

On or Off? That is the question.

Abstract

The volume and value of share repurchases in Australia has increased considerably since regulations were simplified in 1995. This paper examines 48 major Australian industrial corporations that repurchased shares over the period 1997-2007 to determine the factors that influence management choice of buyback method between on- and off-market buybacks. An inter-related set of factors is at work, with managers favouring off-market buybacks to distribute excess franking credits to shareholders, when the buyback is bigger and when the firm is generating more cash. In contrast on-market buybacks are more likely when the firm is undervalued, and when there are more employee stock options on issue. Overall, these findings have implications for understanding the impact of taxes on corporate financial policy, how corporate managers approach the repurchase decision and how transaction costs can influence the choice between an off-market and an on-market buyback.

Keywords: Buybacks, Repurchases, Taxation, On-Market, Off-Market

1. Introduction

Share repurchases form an important component of a modern corporation's overall payout policy. In Australia The First Corporate Law Simplification Act (1995) altered the Corporations Act requirements surrounding share buybacks, paving the way for their increased use as a method of capital management. Within this framework companies can repurchase shares on-market in the ordinary course of trading on the stock exchange. Or a company can buy back shares off-market, in which case for an 'equal access' repurchase the company makes a uniform offer to repurchase the shares of eligible shareholders at a fixed price or a price determined by a tender process. A natural question to ask is what factors affect managerial choice between on- and off-market buybacks. Answering that question is the focus of this paper.

Academic studies have typically investigated the drivers of the decision to undertake a buyback but not the motivations behind choosing between different methods of doing so. US based studies have identified the main motivations as signalling undervaluation (Barclay and Smith (1988), Dann (1981) Hertz and Jain (1991) and Vermaelen (1981 and 1984), distribution of free cash flow (Stephens and Weisbach (1998), Dittmar (2000) and Grullon and Michaely (2004)), as a substitute for dividends (Grullon and Michaely (2002)) or as a flexible alternative to dividends for large one-off dispersions (Brennan and Thakor (1990), Jagannathan et al (2000), Guay and Harford (2000) and Skinner (2008)). A buyback increases the debt-equity ratio and can be used to move the company towards an optimal capital structure (Bagwell and Shoven (1988), Lie (2002), Hovakimian et al (2001), Hovakimian (2004), Oded (2005)) and can be used as a takeover defence (Bagwell (1991)).

Australian studies on buybacks include studies using data before or around the 1995 changes to the Corporations Act by Mitchell and Robinson (1999) and Lamba and Ramsey (2005). Mitchell et al (2001) provide early survey evidence of managers' motivations for undertaking buybacks. Brown and Efthim (2005) study the tax effects of off-market buybacks, Brown (2007) examines the announcement effects of off-market buybacks while Balachandran and Faff (2004) compare announcement effects of on-market buybacks to other methods of cash dispersion. Mitchell and Dharmawan (2007) provide a comprehensive study of motivations for on-market buybacks. Using data over 1996 to 2001

they find that the probability of undertaking an on-market buyback in Australia is influenced by signalling related to undervaluation and free cash flows and also by leverage parameters.

The focus of this paper is different from previous buyback studies. We are interested in the choice that managers make between on-market and off-market repurchases in Australia, where special tax arrangements apply to off-market repurchases for participating shareholders.² Our paper is the first to examine the factors that affect managers' choice of repurchase method. We also develop a simple model of the costs associated with on- and off-market buybacks and test the predictions of the model.

While on- and off-market repurchases in Australia share similar definitions and features to their counterparts in other countries their tax consequences are quite unique. Off-market repurchases in Australia typically specify that some part of the repurchase price is to take the form of a dividend. Then because Australia operates under a full dividend imputation system the dividend component can (but need not) have attached tax credits.³ The remainder is regarded as the capital component or sale price for capital gains tax purposes. Therefore the structure for off-market repurchases in Australia provides considerable tax benefits for some shareholders and raises an important question as to whether companies will be primarily driven by tax considerations when weighing up the choice between on- and off-market repurchases.

Overall we find that firms are more likely to choose off-market buybacks when they repurchase more shares and when they have excess tax credits that they wish to distribute to shareholders. In addition free cash flows and leverage levels also influence the likelihood of choosing an off-market over an on-market repurchase. In contrast, firms are more likely to favour on-market buybacks to take advantage of undervaluation, and when there are more employee stock options on issue.

These findings are important because they reinforce the view that both taxation

² The terms 'repurchase' and 'buyback' will be used interchangeably throughout the paper. Off-market repurchases are often termed self-tender offers in the US and on-market repurchases, where the company repurchases shares on the stock market through a broker, are termed open-market repurchases in the US.

³ Tax paid at the company level results in the accumulation of imputation franking credits, which are passed on as a tax credit to shareholders and as imputed taxable income when they receive dividends paid from after-company-tax profits. The franking credits are then used by the shareholder to reduce personal income tax, dollar for dollar.

implications and transactions costs matter when it comes to choosing the type of share buyback to undertake. The empirical evidence demonstrates that Australia's unique taxation treatment of off-market buybacks provides an incentive for corporate managers to repurchase shares off-market, in order to distribute excess franking credits to low marginal tax rate investors who would prefer to sell shares into the buyback than in the open market. It is worth noting that this result differs markedly when compared to the typical tax treatment of open market buybacks in a classical taxation system such as exists in the US. The costs associated with on-market buybacks become increasingly prohibitive as the buyback volume increases. Consistent with our model predictions we find empirical evidence that shows that as the volume of shares repurchased increases, firms' propensity to repurchase off-market increases.

The rest of the paper is organised as follows. Section 2 describes the taxation structure for buybacks in Australia, develops a model of transaction costs, then discusses traditional motivations for undertaking buybacks in the light of the choice of method. This section includes the development of hypotheses related to the effect of differential taxation treatment and costs on the choice of buyback method. Section 3 outlines the methodology, including a description of the data and the econometric models. Section 4 presents the results, and Section 5 concludes.

2. A Comparison of On- and Off- Market Buybacks in Australia

2.1 Tax treatment

Integral to the consideration of the taxation of buybacks is the Australian dividend imputation tax system, whereby dividends paid by Australian companies carry tax credits for the tax paid by the company on the profits from which the dividend has been distributed. Resident shareholders declare the dividend (grossed up to equal the pre-company-tax profit from which the dividend was paid) as income, and then the tax credit is used to offset personal income tax obligations.⁴ Overseas investors cannot use the franking

⁴ Australian resident individuals, complying superannuation funds, registered organisations and life assurance companies may use distributed franking credits to offset their tax liabilities. If all the franking credits are distributed, and all recipients are able to fully utilise them, then the imputation system effectively eliminates the double taxation of dividends (Officer, 1994).

credits. Under the imputation system resident companies generate imputation or ‘franking credits’ for the company tax paid. These credits accumulate in the company franking account which keeps track of the income tax credits that can be passed on to shareholders. The franking account balance (FAB) increases with franking credits arising from company tax paid and also with distributions that carry franking credits received from other companies. It decreases when the company makes a franked distribution, when it streams dividends to shareholders most able to benefit from them, or (under certain conditions) when it buys back shares on-market.

There are five types of buyback in Australia: on-market, selective, employee, equal access and minimum holding.⁵ The last four are undertaken off-market whereas on-market buybacks occur in the normal course of trading on the stock exchange. As the categories suggest, only the equal access category amongst the off-market buybacks are not to a select group of shareholders. We therefore compare the arrangements between off-market equal access schemes and on-market buybacks. As in most countries proceeds from an on-market buyback in Australia are taxed as capital gains. Equal-access buybacks attract special taxation treatment.⁶ First, a large component of the off-market buy-back price may be treated as a dividend, allowing a franking credit to be attached. Off-market buybacks are thus an effective method to distribute excess franking credits that are not distributed through normal dividend payout policy. Second, after subtracting the designated dividend component, the remainder of the buyback price is treated as the selling price for capital gains tax purposes.⁷ This may result in significant capital gains tax benefits for participating shareholders.

The tax treatment of off-market buybacks has led to them becoming an economically important mechanism for Australian companies to return cash and franking credits to shareholders. For example, over the years 1996 to 2008 almost \$27 billion was

⁵ Section 257B of the Corporations Act 2001. A company can normally repurchase (except in the case of a selective buyback) up to 10% of shares in a 12 month period.

⁶ Equal access buybacks do not strictly satisfy the definition of equal-access buybacks under the Corporations Act. Generally listed companies are able to obtain approval from the Australian Securities & Investments Commission (ASIC) to treat off-market share buybacks as “equal access” provided each shareholder is given the same opportunity to participate in the buyback

⁷ The capital component is determined under Draft Taxation Determination TD 2004/D1, which since 2004 implies that there may be an adjustment to the capital component announced by the company. The split between the dividend and capital gains components of the offer price include balance sheet constraints, the level of retained earnings and the balance of a company’s franking account.

spent by Australian companies in off-market buybacks with around \$7.6 billion of franking credits distributed (Brown and Davis (2009)). In the U.S. on-market repurchases dominate in terms of both number of buybacks and the dollars distributed to shareholders. However, in Australia, although fewer off-market repurchases are undertaken each year, in many years off-market repurchases dominate in terms of the value of the cash distributed to shareholders (not including franking credits).⁸ Therefore firms with accumulated franking credits in excess of that needed to support fully franked dividends under existing dividend policy may prefer off-market buybacks to on-market buybacks, as franking credits cannot be distributed using on-market buybacks and may actually be lost under this method of repurchase.⁹

The foregoing discussion leads to our first testable hypothesis. We expect companies with large balances in the franking account to be more likely to choose an off-market over an on-market buyback.

H₁: Firms that have accumulated excess franking credits are more likely to undertake an off-market buyback

2.2 The costs

There may be substantial differences in the relative costs to a company undertaking an on-market versus an off-market repurchase. In this subsection we develop a model to help understand the differential costs between the two types of buyback. First, consider the total transaction cost equation if the firm conducts an on-market buyback. Suppose the number of shares the company intends to repurchase is denoted by α , VC is the pre-buyback market price per share before taking into account price variation due to order flow imbalance, management timing and tax considerations, B represents per share labour and brokerage costs needed to trade, which are highest for small firms who infrequently engage in on-market transactions.

⁸ For example, we have data on the complete population of on-market and off-market buybacks for the period 2003-2006. There are 147 companies undertaking 247 on-market buybacks buying an (unweighted) average of 2.4% of outstanding shares and spending \$7.4 billion. In contrast over the same period there were 18 companies undertaking 22 off-market buybacks returning \$13.7 billion to shareholders and buying back an (unweighted) average of 7.2% of outstanding shares.

⁹ Although companies that undertake on-market buybacks do not pay any dividends to their shareholders, if all or part of the buyback is sourced from profits, they may still be required to debit their franking account. See ITAA97 s205-30.

Then the cost of an on-market repurchase can be modelled as:¹⁰

$$Cost_{On-Market} = \alpha (VC^\eta + B) \quad (1)$$

The variable η adjusts variable costs for order flow imbalance and management timing factors. It captures the net cost from increased premiums that must be paid to purchase on-market as there becomes an increasing shortage of willing sellers and the firm must repurchase from shareholders with increasing reservation prices.¹¹

Brockman and Chung (2001) find evidence of reduced market liquidity during on-market repurchase periods as traders withdraw to avoid trading with informed managers. These increased adverse selection costs are manifest through wider bid-ask spreads and lower market depth.¹² Such factors lead to the conclusion that $\eta > 1$ and costs are increasing in α . For any given α and B , the total cost of repurchasing is greater when η is large. Ceteris paribus, η is larger if the company's traded shares are initially illiquid or if management intends to repurchase over a shorter time frame. It is smaller if management has the ability to time repurchases and minimise the price paid.

The total transaction costs for an off-market buyback can be modelled somewhat similarly. In this case however there are large fixed costs, A , which include disclosure, regulatory and legal, printing, distribution and processing costs. Off-market repurchases are often completed at a discount to the market price.¹³ If the discount per share is D and VC is the pre-buyback price, then the variable cost of the repurchase is given by $\alpha(VC - D)$, where α is the number of shares repurchased. Thus $A + \alpha(VC - D)$ represents the explicit costs to the company of undertaking an off-market repurchase. However there is an implicit cost to non-participating shareholders, which should not be ignored when comparing the costs of

¹⁰ Note that in some on-market buybacks the company must debit the FAB (see footnote 8). We ignore this complication and the consequent implicit cost to shareholders of 'lost' franking credits. Adding some measure for the value of any franking credits does not change our subsequent arguments.

¹¹ The model assumes that the variable cost per share remains at a constant value VC . Clearly the price at which the company buys back shares in an on-market buyback varies over the life of the buyback. The model ignores this variability in order to graph the relations. Our arguments remain valid if the share price is allowed to vary stochastically.

¹² The ability of management to 'time' on-market repurchases has been examined in Cook, Krigman and Leach (2003 and 2004) and Brockman and Chung (2001).

¹³ This contrasts with the situation in the US where self-tender offers are generally at a premium to the market price. Shareholders in Australia are willing to sell at a price below market because of the generous tax arrangements. The ATO in Practice Statement Law Administration PS LA 2007/9 has stated that the maximum acceptable level of discount in a tender process buy-back is 14%, calculated by reference to the VWAP of the shares for the five days up to and including the closing date of the buy-back.

on- to off-market buybacks. If the company is distributing franking credits that are valued by the market then this is a cost borne by non-participating shareholders. Thus an implicit cost to non-participating shareholders is the value of the aggregate franking credits distributed, αFCD where FCD is the value of the franking credit distributed per share.¹⁴ Hence the cost of the off-market buyback can be modelled as: restyle alpha as proportion of shares bought back

$$Cost_{Off-Market} = A + \alpha (VC - D) + \alpha FCD \quad (2)$$

The company is able to buy back shares at a price below the market price because selling shareholders receive value via franking credits and an ability to claim a capital loss on the transaction. D is likely to be closer to the maximum discount allowed by the ATO when the share registry predominantly comprises resident shareholders and institutions, who can fully utilise franking credits and who are subject to Australian capital gains tax. For a given α , companies with higher fixed costs of doing a buy-back, companies with fewer franking credits and more international shareholders on the share register are less likely to prefer an off-market buyback.

Figure 1 graphs the total costs for on-market and off-market buybacks. As α increases, the on-market cost increases at an increasing rate (because η increases in α), whereas the off-market cost (which is initially higher than the on-market total cost curve) increases at a constant rate of $(VC - D + FCD)$. Provided A is sufficiently large, there exists an equilibrium number of shares (α^*) where a company will be indifferent between buying back shares on or off-market. At volumes above α^* , they will prefer off-market. At volumes below α^* they will prefer on-market.

When empirically testing the model against company choice, the number of shares is scaled by shares outstanding in order to compare companies of differing sizes. Our model and related arguments are consistent with the empirical facts: Mitchell and Dharmawan (2007) report that in their on-market buyback sample over 1996-2001 firms on average buy back 3% of outstanding shares; over the same time period off-market buybacks bought back on average around 9%.¹⁵ This argument leads to our second testable hypothesis.

¹⁴ Evidence on the value of franking credits is provided in Handley and Maheswaran (2008) and Cannavan, Finn and Gray (2004).

¹⁵ Data sourced from brown and Davis (2009). This figure is calculated from off-market buybacks, where the very large buybacks (prior to winding up the company or other special arrangements have been excluded).

H₂: Firms are more likely to choose an off-market buyback rather than an on-market buyback when they intend to repurchase a greater proportion of outstanding shares.

2.3 Undervaluation

Consistent with the results of US studies, Mitchell and Dharmawan (2007) find that managers of Australian companies are motivated to undertake on-market buybacks to signal that their shares are undervalued, while Mitchell et al (2006) find that companies buying back on-market are significantly undervalued relative to non-repurchasing companies prior to the buyback. Undervaluation as a motive for repurchasing has significant empirical support for both open-market (on-market) repurchases and self-tender (off-market) offers in the US. See papers by Masulis (1980), Dann (1981), Vermaelen (1984), D'Mello and Schroff (2000) and Anderson and Dyl (2004) for off-market evidence. For studies of on-market repurchases see Dittmar (2000), Ikenberry, Lakonishok and Vermaelen (1995, 2000). Papers that investigate both types of buyback include Vermaelen (1981), Comment and Jarrell (1991), Weisbenner (2000), Rau and Vermaelen (2002). Non-US based evidence is provided by Hatakeda and Isagawa (2004), Balachandran and Faff (2004), Lamba and Ramsay (2005), Brown (2007), Mitchell and Dharmawan (2007) and Balachandran et al (2008). Depending on measurement approach, undervaluation usually appears as a significant explanatory variable in explaining firm buyback behaviour, across most studies cited.

Self-tender repurchases in the US overwhelmingly occur at a premium (Anderson and Dyl 2004) and so announcement of the buyback sends a credible signal that the firm's shares are undervalued. However, signalling is more likely to be a factor influencing on-market buybacks than off-market buybacks in Australia. Brown and Efthim (2005) and Brown and Davis (2009) show that when a portion of off-market proceeds can be structured as a fully franked dividend, Australian firms generally offer less than the market value of the stock. Since the consideration paid by management is below the current market price, there can be little credibility to using this means to signal undervaluation. Thus we postulate that undervaluation is more likely to affect the decision to undertake an on-market buyback than an off-market buyback, leading to our third testable hypothesis.

H₃: Firms are more likely to choose an on-market buyback rather than an off-market buyback when they are undervalued.

2.4 Other motivations

The literature is replete with other motivations for firms to undertake buybacks include the distribution of free cash flows (see e.g. Jensen (1986), Jagannathan, Stephens and Weisbach (2000), Dittmar (2000), Weisbenner (2000), Fenn and Liang (2001) and Grullon and Michaely (2004)), to move the firm towards an optimal leverage ratio (see e.g. Bagwell and Shoven (1988) Dittmar (2000), Weisbenner (2000), Fenn and Liang (2001) and Lie (2002)), to preserve the value of executive stock options (for evidence see Weisbenner, (2000), Dittmar (2000), Fenn and Liang (2001) and Core et al (2002)) and size. The effects of size can be positive with large firms more likely to repurchase (see e.g. Jagannathan, Stephens and Weisbach (2000) Dittmar (2000), Fenn and Liang (2001) and Weisbenner (2000) or negative (see e.g. Vermaelen (1981), Lakonishok and Vermaelen (1990), Anderson and Dyl (2004)).

Another possible motive for firms undertaking buybacks is to manage earnings per share (EPS). EPS is widely used as a benchmark to assess firm performance and assist in security valuation. To the extent that EPS is used by the investment community to evaluate firm performance, a reduction in EPS may lead to a lower market valuation of the company. Thus repurchasing shares to boost EPS might be a rational decision by managers.¹⁶ In fact, potential EPS dilution has been documented to have a major effect on CFO payout decisions in recent survey evidence (Graham and Harvey 2001; Brav et al 2005). In addition, because managers have considerable flexibility over the timing of the buyback (Cook et al (2004)), Hribar et al (2006) show that buybacks can be used to strategically alter the denominator of the EPS ratio. Bens et al (2003) show that a buyback results in an increase in EPS (and thus will avoid or undo EPS dilution) only if the price-to-earnings ratio is less than the reciprocal of the firm's opportunity cost of funds.

In Australia Mitchell and Dharmawan (2007) find evidence in favour of free cash flows and leverage levels as influencing the buyback decision, while Balachandran et al

¹⁶ It may also be attractive if executive compensation is tied to performance measures such as EPS, as in this case a reduction in EPS may lower management wealth through lower bonuses. Of 214 Australian companies undertaking on-market buybacks over 1996-2003 almost 50 percent include managing EPS as a reason for the buyback (Brown 2004).

(2008) find evidence of earnings management in the year prior to on-market buybacks for firms with exercisable options in the year of the buyback. Previous literature has little guidance on whether any of the possible motivations will affect the choice of on- versus off-market buybacks. Therefore in our empirical testing we include free cash flows, leverage, executive stock options, changes in EPS and size as control variables with no prior expectations as to the sign of the coefficient.

3. Data Collection and Research Approach

3.1 Data collection

We construct a sample of firms that undertook on-market repurchases over the period 1997-2007. We take the largest 75 industrial companies by market capitalisation in 1997 and using this group of firms find the firms that repurchased shares on-market over the sample period. Consistent with Dittmar (2000) and Grullon and Michaely (2002), our definition of industrial companies includes all companies except financial and real estate firms.¹⁷ To construct our sample of off-market repurchases, because off-market buybacks are less frequent we search for all off-market buybacks over the period. The overall sample consists of 48 companies conducting 154 buybacks and includes most off-market buybacks completed by industrial firms during the period 1996-2007.¹⁸ The data set contains 106 on-market buybacks, 36 off-market buybacks and 12 observations where companies undertook both on and off-market buybacks in the calendar year.¹⁹

Historical financial data, used to calculate explanatory variables, are obtained from AspectHuntley FinAnalysis. Share prices are obtained from IRESS.²⁰ Details on employee stock options outstanding are manually collected from the Connect4 Annual Reports database. Details of share repurchase volumes on the ASX are manually collected from AspectHuntley DatAnalysis, and cross-checked against SDC and company press releases.

¹⁷ These companies are not included in the analysis because their unique regulatory and operational nature may affect payout policy.

¹⁸ Companies were excluded from the final sample if they completed equal access buybacks in response to a takeover or as an alternative to a pure capital return when winding up. Companies that issued publicly traded rights to participate in their buyback and companies that bought back ordinary shares for convertible notes were also excluded.

¹⁹ The 48 buyback firms belong to the following sector classifications based on GICS two-digit industry codes. Materials (12), Consumer Discretionary (13), Consumer Staples (8), Energy (2), Industrials (6), Health (3), IT (1), Utilities (1) and Telecommunications (2).

²⁰ IRESS provides equity data across Australia, New Zealand and Canada.

Details of on-market repurchases undertaken by RIO and BHP on the London Stock Exchange are manually collected from Daily Share Buyback notices.

The key variables relating to Hypotheses 1, 2 and 3 are the value of the franking account balance (FAB), the proportion of shares bought back and a measure of undervaluation. *FABDUMMY* is a dummy variable which is coded 1 if the firm pays fully franked dividends and is estimated to have a significant franking-account balance. The Appendix provides a detailed explanation of how a firm's franking-account balance is estimated. *REPOYIELD* is the proportion of issued capital repurchased in the buyback, readily accessible from the Appendix 3F proforma that all companies must lodge with the Australian Securities Exchange on completion of the buyback. We use *MB* (the market to book ratio of equity) as a proxy for undervaluation.

Control variables used in our estimation are as follows. *SIZE* is the logarithm of total assets and controls for any size effect in the data. *LEVERAGE* is total debt (short term plus long term) / assets. *LEVERAGE TARGET* is a measure of the firm's debt ratio relative to its target debt ratio, and is measured as *LEVERAGE* minus the industry mean, where industry mean is the average leverage of same-sector firms in the sample in that year. *FCF* is free cash flows / assets, where free cash flows equals EBITDA – Tax paid – Net Interest – Capex – Increase in working capital – Dividends paid. *RETURN* is prior year percentage change in adjusted stock price, and is also included to capture undervaluation. *OPTIONS* measures the level of stock options and nil-exercise share performance rights issued to employees, including directors and executives, under remuneration plans. *EPSA* is a measure of the change in earnings per share relative to the previous year.

3.2 Research approach

To investigate the factors that influence a firm's choice between an on-market and off-market buyback we estimate a logistic equation of the form.

$$\Pr(\text{Offmarket})_{i,t} = \frac{1}{1 + e^{-y_{i,t}}}; y_{i,t} = \beta_1 \text{Factor}1_{i,t} + \beta_2 \text{Factor}2_{i,t} + \dots + \beta_N \text{Factor}N_{i,t},$$

where the binary dependent variable takes the value 1 if the company undertook an off-market buyback in year t and 0 if it undertook an on-market buyback in year t .²¹ A buyback is defined to occur in any year that shares were repurchased.²² The 154 observations of both on-market and off-market buybacks are used to estimate equation (1). The data include 12 instances where a company elected to repurchase both on-market and off-market in a particular calendar year (“dual buybacks”) and excludes all selective buybacks. The key variables to test the three hypotheses are *FAB*, *REPOYIELD* and *MB*.

The dependent variable is matched with the financial characteristics existing in the prior financial year preceding the buyback. This approach achieves two aims. First, it focuses on the link between actual repurchase behaviour and financial characteristics, and avoids noise from buybacks that are announced but subsequently cancelled. Second, this approach takes account of the fact that it is the firm’s financial characteristics at announcement date which influence the buyback decision, rather than the financial characteristics when the buyback is completed.

We estimate two regressions. The first regression comprises an unbalanced panel of data on a cross section of firms from 1997-2006, corresponding to buybacks undertaken in the following year 1998-2007 (“full sample”). The second regression restricts the analysis to five years of financial data from 2002-2006, corresponding to buybacks undertaken in the following year 2003-2007 (“restricted sample”). The purpose of the restricted sample is to identify whether motivations for repurchases have changed. There are a number of reasons that firm motives or behaviour may have changed. First, firms could undertake a buyback with fewer onerous regulatory restrictions only from 1996 onwards. So as buybacks became more common and shareholders learned of the considerable tax advantages of off-market buybacks, company choices may have altered over time with the continued success of large scale off-market buybacks. In addition, the requirement to seek a tax ruling for each off-market buyback with a dividend component may have deterred some

²¹ Firms undertaking both an off-market and on-market buyback in a calendar year (“dual buybacks”) are all coded 1. This is because for every dual buyback in the sample, the repurchase yield for the off-market component exceeds that of the on-market component

²² It is the repurchase activity that matters; our approach does not consider the date of announcement. For example, if a company announces an off-market buyback in 1998 and completes it in 1999, it is credited with an off-market buyback for 1999. If a company announces an on-market buyback in 1998 and repurchases over three years 1998-2000, it will be credited with an on-market buyback for 1998, 1999 and 2000.

companies from off-market buybacks in the early years. Given Australia's particularly strong economic growth over the period 2003-2007, Company motives over 2002-2007 may be influenced by the strong economic growth experienced during most of this period.

4. Results and Discussion

In this section we document the key findings relating to the choice of buyback method and examine the support for each of the three main hypotheses.

4.1 Descriptive statistics

Table 1 presents summary statistics for the sample of buybacks. Observations are grouped into three categories, based on repurchase activity: on-market buyback only, off-market buyback only, and dual buyback. Median *Assets*, *FCF* and *MB* are highest for dual buybacks, and lowest for non-buybacks. Median *Leverage* is lowest for dual-buybacks.²³ Returns are largest for dual buybacks perhaps reflecting strong growth and large free cash flows, as can be seen by the higher level of free cash flows for the dual buyback companies. However there are only 12 observations for dual buybacks so any conclusions are tentative. We have also included the variables used to calculate free cash flows: dividend yield is higher for dual buyback and off-market buyback companies, suggesting that companies using buybacks as a mechanism for distributing cash to shareholders are not doing so as a substitute for payment of dividends. *MB* is lowest for firms undertaking only on-market buybacks.

Table 2 provides an analysis of the changing nature of the characteristics of the repurchase programmes for the 48 sample companies over the sample period. The table confirms that sample firms are more frequently choosing to repurchase in more recent years; 32% of sample firms undertook a repurchase in 2006, increasing from only 13% in 1999. Seventy-three percent of companies repurchased more than once. For sample firms on-market buybacks are more frequent than off-market buybacks, but off-market buybacks are substantially larger.²⁴ The average transaction value for off-market buybacks over the period was \$495 million, about \$293 million more than the average value for an on-market buyback. The average repurchase yield for off-market buybacks over the period was 12.4%

²³ Note that we use leverage for the univariate analysis and target leverage for the regressions.

²⁴ This fact is valid for the whole population of buybacks. See Brown and Davis (2009).

of issued capital, substantially larger than the 3% for on-market buybacks. This trend is consistent with the Hypothesis 2.

4.2 The buyback method

We use univariate tests and multivariate logistic regressions to investigate the factors affecting the choice between on-and off-market buybacks. Table 3 presents univariate differences between on- and off-market buybacks for the full sample in Panel A and the restricted sample in Panel B. For both sample periods the repurchase yield is significantly greater for off-market repurchases. *MB* is significantly lower for on-market repurchases for the full and restricted samples. As expected, the franking account dummy is greater for off-market repurchases with the level of significance greater in the restricted sample. Leverage is significantly greater for on-market buybacks over the full sample. Note that we use leverage measured as total debt (short term plus long term) over assets for the univariate statistics.

Table 4 presents the results of the multivariate logistic regression represented by equation (1) for the period 1997-2006. Panel A (B) presents the results for the full (restricted) sample. In this model the McFadden R^2 (analogous to R^2 in ordinary regression analysis) can be used to evaluate the explanatory power of the model. The McFadden R^2 ranges from 0.37 to 0.56, much better explanatory power than logistic models that are used to predict repurchase likelihood.²⁵ The key and control variables explain a much greater percentage of the variation in buyback choice than the initial decision to repurchase.

There is support for H_1 , that companies with a large franking account balance (FAB) prefer off-market buybacks. This tax-based rationale is manifest for both sample periods with the coefficient on *FABDUMMY* positive and significant. It is also worth noting that the economic influence of a large FAB on the buyback method choice is quite large; the marginal effects in Table 4 (Panel A) indicate that when *FABDUMMY* on an observation changes from 0 to 1, this results in an increase in the probability of choosing an off-market buyback of 16.8%. These results are consistent with the univariate results reported in Table 3 which show that firms which repurchase off-market have larger franking-account balances than those which repurchase on-market. This finding is

²⁵ Logistic models for buyback likelihood typically have R^2 of less than 5 percent. See Mitchell and Dharmawan (2007).

consistent with anecdotal evidence in the marketplace, and confirms the conclusions of Brown and Efthim (2005) that one motive in undertaking off-market buybacks is the distribution of excess franking credits.

The model developed in Section 2.2 predicts that off-market repurchases should be preferred when the target repurchase yield is large. Consistent with research hypothesis H_2 , there is overwhelming evidence that firms are more likely to select off-market buybacks when they repurchase more shares. The coefficient on *REPOYIELD* is positive and strongly significant in the logistic regressions reported in Table 4 for both the full and restricted samples. In addition a one standard deviation movement in the median repurchase yield results in an increase in the probability of the firm choosing to repurchase off-market of 48% (Panel A). The analysis supports the view that as the proportion of shares to be repurchased increases, an off-market buyback become more cost-effective relative to an on-market buyback, and is more likely to be the chosen method.

The coefficient on *MB* is positive and significant in the full sample regression (Table 4, Panel A) with its significance increasing in the restricted sample (Panel B) suggesting that a high market to book ratio has been a more important predictor of the choice of an off-market buyback during the period 2002-2007.²⁶ Consistent with research hypothesis H_3 , there is strong evidence that undervalued firms are more likely to undertake an on-market rather than an off-market buyback. The preference for on-market buybacks as a signalling tool is consistent with the findings of Brockman and Chung (2001) for Hong Kong and Cook, Krigman and Leach (2003, 2004) for the US.

Recall that we did not take a view as to the signs on the coefficients of the control variables in equation (1). We find free cash flows to be a strong predictor of choosing an off-market repurchase. The coefficient on *FCF* is strongly significant and positive in both the restricted and full sample regressions.²⁷ This result is consistent with the view that firms

²⁶ Some papers, such as Dittmar (2000), Fenn and Liang (2000), Lie and Lie (1999) and Weisbenner (2000) calculate the market to book ratio using total assets instead of equity. As a robustness check, we re-estimate all regressions using an M/B measure based on total assets rather than equity. The results are quantitatively the same; the coefficients on each explanatory variable are of the same sign and significance under both methods.

²⁷ BHP, Australia's largest mining company, provides an interesting case study. BHP generated an estimated \$5.89 billion (\$4.00 billion) of free cash flows after capital expenditures and investment in working capital in 2006 (2005). During 2004–2007, BHP completed three off-market buybacks: 2004 (Value: \$2.27 billion), 2006 (\$2.25 billion) and 2007 (\$3.50 billion). BHP also repurchased issued shares in open market

undertaking large buybacks (as a proportion of outstanding shares) are more likely to have large free cash flows to fund some portion of the buyback.

The coefficient on *LEVERAGE TARGET* is negative and significant for both samples in the logistic regression, supporting the view that firms whose leverage is low relative to target leverage are more likely to repurchase off-market. In fact, most firms cite “capital management” as one motivation for undertaking an off-market buyback when first announcing their intention to the market.²⁸ An off-market repurchase, where a large proportion of shares are bought back can move the company quickly towards its target debt-equity ratio.

The coefficient on *OPTIONS* is negative for the full sample, but not for the restricted sample. A negative coefficient indicates that companies prefer on-market buybacks over off-market buybacks when they have more employee options outstanding, consistent with Dittmar (2000) and Fenn and Liang (2001). These results could indicate that repurchasing to prevent the dilution of granting employee share options is less of a determinant in the choice of buyback method during the recent period 2002-2007.

In summary, we find support for our three central hypotheses. Firms are more likely to choose off-market buybacks when they have excess franking credits to distribute, when they are buying back a large proportion of outstanding shares. They are less likely to choose an off-market repurchase if they are undervalued. Our results also suggest that firms which have greater free cash flows and a lower debt-equity ratio have a higher probability of undertaking an off-market buyback. We also find that over 1996-2007 firms with more stock options on issue are less likely to prefer an off-market buyback.

4.3 Robustness checks

We investigate whether the major determinants of the buyback method chosen differ depending on whether the firm undertook repurchases regularly or infrequently, by running two auxiliary regressions which exclude observations of firms that conducted

transactions on the London and Australian Stock Exchanges, repurchasing 134 million shares during 2006-2007 at an estimated cost of \$3.84 billion. (Dollar amounts denominated in AUD). In fact, over the years 2005-2007 BHP Billiton paid out the majority (68%) of its total buyback distributions using off-market buybacks.

²⁸ Companies in Australia are required to lodge an Appendix 3C when announcing the buyback. Information required includes the reason for the buyback.

frequent or multiple buyback programmes.²⁹ Results are quantitatively the same as those reported in Section 4.2 apart from two key differences. First, *OPTIONS* becomes strongly significant when frequent and multiple buybacks are excluded, indicating that firms that do not repurchase regularly are more likely to repurchase on-market for to prevent dilution arising from employee stock options. Second, the coefficient on *FABDUMMY* is less significant when frequent and multiple buybacks are excluded, implying that firms that do not repurchase regularly are less likely to undertake off-market buybacks for tax reasons.

In order to test the robustness of our results to the classification of dual buybacks, we re-estimate equation (1) with the 12 dual buyback observations excluded. Our central three hypotheses still hold. The only major change is that *LEVERAGE TARGET* is not significant when the dual buybacks are excluded. Because the on-market component of the dual buyback is substantially smaller than the off-market component in each case, treating dual buybacks as off-market does not affect the key results of the analysis. In addition we re-estimate equation (1) using firm leverage rather than target leverage and obtain quantitatively similar results; the coefficients on each variable and their significance are similar for the two measures of leverage.

5. Conclusions

On the assumption that a company has decided to undertake a buyback we investigate whether there are different factors affecting the choice between on- and off-market buyback. We examine 154 buybacks undertaken by 48 industrial companies over the period 1997-2007. Our paper is the first to thoroughly investigate the determinants of the choice between an off-market and an on-market buyback using Australian data, and contributes to our understanding of corporate financial policy. In particular the paper investigates the effects of frictions such as taxes and transaction costs on firm decision making.

We develop three central hypotheses which are supported by our empirical analysis. First, off-market buybacks are preferred over on-market buybacks when a company has a

²⁹ The first regression excludes multiple buybacks, the second excludes frequent buybacks. Multiple buybacks are defined as those buybacks that are part of a repurchase programme which occurred over four consecutive calendar years. Frequent buybacks are defined as all the buybacks of firms who repurchased on five or more occasions from 1997-2007.

large franking account balance. Our results provide empirical support for the view that the incentive to distribute franking credits is a major motivation to undertake an off-market buyback in Australia. Second, off-market buybacks are a significantly more likely choice when firms are buying back a large proportion of shares. Third, and consistent with the signalling hypothesis, we find that firms prefer on-market buybacks when the firm is undervalued. This is as expected because in Australia off-market buybacks do not send a credible signal of undervaluation because they are usually completed at a discount to market price.

While the importance of the taxation advantage in the buyback decision has been downplayed by corporate managers (Brav et al (2005)), it remains a widely held view amongst practitioners, the public and the Australian Taxation Office (Board of Taxation, (2007)). Our results underscore the importance of the value of the distributed franking credits to shareholders, who are willing to sell their shares back at a price below the market price as a result of the tax credits they receive in an off-market buyback.

In addition, we find that several control variables affect the choice of buyback method. The likelihood of choosing an off-market buyback is positively related to free cash flows and leverage. However firms are less likely to choose an off-market buyback if they have large employee option schemes, consistent with the finding that firms that repurchase on-market also tend to have issued more employee options under employee remuneration plans. Taken together with the preference for on-market buybacks if the firm is undervalued this suggests that managers may use on-market repurchases as a way to maximise the stock price. In contrast we find that the decision to repurchase off-market is primarily driven by market frictions such as taxes and the costs of undertaking the buyback.

Appendix : Estimation of the franking account balance

Australia operates under a full dividend imputation system. Companies generate imputation or ‘franking credits’ for the company tax paid, which accumulate in the company franking account, maintained in order to keep track of the income tax credits that can be passed on to shareholders. The franking account balance (FAB) increases with franking credits arising from tax instalments or income tax paid, and on receipt of franked dividends from other companies. It decreases when the company makes a franked distribution, when it streams dividends to shareholders most able to benefit from them, or (under certain conditions) when it buys back shares on-market.

Time series data on franking account balances are not generally available. We therefore use the following method to estimate the FAB. The one year periodic change in the FAB is approximated using the formula:

$$\Delta FAB_t = Tax + DR * t_c / (1-t_c) - DP * FF * (t_c / 1-t_c) - OFF \quad (A1)$$

Tax is annual taxes paid by the company. *DR* is annual cash dividends received (assumed fully franked). *DP* is annual cash dividends paid. *FF* is the percentage of total dividend paid that was franked. The corporate tax rate is t_c (30 percent). *OFF* represents the franking credits distributed under an off-market buyback. The financial year-end FAB at time T is the sum of all previous changes in the FAB:

$$FAB_T = \sum \Delta FAB_t \quad (A2)$$

An observation was treated as having a large FAB only if the company paid fully franked dividends in that year, and the FAB was greater than three times the amount of franking credits distributed as part of that year’s dividend.

We note the following limitations to this estimation approach:

- Franking-account balances are volatile, and change throughout the year upon payment and receipt of dividends and payment of taxes. Equation A1 ignores the impact of intra-year timing differences;
- Equation A1 does not account for debits in the franking-account when companies undertake on-market buybacks. Item 8, s25-30 ITAA97 states that a debit is required for on-market buybacks, equal to the debit that would have arisen if the company had repurchased the interest off-market and franked the distribution at the

entity's benchmark franking percentage or, if the company doesn't have a benchmark franking percentage, at 100% fully franked;

- Equation A1 does not take into account penalties in the form of loss of franking credits that arise if the company violates the benchmark franking rule when making a franked distribution;
- Equation A1 does not take into account the amount debited to the FAB (in excess of franking credits distributed) in an off-market buyback to take account of the proportion of international shareholders on the register; and
- DR assumes that franking credits were attached to the entire amount of dividends received; this will not be the case for companies that have interests in foreign entities.

As a check on the accuracy of our approach we compare actual FAB and estimated FAB for a sample of six companies over the period 2004-2006. The comparison demonstrates that although the calculation approximates the annual change in FAB reasonably well, it tends to substantially overstate the actual FAB. We conclude that although the measure is quite noisy, it is still useful as a proxy to test the first hypothesis H_1 because it calculates the degree to which a firm has accumulated excess franking credits as a result of its earnings and dividend policy.

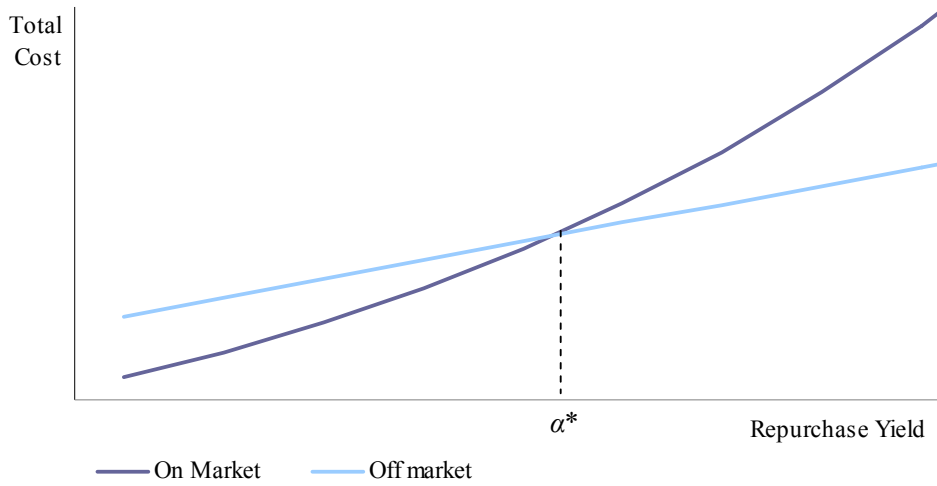
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Figure 1: Buyback cost comparison



This figure compares the transaction costs of an off-market repurchase and an on-market repurchase. We posit that the marginal cost of conducting an on-market buyback increases as the repurchase yield increases, due to increased order imbalances and illiquidity. A greater component of the off-market buyback cost is fixed, and variable off-market costs are reduced due to the lower purchase price paid to shareholders.

Table 1: Descriptive statistics for key and control variables

		SIZE Assets (\$M)	MB	LEVERAGE	% Assets				RETURN	OPTIONS	EPSA
					EBITDA	Capex	Dividend	FCF			
Dual Buyback (Observations: 12)	Mean	14,300	2.96	20.2%	17.2%	7.6%	-3.3%	4.5%	12.8%	1.3%	17.92
	Median	6,090	2.49	17.2%	15.9%	9.0%	-3.7%	4.8%	13.7%	0.7%	6.15
	Maximum	65,300	7.57	35.6%	34.2%	14.8%	-0.1%	25.4%	65.7%	4.5%	97.00
	Minimum	64	0.71	9.3%	6.2%	0.5%	-5.4%	-9.0%	-33.8%	0.0%	-14.10
	Std. Dev	21,800	2.06	8.9%	8.3%	4.6%	1.6%	8.4%	32.6%	1.6%	33.28
Off-market only (Observations: 24)	Mean	8,090	2.57	21.6%	17.7%	6.9%	-4.5%	0.8%	4.2%	2.1%	7.55
	Median	2,110	2.04	24.4%	18.6%	5.1%	-3.6%	2.1%	0.3%	0.9%	4.75
	Maximum	43,300	7.51	43.0%	41.3%	18.4%	0.0%	20.8%	68.1%	17.3%	73.70
	Minimum	16	0.37	0.0%	-21.8%	0.0%	-12.5%	-31.6%	-98.1%	0.0%	-12.70
	Std. Dev	13,700	1.81	13.3%	11.4%	5.0%	3.1%	11.1%	34.0%	3.6%	18.13
On-market only (Observations: 106)	Mean	6,880	2.29	26.4%	16.1%	6.1%	-3.8%	0.9%	17.7%	1.8%	11.78
	Median	3,150	1.83	27.2%	15.0%	4.8%	-3.4%	1.3%	12.7%	1.5%	3.65
	Maximum	73,700	9.71	56.5%	52.8%	37.5%	0.0%	32.0%	152.3%	6.8%	285.30
	Minimum	55	0.26	0.2%	-2.9%	0.7%	-18.9%	-31.3%	-58.5%	0.0%	-73.60
	Std. Dev	12,600	1.75	11.0%	7.3%	4.9%	2.8%	9.5%	35.9%	1.5%	39.42

Total observations: 142

Selected descriptive statistics for explanatory variables used in logistic regressions. Data taken from a sample of 89 large Australian industrial companies from 1997-2006. All data measured as at fiscal year ends. Variables are defined follows: *Assets* is the book value of assets in AUD million. *MB* is the market value of equity/book value of equity. *Leverage* is total debt (short term plus long term)/assets. *EBITDA* is earnings before interest, tax, depreciation and amortization, expressed as a percentage of assets. *Capex* is capital expenditures/assets. *Dividend* is the total cash dividend paid/assets (note that it is negative). *FCF* is free cash flows/assets, where free cash flows equals EBITDA - tax - interest - capex - increase in working capital - dividend. *Return* is the prior year share price appreciation, calculated as the percentage change in the share price over the previous financial year. *Options* is the total number of unissued shares under option or rights schemes, as part of employee and executive remuneration packages, divided by the total number of ordinary issued shares outstanding. *EPSA* is the annual change in ordinary earnings in cents per share before abnormal items. Financial data obtained from AspectHuntley. Options data collected from Connect4 Annual Reports database. Stock price data obtained from IRESS.

Table 2: Descriptive statistics for repurchases

Year	Buyback firms	Buyback %	Buybacks			Average repurchase yield (%)		Average transaction size (\$m)	
			On-market	Off-market	Total	On- market	Off -market	On- market	Off -market
1997	1	1%	1	0	1	6.6%	-	\$159.1	-
1998	3	4%	3	0	3	1.9%	0.0%	16.7	\$0.0
1999	11	13%	9	3	12	5.2%	26.6%	124.3	162.2
2000	13	15%	10	4	14	3.6%	6.2%	330.5	164.5
2001	12	14%	9	3	12	1.5%	26.1%	22.0	300.8
2002	16	19%	13	3	16	2.8%	23.0%	37.4	89.2
2003	17	21%	15	4	19	2.6%	7.0%	60.8	598.7
2004	13	17%	10	5	15	4.6%	10.0%	86.1	709.2
2005	19	26%	17	4	21	2.3%	3.7%	104.1	460.1
2006	21	32%	20	4	24	2.0%	17.9%	351.7	777.6
2007 ^a	16	25%	11	6	17	4.2%	5.0%	718.7	767.7
Totals			118	36	154	3.0%	12.4%	\$201.7	\$494.8

Selected summary statistics on the frequency, volume and value of off-market and on-market buybacks undertaken by a sample of 48 large Australian industrial companies during the period 1997-2007. Dollar amounts expressed in AUD millions. Data sourced from AspectHuntley, Australian Government Board of Taxation Review (2007) and company announcements. *Buyback firms* is the number of firms who conducted a share repurchase during the calendar year. *Buyback %* equals Buyback firms / Firms. *On-market* counts all firms that repurchased stock in an on-market transaction during the calendar year, even if they are part of a single buyback program completed over consecutive years. For a given year and firm, the number of shares repurchased via an on-market buyback equals the sum of all shares repurchased in the calendar year through on-market transactions. The on-market buyback transaction value is approximated as the number of shares bought back multiplied by the financial year-end stock price. *Off-market* counts all firms that completed an equal access off-market repurchase during the calendar year. Selective buybacks are not considered. Off-market buyback transaction values are sourced from ASX company announcements. *Average repurchase yield* is the average repurchase yield per buyback undertaken during that year, where repurchase yield is the number of shares repurchased in the transaction / ordinary shares outstanding. *Average transaction size* is the average transaction size of each buyback undertaken during the year, where transaction size is defined as the dollar value of shares repurchased. ^a Includes all buybacks that were completed up to 30 September 2007.

Table 4: Tests for equality of medians and means for on- and off-market buybacks

Panel A: Full sample 1997-2007								
Total observations: 142	Off-market (N = 36)		On-market (N = 106)		Median P-Value		Mean P-Value	
	Median	Mean	Median	Mean				
FAB DUMMY	1.000	0.528	0.000	0.321	0.064	*	0.027	**
REPO YIELD	0.073	0.124	0.017	0.031	0.000	***	0.000	***
MB	2.175	2.702	1.828	2.289	0.265		0.231	
SIZE	21.872	21.483	21.921	21.706	0.813		0.489	
LEVERAGE	0.215	0.212	0.272	0.264	0.032	**	0.016	**
FCF	0.024	0.020	0.013	0.009	0.159		0.540	
RETURN	0.017	0.070	0.127	0.177	0.159		0.120	
OPTIONS	0.008	0.018	0.015	0.018	0.129		0.914	
EPSΔ	4.750	11.002	3.650	11.781	0.920		0.912	

Panel B: Restricted sample 2002-2007								
Total observations: 96	Off-market (N = 23)		On-market (N = 63)		Median P-Value		Mean P-Value	
	Median	Mean	Median	Mean				
FAB DUMMY	1.000	0.652	0.000	0.270	0.007	***	0.001	***
REPO YIELD	0.046	0.084	0.016	0.030	0.000	***	0.000	***
MB	2.793	3.190	1.778	2.102	0.032	**	0.003	***
SIZE	22.589	22.008	22.078	21.868	0.391		0.731	
LEVERAGE	0.239	0.215	0.265	0.260	0.205		0.102	
FCF	0.034	0.055	0.021	0.029	0.172		0.243	
RETURN	0.052	0.127	0.179	0.202	0.240		0.343	
OPTIONS	0.007	0.015	0.014	0.019	0.139		0.320	
EPSΔ	7.100	15.413	4.800	15.924	0.647		0.963	

Table 1 presents descriptive statistics with the results of tests of equality of median and mean between firms that undertook an off-market buyback in a given year and firms that undertook an on-market buyback. Panel A presents the results using the full sample of financial data on 89 companies over 1996-2006, corresponding to buybacks undertaken in the following year from 1997-2007. Panel B presents the restricted sample, which includes only the years 2002-2006, corresponding to buybacks undertaken in the following year from 2003-2007. 12 dual buybacks are treated as off-markets only, as the repurchase yield and transaction size for the off-market component of the dual buyback is greater than that of the on-market component. Data measured as at fiscal year end, and obtained from AspectHuntley, IRESS and Connect4. Variables are as follows: *SIZE* is LN (Assets). *MB* is the market to book ratio. *LEVERAGE* is total debt (short term plus long term) / assets. *LEVERAGE TARGET* is *LEVERAGE* minus the industry mean, where industry mean is calculated as the average of same-sector firms in that year. *FCF* is free cash flows / assets, where free cash flows are calculated according to EBITDA – Tax paid – Net interest - Capex - Increase in working capital - Dividends paid. *RETURN* is prior year % change in adjusted stock price. *FAB DUMMY* is a dummy variable which takes the value of 1 if the company is estimated to have a large franking-account balance and pays fully franked dividends, 0 if not. Refer to the Appendix for a description of the franking-account balance estimation method. *OPTIONS* are the number of unissued ordinary shares under employee option and rights schemes / total ordinary shares on issue. *REPO YIELD* is the repurchase yield, defined as total shares repurchased in the buyback during the calendar year / ordinary shares outstanding in the year preceding the buyback. *EPSΔ* is the annual change in ordinary earnings in cents per share before abnormal items.

* Statistically significant at 10% level (two-tailed test) ** Statistically significant at 5% level *** Statistically significant at 1% level.

Table 3: Buyback method logistic regression estimates

Variable	Predicted sign	Panel A (1997-2007)			Panel B (2002-2007)		
		Coefficient	Δ Prob.	T-Stat	Coefficient	Δ Prob.	T-Stat
CONSTANT	NA	-13.304		-2.139 **	-12.713		-2.285 **
FAB DUMMY (H1)	+	1.383	16.79%	2.450 **	1.523	7.41%	1.735 *
REPO YIELD (H2)	+	29.375	47.58%	3.603 ***	36.850	16.88%	3.873 ***
MB (H3)	+	0.332	5.23%	1.931 *	1.065	8.51%	3.853 ***
SIZE	?	0.447		1.700 *	1.024		2.676 ***
LEVERAGE TARGET	?	-4.114	3.89%	-1.806 *	-6.844	1.20%	-2.545 **
FCF	?	6.127	5.26%	2.738 ***	10.679	3.66%	3.153 ***
RETURN	?	-1.073	2.22%	-1.427	-1.930	1.05%	-1.180
OPTIONS	?	-36.075	3.66%	-2.482 **	-39.076	1.06%	-1.517
EPSΔ	?	-0.009	1.95%	-1.450	-0.023	1.44%	-2.060 **

Dependent Variable = 1 if company did off-market buyback, Dependent Variable = 0 if company did on-market buyback. Convergence achieved after 6 iterations

Mean dependent variable	0.254	0.267
Log likelihood	-49.8	-22.2
McFadden R ²	0.380	0.555
Observations with Dependent = 0	106	63
Observations with Dependent = 1	36	23

Table 3 presents the results of a binary logistic model (quadratic hill climbing) where the dependent variable takes a value of 1 if the firm chose an off-market buyback in that year, and zero if they chose an on-market buyback, for the full sample. The full sample represents an unbalanced panel of 142 observations on companies undertaking buybacks during 1997-2007, relating to financial characteristics in the years 1997-2007. This includes 12 observations representing “dual” buybacks (both on and off-market buyback in that year) which are treated as off-market buybacks. The dual buyback companies are treated as having done only off-market in that year because in each case, the on-market yield was smaller than the off-market yield. Panel A presents the results for the full sample. Panel B restricts the period to 2002-2007. Huber/White robust standard errors and covariance terms are used. The coefficient on an explanatory variable X should be interpreted as an estimate of the effect of a unit change in X on the logarithm of the odds ratio, where the odds ratio is the ratio of the probability of a firm undertaking an off-market buyback that period (instead of an on-market buyback) divided by 1 minus the probability of a firm undertaking an off-market buyback. Δ Prob. measures the marginal % change in the probability of undertaking an off-market buyback resulting from an increase in the independent variable, holding all other explanatory variables constant at their sample median. For *FAB DUMMY* the increase is a change from 0 to 1, for all other variables the change is to increase the sample median by one standard deviation. * Statistically significant at 10% level ** Statistically significant at 5% level *** Statistically significant at 1% level (two-tailed test).