jarrell, 1991; Ikenberry et al., 1995; Stephens and Weisbach, 1998; Ikenberry et al., 2000), however with regard to future profitability the evidence is mixed. Bartov (1991) finds only weak supportive evidence, whereas Grullon and Michaely (2004) find no evidence that repurchasing firms experience improvement in future profitability relative to peer firms and in some measures, repurchasing firms underperform their peers. In addition, they find analysts revise their expectations

downward after announcements of a repurchase program, which is the opposite expected under the 'information signalling' hypothesis. Chan et al. (2004), on the other hand, find that after a repurchase program is announced, quarterly earnings surprise tends to be positive and significant and Lie (2005) finds that improved operating performance is limited to those firms that actually repurchase shares in the same fiscal quarter. This evidence suggests that some firms at least, are motivated to signal future earnings improvement, however it is only those firms that actually repurchased shares that this is found and the period of improvement is short term.

Whilst not a necessary precondition for 'information signalling', evidence of poor share price performance preceding an announcement is typically found (see for example, Vermaelen, 1981; Netter and Mitchell, 1989; Comment and Jarrell, 1991; Ikenberry et al., 1995; Stephens and Weisbach, 1998) and is negatively related to announcement returns (Comment and Jarrell, 1991; Stephens and Weisbach, 1998; Kahle, 2002) and long run abnormal returns (Peyer and Vermaelen, 2009), providing support for the 'signalling undervaluation' hypothesis.[49] Similarly, Ikenberry and Vermaelen (1996) find evidence of high share price volatility prior to announcements, also an indicator of poor share price performance since high volatility provides greater opportunities for departure from fundamental value, and that announcement returns are positively related to this volatility. McNally (1999) on the other hand does not find this, but instead finds announcement returns are positively associated with the

[49] Peyer and Vermaelen (2009) attribute the long run abnormal return performance to analysts downgrading earnings forecasts around the time of announcements, as also observed by Grullon and Michaely (2004), as a result of becoming too pessimistic from disappointing earnings results. They further point out that such firms tend to be followed by a small number of analysts whose opinion carries more weight than otherwise would be expected. This evidence compliments that of Brockman, Khurana and Martin (2008) who find that firms release significantly bad news before the start of a share repurchase, which they attribute to management manipulating information flows.

proportion of shares held by insiders and that insider shareholdings increase after announcements irrespective of whether firms subsequently repurchase shares or not.

Akin to this, Raad and Wu (1995), Babenko et al. (2012), Chan et al. (2012) and Jategaonkar (2013) find that announcements returns are higher for firms whose insiders are net buyers preceding an announcement, further Jategaonkar (2013) finds such firms exhibit long run abnormal returns and better operating performance after the announcement. Babenko et al. (2012) also find a stronger relation between announcement returns and insider purchases prior to announcement for firms that are more likely to be mispriced, for example, small firms and firms with little analyst coverage, characteristics normally associated with firms suffering from information asymmetry. Bonaimé and Ryngaert (2013) find, on the other hand, that insiders are more likely to be net sellers of their company's stock during periods when firms repurchase shares, but are more likely to be net buyers in the period before and after and that share returns are abnormally high immediately after repurchase periods when insiders are net buyers.

Chan et al. (2010) find that management of announcing firms which exhibit poor earnings quality tend to have more outstanding stock options and exercise more stock options following the announcement, leading them to conclude that management use on-market repurchases as a potential 'tool' to mislead investors. Similarly, Brockman, Khurana and Martin (2008) find that management time disclosures around repurchases. They find that managers' earnings forecasts are biased downwards before repurchases and that the likelihood of this opportunistic behaviour occurring is linked to managerial incentives in the form of stock options. Similarly, Griffin and

Zhu (2010) find that actual repurchases are positively associated with the number of options granted to and exercisable by CEOs and that buyback companies exhibit higher CEO compensation and weaker governance. This evidence suggests that investors consider shareholder composition of the firm and changes to management shareholding around repurchase announcements when assessing the credibility of signalling.

As previously mentioned, management tend not to substantiate their belief in why a firm's shares is undervalued in an announcement, however investors may still draw inferences from what information is disclosed. For example, announcement returns are found to be positively associated with the number of shares sought suggesting that the market at least takes into account the potential cost of false signalling (Comment and Jarrell, 1991; Ikenberry et al., 1995, Ikenberry and Vermaelen, 1996; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Chan et al., 2004; Bonaimé, 2012). Similarly, it is found that the stated motive in the announcement may contain economic value. Peyer and Vermaelen (2009) find that the stated reason for the repurchase affects the size of announcement returns, with 'undervaluation' as the stated reason having the largest impact on announcement returns (see also Akyol and Foo, 2013 for Australian repurchases), consistent with signalling. In contrast, Bonaimé (2012) finds 'enhance shareholder value' as being the only motivation that is significant in explaining announcement returns but finds that completion rates are not impacted by the stated motive, thus undermining the usefulness of such information. Stephens and Weisbach (1998) find a positive relationship between announcement returns and subsequent repurchases, supporting the notion that the market can identify which firms are likely to repurchase and which ones are not. Bonaimé (2012) finds a

reputation effect, whereby current announcement returns are positively related to completion rates of prior programs, suggesting that the market examines a firm's reputation when assessing a current announcement. This evidence may also support the notion that the market reaction to an 'initial' announcement results in a 'pooling equilibrium' across firms but with a 'repeat' announcement, once the market establishes firm reputation, results in a 'separating equilibrium'. A counter argument offered by Andriosopoulos and Lasfer (forthcoming) is that 'initial' announcements are likely to resolve information asymmetries and therefore carry greater information content than 'repeat' announcements which 'are likely to be routine'. Consistent with this proposition, they find announcement returns are greater for 'initial' than for 'repeat' announcements, which is also supportive of the 'pooling equilibrium' argument.

The body of literature discussed has revealed general support for the 'signalling undervaluation' hypothesis and to a lesser extent the 'information signalling' hypothesis. Positive announcement returns are supportive of both hypotheses and poor share price performance in the period leading up to the announcement provide the motivation for firms to signal undervaluation, however evidence of improved operating performance is mixed and suggests that the 'information signalling' hypothesis can only be the motivation of some firms. Evidence of long-run abnormal returns, whilst being consistent with the 'signalling undervaluation' hypothesis, suggests that capital markets are inefficient and that repurchases are 'triggered by the management's disagreement with the market's interpretation of *publicly available information*' (Peyer and Vermaelen, 2009, p. 1695).

Australian studies about on-market repurchases document positive announcement returns of around 3%, consistent with that found in overseas studies (see Lamba and Ramsay, 2005; Lamba and Miranda, 2010; Akyol and Foo, 2013).[50] Mitchell et al. (2001) provide survey evidence on motivations and find support mainly for the improvement in EPS and net asset backing per share and, to a lesser extent, the signalling undervaluation hypothesis. Mitchell and Dharmawan (2007) reveal that almost half of the shares sought in an announcement are subsequently repurchased and show that undervaluation prior to announcements and adjustment to capital structure are likely to be a consideration for smaller firms and for firms that sought ≥ 6% of shares outstanding. Results from Chapter 3 (Table 3.8) of this thesis reveal that Australian firms repurchase on average 39.3% of shares targeted in an announcement.

Balachandran et al. (2008) find that repurchasing firms with outstanding stock options held by management are more likely to engage in earnings management prior to an announcement, suggesting that share repurchases are used by self-interested managers to maximise option payoffs. Similarly, Lamba and Miranda (2010) find the size of repurchase programs to be positively related to the amount of executive stock options outstanding but do not find outstanding executive stock options to be a significant determinant of announcement returns or future operating performance. Their evidence suggests that although management may be motivated to nullify the negative impact of stock options on EPS it is not considered an important factor by the market. Brown and Norman (2010) examine the choice between on-market and off-market repurchases among the largest 75 industrial firms and find companies that undertake

[50] Lamba and Ramsay (2005) measure abnormal returns of 3.3% for announcements made over the period 1989 – 1998 and include the time period prior to the legislative changes of 1995. Lamba and Miranda (2010) measure abnormal returns of 2.3% for announcements made over the period 1997 – 2000 and Akyol and Foo (2013) measure abnormal returns of 3.06% for announcements made over the period 1998 – 2008.

on-market repurchases have lower market-to-book ratios, suggesting undervaluation as a motive. Lastly, Akyol and Foo (2013) find that firms which state undervaluation as a motive experience a greater market reaction to announcements and to disclosures of daily repurchase notices than firms motivated for other reasons. Further, they find that such firms also repurchase fewer shares, have lower completion rates and experience greater long term returns for the 12 month period following repurchases, supporting the notion that firm managers are able to detect "valuation errors".

Notwithstanding the evidence discussed, certain gaps can be recognised in the literature in relation to the signalling undervaluation hypothesis. Firstly, a majority of the evidence produced thus far is on the US capital market which is not regarded as transparent for on-market repurchases. For example, firms are not required to make a formal announcement in advance of repurchasing shares so that the market is unaware of the firm's intention, similarly, the market is unaware of when the firm actually enters into the market to repurchase shares, and it is only recently that the market is required to be informed after the event. Further, in the US firms are able to hold repurchased shares as treasury stock which enables them to transfer shares to management in satisfaction of share options, whereas in Australia, repurchased shares must be cancelled.

Australian firms are required to make a formal announcement of their intention to repurchase shares and disclose the name of the broker acting on their behalf, further they are also required to disclose repurchase trades on a daily basis and notify the market upon completion of a program. Evidence provided by Andriosopoulos and Lasfer (forthcoming) demonstrate how market confidence can be compromised by

reducing repurchase transparency. They find that recent legislative change in the UK which now allows firms to hold repurchased shares as treasury stock has resulted in the decrease in announcement returns from 2.95% to 0.72%. Given a high degree of transparency, Australian firms potentially bear a greater cost for misleading the market and therefore to the extent that they are being used to signal undervaluation, on-market repurchases in Australia can be considered as having greater signalling potential and therefore provide a better setting for investigation.

To the extent that prior US studies rely on completion rates that are difficult to measure and are subject to estimation error (Stephens and Weisbach, 1998; Banyi et al., 2008), an investigation on the Australian capital markets will further the theoretical development of firm reputation since completion rates can be reliably determined from completion notices and progressive acquisitions can be determined from trading notices. Lastly, besides the number of shares sought and motivation, research so far has not considered other information stated in an announcement that may be relevant in assessing firm credibility and therefore explaining the market reaction to an announcement. In Australia, besides the number of shares sought and motivation, the ASX prescribes other information to be provided in an announcement, such as, the intended program duration which may be relevant to the market in assessing the likelihood that a firm is likely to fulfil its announcement commitment and therefore signal firm quality.

4.2 HYPOTHESIS DEVELOPMENT

The purpose of this section is to discuss the development of hypotheses aligned with the research question raised in the second chapter. In Section 4.1 it was identified that although the signalling undervaluation hypothesis is generally supported in the literature there exists a gap in the literature relating to the costs of false signalling. As noted, an announcement is not a firm commitment to buy back shares and therefore questions the validity of any explanation offered in the literature to explain on-market repurchases but signalling in particular. The primary focus of this chapter is therefore to investigate whether information contained in Australian announcements that have not been examined previously add credibility. To this end, this chapter will draw upon whether the intended length of a repurchase program is useful to the market in assessing announcements, and further, whether a firm develops a reputation from prior programs for program duration and the number of shares repurchased in the early stages of a program in line with prior completion rates identified by Bonaimé (2012).

According to the signalling hypothesis the announcement of an on-market share repurchase conveys a positive signal to the market and therefore should be accompanied by a positive reaction. As such, it is hypothesised that the share market reaction to an on-market share repurchase announcement is positive.

H1: On average, the share price reaction to on-market repurchase announcements will be positive.

A question arises whether the market interprets the signal from an 'initial' announcement differently from that of a 'repeat' announcement. Andriosopoulos and Lasfer (forthcoming) argue that 'initial' announcements significantly resolve information asymmetries and therefore carry greater information content than subsequent announcements, and as such, the market reaction to 'initial' announcements should be greater than that for 'repeat' announcements. Evidence provided by Chan et al. (2010) however, shows that the market does not sort out differences in earnings quality between firms from repurchase program announcements, undermining the market's ability to resolve information asymmetries. Further, Bonaimé (2012), produces evidence that is consistent with the market differentiating between firm types based on their repurchase reputation from prior programs. As such, it is expected that the market is able to differentiate between firm types, successful and unsuccessful, for 'repeat' announcements resulting in a 'separating' equilibrium, whereas for 'initial' announcements the market is unable to do so resulting in a 'pooled' equilibrium. Given that some firms may be of the successful type and others of the unsuccessful type it is expected that the variation in announcement returns will be stronger for 'repeat' announcements than for 'initial' announcements.

Consistent with the above discussion, it is hypothesised that the share market reaction to an 'initial' announcement will be greater than that for a 'repeat' announcement.

H2: On average, the share price reaction to 'repeat' on-market repurchase announcements will be lower than for 'initial' repurchase announcements.

Announcement returns have been found to be positively associated with the fraction of shares sought, since program size is argued to be a potential cost to the firm to repurchase shares. Therefore, the greater the fraction sought, the greater potential cost and therefore the more credible the signal to the market. Since Australian firms must indicate the intended length of the repurchase program amongst other information, given the fraction of shares sought, other things being equal, the shorter the intended length of the repurchase period the greater is the potential cost to the announcing firm as it has less time to buy the necessary number of shares, thereby increasing the possibility of paying more than it intended for shares or compromising its financial flexibility in raising the necessary funds for the repurchase. Therefore it is expected the shorter the intended repurchase period the more credible the signal and therefore the larger the positive reaction to an announcement.

H3: On average, the share price reaction to on-market repurchase announcements will be negatively associated with the intended length of the repurchase program.

As previously discussed, not all firms are committed to repurchasing shares following an announcement, however the market is unaware of a company's true intentions at the time an announcement is made but nonetheless must assess the likelihood of this occurring. Bonaimé (2012) finds that firms earn a repurchase reputation based on prior completion rates and to the extent that the program duration and the 'speed' at which firms repurchase their shares are also an indication of a firm's likelihood of following thru with its commitment, it is expected that for 'repeat' programs, announcement returns will be negatively associated with prior program duration and

positively associated with the 'speed' in which shares are repurchased during the program.

H4: On average, the share price reaction to 'repeat' on-market repurchase announcements will be negatively associated with prior repurchase duration and positively associated with the speed with which shares are repurchased from prior programs.

4.3 RESEARCH DESIGN

The purpose of this section is to describe the research methods used in this chapter to measure and explain the market reaction to announcements of on-market share repurchases. In order to test hypothesis H1 and H2, this chapter will employ a standard event study methodology in which to capture the market reaction to the announcement of on-market share repurchases and then apply multiple regression analysis to explain the market reaction to test hypotheses H3 and H4.

4.3.1 DEFINING EVENT STUDIES

This chapter will be guided by other on-market repurchase studies, such as Comment and Jarrell (1991), Ikenberry et al. (1995), Stephens and Weisbach (1998) and Bonaimé (2012) and methodology review studies, such as Brown and Warner (1980 and 1985) and others. An event study measures the relationship between security prices and an economic event, such as the release of firm specific information to the share market.[51] An event may be firm specific, such as the announcement of a share

[51]Event studies have been the subject of numerous research papers in finance and accounting since the seminal works of Ball and Brown (1968) who examined the market reaction to earnings

repurchase, or market wide, such as the announcement of political upheaval. Under the assumption that capital markets are semi-strong form efficient, examining share price changes around an announcement should reveal the value of the information imparted. Event studies require firstly, the identification of an event of interest and the date upon which the event is first known to the market, defined as the event date. Secondly, a period over which the market reaction to an announcement is measured, defined as the event window and finally, a model to generate abnormal returns from which the market reaction is measured.

4.3.1.1 IDENTIFICATION OF EVENT AND EVENT DATE

The ability to correctly identify the date upon which an event first becomes public knowledge is crucial since, if capital markets are semi-strong form efficient then markets will only react to the unanticipated information and the ability to observe any share price reaction and abnormal performance is substantially reduced if the correct date is not identified (Brown and Warner, 1980, p.247). In this chapter the event is defined as the announcement of an on-market share repurchase program by a firm on the Australian capital market and the event date as the date upon which the announcement is made. As discussed in section 3.2, firms are required to make an announcement to the market of an on-market share repurchase by lodging a 3C notice with the stock exchange, however, they may pre-empt its intentions in an earlier release with the 3C notice to follow. The announcement date, day (t = 0) is therefore the date upon which the market first becomes aware of a firm's intention to repurchase shares on-market from an ASX information release to the market, keeping in mind normal trading time of the exchange.

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announcements, and Fama, Fisher, Jensen and Roll (1969), who studied the speed of adjustment of security prices to shares splits.

A problem associated with measuring abnormal returns around an event is the occurrence of confounding events, that is, the announcement of other information by a firm which may jeopardise the outcome of the event under study. For example, a firm may announce a capitalisation change concurrently with the announcement of an on-market repurchase. This is particularly the case when firms announce their intent prior to the release of the 3C notice since the intention to repurchase is indicated together with other information contained in the information release. A systematic approach to the identification and treatment of confounding events is advocated (Foster, 1980) and Williams (1988, p.743) argues that deleting data with multiple announcements can bias estimates on stock prices,[52] and as such, this chapter will retain all announcements identified in the sample under the assumption that the net effects of other events are minimal.

4.3.1.2 EVENT WINDOW

Event studies typically require the identification of two distinct periods, the event test period and the estimation period. The event test period or event window is the period over which abnormal returns are expected to occur in response to the event under study whilst the estimation period is the period over which parameters, such as beta, are determined in accordance with the asset pricing model employed to generate abnormal returns during the test period (discussed below). The test period enables the researcher to analyse abnormal returns for individual time periods or aggregate over several time periods. The length of the test period is dependent upon the degree of confidence in correctly identifying the event date, and if the event date is known with

[52]Ball and Brown (1968), for example, retain all firms for analysis since their sample was considered large, consisting of 261 firms with 9 years of data.

certainty, the ability to detect abnormal performance is reduced when using a longer event window (Dyckman et al., 1984). Various event windows have been employed by researchers on share repurchases and research in general, for example, Vermaelen (1981) uses a two day event window comprising the day of the announcement and the day after the announcement (0, 1), whilst Comment and Jarrell (1991), Stephens and Weisbach (1998) and Kahle (2002) use a 3 day event window from the day prior to the announcement until the day after the announcement (-1, 1) and Bonaimé (2012) uses a five day window, two days either side of the announcement date (-2, 2). As discussed in Chapter 3, the Connect 4 database allows all company announcements made thru the ASX to be accurately identified do the date and time of release, and as such, provides confidence in the correct identification of an announcement. This chapter will therefore use a 3 day event window, one day either side of the event date (-1, 1) and for robustness will use a five day event window (-2, 2) for testing of hypotheses.

4.3.1.3 GENERATING ABNORMAL RETURNS

To establish whether an event has an impact on the security prices an asset pricing model is required to generate returns that are expected in the absence of an event (see below), so that comparison of actual returns with expected returns can be made to detect if unusual behaviour of security returns is attributable to the event.[53] The difference between actual *ex post* expected returns and *ex ante* expected returns are measured as 'excess' or 'abnormal' returns, that is returns in excess of or below what would normally be expected to occur had the event not taken place, as follows:

$$AR_{jt} = R_{jt} - E(R_{jt})$$

[53] Event studies examine the behaviour of security returns rather than security prices for ease of comparison between securities of differing values.

where AR_{jt} = abnormal return for security j in period t

R_{jt} = actual returns for security j in period t

$E(R_{jt})$ = is the expected return for security j in period t in accordance with the returns generating model selected.

Security returns for any time period are calculated as follows:

$$R_{jt} = \frac{P_{jt} + D_{jt}}{P_{jt-1}}$$

where P_{jt} = the market price of security j at the end of period t

P_{jt-1} = the market price of security j at the end of period t-1, adjusted for capitalisation changes in order to make it comparable to the market price at the end of period t.

D_{jt} = the dividends paid on security j during period t

Security returns can be measured in discrete or logarithmic form and although transforming returns into logarithmic form may lead to returns that are closer to normal distributions, the distributions of discrete and continuously compounded returns generally have the same properties (Fama, 1976, p.27; Brown and Warner, 1985) and transformation may lead to a slight increase in Type 1 errors, that is rejecting the null hypothesis when it is in fact true (Thompson, 1988). Therefore security returns in this study will be measured in discrete form. All returns on securities and the market portfolio will be measured on a daily basis.[54] The use of daily data has two potential shortcomings, firstly, daily data are less normally

[54] Daily returns have the advantage of having smaller standard deviations than monthly data and permit the researcher to take advantage of prior information about the specific day on which an event took place thereby increasing the ability to detect abnormal performance '*roughly three times those reported for monthly data, thus highlighting the substantial gains to more precise pinpointing of an event*' (Brown and Warner, 1985, p.12).

distributed than monthly data (Fama, 1976) and secondly, using daily returns increases the problem of thin trading. Although techniques are available to correct for these biases (for example see Heinkel and Kraus, 1988; Scholes and Williams, 1977; and Dimson, 1979) they provide 'no clear-cut' benefit in detecting abnormal performance (see Brown and Warner, 1985, p.26; Dyckman et al., 1984).[55] As such, this chapter will assume that prices change whenever there is new information, whether trading occurs or not.

Once abnormal returns are calculated for an individual security, average portfolio abnormal returns, AR_{pt}, can be calculated for the entire sample for time period t as follows:

$$AR_{pt} = \frac{1}{N}\left(\sum_{j=1}^{N} AR_{jt}\right)$$

where N = the number of securities in the sample

It is expected that for some time periods the expected return will differ from the realised return even in the absence of new information, but in an efficient market returns cannot systematically differ from those which are predicted if the model is an accurate representation of investor's expectations. Event studies typically focus on abnormal returns for individual time periods over the event window and present a time series aggregation of abnormal returns (cumulative abnormal returns) to

[55] Dyckman et al. (1984, p.29) do make the point that their simulation results are based on a sample that excludes less frequently traded firms for which the problem of non-synchronous trading is more important.

determine whether they differ significantly from zero. Cumulative abnormal returns (CAR) are represented as follows:[56]

$$CAR_t^{t+n} = \sum_{t=1}^{T} AR_{pt}$$

where CAR_t^{t+n} = cumulative abnormal return for the time period t to t + n

n = number of time period being aggregated

The CAR technique adds up the residual or abnormal returns for n periods within the event window, say, from two days before the announcement (t = -2 days) until two days after the announcement (t = 2 days). Each period's average residual is composed of individual security residuals at various points in chronological time with day 0 being the announcement date. Examining CAR will provide a pattern in the average residuals over the event window. A negative or positive trend in CAR will provide evidence that the market is impounding price sensitive information since in the absence of new information CAR is expected to resemble a random walk. This means that the average abnormal returns following an announcement of information should not systematically differ from zero since in an efficient market such information is expected to be impounded in the share price instantaneously. As such, this chapter will employ a 3 day event window (-1, 1) and for robustness a 5 day event window. Daily abnormal returns will be computed for each day of the event and CAR will be measured over both of the event windows.

[56] An alternative approach to measuring share price performance over more than one time period is the abnormal price index (API) introduced by Ball and Brown (1968). The CAR approach was introduced by Fama et al. (1969).

4.3.1.4 MODELS USED

A major concern of event studies is to assess the extent to which security returns around the time of an event are abnormal, that is, different from that which is expected, given a model determining equilibrium expected returns (Brown and Warner, 1980, p.205). Various models have been employed in event studies ranging from very simple, such as the mean adjusted returns model, to more complicated models, such as the capital asset pricing model.[57] In comparing alternative models, Brown and Warner (1980, p.210) conclude that models such as the capital asset pricing model which model expected returns on systematic and unsystematic components, may not dominate simpler models, such as the mean adjusted returns model, which defines expected return for a security as the mean of past security returns, in generating more powerful tests for abnormal performance.[58] Fama (1991, p.1601) concludes that when using daily data when the announcement of the event can be dated to the day and given that the response to an event is large enough, different ways of measuring daily expected returns has 'little' effect on inferences.[59] Simulation studies (see Brown and Warner, 1980 & 1985; Dyckman et al., 1984; and Shevlin, 1981; on Australian data, and others) generally conclude that there is no evidence that methodologies beyond a simple, one factor model using standard parametric tests convey any benefits (Brown and Warner, 1980, p.249).

[57] For a description and evaluation of alternative asset pricing models employed in event studies see Brown and Warner (1980), Bowman (1983), Dyckman et al. (1984) and Strong (1992).
[58] For example, Brown and Warner (1980) argue amongst other things, that measurement error exists in each of the variables upon which abnormal returns depend and therefore models such as the capital asset pricing model, which rely on a proxy for the return of the market portfolio which cannot be observed directly, increase error.
[59] Fama (1991) goes on to argue that the use of daily data eliminates the joint-hypothesis problem, that is, the test of market efficiency on daily data is not contingent upon the asset-pricing model employed.

The market model is commonly employed in event studies (see Stephens and Weisbach, 1998; Kahle, 2002; and Peyer and Vermaelen, 2009), and as such, will be employed in this study to generate the expected returns for a security in the absence of an event. The market model is a single index model and makes no explicit assumptions about how equilibrium security prices are established and assumes that a security's expected return is a function of its systematic and unsystematic risk. The systematic component is measured by its beta, which is equal to the slope coefficient in a time series regression of an individual firm's return on the return on a market index. The parameters of the market model are derived from the following equation by ordinary least squares regression:

$$R_{jt} = \alpha_j + \beta_j R_{mt} + e_{jt}$$

where R_{jt} = rate of return of security j for the period t

R_{mt} = rate of return on the market index m for the period t

α_j , β_j = parameter estimates that are constant for security j

e_{jt} = random disturbance term

The expected security returns for the market model are therefore represented as follows:

$$E\left(R_{jt}|\alpha_j, \beta_j, R_{mt}\right)$$

where $E\left(R_{jt}|\alpha_j, \beta_j, R_{mt}\right)$ is the expected return on security j conditional upon the return of the market index, its beta estimate and alpha and α_j , β_j are determined from the above ordinary least squares regression equation.

Implementing the market model requires a period prior to the event in which to estimate parameters, the estimation period, and a choice of market index. Generally, a

period close to the event window is chosen but is expected the event under study will have no impact so that parameter estimation is made over a period when there is no persistent abnormal returns (Strong, 1992). Since it is found on-market repurchase announcements are typically preceded by a period of negative share price performance, this chapter will follow Stephens and Weisbach (1998) and estimate parameters over a 100 day period beginning t = -165 days and ending t = -65 days relative to the announcement. This chapter will employ the ASX All Ordinaries Total Return Index which is an accumulation index as a proxy for the market portfolio and therefore adjusts for stocks that are traded *ex-dividend* so that both growth and dividend income can be captured in the return measurement. This index is a value-weighted index and comprises the 500 largest companies listed on the ASX and so provides a representative of the companies listed on the ASX.[60]

4.3.2 MULTIPLE REGRESSION ANALYSIS

The purpose of hypotheses H3 and H4 is to explain the abnormal return to on-market repurchase announcements measured from the event study. Hypothesis H3 is concerned with the impact of the intended length of a repurchase program as indicated in the announcement on abnormal returns for all programs, whether 'initial' or 'repeat' announcements. Hypothesis H4 on the other hand is concerned with the impact of program duration and the 'speed' with which shares are repurchased in previous programs on announcement returns for 'repeat' announcements only.

[60] Although larger indexes provide better representation of listed firms they are more inclined to suffer the potential problem of non-synchronous trading for stocks that do not trade daily. Brown and Warner (1980, pp.242 -243) find that an equally weighted index is 'slightly more likely' to detect abnormal performance than a value weighted index using the market model but suffers from 'too high' a frequency of Type 1 errors.

The multiple regression equation to test hypotheses H3 and H4 is of the following form.

$$CAR\ (-1,\ 1)_i = \alpha_0 + \alpha_1 Intended\ Length_i + \alpha_2 Duration\ Ratio_i + \alpha_3 Program\ Size_i + \alpha_4 Completion\ Rate_i + \alpha_5 Repurchase\ Speed_i + \alpha_6 PreCAR_i + \alpha_7 MTB_i + \alpha_8 Firm\ Size_i + \alpha_9 Cash\ Balance_i + \alpha_{10} Cash\ Flow_i + \alpha_{11} \Delta Leverage_i + \alpha_{12} \Delta Dividends_i + \alpha_{13} \Delta EPS_i + \alpha_{14} Return\ Deviation_i + \alpha_{15} Turnover_i + \varepsilon_i$$

Equation (1)

Where *i* represents the firm and

CAR (-1, 1)	=	The cumulative abnormal returns measured around the event date.
Intended Length	=	The expected duration of the repurchase program as indicated in the announcement measured in months.
Duration Ratio	=	The ratio of program length to intended length, as indicated in the announcement truncated at 100% for programs where intended length and shares sought are extended.
Program Size	=	The number of shares sought as indicated in the announcement represented as a percentage of shares outstanding.
Completion Rate	=	The number of shares repurchased divided by the number of shares sought, as indicated in the announcement, truncated at 100%.
Repurchase Speed	=	The number of shares repurchased divided by the number of shares sought at the halfway point of the intended program

length, as indicated in the announcement, truncated at 100%.

PreCAR	=	CAR measure over the time period (-40, -6) days relative to the announcement date.
MTB	=	Ratio of market capitalisation to book value of common equity.
Firm Size	=	Natural logarithm of market capitalisation.
Cash Balance	=	Cash and short term investments divided by market capitalisation.
Cash Flow	=	Operating cash flow divided by market capitalisation.
Δ*Leverage*	=	The change in leverage ratio from period t-2 to period t-1 where leverage is measured as the ratio of short term and long term debt (including current portion of long term debt) to common equity.
Δ*Dividends*	=	The change in dividend payout ratio from period t-2 to period t-1 where the dividend payout ratio is measured as the ratio of cash dividends paid on common shares to net income.
Δ*EPS*	=	The change in EPS from period t-2 to period t-1 where EPS is represented as the basic EPS measure provided in the annual report and calculated as the ratio of net income to outstanding common shares.
Return Deviation	=	The standard deviation of daily returns estimated over the trading period (-165, - 10) days relative to the announcement date.
Turnover	=	The natural logarithm of the average trading volume of

shares measured over the period (-165, -10) days relative to the announcements date scaled by the number of shares outstanding provided in the announcement.

All financial data are taken from the most recent annual report released prior to the announcement, period t = -1, except for variables, Δ*Leverage*, Δ*Dividends* and Δ*EPS* which measure the changes from the period t = -2 (annual report released 2 years prior to the announcement) to the period t = -1. Market capitalisation is measured at reporting date for the financial period t = -1. The selection of dependent and independent variables is consistent with that used in other studies by Stephens and Weisbach (1998) and Bonaimé (2012) and others except for the explanatory variable, *Intended Length*, which has not been examined previously, is included to test hypothesis H3. It is expected that given the fraction of shares sought, the shorter the intended length of a program the more positive the signal and therefore announcement returns. As such, the sign of the coefficient for *Intended Length* is expected to be negative. Since some firms have indicated an unlimited duration in their program announcements the regression model will be alternatively executed with the inclusion of dummy variable *Unlimited Duration* that will take on the value of 1 if an unlimited duration is indicated or 0 if a fixed intended length has been indicated in the program announcement.

Consistent with the association found between actual completion rates and fraction of shares sought found by Stephens and Weisbach (1998), this chapter will employ an alternative measure of intended duration, *Duration Ratio*, to capture whether the market correctly anticipates the actual duration of the repurchasing period in addition

to completion rates. The variable *Duration Ratio* is measured as the ratio of actual repurchase duration to the intended duration (*Intended Length*) indicated in the announcement. This ratio is truncated at 100% for programs where both the fraction of shares sought and program duration has been extended since the time extension is required to repurchase the revised number of shares sought rather than the number of shares advertised in the original announcement. As with the variable *Intended Length*, the sign of coefficient for *Duration Ratio* is expected to be negative.

Control variables

Additional variables, indicated in the literature as potentially influencing the market reaction to repurchase announcements, are included in regression Equation (1) to act as controls in estimating the significance of the explanatory variables. The variable *Program Size* measures the fraction of shares sought and represents the size of the intended program. Since *Program Size* is an indicator of the potential cost of false signalling it is expected the sign of its coefficient will be positive. Stephens and Weisbach (1998) note that the fraction of shares sought becomes insignificant in explaining announcement returns if a measure of actual repurchases is included in the regression, suggesting that the market correctly anticipates actual repurchases at the time of the announcement. As such, the variable *Completion Rate* is included in the model and is measured as the ratio of the fraction of shares acquired to the fraction of shares sought truncated at 100% to avoid the influence of firms that have increased the program size subsequent to the announcement. The coefficient for both variables is expected to be positive.

An alternative measure of shares repurchased, *Repurchase Speed*, which has not been the subject of examination previously, will be used to see if the market correctly

anticipates the numbers of shares purchased earlier in the program. *Repurchase Speed* measures the mid-completion rate and as with variable, *Completion Rate*, its measure is truncated at 100% to allow for firms that have extended the number of shares sought in the original announcement. Mid-completion rate measures the number of shares repurchased at the intended halfway point of a program divided by the number of shares sought in the announcement (see Chapter 3). The coefficient for *Repurchase Speed* is expected to be positively associated with announcement returns since firms that are committed to repurchase shares earlier in a program run a greater cost of false signalling.

The variable *PreCAR* is used to measure the pre-announcement share price performance for the announcing firm in the lead up to the announcement. A negative share price performance prior to announcements has frequently been identified in other studies as an indication of undervaluation of a firm's shares. *PreCAR* is CAR measured for the period (-40, -6) days to the announcement date consistent with Stephens and Weisbach (1998). The sign of its coefficient is expected to be negative.

The variable *MTB* ratio is a standard indicator of a firm's investment opportunities and firms with high market-to-book ratios are commonly considered to have more investment opportunities. Jensen (1986) argues that firms with free cash flows may be motivated to repurchase shares as a means of disgorging excess cash, so that firms with low market-to-book ratios, which are seen as lacking investment opportunities, are likely to be motivated to repurchase shares for this reason. Firms with low market-to-book ratios (value firms) are also considered in the literature as being undervalued (see Bartov et al., 1998; Barth and Kasznick, 1999; and Dittmar, 2000) and so,

consistent with the variable *PreCAR* it is expected that the market will react more favourably to announcements made by low *MTB* firms than firms with high *MTB* and therefore, the sign of the coefficient for *MTB* is expected to be negative.

Firm Size is expressed as the natural logarithm of market capitalisation to control for firms with extreme values and is a variable commonly employed in capital market research as a control variable for information asymmetry since large firms are generally considered to have more publicly available information than small firms. Small firms are also argued to be less scrutinized by analysts and therefore more likely to be mispriced, and as such, the market is expected to react more favourably to announcements made by smaller firms, implying a negative association with announcement returns. As such, the coefficient for *Firm Size* is also expected to be negative.

The variable *Cash Balance* represents cash and marketable securities scaled by market capitalisation to avoid the impact of extreme values. Excess cash or equivalents are considered to indicate potential agency problems of free cash flow of which share repurchases are argued to reduce. Alternatively, firms with high levels of cash are better able to complete their repurchase intentions and therefore send a more credible signal (Bonaimé, 2012). As such, the coefficient for *Cash Balance* is expected to be positive. Consistent with Dittmar (2000) and Bonaimé (2012) a second measure of free cash flow, *Cash flow*, is considered. *Cash flow* is measured as operating cash flows scaled by market capitalisation, and as with variable, *Cash Balance*, its coefficient is also expected to be positive.

The variable Δ*Leverage* is used to capture the situation where firms may use repurchases to bring its capital structure towards an optimal target level (Bagwell and Shoven, 1988; Dittmar, 2000). Repurchases reduce equity and therefore other things being equal will result in an increase in the leverage ratio. Although some doubt has been expressed that on-market repurchases are used for this purpose (Vermaelen, 1981), Grullon and Ikenberry (2000) argue that repurchases may be used on an on-going basis to avoid large leverage adjustments. Odgen et al. (2003) measure a strong association between debt and repurchases suggesting that firms use debt to finance repurchases and in so doing increase leverage. For this reason Δ*Leverage* is expressed as the change in the debt/equity ratio from the reporting period t-2 to period t-1 relative to the announcement date where the debt/equity ratio encompasses the ratio of short term and long term debt to common equity. The variable is intended to capture firms in the stage of changing their debt/equity ratio over time. Since share repurchases provide the opportunity for firms to correct their debt/equity ratios the sign of the coefficient is expected to be negative to capture firms that have recently departed from their optimal debt/equity ratios prior to the announcement.

The variable Δ*Dividends* is used to capture the situations where firms may be substituting on-market share repurchases for dividends (Jagannathan et al., 2000; Guay and Harford, 2000). The variable is measured as the change in dividend payout ratio from period t = -2 to period t = -1 relative to the announcement. It is argued under the tax savings hypothesis that firm value can be increased by substituting share repurchases, which are subject to capital gains tax, for dividends which are subject to income tax (Bagwell and Shoven, 1988). However, it cannot be concluded that on-market repurchases will be preferable to paying dividends in Australia for tax reasons

since dividend payments are subject to imputation credits which potentially eliminate any tax benefits.[61] If firms are substituting repurchases for dividends to the benefit of shareholders, then it is expected that the coefficient for this variable to be negative.

It is suggested in the literature that share repurchases may lead to an increase in share price if it increases EPS because of the way the market sets share price by mechanically capitalising EPS (Grullon and Ikenberry, 2000; Guay, 2002; Oded and Michel, 2008). Firms may wish to avoid the dilutive impact on EPS from the exercise of options (see for example Bens et al., 2002; Kahle, 2002; Bens et al., 2003; Lee and Alam, 2004; Balachandran et al., 2007; Lamba and Miranda, 2010) or may wish to meet or beat analysts' EPS forecasts (Hribar et al., 2006). To capture this potential effect the variable, ΔEPS, is included in the regression to measure the change in EPS from the period t = -2 to the period t = -1 relative to the announcement date. Firms experiencing declining EPS will be motivated to repurchase shares to increase EPS so that it is expected that the coefficient for ΔEPS will be negative.

Consistent with Bonaimé (2012) the variable *Return Deviation* is included in the regression to capture the flexibility of on-market share repurchase programs (Jagannathan et al., 2000) since firms can take advantage of repurchasing shares at low prices and avoid repurchasing shares at inflated prices. According to Ikenberry and Vermaelen (1996) stocks with volatile share prices provide firms with greater opportunity to repurchase undervalued shares to the benefit of long-term shareholders. The increase in share prices accompanying the announcement represents the value of the 'exchange option' to the firm and is proportional to the volatility of the underlying

[61] Occasions may arise when on-market repurchases are preferable to paying dividends, for example, when companies do not have credit balances in their franking accounts and are therefore unable to pay franked dividends.

stock. Whilst transparency of on-market repurchases on the Australian share market is expected to deter firms from behaving opportunistically, it is expected that the coefficient for this variable will be positive.

The control variable *Turnover*, is included as a measure of share liquidity to capture firms that substitute repurchases for dividends (Brockman, Howe and Mortal, 2008). It is argued that if liquidity of a firm's shares is high then the transaction costs associated with repurchases in the form of widening bid-asks spreads is not as severe as for firms with illiquid shares and therefore favouring repurchases over dividends as a payout mechanism in such situations (Barclay and Smith, 1988). Therefore the more liquid a firm's shares the lower the expected transaction costs associated with substitution and the more positive the announcement, other things being equal. As such, the sign of the coefficient for *Turnover* is expected to be positive.

Finally, to control for the potential bias introduced by the industry in which an announcing firm belongs or the year in which announcements are made, regressions will be alternatively executed with dummy variables for industry type and the year in which announcements are made. Dummy variables are developed for each of the following industry sectors according to the Global Industry Classification Standard (GICS): Energy; Materials; Industrials; Consumer Discretionary; Consumer Staples; Health Care; Financials; Information Technology and Telecommunication Services.

To test hypothesis H4 regression Equation (1) is modified to include variables that capture potential reputation signals from previous announcements for 'repeat' programs as follows.

$$CAR\ (-1, 1)_i =$$

$$\alpha_0 + \alpha_1 LagDuration_i + \alpha_2 LagSpeed_i + \alpha_3 LagComprate_i + \alpha_4 Intended\ Length_i + \alpha_5 Program\ Size_i + \alpha_6 Repurchase\ Speed_i + \alpha_7 PreCAR_i + \alpha_8 MTB_i + \alpha_9 Firm\ Size_i + \alpha_{10} Cash\ Balance_i + \alpha_{11} Cash\ Flow_i + \alpha_{12} \Delta Leverage_i + \alpha_{13} \Delta Dividends_i + \alpha_{14} \Delta EPS_i + \alpha_{15} Return\ Deviation_i + \alpha_{16} Turnover_i + \alpha_{17} Time\ Lapse_i + \varepsilon_i$$

Equation (2)

Where *i* represents the firm and

LagDuration = The duration period, measured in months, of the most recent prior program divided by the intended program length as indicated in the announcement, also measured in months truncated at 100% for programs that have both the fraction of shares sought and program length extended.

LagSpeed = The number of shares repurchased at the halfway point of the intended program length divided by the number of shares sought indicated in the announcement of the most recent prior program truncated at 100%.

LagComprate = The number of shares repurchased divided by the number of shares sought as indicated in the announcement of the most recent prior program truncated at 100%.

Time Lapse = The time period between current and prior repurchase program announcement dates, measured in months.

The measurement of all other variables is consistent with that described above for regression Equation (1). Of particular importance for this hypothesis is the measure of association between announcement returns of 'repeat' repurchases and repurchase characteristics of prior programs in conjunction with prior completion rates identified by Bonaimé (2012). Two additional explanatory variables have been identified for this model, *LagDuration* and *LagSpeed*. The variable *LagDuration* measures the program duration scaled by the intended length of the program represented in the announcement of the most recent prior program. If firms terminate the program ahead of time indicated in the announcement then, other things being equal, they have less time in which to repurchase shares which imposes an additional cost to the firm in repurchasing shares and conversely, firms that extend the time period have greater flexibility thereby reducing the potential cost to the firm in repurchasing shares. To the extent that firms develop a reputation for reducing duration it is expected that the market will anticipate that current program length will also be reduced, thereby conveying a positive signal to the market and vice versa for firms that have a reputation for extending the program length. Therefore it is expected that the coefficient for this variable will be negative. Consistent with the measurement of *Duration Ratio* from the first regression, the variable is truncated at 100% for firms that have extended the program in terms of fraction of shares sought as well as intended duration.

The variable *LagSpeed* measures the mid-completion rate of the most recent prior program and consistent with *Repurchase Speed* is truncated at 100%. The variable is an indicator of the firm's commitment to repurchase shares and therefore to the extent

that firms earn a reputation for the number of shares repurchased in the early stages of a prior program it is expected that the coefficient for this variable will be positive.

Consistent with Bonaimé (2012), the variable *LagComprate* is included in the regression to capture the potential reputation effect of prior program completion rates and is expected that its coefficient will be positive. The variable *Time Lapse* is included in the model to capture the potential negative impact on firm reputation for firms announcing a new program soon after a prior plan, thereby reducing the time period in which to complete the prior program and potentially weakening the market reaction to the second program announcement (Bonaimé, 2012). Alternatively, for a firm that announces a program shortly after the completion of a prior program because it completed the program sooner than expected, the announcement of the subsequent program may include information pertaining to the completion of the first program (Bonaimé 2012). Similarly, firms that announce a program soon after the completion of a prior program because it completed the program more quickly than expected may convey a positive signal to the market of their confidence in meeting its target. It is therefore not clear whether the sign of the coefficient for *Time Lapse* is expected to be positive or negative. Consistent with Equation (1) the regression will be interchangeably performed with the inclusion of dummy variables for programs that indicate an unlimited program duration in the announcement, industry type and the year in which programs are announced.

4.4 DESCRIPTIVE STATISTICS AND EMPIRICAL RESULTS

The purpose of this section is to discuss descriptive statistics of repurchasing firms and the empirical results for testing of hypotheses H1 – H4.

4.4.1 DESCRIPTIVE STATISTICS

The following Tables 4.1- 4.3 provide summary statistics regarding the final sample of 789 on-market share repurchase program announcements for this study. Table 4.1 presents summary statistics, minimum, mean, median, maximum and standard deviation values for the market-to-book ratio, market capitalisation, total assets, cash balance, operating cash flow, debt/equity ratio (D/E %), the change in debt/equity ratio (ΔD/E %), dividend payout ratio %, change in dividend payout ratio %, EPS and change in EPS (ΔEPS) for the entire sample. All data are taken from annual reports for the year end immediately prior to the announcement, period t = -1, except for the change in debt/equity ratio, change in dividend payout ratio, and change in EPS which are measured as the change from period t = -2 to period t = -1. Market capitalisation is measured at reporting date for the reporting year immediately before announcement.

In comparing the mean and median values it is evident that most financial data are affected by extreme values and are therefore not normally distributed. For example, the mean and median values by market capitalisation are $1,013.07m and $94.46m respectively, and the smallest and largest firms are $0.26m and $35,316.84m respectively. For total assets the mean and median values are $1,465.65m and $100.82m respectively, and the smallest and largest firms are $1.8m and $172,998m respectively.

TABLE 4.1

Financial Characteristics of Repurchasing Firms

Table 4.1 presents summary financial statistics for all announcing firms. *Market-to-book ratio* is market capitalisation divided by book value of equity. *Market capitalisation* is outstanding shares times market price recorded at reporting date. *Total assets* is current plus non-current assets. *Cash balance* is cash and short term investments. *Cash flow* is cash flow from operations. *D/E* is long term debt plus short term debt plus current portion of short term debt divided by book value of equity. *ΔD/E* is the change in *D/E* from period t=-2 to period t= -1 relative to announcement date. *EPS* is net profit divided by outstanding shares. *Dividend payout ratio* is common dividends paid divided by net profit. *ΔDividend payout ratio* is the change in *Dividend payout ratio* from period t=-2 to period t= -1 relative to announcement date. *ΔEPS* is change in *EPS* from period t= -2 to period t= -1 relative to announcement date. All variables are measured at financial year end immediately prior to repurchase announcement except variables which measure the change over two consecutive periods prior to an announcements.

Variable	n	Min	Mean	Median	Max	Standard Deviation
Market-to-book ratio	778	-7.85	2.29	1.23	29.08	3.06
Market capitalisation ($m)	778	0.26	1013.07	94.46	35316.84	2952.99
Total assets ($m)	781	1.80	1456.65	100.82	172998.00	7196.12
Cash balance ($m)	781	0.00	181.87	12.82	22813.00	1436.28
Cash flow ($m)	781	-944.00	85.86	5.46	3938.00	276.18
D/E (%)	781	-334.54	55.73	15.73	4807.50	246.97
ΔD/E (%)	769	-1093.49	-0.09	0.00	2249.06	156.58
Dividend payout ratio (%)	780	-329.98	38.63	27.35	1431.36	97.73
ΔDividend payout ratio (%)	766	-83314.00	-109.78	0.00	8811.71	3039.61
EPS ($)	781	-8.68	0.14	0.07	7.24	0.55
ΔEPS ($)	769	-8.90	0.06	0.01	27.86	1.24

This, together with negative minimum values for market-to-book value, debt/equity ratio and dividend payout ratio, which are indicative of negative book values and net income, suggest the need for winsorisation of data for hypothesis testing.

Table 4.2 presents a comparison of the means of financial characteristics by industry sector. Of note, the number of firms belonging to the Financials sector (n = 282) represents 35.7% of the total announcements. A comparison of the market-to-book ratio reveals that firms from the Telecommunication Services (0.73) and to a lesser extent, the Financials (1.87) sectors are more likely to be motivated by undervaluation than other sectors. Firms from the Telecommunication Services sector as well as the Information Technology sector are also likely candidates to suffer from information symmetry as indicated by firm size, whether measured by market capitalisation or total assets. Market capitalisation and total assets values for Telecommunication Services firms are $39.64m and $57.47m respectively, and for Information Technology firms $162.09m and $100.72m respectively, compared to firms from Consumer Staples with respective values of $4,664.71m and $3,704.58m. In terms of motivation to reduce excess cash balances, firms from the Financials and Industrial sectors have the highest cash balances on average, $345.17m and $213.43m respectively, and are therefore more likely to repurchase shares for this reason whereas firms from the Consumer Staples and Materials sectors have the highest cash flows, $377.76m and $192.89m respectively, suggesting that they may also be motivated to disgorge excess cash.

TABLE 4.2

Financial Characteristics of Announcing Firms by Industry Sector

Table 4.2 presents the mean values of financial statistics for all announcing firms grouped by industry sector (GICS industry Classification). *Market-to-book ratio* is market capitalisation divided by book value of equity. *Market capitalisation* is outstanding shares times market price recorded at reporting date. *Total assets* is current plus non-current assets. *Cash balance* is cash and short term investments. *Cash flow* is cash flow from operations. *D/E* is long term debt plus short term debt plus current portion of short term debt divided by book value of equity. *ΔD/E* is the change in *D/E* from period t=-2 to period t= -1 relative to announcement date. *Dividend payout ratio* is common dividends paid divided by net profit. *ΔDividend payout ratio* is the change in *Dividend payout ratio* from period t=-2 to period t= -1 relative to announcement date. *EPS* is net profit divided by outstanding shares. *ΔEPS* is change in *EPS* from period t= -2 to period t= -1 relative to announcement date. All variables are measured at financial year end immediately prior to repurchase announcement except variables which measure the change over two consecutive periods prior to an announcements.

Variable	Energy (n= 27)	Materials (n= 102)	Industrials (n= 82)	Consumer Discretion -ary (n= 113)	Consumer Staples (n= 33)	Health Care (n= 42)	Financials (n= 282)	Informatio n Technolog y (n= 88)	Telecomm unication Services (n= 12)
Market-to-book ratio	3.49	2.13	2.65	2.40	2.49	2.84	1.87	2.84	0.73
Market capitalisation ($m)	805.62	1808.66	924.89	704.77	4664.71	2096.95	626.98	162.09	39.64
Total assets ($m)	757.01	1818.84	1650.59	679.42	3704.58	1212.86	1903.60	100.72	57.47
Cash balance ($m)	65.86	78.06	213.43	38.56	167.12	149.46	345.17	14.16	5.53
Cash flow ($m)	66.51	192.89	122.55	56.27	377.76	112.76	39.13	9.72	7.30
D/E (%)	40.85	39.23	62.63	129.34	56.92	26.97	53.68	5.28	4.78
ΔD/E (%)	-45.50	-29.30	-10.26	48.57	0.90	-5.24	-1.16	0.05	-0.74
Dividend payout ratio (%)	6.81	39.20	42.96	42.50	46.37	18.19	40.61	43.69	6.40
ΔDividend payout ratio (%)	-0.22	-53.10	7.79	72.18	-2.22	-0.49	-18.62	-956.63	4.31
EPS ($)	0.11	0.19	0.29	0.17	0.38	0.18	0.08	-0.02	0.01
ΔEPS ($)	0.08	0.10	0.37	0.00	-0.04	0.06	0.01	0.02	0.02

Firms from the Telecommunications Services and Information Technology sectors have the lowest debt/equity ratios on average, with ratios of 4.78% and 5.28% respectively, but in terms of recent change to the debt/equity ratio prior to announcements, firms from the Energy, Materials, Industrials, Health Care, Financials as well as the Telecommunication Services sectors have all experienced a recent decrease in their debt/equity ratios (-45.5%, -29.3%, -10.26%, -5.24%, -1.16% and -0.74% respectively) and are therefore more likely to be motivated to repurchase shares in order to correct their ratios. Although firms from the Telecommunication Services and Energy sectors have the lowest dividend payout ratios, 6.81% and 6.4% respectively, firms from the Information Technology, Materials and Financials sectors all experience large negative adjustments to their dividend payout ratios, (measured as -956.63%, -53.1%, -18.62% respectively). To a lesser extent firms from the Consumer Staples, Health Care, and Energy sectors also experience negative adjustments to their dividend payout ratios prior to announcements, -2.22%, -0.49% and -0.22% respectively, consistent with the notion of firms substituting repurchases for dividends. Lastly, firms from the Information Technology and Telecommunication Services sectors have the lowest EPS, -$0.02 and $0.01 respectively, but the only sector in which firms on average record a decrease in EPS prior to announcements is the Consumer Staples sector (-$0.04), suggesting that few firms from the entire sample are motivated to repurchase shares in order to improve EPS.

Table 4.3 presents the mean and median values for all explanatory and control variables used in regression equations to test hypotheses H3 and H4 and provides a comparison by announcement type as well as for announcements overall together with test statistics for difference between ‘initial’ and ‘repeat’ programs.

TABLE 4.3

Mean and Median Values for Regression Variables by Announcement Type

Table 4.3 presents the mean and median (in brackets) values for all variables used in regression analysis to test hypotheses H3 and H4 for all announcements and by announcement type- 'initial' and 'repeat'. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate, Repurchase Speed, LagComprate and LagSpeed* which are truncated at 100%. The final column presents statistics for *t*-tests of difference for mean values and the Wilcoxon rank-sum test of difference for median values [in brackets] between 'initial' and 'repeat' announcements.

Variable	All Announcements	Initial Announcements	Repeat Announcements	Test of difference
Intended Length	13.933	15.398	12.868	-3.77[a]
	[12.000]	[12.000]	[12.000]	[3.27[a]]
Program Size	0.078	0.077	0.078	0.26
	[0.095]	[0.095]	[0.097]	[-0.04]
Duration Ratio	0.906	0.906	0.906	0.00
	[1.000]	[1.000]	[1.011]	[-0.53]
Completion Rate	0.395	0.410	0.385	-0.87
	[0.250]	[0.316]	[0.230]	[1.59]
Repurchase Speed	0.295	0.305	0.288	-0.68
	[0.130]	[0.154]	[0.120]	[1.54]
PreCAR	-0.035	-0.055	-0.021	2.28[b]
	[-0.024]	[-0.046]	[-0.014]	[-2.33[b]]
MTB	2.252	2.376	2.235	-0.21
	[1.232]	[1.319]	[1.146]	[0.64]
Firm Size	18.570	18.314	18.749	2.86[a]
	[18.364]	[18.096]	[18.486]	[-2.46[b]]
Cash Balance	0.288	0.333	0.267	-1.43
	[0.124]	[0.138]	[0.113]	[1.96[c]]
Cash Flow	0.066	0.048	0.080	1.68[c]
	[0.061]	[0.057]	[0.063]	[-0.98]
ΔLeverage	-3.394	-4.654	-2.520	0.39
	[0.000]	[0.000]	[0.000]	[-2.57[b]]
ΔDividends	-1.840	-10.464	4.280	2.18[b]
	[0.000]	[0.000]	[0.000]	[-1.32]
ΔEPS	0.029	0.032	0.027	-0.04
	[0.011]	[0.009]	[0.014]	[-0.11]
Return Deviation	0.0296	0.0345	0.026	-6.86[a]
	[0.025]	[0.030]	[0.022]	[6.35[a]]
Turnover	-13.606	-13.640	-13.589	0.39
	[-13.555]	[-13.487]	[-13.615]	[0.53]
LagComprate	-	-	0.448	
			[0.357]	
LagDuration	-	-	0.889	
			[1.000]	
LagSpeed	-	-	0.328	
			[0.160]	
Time Lapse	-	-	19.686	
			[12.467]	
No observations	781	324	457	

All data are winsorised at the 1st and 99th percentiles except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed* which are all truncated at 100%. In comparing firms of 'initial' with 'repeat' announcements, 'initial' announcement firms have indicated significantly longer intended program duration as measured by *Intended Length*, 15.398 months compared to 12.868 months, intend to repurchase slightly less shares as indicated by *Program Size*, 7.7% compared to 7.8%, and have shares that are significantly more under-priced as indicated by variable, *PreCAR*, -0.055% compared to -0.021%.[62] The fact that firms of 'repeat' announcements also have under-priced shares demonstrates that if repurchase announcements are signals of undervaluation then 'initial' announcements only achieve a partial correction in the share price. 'Initial' firms also repurchase more shares as indicated by variable *Completion Rate*, 41% compared to 38.5%, and *Repurchase Speed*, 30.5% compared to 28.8%, but when comparing program duration with intended duration, as indicated by *Duration Ratio*, both have identical measures, 0.906.[63]

As observed previously (Table 3.5) the fraction of shares sought between 'initial' and 'repeat' announcements is similar but completion rates for 'initial' announcements are higher than for 'repeat' announcements. In comparing other variables, firms of 'initial' announcements have higher amounts of cash as measured by C*ash Balance*, 0.333 compared to 0.267, but have significantly lower operating cash flows, as

[62] For both 'initial' and 'repeat' programs the median value for *Intended Length* is 12 months whilst for *Program Size* the median values are 9.5% and 9.7% respectively. For variable *PreCAR* the median values are -0.046% and -0.014% respectively for 'initial' and 'repeat' programs. The test of difference between group mean and median values for *Intended Length* is significant at the 1% level of significance and for *PreCAR* is significant at the 5% level of significance.

[63] Median values for variable *Completion Rate* are 31.6% and 23% for 'initial' and 'repeat' programs respectively whilst for *Repurchase Speed* median values are 15.4% and 12% respectively. Median values for variable *Duration Ratio* are 1.000 and 1.011 for 'initial' and 'repeat' programs respectively.

indicated by *Cash Flows*, 0.048 compared to 0.08, and experience significantly higher share price volatility as measured by the variable, *Return Deviation*, 0.0345 compared to 0.026.[64] 'Initial' firms also have reduced their dividend payout ratios prior to announcements whereas 'repeat' firms have increased their ratios, as indicated by Δ*Dividends*, -10.464 compared to 4.28, suggesting that 'initial' firms are more likely to be substituting repurchases for dividends than 'repeat' firms.[65]

In addition, both 'initial' and 'repeat' announcers are reducing their debt/equity ratios prior to announcements as indicated by the variable Δ*Leverage*, -4.654 and -2.52 respectively, indicating the possibility that both sets of firms are motivated to increase their leverage ratios.[66] Both 'initial' and 'repeat' announcement firms have similar market-to-book ratios, as indicated by *MTB*, 2.376 compared to 2.235, and like Jagannathan and Stephens (2003), 'initial' announcement firms are significantly smaller in size as indicated by *Firm Size*, 18.314 compared to 18.749.[67]

Lastly, firms of both programs experience similar values for share liquidity as indicated by *Turnover*, -13.640 for 'initial' announcements compared to -13.589 for 'repeat' announcements, and both experience increasing EPS prior to announcements

[64] Median values for variable *Cash Balance* are 0.138 and 0.113 for 'initial' and 'repeat' programs respectively whilst for *Cash Flows* median values are 0.048 and 0.08 respectively. Median values for variable *Return Deviation* are 0.030 and 0.022 for 'initial' and 'repeat' programs respectively. The test of difference between group mean and median values for *Return Deviation* is significant at the 1% level of significance whilst for *Cash Balance* the test of difference for median values is significant the 10% level of significance and for *Cash Flow* the test of difference between mean values is significant at the 10% level of significance.

[65] The median value for Δ*Dividends* for both 'initial' and 'repeat' programs is 0.0. Whilst the test of difference between group median values is insignificant the *t*-test of difference between mean values is significant at the 5% level of significance.

[66] The median value for Δ*Leverage* for both 'initial' and 'repeat' programs is 0.0 and are significantly different at the 5% level of significance whilst the test of difference for mean values is insignificant.

[67] Median values for variable *MTB* are 1.319 and 1.146 for 'initial' and 'repeat' programs respectively whilst for *Firm Size* median values are 18.096 and 18.486 respectively. The test of difference between group mean and median values for *Firm Size* is significant at the 1% and 5% levels of significance respectively.

as indicated by variable Δ*EPS*, 0.032 for 'initial' announcements compared to 0.027 for 'repeat', undermining the motivation to repurchase shares in order to increase EPS.[68]

For 'repeat' announcements only, the closeness in mean values for *LagDuration* and *Duration Ratio*, 0.889 and 0.906 respectively, suggest that the ratio of actual duration to intended duration is consistent between current and past programs. Prior completion rates are higher than current completion rates, as indicated by percentages of 44.8% for the variable *LagComprate* compared to 38.5% for *Completion Rate*. Also, the value for variable, *LagSpeed,* indicates that approximately 32.8% of shares sought in an announcement from prior programs are repurchased in the first half of the repurchase period compared to 44.8% for the entire program, suggesting that for prior programs 73.2% of shares are repurchased in the first half of the intended repurchase program compared to 74.8% for current programs. Finally, the average time between subsequent announcements, as indicated by *Time Lapse*, is over 19 months and is noticeably less than the 679 days found by Jagannathan and Stephens (2003) for 'occasional repurchase' programs but more than the 370 days for 'frequent repurchase' programs.[69]

4.4.2 EMPIRICAL RESULTS

The purpose of this section is to discuss the results from testing of the four hypotheses, H1 – H4. Hypothesis H1 is concerned with examining the market reaction to the announcement of on-market repurchase programs. Results of announcement

[68] Median values for variable *Turnover* are -13.487 and -13.615 for 'initial' and 'repeat' programs respectively whilst for Δ*EPS* median values are 0.009 and 0.014 respectively.
[69] Median values are 1.0, 35.7%, 16% and 12.467 months respectively for variables *LagDuration*, *LagComprate*, *LagSpeed* and *Time Lapse*.

CAR measured over various event windows are presented in Table 4.4. Hypothesis H2 is concerned with examining and comparing the market reaction to announcements categorised by program type, 'initial' and 'repeat' and results of announcement CAR measured over various event windows are presented in Table 4.5. Hypothesis H3 is concerned with explaining the market reaction to announcements for programs in general and regressions include *Intended Length* and *Duration Ratio* as key explanatory variables with other independent control variables of Equation (1). Hypothesis H4 is concerned with 'repeat' announcements only and extends explanatory variables to include *LagDuration* and *LagSpeed* together with other independent control variables of Equation (2). Results for hypothesis H3 are presented in Table 4.6 and results for hypothesis H4 regressions are presented in Table 4.7.

All regressions are performed with CAR measured over the 3 day event window and results document coefficient statistics with *t*-values in parentheses and with all variables winsorised at the 1st and 99th percentiles, except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed* which are truncated at 100%. Regressions are checked for autocorrelation using the Durbin-Watson statistic for first order autocorrelation and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics. For robustness, tests are repeated with the 5 day event window as the dependent variable using winsorised data, and also with the 3 day event window using raw data in the Appendix (Tables A.2 - A.5).

Hypothesis H1

Results for the first hypothesis is presented in Table 4.4 and documents the average announcement CAR, the associated cross-sectional t-statistic and corresponding significance level for announcement returns over the 3 day and 5 day event windows for data winsorised at the 1st and 99th percentiles and 3 day event window only for raw data. As can be seen announcement returns are positive and significantly different from zero as expected in all cases and consistent with the notion that announcements of on-market share repurchases provide positive new information to the market. The cumulative abnormal returns for both the 3 day and 5 day event windows are 2.7% and 2.6% respectively, and 2.8% for raw data. All results are significant at the 1% level of significance. Compared to other Australian studies, the results are similar but lower to those found by Lamba and Ramsay (2005) and Akyol and Foo (2013) who find announcement returns of 3.3% and 3.06% respectively, but higher than those found by Lamba and Miranda (2010), 2.3%.

TABLE 4.4

Announcement Returns

Table 4.4 reports the mean market reaction to the announcement of on-market share repurchase programs by event windows, (-1, 1) and (-2, 2), for both winsorised and raw data. Announcement period returns are calculated using market model to generate abnormal returns summed over the event window. T-statistics are provided in the parentheses. Winsorised data are winsorised at the 1st and 99th percentiles. All results are significant at the 1% level of significance.

Variable	N	Mean
CAR (-1, 1) (winsorised)	753	0.027 (10.98)
CAR (-2, 2) (winsorised)	753	0.026 (9.61)
CAR (-1, 1) (raw data)	781	0.028 (9.19)

In comparison with overseas studies the results are comparable to those of Stephens and Weisbach (1998) but lower than those of Vermaelen (1981) and Ikenberry et al. (1995) who record 2.69%, 3.37% and 3.54% for US announcements respectively, however are higher than for other US studies recorded by Comment and Jarrell (1991), Peyer and Vermaelen (2009), Bonaimé (2012) and Babenko et al. (2012), 2.3%, 2.39%; 1.93% and 1.27% respectively. [70] The results are also higher than those of Ikenberry et al., (2000) who measure announcement returns of 0.93% for Canada. Of note, the results for this chapter are comparable with those of Andriosopoulos and Lasfer (forthcoming) who record 2.95% for announcement returns made in the UK prior to the change in regulation which now allows firms to hold repurchased shares as treasury stock.[71] Results of announcement CAR provide strong support for the first hypothesis.

Hypothesis H2

Hypothesis H2 requires a comparison of the announcement returns between 'initial' and 'repeat' announcements. It is hypothesised that given information from previous announcements, the market is in a better position to assess the likelihood that a firm will follow thru with the commitment of repurchasing shares resulting in a 'separating' equilibrium between successful and unsuccessful type firms. With 'initial' announcements it is argued that the market will assess this likelihood in a 'pooling' equilibrium, in which all firms are assessed equally. Results with *t*- values provided in parentheses for cumulated abnormal returns winsorised at the 1st and 99th

[70] Differences in announcement returns found for the US may reflect variations in the time periods under examination. The periods under examination are 1970 - 1978 Vermaelen (1981); 1984 - 1989 Comment and Jarrell (1991); 1981 - 1990 (Stephens and Weisbach, 1998); 1980 - 1990 (Ikenberry et al., 1995); 1991- 2001 (Peyer and Vermaelen, 2009); 1988 - 2007 (Bonaimé, 2012); and 1993 - 2008 (Babenko et al., 2012).

[71] Andriosopoulos and Lasfer (forthcoming) record announcement returns of only 0.72% since the change in legislation.

percentiles for both 'initial' and 'repeat' announcements are presented in Table 4.5 and for robustness repeated for the 5 day event window using winsorised data and 3 day event window using raw data.

TABLE 4.5

Announcement Returns by Announcement Type

Table 4.5 reports the mean market reaction to the announcement of on-market share repurchase programs by event windows, (-1, 1) and (-2, 2), for winsorised and event window (-1,1) for raw data for both 'initial' and 'repeat' announcements. Announcement period returns are calculated using market model to generate abnormal returns summed over the event window. T-statistics are provided in the parentheses. The table also reports the T-Test of equality between 'initial' and 'repeat' announcements. Winsorised data are winsorised at the 1st and 99th percentiles. a, b and c represent significance at the 1%, 5% and 10% level of significance.

	CAR (-1, 1) (winsorised)		CAR (-2, 2) (winsorised)		CAR (-1, 1) (raw)	
	Initial (n=292)	Repeat (n=442)	Initial (n=292)	Repeat (n=442)	Initial (n=324)	Repeat (n= 457)
Announcement returns	0.031[a] (8.12)	0.021[a] (7.35)	0.037[a] (9.24)	0.015[a] (4.82)	0.035[a] (6.69)	0.022[a] (6.34)
T-Test of equality	(-2.12)[b]		(-4.38)[a]		(-2.14)[b]	

Results indicate that announcement returns are significantly different from zero for both 'initial' and 'repeat' announcements at the 1% level of significance in all cases. For 'initial' announcements the 3 day announcements returns are 3.1% compared to 2.1% for 'repeat' announcements. Further, the test of difference between both groups is also significantly different from zero at a significance level of 5%, thus rejecting the null hypothesis of equal CARs across both groups and providing support for hypothesis H2. Similar results are produced for CAR measured across the 5 day event window for winsorised data and 3 day event window for raw data. As discussed from Table 4.3, the fraction of shares sought is slightly lower for 'initial' programs, 7.7% compared to 7.8% for 'repeat' programs, and firms from 'initial' programs indicate a longer program duration, 15.398 months compared to 12.868 months, which according to theory should result in higher announcement returns for 'repeat'

programs than 'initial' programs and yet this is not the case. These results highlight that information asymmetries are to an extent resolved by 'initial' programs or that for 'repeat' programs, announcements returns represent the market response to successful and unsuccessful firm types.

These results are consistent with those of Jagannathan and Stephens (2003), who find that announcements of first or 'infrequent' repurchase programs are accompanied by abnormal returns of 3.4% compared to announcements of second or third repurchase programs of 2% and 1.1% respectively, and Andriosopoulos and Lasfer (forthcoming) who find announcement returns of 2.01% for 'initial' programs compared to 0.98% for 'repeat' programs.

Hypothesis H3

The third hypothesis is concerned with identifying the information that explains the market reaction to announcements. A multiple regression analysis is performed with announcement CAR as the dependent variable, variables *Intended Length*, *Duration Ratio*, and *Repurchase Speed* as explanatory variables together with other independent control variables consistent with Equation (1). Results for robustness tests are presented in the Appendix (Tables A.2 and A.3). As can be seen from Table 4.6, four versions of the regression model are presented. Models (2) to (4) are variations of model (1) which presents the basic variables of Equation (1).

TABLE 4.6

Regressions for All Announcements

Table 4.6 presents coefficient estimates from ordinary least squares (OLS) regressions describing 3-day abnormal returns around repurchase announcements using the market model to compute abnormal returns. Four versions of Equation (1) are presented with *CAR (-1, 1)* as the dependent variable. Model (1) presents the basic variables of Equation (1). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. Regressions are checked for autocorrelation using the Durbin-Watson statistic for first order autocorrelation and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0240	0.0411	0.0282	-0.0091
	(0.38)	(0.64)	(0.44)	(-0.14)
Intended Length	-0.0006[c]	-0.0025[b]	-0.0026[b]	-0.0026[b]
	(-1.85)	(-2.25)	(-2.35)	(-2.37)
Duration Ratio	0.0011	-0.0008	-0.0008	0.0003
	(0.23)	(-0.18)	(-0.18)	(0.06)
Program Size	0.0077	0.0518	0.0693	0.0801
	(0.1)	(0.66)	(0.88)	(1.04)
Completion Rate	0.0069	0.0062	0.0098	0.0094
	(0.44)	(0.39)	(0.6)	(0.56)
Repurchase Speed	-0.0230	-0.0246	-0.0271	-0.0298
	(-1.26)	(-1.34)	(-1.46)	(-1.59)
PreCAR	-0.0169	-0.0180	-0.0177	-0.0176
	(-0.81)	(-0.86)	(-0.86)	(-0.88)
MTB	-0.0007	-0.0007	-0.0012	-0.0012
	(-0.7)	(0.69)	(-1.16)	(-1.2)
Firm Size	0.0010	0.0012	0.0016	0.0020
	(0.55)	(0.65)	(0.9)	(1.12)
Cash Balance	0.0208[a]	0.0214[a]	0.0243[a]	0.0239[a]
	(2.85)	(2.94)	(3.2)	(3.22)
Cash Flow	0.0186	0.0169	0.0109	0.0149
	(1.37)	()1.26	(0.79)	(1.1)
ΔLeverage	0.0001	0.0001	0.0000	0.0001
	(1.16)	(1.19)	(0.96)	(1.11)
ΔDividends `	0.0000	0.0000	0.0000	-0.0001
	(-1.24)	(-1.29)	(-1.33)	(-1.53)
ΔEPS	-0.0023	-0.0019	-0.0010	-0.0036
	(-0.25)	(-0.2)	(-0.12)	(-0.4)
Return Deviation	0.7878[a]	0.7831[a]	0.6239[b]	0.8334[a]
	(2.98)	(2.94)	(2.05)	(2.61)
Turnover	0.0025	0.0026	0.0011	0.0004
	(0.83)	(0.89)	(0.36)	(0.14)
Unlimited (dummy)	-	0.0529[c]	0.0537[c]	0.0548[c]
		(1.81)	(1.81)	(1.86)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.05	0.0534	0.0663	0.0708
No observations	759	759	759	759

The dummy variable, *Unlimited Duration*, is included in models (2) to (4), whilst industry dummy variables are included in models (3) and (4) and year of announcement dummy variables are included in model (4) only.[72] Results indicate that the explanatory variable *Intended Length* has the correct sign and is significant for all four models with the level of significance increasing with the inclusion of dummy variable, *Unlimited Duration*, and dummy variables for industry type and year of announcement. Although not reported in the table, the probability making a Type 1 error is 6.51%, 2.45%, 1.9% and 1.82% for models (1) to (4) respectively. The value of the coefficient indicates that a one month decrease of intended program duration will result in an increase in the announcement CAR of almost 0.3 basis points. The result is robust with the inclusion of *Program Size*, *Completion Rate* and *Repurchase Speed*. These results suggest that for Australian firms, intended program length conveys important information to the market and strongly supports hypothesis H3.

The coefficient for *Duration Ratio* however, is insignificant and does not suggest that the market correctly anticipates actual duration of repurchase programs.[73] Of note, the coefficients for *Program Size* and *Completion Rate* in addition to *Repurchase Speed* are all insignificant in explaining announcement returns. Results for program size are consistent to those found by Lamba and Miranda (2010) and Akyol and Foo (2013) who also do not find a significant relationship between shares repurchased and announcement returns for Australian programs. These results suggest that the

[72] A correlation matrix for independent variables used in regression analyses throughout the thesis is provided in Table A.10 of the Appendix. Overall correlations between the variables are modest (< 0.8), which suggests that multicollinearity is not a substantive issue.

[73] In another Australian study, Akyol and Foo (2013) also do not find a significant relationship between program duration and announcement returns. An important distinction of their study is the measure of program duration which they quantify in years, whereas in this study it is represented as a ratio of intended length, which is measured in months.

intended program duration has more explanatory power than the number of shares sought or subsequently repurchased, which is found to be important in other studies (Comment and Jarrell, 1991; Stephens and Weisbach, 1998; Chan et al., 2004; Grullon and Michaely, 2004; and Bonaimé, 2012).

The coefficient for *Cash Balance* is of the correct sign and significant at the 1% level of significance for all models whilst the coefficient for *Cash Flow* is insignificant, providing some support for firms using repurchases to disgorge excess cash as indicated under the free cash flow hypothesis or alternatively, firms with large cash holdings are considered better able to complete a program and therefore send a more credible signal to the market.[74] The coefficient for *Return Deviation* is positive as expected and significant at the 1% level of significance and is economically meaningful, indicating that a 1% increase in the volatility of share price will result in an increase of around 80 basis points in announcement abnormal returns. This result suggests that the market sees value in the financial flexibility of on-market repurchase programs for firms with volatile share prices but is also consistent with Ikenberry and Vermaelen's (1996) notion that announcement returns represent the market's valuation of an 'exchange option' that is increasing with the volatility of the underlying share price.

The coefficient for *Turnover* is insignificant and not indicative of liquidity being a major factor for firms announcing repurchase programs. Coefficients for *PreCar* and *MTB*, also a measure of undervaluation, are not significant, indicating that volatility of share price has more explanatory power than pre-announcement CAR which is

[74] Of interest, Lamba and Miranda (2010) find a negative relationship between announcement returns and free cash flow for Australian repurchases.

commonly found to be associated with announcement returns in other studies, or market-to-book ratio. These results are however consistent with those of Akyol and Foo (2013) who also do not find pre-announcement returns or market-to-book ratio to be significant in explaining announcement returns for Australian announcements.[75] The coefficient for *Firm Size* is also insignificant, providing no support for the notion that repurchasing firms suffer the effects of information asymmetry commonly associated with small firms. This result contrasts with that of Akyol and Foo (2013) who do find firm size to be negatively associated with announcement returns but is consistent with the results of Lamba and Miranda (2010).[76] The notion that repurchases are a mechanism for adjusting a firm's capital structure is not well supported as the coefficient for Δ*Leverage* is insignificant despite the fact that firms have decreased their ratios in the period leading up to the announcement (see Table 4.3).

The coefficient for Δ*Dividends* is insignificant and not indicative of firms substituting repurchases for dividends as is expected whilst the coefficient for Δ*EPS* is also insignificant and does not support the notion that firms repurchase shares to boost EPS. Lastly, the coefficient for dummy variable, *Unlimited Duration* is significant at the 10% level of significance and positive for each model and shows that announcement returns increase by 5 basis points if unlimited duration is indicated in an announcement. This result suggests that such firms are motivated to repurchase

[75] Akyol and Foo (2013) measure pre-announcement returns over a much shorter time period and closer to the announcement, (-11, -2) days relevant to the announcement date. Similarly, Lamba and Miranda (2010) also do not find a significant relationship between announcement returns and market-to-book ratio.

[76] Apart from firm size, Akyol and Foo (2013) do not find any other variable, including pre-announcement returns, market-to-book, program size, program duration and dummy variables for undervaluation programs, zero repurchases and repeat programs that significantly explain announcement returns.

shares for reasons other than signalling undervaluation. Results for regressions involving raw data and a 5 day event window are mostly consistent with the results above (see Appendix, Tables A.2 and A.3).[77]

Overall, the results are strongly supportive of hypothesis H3. The variable *Intended Length* is found to be significant under a variety of conditions comprising the inclusion of variables measuring the fraction of shares sought and completion rates, which are found to be significant in explaining announcement returns in other studies (see Stephens and Weisbach, 1998 and Bonaimé, 2012) as well as controlling for potential biases introduced by industry type and year of announcement. These results indicate that intended program duration is of more importance to the Australian share market than the fraction of shares sought as a potential cost of false signalling and therefore for firms wishing to signal undervaluation in a program announcement it is preferable assigning the shortest period of time possible over which to conduct a program rather than signalling undervaluation thru the fraction of shares sought. Of note, firms that indicate unlimited program duration attract a more positive share price reaction to an announcement than firms which indicate a fixed period duration, suggesting that such firms are motivated to repurchase shares for other reasons.

Interestingly, whilst poor share price performance in the period leading up to an announcement is found in Table 4.3, the coefficient for *PreCAR* is found to be

[77] Results for the variable *Intended Length* are consistently significant under all conditions. Its significance, however, becomes lower for raw data where its level of significance falls to 10% (Table A.3). The coefficient for *Completion Rate* is significant at the 10% level of significance under the 5 day event window (Table A.2) and is of the correct positive sign. Of note, the coefficient for *Repurchase Speed* is of the opposite sign to that expected and significant at the 5% level of significance under the 5 day event window (Table A.2) and at the 10% level of significance for raw data (Table A.3) with the inclusion of dummy variables for industry type and year of announcement. For raw data (Table A.3) the coefficients for *MTB*, Δ*Leverage*, Δ*Dividends* and Δ*EPS* are also significant and suggests that regressions based on raw data may be affected by extreme values. Lastly, the coefficients for *Return Deviation* and *Cash Balance* continue to be significant for all tests.

insignificant, a finding that is inconsistent with numerous other studies and undermines share price undervaluation as a motive for repurchasing shares. If firms are motivated to signal undervaluation then it is clear that the market does not associate undervaluation with recent share price performance in the period preceding an announcement. Share price volatility and cash balances are also important in explaining the market reaction to program announcements.

Hypothesis H4

Testing of hypothesis H4 replicates the methodology used to test hypothesis H3 with the inclusion of two new variables, *LagDuration* and *LagSpeed*, to see if there is a reputation effect with respect to duration and the 'speed' with which shares are repurchased from prior programs that has been found with completion rates by Bonaimé (2012). The variable for prior completion rate, *LagComprate*, is included to account for the reputation impact of prior completion rates. The variable *TimeLapse* has been included to see if the period between successive program announcements has any impact on the market's interpretation of the announcement. As with the testing of hypothesis H3, four versions of the model are presented. Model (1) presents the basic variables of Equation (2), whilst the dummy variable, *Unlimited Duration*, is included in models (2) to (4), industry dummy variables are included in models (3) and (4) and year of announcement dummy variables are included in model (4) only.

Results from regressions are presented in Table 4.7 with results for robustness tests presented in the Appendix (Tables A.4 and A.5). The coefficients for explanatory variables, *LagSpeed* and *LagDuration* are both insignificant in all models. Similarly, the coefficient for variable, *LagComprate*, is also insignificant.

TABLE 4.7

Regressions for Repeat Announcements

Table 4.7 presents coefficient estimates from ordinary least squares (OLS) regression describing 3-day returns around 'repeat' repurchase announcements using the market model to compute abnormal returns. Four versions of Equation (2) are presented with *CAR (-1, 1)* as the dependent variable. Four versions of Equation (2) are presented. Model (1) presents the basic variables of Equation (2). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate, LagComprate, Repurchase Speed* and *LagSpeed* which are truncated at 100%. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0310	0.0415	-0.0124	-0.0334
	(0.39)	(0.54)	(-0.16)	(-0.42)
LagDuration	-0.0047	-0.0059	-0.0047	-0.0048
	(-0.61)	(-0.78)	(-0.68)	(-0.71)
LagSpeed	0.0291	0.0282	0.0234	0.0205
	(1.5)	(1.47)	(1.26)	(1.14)
LagComprate	-0.0106	-0.0124	-0.0079	-0.0056
	(-0.69)	(-0.81)	(-0.54)	(-0.38)
Intended Length	-0.0008[b]	-0.0022[b]	-0.0023[b]	-0.0025[b]
	(-2.41)	(-1.97)	(-2.02)	(-2.13)
Repurchase Speed	-0.0102	-0.0104	-0.0107	-0.0144
	(-0.94)	(-0.97)	(-1)	(-1.35)
Program Size	0.0071	0.0415	0.0630	0.0579
	(0.08)	(0.45)	(0.68)	(0.63)
PreCAR	-0.0516[c]	-0.0517[c]	-0.0525[c]	-0.0512[c]
	(-1.86)	(-1.87)	(-1.86)	(-1.8)
MTB	-0.0004	-0.0004	-0.0007	-0.0008
	(-0.36)	(-0.33)	(-0.65)	(-0.75)
Firm Size	0.0001	0.0003	0.0017	0.0022
	(0.05)	(0.16)	(0.87)	(1.13)
Cash Balance	0.0175[b]	0.0181[b]	0.0202[b]	0.0213[b]
	(1.99)	(2.06)	(2.39)	(2.51)
Cash Flow	0.0285	0.0265	0.0183	0.0196
	(1.52)	(1.43)	(0.96)	(1.05)
ΔLeverage	0.0002[a]	0.0002[a]	0.0002[a]	0.0002[a]
	(3.75)	(3.8)	(3.3)	(3.56)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-0.56)	(-0.58)	(-0.79)	(-0.93)
ΔEPS	0.0063	0.0068	0.0085	0.0063
	(0.78)	(0.84)	(1.07)	(0.75)
Return Deviation	0.6887[b]	0.6799[c]	0.6444[c]	0.8185[c]
	(1.98)	(1.95)	(1.65)	(1.83)
Turnover	0.0023	0.0024	0.0007	0.0007
	(0.59)	(0.62)	(0.16)	(0.17)
Time Lapse	0.0004[c]	0.0004[c]	0.0004	0.0003
	(1.74)	(1.77)	(1.54)	(1.38)
Unlimited Duration (dummy)	-	0.0404 (1.3)	0.0435 (1.33)	0.0508 (1.51)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0863	0.0878	0.1105	0.1015
No observations	452	452		452

These results do not indicate that, for Australian data at least, reputation from prior repurchases plays a major role in forming investors' opinions for current announcements and does not support hypothesis H4. Consistent with the results of testing hypothesis H3, the coefficient for variable *Intended Length* is of the correct sign and significant at the 5% level of significance across all models, demonstrating its importance in explaining announcement returns for 'repeat' as well as for announcements in general.

Also consistent with the results for hypothesis H3, the coefficients for *Program Size* and *Repurchase Speed* are also insignificant, and this together with the result for *LagComprate* contrasts with those of Bonaimé (2012) who finds that both the fraction of shares sought in a current announcement and the completion rates of prior programs are significantly associated with announcement returns for current programs.

Although not found to be significant in the testing of hypothesis H3, *PreCar* is significant at the 10% level of significance and of the correct sign providing some support for the notion that firms announce repurchase programs to arrest falling share prices despite the fact that share undervaluation, as measured by *PreCar*, is lower for 'repeat' announcements than for announcements in general as shown in Table 4.3 (-2.1% compared to -3.5% respectively). Consistent with testing of Equation (1), the coefficient for *Return Deviation* continues to be important, however, the level of significance after controlling for fixed effects and unlimited duration is lower for 'repeat' announcements than announcements in general, 10% compared to 5%.

Whilst supporting the notion that repurchases provide firms with financial flexibility or represent an 'exchange option' that is increasing with the volatility of the underlying share price (Ikenberry and Vermaelen, 1996), the relative importance of share price volatility is reduced for 'repeat' announcements. The coefficient for *Return Deviation* is significant at the 5% level of significance for model (1) and at the 10% level of significance for remaining models.

Similarly, the coefficient for *Cash Balance* is significant at the 5% level of significance rather than at the 1% level of significance for programs in general, whilst the coefficient for *Cash Flow* continues to be insignificant. Although not as important as for programs in general, this evidence provides some support that repurchases are addressing agency costs of free cash flow or alternatively firms with excess cash are seen as more likely to complete announcement programs and are therefore considered more credible. Unlike for announcements in general, the coefficient for the variable Δ*Leverage* is significant at the 1% level of significance and is of a positive rather than negative sign as posited suggesting that firms are already in the process of moving toward their optimal debt/equity ratios prior to announcements and are not using repurchases as a means of making minor corrections.

Consistent with results for regression Equation (1), the coefficients for *MTB*, *Firm Size*, Δ*Dividends*, Δ*EPS* and *Turnover* are all insignificant in explaining the market reaction of 'repeat' announcements. The coefficient *Time Lapse* is significant at the 10% level of significance for models (1) and (2) and is of the correct positive sign but becomes insignificant with the inclusion of control variables for industry type and year of announcement, models (3) and (4) respectively. These results do not indicate

that the length of time between announcements of consecutive programs is considered important by the market. Finally, the coefficient for dummy variable *Unlimited Program* is insignificant across all models indicating that announcement returns for 'repeat' programs specifying an unlimited duration is not significantly different from those programs specifying a fixed period duration and contrasts with the results for programs in general.

Results of robustness tests are presented in Table A.4 and A.5 of the Appendix. The coefficients for explanatory variables, *LagSpeed* and *LagDuration*, as well as for *LagComprate* are all insignificant. Although results are similar to those of Table 4.7, the coefficients of variables *PreCar* and *Cash Balance* are no longer significant but the coefficient for *MTB*, which is not found to be significant in explaining 3 day abnormal returns using winsorised data is found to be significant for some models.[78] *Intended Length* continues to be significant demonstrating its importance in explaining announcement returns in a variety of settings.[79]

The results from Table 4.7 demonstrate that there does not appear to be a reputation effect from prior programs in terms of program duration or the speed in which shares are repurchased. Contrary to the findings of Bonaimé (2012) completion rates of prior programs are also found not to convey a reputation effect for current repurchase announcements. Overall the results do not support the notion that firms earn a

[78] The coefficient for *MTB* is significant at the 10% level of significance and of the correct sign for models (3) and (4) under the 5 day event window and is significant at the 5% level of significance for the same models using raw data. Also under the 5 day event window the coefficient for *Time Lapse* is significant at the 5% for models (1) and (2) and at the 10% level for models (3) and (4) but is insignificant for all models using raw data.

[79] Under the 5 day event window, the coefficient for *Intended Length* becomes more significant at the 1% level of significance for models (1) and (2) and is significant at the 5% level for models (3) and (4). Under the 3 day event window using raw data, the coefficient becomes insignificant for model (2) with the inclusion of dummy variable *Unlimited Duration* but is significant at the 10% level for models (3) and (4) when controlling for industry and year fixed effects.

reputation based on prior repurchase programs for Australian data and therefore hypothesis H4 is not supported. Instead, it is found that intended duration remains significant in explaining announcement returns for 'repeat' programs, demonstrating its importance in determining the credibility of on-market repurchase announcements as a signal of undervaluation and supporting hypothesis H3. Unlike announcements in general, share under-pricing, as measured by *PreCAR*, has some importance in explaining the market reaction to 'repeat' announcements. As for announcements in general, both *Cash Balance* and *Return Deviation* are important in explaining announcement returns for 'repeat' programs, however the coefficient for *Cash Balance* is no longer significant under robustness tests. There is also evidence supporting the notion that 'repeat' announcement firms are motivated to repurchase shares as part of an overall strategy to meet debt/equity targets. Finally, the dummy variable '*Unlimited Duration'* is not significant in explaining announcement returns for 'repeat' programs.

4.5 SUMMARY AND CONCLUSIONS

This chapter investigates and explains the market reaction to 789 hand-collected on-market share repurchase program announcements made between 2000 and 2010 on the ASX. Overall, results of tests on announcements reveal the following.

Announcements in general are accompanied by positive abnormal returns of 2.7% demonstrating that on-market repurchase programs are associated with positive news to the market. Announcement returns for 'initial' programs are greater than that for 'repeat' programs, 3.1% compared to 2.1%, consistent with the notion that 'initial' programs resolve (in part) information asymmetries between firms and the market but

is also consistent with the idea that announcements returns for 'repeat' programs represent a cross section of firm types, both successful and unsuccessful.

In investigating the determinants of announcement returns it is found that abnormal returns are negatively associated with the intended program length demonstrating that a shorter intended program duration is associated with more positive the news. This result holds for 'repeat' announcements as well as for announcements in general and establishes intended program duration as a potential cost of false signalling in the same way as program size has been found to explain announcement returns in overseas studies. Although intended program length is important in explaining announcement returns, actual duration when compared to its intended length is not, suggesting that the market does not correctly anticipate actual program duration.

Announcement returns of 'repeat' programs are not associated with program duration, measured as a ratio to intended duration, of prior programs. Similarly, announcement returns of 'repeat' programs are not associated with the 'speed' in which firms repurchase shares in prior programs. These results together with the insignificance of prior completion rates in explaining announcement returns for 'repeat' programs suggest that firms do not earn a repurchase reputation in Australia and that investors are reluctant in assessing current programs based on the outcome of prior programs.

This chapter does not find a significant connection between announcement returns and the fraction of shares sought or subsequently repurchased, undermining its role as a potential cost of false signalling in the Australian context. Similarly, the 'speed' in which shares are repurchased is also found to be unimportant. These findings are

somewhat puzzling given the strong association between announcement returns and program size found in overseas studies (Stephens and Weisbach, 1998; Bonaimé, 2012). Since repurchased shares in Australia cannot be held as treasury stock, acquiring shares cannot be seen as transferring shares from outsiders to insiders as in countries such as the US, and therefore it is considered that insiders of Australian firms are not seen as bearing the cost of false signalling in the same way. This conclusion has important implications for firms wishing to signal undervaluation on the Australian share market and suggests that it is preferable assigning the shortest period of time possible over which to conduct a program rather than signalling undervaluation thru the fraction of shares sought.

Another surprising result of this study is the finding that share price undervaluation prior to announcements is not important in explaining announcement returns for programs overall but is significant for 'repeat' programs. A negative association between market-to-book ratios and announcement returns is also not evident. This evidence suggests the Australian share market is somewhat sceptical of recent poor share price as a motivation for firms to repurchase shares on-market, except for 'repeat' programs.

Both the volatility in share price and the level of cash balances are important factors in explaining the market's reaction to announcement returns. The positive association between announcement returns and price volatility indicates that the market sees value in the flexibility of on-market repurchase programs that allow firms to acquire shares when they are undervalued yet refrain from acquiring shares when they are undervalued, or alternatively the market sees a repurchase program as an 'exchange

option' that is increasing in value with increasing share price volatility. Similarly, the association with cash balances indicates that repurchases are seen as a way of resolving agency costs of free cash flow or providing an assurance that a firm will repurchase shares.

Leverage is important in explaining announcement returns for 'repeat' programs but not for programs in general, further, its association with announcement returns is positive suggesting that firms are already in the process of increasing their debt/equity ratios prior to announcements. Finally, this study finds that the market attaches a premium for programs indicating an unlimited rather than a fixed period duration, suggesting that such firms may have motivations other than signalling undervaluation to announce repurchase programs. This association however does not hold for 'repeat' programs and suggests, along with the importance of leverage and prior share price performance in explaining announcements returns, that firms of 'repeat' programs have different motivations to repurchase shares than firms of programs in general.

The research conducted in this chapter contributes to the literature of on-market share repurchase programs by investigating the role of program duration in explaining the market reaction to announcements. In Australia firms are required to make an announcement to the market and indicate the expected duration of a program in addition to the number of shares targeted. Literature to date has not considered the role of program duration as a potential cost of false signalling with program announcements. Previous studies have identified the fraction of shares sought as a potential cost of false signalling (Comment and Jarrell, 1991; Ikenberry et al., 1995, Ikenberry and Vermaelen, 1996; Stephens and Weisbach, 1998; Jagannathan and

Stephens, 2003; Chan et al., 2004; Bonaimé, 2012), however evidence produced by this study demonstrates that program size is unimportant and instead intended program length plays an important role in signalling undervaluation.

This research also contributes to the literature by investigating the 'speed' in which shares are repurchased following an announcement as a determinant of announcement returns and by the finding that execution of prior programs is not important to the market is assessing announcements of 'repeat' programs.

CHAPTER 5: DETERMINANTS OF COMPLETION RATES

The major objective of this chapter is to investigate program completion rates in relation to the second research question: does the transparency of the Australian repurchase environment lead to a greater commitment of the firm to follow thru with its announcement intention?

Five hypotheses are developed to test completion rates. The first hypothesis predicts that firms will be discouraged from buying back shares at 'cheap' prices owing to the transparent repurchasing rules of the ASX. The second hypothesis predicts that firms will repurchase more shares the shorter the intended program length and the sooner a program is completed whilst the third hypothesis predicts that firms will repurchase more shares the greater the price range paid its shares. The fourth hypothesis predicts that firms will repurchase more shares the shorter the program duration and the higher the mid-completion rates of prior programs and the final hypothesis predicts a positive relationship between mid-completion rates of current and prior programs.

This chapter relies upon the number of shares repurchased during a program compared to the number of shares intended to determine completion rates. The number of shares repurchased is determined from details revealed in 3F notices, which Australian firms are required to submit at the completion of a program. For 'closed' programs the number of shares acquired is determined from 3E notices as are the number of shares acquired at the midpoint of an intended program for mid-completion rates. Tobit regressions are performed with completion rates as the dependent variable and various repurchase, share price and other financial information as independent variables to establish the determinants of completion

rates. As there is concern expressed in Chapter 3 of the recognition of completed programs in the absence of a 3F notice, the final sample of completed programs are further partitioned into subsamples to see if these concerns are a factor in explaining completion rates.

This chapter finds that completion rates are not positively related to share price volatility, suggesting that firms are deterred by the transparency requirements of Australian repurchases from acquiring shares 'cheap' prices. Evidence indicates that firms are more likely to meet their repurchase targets, the shorter the program duration, whether measured as that intended or in execution. Notwithstanding this, when restricting examination to 'closed' programs when shares are repurchased there is evidence that intended program length is not important in explaining completion rates and firms do not repurchase more shares the quicker they execute a program. This chapter also finds that firms that nominate an unlimited duration in an announcement tend to repurchase more shares than firms that nominate a fixed period duration.

Evidence is found that firms repurchase shares out of disagreement with the market over the value of its shares rather than to arrest falling share prices. A positive association between completion rates and the ratio of the highest and lowest price paid for shares is found, but a negative relationship between completion rates and concurrent share returns is not. This evidence suggests that whilst repurchase activity is aligned with the undervaluation of shares it is not driven by falling share prices. A repurchase reputation for program duration and the 'speed' with which shares are

repurchased in prior programs is not found, however a repurchase reputation exists for completion rates measured over the entirety of a program.

This chapter also finds evidence that firms authorise programs greater than they initially intend to buy and there is evidence that firms are motivated to improve EPS, however when restricting tests to programs when shares are actually repurchased, no association is found. Finally, it is found that completion rates are positively associated with share liquidity, an indication that firms avoid repurchasing shares if liquidity for their shares is low.

The remainder of this chapter will review the relevant theoretical and empirical literature in Section 5.1, discuss the development of research hypotheses in Section 5.2, appropriate research methods to test them in Section 5.3, discuss descriptive statistics and empirical evidence in Section 5.4, and provide a summary of findings and conclusions in Section 5.5.

5.1 LITERATURE REVIEW

As discussed in Chapter 4 (Section 4.1) the body of literature to date reveals general support for the signalling undervaluation hypothesis. Positive announcements returns are supportive of the hypothesis and poor share price performance in the period leading up to the announcement provide the motivation for firms to signal undervaluation, however, evidence of subsequent improved operating performance is mixed and suggests that only some firms provide improved future performance.

Although announcements are not definite commitments, evidence that firms follow thru with their announcement commitments is found (see Stephens and Weisbach 1998; Rau and Vermaelen, 2002; and Bonaimé, 2012) and announcement returns are positively associated with the fraction of shares sought, the percentage of shares repurchased and completion rates of prior programs (see Comment and Jarrell, 1991 and Stephens and Weisbach, 1998, Chan et al., 2004, Chan et al., 2010; and Bonaimé, 2012) (Bonaimé, 2012), suggesting that the market factors in the likelihood that firms will follow thru with repurchase targets.

Notwithstanding the above evidence, the inherent flexibility of on-market repurchases undermines them as an appropriate signal of firm type. Although firms may be discouraged from giving a false signal, the necessity to repurchase shares may not even eventuate if the share price correctly adjusts to its underlying fundamental value. However, evidence of abnormal returns persisting for some years following an announcement (see Ikenberry et al., 1995; Chan et al., 2007; and Peyer and Vermaelen, 2009) suggests that markets are not efficient in impounding share repurchase information and that repurchases are 'triggered by management's disagreement with the market's interpretation of *publicly available information*' (Peyer and Vermaelen, 2009, p. 1695).[80] Congruent with undervaluation being a motivation, firms should repurchase shares whilst they are under-priced, particularly following poor stock price performance since negative share returns are expected to bring an undervalued security further from its fundamental value (Stephens and Weisbach, 1998).

[80] In an Australian study, Akyol and Foo (2013) provide evidence of long term excess returns following announcements but mainly in the first year after an announcement and for firms motivated by undervaluation.

Consistent with this notion, repurchase volume is found to be negatively associated with poor share price performance measured prior to announcement or concurrently (Stephens and Weisbach, 1998; Ikenberry et al., 2000; Oswald and Young, 2004; Billett and Xue, 2007; Brockman, Howe and Mortal, 2008; Chan et al., 2010; Akyol and Foo, 2013; Ben-Rephael et al., 2014). Similarly, repurchases are found to be negatively related to a firm's market-to-book ratio, which is consistent with the notion of 'value' firms being undervalued (Dittmar, 2000; Ikenberry et al., 2000; Billett and Xue, 2007; Brockman, Howe and Mortal, 2008; Oswald and Young, 2008; Akyol and Foo, 2013). [81] Evidence of firms timing repurchases to enable them to buy shares at low prices collaborates with this evidence and suggests firms do so for the benefit of non-selling shareholders (see Brockman and Chung, 2001; Cook et al., 2004; and De Cesari et al., 2012; Ben-Rephael et al., 2014).[82]

On completion rates, similar evidence of a negative association with poor share price performance also is found (Ikenberry et al., 2000; Bonaimé, 2012) as well as a negative association with market-to-book ratio and firm size, consistent with the notion that small firms are less efficiently priced (Ikenberry et al., 2000). Collectively, these findings provide strong evidence for under-pricing as a motivating factor for managers to repurchase shares following announcements. Bonaimé (2012) demonstrates that firms develop a repurchase reputation from prior programs so that

[81] This is not to say that studies consistently find support of negative share price performance both prior and concurrently. Stephens and Weisbach (1998), for example, find only limited support of a negative relationship between concurrent returns and repurchases but significant support for prior returns. Dittmar (2000), on the other hand, does not find support of a negative relationship between prior returns and repurchases but instead finds a negative association with firm's market-to-book ratio. In contrast, Brockman, Howe and Mortal (2008) report a negative association between repurchases and book-to-market ratio. They also find a positive association between repurchases and income and repurchases and turnover which may indicate that there sample is different to other studies.

[82] De Cesari et al. (2012) provide evidence that timing of repurchase transactions is related to firm ownership structure. Firms are found to time repurchases to buy back stock at favourable prices when corporate decision makers have better information than outsiders resulting in a benefit to non-selling shareholders.

completion rates of current programs will be similar to that of prior programs (see also Andriosopoulos et al., 2013). Interestingly, although reputation from prior programs plays a part in explaining completion rates of current programs, Ikenberry et al. (2000) find a negative relationship between completion rates and the fraction of shares sought in an announcement (see also Bonaimé, 2012) suggesting that firms may authorize amounts that are greater than they initially intend to buy and complete programs only if share prices fall.

A query regarding reputation is whether firms, wishing to uphold their reputation, repurchase shares beyond their fundamental value, thus raising a potential conflict between selling and non-selling shareholders since it may require a firm to repurchase shares over and above its fundamental value. However, the fact that completion rates are found to be negatively associated with share price returns and are positively associated with completion rates of prior programs suggests that reputation is important under conditions of undervaluation when share prices are falling. In addition, a negative association between completion rates and prior share price volatility (Bonaimé, 2012), suggests that firms are not taking advantage of buying 'cheaply' priced shares in order to correct under-pricing or uphold their repurchase reputation.

Notwithstanding the above evidence, other motivations have been advanced to explain the determinants of repurchasing behaviour of firms following announcements. For example, Brockman, Howe and Mortal (2008) argue that firms with liquid shares are more likely to repurchase than firms with illiquid shares since, according to Barclay and Smith (1988), repurchases induce higher transaction costs in

the form of widening bid-ask spreads as uninformed investors realise they are likely to be exposed to trading against informed insiders (the firm) thereby offsetting any potential benefits from repurchasing, such as taxation or signalling. Using turnover as a proxy for liquidity, Brockman, Howe and Mortal (2008) find that repurchase-initiating firms are significantly more liquid than non-initiating firms and that the size of the repurchase increases with turnover, supporting this notion. Andriosopoulos et al. (2013) find completion rates to be positively associated with the overconfidence of managers who believe that their firm's shares are undervalued. Similarly, Babenko et al. (2012) find that firms whose managers actively purchase shares in the pre-announcement period are more committed to completing their repurchase programs since managers buy stock if they think it is undervalued. Oswald and Young (2008) on the other hand, find a negative association between insider holdings and repurchases for the UK.

Other reasons, such as removing excess cash holdings, warding off takeover attempts, adjustments to leverage or substituting repurchases for dividends, that are put forward to explain the motivation of announcements are also offered to explain completion rates (see for example Stephens and Weisbach, 1998; Dittmar, 2000; Guay and Harford, 2000; Jagannathan et al., 2003; Oswald and Young, 2008; Billett and Xue, 2007; Bonaimé, 2012; and Babenko et al., 2012).

5.2 HYPOTHESES DEVELOPMENT

Evidence from this thesis presented in the last two chapters reveal that characteristics of on-market repurchases in Australia may differ to those in other countries. For example, completion rates are much lower than that compared to other studies, around

40% compared to over 70% found by Stephens and Weisbach (1998) and Bonaimé (2012) for the US and by Rau and Vermaelen (2002) for the UK.[83] Conditions of on-market repurchase programs in Australia may contribute to this difference. Firstly, firms are required to make a formal announcement (3C notice) to the market of its intention to repurchase shares. Secondly, firms are required to cancel repurchased shares which may remove the incentive to repurchase shares to be later re-issued in fulfilment of management stock options. Thirdly, on the day following a repurchase of shares, firms must notify the exchange of its repurchasing activity (3E notice) and disclose amongst other things, the number of shares bought, the total consideration paid, and the highest and lowest price paid for its shares, thereby discouraging firms from behaving opportunistically compared to other countries, such as the US or Canada, where reporting of repurchase activity is less stringent. However, despite a similar reporting requirement of repurchase activity in the UK as in Australia, Rau and Vermaelen (2002) and Andriosopoulos et al. (2013) find similar completion rates in the UK to that reported in the US, further, Andriosopoulos et al. (2013) find completion rates are positively associated with share returns, rather than negatively as reported in other studies.[84]

In addition to this, firms in Australia must make a formal announcement to the market, disclosing amongst other things, the name of the broker acting on its behalf and this information together with that revealed in a 3E notice may discourage firms from buying shares at cheaper prices, thereby resulting in lower completion rates.

[83] Although Ikenberry et al. (2000) find completion rates to be 28.6% on average for programs conducted in Canada, the period of measurement is restricted to 12 months following an announcement and therefore may understate the true percentage.

[84] Andriosopoulos et al. (2013) measure completion rates of only 31.5%, however, when confining their sample to firms that actually initiate repurchases, they measure completion rates of 69.5%, similar to that of other studies.

Apart from this, the release of a repurchase notice may also provide a positive signal to the market (Zhang, 2005; Wang et al., 2009; Akyol and Foo, 2013) further reducing the requirement to acquire shares for undervaluation purposes resulting in lower completion rates still.[85]

For firms wishing to exploit the flexibility of repurchases, buying back shares at 'cheap' prices is particularly suited to stocks with volatile share prices since the opportunities for departures from fundamental value is greater (Ikenberry and Vermaelen, 1996). However, a negative association between completion rates of 'repeat' programs and pre-announcement share price volatility undermines this argument (see Bonaimé, 2012), further, positive returns accompanying repurchase announcements is not consistent with exploitation of the market.[86] Although a positive relationship between announcement returns and pre-announcement share price volatility is found in Chapter 4, firms will be less inclined to repurchase shares at 'cheap' prices due to the high transparency of Australian share repurchases and therefore it is hypothesised that the relationship between completion rates and share price volatility will be negative.

H5: Completion rates, on average, are negatively associated with share price volatility.

[85] Zhang (2005) examines the impact of reporting on daily repurchase trading activity on the Hong Kong Stock Exchange, where reporting of repurchasing activity must also be provided on the following day, and finds evidence of a positive market reaction to these notices.

[86] Although Ikenberry and Vermaelen (1996) argue that positive announcement returns are also consistent with the view that the firm has created an option to exchange the market value of a share for its fundamental value, a negative relationship between completion rates and volatility is not congruent with this notion.

Evidence from the last chapter shows that the fraction of shares sought and repurchased are not important in explaining announcement returns, and completion rates of prior programs are not important in explaining returns for 'repeat' announcements despite the presence of poor share price performance leading up to 'repeat' program announcements. These results suggest that the Australian share market is perhaps sceptical of the fraction of shares sought in an announcement or that announcements are effective in adjusting shares prices towards their fundamental values, thus removing the necessity to repurchase shares. Notwithstanding this, if firms are committed to establish that they are of a successful firm-type, then an alternative criteria, such as intended program length, must be established from which the market judges them against. In Chapter 4, evidence of a negative association between intended program length and announcement returns is congruent with this notion and as such it is expected that successful firm-types will confirm their status by repurchasing more shares. Against this notion, the shorter the period of time in which a firm has to repurchase shares, other things being equal, the less likely they are to complete a program. Nevertheless, given that firms have discretion over the intended time period in which to repurchase shares, it is hypothesised that a negative relationship between completion rates and intended program length exists.

Similarly, if firms are aware of the importance of program length in signalling firm type to the market, they may choose to repurchase shares over a shorter duration than that indicated in the announcement, thereby sending another signal to the market. As such, it is also hypothesised that there will be a negative relationship between completion rates and program duration relative to intended duration.

H6: On average, completion rates are negatively associated with intended program length and the ratio of program duration to intended length.

If firms are motivated to repurchase undervalued shares then it is expected that the difference between the highest and lowest price paid will reflect the extent of under-pricing of its shares and therefore completion rates. Firms wishing to exploit under-pricing rather than signal undervaluation will only acquire shares at low prices, so that the difference between the highest and lowest price paid will be much smaller and lead to a lower acquisition of shares overall. If repurchase arrangements in Australia discourage firms exploiting their repurchase powers it is expected that there will be a positive relationship between completion rates and the difference between the highest and lowest price paid. A divergent explanation assumes that shareholders have different reservation prices, for example tax reasons or holding periods, so that the firm faces an upward sloping supply curve for its shares (Bagwell, 1991).[87] Under this assumption shareholders with the lowest reservation price will sell their shares first and firms that have a specific number of shares they wish to repurchase must pay higher prices for remaining shares. If firms, however, are motivated to repurchase shares to correct mispricing they will continue repurchasing shares until the share price reflects its fundamental value. It is therefore expected that there will be a positive relationship between completion rates and the difference between the highest and lowest price paid.

[87] Although Bagwell (1991) attempts to explain the market reaction to the announcement of other repurchase types, Dutch Auctions and fixed tender offers, as a takeover defence, the existence of shareholder heterogeneity is relevant in explaining the variation in price paid for shares for on-market repurchases also.

H7: On average, completion rates are positively associated with the difference between the highest and lowest price paid for shares.

If, as is hypothesised in Chapter 4, firms earn a reputation for program duration and the number of shares they repurchase in the early stages of a prior program, then it is expected that completion rates for 'repeat' programs will be positively associated with repurchase 'speed' and negatively related to program duration of prior programs.

H8: On average for 'repeat' programs, completion rates will be a negatively associated with the ratio of program duration to intended length from prior programs and positively associated with the 'speed' with which shares are repurchased from prior programs.

Similarly, if repurchase 'speed' of prior programs is an indication of current completion rates then an analogous argument can be made for the link between repurchase 'speed' of prior programs and current programs. As such, it is expected that the repurchase 'speed' of prior programs will be positively associated with the repurchase 'speed' of current programs.

H9: On average for 'repeat' programs, there will be a positive association in the 'speed' with which shares are repurchased between successive programs.

5.3 RESEARCH DESIGN

The purpose of this section is to describe the research methods used in this chapter to explain the determinants of completions rates for on-market repurchase programs. To achieve this, multiple regression analysis will be employed with completion rates as the dependent variable together with variables mentioned in the literature and used to test announcement returns in Chapter 4 as explanatory and control variables. To test hypothesis H9, mid-completion rates will be used as the dependent variable in order to examine the relationship between current and prior repurchasing 'speed' for 'repeat' programs. Since the minimum value for completion rates is zero and the maximum value is truncated at 100%, a regression based on tobit analysis will be used. Tobit analysis is designed to estimate the linear relationship between variables when the dependent variable is censured from above or below and is therefore considered appropriate for a study of this type.

Hypotheses H5 - H7 are concerned with completion rates for programs in general, whilst hypotheses H8 and H9 are concerned with 'repeat' announcements only and, as such, this chapter will employ two regression models; one for all on-market repurchase programs and the other for 'repeat' programs only. The regression model for 'repeat' programs will include lagged repurchase variables in the same way as testing for announcement returns in Chapter 4. To test hypothesis H6 a measurement to compare the highest and lowest price paid is required so that only those programs in which shares are actually repurchased, 'non-zero' programs are included. A consideration concerns the identification of completed programs. In Chapter 3 it is determined that programs are recognised as completed with either the identification of a 3F 'final share buy-back' notice, which is the official notice of the ASX to finalise a

program, or if the program becomes inactive, in which case it is regarded as 'closed'. A program is recognised as inactive if no shares have been repurchased for 12 months and since this choice of period is somewhat arbitrary, hypotheses will be alternatively tested for '3F notice' and 'closed' programs individually for robustness.

As with testing of announcement returns in Chapter 4, the regression model will be alternatively executed with the inclusion of dummy variable *Unlimited Duration* that will take on the value of 1, if an unlimited duration is indicated or 0 if a fixed intended length has been indicated in a program announcement. Similarly, regressions will be interchangeably performed with the inclusion of dummy variables for industry type and the year in which programs are announced.

This chapter will follow the research design developed in Chapter 4 to examine the determinants of announcement returns, and introduce related variables to test completion rates. The tobit model to test hypotheses H5 to H7 for all programs is of the following form.

$$\begin{aligned} Completion\ Rate_i = \\ &\alpha_0 + \alpha_1 Return\ Deviation_i + \alpha_2 ConDeviation_i + \alpha_3 Intended\ Length_i + \\ &\alpha_4 Duration\ Ratio_i + \alpha_5 Program\ Size_i + \alpha_6 PreCAR_i + \alpha_7 MTB_i + \alpha_8 Firm\ Size_i + \\ &\alpha_9 Cash\ Balance_i + \alpha_{10} Cash\ Flow_i + \alpha_{11} \Delta Leverage_i + \alpha_{12} \Delta Dividends_i + \\ &\alpha_{13} \Delta EPS_i + \alpha_{14} Turnover_i + \alpha_{15} ConCAR_i + \alpha_{16} ConTurnover_i + \varepsilon_i \end{aligned}$$

Equation (3)

Where *i* represents the firm and

ConDeviation = The standard deviation of daily returns estimated over the duration of the program.

ConCAR = CAR measured over the duration of the program, where daily abnormal returns are measured as the difference between returns on security j and the market index.

ConTurnover = The natural logarithm of the ratio of average daily trading volume for the duration of the program relative to shares outstanding indicated in the announcement.

The measurement of all other variables is consistent with that described for regression Equation (1) in Chapter 4. Of particular importance for hypothesis H5 and H6 is to measure the influence of share price volatility, intended program length and program duration on *Completion Rates.* It is hypothesised that repurchase transparency will deter firms from taking advantage of under-pricing which is of particular concern for firms with volatile stocks, and as such, the sign of the coefficient for *Return Deviation* is expected not to be positive. For robustness, the variable *ConDeviation*, which measures the share price volatility over the repurchase program, will be added to the model as an alternative measure.

Since intended program length is hypothesised to signal firm quality and successful type firms are committed to follow thru with announcement intentions, it follows that the sign of the coefficient for *Intended Length* will be negative. Similarly, to capture the fact that firms may wish to complete programs ahead of that intended to signal

that they are of a successful firm type, the sign of the coefficient for variable *Duration Ratio* is also expected to be negative.

The variable *Price Range*, which measures the ratio between the highest and lowest price paid over the entire program, will be used to test hypothesis H7. As such, the sample of completed programs will be restricted to include only those programs where shares are actually repurchased. *Price Range* is measured as the ratio of the highest price paid to the lowest price paid for shares repurchased minus 1.[88] Since the range in price paid indicates the extent of share undervaluation it is expected that the greater the price range, the greater the number of shares required to be repurchased to correct under-pricing and therefore the coefficient for *Price Range* is expected to be positive.

Control variables

Consistent with the analysis of announcement returns in Chapter 4, additional variables indicated in the literature as potentially influencing completion rates are included in regression Equation (3) and are expected to have the same coefficient signs. The sign of coefficients for the following variables *PreCAR*, *MTB*, *Firm Size*, Δ*Leverage*, Δ*Dividends*, and Δ*EPS* are all expected to be negative whilst the sign of coefficients for *Cash Balance* and *Cash Flow* are expected to be positive. Although the variable *Program Size* is found to have a positive coefficient when testing announcement returns, Ikenberry et al. (2000) and Bonaimé (2012) find a negative association between it and completion rates which they attribute to firms authorising programs greater than they initially intend to buy and only complete programs when

[88] $Price\ Range = \frac{H;ighest\ price\ paid}{Lowest\ price\ paid} - 1$

prices fall. As such, the sign of the coefficient for *Program Size* is expected to be negative.

The size of repurchases is found to increase with liquidity of shares (Brockman, Howe and Mortal; 2008) and as such the coefficient for *Turnover* is expected to be positive. For robustness, the variable *ConCAR* is included in the regression as an alternative measure to *PreCAR* to capture the impact of share price performance over the duration of the program on completion rates (see Bonaimé, 2012). Consistent with the coefficient for variable *PreCAR* the coefficient for *ConCAR* is expected to be negative and is measured as the cumulative market-adjusted returns for the repurchase period as follows:

$$CAR_t^{t+n} = \sum_{t=1}^{n} AR_{jt}$$

Where AR_{jt} = abnormal return for security j in period t and is measured by the difference between return on security j and the return on the market index

Similarly, the variable *ConTurnover*, is included in the regression as an alternative measure to *Turnover* to measure the potential impact of liquidity during the program on completion rates and is measured as the natural logarithm of average trading volume of shares measured over the program duration scaled by the outstanding number of shares disclosed in the repurchase announcement. Consistent with that of *Turnover*, the coefficient for *ConTurnover* is also expected to be positive indicating that firms are more likely to repurchase shares when their shares are liquid. To test hypotheses H8, regression Equation (3) is modified to include variables that capture

potential reputation signals from previous announcements for 'repeat' programs and is consistent with those used for regression Equation (2).

$$\begin{aligned} \textit{Completion Rate}_i = \\ & \alpha_0 + \alpha_1 \textit{LagDuration}_i + \alpha_2 \textit{LagSpeed}_i + \alpha_3 \textit{Return Deviation}_i + \alpha_4 \textit{ConDeviation}_i \\ & + \alpha_5 \textit{Intended Length}_i + \alpha_6 \textit{Duration Ratio}_i + \alpha_7 \textit{Program Size}_i + \\ & \alpha_8 \textit{LagComprate}_i + \alpha_9 \textit{PreCAR}_i + \alpha_{10} \textit{MTB}_i + \alpha_{11} \textit{Firm Size}_i + \alpha_{12} \textit{Cash Balance}_i \\ & + \alpha_{13} \textit{Cash Flow}_i + \alpha_{14} \Delta \textit{Leverage}_i + \alpha_{15} \Delta \textit{Dividends}_i + \alpha_{16} \Delta \textit{EPS}_i + \\ & \alpha_{17} \textit{Turnover}_i + \alpha_{18} \textit{ConCAR}_i + \alpha_{19} \textit{ConTurnover}_i + \alpha_{20} \textit{Time Lapse}_i + \varepsilon_i \end{aligned}$$

Equation (4)

The measurement of all variables is consistent with that described for previous models, Equations (1) – (3). Of particular importance to hypothesis H8 is the association between completion rates of 'repeat' programs with repurchase characteristics from prior programs. Congruent with Equation (2) two additional explanatory variables, *LagDuration* and *LagSpeed*, are included to capture the potential reputation impact of program duration and repurchasing 'speed' from prior programs. To the extent that intended duration is a signal of firm quality and therefore a firm's commitment to repurchase shares, if firms terminate a program ahead of time in a prior program it is expected that they will be equally committed in executing a current program and therefore it is expected that the coefficient for *LagDuration* will be negative. Similarly, to the extent that share acquisitions in the first half of a program is also a signal of firm quality and a firm's commitment to repurchase shares, then it is expected that mid-completion rates of prior programs will be positively

associated with completion rates of current programs and therefore the coefficient for *LagSpeed* is expected to be positive.

Consistent with Equation (2) the variable *LagComprate* is included in the regression as an alternative measure to *Program Size* to capture the relationship between completion rates of successive programs (Bonaimé, 2012) and is expected that its coefficient will be positive. The variable *Time Lapse* is included to capture the negative impact on a firm announcing a new program soon after a prior plan, thereby reducing the time period in which to complete the prior program. Alternatively, a firm may complete a program more quickly than expected and therefore is committed to complete a subsequent program. It is therefore not clear whether the sign of the coefficient for *Time Lapse* is expected to be positive or negative. Consistent with regression Equation (3), the variables *ConDeviation*, *ConCAR*, and *ConTurnover* will be included to capture the impact of share trading over the repurchasing period on completion rates. To test hypothesis H9, regression Equation (4) is modified to replace the dependent variable, *Completion Rate*, with *Repurchase Speed*.

5.4 EMPIRICAL RESULTS

The purpose of this section is to discuss descriptive statistics of repurchase completions and the empirical results from testing of hypotheses.

5.4.1 DESCRIPTIVE STATISTICS

The following Table 5.1 presents the mean and median values for explanatory and control variables used in regression equations to test hypotheses and provide a

comparison by program type and completed programs overall. All data are winsorised at the 1st and 99th percentiles except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed* which are all truncated at 100%.[89] Statistics are comparable with those of Table 4.3 which includes all programs, except for the variables *Price Range*, *ConCAR*, *ConDeviation* and *ConTurnover* which are included in the testing of completion rates to see if they have an influence.

Whilst firms of 'repeat' programs are similar to those of 'initial' programs in terms of *Program Size*, *MTB* and *Turnover*, firms of 'repeat' programs are smaller in terms of *Completion Rate,* 38.4% compared to 40.7%, and *Repurchase Speed*, 29% compared to 31.2%.[90] Similarly, 'repeat' programs are of significantly shorter duration as measured by *Intended Length*, 12.88 compared to 15.244 months but take longer to execute relative to the time intended as indicated by the variable *Duration Ratio*, 0.9 compared to 0.85.[91] Of interest is the fact that for both 'initial' and 'repeat' programs the measurement for *Duration Ratio* is less than one which indicates that firms on average complete their programs ahead of time indicated in the announcement.

[89] Consistent with the measurement elsewhere in the study, the variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed*, are truncated at 100% to avoid the influence of firms that have increased the program size subsequent to the announcement.

[90] Median values for *Completion Rate* are 30.4% and 22.6% for 'initial' and 'repeat' programs respectively whilst for *Repurchase Speed* median values are 16.5% and 12.1% respectively. Although insignificant for test of difference between the means, the test of difference between group median values for *Repurchase Speed* is significant at the 5% level of significance.

[91] For both 'initial' and 'repeat' programs the median value for *Intended Length* is 12 months whilst for *Duration Ratio* the median values are 0.986 and 1.008 respectively. The test of difference between group mean and median values for *Intended Length* is significant at the 1% level of significance.

TABLE 5.1

Mean and Median Values for Regression Variables by Announcement Type

Table 5.1 presents the mean and median (in brackets) values for all variables used in regression analysis to test hypotheses H5 – H9 for all completed programs by announcement type. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate, Repurchase Speed, LagComprate and LagSpeed* which are truncated at 100%. The final column presents statistics for *t*-tests of difference for mean values and the Wilcoxon rank-sum test of difference for median values [in brackets] between 'initial' and 'repeat' announcements.

Variable	All Programs	Initial Programs	Repeat Programs	Test of difference
Completion Rate	0.393	0.407	0.384	-0.79
	[0.248]	[0.304]	[0.226]	[1.52]
Return Deviation	0.030	0.034	0.026	-6.59[a]
	[0.025]	[0.030]	[0.022]	[5.97[a]]
ConDeviation	0.029	0.033	0.026	-5.68[a]
	[0.024]	[0.028]	[0.022]	[5.67[a]]
Intended Length	13.858	15.244	12.880	-3.47[a]
	[12.00]	[12.000]	[12.000]	[2.97[a]]
Duration Ratio	0.878	0.850	0.900	1.05
	[1.000]	[0.986]	[1.008]	[-1.19]
Price Range	0.336	0.408	0.282	-3.66[a]
	[0.199]	[0.247]	[0.168]	[3.45[a]]
Program Size	0.077	0.076	0.078	0.32
	[0.095]	[0.095]	[0.095]	[-0.13]
Repurchase Speed	0.299	0.312	0.290	-0.86
	[0.136]	[0.165]	[0.121]	[1.69[c]]
PreCAR	-0.036	-0.056	-0.021	2.45[b]
	[-0.026]	[-0.050]	[-0.014]	[-2.55[b]]
MTB	2.262	2.280	2.250	-0.15
	[1.238]	[1.322]	[1.157]	[0.67]
Firm Size	18.584	18.331	18.758	2.79[a]
	[18.37]	[18.108]	[18.506]	[-2.37[b]]
Cash Balance	0.287	0.318	0.265	-1.61
	[0.121]	[0.138]	[0.110]	[2.03[b]]
Cash Flow	0.064	0.044	0.080	1.92[c]
	[0.061]	[0.055]	[0.063]	[-1.13]
ΔLeverage	-2.867	-3.617	-2.364	0.23
	[0.000]	[0.000]	[0.000]	[-2.72[a]]
ΔDividends	-1.663	-9.798	3.797	2.10[b]
	[0.000]	[0.000]	[0.000]	[-1.21]
ΔEPS	0.032	0.039	0.025	-0.46
	[0.011]	[0.010]	[0.013]	[0.34]
Turnover	-13.568	-13.543	-13.582	-0.55
	[-13.531]	[-13.428]	[-13.599]	[1.11]
ConCAR	0.061	0.096	0.035	-2.18[b]
	[0.015]	[0.041]	[-0.006]	[2.06[b]]
ConTurnover	-16.492	-16.462	-16.513	-1.23
	[-16.550]	[-16.550]	[-16.550]	[1.22]
LagComprate	-	-	0.449	
			[0.362]	
LagSpeed	-	-	0.329	
			[0.160]	
LagDuration	-	-	0.891	
			[1.000]	
Time Lapse	-	-	19.626	
			[12.500]	
No observations	769	318	451	

In addition, compared to firms of 'initial' programs, firms of 'repeat' programs have share prices that are significantly less volatile as indicated by *Return Deviation*, 0.026 compared to 0.034; are significantly less undervalued prior to announcement as indicated by *PreCAR*, -2.1% compared to -5.6%; have lower cash balances as measured by variable *Cash Balance*, 0.265 compare to 0.318; but have higher operating cash flows as indicated by variable *Cash Flow*, 0.08 compared to 0.044.[92] Firms of 'repeat' programs are also significantly larger than firms of 'initial' programs as indicated by variable *Firm Size*, 18.758 compared to 18.331.[93]

Also compared to firms of 'initial' programs, firms of 'repeat' programs have lower negative changes to leverage as measured by Δ*Leverage*; -2.364 compared to -3.617; are in the process of increasing dividends rather than decreasing dividends as indicated by Δ*Dividends*, 3.797 compared to -9.798; are increasing EPS but at a lower rate as measured by Δ*EPS*, 0.025 compared to 0.039; and have less variation between the highest and lowest price paid for shares as indicated by the variable *Price Range*, 0.282 compared to 0.408.[94] When considering share price performance over the

[92] The median values for variable *Return Deviation* are 0.03 and 0.022 for 'initial and repeat programs respectively whilst for *PreCAR* the median values are -0.05 and -0.014 respectively. The median values for variable *Cash Balance* are 0.138 and 0.11 for 'initial and repeat programs respectively whilst for *Cash Flow* the median values are 0.055 and 0.063 respectively. The tests of difference between group mean and median values is significant at the 1% and 5% levels of significance for *Return Deviation* and *PreCAR* respectively whilst the test of difference between median values is significant at the 5% level of significance for *Cash Balance* but is insignificant for mean values. The test of significance between group mean values for *Cash Flow* is significant at the 10% level of significance but is insignificant for median values.

[93] The median values for *Firm Size* are 18.108 and 18.506 for 'initial' and 'repeat' programs respectively and the test of significance between group mean and median values is significant at the 1% and 5% levels of significance respectively.

[94] The median value for variable Δ*Leverage* is 0.0 for both 'initial' and 'repeat' programs as are the median values for Δ*Dividends*. The median values for Δ*EPS* are 0.01 and 0.013 for 'initial' and 'repeat' programs respectively whilst for *Price Range* the median values are 0.247 and 0.168 respectively. The test of difference between group median values for Δ*Leverage* is significant at the 1% level of significance but insignificant for mean values whilst the test of difference between group mean values is significant at the 5% level of significance for Δ*Dividends* but is insignificant for median values. The test of difference for both mean and median values for variable *Price Range* is significant at the 1% level of significance.

duration of the program, firms of 'repeat' programs have significantly lower market-adjusted share price returns and share price volatility compared to firms of 'initial' programs as indicated by variables *ConCAR*, 3.5% compared to 9.6%, and *ConDeviation*, 0.026 compared to 0.033; and have lower share liquidity occurring over the program, as measured by *ConTurnover*, -16.513 compared to -16.462.[95] Of note, the positive abnormal returns measured over the duration of a program, as indicated by *ConCAR*, is consistent with the positive abnormal returns in the years following an announcement found in other studies (Ikenberry et al., 1995; Peyer and Vermaelen, 2009).

Of interest is the fact that returns measured over the program (*ConCAR*) for both 'initial' and 'repeat' programs on average are positive but are negative in the period leading up to the announcement (*PreCAR*), however, share price volatility for both programs remains relatively unchanged from the period prior (*Return Deviation*) to the period during the program (*ConDeviation*). In contrast the liquidity of shares decreases over the program (*ConTurnover*) compared to the period prior to announcement (*Turnover*) for both 'initial', -16.462 compared to -13.543, and for 'repeat' programs, -16.513 compared to -13.582.

Also from Table 5.1 it can be seen that completion rates from prior programs are generally higher than for current programs as shown by comparing variables *LagComprate* and *LagSpeed* with *Completion Rate* and *Repurchase Speed*, 44.9% compared to 38.4% and 32.9% compared to 29% respectively, however, the ratio of

[95] The median values for variable *ConCAR* are 4.1% and -0.6% for 'initial' and 'repeat' programs respectively whilst for *ConDeviation* median values are 0.028 and 0.022 respectively. The median values for *ConTurnover* are -16.55 for both 'initial' and 'repeat' programs. The test of difference between group mean and median values for *ConCAR* is significant at the 5% level of significance and at the 1% level of significance for *ConDeviation*.

program duration to intended length is similar for current programs (*Duration Ratio*) and prior programs (*LagDuration*), 0.9 and 0.891 respectively.[96] Finally the average time between subsequent announcements, as indicated by *Time Lapse*, is over 19 months.[97]

Overall, when comparing 'repeat' programs with 'initial' programs it can be seen that completion rates are higher for 'initial' programs and although intended execution is longer, when comparing actual duration with that intended, programs for 'initial' programs are comparatively shorter. Also the range in prices paid for repurchased shares is higher for 'initial' programs than for 'repeat' programs indicating the potential for undervaluation is greater for 'initial' programs and consistent with the greater degree of under-pricing measured prior to announcements. In terms of share price volatility, although higher for 'initial' programs, there is little change in volatility for both programs over the program duration. Of note, the measure of *Price Range* indicates that on average firms are willing to pay a premium of over 33% on the lowest price paid for its shares, which, given the fact that the ASX restricts firms from paying more than a 5% premium over the prevailing market price for its shares, suggests that firms are involved in several repurchase transactions over the duration of a program.[98]

[96] The median values for *LagComprate*, *LagSpeed* and *LagDuration* are 36.2%, 16% and 1.0 respectively.
[97] The median value for *Time Lapse* is 12.5 months.
[98] The ASX requires that a company may only buy shares if transactions in the company's shares are recorded on a least 5 days in the 3 months before it repurchases and may only pay a price that is not more than 5% above the average of the market price calculated over the last 5 days on which sales in the shares were recorded (ASX Listing Rules Chapter 7, ss 7.29 and 7.33).

5.4.2 RESULTS

The purpose of this section is to discuss the results from testing of the five hypotheses, H5 –H9. Hypotheses H5 and H6 are concerned with the relationship between share price volatility and program length on completion rates. Tobit regressions are performed with completion rate as the dependent variable and variables *Intended Length*, *Duration Ratio*, *Return Deviation* and *ConDeviation* as independent explanatory variables, together with other independent control variables consistent with Equation (3). Hypothesis H7 is concerned with programs where firms acquire shares ('non-zero' programs) and regressions include the variable *Price Range* to measure the relationship between completion rates and the difference between the highest and lowest price paid for repurchased shares. Hypotheses H8 and H9 are concerned with 'repeat' programs only and extend explanatory variables to include *LagDuration*, *LagSpeed* and *LagComprate* in addition to the variable *TimeLapse* to see if the period between announced programs has any impact on the firm's ability to repurchase shares. The inclusion of other variables is consistent with that of Equation (4) except for Hypothesis H9, where the dependent variable *Completion Rate* is replaced by *Repurchase Speed*, which measures mid-completion rates.

Tables 5.2 and 5.3 provide results for explaining completion rates of repurchase programs in general and are relevant for the testing of hypotheses H5 – H7, whilst Tables 5.4 and 5.5 are concerned with explaining completion rates for 'repeat' programs only and are relevant for testing hypotheses H8 and H9. For each table three panels of results are presented. In Panel A results are presented for completed programs in general, whilst in Panels B and C individual results for '3F notice' and

'closed' programs, respectively, will be presented. For all tables, four versions of the tobit regression model are presented. Models (2) to (4) are variations of model (1) which presents the basic variables of Equations (3) and (4). The dummy variable *Unlimited Duration* is included in models (2) to (4) whilst industry dummy variables are included in models (3) and (4) and year of announcement dummy variables are included in model (4) only. Regression results are presented with t- values in parentheses and with all variables winsorised at the 1st and 99th percentiles except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *Lagspeed* which are all truncated at 100%.

Hypothesis H5

Results from Table 5.2, Panel A indicate that the coefficient for explanatory variable *Return Deviation* is insignificant for models (1) – (3) but is significant at the 10% level of significance and is of positive sign for model (4) after the inclusion of dummy variables for year of announcement, suggesting that firms may be taking advantage of undervalued shares. However, when volatility measured over the duration of the program is considered, this is not found to be the case. The coefficient for *ConDeviation* is of negative sign and significant at the 5% level of significance for models (1) and (2) before becoming insignificant for models (3) and (4) with the inclusion of dummy variables for industry type and year of announcement.

TABLE 5.2

Regressions for All Completed Programs

Table 5.2 presents coefficient estimates from tobit regressions describing completion rates for all completed programs. Panel A presents estimates for all completed programs, whilst Panel B presents estimates for all '3F notice' programs, and Panel C presents estimates for all 'closed' programs. Four versions of Equation (3) are presented with *Completion Rate* as the dependent variable. Model (1) presents the basic variables of Equation (3). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* which is truncated at 100%.T-statistics are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A: All programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	4.4456[a]	4.4987[a]	4.3641[a]	4.062[a]
	(5.31)	(5.43)	(5.27)	(4.92)
Return Deviation	2.3044	2.1427	2.3555	3.048[c]
	(1.4)	(1.31)	(1.42)	(1.79)
ConDeviation	-3.4905[b]	-3.3636[b]	-2.3326	-1.362
	(-2.36)	(-2.3)	(-1.57)	(-0.86)
Intended Length	-0.0048[b]	-0.0319[a]	-0.0336[a]	-0.031[a]
	(-2.01)	(-4.27)	(-4.51)	(-4.1)
Duration Ratio	-0.0983[a]	-0.1270[a]	-0.1247[a]	-0.116[a]
	(-2.77)	(-3.53)	(-3.48)	(-3.25)
Program Size	-4.0843[a]	-3.3857[a]	-3.3639[a]	-3.316[a]
	(-7.81)	(-6.2)	(-6.21)	(-6.15)
PreCAR	-0.0203	-0.0374	-0.0389	-0.050
	(-0.2)	(-0.37)	(-0.39)	(-0.49)
MTB	-0.0078	-0.0074	-0.0070	-0.007
	(-1)	(-0.96)	(-0.9)	(-0.9)
Firm Size	0.0112	0.0136	0.0167	0.021
	(0.89)	(1.09)	(1.31)	(1.63)
Cash Balance	0.0723	0.0756	0.0584	0.042
	(1.5)	(1.59)	(1.22)	(0.89)
Cash Flow	-0.0359	-0.0678	-0.0428	0.003
	(-0.4)	(-0.76)	(-0.47)	(0.04)
ΔLeverage	0.0001	0.0001	0.0000	0.000
	(0.37)	(0.42)	(0.08)	(0.28)
ΔDividends	0.0000	0.0000	0.0000	0.000
	(0.14)	(0.11)	(0.15)	(0.11)
ΔEPS	-0.1044[c]	-0.0949[c]	-0.0923[c]	-0.115[b]
	(-1.84)	(-1.69)	(-1.66)	(-2.06)
Turnover	0.0618[a]	0.0639[a]	0.0775[a]	0.077[a]
	(3.17)	(3.31)	(3.78)	(3.74)
ConCAR	-0.0815	-0.0875	-0.0975[c]	-0.108[b]
	(-1.47)	(-1.59)	(-1.77)	(-1.96)
ConTurnover	0.1777[a]	0.1668[a]	0.1666[a]	0.164[a]
	(3.77)	(3.58)	(3.6)	(3.57)
Unlimited Duration (Dummy)	-	0.7448[a] (3.84)	0.8129[a] (4.19)	0.726[a] (3.72)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.5009[b]	0.4961[a]	0.4897[a]	0.48327[a]
	(28.66)	(28.68)	(28.7)	(28.7)
Log Likelihood	-598.99	-591.61	-583.49	-574.35
No observations	741	741	741	741

Panel B: '3F notice' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	3.7996[a]	3.7201[a]	3.5112[a]	2.9694[a]
	(3.48)	(3.49)	(3.26)	(2.85)
Return Deviation	1.1093	1.2182	1.2337	2.6951
	(0.54)	(0.6)	(0.6)	(1.27)
ConDeviation	-5.7278[a]	-5.6345[a]	-4.4696[b]	-4.0667[b]
	(-3.21)	(-3.2)	(-2.5)	(-2.16)
Intended Length	-0.0030	-0.0298[a]	-0.0303[a]	-0.0269[a]
	(-0.89)	(-3.39)	(-3.44)	(-3.04)
Duration Ratio	-0.1708[a]	-0.2023[a]	-0.1985[a]	-0.1814[a]
	(-3.74)	(-4.38)	(-4.29)	(-3.94)
Program Size	-3.6534[a]	-2.7615[a]	-2.7946[a]	-2.7349[a]
	(-5.58)	(-3.96)	(-4.03)	(-3.94)
PreCAR	0.1434	0.1282	0.1401	0.1248
	(1.16)	(1.05)	(1.16)	(1.02)
MTB	-0.0068	-0.0049	-0.0061	-0.0071
	(-0.73)	(-0.53)	(-0.66)	(-0.78)
Firm Size	0.0090	0.0135	0.0238	0.0281[c]
	(0.56)	(0.85)	(1.43)	(1.68)
Cash Balance	0.0703	0.0731	0.0617	0.0327
	(1.14)	(1.2)	(1)	(0.53)
Cash Flow	0.0319	0.0034	0.0158	0.0449
	(0.28)	(0.03)	(0.14)	(0.4)
ΔLeverage	-0.0002	-0.0001	-0.0002	-0.0002
	(-0.46)	(-0.39)	(-0.6)	(-0.49)
ΔDividends	0.0002	0.0002	0.0002	0.0002
	(0.89)	(0.83)	(0.83)	(0.77)
ΔEPS	-0.0900	-0.0768	-0.0812	-0.1133[c]
	(-1.36)	(-1.17)	(-1.25)	(-1.74)
Turnover	0.0145	0.0175	0.0262	0.0255
	(0.55)	(0.68)	(0.96)	(0.94)
ConCAR	-0.0458	-0.0588	-0.0523	-0.0560
	(-0.67)	(-0.87)	(-0.77)	(-0.83)
ConTurnover	0.1585[b]	0.1432[b]	0.1469[b]	0.1318[b]
	(2.56)	(2.37)	(2.41)	(2.26)
Unlimited Duration (Dummy)	-	0.7795[a]	0.8278[a]	0.7483[a]
		(3.31)	(3.51)	(3.18)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.4902[a]	0.4841[a]	0.4768[a]	0.4674[a]
	(22.57)	(22.6)	(22.65)	(22.64)
Log Likelihood	-349.98	-344.49	-338.73	-329.83
No observations	445	445	445	445

Panel C: 'Closed' programs

Variable	Parameter Estimate (1)	(2)	(3)	(4)
Intercept	3.5122[a]	3.6564[a]	3.3932[a]	3.1804[a]
	(3.52)	(3.6)	(3.37)	(3.15)
Return Deviation	2.2927	1.7973	2.6751	2.9779
	(1.03)	(0.8)	(1.17)	(1.29)
ConDeviation	-1.6994	-1.4201	-0.4542	1.1117
	(-0.81)	(-0.68)	(-0.21)	(0.47)
Intended Length	0.0010	-0.0233[b]	-0.0239[b]	-0.0143
	(0.35)	(-2.01)	(-2.06)	(-1.2)
Duration Ratio	-0.0591	-0.0768[c]	-0.0812[c]	-0.0999[b]
	(-1.28)	(-1.66)	(-1.77)	(-2.14)
Program Size	-2.3139[a]	-1.9938[a]	-2.2517[a]	-1.9457[a]
	(-3.31)	(-2.81)	(-3.17)	(-2.77)
PreCAR	-0.4035[a]	-0.4177[a]	-0.3999[a]	-0.3396[b]
	(-2.75)	(-2.85)	(-2.68)	(-2.23)
MTB	-0.0072	-0.0104	-0.0103	-0.0091
	(-0.61)	(-0.87)	(-0.85)	(-0.76)
Firm Size	0.0106	0.0101	0.0076	0.0119
	(0.63)	(0.61)	(0.45)	(0.69)
Cash Balance	0.1217[b]	0.1229[b]	0.0957	0.0658
	(2)	(2.03)	(1.57)	(1.08)
Cash Flow	-0.1433	-0.1641	-0.1052	-0.0699
	(-1.2)	(-1.38)	(-0.85)	(-0.55)
ΔLeverage	0.0000	0.0000	-0.0001	-0.0001
	(0.03)	(-0.05)	(-0.18)	(-0.16)
ΔDividends	-0.0004	-0.0004	-0.0004	-0.0003
	(-1.28)	(-1.21)	(-1.2)	(-1.12)
ΔEPS	-0.1428[c]	-0.1410[c]	-0.1212	-0.1424[c]
	(-1.66)	(-1.65)	(-1.41)	(-1.66)
Turnover	0.0432[c]	0.0462[c]	0.0736[a]	0.0736[a]
	(1.75)	(1.87)	(2.7)	(2.71)
ConCAR	-0.1600[b]	-0.1541[b]	-0.1668[b]	-0.1886[b]
	(-2.07)	(-2)	(-2.14)	(-2.36)
ConTurnover	0.1694[a]	0.1593[a]	0.1463[a]	0.1475[a]
	(3.07)	(2.85)	(2.64)	(2.68)
Unlimited Duration (Dummy)	-	0.6314[b]	0.6661[b]	0.3717
		(2.17)	(2.27)	(1.21)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.3940[a]	0.3914[a]	0.3846[a]	0.3742[a]
	(17.97)	(17.99)	(18.02)	(18.12)
Log Likelihood	-178.27	-175.92	-171.19	-165
No observations	296	296	296	296

Whereas Bonaimé (2012) finds a negative association between completion rates and volatility measured prior to announcements for 'repeat' programs conducted in the US, this study finds evidence of a negative association when volatility is measured concurrently for Australian repurchases.[99] These results suggest Australian firms are not acquiring shares at 'cheap' prices and provide some support for hypothesis H5.

Hypothesis H6

Results from Table 5.2, Panel A, show that the sign of coefficient for *Intended Length* is negative as expected and significant at the 5% level of significance for model (1) and at the 1% level for models (2) – (4) with the inclusion of dummy variables, demonstrating that firms are more likely to achieve their repurchase targets if a shorter program duration is indicated. Moreover, a one month decrease in *Intended Length* is associated with an increase in completion rates of around three percentage points.[100] When comparing actual duration with intended duration, the relationship with completion rates is also negative, as indicated by the sign of coefficient for *Duration Ratio* and is significant at the 1% level of significance for all models. A one standard deviation decrease in *Duration Ratio* is associated with an increase in completion rates of around six percentage points.[101] These results indicate that firms are not only more likely to achieve their repurchase targets, the shorter the intended program duration but also the quicker a program is executed. Taken together, the results for *Intended Length* and *Duration Ratio* strongly support hypothesis H6 and

[99] Of note, Andriosopoulos et al. (2103) find no association between completion rates and prior share volatility for UK programs.
[100] Although not reported in the tables, the standard deviation for *Intended Length* is 9.356 months, which means that a one standard deviation decrease in *Intended Length* is associated with an increase in completion rates of around 28 percentage points.
[101] Although not reported in the tables, the standard deviation for *Duration Ratio* is 0.6182.

demonstrate that firms that are committed in meeting their targets are more likely to indicate programs of shorter length and complete their programs ahead of time.

Consistent with studies by Ikenberry et al. (2000) and Bonaimé (2012), the coefficient for *Program Size* is negative as expected and significant at the 1% level of significance for all models but is inconsistent with Akyol and Foo (2013) who do not find program size to be significant in explaining completion rates for Australian repurchases.[102] Results demonstrate that a one percent increase in the fraction of shares sought is associated with more than a three percent decrease in completion rates, an effect greater than that of any other explanatory variable.[103] These findings suggest that firms authorise programs that are larger than they initially intend to buy and is consistent with the low completion rates found in this thesis (Chapter 3).

Results from other studies report a negative relationship between share price performance in the period prior to a program announcement and completion rates (Stephens and Weisbach, 1998; Ikenberry et al., 2000 and Bonaimé, 2012) whereas this study finds evidence of a negative association between completion rates and share returns measured over the duration of a program. The coefficient for *PreCAR* is found here to be insignificant for all models and although being insignificant for models (1) and (2) the coefficient for *ConCAR* is of negative sign as expected and significant at the 10% level with the inclusion of dummy variables for industry type, model (3), and

[102] Akyol and Foo (2103) do not truncate completion rates at 100% and base completion rates on the number of shares reported in 3E notices whereas this study relies on the number of shares acquired reported in 3F notices for '3F notice' programs and the progressive number of shares acquired in 3E notices for 'closed' programs. There is a possibility of under estimating completion rates if not all 3E notices are represented.

[103] Although not reported in the tables, the standard deviation for *Program Size* is 40.3 percent, which means that a one standard deviation increase in *Program Size* is associated with a decrease in completion rates of over one percent.

at the 5% level of significance with the addition of dummy variables for year of announcement, model (4). This evidence is consistent with that of Akyol and Foo (2013) who also do not find a significant association between completion rates and excess returns measured prior to announcement for Australian data and find a negative association between monthly repurchase activity and excess returns measured both prior and during the month of repurchase. These results are consistent with Australian firms repurchasing shares to arrest falling share prices.

The coefficient for *Cash Balance* is insignificant across all models, a result that does not indicate that cash levels are an important consideration for completion rates and contrasts with findings from other studies (see Stephens and Weisbach, 1998; Dittmar, 2000; Bonaimé, 2012 and Babenko et al., 2012). The sign of coefficient for ΔEPS is negative and significant at the 10% level for all models except model (4) where it is significant at the 5% level, providing support for the notion that firms engage in repurchase programs for the purpose of improving EPS (Mitchell et al., 2001; Lamba and Miranda, 2010).

Liquidity measured both prior to and during a program is important in explaining completion rates, a finding that is consistent with those of Brockman, Howe and Mortal (2008). The coefficient for both *Turnover* and *ConTurnover* are positive and significant at the 1% level of significance across all models and indicate that share liquidity is important in explaining completion rates and that firms avoid repurchasing when the market for its shares are not liquid. The coefficient for dummy variable, *Unlimited Duration*, is significant at the 1% level of significance and positive for all relevant models, demonstrating that firms acquire more shares if they nominate an

unlimited rather than a fixed period duration and the size of its coefficient suggests that firms that indicate an unlimited duration have completion rates that are almost one percent higher than firms that do not. Lastly, for other independent control variables, the coefficients for *MTB*, *Firm Size*, *Cash Flow*, Δ*Leverage* and Δ*Dividends* are all insignificant in explaining completion rates.[104]

Individual regression results for '3F notice' and 'closed' programs are presented in Panels B and C, respectively, of Table 5.2. Results demonstrate support of hypothesis H5 with the testing of completion rates for '3F notice' programs and when share price volatility measured over the duration of a program. The coefficient for *ConDeviation* is of negative sign and significance at the 1% level of significance for models (1) and (2) and at the 5% level of significance for models (3) and (4) for '3F notice' programs (Panel B) but insignificant across all models for 'closed' programs (Panel C), whilst the coefficient for *Return Deviation* is insignificant across all models for both programs.

Whilst being supportive of hypothesis H6, results for 'closed' programs show a reduction in the significance of program duration in explaining completion rates. In regards to '3F notice' programs (Panel B) the coefficient for *Intended Length* is insignificant for model (1) but is of the correct sign and significant at the 1% level of significance for the remaining models (2) - (4) whilst the coefficient for *Duration Ratio* is significant at the 1% level of significance and of the correct sign for all models. For 'closed' programs, Panel C, the coefficient for *Intended Length* is insignificant for model (1) and significant at the 5% level of significance and of the

[104] In another Australian study, Lamba and Miranda (2010) also find firm size, leverage and free cash flow to be insignificant in explaining completion rates but find some support of a negative relationship between market-to-book ratio and capital expenditure with completion rates.

correct sign for models (2) and (3) but is insignificant for model (4) when the dummy variable for year of announcement is included. The coefficient for *Duration Ratio* is insignificant for model (1) but is significant at the 10% level for models (2) and (3) and at the 5% level for model (4) and of the correct sign.

For control variables, results are similar for variables *Program Size*, *Turnover* and *ConTurnover* except in the case of '3F notice' programs where the coefficient for *Turnover* is insignificant.[105] The coefficient for Δ*EPS* remains significant for 'closed' programs and with the exception of model (4) is insignificant for '3F notice' programs.[106] Of interest, the coefficients for both *PreCAR* and *ConCAR* are significant and of the correct, negative sign for 'closed' programs (Panel C) whilst being insignificant for '3F notice' programs (Panel B), indicating that firms acquire shares to support falling share prices for 'closed' programs.[107]

Overall support is found for hypothesis H6 and mixed support for hypothesis H5. Completion rates are negatively and significantly associated with share price volatility in some situations, particularly for '3F notice' programs, when volatility is measured over the duration of a program. In all cases completion rates are not positively and significantly associated with share price volatility suggesting that transparency of on-market share repurchase programs conducted in Australia discourages firms from

[105] The coefficient for *Turnover* is insignificant across all models for '3F notice' programs (Panel B) and is significant at the 10% level of significance and of the correct sign for models (1) and (2) and at the 1% level for models (3) and (4) for 'closed' programs (Panel C).
[106] The coefficient for Δ*EPS* is significant at the 10% level of significance for model (4) only for '3F notice' programs (Panel B) whilst for 'closed' programs (Panel C), it is significant at the 10% level of significance for all models except model (3) where it is insignificant.
[107] For 'closed' programs (Panel C), the coefficient for *PreCAR* is significant at the 1% level of significance for models (1) – (3) and at the 5% level of significance for model (4) whilst the coefficient for *ConCAR* is significant at the 5% level of significance for all models. There is also evidence of significance for coefficients of variables *Firm Size*, model (4) of Panel B, and *Cash Balance*, models (1) and (2) of Panel C.

acquiring shares at 'cheap' prices. In regards to hypothesis H6, completion rates are negatively and significantly associated with both *Intended Length* and *Duration Ratio* demonstrating that firms are not only more likely to achieve repurchase targets if a shorter program duration is indicated but also the quicker a program is executed.

Hypothesis H7

Given the transparency of the Australian share market for on-market share repurchases it is expected that the difference between the highest and lowest price paid will reflect the degree of under-pricing and therefore the number of shares to be repurchased to correct the share price. Results from Panel A, Table 5.3, which provide completion rates for 'non-zero' programs only, indicate that the explanatory variable, *Price Range*, is significant in explaining completion rates. The coefficient is positive and significant at the 1% level of significance across all models, further, a one standard deviation increase in its measure is associated with an increase in completion rates of around eight percentage points.[108] These results show that firms acquire more shares the greater is the differential between the highest and lowest price paid and provide strong evidence that repurchase activity is positively related to the degree of under-pricing of firms' shares and offer strong support for hypothesis H7.

Further support is found for hypotheses H5 and H6 for 'non-zero' programs. The coefficient for *ConDeviation* is negative and significant at the 1% level for all models except for model (4) where it is significant at the 10% level of significance, indicating that firms are reluctant to repurchase shares when share prices are volatile.

[108] Although not reported in the tables, the standard deviation for *Price Range* is 0.4269.

TABLE 5.3

Regressions for Non- Zero Programs

Table 5.3 presents coefficient estimates from Tobit regressions describing completion rates for all completed programs, 'non-zero' programs, in which shares are repurchased. Panel A presents estimates for all completed programs, whilst Panel B presents estimates for all '3F notice' programs, and Panel C presents estimates for all 'closed' programs. Four versions of Equation (3) are presented with *Completion Rate* as the dependent variable. Model (1) presents the basic variables of Equation (3). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* which is truncated at 100%.T-statistics are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A: All programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	3.9637[a]	4.0095[a]	3.7688[a]	3.6038[a]
	(5.8)	(5.94)	(5.63)	(5.39)
Price Range	0.1825[a]	0.2066[a]	0.1913[a]	0.2195[a]
	(4.1)	(4.64)	(4.31)	(4.87)
Return Deviation	1.1546	0.8831	1.1877	1.3023
	(0.81)	(0.63)	(0.84)	(0.9)
ConDeviation	-4.3468[a]	-4.1761[a]	-3.6212[a]	-2.3129[c]
	(-3.37)	(-3.26)	(-2.78)	(-1.71)
Intended Length	-0.0028	-0.0255[a]	-0.0251[a]	-0.0228[a]
	(-1.32)	(-3.96)	(-3.91)	(-3.58)
Duration Ratio	-0.0631[b]	-0.0882[a]	-0.0818[b]	-0.0804[b]
	(-1.99)	(-2.75)	(-2.56)	(-2.55)
Program Size	-3.8719[a]	-3.2895[a]	-3.3340[a]	-3.2407[a]
	(-8.6)	(-7)	(-7.14)	(-7)
PreCAR	0.1591[c]	0.1416	0.1450	0.1199
	(1.77)	(1.59)	(1.64)	(1.35)
MTB	0.0012	0.0013	0.0007	0.0020
	(0.17)	(0.18)	(0.1)	(0.29)
Firm Size	0.0031	0.0051	0.0071	0.0140
	(0.28)	(0.47)	(0.63)	(1.23)
Cash Balance	0.0572	0.0597	0.0487	0.0336
	(1.4)	(1.48)	(1.2)	(0.84)
Cash Flow	0.0259	-0.0069	0.0182	0.0206
	(0.34)	(-0.09)	(0.23)	(0.27)
ΔLeverage	0.0002	0.0002	0.0001	0.0002
	(0.79)	(0.84)	(0.6)	(0.89)
ΔDividends	0.0000	0.0000	0.0001	0.0001
	(0.25)	(0.21)	(0.32)	(0.47)
ΔEPS	-0.0646	-0.0571	-0.0580	-0.0798
	(-1.29)	(-1.15)	(-1.18)	(-1.63)
Turnover	0.0478[a]	0.0489[a]	0.0516[a]	0.0526[a]
	(2.82)	(2.91)	(2.9)	(2.97)
ConCAR	0.0581	0.0503	0.0378	0.0289
	(1.14)	(1)	(0.75)	(0.58)
ConTurnover	0.1486[a]	0.1406[a]	0.1369[a]	0.1410[a]
	(3.91)	(3.74)	(3.71)	(3.82)
Unlimited Duration (Dummy)	-	0.6287[a]	0.6373[a]	0.5688[a]
		(3.74)	(3.8)	(3.4)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.4007a	0.3965[a]	0.3913[a]	0.3839[a]
	(29.77)	(29.8)	(29.82)	(29.83)
Log Likelihood	-359.18	-352.17	-344.25	-333.1
No observation	602	602	602	602

Panel B: '3F notice' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	3.7913[a]	3.69012[a]	3.51716[a]	3.19674[a]
	(4.03)	(4.05)	(3.83)	(3.57)
Price Range	0.10328[c]	0.14019[b]	0.12296[b]	0.14027[b]
	(1.73)	(2.36)	(2.08)	(2.32)
Return Deviation	-0.0292	-0.0744	0.27969	0.98184
	(-0.02)	(-0.04)	(0.16)	(0.52)
ConDeviation	-4.5775[a]	-4.5574[a]	-3.7078[b]	-3.1345[c]
	(-2.71)	(-2.75)	(-2.2)	(-1.8)
Intended Length	-0.0048	-0.0342[a]	-0.0333[a]	-0.0306[a]
	(-1.59)	(-4.27)	(-4.15)	(-3.81)
Duration Ratio	-0.201[a]	-0.2419[a]	-0.2313[a]	-0.2174[a]
	(-4.88)	(-5.78)	(-5.52)	(-5.25)
Program Size	-3.6668[a]	-2.7329[a]	-2.7392[a]	-2.8729[a]
	(-6.23)	(-4.41)	(-4.43)	(-4.63)
PreCAR	0.18656[c]	0.16255	0.17654	0.15468
	(1.69)	(1.49)	(1.63)	(1.41)
MTB	-0.0055	-0.004	-0.0048	-0.0055
	(-0.67)	(-0.48)	(-0.58)	(-0.67)
Firm size	0.00331	0.00932	0.01444	0.02067
	(0.23)	(0.66)	(0.98)	(1.37)
Cash Balance	0.04503	0.04644	0.03859	0.01982
	(0.83)	(0.88)	(0.72)	(0.37)
Cash Flow	0.04038	0.00189	0.01877	0.02295
	(0.4)	(0.02)	(0.19)	(0.23)
ΔLeverage	0.0000	0.0001	-0.0000	0.0001
	(0.13)	(0.2)	(-0.11)	(0.18)
ΔDividends	0.00021	0.0002	0.00022	0.00023
	(0.88)	(0.83)	(0.93)	(0.98)
ΔEPS	-0.0537	-0.0405	-0.0378	-0.0736
	(-0.86)	(-0.66)	(-0.62)	(-1.21)
Turnover	0.02817	0.02822	0.03445	0.03333
	(1.21)	1.23)	(1.43)	(1.38)
ConCAR	0.04409	0.04108	0.03225	0.04426
	(0.7)	(0.66)	(0.52)	(0.71)
ConTurnover	0.13506[b]	0.12089[b]	0.12498[b]	0.12234[b]
	(2.54)	(2.34)	(2.42)	(2.45)
Unlimited Duration (Dummy)	-	0.84367[a]	0.85729[a]	0.80032[a]
		(3.97)	(4.04)	(3.79)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.41945[a]	0.41154[a]	0.40519[a]	0.39661[a]
	(23.13)	(23.17)	(23.2)	(23.22)
Log Likelihood	-254.92	-247.03	-240.74	-232.69
No observations	402	402	402	402

Panel C: 'Closed' programs

Variable	Parameter Estimate (1)	(2)	(3)	(4)
Intercept	2.9439[a]	3.0593[a]	2.9478[a]	2.8716[a]
	(3.93)	(4.01)	(3.83)	(3.85)
Price Range	0.2818[a]	0.2931[a]	0.2896[a]	0.3116[a]
	(5.23)	(5.42)	(5.31)	(5.64)
Return Deviation	1.8296	1.4280	1.9019	2.2510
	(1.01)	(0.79)	(1.01)	(1.2)
Con Deviation	-3.6168[b]	-3.2753[b]	-2.9754[c]	-0.8481
	(-2.23)	(-2.01)	(-1.77)	(-0.46)
Intended Length	0.0031	-0.0124	-0.0120	-0.0018
	(1.37)	(-1.32)	(-1.27)	(-0.18)
Duration Ratio	0.0744[c]	0.0713[c]	0.0609	0.0121
	(1.72)	(1.66)	(1.4)	(0.27)
Program Size	-2.1691[a]	-1.9540[a]	-1.9906[a]	-1.6555[a]
	(-3.87)	(-3.42)	(-3.49)	(-2.94)
PreCAR	0.0344	0.0241	0.0411	0.0647
	(0.27)	(0.19)	(0.31)	(0.5)
MTB	0.0131	0.0089	0.0115	0.0150
	(1.12)	(0.75)	(0.95)	(1.25)
Firm Size	-0.0002	-0.0011	-0.0022	0.0029
	(-0.02)	(-0.08)	(-0.15)	(0.2)
Cash Balance	0.1384[a]	0.1389[a]	0.1244[b]	0.0838[c]
	(2.85)	(2.88)	(2.54)	(1.72)
Cash Flow	0.0082	-0.0085	0.0126	0.0568
	(0.09)	(-0.09)	(0.12)	(0.55)
ΔLeverage	0.0001	0.0001	0.0002	0.0001
	(0.35)	(0.34)	(0.49)	(0.38)
ΔDividends	-0.0003	-0.0003	-0.0003	-0.0004
	(-1.28)	(-1.2)	(-1.24)	(-1.46)
ΔEPS	-0.0920	-0.0887	-0.0896	-0.0945
	(-1.35)	(-1.31)	(-1.31)	(-1.4)
Turnover	0.0304	0.0343[c]	0.0441[c]	0.0486[b]
	(1.49)	(1.68)	(1.95)	(2.21)
ConCAR	-0.0035	-0.0185	-0.0227	-0.0639
	(-0.05)	(-0.25)	(-0.31)	(-0.86)
ConTurnover	0.1348[a]	0.1281[a]	0.1208[a]	0.1284[a]
	(3.31)	(3.09)	(2.92)	(3.22)
Unlimited Duration (Dummy)	-	0.4101[c]	0.4200[c]	0.1113
		(1.7)	(1.73)	(0.43)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.2790[a]	0.2772[a]	0.2752[a]	0.26347[a]
	(19.03)	(19.04)	(19.04)	(19.06)
Log Likelihood	-40.595	-39.147	-37.7	-29.043
No observations	200	200	200	200

With the exception of model (1) the variable *Intended Length* is important in explaining 'non-zero' programs. Its coefficient is negative and significant at the 1% level of significance for all remaining models. With respect to actual duration, the coefficient for *Duration Ratio* is negative, as expected, and significant at the 5% level of significance or higher for all models. With respect to control variables, the coefficient for *Program Size* is negative as expected and significant at the 1% level of significance for all models, whilst the coefficient for both *Turnover* and *ConTurnover* are of the correct sign and significant at the 1% level of significance across all models, emphasising the importance of liquidity to firms wishing to repurchase shares.

Except for model (1), where it is of the incorrect, positive sign and significant at the 10% level, the coefficient for *PreCAR* is insignificant for remaining models as is the coefficient for *ConCAR* for all models. These results fail to demonstrate that firms acquire shares to support falling share prices and is inconsistent with the evidence found for programs in general (Table 5.2, Panel A). Unlike the results for completed programs in general, the variable ΔEPS is not important in explaining completion rates for 'non-zero' programs as suggested by its coefficient which is insignificant for all models. The coefficient for dummy variable, *Unlimited Duration*, is of positive sign and significant at the 1% level of significance for all models, further demonstrating that firms which indicate programs of no fixed duration have higher completion rates than firms of programs that do. The coefficients for all remaining control variables are insignificant.

Individual regression results for '3F notice' and 'closed' programs are provided in Panels B and C, respectively, of Table 5.3. Results for '3F notice' programs (Panel B) are consistent with those for programs in general (Panel A), however, some differences are found for 'closed' programs (Panel C). The coefficient for *Price Range* is of the correct positive sign and significant at the 1% level of significance for all models of 'closed' programs whilst being significant at the 10% level of significance for model (1) and at the 5% level of significance for remaining models of '3F notice' programs, providing further support for hypothesis H7. Although still supportive of hypothesis H5, the negative association between *ConDeviation* and completion rates is reduced for 'closed' programs with its coefficient becoming insignificant for model (4) whilst remaining significant for other models.[109] Similarly, for 'closed' programs the importance of program duration in explaining completion rates is diminished and unsupportive of hypothesis H6 whilst remaining supportive for '3F notice' programs. For 'closed' programs, the coefficient for *Intended Length* is insignificant across all models, whilst the coefficient for *Duration Ratio* is of the incorrect, positive sign and significant at the 10% level of significance for models (1) and (2) but is insignificant for models (3) and (4).[110] These results do not suggest that for 'closed' programs, firms repurchase more shares the shorter the period of time they indicate in an announcement or the quicker they execute a program as reported elsewhere.

[109] For '3F notice' programs, the coefficient for *ConDeviation* is significant at the 1% level of significance for models (1) and (2), at the 5% level for model (3) and at the 10% level for model (4), while for 'closed' programs, its coefficient is significant at the 5% level of significance for models (1) and (2) and at the 10% level for model (3).

[110] For '3F notice' programs (Panel B), the coefficient for *Intended Length* is insignificant for model (1) but is of the correct sign and significant at the 1% level of significance for remaining models while the coefficient for *Duration Ratio* is significant at the 1% level of significance for all models.

For control variables, the coefficient for *Cash Balance* is of the correct, positive sign and significant for 'closed programs' only, suggesting that repurchase activity for firms of 'closed' programs is contingent upon the cash levels of a firm rather than other factors, such as, intended program duration.[111] Finally, the coefficient for *Turnover* is significant for 'closed' programs but insignificant for '3F notice' programs while the coefficient for *ConTurnover* remains significant for both programs.[112]

In summary, strong support is found for hypothesis H7. The coefficient for *Price Range* is found to be both significant and of the correct sign across all regression models and is robust with alternate tests for '3F notice' and 'closed' programs. These results suggest that completion rates increase with the degree of share under-pricing and suggests that firms repurchase shares until the share price reflects its fundamental value, consistent with the signalling undervaluation hypothesis. Further support is found for hypothesis H5, although the significance of the coefficient for *ConDeviation* is somewhat reduced for 'closed' programs. Similarly, although generally supportive of hypothesis H6, results for 'closed' programs are contrary to that hypothesised. The coefficient for *Intended Length* is insignificant whilst evidence of a positive association between completion rates and *Duration Ratio* is present, suggesting that firms conducting 'closed' programs are not as committed as firms conducting '3F notice' programs. Also, concurrent share price behaviour is not found

[111] The coefficient for *Cash Balance* (Panel C) is significant at the 1% level of significance for models (1) and (2), at the 5% level of significance for model (3) and at the 10% level of significance for model (4).

[112] For 'closed' programs, the coefficient for *Turnover* is insignificant for model (1) whilst being significant at the 10% level for models (2) and (3) and at the 5% level for model (4). The coefficient for *ConTurnover* is of the correct sign and significant at the 5% level of significance for all models of '3F notice' programs and significant at the 1% level of significance for all models of 'closed' programs.

to be important to firms when repurchasing shares and therefore cannot be concluded that firms repurchase shares to arrest falling share prices.

Hypothesis H8

Regression results for 'repeat' programs and testing of hypothesis H8 are presented in Panel A of Table 5.4. Results indicate that explanatory variables, *LagDuration* and *LagSpeed*, are not important in explaining completion rates for 'repeat' programs. The coefficients for both *LagDuration* and *LagSpeed* are insignificant across all models, a result that does not indicate failing that firms are mindful of mid-completion rates and duration of prior programs when repurchasing shares in current programs and provide evidence contrary to hypothesis H8.

The coefficients for both *Return Deviation* and *ConDeviation* are insignificant for all models and are not supportive of hypothesis H5. This evidence contrasts with that of Bonaimé (2012) who finds a negative relationship between share price volatility, measured prior to program announcements, and completion rates of 'repeat' programs. The lack of significance of *ConDeviation* for 'repeat' programs does not demonstrate that firms avoid acquiring shares at 'cheap' prices whereas evidence for programs in general show some support of this.

As with testing programs in general, program duration is an important factor in the determination of completion rates for 'repeat' programs. The coefficients for both *Intended Length* and *Duration Ratio* are of the correct, negative sign and significant at the 1% level of significance for all models and provide further support of hypothesis H6 for 'repeat' programs.

TABLE 5.4

Regressions for Completed Repeat Programs

Table 5.4 presents coefficient estimates from Tobit regressions describing completion rates for all completed 'repeat' programs. Panel A presents estimates for all completed programs, whilst Panel B presents estimates for all '3F notice' programs, and Panel C presents estimates for all 'closed' programs. Four versions of Equation (4) are presented with *Completion Rate* as the dependent variable. Model (1) presents the basic variables of Equation (4). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate, LagComprate and LagSpeed* which are truncated at 100%.T-statistics are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A: All programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.6671[a]	1.7802[a]	2.1513[a]	1.8697[a]
	(3.14)	(3.31)	(3.83)	(3.28)
LagDuration	0.0243	0.0187	0.0184	0.0142
	(0.53)	(0.4)	(0.4)	(0.31)
LagSpeed	0.0215	0.0126	0.0410	-0.0052
	(0.17)	(0.1)	(0.32)	(-0.04)
Return Deviation	0.9558	0.8185	1.7688	2.5259
	(0.42)	(0.36)	(0.76)	(1.04)
ConDeviation	-3.0881	-2.9974	-1.6745	-1.7213
	(-1.63)	(-1.58)	(-0.87)	(-0.84)
Intended Length	-0.0121[a]	-0.0235[a]	-0.0278[a]	-0.0313[a]
	(-3.89)	(-2.68)	(-3.12)	(-3.46)
Duration Ratio	-0.1238[a]	-0.1377[a]	-0.1421[a]	-0.1379[a]
	(-2.86)	(-3.1)	(-3.23)	(-3.09)
Program Size	-2.8058[a]	-2.5388[a]	-2.5483[a]	-2.6302[a]
	(-5.25)	(-4.48)	(-4.51)	(-4.7)
LagComprate	0.5413[a]	0.5294[a]	0.4721[a]	0.5061[a]
	(4.9)	(4.78)	(4.24)	(4.56)
PreCAR	-0.0536	-0.0512	-0.0553	-0.0034
	(-0.4)	(-0.38)	(-0.41)	(-0.03)
MTB	0.0016	0.0017	0.0029	0.0006
	(0.19)	(0.2)	(0.34)	(0.07)
Firm Size	0.0021	0.0035	0.0070	0.0087
	(0.15)	(0.24)	(0.46)	(0.57)
Cash Balance	0.0691	0.0703	0.0327	0.0518
	(1.18)	(1.2)	(0.55)	(0.87)
Cash Flow	-0.0183	-0.0327	0.0630	0.0783
	(-0.16)	(-0.28)	(0.52)	(0.65)
ΔLeverage	0.0000	0.0000	0.0001	0.0002
	(-0.05)	(0)	(0.45)	(0.59)
ΔDividends	0.0003	0.0003	0.0003	0.0003
	(1.18)	(1.18)	(1.28)	(1.28)
ΔEPS	-0.0917	-0.0863	-0.0994	-0.1104[c]
	(-1.45)	(-1.36)	(-1.58)	(-1.76)
Turnover	-0.0398	-0.0369	-0.0218	-0.0297
	(-1.05)	(-0.97)	(-0.57)	(-0.78)
ConCAR	-0.1089	-0.1117	-0.1293[c]	-0.1134
	(-1.48)	(-1.52)	(-1.77)	(-1.54)
ConTurnover	0.1215[a]	0.1200[a]	0.1457[a]	0.1512[a]
	(3.39)	(3.34)	(3.94)	(4.11)
Time Lapse	0.0004	0.0005	0.0007	0.0001
	(0.3)	(0.37)	(0.59)	(0.1)
Unlimited Duration (Dummy)	-	0.3233	0.4567[c]	0.5674[b]
		(1.4)	(1.94)	(2.37)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.4466[a]	0.4463[a]	0.4387[a]	0.4303[a]
	(22.29)	(22.29)	(22.29)	(22.33)

Log Likelihood	-313.74	-312.75	-306.93	-298.07
No observations	447	447	447	447

Panel B: '3F notice' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.9757[b]	2.0909[a]	2.1311[a]	1.5768[b]
	(2.56)	(2.7)	(2.75)	(2.01)
LagDuration	-0.0189	-0.0299	-0.0166	-0.0403
	(-0.29)	(-0.46)	(-0.26)	(-0.62)
LagSpeed	0.1324	0.1215	0.1377	0.0111
	(0.89)	(0.81)	(0.93)	(0.07)
ReturnDeviation	-0.4249	-0.3178	0.2667	2.7300
	(-0.15)	(-0.11)	(0.09)	(0.85)
ConDeviation	-6.9221[a]	-6.9229[a]	-5.8331[b]	-5.6086[b]
	(-2.88)	(-2.89)	(-2.45)	(-2.19)
Intended Length	-0.0095[b]	-0.0259[b]	-0.0288[a]	-0.0296[a]
	(-2.28)	(-2.42)	(-2.69)	(-2.73)
Duration Ratio	-0.1104[b]	-0.1264[b]	-0.1252[b]	-0.1162[b]
	(-2.07)	(-2.34)	(-2.35)	(-2.19)
Program Size	-2.6091[a]	-2.1179[a]	-2.1626[a]	-2.1846[a]
	(-3.75)	(-2.8)	(-2.91)	(-2.95)
LagComprate	0.3822[a]	0.3642[a]	0.2952[b]	0.3814[a]
	(2.91)	(2.77)	(2.24)	(2.89)
PreCAR	0.0949	0.0833	0.0975	0.1524
	(0.55)	(0.49)	(0.57)	(0.87)
MTB	0.0133	0.0140	0.0126	0.0054
	(1.29)	(1.36)	(1.23)	(0.53)
Firm size	-0.0111	-0.0071	0.0080	0.0209
	(-0.57)	(-0.36)	(0.39)	(1.02)
Cash Balance	0.1349	0.1323	0.0897	0.0781
	(1.63)	(1.61)	(1.08)	(0.95)
Cash Flow	0.0322	0.0064	0.0683	0.1160
	(0.23)	(0.05)	(0.48)	(0.81)
ΔLeverage	0.0000	0.0000	0.0001	0.0002
	(0)	(0.11)	(0.28)	(0.4)
ΔDividends	0.0006[b]	0.0006[c]	0.0005	0.0005
	(1.96)	(1.94)	(1.94)	(1.94)
ΔEPS	-0.1220	-0.1193	-0.1367[c]	-0.1600[b]
	(-1.6)	(-1.57)	(-1.83)	(-2.15)
Turnover	-0.0844[c]	-0.0855[c]	-0.0736	-0.0723
	(-1.68)	(-1.7)	(-1.48)	(-1.48)
ConCAR	-0.1160	-0.1235	-0.1198	-0.0843
	(-1.28)	(-1.37)	(-1.36)	(-0.93)
ConTurnover	0.1566[a]	0.1598[a]	0.1865[a]	0.1794[a]
	(3.15)	(3.21)	(3.7)	(3.66)
Time Lapse	0.0025	0.0025	0.0029[c]	0.0026
	(1.44)	(1.44)	(1.7)	(1.56)
Unlimited Duration (Dummy)	-	0.4845[c]	0.6116[b]	0.6524[b]
		(1.68)	(2.12)	(2.26)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.4462[a]	0.4444[a]	0.4306[a]	0.4171[a]
	(17.59)	(17.59)	(17.77)	(17.75)
Log Likelihood	-186.39	-184.98	-179.43	-170.64
No observations	268	268	268	268

Panel C: 'Closed' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.0634[c]	1.3220[b]	1.8000[a]	1.7506[b]
	(1.7)	(2.05)	(2.57)	(2.44)
Lag Duration	0.0480	0.0446	0.0402	0.0344
	(0.92)	(0.85)	(0.79)	(0.67)
LagSpeed	-0.3742[c]	-0.3948[c]	-0.3055	-0.3130
	(-1.8)	(-1.9)	(-1.46)	(-1.49)
Return Deviation	-1.0048	-1.4240	0.8504	1.1326
	(-0.32)	(-0.46)	(0.28)	(0.36)
ConDeviation	0.6985	0.8009	1.7999	0.7137
	(0.25)	(0.29)	(0.63)	(0.23)
Intended Length	-0.0130[a]	-0.0324[b]	-0.0341[b]	-0.0325[b]
	(-3.37)	(-2.55)	(-2.56)	(-2.37)
Duration Ratio	-0.2632[a]	-0.2916[a]	-0.2983[a]	-0.3152[a]
	(-3.61)	(-3.94)	(-4.14)	(-4.11)
Program Size	-2.1683[a]	-1.9052[a]	-1.9539[a]	-2.0615[a]
	(-3.28)	(-2.79)	(-2.91)	(-3.01)
LagComprate	0.8087[a]	0.7943[a]	0.7115[a]	0.7283[a]
	(4.62)	(4.56)	(4.03)	(4.01)
PreCAR	-0.3981[b]	-0.3717[c]	-0.2669	-0.2739
	(-2.09)	(-1.95)	(-1.4)	(-1.4)
MTB	-0.0106	-0.0116	-0.0018	0.0041
	(-0.87)	(-0.95)	(-0.14)	(0.33)
Firm Size	-0.0045	-0.0052	-0.0079	-0.0116
	(-0.25)	(-0.29)	(-0.43)	(-0.61)
Cash Balance	0.0585	0.0641	0.0277	0.0388
	(0.86)	(0.94)	(0.41)	(0.55)
Cash Flow	-0.0630	-0.0917	0.0444	-0.0139
	(-0.31)	(-0.45)	(0.21)	(-0.06)
ΔLeverage	-0.0001	-0.0002	0.0000	0.0000
	(-0.4)	(-0.47)	(0.04)	(0.06)
ΔDividends	-0.0005	-0.0005	-0.0004	-0.0004
	(-1.51)	(-1.43)	(-1.12)	(-1.19)
ΔEPS	-0.0556	-0.0404	-0.0111	-0.0238
	(-0.59)	(-0.43)	(-0.11)	(-0.24)
Turnover	0.0112	0.0223	0.0384	0.0189
	(0.23)	(0.45)	(0.8)	(0.38)
ConCAR	-0.1361	-0.1285	-0.1518	-0.1380
	(-1.24)	(-1.17)	(-1.37)	(-1.2)
ConTurnover	0.0238	0.0146	0.0504	0.0594
	(0.55)	(0.33)	(1.16)	(1.35)
Time Lapse	-0.0015	-0.0013	-0.0011	-0.0015
	(-0.99)	(-0.83)	(-0.74)	(-0.96)
Unlimited Duration (Dummy)	-	0.5235 (1.61)	0.5328 (1.53)	0.4772 (1.3)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.3332[a]	0.3320[a]	0.3163[a]	0.3085[a]
	(13.94)	(13.96)	(13.91)	(14.06)
Log Likelihood	-80.963	-79.608	-71.856	-68.484
No observations	179	179	179	179

Moreover, a one month decrease in intended duration is associated with an increase in the completion rate of around three percentage points, an effect that is similar to that for completed programs in general.[113] Similarly, a one standard deviation decrease in the variable *Duration Ratio* is associated with an increase in completion rates of around eight percentage points, which is marginally greater than for completed programs in general.[114] These results suggest that firms are aware of the time taken to execute a current program but fail to demonstrate that they earn a repurchase reputation with respect to program duration, a finding that is consistent with the testing of announcement returns for 'repeat' programs in Chapter 4 (Table 4.7).

Although a reputation effect is not found for *LagSpeed*, completion rates of prior and current programs are related. The coefficient for *LagComprate* is of positive sign and is significance at the 1% level of significance for all models, a result that is consistent with those found by Boniame' (2012) for US data and Andriosopoulos et al. (2013) for UK data and indicates that firms are consistent in their repurchasing behaviour between successive programs. Further, a one percent increase in completion rates of prior programs is associated with an increase in completion rates of current programs of around half a percent, an effect that is of greater impact than that measured by Bonaimé (2012).[115] The results for *LagSpeed* and *LagComprate* show that whilst firms may be consistent in the number of shares acquired in successive programs, the number of shares acquired by the midpoint of a prior program is not a good indicator of the number of shares likely to be acquired for the entirety of a 'repeat' program.

[113] Although not reported in the tables, the standard deviation for *Intended Length* is 8.5113 months for 'repeat' programs, which means that a one standard deviation decrease in *Intended Length* is associated with an increase in completion rates of around 0.26 percent.
[114] Although not reported in the tables, the standard deviation for *Duration Ratio* is 0.618.
[115] Bonaimé (2012) measures a coefficient value of approximately 0.3 for lagged completion rates which equates to an increase in current completion rates of about by 0.3 percent for a 1% increase in lagged completion rates.

This evidence suggests that firms consider the number of shares to be acquired over the entirety of a program to be important rather than the amount of shares to be acquired at different stages of a program. Uniform with results to date, the coefficient for *Program Size* continues to be significant at the 1% level for all models and of the correct, negative sign and consistent with the findings of Bonaimé (2012) for 'repeat' programs conducted in the US.

The coefficient for *PreCAR* is insignificant for all models as is the coefficient for variable *ConCAR* except for model (3), where it is significant at the 10% level of significance and of negative sign with the inclusion of dummy variables for industry type but is insignificant when year of announcement is controlled for, model (4). These results do not demonstrate that share price performance, whether measured prior to or over the duration of a program, is important in explaining completion rates for 'repeat' programs and contrasts with the evidence of Bonaimé (2012) for US programs. This evidence suggests that whilst US firms conduct 'repeat' programs to support falling share prices, Australian firms do not. As with other tests, share liquidity continues to be an important factor in explaining completion rates. Although insignificant for *Turnover*, the coefficient for *ConTurnover* is positive and significant at the 1% level of significance for all models.

As with completed programs in general, the coefficients for *MTB*, *Firm Size*, *Cash Balance*, *Cash Flow*, Δ*Leverage* and Δ*Dividends* are all insignificant in determining completion rates for 'repeat' programs. Although important for 'repeat' programs conducted in the US (Bonaimé, 2012), findings of this study do not show that Australian firms utilise surplus cash to fund share acquisitions when conducting

'repeat' programs in addition to programs in general. Also, while not found to be important for models (1) – (3), the coefficient for Δ*EPS* is significant at the 10% level of significance and of the correct sign for model (4) after controlling for program duration, industry type and year of announcement, demonstrating that firms of 'repeat' programs repurchase shares to improve EPS. Of note, the coefficient for *Time Lapse* is insignificant across all models providing no support to the notion that completion rates are materially affected by the time lapse between programs. Finally, despite being of importance in explaining completion rates for programs in general, the coefficient of dummy variable, *Unlimited Duration*, is insignificant for 'repeat' programs until industry type and year of announcement are controlled for, models (3) and (4), respectively.

Individual regression results for '3F notice' and 'closed' programs are provided in Panels B and C, respectively, of Table 5.4. Results are generally consistent with those for 'repeat' programs in general. The coefficient for *LagDuration* is insignificant across all models, whilst the coefficient for *LagSpeed* is also insignificant across all models except for models (1) and (2) for 'closed' programs where it is of the opposite, negative sign and significant at the 10% level of significance, suggesting that firms repurchase less shares in a current program the more shares they acquired by the midpoint of a prior program. This association becomes insignificant for models (3) and (4), suggesting that it may be attributable to biases of industry type. These results provide further contrary evidence to hypothesis H8. Results for *Return Deviation* and *ConDeviation* continue to provide mixed support of hypothesis H5. The coefficient for *Return Deviation* is insignificant across all models and whilst being insignificant for 'closed' programs the coefficient for *ConDeviation* is of the correct, negative sign

and significant at the 5% level or higher for '3F notice' programs, confirming that firms of such programs avoid repurchasing shares when share prices are volatile whereas no evidence is found for firms conducting 'closed' programs. The coefficients for *Intended Length* and *Duration Ratio* also continue to be significant and of the correct sign across all models, providing further support for hypothesis H6.[116]

For the remaining variables, the coefficients for *LagComprate* and *Program Size* continue to be significant and of the correct sign, whilst the coefficient for *ConTurnover* also continues to be of the correct sign and significant for '3F notice' programs but not so for 'closed' programs, as is the coefficient for *Turnover*.[117] There is also support of firms conducting '3F notice' programs to acquire shares to improve EPS and increase payout ratios to shareholders but not so for 'closed' programs.[118] As with 'repeat' programs in general, the coefficient for *ConCAR* is significant for both program types. Finally, firms that conduct programs over an unlimited duration

[116] For '3F notice' programs, the coefficient for *Intended Length* is of the correct sign and significant at the 5% level of significance for models (1) and (2) and at the 1% level of significance for models (3) and (4), while for 'closed' programs it is significant at the 1% level for model (1) and at the 5% level for all remaining models. For '3F notice' programs, the coefficient for *Duration Ratio* is of the correct sign and significant at the 5% level of significance for all models, while for 'closed' programs it is significant at the 1% level for all models.

[117] For '3F notice' programs, the coefficient for *Turnover* is of the opposite, negative sign and significant at the 10% level of significance for models (1) and (2) and insignificant for models (3) and (4). The coefficient for *ConTurnover* is of positive sign and significant for all models.

[118] The coefficient for Δ*EPS* is significant at the 10% and 5% levels of significance respectively, for models (3) and (4) only of '3F notice' programs whilst the coefficient for Δ*Dividends* is of the opposite, positive sign and significant at the 5% level of significance for model (1) and at the 10% level of significance for all remaining models of '3F notice' programs only. The coefficient for *ConCAR* is insignificant for all models of both programs. The coefficient for *PreCAR* is of negative sign and significant at the 5% level of significance for model (1) and at the 10% level for model (2) for 'closed' programs whilst being insignificant for all remaining models as is the coefficient for *ConCAR* for all models of both programs.

acquire more shares if they complete a program with a 3F notice but not so for 'closed' programs.[119]

Overall, results from regressions for 'repeat' programs do not support hypothesis H8, thereby not supporting a repurchase reputation between duration and mid-completion rates of prior programs with completion rates of current programs. Whilst a reputation effect is absent for repurchase 'speed' and program duration, there is a positive association between completion rates of successive programs. Further support is found for hypothesis H5 but results are mixed for hypothesis H6. Both *Intended Length* and *Duration Ratio* are significant in explaining completion rates for 'repeat' programs as hypothesised but results for *Return Deviation* and *ConDeviation* are inconsistent with those hypothesised except for '3F notice' programs where there is evidence of firms avoiding acquisitions when share price volatility is high.

Hypothesis H9

Panel A of Table 5.5 presents regression results for all 'repeat' programs with variable *Repurchase Speed* as the dependent variable. As with completion rates for 'repeat' programs, results indicate that the explanatory variable *LagSpeed* is also unimportant in explaining mid-completion rates for current programs. The coefficient for *LagSpeed* is insignificant for all models and therefore does not support hypothesis H9 and fails to confirm that firms follow a repetitive pattern between successive programs with respect to mid-completion rates.

[119] For '3F notice' programs the coefficient for *Unlimited Duration* is significant at the 10% level for model (2) and at the 5% level for models (3) and (4) and of the correct, positive sign but is insignificant for all models of 'closed' programs.

TABLE 5.5

Midpoint Completion Rate Regressions for Completed Repeat Programs

Table 5.5 presents coefficient estimates from Tobit regressions describing midpoint completion rates for all completed 'repeat' programs. Panel A presents estimates for all completed programs, whilst Panel B presents estimates for all '3F notice' programs, and Panel C presents estimates for all 'closed' programs. Four versions of Equation (4) are presented with *Repurchase Speed* as the dependent variable. Model (1) presents the basic variables of Equation (4). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Repurchase Speed, LagComprate and LagSpeed* which are truncated at 100%.T-statistics are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A: All programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.2180[a]	1.3285[a]	1.6951[a]	1.5003[a]
	(2.66)	(2.89)	(3.5)	(3.05)
LagDuration	0.0154	0.0087	0.0034	-0.0013
	(0.38)	(0.22)	(0.08)	(-0.03)
LagSpeed	0.1767	0.1659	0.1665	0.1340
	(1.63)	(1.53)	(1.53)	(1.24)
Return Deviation	0.5597	0.4432	1.0182	1.6804
	(0.28)	(0.23)	(0.5)	(0.79)
ConDeviation	-1.4661	-1.3644	-0.8243	-1.1567
	(-0.89)	(-0.83)	(-0.49)	(-0.65)
Intended Length	-0.0093[a]	-0.0218[a]	-0.0253[a]	-0.0260[a]
	(-3.49)	(-2.95)	(-3.36)	(-3.43)
Duration Ratio	-0.2197[a]	-0.2339[a]	-0.2413[a]	-0.2321[a]
	(-5.58)	(-5.85)	(-6.06)	(-5.76)
Program Size	-1.7024[a]	-1.3947[a]	-1.4050[a]	-1.4467[a]
	(-3.73)	(-2.87)	(-2.88)	(-2.99)
LagComprate	0.3060[a]	0.2927[a]	0.2758[a]	0.3025[a]
	(3.26)	(3.12)	(2.9)	(3.2)
PreCAR	-0.0528	-0.0503	-0.0487	-0.0150
	(-0.45)	(-0.43)	(-0.41)	(-0.13)
MTB	-0.0010	-0.0008	-0.0011	-0.0037
	(-0.15)	(-0.11)	(-0.16)	(-0.51)
Firm Size	0.0050	0.0069	0.0101	0.0115
	(0.41)	(0.56)	(0.77)	(0.87)
Cash Balance	0.0418	0.0448	0.0184	0.0264
	(0.83)	(0.89)	(0.36)	(0.52)
Cash Flow	0.0155	-0.0003	0.0465	0.0501
	(0.15)	(0)	(0.44)	(0.48)
ΔLeverage	-0.0001	-0.0001	0.0000	0.0000
	(-0.34)	(-0.27)	(0.05)	(0.17)
ΔDividends	0.0003	0.0003	0.0003	0.0003
	(1.53)	(1.52)	(1.57)	(1.57)
ΔEPS	-0.0920[c]	-0.0864	-0.0903	-0.0991[c]
	(-1.67)	(-1.57)	(-1.64)	(-1.81)
Turnover	-0.0606[c]	-0.0579[c]	-0.0427	-0.0530
	(-1.83)	(-1.75)	(-1.27)	(-1.59)
ConCAR	-0.0643	-0.0682	-0.0722	-0.0617
	(-1)	(-1.07)	(-1.13)	(-0.95)
ConTurnover	0.1240[a]	0.1226[a]	0.1374[a]	0.1436[a]
	(3.92)	(3.88)	(4.21)	(4.43)
Time Lapse	0.0010	0.0011	0.0012	0.0007
	(0.88)	(0.97)	(1.05)	(0.63)
Unlimited Duration	-	0.3565[c]	0.4510[b]	0.4837[b]
		(1.82)	(2.25)	(2.38)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.3863[a]	0.38523[a]	0.38136[a]	0.3743[a]
	(22.82)	(22.84)	(22.84)	(22.88)

Log Likelihood	-263.51	-261.84	-258.05	-249.94
No observations	447	447	447	447

Panel B: '3F notice' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.0098	1.0804	1.1252	0.8313
	(1.49)	(1.6)	(1.63)	(1.17)
LagDuration	-0.0492	-0.0616	-0.0634	-0.0756
	(-0.85)	(-1.07)	(-1.08)	(-1.29)
LagSpeed	0.2843[b]	0.2697[b]	0.2591[b]	0.1807
	(2.18)	(2.08)	(1.98)	(1.38)
ReturnDeviation	-1.3236	-1.2438	-0.6156	1.3093
	(-0.51)	(-0.48)	(-0.23)	(0.45)
ConDeviation	-2.5032	-2.3855	-2.3295	-3.1636
	(-1.17)	(-1.13)	(-1.08)	(-1.35)
Intended Length	-0.0049	-0.0213[b]	-0.0239[b]	-0.0236[b]
	(-1.34)	(-2.33)	(-2.57)	(-2.49)
Duration Ratio	-0.2132[a]	-0.2284[a]	-0.2333[a]	-0.2253[a]
	(-4.27)	(-4.56)	(-4.68)	(-4.49)
Program Size	-1.3753[b]	-0.8375	-0.8304	-0.7492
	(-2.25)	(-1.26)	(-1.24)	(-1.12)
LagComprate	0.1566	0.1395	0.1336	0.1864
	(1.36)	(1.22)	(1.14)	(1.59)
PreCAR	0.0380	0.0254	0.0382	0.0721
	(0.25)	(0.17)	(0.25)	(0.45)
MTB	0.0072	0.0079	0.0056	0.0006
	(0.79)	(0.88)	(0.61)	(0.07)
Firm Size	0.0014	0.0065	0.0179	0.0225
	(0.08)	(0.38)	(0.97)	(1.21)
Cash Balance	0.0625	0.0621	0.0434	0.0273
	(0.87)	(0.87)	(0.59)	(0.37)
Cash Flow	0.0457	0.0192	0.0398	0.0949
	(0.36)	(0.15)	(0.31)	(0.73)
ΔLeverage	-0.0003	-0.0003	-0.0002	-0.0002
	(-0.83)	(-0.71)	(-0.56)	(-0.56)
ΔDividends	0.0006[b]	0.0006[b]	0.0006	0.0006
	(2.38)	(2.32)	(2.32)	(2.32)
ΔEPS	-0.1142[c]	-0.1111	-0.1172[c]	-0.1291[c]
	(-1.67)	(-1.63)	(-1.71)	(-1.89)
Turnover	-0.0845[c]	-0.0853[c]	-0.0799[c]	-0.0799[c]
	(-1.91)	(-1.94)	(-1.78)	(-1.8)
ConCAR	-0.0079	-0.0151	-0.0091	-0.0035
	(-0.1)	(-0.19)	(-0.11)	(-0.04)
ConTurnover	0.1178[a]	0.1196[a]	0.1328[a]	0.1305[a]
	(2.67)	(2.72)	(2.93)	(2.92)
Time Lapse	0.0022	0.0022	0.0022	0.0022
	(1.43)	(1.43)	(1.44)	(1.46)
Unlimited Duration (Dummy)	-	0.4884[b]	0.5677[b]	0.5692[b]
		(1.96)	(2.23)	(2.22)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.3990[a]	0.3961[a]	0.3929[a]	0.3834[a]
	(18.27)	(18.29)	(18.28)	(18.3)
Log Likelihood	-167.19	-165.27	-163.81	-157.63
No observations	268	268	268	268

Panel C: 'Closed' programs

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	1.0339[b]	1.2278[b]	1.5045[a]	1.5673[a]
	(2.03)	(2.34)	(2.64)	(2.67)
Lag Duration	0.0408	0.0380	0.0357	0.0248
	(0.95)	(0.88)	(0.85)	(0.57)
LagSpeed	-0.2707	-0.2896[c]	-0.2132	-0.2331
	(-1.61)	(-1.72)	(-1.25)	(-1.36)
Return Deviation	0.9800	0.8105	1.1689	1.3143
	(0.39)	(0.32)	(0.45)	(0.5)
Con Deviation	-0.7092	-0.7697	0.8660	-0.2252
	(-0.32)	(-0.34)	(0.37)	(-0.09)
Intended Length	-0.0142[a]	-0.0309[a]	-0.0321[a]	-0.0315[a]
	(-4.48)	(-3)	(-2.95)	(-2.8)
Duration Ratio	-0.3195[a]	-0.3407[a]	-0.3462[a]	-0.3574[a]
	(-5.06)	(-5.33)	(-5.45)	(-5.28)
Program Size	-1.6391[a]	-1.3749[b]	-1.3457[b]	-1.3653[b]
	(-3.08)	(-2.5)	(-2.48)	(-2.46)
LagComprate	0.6444[a]	0.6341[a]	0.5682[a]	0.5833[a]
	(4.57)	(4.51)	(3.95)	(3.93)
PreCAR	-0.3758[b]	-0.3485[b]	-0.2435	-0.2732
	(-2.34)	(-2.16)	(-1.49)	(-1.62)
MTB	-0.0164	-0.0169[c]	-0.0088	-0.0042
	(-1.63)	(-1.67)	(-0.87)	(-0.41)
Firm Size	0.0065	0.0068	0.0018	-0.0035
	(0.45)	(0.46)	(0.12)	(-0.22)
Cash Balance	0.0732	0.0806	0.0534	0.0588
	(1.33)	(1.47)	(0.97)	(1.02)
Cash Flow	0.0023	-0.0233	0.0932	0.0273
	(0.01)	(-0.14)	(0.54)	(0.15)
ΔLeverage	-0.0001	-0.0001	0.0001	0.0002
	(-0.2)	(-0.26)	(0.43)	(0.6)
ΔDividends	-0.0004[c]	-0.0004	-0.0003	-0.0004
	(-1.7)	(-1.55)	(-1.29)	(-1.46)
ΔEPS	-0.0501	-0.0376	-0.0296	-0.0577
	(-0.65)	(-0.49)	(-0.36)	(-0.69)
Turnover	-0.0181	-0.0103	0.0001	-0.0199
	(-0.44)	(-0.25)	(0)	(-0.48)
ConCAR	-0.1808[b]	-0.1775[b]	-0.2127[b]	-0.1883[b]
	(-2.02)	(-1.98)	(-2.34)	(-2)
ConTurnover	0.0685[c]	0.0619[c]	0.0814[b]	0.0918[b]
	(1.85)	(1.67)	(2.19)	(2.47)
Time Lapse	-0.0004	-0.0002	-0.0003	-0.0008
	(-0.34)	(-0.16)	(-0.23)	(-0.63)
Unlimited Duration (Dummy)	-	0.4540[c] (1.72)	0.4604 (1.62)	0.4640 (1.53)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
_Sigma	0.2672[a]	0.2668[a]	0.2557[c]	0.2483[a]
	(13.98)	(13.99)	(13.98)	(13.97)
Log Likelihood	-49.765	-48.199	-42.235	-36.944
No observations	179	179	179	179

Results for the remaining variables are similar to those provided in Panel A of Table 5.4 for *Completion Rates* as the dependent variable. The coefficient for *LagDuration* is insignificant for all models and the coefficients for *Return Deviation* and *ConDeviation* are both insignificant across all models. Similarly, the coefficients of both *Intended Length* and *Duration Ratio* are significant at the 1% level of significance for all models and are of the correct sign.

Although lagged mid-completion rates are not associated with mid-completion rates of current programs, lagged completion rates are. The coefficient for *LagComprate* is of positive sign and significant at the 1% level of significance for all models. This evidence indicates that the total number of shares acquired in a prior program is a better indicator of mid-completion rates for a current program than mid-completion rates of a prior program. *Program Size* continues to be of the correct, negative sign and is significant at the 1% level of significance across all models.

In terms of price support, the coefficients for *PreCAR* and *ConCAR* are insignificant for all models and fail to confirm that for 'repeat' programs, firms acquire shares to arrest falling share prices. In regards to market liquidity, the coefficient for *ConTurnover* is positive and significant at the 1% level of significance across all models whilst the coefficient for *Turnover* is of the opposite, negative sign and significant at the 10% level for models (1) and (2) before becoming insignificant with the inclusion of dummy variables for industry type and year of announcement, models (3) and (4), respectively.

For variables *MTB*, *Firm Size*, *Cash Balance*, *Cash Flow*, Δ*Leverage* and Δ*Dividends* results indicate that their coefficients are all insignificant in explaining mid-completion rates, consistent with the results for tests of completion rates for 'repeat' programs. There is evidence of firms repurchasing shares in the early stages of a program to improve EPS, a result that is also consistent with those of Panel A, Table 5.4. The coefficient for Δ*EPS* is negative and significant at the 10% level for models (1) and (4). Results also fail to confirm that the period between successive programs is important in explaining mid-completion rates as indicated by the coefficient for *Time Lapse* which is insignificant for all models. Lastly, dummy variable, *Unlimited Duration*, is significant and of positive sign for all models, confirming the position that firms selecting programs of limited duration repurchase less shares than firms that don't.

Individual regression results for '3F notice' and 'closed' programs are provided in Panels B and C, respectively, of Table 5.5. Of interest, whilst being insignificant for programs in general, the coefficient for *LagSpeed* is of the correct, positive sign for models (1) – (3) and significant at the 5% level of significance for '3F notice' programs but becomes insignificant in model (4) with the added inclusion of dummy variables for the year a program is announced, indicating a potential bias in the results due to this factor. For 'closed' programs the coefficient for *LagSpeed* is insignificant except for model (2) where it is significant at the 10% level of significance but of the opposite, negative sign, suggesting that acquisitions in the early stages of a program are quite different between '3F notice' and 'closed' programs.

Coefficients for variables *LagDuration*, *Return Deviation* and *ConDeviation* are insignificant for all models, consistent with the results of Panel A. Whilst insignificant for model (1), the coefficient for *Intended Length* is significant at the 5% level and of the correct sign for models (2) – (4) for '3F notice' programs and significant at the 1% level of significance for all models of 'closed' programs. The coefficient for *Duration Ratio* remains significant at the 1% level of significance for all models of both '3F notice' and 'closed' programs and is of the correct sign. Of interest, both *Program Size* and *LagComprate* are unimportant in explaining mid-completion rates for '3F notice' programs but are important for 'closed' programs. For '3F notice' programs, the coefficient for *Program Size* is insignificant for models (2) – (4) and the coefficient for *LagComprate* is insignificant across all models, whilst for 'closed' programs the coefficient for *Program Size* is significant at the 1% level of significance for model (1) and at the 5% level for models (2) – (4) and the coefficient for *LagComprate* is significant for all models at the 1% level of significance. Although insignificant for '3F notice' programs, the coefficient for *ConCAR* is of the correct, negative sign and significant at the 5% level for 'closed' programs, whilst the coefficient for *PreCAR* is significant at the 5% level for models (1) and (2) only and of the correct negative sign. These results suggest that for 'closed' programs, firms are motivated to repurchase shares in the earlier stages of a program to support falling share prices but not so for '3F notice' programs. The coefficients for *Turnover*, Δ*EPS* and Δ*Dividends* are significant for '3F notice' programs but not for 'closed' programs.[120] Results for all remaining variables are consistent with those reported in Panel A.

[120] Of interest, the sign of coefficients for Δ*Dividends* and *Turnover* are the opposite to that expected, whilst the coefficient of Δ*EPS* is of the correct sign. For '3F notice' programs, the sign of the coefficient for *Turnover* is negative and significant at the 10% level of significance across all models whilst the coefficient for Δ*EPS* is of the correct, negative sign and significant at the 10% level of

Overall, results from Table 5.5 do not indicate an association between mid-completion rates of current and prior programs and therefore do not support hypothesis H9. However, examination of '3F notice' and 'closed' programs individually demonstrate contrasting findings. There is evidence of a positive association between *Repurchase Speed* and *LagSpeed* for '3F notice' programs but a negative or insignificant association for 'closed' programs. Program duration, as represented by variables *Intended Length* and *Duration Ratio* continue to be of importance in explaining the repurchasing behaviour of 'repeat' programs. Results for *Return Deviation* and *ConDeviation* are inconsistent with those expected under hypothesis H5 for completion rates. Surprisingly, whilst being significance for 'closed' programs there appears to be limited or no association between mid-completion rates and *Program Size* or lagged completion rates for '3F notice' programs. Evidence also suggests that firms repurchase shares in the early stages of a program to support the market price of its shares for 'closed' programs but not so for '3F notice' programs.

significance for all models except model (2) where it is insignificant. The coefficient for Δ*Dividends* is of positive sign and significant at the 5% level of significance for all models of '3F notice' programs but for 'closed' programs is significant at the 10% level of significance for model (1) only.

5.5 SUMMARY AND CONCLUSIONS

This chapter investigates the determinants of completion rates for 769 programs announced between 2000 and 2010 that are completed by March 2012. Overall, results of tests on completion rates reveal the following.

Completion rates are not positively related to share price volatility. The relationship between completion rates and pre-announcement volatility (*Return Deviation*) is generally insignificant whilst the relationship between completion rates and concurrent volatility (*ConDeviation*) shows evidence of a negative association, particularly for '3F notice' programs. This evidence suggests that in some instances firms with volatile share prices avoid repurchasing shares and strongly demonstrates that transparency of repurchase transactions in Australia deter firms from buying shares at 'cheap' prices. Of interest, the insignificance found for pre-announcement volatility is at odds with the positive association that is found with announcement returns in Chapter 4, suggesting that the market does not anticipate firms with volatile share prices not to follow thru with their repurchase targets.

Completion rates are negatively related with program duration whether measured as that intended in an announcement or in execution and reinforces the importance of intended program duration found in Chapter 4 in determining announcement returns. The negative association between completion rates and both *Intended Length* and *Duration Ratio* demonstrates that firms are not only more likely to achieve their repurchase targets if a shorter program duration is indicated but also the sooner the program is terminated ahead of time. Notwithstanding this evidence, this association is not as significant for 'closed' programs as with '3F notice' programs. When

restricting examination to programs where shares are actually repurchased, 'non-zero' programs, the association between completion rates and program duration becomes insignificant for 'closed' programs failing to indicate that for such programs firms structure their repurchase activity over the shortest period of time. Results overall are strongly supportive of those hypothesised and highlight the importance of program duration for firms wishing to show that they are committed to follow thru with their repurchase targets and signal that they are of a successful firm-type.

When examining programs where shares are acquired, 'non-zero' programs, completion rates are found to be positively associated with the ratio of the highest and lowest price paid for shares (*Price Range*). This finding, together with the fact that completion rates are not negatively associated with concurrent share returns (*ConCAR*) or market-to-book ratio (*MTB*) suggests that firms do not repurchase shares to arrest falling share prices but are in disagreement with the market over the valuation of its shares.

Completion rates of current programs are not associated with prior program duration or mid-completion rates, a result that is also consistent with that found in Chapter 4 for announcement returns. The absence of association with respect to prior program duration is of particular surprise given its importance in explaining current completion rates. Similarly, when tests are conducted with mid-completion rates as the dependent variable (Table 5.5), this study fails to identify a positive association between mid-completion rates of successive programs overall.

This study finds completion rates are negatively associated with program size, which suggests that firms are less likely to follow thru with their repurchase intentions if more shares are sought and reinforces the lack of importance of program size in determining announcement returns found in Chapter 4. Completion rates of successive programs are positively associated, indicating that firms are consistent in their repurchasing behaviour when repurchase activity is considered over the entirety of a program even though this relationship may not hold for the early stages of a program.

Whilst there is some evidence of a positive association between completion rates and falling share prices for programs overall, when examining programs individually, this association is found for 'closed' programs but not for '3F notice' programs, further highlighting the differences in the repurchasing behaviour between these two groups of repurchasers.

Evidence demonstrates that firms avoid repurchasing shares if the market liquidity for their shares is low. With the exception of 'closed' programs and when completion rates of 'repeat' programs are examined (Panel C of Table 5.4) a positive association between completion rates and share liquidity, particularly if measured over the duration of a program, is found and demonstrates that firms avoid repurchasing shares if liquidity for their shares is low.

Except for firms of 'closed' programs and for programs when shares are acquired, 'non-zero' programs, this chapter does not find a positive association between completion rates and cash balances or cash flows, suggesting that the acquisition of

shares is generally not dependent upon a firm's ability to raise cash. This evidence is somewhat puzzling given the positive association between cash balances and announcement returns found in Chapter 4 but suggests that the market's reaction to an announcement is not in anticipation of firms utilising their cash balances to meet repurchase targets.

Although leverage is found to be a determinant of announcement returns for 'repeat' programs in Chapter 4, it is found to be unimportant in explaining completion rates for programs in general as well as for 'repeat' programs, suggesting that firms are indifferent to the impact on their debt/equity ratios when acquiring shares. In general, firms do not repurchase shares in order to alter their dividend payout ratios, for example, Δ*Dividends* is found only to be significant in explaining completion rates for '3F notice' programs when completions are restricted to 'repeat' programs. There is some support that firms repurchase shares in order to improve the EPS measure, however when completion rates are restricted to programs where shares are acquired, 'non-zero' programs, no association is found, undermining its importance to Australian firms. Finally, results demonstrate firms that nominate an unlimited duration in program announcements have completion rates that are almost one percent higher than firms which elect a fixed period duration. This association is not as significant for 'repeat' programs and for those of 'closed' type the association becomes insignificant. These results are generally consistent with those of Chapter 4, where *Unlimited Duration* is found to be a determinant of announcement returns for programs in general but not for 'repeat' programs.

This chapter makes several contributions to the literature of on-market share repurchase programs. This research makes a major contribution by examining completion notices (3F notices) filed with the ASX at the completion of a program. Firms in Australia are required to report the total number of shares acquired in a program and the total consideration paid for their shares. Literature to date has relied on other means to estimate the number of shares acquired during a program or over particular time periods of a program (Stephens and Weisbach, 1998; Banyi et al., 2008), whereas this study relies on that reported by firms themselves in final completion notices. This chapter makes a further contribution by examining completion rates of programs that have become inactive. Evidence produced in this chapter demonstrates that the repurchasing behaviour and motivation of firms conducting 'closed' programs may differ to firms conducting '3F notice' programs.

Also this chapter also contributes to the literature by examining completion rates in connection with share price volatility measured over the duration of a program. Prior studies (Bonaimé 2012; and Andriosopoulos et. al., 2013) have examined the association with share price volatility measured prior to a program commencing but not concurrently. Examining the association concurrently has the advantage of observing the impact of share price volatility on the repurchasing behaviour of firms during a program rather than inferring it from a prior measure. Evidence produced in this chapter demonstrates that transparency of on-market programs conducted in Australia deter firms from acquiring shares at 'cheap' prices.

Following on from Chapter 4, this chapter makes a further contribution by investigating the role of program duration in determining completion rates. Literature

to date (Stephens and Weisbach, 1998; Ikenberry et al., 2000; Dittmar, 2000; Billett and Xue, 2007; Bonaimé 2012); Andriosopoulos et al. 2013) has not considered the role of duration as a potential cost to false signalling and therefore has not considered its impact upon completion rates. Consistent with results from Chapter 4, it is found that intended length together with program duration as key factors in explaining completion rates for programs conducted in Australia, demonstrating that firms are more likely to achieve repurchase targets if a shorter intended program duration is indicated and the quicker a program is executed.

In addition, this chapter examines the role of price paid by firms for their shares as a determinant of program completion rates. As well as the total number of shares acquired and consideration paid, Australian firms must also disclose the highest and lowest price paid in a 3F notice as well as the highest and lowest price paid to date in a 3E notice. Evidence produced in this chapter shows that price range is important in explaining completion rates and demonstrates that firms do not repurchase shares in order to halt falling shares prices but do so because of managements' disagreement over the valuation of its shares.

Lastly, this research also contributes to the literature by investigating the 'speed' in which shares are repurchased following an announcement on final completion rates, including the connection between its measure from prior programs, together with program duration, and completion rates of current programs.

CHAPTER 6: EXPLAINING PROGRAM COMPLETION RETURNS

The major objective of this chapter is to investigate the share market reaction to on-market share repurchase announcements in relation to the third and final research question: are firms penalised (rewarded) that do not meet (exceed) expectations?

Four hypotheses are developed to test changes in share price around the date of release of program completion notices. Whilst the first hypothesis is concerned with detecting abnormal share market performance, the remaining hypotheses are concerned with explaining the cross sectional variation. The first hypothesis predicts that on average there will be no discernible market reaction to the release of a program completion notice. The second hypothesis predicts the share price reaction to a completion notice release will be negatively associated with program announcement returns and positively associated with completion rates. The third hypothesis predicts the share price reaction to a completion notice release will be negatively associated with program length and positively or negatively associated with the 'speed' at which shares are repurchased. The fourth and final hypothesis predicts the share price reaction to a 'repeat' program completion notice release will be negatively associated with program completion rates, positively associated with program length and positively or negatively associated with the 'speed' with which shares are repurchased in prior programs.

This chapter relies upon changes in share prices around the release of a program completion notice to determine its information content. Share price returns are examined using standard event study methodology employed in Chapter 4 in which

changes to actual share price are compared to those generated using the market adjusted returns model and market model for robustness. Abnormal returns for each security around the notice release are produced and then combined with other securities to determine the average response for the entire sample. To explain the market response multiple regressions are then run with completion returns as the dependent variable and various repurchase and financial information used in Chapters 4 and 5 as independent variables. Statistical tests are employed to test the level of significance of abnormal returns around completion announcements and coefficients of explanatory variables used in regression analysis to explain them.

Evidence presented in this chapter indicates that the market reaction to a completion notice is not significantly different from zero and this result is robust over alternative measures of CAR. Notwithstanding this, completion returns, particularly so for 'repeat' programs are negatively associated with program announcement returns, an association that is consistent with the market revaluating a firm's credibility formed at the time a program is announced. The duration over which a program is executed and the number of shares repurchased in the early stages of a program has no impact on completion returns. Similarly, this chapter does not find evidence that firms are penalised or rewarded for disappointing or exceeding expectations. Instead, there is evidence of a negative relationship between completion returns and completion rates, however this association is sensitive to the model used and the window over which CAR is measured. Results also fail to demonstrate that the market considers the execution of prior programs in a manner that is consistent with signalling theory when evaluating a firm's credibility upon the completion of a current program.

Evidence reveals that the market reaction to a program completion notice is more likely to follow the trend in share price established over the duration of a program and share price volatility. For 'repeat' programs, firms that nominate an unlimited duration are penalised by the market at the completion of a program but firms are rewarded for increasing leverage.

The remainder of this chapter will review the relevant theoretical and empirical literature in Section 6.1, discuss the development of research hypotheses in Section 6.2, appropriate research methods to test them in Section 6.3, discuss descriptive statistics and empirical evidence in Section 6.4, and provide a summary of findings and conclusions in Section 6.5.

6.1 LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This thesis provides evidence (Chapter 4) that repurchase announcements convey good news to the share market. Three day abnormal returns of 2.7% are measured across all announcements made over the period 2000 – 2010, consistent with findings made in many other studies despite the fact that completion rates are relatively low in Australia. Whilst overseas evidence demonstrates a positive association between program announcement returns and the fraction of shares sought and subsequently repurchased (see Comment and Jarrell, 1991 and Stephens and Weisbach, 1998, Chan et al., 2004, Chan et al., 2010; and Bonaimé, 2012), evidence from thesis shows that the Australian capital market does not consider program size as a potential cost of false signalling.

Instead, intended program duration, which is a required to be disclosed in announcements, is negatively associated with announcement returns, suggesting that the market associates program duration with costs of false signalling. Consistent with this notion, results from Chapter 5 demonstrate that a firm's commitment to a repurchase program is negatively associated with intended program duration and the sooner a program is completed.

Upon comparing announcements of 'repeat' programs with 'initial' programs, this thesis finds that announcement returns are greater for 'initial' programs than for 'repeat' programs, 3.1% compared to 2.1%, consistent with the findings of overseas studies. For example, Andriosopoulos and Lasfer (forthcoming) find that announcement returns are greater for 'initial' than for 'repeat' programs conducted in Europe, 2.01% compared to 0.98%, and Jagannathan and Stephens (2003) find announcement returns for 'infrequent' repurchase programs are greater than that for 'occasional' or 'frequent' repurchase programs conducted in the US, 3.4% compared to 2% and 1.1%. Although, as discussed in Chapter 4, this variation may be attributed to differences in information asymmetry, of which 'initial' programs are argued to largely resolve (Andriosopoulos and Lasfer, forthcoming), the variation may also reflect differences in the way in which the market assesses firm quality. Bonaimé (2012), for example, finds evidence of the market differentiating firm quality based on the repurchasing behaviour observed from prior programs. As such, it can be viewed that the market reaction to the announcement of a 'repeat' program will reflect a cross-section of successful and less successful firm types based on prior repurchase behaviour whereas for 'initial' program announcements the market regards firms as of similar quality.

Although lagged completion rates are found to be a positive determinant of current completion rates in Chapter 5, they are not found to be a determinant of announcement returns for 'repeat' programs in Chapter 4. Similarly, although both intended program length and program execution are negatively associated with completion rates a link between the duration of prior programs and announcement returns of current programs or completion rates is not found. These results undermine the role of a repurchase reputation on the Australian capital market, yet a positive reaction to the announcement of 'repeat' programs and the importance of intended program length in explaining this reaction suggests that firm type is not completely resolved by 'initial' programs. In addition, evidence from Zhang (2005), Wang et al. (2009) and Akyol and Foo (2013) that daily repurchase notifications of repurchase programs conducted in Japan and Australia also impart positive information to the market suggests that assessment of firm credibility can be regarded as taken place continuously over the duration of a program and not just when it is announced.

It follows that firm quality may also be reviewed upon the completion of a program in view of the way it has been conducted. For firms that fulfil program expectations, whilst viewed positively by the market, will reaffirm firm type and therefore the release of a completion notice should not convey new information unless it coincides with the release of other market sensitive information, such as the announcement of a new program or the release of a repurchase trading notice. On the other hand, if a firm does not meet expectations or exceeds them it is anticipated that the market will reappraise its type, however it is not clear if this will take place at the time a completion notice is released. For example, if a firm completes a program ahead of

that anticipated but fails to meet its repurchase target the early completion may surprise the market, prompting it to reappraise firm quality downwards in response. However, if it becomes clear to the market beforehand that a firm will not meet its target then this reappraisal should occur ahead of the completion date. [121] Similarly, although a firm may be positively appraised for exceeding expectations, this is likely to occur when the market first becomes aware that this has occurred, for example, from a trading notice (3E notice) rather than a program completion notice.

To the extent that program duration is a signal of firm quality, although negative news may be conveyed to the market when a program is extended, this is likely to take place when the market is first informed of this change (3D notice). For a firm that completes a program ahead of that anticipated it is expected that the market will only revise its assessment of the firm if repurchase expectations are not met. As such, it is not clear for firms that surprise the market if a revision of firm value will take place at the time a completion notice is released or at some time beforehand. In light of the above discussion, this chapter will examine the share price behaviour leading up to the release of completion notices as well as the share price response at the time of release.

Research to date has examined the market's response to announcements of repurchase programs and the release of repurchase trading notices, however no study to the author's knowledge has examined the share market response to the release of program completion notices.

[121] Although programs classified as 'unlimited duration' must by definition be completed ahead of time, it is still possible that the market anticipates this in advance.

6.2 HYPOTHESES DEVELOPMENT

It is expected that the information content of a completion notice will take into account information already disseminated from a program announcement (3C notice) as well as subsequent trading notices (3E notice) and notices from prior programs. However, since it is only for programs that are concluded in advance of that expected and only for those firms that do not meet expectations that new information is imparted to the market, on average the market reaction to the release of a completion notice should not be significantly different from zero. If, on the other hand, the market reaction is significantly different from zero then it will demonstrate that new information is imparted to the market.

H10: On average, the share price reaction to the release of an on-market repurchase completion notice will be significantly different from zero.

Although the average response may not be significantly different from zero, the market reaction to an individual program completion will be dependent upon whether the firm meets, exceeds or fails to achieve expectations. If as found in other studies that program size and completion rates are important in explaining announcement returns, then it is expected that these factors will be considered by the market when re-appraising firm type upon the completion of a program also. To the extent that the fraction of shares sought in a program announcement is a potential cost of false signalling and therefore firm credibility, the more shares that are actually repurchased the more likely that a firm will meet expectations and therefore the less likely it will be negatively appraised. Similarly, to the extent that market expectations are formed at the time of an announcement are reflected in the share price, it follows that revision

of firm value upon completion, if any, will be negatively related to abnormal returns measured at the time of the program announcement. This follows since, as argued above, it is only for those programs that are concluded in advance of that expected and only for firms that do not meet expectations that price sensitive information is imparted to the market. It follows therefore that program completion returns will be negatively associated with program announcement returns and positively associated with completion rates.

H11: On average, the share price reaction to the release of an on-market repurchase completion notice will be negatively associated with program announcement returns and positively associated with completion rates.

Since it is hypothesised in this thesis that intended program length is a potential cost of false signalling and examination of announcement returns in Chapter 4 confirm this, it follows that variation in the duration with that expected should also be relevant in re-assessing firm type. As such, given a firm's intended program length the sooner (later) a program is executed, the more (less) credible the firm is seen, and therefore the more (less) positive the revaluation. It follows the association between program completion returns and *Duration Ratio* is expected to be negative.

It is also hypothesised in Chapter 4 that the 'speed' with which a firm repurchases its shares is an indicator of firm quality, so that for a firm that does not meet its expected repurchase target, the more shares that it repurchases earlier in a program the more credible a firm will be seen and therefore invoke a smaller negative adjustment. Alternatively, the market may revise its expectations in light of the number of shares a

firm has repurchased earlier in a program, so that the more shares that it has repurchased by this stage the less likely that the revised expectations will be met. As such, the market may react negatively to the completion of a program. Consequently, the relationship between the 'speed' with which a firm repurchases its shares and the market reaction to a completion notice can be positive or negative.

H12: On average, the share price reaction to the release of an on-market repurchase completion notice will be negatively associated with program length and positively or negatively associated with the 'speed' with which shares are repurchased.

To the extent that prior programs help resolve the credibility of a repurchase announcement, repurchase attributes such as completion rates, program length and the 'speed' with which shares are repurchased should assist investors in forming expectations of 'repeat' programs and therefore revisions of firm type upon a program completion. Firms achieving lower completion rates in prior programs will be expected to achieve lower completion rates in current programs, so that for a given number of shares repurchased in a current program the more likely a firm will meet expectations and vice versa for firms with higher prior completion rates. The association between completion returns and prior completion rates is therefore expected to be negative.

Similarly, if intended duration is a signal of firm quality and a firm develops a reputation for terminating a program ahead of that anticipated, then the more likely it will exceed the time period expected in a current program and disappoint the market.

On the other hand, a firm that has a reputation for running a program to its full duration or beyond will be expected to do so in a current program, thereby not disappointing the market or if finishing ahead of that intended, improve its standing in the market place. The association between the ratio of duration to intended length of a prior program and completion returns of a current program is therefore expected to be positive.

To the extent that the 'speed' with which a firm repurchases shares is also an indicator of firm quality and a firm develops a reputation for repurchasing less shares in the early stages of a prior program, then the more likely it will be able to achieve or exceed this expectation in a subsequent program. As such, it will be seen as more credible than a firm that has a reputation for repurchasing more shares in the early stages and not living up to this reputation. The association between completion rates and repurchase speed of prior programs is therefore expected to be negative. Alternatively, the market may revise its expectations in light of whether a firm's reputation for repurchasing shares in the early stages of a program is upheld. A firm that exceeds this reputation will therefore be expected to repurchase more shares over the entirety of a program and will more likely disappoint the market than a firm that fails to meet its reputation. As such, the association between the market reaction to a completion notice and the number of shares repurchased in the early stages of a prior program is expected to be positive or negative.

H13: On average, for 'repeat' programs, the share price reaction to the release of an on-market repurchase completion notice will be negatively associated with completion rates from prior programs, positively associated with program length

of prior programs and positively or negatively associated with the 'speed' with which shares are repurchased from prior programs.

6.3 RESEARCH DESIGN

The purpose of this section is to describe the research method used in this chapter to measure and explain the market reaction to program completion notices. In order to test hypotheses H10, this chapter will employ a standard event-study methodology discussed in Chapter 4 in which to measure and explain the market reaction to the release of a completion notice. To test hypotheses H11 - H13 this chapter will then apply multiple regression analysis, also employed in Chapter 4, to explain the market reaction for programs in general and for 'repeat' programs only.

As described in Chapter 3, this thesis considers a program completed when a firm lodges a 3F notice ('3F notice' programs) with the stock exchange or if the program becomes inactive ('closed' programs). Since the focus of the present chapter is to capture the market's reaction to the release of a completion notice, only '3F notice' programs are considered.

For the present chapter the event is defined as the release of a completion notice (3F notice) to the market. Completion notices are identified from the Connect 4 data base which provides the date and time when a notice is processed by the exchange and therefore released to the market. The 3F notice provides information on the total number of shares repurchased, total consideration paid and the highest and lowest price paid for shares. The announcement date, day t = 0, is therefore the date upon

which 3F notice is disclosed by the ASX. [122] As in testing of announcement returns, this chapter will employ a 3 day event window, one day either side of the event date (-1, 1) and for robustness will use a 5 day event window (-2, 2) for testing of hypothesis H10.

Since this chapter also wishes to capture the situation where the market has correctly anticipated the outcome of a program ahead of completion, abnormal returns will also be measured over a 7 day period beginning t = -5 days and ending t = +1 days relative to the event date to test hypotheses. Although the choice of period is somewhat arbitrary, it is considered that extending the period prior to the completion date will increase the likelihood of capturing the market response to a repurchase trade rather than the impending completion of a program itself.

Daily abnormal returns will be computed for each day of the event and CAR will be measured over the event window. Abnormal returns are generated following the research design prescribed in Chapter 4, however as firms' risk characteristics may have changed since the time period in which market model parameters are estimated (parameters are estimated over the 100 day period beginning t = -165 days and ending t = -65 days relative to the program announcement) this chapter will employ the market adjusted returns model to generate abnormal returns whilst also providing comparative results using the market model for robustness in the Appendix.

[122] As discussed in Chapter 3, normal trading takes place between 10am and 4pm, Sydney time, so that notices processed after the close of trading by the ASX will be treated as being released on the following trading day.

The market adjusted returns model assumes that *ex ante* expected returns are equal across all securities and therefore equal in any period to the expected market return for that period (Brown and Warner, 1980):

$$R_{jt} = R_{mt}$$

where R_{jt} = rate of return of security j for the period t

R_{mt} = rate of return on the market index m for the period t

The *ex post* abnormal return on security j is given by the difference between its return and that on the market portfolio ($R_{jt} - R_{mt}$) and is consistent with that measured by the market model if assuming that all securities have systematic risk equal to 1. As with the market model, the ASX All Ordinaries Total Return Index is used as the proxy for the market portfolio.

Consistent with the testing of announcement returns in Chapter 4 and completion rates in Chapter 5, the regression model will be alternatively executed with the inclusion of dummy variable *Unlimited Duration* that will take on the value of 1, if an unlimited duration is indicated in a program announcement or 0 if a fixed intended program length has been indicated. Similarly, regressions will be interchangeably performed with the inclusion of dummy variables for industry type and the year in which programs are announced.

The purpose of hypotheses H11 - H13 is to explain the share price reaction to the release of completion notices. Hypotheses H11 and H12 are concerned with programs in general whilst hypothesis H13 is concerned with 'repeat' programs only. Hypothesis H11 is interested in the impact of completion rates and program

announcement CAR whilst hypothesis H12 is concerned with program duration and the 'speed' with which firms repurchase their shares. Hypothesis H13 is concerned with the impact of completion rates, program duration and repurchase 'speed' from prior programs. The multiple regression equation to test these hypotheses will follow the research design developed in Chapter 4 to examine the determinants of program announcement returns and introduce related variables developed in Chapter 5 to examine completions rates. For robustness the model will be run alternatively with cumulative abnormal returns measured over the 7 day event window (-5, 1) in addition to the 3 day event window (-1, 1) as the dependent variable.

The multiple regression equation used to test hypotheses H11 and H12 is of the following form with the inclusion of variable *CAR (-1, 1)* measured in Chapter 4 as a key explanatory variable.

$$\begin{aligned} Completion\ CAR_i = \\ & \alpha_0 + \alpha_1 Completion\ Rate_i + \alpha_2 Duration\ Ratio_i + \alpha_3 Repurchase\ Speed_i + \\ & \alpha_4 CAR\ (-1, 1)_i + \alpha_5 MTB_i + \alpha_6 Firm\ Size_i + \alpha_7 Cash\ Balance_i + \alpha_8 Cash\ Flow_i + \\ & \alpha_9 \Delta Leverage_i + \alpha_{10} \Delta Dividends_i + \alpha_{11} \Delta EPS_i + \alpha_{12} ConDeviation_i + \\ & \alpha_{13} ConCAR_i + \alpha_{14} ConTurnover_i + \varepsilon_i \end{aligned}$$

Equation (5)

Where *i* represents the firm and *Completion CAR* represents the cumulative abnormal returns measured around the event date. The measurement of all other variables is consistent with that described for regression equations in Chapters 4 and 5. Of particular importance for Hypotheses H11 and H12 is to measure the information

content, if any, from the release of a completion notice and whether firms that do not meet or exceed repurchase targets are penalised or rewarded. As hypothesised in Section 6.2, firms that do not meet repurchase expectations will be seen as less credible than firms that do or exceed expectations and as such, the coefficient for *Completion Rate* is expected to be positive. Similarly, to the extent that program completions result in the re-appraisal of firm credibility previously assessed at the time a program is announced, the coefficient for *CAR (-1, 1)* is hypothesised to be negative. It is also hypothesised that the shorter the period over which a program is actually executed compared to that intended the more credible the firm, and so the coefficient for *Duration Ratio* is also expected to be negative.

Since the 'speed' with which shares are repurchased is also hypothesised to be an indicator of firm type, the more shares that a firm repurchases earlier in a program the more credible it is seen, however to the extent that this may also signal to the market that it is more likely to achieve its ultimate target the likelihood of not meeting expectations is increased. The coefficient for *Repurchase Speed* can therefore be positive or negative.

Control variables

Consistent with the analysis of announcement returns in Chapter 4, the following variables *MTB*, *Firm Size*, *Cash Balance*, *Cash Flow*, Δ*Leverage*, Δ*Dividends* and Δ*EPS* are included in regression Equation (5) as controls. Variables *ConCAR*, *ConTurnover* and *ConDeviation*, also used in Chapter 5 to test completion rates, are introduced in Equation (5) as replacements for variables *PreCAR*, *Turnover* and *Return Deviation* presented in Equation (1), since they represent concurrent measures

and are therefore more relevant in determining completion returns. Since it is envisaged that the outcome of a program will be assessed in line with whether repurchase expectations are met, the association of each variable with the dependent variable will therefore be depend on whether repurchase targets are met or not. For example, excess cash is considered to indicate potential agency problems of free cash flow of which share repurchases are argued to reduce and as such, it is argued in Chapter 4 that the market reaction to a program announcement is expected to be positively associated with the variables *Cash Balance* and *Cash flow*. Firms that do not meet expectations but have high levels of cash will be seen as not resolving agency problems despite having the means to do so, prompting the market to negatively reassess their credibility. On the other hand, firms that do meet expectations will be seen as utilising cash balances to resolve agency problems thereby invoking a positive or no reaction by the market. As such, the market reaction to a completion notice is contingent upon whether a firm meets, exceeds or fails to reach their repurchase target and therefore the coefficient for variables *Cash Balance* and *Cash flow* can be of a positive or negative sign.

To test hypotheses H13, regression Equation (5) is modified to include variables that capture potential reputation signals from previous announcements programs and is consistent with those used for regression Equations (2) and (4).

$$Completion\ CAR_i =$$

$$\alpha_0 + \alpha_1 Completion\ Rate_i + \alpha_2 LagComprate_i + \alpha_3 Duration\ Ratio_i + \alpha_4 LagDuration_i + \alpha_5 Repurchase\ Speed_i + \alpha_6 LagSpeed_i + \alpha_7 CAR\ (-1, 1)_i + \alpha_8 MTB_i + \alpha_9 Firm\ Size_i + \alpha_{10} Cash\ Balance_i + \alpha_{11} Cash\ Flow_i + \alpha_{12} \Delta Leverage_i$$

$$+ \alpha_{13}\Delta Dividends_i + \alpha_{14}\Delta EPS_i + \alpha_{15}ConDeviation_i + \alpha_{16}ConCAR_i + \alpha_{17}ConTurnover_i + \alpha_{18}TimeLapse_i + \varepsilon_i$$

Equation (6)

The measurement of all variables is consistent with that described for previous models. Of particular importance to this hypothesis is the measurement of association between program completion return of 'repeat' programs with repurchase characteristics from prior programs. Consistent with Equation (2) explanatory variables, *LagDuration* and *LagSpeed*, have been included to capture the potential reputation impact of program duration and the repurchase 'speed' from prior programs in addition to *LagComprate* which has been used in prior studies to capture the reputational impact of completion rates (Bonaimé, 2012).

According to the reputation argument the market conditions expectations of current programs upon prior programs and as such, firms that have a reputation of achieving high completion rates are less likely to meet expectations in a current program than firms that have a reputation for low completion rates. The coefficient for *LagComprate* is therefore hypothesised to be negative. Similarly, a firm that has a reputation for terminating a program ahead of that anticipated is more likely to exceed the time period expected in a current program than a firm that has a reputation for running a program to its full duration. The coefficient for *LagDuration* is therefore hypothesised to be positive. Since a firm that has a reputation for repurchasing more shares in the early stages of a program is less likely to meet expectations in a subsequent program, but at the same time is more likely to meet revised expectations for the entirety of a program than a firm that has a reputation for repurchasing less

shares at the same stage, the coefficient for *LagSpeed* is hypothesised to be positive or negative.

As with Equations (2) and (4) the variable *Time Lapse* is included in Equation (6) as a control variable to capture the potential impact on firm reputation for firms announcing a new program soon after a prior program. Since in Chapter 4 its coefficient is conjectured to be positive or negative in explaining program announcement returns, its coefficient for this study is also expected to be positive or negative. The coefficients of all other variables are expected to be of the same sign as that considered for Equation (5).

6.4 DESCRIPTIVE STATISTICS AND EMPIRICAL RESULTS

The purpose of this section is to discuss the descriptive statistics of firms that have have lodged a 3F notice ('3F notice' program) and the empirical results for testing of hypotheses.

6.4.1 DESCRIPTIVE STATISTICS

The following Table 6.1 presents the mean values for explanatory and control variables used in regression equations to test hypotheses and provide a comparison between completed programs overall and 'repeat' programs only. All data are winsorised at the 1st and 99th percentiles except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed* which are truncated at 100%.[123] Statistics are comparable with those of Table 5.1. Measurements for variables

[123] Consistent with the measurement elsewhere in the study, these variables are truncated at 100% to avoid the influence on measures for firms that have increased program size subsequently to the original announcement.

LagComprate, *LagSpeed*, *LagDuration* and *Time Lapse* are provided for 'repeat' programs only.

Of interest, is that fact that there is no discernible difference in the measures of explanatory variables *Completion Rate* and *CAR (-1, 1)* between 'repeat' programs and for programs in general.[124] For explanatory variable *Repurchase Speed* its measure for 'repeat' programs is only slightly lower than that for programs in general, 37.9% compared to 38.7%, but notable is the fact that 'repeat' programs take longer to execute relative to the time intended than for programs in general as indicated by the variable *Duration Ratio*, 0.98 compared to 0.946.

Firms of 'repeat' programs have higher levels of operating cash, as measured by variable *Cash Flow* than programs in general, 0.086 compared to 0.072 but have lower cash balances as measured by variable *Cash Balance*, 0.24 compared to 0.269. In terms of leverage, firms of both categories have recently decreased their ratios prior to commencing their programs as indicated by the negative measures of Δ*Leverage*, however firms of 'repeat' programs demonstrate larger negative changes, -0.495 compared to -0.268, indicating a greater need to improve their ratios by repurchasing more shares.

[124] It should be pointed out that the categories 'All Programs' and 'Repeat Programs' are not mutually exclusive, therefore limiting comparison between them.

TABLE 6.1

Mean and Median Values for Regression Variables

Table 6.1 presents the mean and median [in brackets] values for all independent variables used in regression analysis to test hypotheses H11 – H13 for all programs completed with 3F notices and for 'repeat' programs. A description of all variables is provided in Table A1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate, Repurchase Speed*, *LagComprate* and *LagSpeed* which are truncated at 100%.

Variable	All Programs	Repeat Programs
Completion Rate	0.512 [0.494]	0.513 [0.492]
LagComprate	-	0.531 [0.551]
Duration Ratio	0.946 [1.022]	0.980 [1.023]
LagDuration	-	0.904 [1.011]
Repurchase Speed	0.387 [0.247]	0.379 [0.234]
LagSpeed	-	0.386 [0.247]
CAR (-1, 1)	0.028 [0.014]	0.027 [0.011]
MTB	2.408 [1.380]	2.364 [1.353]
Firm Size	18.721 [18.471]	18.914 [18.654]
Cash Balance	0.269 [0.102]	0.240 [0.095]
Cash Flow	0.072 [0.067]	0.086 [0.071]
ΔLeverage	-0.268 [0.000]	-0.495 [0.000]
ΔDividends	-0.625 [0.000]	4.056 [0.000]
ΔEPS	0.040 [0.009]	0.038 [0.009]
Price Range	0.335 [0.207]	0.301 [0.180]
ConDeviation	0.030 [0.025]	0.026 [0.022]
ConCAR	0.065 [0.025]	0.056 [0.005]
ConTurnover	-16.489 [-16.550]	-16.529 [-16.550]
Time Lapse	-	19.185 [12.433]
No observations	462	271

Results also demonstrate that firms of 'repeat' programs are in the process of increasing dividend payout ratios before commencing a program rather than decreasing them as indicated by Δ*Dividends*, 4.056 compared to -0.625 for programs in general, suggesting that firms of 'repeat' programs are not in the process of substituting share repurchases for dividends as a form of preferred payout to shareholders.

Firms of both programs experience an increase in EPS prior to the commencement of a program as indicated by Δ*EPS*, 0.038 for 'repeat' programs compared to 0.04 for programs in general, undermining the need for firms of either type to repurchase shares in order to improve EPS.

When considering share price performance over the duration of the program, firms of 'repeat' programs experience lower market adjusted share returns and share price volatility compared to firms of programs in general as indicated by variables *ConCAR*, 5.6% compared to 6.5%, and *ConDeviation*, 0.026 compared to 0.03 but have similar measures for liquidity as measured by *ConTurnover*, -16.529 compared to -16.489. Finally, firms of both programs have very similar measures for control variables, *MTB* and *Firm Size*.

6.4.2 RESULTS

The purpose of this section is to discuss the results from testing hypotheses H10 – H13. Hypothesis H10 is concerned with examining the market reaction to the release of completion notices. Results of completion CAR measured over various event windows are presented in Table 6.2 for programs in general and in Table 6.3 for

'repeat' programs only. Hypotheses H11 and H12 are concerned with explaining the market reaction to completion notices for all programs and regressions include variables *Completion Rate*, *Duration Ratio* and *Repurchase Speed* in addition to program announcement *CAR (-1, 1)* as key explanatory variables together with other independent control variables of Equation (5). Results for hypotheses H11 and H12 are presented in Table 6.4 with the dependent variable measured over the 3 day event window presented in Panel A and the 7 day event window presented in Panel B. Hypothesis H13 is concerned with 'repeat' programs only and extends explanatory variables to include *LagComprate*, *LagDuration* and *LagSpeed* together with other independent control variables of Equation (6). Results for hypotheses H13 are presented in Table 6.5 with results for 3 day CAR as the dependent variable presented in Panel A and 7 day CAR as the dependent variable presented in Panel B. For robustness, tests are repeated with the market model used to generate abnormal returns in the Appendix (Tables A.6 - A.9).

For Tables 6.4 and 6.5 and Tables A.8 and A.9 in the Appendix, four versions of each regression model are presented. Models (2) to (4) are variations of model (1) which presents the basic variables of Equations (5) and (6). The dummy variable, *Unlimited Duration*, is included in models (2) to (4) whilst industry dummy variables are included in models (3) and (4) and year of announcement dummy variables are included in model (4) only. Regression results document coefficient statistics with *t*-values in parentheses and with all variables winsorised at the 1st and 99th percentiles, except for variables *Completion Rate*, *Repurchase Speed*, *LagComprate* and *LagSpeed* which are truncated at 100%. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression

coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics.

Hypothesis H10

Results for hypothesis H10 are presented in Tables 6.2 and 6.3 which document the average completion CAR for all completion notices, the associated cross-sectional t-statistic and corresponding significance levels for completion returns measured over 3 day, 5 day and 7 day event windows for data winsorised at the 1st and 99th percentiles and for raw data measured over the 3 day event window only. Results of robustness tests are presented in Tables A.6 and A.7 of the Appendix. As can be seen from Table 6.2 completion returns for programs in general are not significantly different from zero in all cases and is not supportive of hypothesis H10. It cannot therefore be concluded that completion notices convey new information to the market.

TABLE 6.2

Completion Returns for All Completion Notices

Table 6.2 reports the mean market reaction to completion notices of on-market share repurchases by event windows, (-1, 1), (-2, 2) and (-5, 1) for winsorised data and (-1, 1) for raw data. T-statistics are provided in parentheses. Announcement period returns are calculated using market adjusted returns model with abnormal returns summed over the event window. Winsorised data are winsorised at the 1st and 99th percentiles. All results are insignificant.

Variable	Mean
CAR (-1, 1) (winsorised)	0.001
	(0.35)
CAR (-2, 2) (winsorised)	-0.002
	(-0.49)
CAR (-5, 1) (winsorised)	0.000
	(0.12)
CAR (-1, 1) (raw data)	0.001
	(0.16)

TABLE 6.3

Completion Returns for Repeat Completion Notices

Table 6.3 reports the mean market reaction to completion notices of 'repeat' on-market share repurchases by event windows, (-1, 1), (-2, 2) and (-5, 1) for winsorised data and (-1, 1) for raw data. T-statistics are provided in parentheses. Announcement period returns are calculated using market adjusted returns model with abnormal returns summed over the event window. Winsorised data are winsorised at the 1st and 99th percentiles. All results are insignificant.

Variable	Mean
CAR (-1, 1)(winsorised)	-0.001
	(-0.22)
CAR (-2, 2) (winsorised)	0.002
	(0.44)
CAR (-5, 1) (winsorised)	0.001
	(0.32)
CAR (-1, 1) (raw data)	0.002
	(0.54)

Table 6.3 documents the same statistics for 'repeat' programs only. As with Table 6.2, completion returns for 'repeat' programs are also not significantly different from zero for all measures and collectively provide strong support against hypothesis H10, that share price returns in response to completion notices are not significantly different from zero. These results are also robust under tests using the market model to generate abnormal returns (Tables A.6 and A.7).

Hypotheses H11 and H12

Results for hypotheses H11 and H12 are presented in Table 6.4. Panel A presents results for CAR measured over the 3 day event window and in Panel B results are presented for CAR measured over the 7 day event window.

TABLE 6.4

Regressions for All Completion Notices

Table 6.4 presents coefficient estimates from ordinary least squares (OLS) regression describing share returns around the release of 3F notices using the market adjusted returns model to compute abnormal returns. Panel A presents estimates with dependent variable, *Completion Returns*, measured over the 3 day event window and Panel B presents estimates measured over the 7 day event window. Four versions of Equation (5) are presented. Model (1) presents the basic variables of Equation (5). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A. (-1,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0173	0.0175	0.0744[c]	0.0532
	(0.54)	(0.55)	(1.86)	(1.38)
Completion Rate	-0.0215[c]	-0.0216[c]	-0.0150	-0.0162
	(-1.9)	(-1.9)	(-1.33)	(-1.41)
Duration Ratio	-0.0039	-0.0041	-0.0036	-0.0037
	(-0.72)	(-0.73)	(-0.71)	(-0.73)
Repurchase Speed	0.0031	0.0033	-0.0005	0.0010
	(0.26	(0.27)	(-0.04)	(0.08)
CAR (-1, 1)	-0.0617[c]	-0.0622[c]	-0.0686[b]	-0.0763[b]
	(-1.81)	(-1.83)	(-1.97)	(-2.19)
MTB	-0.0004	-0.0004	-0.0005	-0.0006
	(-0.46)	(-0.47)	(-0.59)	(-0.75)
Firm Size	0.0006	0.0006	-0.0009	-0.0006
	(0.37)	(0.37)	(-0.58)	(-0.39)
Cash Balance	0.0021	0.0021	0.0043	0.0062
	(0.37)	(0.36)	(0.69)	(1)
Cash Flow	0.0020	0.0020	0.0001	-0.0004
	(0.13)	(0.13)	(0.01)	(-0.03)
ΔLeverage	0.0000	0.0000	0.0000	0.0000
	(0.5)	(0.49)	(0.97)	(1.09)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-1.02)	(-1.02)	(-1.11)	(-0.94)
ΔEPS	0.0063	0.0063	0.0064	0.0037
	(0.7)	(0.7)	(0.73)	(0.42)
ConCAR	0.0300[a]	0.0301[a]	0.0290[a]	0.0312[a]
	(3.25)	(3.23)	(3.27)	(3.65)
ConDeviation	0.5063[b]	0.5049[b]	0.3455	0.4598[c]
	(1.98)	(1.97)	(1.44)	(1.83)
ConTurnover	0.0017	0.0017	0.0016	0.0009
	(0.92)	(0.92)	(0.81)	(0.46)
Unlimited Duration (Dummy)		-0.0014	-0.0058	-0.0050
		(-0.14)	(-0.71)	(-0.63)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0638	0.0617	0.0932	0.0906
No observations	445	445	445	445

Panel B. (-5,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0346	0.0332	0.1208	0.0932
	(0.42)	(0.39)	(1.33)	(0.93)
Completion Rate	-0.0280[c]	-0.0274[c]	-0.0152	-0.0179
	(-1.78)	(-1.74)	(-0.95)	(-1.15)
Duration Ratio	-0.0035	-0.0022	-0.0028	-0.0020
	(-0.45)	(-0.27)	(-0.38)	(-0.28)
Repurchase Speed	0.0106	0.0095	0.0015	0.0032
	(0.66)	(0.59)	(0.1)	(0.2)
CAR (-1, 1)	-0.0723	-0.0696	-0.0890	-0.0962[c]
	(-1.25)	(-1.21)	(-1.57)	(-1.71)
MTB	-0.0014	-0.0014	-0.0021	-0.0021[c]
	(-1.09)	(-1.07)	(-1.61)	(-1.66)
Firm Size	-0.0004	-0.0004	-0.0011	-0.0005
	(-0.17)	(-0.17)	(-0.46)	(-0.21)
Cash Balance	-0.0115	-0.0112	-0.0075	-0.0069
	(-1.2)	(-1.16)	(-0.77)	(-0.73)
Cash Flow	-0.0098	-0.0092	-0.0138	-0.0141
	(-0.47)	(-0.44)	(-0.68)	(-0.7)
ΔLeverage	0.0000	0.0000	0.0001	0.0001
	(0.4)	(0.43)	(0.92)	(1.16)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-1.2)	(-1.21)	(-1.34)	(-1.07)
ΔEPS	0.0149	0.0147	0.0138	0.0097
	(1.2)	(1.19)	(1.17)	(0.85)
ConCAR	0.0557[a]	0.0553[a]	0.0574[a]	0.0601[a]
	(4.05)	(4)	(4.29)	(4.41)
ConDeviation	0.2432	0.2524	-0.0247	0.1518
	(0.61)	(0.63)	(-0.06)	(0.36)
ConTurnover	0.0010	0.0011	0.0005	-0.0009
	(0.2)	(0.21)	(0.09)	(-0.15)
Unlimited Duration (Dummy)		0.0087	0.0034	0.0044
		(0.6)	(0.27)	(0.34)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0564	0.055	0.1028	0.0987
No observations	445	445	445	445

Results of Panel A indicate that the coefficient for *Completion Rate* is of the incorrect, negative sign and is significant at the 10% level for models (1) and (2), suggesting that the market punishes rather than rewards firms that achieve repurchase targets and vice versa for firms that fail to meet them. However, the coefficient becomes insignificant for models (3) and (4), indicating that its significance is due to measurement bias introduced by industry type. The coefficient for program announcement returns, *CAR (-1, 1)*, is significant at the 10% level of significance for models (1) and (2) and at the 5% level of significance for models (3) and (4). Further, the coefficient is of the correct, negative sign and provides support for the notion that the market negatively reassesses firm credibility formed at the time a program is announced. A one percent increase in announcement returns is associated with a decrease in completion returns of around seven percentage points.[125] This evidence provides some support for hypothesis H11 with respect to program announcement returns but not for completion rates.

With regards to hypothesis H12, results are not supportive. The coefficient of *Duration Ratio* is insignificant across all models and fails to demonstrate that the market differentiates between firms that complete a program ahead of time, on time or later reassessing firm type at the completion of a program. Similarly, the coefficient of *Repurchase Speed* is insignificant across all models, failing to show that the market also considers how many shares are acquired at the midpoint of a program.

In considering control variables, the coefficients of both *ConDeviation* and *ConCAR* are significant and positively related to completion returns. The coefficient for

[125] Although not reported in the tables, the standard deviation of *CAR (-1, 1)* is 0.0815 which means a one standard deviation increase in its value is associated with a decrease in approximately half a percentage point in completion returns.

ConDeviation is positive and significant at the 5% level of significance for models (1) and (2), insignificant for model (3) with the inclusion of industry dummies but is significant at the 10% level of significance for model (4) with the inclusion of year of announcement dummy variables. These results suggest that the more volatile the underlying share price the more likely the market will view a firm positively at the completion of a program. The coefficient for *ConCAR* is significant at the 1% level of significance for all models and of positive sign, indicating that firms with decreasing (increasing) share prices will experience negative (positive) returns at the completion of a program. This evidence suggests that share prices measured at the completion of a program follow the trend established over the duration of a program. The coefficient of dummy variable, *Unlimited Duration*, is insignificant for all models, inconsistent with the notion that if such programs are completed ahead of time, the market interprets a completion notice as new information.

The coefficients for all other control variables *MTB*, *Firm Size*, *Cash Balance*, *Cash Flow*, Δ*Leverage*, Δ*Dividends*, Δ*EPS*, and *ConTurnover* are insignificant in explaining the market reaction to completion notices.

Results for multiple regressions with CAR measured over the 7 day event window are presented in Panel B. Consistent with results of Panel A, the coefficient for explanatory variable *Completion Rate* is significant at the 10% level and of the incorrect sign for models (1) and (2) whilst being insignificant for models (3) and (4), demonstrating the robustness of these results over alternative event windows. The coefficient for program announcement returns, *CAR (-1, 1)*, however is significant at the 10% level of significance for model (4) only, indicating that its measure is

sensitive to the period over which completion returns are measured. As with Panel A, the coefficients of both *Duration Ratio* and *Repurchase Speed* are insignificant across all models, further undermining hypothesis H12.

Results indicate the coefficient for *ConDeviation* is insignificant but the coefficient for *ConCAR* remains significant at the 1% level of significance and of positive sign for all models. With the exception of variable *MTB* the coefficients for all other variables remain insignificant. The coefficient of *MTB* is significant at the 10% level of significance for model (4) and of negative sign, suggesting that value stocks are more likely to be revalued positively than growth stocks upon program completion. The coefficient of *Unlimited Duration* continues to be insignificant for all models, failing to indicate that new information is provided to the market upon the completion of a program ahead of time.

Results of robustness tests for completion returns determined using the market model is presented in Table A.8 of the Appendix. The results are mostly consistent with those of Table 6.4 with the exception of explanatory variable, *CAR (-1, 1)*, which shows a reduction in its significance. Under the 3 day event window, Panel A, its coefficient is insignificant for all models except for model (4) where it is significant at the 10% level, and is insignificant for all models conducted over the 7 day event window, Panel B. The reduction in significance suggests that measurement of *CAR (-1, 1)* is sensitive to the asset pricing model used to generate abnormal returns in addition to the length of event window. Results for other explanatory variables,

Completion Rate, *Duration Ratio* and *Repurchase Speed* remain consistent with those of Table 6.4.[126]

Overall, the results provide only limited support for hypothesis H11 and are unsupportive of hypothesis H12. The coefficient for *Completion Rate* is of the incorrect sign to that hypothesised, suggesting that the market punishes rather than rewards firms that achieve or exceed repurchase targets and vice versa for firms that fail to meet repurchase targets. This association however becomes insignificant when controlling for potential biases of industry type. The coefficient for *CAR (-1, 1)* is of the correct, negative sign and significant for models when CAR is measured over the 3 day event window but with the exception of model (4) is insignificant when CAR is measured over the 7 day event window and is not robust when employing the market model to generate abnormal returns.

With regard to hypothesis H12, the coefficients of both *Duration Ratio* and *Repurchase Speed* are insignificant across all models, irrespective of the length of event window or model used to generate abnormal returns. These results do not suggest the market considers program duration or the number of shares repurchased at the midpoint of a program when assessing firm quality at program completion. Of note, the coefficient for dummy variable, *Unlimited Duration*, is insignificant for all models, a result that does not suggest the market is sensitive to intended duration when re-assessing firm type or that it correctly anticipates program completions in

[126] For remaining control variables *MTB*, *ConDeviation* and *ConCAR* the following differences are noted. The coefficient for *MTB* increases in significance to 5% level of significance for all models for regressions tested over the 7 day event window, Panel B. Results demonstrate a reduction in significance of variable *ConDeviation* for regressions conducted over the 3 day event window, Panel A, where its coefficient becomes insignificant for model (4) as well as being insignificant for all models when completion returns are measured over the 7 day window, Panel B. Lastly, the coefficient for *ConCAR* continues to be significant at the 1% level of significance across all models.

advance. Finally, results show that control variable *ConCAR* is an important determinant of completion returns and demonstrate that share returns measured around the completion of a program follow the trend established over the duration of a program.

Hypothesis H13

Results for testing of hypothesis H13 are presented in Table 6.5 for 'repeat' programs. Panel A presents results of multiple regressions with CAR measured over the 3 day event window and for the 7 day event window in Panel B. As with testing of programs in general four versions of the regression model are presented.

Results for Panel A indicate that the coefficients for explanatory variables *LagComprate* and *LagSpeed* are insignificant and do not suggest that investors consider completion rates or partial completion rates of prior programs when assessing firm type upon completion of subsequent programs. The coefficient for *LagDuration* is however significant at the 10% level of significance for model (1) and at the 5% level of significance for remaining models but is of the opposite, negative sign to that expected, suggesting that firms that complete prior programs sooner rather than later are considered more favourably by the market upon the completion of a subsequent program. These results provide strong evidence against hypothesis H13, inconsistent with the notion that investors consider repurchase reputation from prior programs when assessing performance at the completion of a program. However, when considering program duration by itself, results suggest that the market is not disappointed by firms that may not live up to a reputation of terminating a program ahead of time but are instead rewarded based on prior performance.

TABLE 6.5

Regressions for Repeat Completion Notices

Table 6.5 presents coefficient estimates from ordinary least squares (OLS) regression describing share returns around the release of 3F notices using the market adjusted returns model to compute abnormal returns. Panel A presents estimates with dependent variable, *Completion Returns*, measured over the 3 day event window and Panel B presents estimates measured over the 7 day event window. Four versions of Equation (6) are presented. Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A. (-1,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0275	0.0272	0.0725	0.0748
	(0.67)	(0.67)	(1.23)	(1.21)
Completion Rate	-0.0234	-0.0238	-0.0227	-0.0208
	(-1.54)	(-1.55)	(-1.53)	(-1.42)
LagComprate	0.0076	0.0077	0.0083	0.0049
	(0.48)	(0.48)	(0.51)	(0.3)
Duration Ratio	-0.0014	-0.0018	0.0009	0.0009
	(-0.21)	(-0.26)	(0.16)	(0.15)
LagDuration	-0.0118[c]	-0.0120[b]	-0.0144[b]	-0.0132[b]
	(-1.9)	(-1.99)	(-2.41)	(-2.36)
Repurchase Speed	0.0006	0.0009	0.0024	0.0036
	(0.04)	(0.06)	(0.16)	(0.23)
LagSpeed	-0.0091	-0.0091	-0.0101	-0.0063
	(-0.54)	(-0.54)	(-0.6)	(-0.38)
CAR (-1, 1)	-0.1811[a]	-0.1823[a]	-0.1587[a]	-0.1640[a]
	(-2.94)	(-2.97)	(-2.67)	(-2.77)
MTB	-0.0011	-0.0011	-0.0008	-0.0007
	(-0.98)	(-0.99)	(-0.71)	(-0.65)
Firm Size	0.0005	0.0004	-0.0021	-0.0025
	(0.22)	(0.2)	(-0.98)	(-1.2)
Cash Balance	-0.0068	-0.0068	-0.0055	-0.0032
	(-0.65)	(-0.65)	(-0.52)	(-0.29)
Cash Flow	0.0187	0.0187	0.0168	0.0145
	(0.98)	(0.98)	(0.9)	(0.81)
ΔLeverage	0.0001[b]	0.0001[b]	0.0002[a]	0.0001[a]
	(2.48)	(2.47)	(3.37)	(3.18)
ΔDividends	0.0000	0.0000	-0.0000	0.0000
	(-0.81)	(-0.79)	(-0.4)	(-0.33)
ΔEPS	0.0076	0.0077	0.0091	0.0097
	(0.73)	(0.73)	(0.9)	(0.9)
ConCAR	0.0142	0.0143	0.0154	0.0174
	(1.01)	(1.01)	(1.22)	(1.37)
ConDeviation	1.1975[a]	1.1893[b]	0.9124[b]	0.9079[b]
	(2.62)	(2.56)	(2.32)	(2.29)
ConTurnover	0.0025	0.0023	-0.0006	-0.0007
	(1.44)	(1.41)	(-0.25)	(-0.28)
Time Lapse	0.0001	0.0001	0.0001	0.0000
	(0.6)	(0.63)	(0.42)	(0.27)
Unlimited Duration		-0.0036	-0.0235[a]	-0.0236[a]
(Dummy)		(-0.24)	(-2.7)	(-2.71)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0912	0.0878	0.2069	0.1841
No observations	268	268	268	268

Panel B (-5,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.1511[c]	0.1506[c]	0.2089[c]	0.2237[c]
	(1.76)	(1.76)	(1.86)	(1.92)
Completion Rate	-0.0369[b]	-0.0377[b]	-0.0354[c]	-0.0345[c]
	(-2.19)	(-2.21)	(-1.96)	(-1.89)
LagComprate	-0.0017	-0.0014	0.0046	0.0036
	(-0.07)	(-0.06)	(0.2)	(0.15)
Duration Ratio	-0.0049	-0.0057	-0.0029	-0.0030
	(-0.63)	(-0.75)	(-0.45)	(-0.45)
LagDuration	-0.0049	-0.0054	-0.0106	-0.0088
	(-0.6)	(-0.68)	(-1.15)	(-0.96)
Repurchase Speed	-0.0001	0.0006	0.0004	0.0013
	(0)	(0.03)	(0.02)	(0.07)
LagSpeed	0.0072	0.0072	0.0005	0.0069
	(0.28)	(0.29)	(0.02)	(0.28)
CAR (-1, 1)	-0.1630[c]	-0.1654[b]	-0.1381[c]	-0.1528[c]
	(-1.93)	(-1.97)	(-1.71)	(-1.89)
MTB	-0.0006	-0.0006	-0.0010	-0.0012
	(-0.36)	(-0.37)	(-0.62)	(-0.71)
Firm Size	-0.0006	-0.0007	-0.0016	-0.0015
	(-0.19)	(-0.23)	(-0.55)	(-0.55)
Cash Balance	-0.0093	-0.0093	-0.0094	-0.0083
	(-0.63)	(-0.63)	(-0.64)	(-0.54)
Cash Flow	0.0258	0.0257	0.0231	0.0205
	(1.05)	(1.05)	(1.01)	(0.94)
ΔLeverage	0.0002[b]	0.0002[b]	0.0002[a]	0.0002[a]
	(2.42)	(2.41)	(3.38)	(3.63)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(0.12)	(0.15)	(0.51)	(0.74)
ΔEPS	0.0102	0.0104	0.0111	0.0108
	(0.72)	(0.73)	(0.84)	(0.81)
ConCAR	0.0443[b]	0.0443[b]	0.0497[a]	0.0557[a]
	(2.26)	(2.26)	(2.82)	(3)
ConDeviation	0.8018	0.7838	0.3120	0.3531
	(1.11)	(1.07)	(0.5)	(0.56)
ConTurnover	0.0085[c]	0.0082[c]	0.0048	0.0056
	(1.86)	(1.85)	(0.9)	(0.93)
Time Lapse	0.0005[b]	0.0005[b]	0.0004[b]	0.0005[b]
	(2.3)	(2.32)	(1.98)	(2.15)
Unlimited Duration (Dummy)		-0.0080	-0.0356[a]	-0.0346[a]
		(-0.35)	(-2.73)	(-2.66)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.071	0.0678	0.2313	0.2139
No observations	268	268	268	268

The coefficients of explanatory variables *Completion Rate*, *Duration Ratio*, and *Repurchase Speed* are all insignificant in explaining completion returns for 'repeat' programs. However, the coefficient for program announcement returns, *CAR (-1, 1)*, is significant at the 1% level of significance for all models and of the correct sign, providing additional support for hypothesis H11 with respect to announcement returns for 'repeat' programs. Moreover, a one percent increase in *CAR (-1, 1)* is associated with a decrease in completion returns of around sixteen to eighteen percentage points, more than twice the amount for programs in general.[127]

Consistent with the results for programs in general, the coefficient for *ConDeviation* is of positive sign and is significant at the 1% level of significance for model (1) and at the 5% level of significance for all remaining models. Although found to be significant for programs in general, the coefficient for *ConCAR* is insignificant across all models, suggesting that the market views 'repeat' programs differently to programs in general in that completion returns are not found to follow the trend established over a program.

Results also demonstrate that leverage is an important consideration to investors for 'repeat' programs. The coefficient for Δ*Leverage* is of positive sign and significant at the 5% level of significance for models (1) and (2) and at the 1% level for models (3) and (4). These results are consistent with the positive association found between Δ*Leverage* and announcement returns for 'repeat' programs in Chapter 4 (Table 4.7) and suggest that firms of 'repeat' programs use repurchase programs to increase their debt/equity ratios and are considered favourably by the market upon the completion of

[127] Although not reported in the tables, the standard deviation of *CAR (-1, 1)* for 'repeat' programs is 0.0709 which means a one standard deviation increase in its value is associated with a decrease in completion returns of around 1.2 percentage points.

a program. Similarly, although insignificant for programs in general the coefficient of dummy variable *Unlimited Duration* is significant at the 1% level of significance for models (3) and (4) after the inclusion of dummy variables for industry type and year of announcement. The sign of its coefficient is negative, an indication that firms which do not specify a fixed period duration are penalised by the market at the completion of a program. This result is inconsistent with the findings for programs in general and suggests that the market does not anticipate the completion of a program in advance for 'repeat' programs. The coefficients of remaining control variables are all insignificant.

Results of regressions with CAR measured over the 7 day event window are presented in Panel B. Consistent with results of Panel A, the coefficients for key explanatory variables *LagComprate* and *LagSpeed* are insignificant across all models. Inconsistent however, the coefficient for *LagDuration* is insignificant for all models and together with the results for *LagComprate* and *LagSpeed*, do not support hypothesis H13. Results for 'repeat' programs provide mixed support with respect to hypothesis H11. The coefficient for *CAR (-1, 1)* continues to be of the correct sign but is of a lower significance than results of Panel A. Although significant at the 1% level across all models in Panel A, the coefficient for *CAR (-1, 1)* is significant at the 10% level of significance across all models except for model (2) where it is significant at the 5% level of significance. While insignificant for tests produced under the 3 day event window, the coefficient for *Completion Rate* is significant at the 5% level for models (1) and (2) and at the 10% level for models (3) and (4) and is of the incorrect sign.

The coefficients of both *Duration Ratio* and *Repurchase Speed* continue to be insignificant and are therefore not supportive of hypothesis H12 with respect to 'repeat' programs also.

Also consistent with results from Panel A, the coefficient for Δ*Leverage* is of positive sign and significant at the 5% level for models (1) and (2) and at the 1% level for models (3) and (4). Although insignificant in Panel A, the coefficients of *ConCAR*, *ConTurnover* and *Time Lapse* all indicate significance in Panel B. The coefficient for *ConCAR* is significant at the 5% level of significance for models (1) and (2) and at the 1% level of significance for models (3) and (4), a result that is consistent with those for programs in general. The coefficient for *ConTurnover* is of a positive sign and significant at the 10% level of significance for models (1) and (2) but becomes insignificant with the inclusion of dummy variables for industry type and year of announcement, models (3) and (4). The coefficient for *Time Lapse* is significant at the 5% level of significance across all models and of positive sign, indicating that firms that allow a longer period between programs are more likely to be viewed favourably by the market than firms that operate successive programs in quick succession. The coefficient for *Unlimited Duration* continues to be significant at the 1% level of significance for models (3) and (4) and of negative sign whilst the results for remaining control variables suggest that they are not important in explaining the market reaction to completion notices of 'repeat' programs.

Results of robustness tests with completion returns determined using the market model is presented in Table A.9 of the Appendix. Results are mostly consistent with those above with the exception of variables *CAR (-1, 1)* and *Completion Rates*. The

coefficient for *CAR (-1, 1)* continues to be significant when CAR is measured over the 3 day event window but becomes insignificant when measured over the 7 day event window, whilst the coefficient for *Completion Rate* is significant and of negative sign for all models tested under both event windows, providing further evidence contrary to that hypothesised in hypothesis H11.[128] The coefficients for *LagComprate* and *LagSpeed* are insignificant across all models and do not support hypothesis H13. The coefficient for *LagDuration* continues to be of the opposite sign hypothesised and is significant at the 10% level of significance for models (1) and (2) and at the 5% level of significance for models (3) and (4) when CAR is measured over the 3 day event window and insignificant for all models tested over the 7 day event window.[129]

Overall, the results from Table 6.5 for 'repeat' programs do not provide support for hypothesis H13. The coefficients for both *LagComprate* and *LagSpeed* are insignificant across all models and the coefficient for *LagDuration* is of the opposite sign to that hypothesised when CAR is measured over the 3 day event window and is insignificant when measured over the 7 day event window. These results indicate that the market does not consider performance of prior repurchase programs in assessing firms upon the completion of current programs as hypothesised under the signalling undervaluation hypothesis. Instead firms that complete prior programs sooner rather than later are considered more favourably by the market upon the completion of a subsequent program.

[128] The coefficient for *CAR (-1, 1)* is of the correct, negative sign and significant at the 1% level of significance for models (1) and (2) and at the 5% level of significance for models (3) and (4) when CAR is measured over the 3 day event window but is insignificant across all models when CAR is computed over the 7 day event window. The coefficient for *Completion Rate* is significant at the 10% level of significance for all models when CAR is measured over the 3 day event window and at the 1% level of significance for models (1) and (2) and at the 5% level of significance for models (3) and (4) when measured over the 7 day event window.

[129] For remaining variables, the coefficient for *ConTurnover* is insignificant for all models and the coefficient for *Time Lapse* is significant for models (1) and (2) only at the 10% level of significance when CAR is computed over the 7 day event window.

In relation to hypotheses H11 and H12 the results are similar to those for programs in general (Table 6.4). The coefficient for *Completion Rate* is significant but of the incorrect sign for all tests except when the dependent variable is measured over the 3 day event window under the market adjusted returns model, indicating that the association is sensitive to the length of event window and model used to generate abnormal returns. The coefficient for *CAR (-1, 1)* is significant and of the correct sign across all models except when the dependent variable is measured over the 7 day window under the market model, providing support for the notion that the market reconsiders firm quality signalled at the time a program is announced.

Also consistent with results for programs in general, the coefficients for *Duration Ratio* and *Repurchase Speed* are insignificant in all cases, providing further evidence that does not support hypothesis H11. Although not found for programs in general, results indicate that firms of 'unlimited duration' programs are negatively assessed by the market upon the completion of a program.

Results also indicate that the more volatile the underlying share price the more likely the market will view a firm positively at the completion of a program. Of note, the coefficient for *ConCAR* is significant only when tests are conducted when completion returns are measured over the 7 day event window, failing to demonstrate that for 'repeat' programs share prices measured around the notification of a program completion follow the trend established over the duration of a program. Interestingly, the coefficient for Δ*Leverage* is significant for all models, suggesting that market considers the impact of share repurchases on capital structure for firms of 'repeat' programs only. Consistent with tests for programs in general, results provide a

positive association between completion returns and share price volatility but only when CAR is measured over the 3 day event window. Finally, there is evidence that the time period between programs may have an influence on completion returns but only when CAR is measured of the 7 day event window.

6.5 SUMMARY AND CONCLUSIONS

The purpose of this chapter is to investigate whether completion notices for Australian on-market share repurchase programs contain information that is useful to investors in valuing a firm's shares. In so doing, the market reaction to completion notices is measured and explained using regression analysis. Of the possible 789 programs recognised in this thesis, 462 programs are identified as being completed with the release of a 3F notice and subject to examination for this chapter. Of these, 271 represent 'repeat' programs. Overall, results of tests on completion returns reveal the following.

The market reaction to a completion notice on average is not significantly different from zero. Completion returns are measured over various event windows using winsorised and raw data and computing CAR using both the market adjusted returns model as well as the market model for robustness. Although the possibility of individual notices imparting new information to the market cannot be ruled out, these results are inconsistent with the notion that new information is imparted to the market upon the disclosure of a 3F notice of completion. A concern raised in this chapter is that the market may anticipate the outcome of program prior to the release of a 3F notice, and to this end, an alternative test period of (-5, 1) days relative to the event date is provided. However, in comparing tests performed over the 7 day event

window with those performed over the 3 day event window, results overall demonstrate that outcomes are not sensitive to the time period over which completion returns are measured.

In investigating the determinants of completion returns, an insignificant association is generally observed between completion rates and returns, suggesting that the market does not reward or punish firms that exceed or fail to meet expectations. This result is also consistent with the lack of significance found for program size in explaining announcement returns in Chapter 4. Completion returns are found to be negatively associated program announcement returns, particularly so for 'repeat' programs, consistent with the notion that the market reconsiders firm credibility originally signalled at the time a program is announced.

A lack of association between either program duration or the 'speed' with which firms repurchase their shares and completion returns does not confirm whether firms are penalised or rewarded for deviating from intended program length or with revised expectations following acquisitions in the initial stages of a program. These results are at odds with the significance of intended program length found in explaining announcement returns in Chapter 4 and completion rates in Chapter 5 together with program duration. The lack of significance found for repurchase 'speed' is however consistent with results of Chapters 4 and 5. Similarly, firms that indicate an unlimited duration are not rewarded or penalised at the completion of a program unless it is for a 'repeat' program, in which case they are punished. These results are somewhat inconsistent with those of Chapters 4 and 5 where it is found that firms indicating an

unlimited duration attract a more positive market reaction to program announcements and tend to repurchase more shares than firms indicating a fixed period duration.

In considering 'repeat' programs, results fail to demonstrate that the market considers a firm's prior completion rates or mid-completion rates at the time a current program is completed. These results are consistent with those found in Chapter 4 and undermine the notion of a repurchase reputation for Australian programs. In contrast, lagged duration is found to be a negatively associated with completion returns of current programs, suggesting that the market rewards firms based upon how quickly they complete prior programs rather how quickly they execute current programs and is at odds with the lack of significance found for lagged duration in explaining announcement returns in Chapter 4.

There is evidence that share returns measured around the release of a completion notice follow the trend established over a program, however this association is less pronounce for 'repeat' programs than for programs in general. In addition, completion returns of 'repeat' programs are more likely to be influenced by leverage considerations than for programs in general, a result that is consistent with those of Chapter 4 for program announcement returns despite an absence of association between completion rates and leverage found in Chapter 5.

In comparing results from regressions performed over the 3 day and 7 day event windows, findings demonstrate that outcomes for some variables may be sensitive to the time period over which completion returns are measured. For example, program announcement returns, lagged duration and share price volatility are more significant

in explaining completion returns of 'repeat' programs when measured over a 3 day event window whereas completion rates and concurrent share returns are more significant in explaining completion returns measured over a 7 day event window. These results indicate measuring abnormal performance over a longer event window increases the likelihood of capturing general market conditions or the market reaction to information not related to completion notices.

The research conducted in this chapter contributes to the literature of on-market share repurchase programs by investigating the information content of program completion notices. In Australia firms are required to inform the market when a program is completed and disclose to the market the total number of shares repurchased and consideration paid as well as the highest and lowest price paid for its shares. Literature to date has measured the impact of program announcements (see for example, Ikenberry et al., 1995; Ikenberry et al., 2000; Chan et al., 2004; Chan et al., 2007; Peyer and Vermaelen, 2009) and trading notices (Zhang, 2005; Wang et al., 2009; Akyol and Foo, 2013) but has not considered the information content of completion notices.

Although there is no supporting evidence of abnormal returns occurring around the release of completion notices, this chapter represents the first study to examine the market impact and provides evidence that is consistent with the market reconsidering firm quality initially assessed at the time a program is announced.

CHAPTER 7: SUMMARY AND FUTURE RESEARCH

The major aim of this thesis has been to examine whether on-market repurchase regulations of the Australian stock exchange are conducive to firms wishing to signal undervaluation of their shares. In particular this thesis explores whether specific information, such as intended program length, that is required to be disclosed in an announcement and other repurchase notices assist investors in differentiating between firm types and how firms conduct their programs. To this end, three research questions are formulated from which three separate studies relating to on-market repurchases are conducted and relevant hypotheses are developed and tested.

In Chapter 3 the information contained program announcements, completion notices and other relevant repurchase notices are collected and analysed. A total number of 789 program announcements are identified for the period 2000 - 2010, of which 459 are for 'repeat' programs and 769 are identified as completed by 15 March 2012. This thesis provides the largest study on program completion rates (Mitchell and Dharmawan, 2007; Akyol and Foo, 2013) and program announcements conducted since legislative changes were introduced in 1995 and 1998 (Farrugia et al., 2011) for on-market repurchase programs conducted in Australia.

Examination of program announcements reveal that the fraction of shares sought is higher than that reported in other Australian and overseas studies (Ikenberry et a., 1995; Stephens and Weisbach, 1998; Mitchell and Dharmawan, 2007; Bonaimé 2012; Akyol and Foo, 2013) and that management do not provide a clear motive for

engaging in repurchase programs, with most announcements indicating 'capital management' purposes or providing multiple reasons.

Examination of completion notices and daily repurchase notices reveal that on average 39.3% of the shares sought in a program are repurchased, representing 3% of outstanding shares. The completion rate is lower than that found in US studies (Stephens and Weisbach, 1998; Bonaimé, 2012) but is similar to that found in other studies conducted in Australia (Mitchell and Dharmawan, 2007; Akyol and Foo, 2013). Examination of mid-completion rates reveal that three quarters of the shares acquired are done so within the first half of a program and programs are completed well before that indicated in an announcement. This evidence indicates that although Australian firms are not as successful as their counterparts overseas in achieving their repurchase targets, they are committed to execute their programs over the shortest period of time.

Completion rates and program duration are found to be similar for 'initial' and 'repeat' programs, but programs motivated to increase EPS have the highest completion rates and shortest program duration whereas programs motivated by share price undervaluation have the lowest completion rates and longest program duration, demonstrating that the outcome of a program depends upon the motivation of the firm. Programs completed with a formal 3F notice have higher completion rates than programs that become inactive and lastly, firms that indicate an unlimited duration repurchase more shares than programs in general, yet on average take 1 month longer to execute.

Chapter 3 makes a contribution to the literature of on-market share repurchases by providing an analysis of intended program length, program duration and mid-completion rates, all of which have been compiled from repurchase notices and have not been considered in the literature so far. I also extend the number of Australian programs for analysis. In Chapter 4 the market reaction to program announcements is investigated. Evidence reveals that on-market program announcements provide positive news to the market and announcement returns are greater for 'initial' programs than for 'repeat' programs. These results confirm evidence produced in numerous other studies conducted both in Australia (Lamba and Ramsay, 2005; Lamba and Miranda, 2010; Akyol and Foo, 2013) and overseas (Vermaelen, 1981; Comment and Jarrell, 1991; Ikenberry et al., 1995; Stephens and Weisbach, 1998; Ikenberry et al., 2000).

In measuring the determinants of abnormal returns around announcements a negative association is found with intended program length, an association that has not been examined in the literature so far. This finding suggests that the shorter the period of time a firm intends to execute a program the greater the potential cost of false signalling and therefore the more the credible a signal to the market of the undervaluation of a firm's shares. Of interest, firms that indicate an unlimited duration earn a greater market response than firms indicating a fixed period duration.

Of surprise, the fraction of shares sought or repurchased in a program is not found to be a determinant of announcement returns, a finding that is inconsistent with many other studies (Comment and Jarrell, 1991; Ikenberry et al., 1995; Stephens and Weisbach, 1998; Jagannathan and Stephens, 2003; Chan et al., 2004; Bonaimé, 2012)

and undermines the importance of program size as a potential cost of false signalling in the Australian environment. Similarly, poor share price performance preceding an announcement is found to be a determinant of 'repeat' programs only, a finding that also contrasts with other studies (Comment and Jarrell, 1991; Stephens and Weisbach, 1998; Kahle, 2002) and suggests that the Australian market is sceptical of undervaluation as a motive for firms making an announcement for the first time, undermining undervaluation as a potential motive to repurchase shares. Also firms do not earn a repurchase reputation as found by Bonaimé (2012) for US firms, further mid-completion rates and program duration of prior programs do not explain announcement returns of current programs, undermining the importance of prior programs to the Australian share market in assessing current programs.

Chapter 4 makes a contribution to the literature by investigating the role of program duration and the 'speed' with which firms repurchase shares during a program as determinants of announcement returns, both factors that have not been considered in the literature so far. Although the number of shares repurchased at the midpoint of a program is not important to the market in evaluating program announcements, intended program length is.

Chapter 4 also makes a contribution by identifying a lack of association between announcement returns and program size for Australian programs. Since repurchased shares in Australia cannot be held as treasury stock, acquiring shares cannot be seen as transferring shares from outsiders to insiders as in countries such as the US, and therefore it is considered here that insiders of Australian firms are not seen as bearing the cost of false signalling in the same way. This conclusion has important

implications for firms wishing to signal undervaluation on the Australian share market and suggests that it is preferable assigning the shortest period of time possible over which to conduct a program rather than signalling undervaluation thru the fraction of shares sought.

In Chapter 5 the determinants of program completion rates is investigated. A negative association is found between completion rates and program duration whether measured as that intended in an announcement or in execution and demonstrates that firms are not only more likely to achieve their repurchase targets if a shorter intended duration is indicated but also the sooner the program is terminated ahead of time. This evidence reinforces the importance of intended program length to the market in assessing program announcements for firms wishing to show that they are committed to follow thru with their repurchase targets and signal that they are of a successful firm type.

Consistent with evidence of other studies, completion rates are negatively associated with program size, an indication that firms are less likely to follow thru with their repurchase intentions the more shares that are sought (Comment and Jarrell, 1991; Ikenberry et al., 1995, Ikenberry and Vermaelen, 1996; Stephens and Weisbach, 1998; Ikenberry et al., 2000; Jagannathan and Stephens, 2003; Chan et al., 2004; Bonaimé, 2012). A concern that is often raised in connection with on-market repurchases is that stocks with volatile shares prices are particularly suited to firms wishing to acquire shares at ‘cheap’ prices to the benefit of non-selling shareholders but evidence produced in Chapter 5 does not show this and demonstrates that transparency of on-

market repurchase programs in Australia are effective in deterring firms from engaging in opportunistic behaviour.

A positive association between completion rates and the range in price paid for shares is found, an indication that firms pay a higher price to repurchase more shares. This finding, together with the fact that completion rates of 'non-zero' programs are not negatively associated with share returns, is consistent with firms repurchasing shares out of management's disagreement with the market over the valuation of its shares rather than to arrest falling share prices.

Duration of prior programs is not a determinant of completion rates of current programs and mid-completion rates of prior programs is not a determinant of completion rates or mid-completion rates of current programs. This evidence confirms that lack of importance of these factors to explain announcement returns of 'repeat' programs found in Chapter 4. In contrast, a positive relationship between completion rates of successive programs is found, confirming evidence of other studies (Bonaimé, 2012; Andriosopoulos et al., 2013) despite the absence of support for a repurchase reputation found in Chapter 4.

A difference in the repurchasing behaviour of firms conducting '3F notice' programs and 'closed' programs is apparent, suggesting that their motivation may vary. For example, firms of '3F notice' programs avoid repurchasing shares at 'cheap' prices and are indifferent to falling share prices whereas firms of 'closed' programs repurchase shares to support falling share prices and are indifferent to repurchasing shares at 'cheap' prices. Also, when examining 'non-zero' programs duration is no

longer a determinant of completion rates for firms of 'closed' programs. This finding is indicative of firms conducting repurchase programs having different motivations. Finally, I note firms that nominate an unlimited duration have completion rates almost one percent higher than firms which elect a fixed period duration, providing support for the higher announcement returns found for 'unlimited duration' programs in Chapter 4.

Research from Chapter 5 makes several contributions to the literature of on-market share repurchase programs. A major contribution is the examination of completion notices (3F notices) filed with the ASX at the completion of a program. Firms in Australia are required to report the total number of shares acquired in a program and the total consideration paid for their shares. Literature to date has relied on other means to estimate the number of shares acquired during a program or over particular time periods of a program (Stephens and Weisbach, 1998; Banyi et al., 2008) whereas this study relies on that reported by firms themselves in final completion notices. Chapter 5 makes a further contribution by differentiating between programs that have become inactive from those that complete with a 3F notice and provides evidence that the repurchasing behaviour of firms conducting them differ.

A further contribution of Chapter 5 is the consideration of association between share price volatility, measured over the duration of a program, and completion rates. This evidence builds on the results of Bonaimé (2012), who measures the association of share price volatility measured prior to the commencement of a program on completion rates, and enables the repurchasing behaviour of firms to be observed under concurrent market conditions.

Also, following on from Chapter 4, Chapter 5 contributes to the literature by investigating the role of program duration in determining completion rates. Literature to date has not considered the role of duration as a potential cost to false signalling and therefore has not considered its impact upon completion rates. Consistent with the results of Chapter 4, this study finds that intended duration is a key factor in explaining completion rates for programs conducted in Australia as well as actual duration and demonstrates that firms are more likely to achieve repurchase targets the shorter the intended program duration and the quicker a program is executed.

Additionally, I extend the extant literature by examining the role of the range in price paid by a firm for its shares. Australian firms are required to disclose the highest and lowest price paid for its shares in a 3F notice in addition to the highest and lowest price paid to date in a 3E notice. The inclusion of this variable enables an examination of the impact of the price paid for shares on the outcome of a program and evidence produced in this chapter shows that firms are more likely to complete their targets the higher the price range paid for its shares. A final contribution is the investigation of whether firms are more likely to achieve repurchase targets the more shares that are repurchased by the intended midpoint of a program. Although no association is found, this study represents the first attempt to measure it.

In Chapter 6 the market reaction to completion notices is examined. Evidence reveals program completion notices do not impart new information to the market, indicating that completion notices are a confirmation of what the market already knows. A concern raised in this chapter is that the market may anticipate the outcome of program prior to the release of a 3F notice, however tests using an extended 7 day

event window demonstrate that the results are not sensitive to the time period over which completion returns are measured.

In investigating the determinants of completion returns, results demonstrate that the market reconsiders firm credibility originally signalled at the time a program is announced, particularly so for 'repeat' programs, however I do not find the market rewards firms that meet repurchase targets nor punishes firms that fail to meet them. Notwithstanding this, for 'repeat' programs a negative relationship between completion returns and completion rates exists, however its measurement is sensitive to the period over which the event is defined and the model used to derive abnormal returns.

Also, the market does not punish or reward firms for deviating from their intended program length but instead rewards firms for completing a prior program over the shortest period of time, suggesting that firms are evaluated based upon how quickly they complete prior programs rather how quickly they execute current programs. These results are inconsistent with those of Chapter 4 where intended program length is significant in explaining announcement returns and prior program duration is insignificant.

Firms that indicate an unlimited duration are not treated differently to firms indicating a fixed period duration unless they are for 'repeat' programs in which case they are penalised by the market. This evidence contrasts with that of Chapter 4 where announcement returns for programs where firms indicate an unlimited duration are not significantly different from those indicating a fixed period duration for 'repeat'

programs but are higher for programs in general. Also, the 'speed' with which firms repurchase their shares is unimportant in explaining completion returns, a result that is consistent with the lack of significance found in explaining announcement returns Chapter 4 and completion rates in Chapter 5.

Of interest, abnormal returns measured at the completion of a program follow the trend established over a program, confirming the lack of abnormal returns found for completion notices. This association is not significant for 'repeat' programs when announcement returns are measured over a 3 day event window, suggesting that the market response to 'repeat' programs is different to programs in general.

The research conducted Chapter 6 contributes to the literature of on-market share repurchase programs by investigating the information content of program completion notices. In Australia firms are required to inform the market when a program is completed and disclose to the market the total number of shares repurchased and consideration paid as well as the highest and lowest price paid for its shares. Literature to date has measured the impact of program announcements and trading notices but has not considered the information content of completion notices. Although there is no supporting evidence that completion notices provide useful information to investors, there is evidence that the market re-assesses firm credibility formed at the time a program is announced.

This thesis also makes contributes to policy makers. An important question arising from this thesis is why program size is not used by the Australian capital market to evaluate program announcements in the same way as in other countries. It is

considered here that since regulation prevents firms in Australia from holding acquired shares as treasury stock, to be later transferred to management in satisfaction of stock options, that repurchases are not seen as transferring shares from outside to insiders, which in turn is argued to convey a positive signal to the market (Vermaelen, 1981). Consequently, this may also reduce the motivation for firms to acquire shares and explain why completions rates in Australian are lower than in other countries. This also has important implications to policy makers in overseas jurisdictions where repurchased shares are held as treasury stock. Evidence from this thesis demonstrates that firms are able to use on-market repurchase programs to credibly signal undervaluation of their shares in the absence of the proviso that acquired shares can be held as treasury stock, which is open to abuse.

Another contribution is the transparency of the Australian repurchase environment deters firms from acquiring shares at 'cheap' prices to the benefit of non-selling shareholders. Evidence suggests transparency of repurchase transactions in Australia not only provides an environment conducive to firms wishing to signal undervaluation of their shares, but also affords protection to selling shareholders when firms acquire shares.

The absence of a significant market reaction to completion notices suggests that new information is not imparted to the market. Although this result is not surprising given that the information provided in program announcements, trading notices and other notices, there is evidence that for some programs at least, they are worthwhile and should be retained at least for programs that are completed ahead of time if their repurchase targets are not met.

Limitations and Future Research

This thesis has several limitations. Although this thesis attempts to control for potential biases that may arise due to the year in which programs are announced or the industry in which an announcing firms belongs by the inclusion of dummy variables, a bias may still be present in the measure of abnormal returns around program announcements and completion notices due to confounding events and therefore caution must be exercised when interpreting results of Chapters 4 and 6.

A potential limitation to the findings of this research is the value allocated for intended program length for 'unlimited duration' programs. Analysis of completion rates in Chapter 3 show that the average duration for such programs is well below the 36 month allocated for testing. Although this thesis attempts to control for this potential bias by the introduction of a dummy variable to signify programs of unlimited duration, future research would benefit from a revision of its measure to a shorter period and conduct separate tests for programs of unlimited duration.

Similarly, since 75% or more of the shares acquired during a program are done so within the first half of an intended program, the measure of completion rates at the midpoint of an intended program may not be an appropriate measure to capture repurchase 'speed' and therefore future research would benefit from a measure that captures partial completion rates earlier in a program.

There is also a potential problem with interpreting the results of Chapter 4 because of the number of programs that have become inactive ('closed' programs) which suggests that such firms may be driven by motivations other than signalling

undervaluation, and therefore future research would benefit from the separation of such programs for examination.

Lastly, an issue for this thesis is the identification of whether the market penalises or rewards firms that do not meet or exceed expectations. Given that the market may anticipate the outcome of a program ahead of completion, future research should consider an alternative methodology for testing purposes, such as separating programs which are completed ahead of time indicated in an announcement from those that run full duration or are extended.

Future research will benefit by the investigation of other information disclosed in announcements, such as the choice of broker(s) to administer a repurchase program. Given that literature on initial public offerings makes a connection between the quality of investment banker administering the transaction and the issue price of its shares, and literature on earnings forecasts makes a connection between the quality of the analyst performing a forecast and forecast accuracy, the literature for on-market repurchases would benefit from a similar focus on the choice of brokers.

APPENDIX

The purpose of this section is to provide information on the measurement of variables used in regressions and to provide results of robustness tests.

TABLE A.1

Description of All Independent Variables Used in Analyses

Table A.1 describes the measure of all independent variables used in regressions to test hypotheses. All financial variables are measured at reporting year end immediately prior to the repurchase announcement, period t-1 except variables which measure the change over two consecutive periods prior to announcement, period t-2 and period t-1.

Variable		Description
CAR (-1, 1)	=	Abnormal announcement returns measured over the event window (-1, 1) days relative to the program announcement. Daily abnormal returns are determined using the market model and summed over the event window. Parameters for the market model are estimated over a 100 day period beginning -165 days and ending -65 days relative to program announcement date.
Cash Balance	=	Cash and short term investments divided by market capitalisation.
Cash Flow	=	Operating cash flow divided by market capitalisation.
Completion Rate	=	The number of shares repurchased divided by the number of shares sought, as indicated in the announcement, truncated at 100%.
Completion Returns	=	Abnormal returns measured over the event window (-1, 1) days relative to the program announcement where the event is defined as the release of a 3F notice to the market. Daily abnormal returns are determined using the market adjusted returns model and summed over the event window.
ConCAR	=	CAR measured over the duration of the program, where daily abnormal returns are measured as the difference between returns on security j and the market index.
ConDeviation	=	The standard deviation of daily returns estimated over the duration of the program.
ConTurnover	=	The natural logarithm of the ratio of average daily trading volume for the duration of the program relative to shares outstanding indicated in the announcement.
Duration Ratio	=	The ratio of program length to intended length, truncated at 100% for programs where intended length and shares sought are extended.
Firm Size	=	Natural logarithm of market capitalisation.
Intended Length	=	The expected duration of the repurchase program as indicated in the announcement measured in months.

LagComprate	=	The number of shares repurchased divided by the number of shares sought as indicated in the announcement of the most recent prior program truncated at 100%.
LagDuration	=	The duration period, measured in months, of the most recent prior program divided by the intended program length as indicated in the announcement, also measured in months truncated at 100% for programs that have both the fraction of shares sought and program length extended.
LagSpeed	=	Repurchase speed of the most recent prior program, truncated at 100%.
MTB	=	Ratio of market capitalisation to book value of common equity.
Price Range	=	The ratio of the highest price paid to lowest price paid for shares repurchased minus one $\left({}^{\text{Highest price}}/_{\text{Lowest price}}\right) - 1.$
PreCAR	=	CAR measure over the time period (-40, -6) days relative to the announcement date using market model adjusted abnormal returns. Parameters for the market model are estimated over a 100 day period beginning -165 days and ending -65 days relative to program announcement date.
Program Size	=	The number of shares sought as indicated in the announcement represented as a percentage of shares outstanding.
Repurchase Speed	=	The number of shares repurchased divided by the number of shares sought at the halfway point of the intended program length, as indicated in the announcement, truncated at 100%.
Return Deviation	=	The standard deviation of daily returns estimated over the 100 day estimation trading period (-165, -65) days relative to the announcement date.
Time Lapse	=	The time period between current and prior repurchase program announcement dates, measured in months.
Turnover	=	The natural logarithm of the ratio of average daily trading volume for the period (-165, -10) days relative to the announcement date to shares outstanding indicated in the announcement.
Unlimited	=	This is a dummy variable that takes on the value of 1 if the intended length of a program, as indicated in the announcement, is unlimited.
ΔLeverage	=	The change in leverage ratio from period t-2 to period t-1 where leverage is measured as the ratio of short term and long term debt (including current portion of long term debt) to common equity.
ΔDividends	=	The change in dividend payout ratio from period t-2 to period t-1 where the dividend payout ratio is measured as the ratio of cash dividends paid on common shares to net income.
ΔEPS	=	The change in EPS from period t-2 to period t-1 where EPS is represented as the basic EPS measure provided in the annual report and calculated as the ratio of net income to outstanding common shares.

TABLE A.2

Regressions for All Announcements using 5 Day Event Window (-2, 2)

Table A.2 presents coefficient estimates from ordinary least squares (OLS) regressions describing 5 day abnormal returns around repurchase announcements using the market model to compute abnormal returns. Four versions of Equation (1) are presented with *CAR (-2, 2)* as the dependent variable. Model (1) presents the basic variables of Equation (1). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. Regressions are checked for autocorrelation using the Durbin-Watson statistic for first order autocorrelation and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0554	0.0767	0.079	0.0253
	(0.83)	(1.14)	(1.17)	(0.37)
Intended Length	-0.0008[b]	-0.0032[b]	-0.003[a]	-0.0033[a]
	(-2.39)	(-2.56)	(-2.71)	(-2.62)
Duration Ratio	-0.0056	-0.0080[c]	-0.008[c]	-0.0077
	(-1.21)	(-1.66)	(-1.72)	(-1.54)
Program Size	-0.0371	0.0178	0.035	0.0451
	(-0.48)	(0.22)	(0.43)	(0.56)
Completion Rate	0.0305[c]	0.0296[c]	0.035[c]	0.0336[c]
	(1.76)	(1.67)	(1.92)	(1.84)
Repurchase Speed	-0.0413[b]	-0.0434[b]	-0.047[b]	-0.0492[b]
	(-2.11)	(-2.18)	(-2.31)	(-2.39)
PreCAR	0.0042	0.0027	0.003	-0.0001
	(0.19)	(0.12)	(0.11)	(0)
MTB	-0.0020	-0.002	-0.003[b]	-0.0026[b]
	(-1.56)	(-1.56)	(-2.09)	(-2.1)
Firm Size	0.0004	0.0006	0.001	0.0021
	(0.18)	(0.3)	(0.61)	(1.01)
Cash Balance	0.0137[c]	0.0145[c]	0.018[b]	0.0174[b]
	(1.73)	(1.83)	(2.19)	(2.23)
Cash Flow	0.0156	0.0135	0.006	0.0090
	(1.16)	(1.02)	(0.47)	(0.68)
ΔLeverage	0.0000	0.0000	0.000	0.0000
	(0.74)	(0.78)	(0.57)	(0.63)
ΔDividends	0.0000	0.0000	0.000	0.0000
	(-1.09)	(-1.14)	(-1.2)	(-1.36)
ΔEPS	-0.0071	-0.0065	-0.005	-0.0079
	(-0.69)	(-0.64)	(-0.54)	(-0.78)
Return Deviation	1.2169[a]	1.2110[a]	1.060[a]	1.3108[a]
	(4)	(3.97)	(3.02)	(3.59)
Turnover	0.0038	0.0040	0.002	0.0016
	(1.19)	(1.27)	(0.71)	(0.5)
Unlimited Duration (dummy)	-	0.0659[b]	0.070[b]	0.0654[b]
		(2.02)	(2.1)	(2.01)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0716	0.0762	0.0916	0.0999
No observations	759	759	759	759

TABLE A.3

Regressions for All Announcements using Raw Data

Table A.3 presents coefficient estimates from ordinary least squares (OLS) regressions describing 3 day abnormal returns around on-market share repurchase announcements using the market model to compute abnormal returns. Four versions of Equation (1) are presented with *CAR (-1, 1)* as the dependent variable. Model (1) presents the basic variables of Equation (1). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. All models include variables that are not winsorised. A description of all variables is provided in Table A.1 of the Appendix. Regressions are checked for autocorrelation using the Durbin-Watson statistic for first order autocorrelation and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0282	0.0412	0.0219	-0.0099
	(0.44)	(0.64)	(0.34)	(-0.15)
Intended Length	-0.0007[b]	-0.0022[c]	-0.0022[c]	-0.0022[c]
	(-2.06)	(-1.95)	(-1.95)	(-1.95)
Duration Ratio	-0.0008	-0.0016	-0.0014	-0.0009
	(-0.31)	(-0.64)	(-0.55)	(-0.34)
Program Size	-0.0021	0.0283	0.0422	0.0550
	(-0.03)	(0.35)	(0.52)	(0.69)
Completion Rate	0.0122	0.0112	0.0148	0.0147
	(0.7)	(0.63)	(0.82)	(0.8)
Repurchase Speed	-0.0313	-0.0321	-0.0342[c]	-0.0381[c]
	(-1.6)	(-1.63)	(-1.73)	(-1.89)
PreCAR	0.0019	0.0011	0.0020	-0.0003
	(0.08)	(0.04)	(0.08)	(-0.01)
MTB	-0.0015[c]	-0.0015[c]	-0.0018[b]	-0.0019[b]
	(-1.76)	(-1.77)	(-2.1)	(-2.27)
Firm Size	0.0011	0.0013	0.0018	0.0023
	(0.57)	(0.63)	(0.89)	(1.12)
Cash Balance	0.0021[a]	0.0021[a]	0.0026[a]	0.0024[a]
	(2.69)	(2.62)	(3.06)	(3.02)
Cash Flow	-0.0007	-0.0006	-0.0009	-0.0010[c]
	(-1.41)	(-1.24)[b]	(-1.58)	(-1.82)
ΔLeverage	0.0000[b]	0.0000[b]	0.0000[b]	0.0000[c]
	(2.23)	(2.29)	(1.98)	(1.95)
ΔDividends	0.0000[a]	0.0000[a]	0.0000[b]	0.0000
	(-3.77)	(-3.97)	(-2.14)	(-1.55)
ΔEPS	-0.0125[a]	-0.0124[a]	-0.0122[a]	-0.0124[a]
	(-3.54)	(-3.47)	(-3.68)	(-4.05)
Return Deviation	0.9401[a]	0.9447[a]	0.8439[b]	1.0324[a]
	(3.06)	(3.06)	(2.37)	(2.74)
Turnover	0.0024	0.0025	0.0011	0.0005
	(0.84)	(0.88)	(0.35)	(0.16)
Unlimited Duration (dummy)	-	0.0421	0.0409	0.0407
		(1.42)	(1.35)	(1.35)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.07	0.0714	0.0789	0.0821
No observations	759	759	759	759

TABLE A.4

Regressions for Repeat Announcements using 5 Day Event Window (-2, 2)

Table A.4 presents coefficient estimates from ordinary least squares (OLS) regression describing 5 day returns around 'repeat' repurchase announcements using the market model to compute abnormal returns. Four versions of Equation (2) are presented with *CAR (-2, 2)* as the dependent variable. Four versions of Equation (2) are presented. Model (1) presents the basic variables of Equation (2). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate LagComprate, Repurchase Speed* and *LagSpeed* which are truncated at 100%.. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0715	0.0854	0.0431	0.0130
	(0.84)	(1.03)	(0.5)	(0.15)
LagDuration	-0.0082	-0.0098	-0.0085	-0.0085
	(-1)	(-1.23)	(-1.11)	(-1.12)
LagSpeed	0.0119	0.0107	0.0064	0.0034
	(0.62)	(0.56)	(0.34)	(0.18)
LagComprate	0.0000	-0.0025	0.0036	0.0063
	(0)	(-0.16)	(0.24)	(0.41)
Intended Length	-0.0010[a]	-0.0028[b]	-0.0029[b]	-0.0029[b]
	(-2.6)	(-2.24)	(-2.26)	(-2.2)
Repurchase Speed	-0.0050	-0.0053	-0.0051	-0.0077
	(-0.4)	(-0.42)	(-0.41)	(-0.62)
Program Size	-0.1128	-0.0670	-0.0641	-0.0613
	(-1.37)	(-0.75)	(-0.7)	(-0.67)
PreCAR	-0.0125	-0.0128	-0.0136	-0.0104
	(-0.41)	(-0.42)	(-0.46)	(-0.35)
MTB	-0.0015	-0.0015	-0.0021[c]	-0.0022[c]
	(-1.27)	(-1.23)	(-1.73)	(-1.78)
Firm Size	-0.0012	-0.0010	0.0006	0.0013
	(-0.57)	(-0.44)	(0.28)	(0.58)
Cash Balance	0.0044	0.0051	0.0081	0.0087
	(0.47)	(0.55)	(0.86)	(0.9)
Cash Flow	0.0290	0.0264	0.0157	0.0158
	(1.58)	(1.46)	(0.84)	(0.85)
ΔLeverage	0.0002[a]	0.0002[a]	0.0002[a]	0.0002[a]
	(4.8)	(4.94)	(4.21)	(4.54)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-0.47)	(-0.49)	(-0.71)	(-0.93)
ΔEPS	0.0041	0.0047	0.0075	0.0055
	(0.41)	(0.48)	(0.76)	(0.53)
Return Deviation	0.8711[b]	0.8594[b]	0.8139[c]	0.9726[b]
	(2.27)	(2.24)	(1.92)	(2.1)
Turnover	0.0026	0.0027	0.0003	0.0003
	(0.61)	(0.66)	(0.07)	(0.08)
Time Lapse	0.0005[b]	0.0005[b]	0.0004[c]	0.0004[c]
	(2.03)	(2.09)	(1.78)	(1.69)
Unlimited Duration (dummy)	-	0.0537	0.0594[c]	0.0594
		(1.58)	(1.66)	(1.64)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0704	0.0736	0.0875	0.0766
No observations	452	452	452	452

TABLE A.5

Regressions for Repeat Announcements using Raw Data

Table A.5 presents coefficient estimates from ordinary least squares (OLS) regression describing 3-day returns around 'repeat' repurchase announcements using raw returns to compute abnormal returns. Four versions of Equation (2) are presented with *CAR (-1, 1)* as the dependent variable. Model (1) presents the basic variables of Equation (2). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. All models include variables that are not winsorised. A description of all variables is provided in Table A.1 of the Appendix. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0501	0.0573	0.0057	-0.0178
	(0.59)	(0.68)	(0.07)	(-0.21)
LagDuration	-0.0048	-0.0055	-0.0047	-0.0052
	(-0.72)	(-0.83)	(-0.75)	(-0.85)
LagSpeed	0.0317	0.0310	0.0264	0.0224
	(1.49)	(1.46)	(1.3)	(1.12)
LagComprate	-0.0098	-0.0112	-0.0074	-0.0045
	(-0.61)	(-0.69)	(-0.48)	(-0.29)
Intended Length	-0.0010[b]	-0.0019	-0.0021[c]	-0.0022[c]
	(-2.48)	(-1.63)	(-1.77)	(-1.77)
Repurchase Speed	-0.0122	-0.0125	-0.0131	-0.0169
	(-0.99)	(-1.02)	(-1.09)	(-1.38)
Program Size	-0.0334	-0.0124	0.0047	0.0038
	(-0.37)	(-0.13)	(0.05)	(0.04)
PreCAR	-0.0189	-0.0187	-0.0192	-0.0190
	(-0.51)	(-0.5)	(-0.51)	(-0.52)
MTB	-0.0018[c]	-0.0018[c]	-0.0020[b]	-0.0022[b]
	(-1.76)	(-1.75)	(-1.99)	(-2.06)
Firm Size	-0.0001	0.0001	0.0019	0.0024
	(-0.02)	(0.03)	(0.79)	(1.05)
Cash Balance	-0.0007	-0.0007	-0.0004	-0.0002
	(-0.85)	(-0.84)	(-0.4)	(-0.26)
Cash Flow	0.0010	0.0010[c]	0.0009	0.0006
	(1.61)	(1.65)	(1.41)	(0.94)
ΔLeverage	0.0001[a]	0.0001[a]	0.0001[a]	0.0001[a]
	(3.46)	(3.54)	(3.03)	(2.95)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-0.86)	(-0.83)	(-0.95)	(-0.99)
ΔEPS	0.0031	0.0033	0.0034	0.0019
	(0.61)	(0.65)	(0.66)	(0.34)
Return Deviation	1.0282[c]	1.0287[c]	1.1000[c]	1.2831[b]
	(1.94)	(1.93)	(1.83)	(1.97)
Turnover	0.0030	0.0031	0.0029	0.0028
	(0.77)	(0.79)	(0.67)	(0.64)
Time Lapse	0.0004	0.0004	0.0004	0.0003
	(1.25)	(1.27)	(1.15)	(1.08)
Unlimited Duration (dummy)	-	0.0280	0.0327	0.0367
		(0.84)	(0.95)	(1.02)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0734	0.0727	0.0900	0.0823
No observations	452	452	452	452

TABLE A.6

Announcement Returns for all Completion Notices

Table A.6 reports the mean market reaction to completion notices of 'repeat' on-market share repurchases by event windows, (-1, 1), (-2, 2) and (-5, 1) for winsorised data and (-1, 1) for raw data with t-statistics in the parentheses. Announcement period returns are calculated using the market model with abnormal returns summed over the event window. Winsorised data are winsorised at the 1st and 99th percentiles. All results are insignificant.

PANEL A. All programs (n = 458)

Variable	Mean
CAR (-1,1) (winsorised)	0.001
CAR (-2,2) (winsorised)	-0.001
CAR (-5,1) (winsorised)	-0.001
CAR (-1,1) (raw data)	0.000

TABLE A.7

Announcement Returns for Repeat Completion Notices

Table A.7 reports the mean market reaction to completion notices of 'repeat' on-market share repurchases by event windows, (-1, 1), (-2, 2) and (-5, 1) for winsorised data and (-1, 1) for raw data with t-statistics in the parentheses. Announcement period returns are calculated using the market model with abnormal returns summed over the event window. Winsorised data are winsorised at the 1st and 99th percentiles. All results are insignificant.

Panel A. All completions (n = 271)

Variable	Mean
CAR (-1,1) (winsorised)	-0.001
CAR (-2,2) (winsorised)	0.000
CAR (-5,1) (winsorised)	0.000
CAR (-1,1) (raw data)	0.002

TABLE A.8

Regressions for All Completion Notices (-1, 1)

Table A.8 presents coefficient estimates from ordinary least squares (OLS) regression describing share returns around the release of 3F notices using the market model to compute abnormal returns. Panel A presents estimates with dependent variable, *Completion Returns*, measured over the 3 day event window and Panel B presents estimates measured over the 7 day event window. Four versions of Equation (5) are presented. Model (1) presents the basic variables of Equation (5). Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively.

Panel A. (-1,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0181	0.019	0.0691[c]	0.0512
	(0.64)	(0.69)	(1.65)	(1.12)
Completion Rate	-0.0218[b]	-0.022[b]	-0.0160	-0.0166
	(-2.02)	(-2.04)	(-1.5)	(-1.52)
Duration Ratio	-0.0044	-0.005	-0.0047	-0.0049
	(-0.84)	(-0.94)	(-0.93)	(-0.97)
Repurchase Speed	0.0034	0.004	0.0008	0.0020
	(0.3)	(0.35)	(0.07)	(0.17)
CAR (-1, 1)	-0.0531	-0.055	-0.0594	-0.0655[c]
	(-1.44)	(-1.49)	(-1.6)	(-1.75)
MTB	-0.0013	-0.001	-0.0014	-0.0015[c]
	(-1.44)	(-1.47)	(-1.56)	(-1.65)
Firm Size	0.0011	0.001	-0.0002	-0.0001
	(0.73)	(0.72)	(-0.15)	(-0.08)
Cash Balance	0.0045	0.004	0.0060	0.0080
	(0.83)	(0.79)	(1.06)	(1.37)
Cash Flow	0.0007	0.000	-0.0009	-0.0012
	(0.05)	(0.03)	(-0.06)	(-0.08)
ΔLeverage	0.0000	0.000	0.0000	0.0000
	(0.13)	(0.1)	(0.51)	(0.53)
ΔDividends	0.0000	0.000	0.0000	0.0000
	(-0.38)	(-0.37)	(-0.44)	(-0.29)
ΔEPS	0.0077	0.008	0.0080	0.0063
	(0.87)	(0.88)	(0.94)	(0.73)
ConCAR	0.0268[a]	0.027[a]	0.0263[a]	0.0277[a]
	(2.79)	(2.8)	(2.83)	(3.08)
ConDeviation	0.4418[c]	0.437[c]	0.2969	0.3762
	(1.71)	(1.68)	(1.21)	(1.47)
ConTurnover	0.0022	0.002	0.0019	0.0009
	(1.29)	(1.32)	(0.93)	(0.38)
Unlimited Duration (Dummy)		-0.005	-0.0092	-0.0089
		(-0.53)	(-1.15)	(-1.12)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0497	0.048	0.0759	0.0676
No observations	445	445	445	445

Panel B. (-5,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0325	0.0332	0.1069	0.0865
	(0.41)	(0.42)	(1.21)	(0.87)
Completion Rate	-0.0293[c]	-0.0296[c]	-0.0179	-0.0196
	(-1.85)	(-1.85)	(-1.12)	(-1.24)
Duration Ratio	-0.0030	-0.0036	-0.0047	-0.0043
	(-0.4)	(-0.46)	(-0.65)	(-0.59)
Repurchase Speed	0.0174	0.0180	0.0105	0.0115
	(1.06)	(1.09)	(0.64)	(0.7)
CAR (-1, 1)	-0.0517	-0.0530	-0.0710	-0.0759
	(-0.85)	(-0.86)	(-1.18)	(-1.27)
MTB	-0.0027[b]	-0.0027[b]	-0.0035[b]	-0.0036[b]
	(-1.98)	(-2)	(-2.51)	(-2.54)
Firm Size	0.0000	0.0000	0.0000	0.0001
	(0)	(-0.01)	(-0.01)	(0.03)
Cash Balance	-0.0113	-0.0115	-0.0090	-0.0085
	(-1.09)	(-1.1)	(-0.87)	(-0.82)
Cash Flow	-0.0114	-0.0116	-0.0138	-0.0134
	(-0.53)	(-0.54)	(-0.65)	(-0.64)
ΔLeverage	0.0000	0.0000	0.0000	0.0000
	(-0.01)	(-0.02)	(0.37)	(0.46)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-0.8)	(-0.79)	(-0.86)	(-0.62)
ΔEPS	0.0160	0.0161	0.0154	0.0127
	(1.22)	(1.23)	(1.23)	(1.06)
ConCAR	0.0493[a]	0.0495[a]	0.0524[a]	0.0541[a]
	(3.48)	(3.48)	(3.74)	(3.74)
ConDeviation	0.0875	0.0832	-0.1356	-0.0413
	(0.24)	(0.22)	(-0.37)	(-0.11)
ConTurnover	0.0011	0.0010	0.0009	-0.0010
	(0.22)	(0.21)	(0.18)	(-0.17)
Unlimited Duration (Dummy)		-0.0041	-0.0097	-0.0098
		(-0.3)	(-0.84)	(-0.85)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0381	0.036	0.078	0.0675
No observations	445	445	445	445

TABLE A.9

Regressions for Repeat Completion Notices (-1, 1)

Table A.9 presents coefficient estimates from ordinary least squares (OLS) regression describing share returns around the release of 3F notices using the market model to compute abnormal returns. Panel A presents estimates with dependent variable, *Completion Returns*, measured over the 3 day event window and Panel B presents estimates measured over the 7 day event window. Four versions of Equation (6) are presented. Dummy variable, *Unlimited Duration*, is included in models (2) – (4), industry dummy variables are included in models (3) and (4), and dummy variables for year of program announcement are included in model (4) only. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate* and *Repurchase Speed* which are truncated at 100%. Regressions are checked for autocorrelaton using the Durbin-Watson statistic for first order autocorrelaton and all regression coefficients are estimated using the White (1980) procedure to compute heteroscedasticity consistent t-statistics, which are provided in parentheses. a, b and c represent significance at the 1%, 5% and 10% levels respectively

Panel A. (-1,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0041	0.0041	0.0344	0.0494
	(0.09)	(0.1)	(0.55)	(0.77)
Completion Rate	-0.0258[c]	-0.0258[c]	-0.0250[c]	-0.0228[c]
	(-1.82)	(-1.8)	(-1.83)	(-1.72)
LagComprate	0.0133	0.0133	0.0132	0.0080
	(0.82)	(0.82)	(0.79)	(0.47)
Duration Ratio	-0.0026	-0.0026	0.0000	0.0003
	(-0.38)	(-0.37)	(0.01)	(0.04)
LagDuration	-0.0119[c]	-0.0119[c]	-0.0142[b]	-0.0135[b]
	(-1.89)	(-1.94)	(-2.25)	(-2.25)
Repurchase Speed	0.0027	0.0027	0.0043	0.0055
	(0.17)	(0.17)	(0.29)	(0.38)
LagSpeed	-0.0123	-0.0123	-0.0127	-0.0083
	(-0.72)	(-0.72)	(-0.73)	(-0.49)
CAR (-1, 1)	-0.1764[a]	-0.1764[a]	-0.1551[b]	-0.1601[b]
	(-2.68)	(-2.69)	(-2.46)	(-2.59)
MTB	-0.0018	-0.0018	-0.0015	-0.0014
	(-1.59)	(-1.59)	(-1.35)	(-1.2)
Firm Size	0.0012	0.0012	-0.0012	-0.0019
	(0.54)	(0.54)	(-0.55)	(-0.9)
Cash Balance	-0.0052	-0.0052	-0.0037	-0.0016
	(-0.53)	(-0.53)	(-0.39)	(-0.15)
Cash Flow	0.0167	0.0167	0.0150	0.0147
	(0.89)	(0.89)	(0.83)	(0.86)
ΔLeverage	0.0001[c]	0.0001[c]	0.0001[a]	0.0001[b]
	(1.96)	(1.96)	(2.72)	(2.47)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(-0.12)	(-0.12)	(0.33)	(0.25)
ΔEPS	0.0090	0.0090	0.0106	0.0119
	(0.92)	(0.91)	(1.14)	(1.19)
ConCAR	0.0083	0.0083	0.0096	0.0102
	(0.57)	(0.57)	(0.74)	(0.77)
ConDeviation	1.2909[a]	1.2909[a]	1.0137[b]	0.9538[b]
	(2.73)	(2.7)	(2.48)	(2.33)
ConTurnover	0.0019	0.0019	-0.0014	-0.0013
	(0.96)	(0.99)	(-0.58)	(-0.44)
Time Lapse	0.0001	0.0001	0.0000	0.0000
	(0.41)	(0.41)	(0.21)	(-0.03)
Unlimited Duration		0.0000	-0.0195[b]	-0.0204[b]
(Dummy)		(0)	(-2.35)	(-2.42)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.093	0.0894	0.2091	0.1898
No observations	268	268	268	268

Panel B. (-5,1)

	Parameter Estimate			
Variable	(1)	(2)	(3)	(4)
Intercept	0.0979	0.0975	0.1424	0.1647
	(1.2)	(1.2)	(1.23)	(1.41)
Completion Rate	-0.0439[a]	-0.0446[a]	-0.0415[b]	-0.0389[b]
	(-2.68)	(-2.69)	(-2.32)	(-2.17)
LagComprate	0.0095	0.0098	0.0152	0.0101
	(0.41)	(0.42)	(0.65)	(0.42)
Duration Ratio	-0.0054	-0.0062	-0.0041	-0.0037
	(-0.72)	(-0.82)	(-0.64)	(-0.55)
LagDuration	-0.0060	-0.0064	-0.0121	-0.0111
	(-0.66)	(-0.72)	(-1.11)	(-1.02)
Repurchase Speed	0.0091	0.0097	0.0084	0.0090
	(0.49)	(0.53)	(0.45)	(0.48)
LagSpeed	0.0013	0.0014	-0.0053	0.0028
	(0.05)	(0.06)	(-0.21)	(0.11)
CAR (-1, 1)	-0.1284	-0.1307	-0.1105	-0.1236
	(-1.46)	(-1.49)	(-1.32)	(-1.49)
MTB	-0.0009	-0.0009	-0.0014	-0.0014
	(-0.52)	(-0.54)	(-0.88)	(-0.85)
Firm Size	0.0003	0.0002	-0.0001	-0.0004
	(0.09)	(0.06)	(-0.02)	(-0.16)
Cash Balance	-0.0112	-0.0112	-0.0117	-0.0113
	(-0.8)	(-0.8)	(-0.85)	(-0.78)
Cash Flow	0.0241	0.0241	0.0234	0.0233
	(0.99)	(0.99)	(1.03)	(1.06)
ΔLeverage	0.0002[c]	0.0002[c]	0.0002[a]	0.0002[a]
	(1.83)	(1.83)	(2.6)	(2.71)
ΔDividends	0.0000	0.0000	0.0000	0.0000
	(0.54)	(0.56)	(0.89)	(0.99)
ΔEPS	0.0098	0.0099	0.0101	0.0110
	(0.67)	(0.68)	(0.77)	(0.83)
ConCAR	0.0351[c]	0.0351[c]	0.0411[b]	0.0427[b]
	(1.78)	(1.78)	(2.28)	(2.26)
ConDeviation	0.7854	0.7691	0.3449	0.3106
	(1.14)	(1.1)	(0.57)	(0.5)
ConTurnover	0.0063	0.0060	0.0033	0.0036
	(1.43)	(1.41)	(0.59)	(0.56)
Time Lapse	0.0004[c]	0.0004[c]	0.0004	0.0004
	(1.84)	(1.86)	(1.53)	(1.53)
Unlimited Duration (Dummy)		-0.0073	-0.0340[b]	-0.0349[a]
		(-0.33)	(-2.57)	(-2.68)
Industry Fixed Effects	-	-	Yes	Yes
Year Fixed Effects	-	-	-	Yes
Adjusted RSQ	0.0459	0.0426	0.1922	0.1695
No observations	268	268	268	268

TABLE A.10

Correlation Matrix

Table A.10 presents the correlation matrix for independent variables used throughout the thesis. A description of all variables is provided in Table A.1 of the Appendix. All variables are winsorised at the 1st and 99th percentiles except for *Completion Rate*, *Repurchase Speed, LagComprate* and *LagSpeed* which are truncated at 100%.

		Variable																	
	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1)	Cash Balance	1.000																	
(2)	Cash Flow	-0.125	1.000																
(3)	Completion Rate	0.005	0.021	1.000															
(4)	ConCAR	0.152	0.038	-0.063	1.000														
(5)	ConDeviation	0.158	-0.131	-0.145	0.216	1.000													
(6)	ConTurnover	-0.025	0.061	0.135	-0.014	-0.015	1.000												
(7)	Duration Ratio	-0.077	0.055	-0.069	0.068	-0.017	-0.079	1.000											
(8)	Firm Size	-0.313	0.136	0.141	-0.176	-0.415	-0.030	0.041	1.000										
(9)	Intended Length	-0.011	0.006	-0.020	-0.016	-0.047	0.021	-0.447	0.035	1.000									
(10)	MTB	-0.235	-0.017	0.057	-0.042	-0.016	-0.046	0.033	0.270	-0.045	1.000								
(11)	PreCAR	0.019	0.069	0.011	0.002	-0.035	-0.012	0.026	-0.002	0.021	-0.086	1.000							
(12)	Program Size	0.148	-0.007	-0.293	0.066	0.127	0.047	-0.002	-0.300	0.027	-0.230	0.010	1.000						
(13)	Repurchase Speed	0.002	0.021	0.862	-0.056	-0.094	0.169	-0.248	0.098	0.063	0.041	0.003	-0.257	1.000					
(14)	Return Deviation	0.248	-0.206	-0.088	0.284	0.659	-0.051	-0.010	-0.526	-0.056	-0.064	-0.010	0.165	-0.070	1.000				
(15)	Turnover	-0.040	0.158	0.189	-0.014	-0.164	0.137	-0.078	0.339	0.069	0.082	-0.008	-0.092	0.160	-0.160	1.000			

(16)	ΔLeverage	-0.029	-0.131	0.012	0.003	0.011	0.031	0.010	0.039	-0.089	0.042	-0.056	-0.012	0.001	-0.035	-0.039	1.000		
(17)	ΔDividends	-0.041	0.014	0.021	-0.064	-0.003	0.005	-0.030	0.013	0.009	0.041	0.004	-0.072	0.048	-0.022	0.061	0.034	1.000	
(18)	ΔEPS	-0.025	0.008	-0.055	-0.036	-0.020	-0.040	0.017	0.071	0.086	0.068	0.016	-0.059	-0.060	-0.049	0.054	-0.041	0.051	1.000

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