Dividend Reinvestment Plans: Evidence from Australian market.

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ABSTRACT

This thesis examines new issue dividend reinvestment plans (“DRPs”) in the Australian market. A new issue DRP allows shareholders to have cash dividends on all or a portion of their shares automatically reinvested in the new shares issued by the firm. The thesis is motivated by the unique institutional setting of the Australian equity market under the dividend imputation tax system and the lack of research on DRPs in the Australian market.

To carry out the empirical analysis we modify Finnerty’s (1989) model and show that a DRP under the Australian dividend imputation system can be the most cost effective way of raising new equity capital compared to retention-financed and new stock-financed equity capital. The thesis then investigates three empirical aspects of the DRP: (i) the factors that explain a firm’s decision to adopt a DRP, (ii) the firm characteristic variables and DRP features that explain the firm’s decision to underwrite its DRP, and (iii) the determinants of the existing shareholder’s decision to participate in a DRP.

Our results show that: (i) The tax induced preference for the distribution of franked dividends results in firms increasing their use of DRPs to offset the increased distribution of earnings. Firms also adopt a DRP when they are faced with profitability constraints, and have high leverage. (ii) DRPs are more likely to be underwritten if the firm size is greater, leverage is higher, and the cash flow profitability is lower. (iii) The discount on the market price of new shares issued under the DRP increases the shareholder participation rate. The shareholder participation rate also increases in DRP firms with high growth and low profitability, which are characteristics of firms with lower agency costs.

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

This thesis examines the factors that explain the decision by Australian listed firms to adopt a dividend reinvestment plan ("DRP"). We also examine the decision by Australian firms to underwrite a DRP as well as the shareholder participation rate in DRPs. A DRP allows shareholders to have cash dividends on all or a portion of their shares automatically reinvested in new shares issued by the firm. The offer of new shares issued under a DRP is similar to a pro-rata rights offer of securities, with the subscription price for the new securities equal or close to the current share price of the firm. In Australia, participation by shareholders in the DRP is typically voluntary. Thus, depending on the level of shareholder participation in the DRP and the extent to which a DRP may be underwritten, a DRP allows the firm to increase its dividend payout ratio, and, at the same time, enables the managers of the firm to retain cash in the firm for new investment opportunities, working capital or the repayment of debt.

Australian DRPs have become increasingly popular for the following reasons.[1] First, DRPs provide a continuing and relatively cheap flow of new equity capital to Australian firms. Second, the features of the Australian dividend imputation tax system[2] introduced in1 July 1987 have incentivized firms to offer a DRP. In an imputation tax system, Australian tax resident investors are able to offset personal tax obligations where franking credits are attached to cash dividends. This tax based preference for franking credits has led to many Australian firms distributing a greater proportion of their earnings as franked dividends. A DRP allows a portion

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[1]The first Australian DRP was introduced by the Lend Lease Company in 1982.The number of DRPs offered by Australian firms have increased significantly subsequent to the introduction of the dividend imputation tax regime.

[2] The details of the imputation system can be found in Hamson & Zeigler (1990), Howard & Brown (1992), Officer (1994), Twite (2001) and Pattenden & Twite (2008).

of these dividend payments to remain within the company. Third, Australian companies may use DRPs to improve corporate shareholder relations (Anderson, 1986). Fourth, shareholders are usually not charged brokerage fees, commissions, stamp duty or any other costs for the allotment of new shares issued under the DRP.[3] Thus, a DRP enables small shareholders to reinvest their dividends without significant transaction costs. Fifth, in the Australian market, new shares issued under a DRP are often issued at a discount, typically 2.5% to 10%, from the weighted average market price of the shares traded on the Australian Stock Exchange ("ASX") in the period immediately after the ex-dividend date. Thus, participating Australian shareholders can benefit from purchasing shares under a DRP at a discount from the current market price.

Despite the evidence of an increase in the number of firms adopting DRPs in the Australian market, there have been no empirical studies, as far as we are aware, that focus on the characteristics of firms that implement a DRP or the reasons why they do this. We are also aware of no prior academic studies that comprehensively examine the decision by Australian firms to underwrite their DRP or the level of shareholder participation in DRPs in the Australian market in the post-tax credit refund period. This thesis therefore seeks to extend the scope of the existing body of literature by analyzing in some detail the features and characteristics of firms that adopt a DRP.

The remainder of this chapter is organized as follows. Section 1.2 undertakes a brief overview of prior literature on DRPs. In section 1.3, we discuss the motivations for our study. Section 1.4 explains the data, sample and time span of the study. The methodology is described in Section 1.5. Section 1.6 outlines the theory and hypothesis development. The structure of the remainder of the thesis is discussed in Section 1.7, and Section 1.8 concludes the chapter.

[3]For example, the current National Australia Bank (NAB) DRP notes that NAB will not charge any brokerage, commission or other transaction costs in respect of an application for or the provision of shares pursuant to the DRP.

1.2 Prior literature

Most of the previous studies on DRPs can be classified into two groups: (i) literature that looks at the new issue DRPs directly as a source of financing for firms and (ii) literature that examines the shareholder wealth (value-enhancing and value-decreasing) effects on DRP announcements. In the Australian market, DRPs have also been considered a mechanism that enables the firm to fully distribute franking credits that accrue within the firm when Australian corporate tax is paid.

1.2.1 DRP as a source of funds

Under the classical tax system, Finnerty (1989) models DRPs as a source of financing for firms in a theoretical framework. He demonstrates that the cost of DRP-financed equity is greater than the cost of stock-financed equity. Also, when new shares under a DRP are issued at a discount, participating investors gain at the expense of non-participating investors. However, Scholes and Wolfson (1989) view DRPs that issue new shares at a discount as providing investment banking function by raising new capital for a firm. Both the firm and the current participating shareholders in the discount DRPs split the underwriting costs, which would otherwise accrue to investment bankers.

A primary attraction of a DRP is that it enables shareholders to reinvest their dividends without incurring transaction costs (Dammon& Spat, 1992). Shareholders who participate in a DRP also benefit by “dollar cost averaging”, whereby more shares are purchased when prices are low and fewer shares are bought when prices are high. Davey’s (1976) survey evidence suggests that firms view DRPs as a mechanism to reduce stock volatility by attracting small individual investors who are less likely to trade the stock. From the firm’s perspective, a DRP provides a source of new equity capital, and it can be an effective means of increasing dividend payout and dividends per share without committing additional net cash outflows.

However, DRPs do have some drawbacks. All shareholders pay for the implementation and administrative costs of a DRP but only the participants receive the benefit; thus, non-participants are subsidizing the shareholders who participate in the DRP. Another perceived cost is the potential dilution of the earnings per share ("EPS") caused by an expanding equity base. When a discount for new shares issued under a DRP is offered, the potential dilution in EPS is further magnified. Agency costs between managers and shareholders can also increase if the firm lacks profitable investment opportunities and managers consume greater perquisites or undertake negative NPV investments funded by "surplus" cash from the dividends reinvested by shareholders.

1.2.2 DRP Announcement Effects

In general, event studies report a positive price reaction to the announcement by the firm of a DRP in the US market (Peterson et al., 1987; Perumpral et al., 1991; Chang & Nichols, 1992; Roden& Stripling, 1996). Peterson et al. (1987) find insignificant average abnormal returns surrounding the SEC (Securities and Exchange Commission) filings for new shares to be issued by non-utility firms using DRPs. Perumpral et al. (1991) investigate the stock market reaction to announcements of DRP plans, with the time of announcement indicated in letters from the firms offering the DRPs in the US market. For their entire sample, they find an average positive significant abnormal return in the month of announcement and significant positive announcement effects for market plan and original issue plan sub-samples. No significant effect is found for discount DRPs for both first and subsequent plan announcements. Chang and Nicholas (1992) report positive effects for announcements regarding the US 1981 tax legislation for qualifying DRP utility firms. Similarly, Roden and Stripling (1996) find significant wealth effects for the announcement of DRPs by qualifying US utilities in the 15-day period before the DRP announcements.

Allen (1991) and Dhillon et al. (1992) find that announcements of DRP issues result in significantly less negative wealth effects than for other new equity issue announcements in the US. They also find that negative wealth effects are significantly smaller for DRPs with a discount than for DRPs with no discount. Chan, McColough and Skully (1993) report a positive DRP announcement effect post imputation in the Australian market. They conclude that this supports the flotation cost hypothesis of Hansen et al. (1985) and that no net wealth distribution happens as a result of the discount.

1.2.3 Australian DRPs as a mechanism for distributing greater levels of franking credits

The dividend imputation regime introduced in Australia from 1 July 1987 substantially reduces incentives for firms to adopt debt in their capital structure. Dividend imputation also encourages firms to pay dividends to the maximum of the franking credits allowed (Nicol, 1992; Twite, 2001). Bellamy (1994) argues that, in the Australian tax environment, a DRP allows firms to exploit new investment opportunities and shareholders to receive a greater level of franking credits from an increase in the dividend payout. Graw (1993) also examines the tax benefit of Australian DRPs compared to share repurchase offers and argues that a DRP increases the firm's share premium/ capital surplus account.

Pattenden and Twite (2008) show that after the introduction of the imputation regime, Australian firms with a high proportion of income available as franked dividends increased their gross dividend payouts. Both Chan et al. (1995) and Pattenden and Twite (2008) report an increase in the number of firms offering a DRP subsequent to the introduction of dividend imputation.[4]

Investor preferences for a higher dividend payout with attached franking credits increased with the July 2000 tax reforms that enabled Australian resident individuals and superannuation and

[4] Chan, McColough and Skully (1993) examined the effect of DRPs on share returns before and after the introduction of dividend imputation. They suggest that before the introduction of the dividend imputation regime, the market reacted indifferently when the firm announced the implementation of a DRP. However, such an announcement was valued positively post-imputation.

pension funds to redeem surplus franking credits from the Australian Tax Office. These tax arguments support shareholder preference for franked dividends in conjunction with a DRP.

1.3 Motivation for our study

The Australian market provides an interesting setting for examining the determinants of a firm's decision to adopt a DRP. The elimination of double taxation of corporate income and the introduction of a capital gains tax in Australia presents a unique opportunity to test whether these tax changes impact on the dividend payout ratio and the decision by Australian firms to adopt a DRP.

The motivation for our study is as follows. First, we modify Finnerty's (1989) model under the Australian dividend tax imputation to examine the costs of retained equity sourced from a DRP in an imputation environment. Second, despite the evidence of an increasing number of firms adopting DRPs in the Australian market, we are not aware of any prior empirical studies that focus on the specific features and characteristics of firms that implement a DRP. Third, unlike Pattenden and Twite's (2008) study that covers the period between 1982 and 1997, our sample period between 1995 and 2009 spans the introduction of the July 2000 tax reforms. Because of this, we can test whether the July 2000 tax credit refund reform has impacted on the decision of Australian firms to adopt a DRP and provide further evidence on the impact of taxation on dividend policy for Australian firms subsequent to this significant tax change on equity income.

Fourth, we investigate the determinants of the shareholder participation rate for non-underwritten DRPs. Wills (1989) studied the Australian DRP participation rate in the period between 1982 and 1987. Our study, which spans the period between 1995 and 2009, provides further insights into the effect of taxation and discounts for new share issues on the shareholder participation rate in a DRP subsequent to the introduction of dividend imputation. Fifth, we identify the specific features and firm characteristics that motivate a firm to underwrite a DRP under the Australian tax imputation system. In an underwritten DRP, an underwriter effectively guarantees a minimum shareholder take-up of the DRP. This means that if there is a shortfall in the number of existing investors that participate in the DRP, the underwriter guarantees to subscribe for additional new shares up to the agreed underwriting level.

Overall, our study contributes to the literature by increasing our understanding of the effect of taxation and other factors on a firm's decision to implement and underwrite a DRP, and determining the level of shareholder participation under a non-classical imputation tax system.

1.4 Data, sample and time span of study

1.4.1 Data

This study uses Australian company data for the period between 1995 and 2009. The sample consisted of dividend paying firms publicly traded in the Australian capital market, drawn from the population of all the listed firms at ASX (Australian Securities Exchange). The sample period is subsequent to the introduction of the dividend tax imputation system in 1987 and spans the July 2000 tax credit refund reform.

We prepared a preliminary sample of 19,763 firm observations obtained from the Aspect Huntley's DAT-Analysis and FIN-Analysis databases. We identified DRP firms by a search of announcements made to the ASX and a search on DAT-Analysis (Capital History of Companies and Company Announcements). Based on the firm's dividend history and DRP announcements, firm observations were grouped into dividend paying firms with and without a DRP. The final sample of 6,061 dividend paying firm observations (934 firms) comprises 2,243 DRP firm observations and 3,818 non-DRP firm observations. The final data is both cross-sectional and time-series in nature. Our sample covers most of the major industrial sectors in Australia.

1.4.2 Time period of study

We split the time period of our study into a pre-tax credit refund period (1995-2000) and a post-tax credit refund period (2001-2009). As previously noted, the July 2000 tax reforms enabled Australian resident individuals and superannuation and pension funds to redeem surplus franking credits from the Australian tax office. We define the period prior to the July 2000 tax reforms as the pre-tax credit refund period and the period post the July 2000 tax changes as the post-tax credit refund period.

1.5 Methodology

To identify the factors distinguishing DRP firms and dividend paying non-DRP firms, we first undertake univariate analysis and compare the independent variables for both the DRP and non-DRP samples. In multivariate analysis we use a logistic regression model. Logistic models are estimated with robust and cluster options to deal with the problems of normality, heteroscedasticity and large residuals. We use the bootstrap method to correct for standard errors. We estimate both random effects and fixed effects models (logistic panel regressions) in our multivariate analysis using panel data. We also estimate a two-stage least-squares logistic model (2SLS) using the Instrument Variable Method to control for any potential endogeneity between dividend payouts and the decision to adopt a DRP.

Similarly, univaraite and multivariate analysis is undertaken to test the impact of tax change, discount for new share issues and other firm characteristics on the firm's decision to underwrite a DRP. Univariate and multivariate analysis are also done to test for the impact of tax changes and firm characteristics on the shareholder's decision to participate in a DRP. Panel logistic and linear models and two-stage least-squares logistic and linear models are also employed to test the hypotheses of underwriting and participation.

1.6 Theory and hypothesis development

1.6.1 Decision to adopt a DRP

We predict a firm's decision to adopt a DRP may be explained by taxes, growth prospects, firm size, leverage, and profitability and liquidity constraints. The Australian imputation credit regime creates incentives for firms to increase their dividend payout ratios where dividends have attached franking credits. The July 2000 tax credit refund reform created additional incentives for superannuation funds and resident low marginal tax rate shareholders to actively seek franking credits. Therefore, we posit that DRP firms will have higher dividend payout ratios and distribute more franking credits than dividend paying non-DRP firms. We also predict that more firms will implement DRPs in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000).

We posit that firms with high growth prospects will be more likely to adopt a DRP. This is because high growth firms or firms with greater new investment opportunities have greater incentives to implement a DRP to access new capital. We also predict that large firms are more likely to introduce a DRP than small firms due to lower relative fixed transaction costs and preferences by shareholders to invest new equity into more liquid firms. Under the leverage hypothesis we predict that firms with higher relative debt levels or firms that are more financially constrained are more likely to adopt a DRP compared to firms with lower debt levels. Firms with lower profitability and liquidity constraints have a greater need for outside funds compared to firms with high profitability and no liquidity constraints. Thus, we also predict that firms with low profitability and liquidity are more likely to have a DRP.[5]

Overall we find evidence to support the role of taxation of equity income in a firm's decision to adopt a DRP. Firms adopting a DRP have a higher dividend payout ratio compared to non-DRP firms. Firms were also more likely to adopt a DRP subsequent to the July 2000 tax reforms. In addition, there is some evidence that DRP firms paid dividends with higher levels of franking credits. Firms that adopt DRPs were also larger in size and had higher leverage, a lower return on assets and operating cash flow and a lower current ratio than non-DRP firms.

[5] Firms that adopt a DRP may also face higher agency costs or potential conflicts of interest between shareholders and managers, where incentives may exist to consume cash reinvested back in the firm on managerial perquisites. High debt or leverage lowers these types of agency costs.

1.6.2 Decision to Underwrite

A common feature of many Australian DRPs is that they are underwritten. We predict firms with a higher dividend payout ratio/dividend yield are more likely to underwrite their DRP, compared to firms with a lower dividend payout ratio/dividend yield. A higher dividend payout ratio means that the firm distributes a greater proportion of its profits to shareholders. By underwriting the DRP to a minimum target level of shareholder participation, the firm ensures a target level of funds is retained within the firm.

Consistent with our prior predictions, we also posit that firms with a higher level of franking credits attached to their dividends will have a greater level of shareholder participation in the DRP. Hence, firms that pay dividends with a high franking credit ratio are less likely to underwrite their DRPs compared to firms with a low level of franking credits. Underwriters are also likely to prefer to underwrite a DRP for large firms due to their greater liquidity, higher underwriting fees and lower research costs. Large firms are able to pay higher underwriting commissions and their stocks are more frequently traded compared to small firms. Therefore, we posit that large firms are more likely to underwrite their DRP than small firms.

We predict a positive relationship between the decision to underwrite the DRP and firm growth and leverage. Under Australia's dividend imputation tax environment we posit that firms with high growth opportunities have a greater incentive to underwrite a DRP to ensure access new equity capital. A more highly leveraged firm subject to greater financial constraints has a greater incentive to underwrite the DRP since the firm does not want to violate its debt covenants or be unable to pay coupon /principal payments. Lastly, we posit that the decision to underwrite a DRP is unrelated to the discount on new shares issued. The greater the discount for new shares issued under the DRP, the higher the likely level of shareholder participation and the less need there will be for the firm to have the DRP underwritten to ensure a minimum level of funds are retained within the firm. However, a higher discount for new shares issued under the DRP also creates a greater incentive for the underwriter to underwrite the DRP.

Overall we find that most Australian DRPs are underwritten. Our empirical findings also suggest that firms that underwrite their DRP are larger in size, have higher leverage, a lower operating cash flow and a lower current ratio than non-underwritten DRP firms. The results provide some evidence that firms that underwrite their DRP have higher dividend yield and lower franking credit yield than non-underwritten DRP firms.

1.6.3 Participation rate

Under the Australian tax imputation regime, we predict a positive association between franking credit ratio and the level of shareholder participation rate in a DRP. When cash dividends have attached franking credits, shareholders will face a lower net tax liability on the cash dividend. In the post-tax credit refund period, Australian superannuation funds, pension funds and resident low marginal tax rate shareholders are also eligible for a tax refund on fully franked dividends. Thus, under the theory of taxation, we posit that firms with a high dividend and franking credit payout ratio are likely to have a higher level of shareholder participation in the DRP than firms with a low dividend payout ratio and a low franking credit ratio.

Consistent with the findings of Wills (1989), we predict a positive association between the shareholder participation rate in the DRP and the discount for new shares issued under the DRP. We posit that firms with high growth prospects will have a higher shareholder participation rate in the DRP. Firms with high growth have lower levels of excess or surplus free cash flow. Thus, agency cost theory would suggest managers of firms are less likely to consume excessive perquisites using cash reinvested back into the firm under a DRP. Debt can also have substantial benefits in controlling the "free-cash-flow" problem, the temptation of managers to over invest in risky businesses so there is a possibility that investors concerned with agency cost issues prefer to participate in DRP stocks with high leverage. Thus, we predict that firms with higher relative debt levels are more likely to have a greater participation rate than firms with lower debt levels.

Overall our results show that a higher discount for new shares issued under the DRP increased the participation rate. Consistent with our expectations, there was some evidence that growth firms have a higher level of participation rate compared to non-growth firms, and that firms with a higher debt level have a greater participation rate compared to firms with lower debt level. Our results also suggest firms with lower cash flow profitability have greater participation rate compared to firms with higher cash flow profitability.

1.7 Structure of the remainder of this thesis

The remainder of the thesis is structured as follows. Chapter 2 discusses the Australian institutional environment and features of DRPs in the Australian equity market. We also review the important changes to the taxation of dividend and equity income in Australia and how they may impact on a firm's decision to adopt a DRP.

In Chapter 3, we review in more detail the prior literature on DRPs. Chapter 4 describes our sample and data sources. The data sample includes firms representing all major industry groupings in Australia. In Chapter 5 we modify Finnerty's (1989) model under the Australian tax imputation system to compare the cost of DRP-financed equity to the retention-financed and stock-financed costs of equity. We demonstrate that under imputation the cost of new equity finance falls relative to the cost of retained equity. This provides further incentive for a firm to adopt a DRP under a dividend imputation regime.

Chapter 6 examines the determinants of firms that adopt a DRP and tests the role of taxes, growth, firm size, agency cost and financial distress as factors that may influence the decision by the firm to adopt a DRP. Chapter 7 discusses the determinants of the firm's decision to underwrite their DRP. Chapter 8 examines the determinants of shareholder participation in non-underwritten DRPs. Chapter 9 summarizes the main conclusions of our study and their implications.

1.8 Conclusion

This chapter has given an overview of the topics examined in the thesis. The main research questions that we examine are: (i) the determinants of factors that may explain a firm's decision to adopt a DRP,(ii) the determinants of the firm's decision to underwrite a DRP, and (iii) the determinants of shareholder participation rate in non-underwritten DRPs. We test empirically these determinants in terms of taxation, growth, firm size, agency cost, financial distress, leverage and the "discount" hypotheses.

Overall our research contributes to a better understanding of the factors that may lead to adopting, underwriting and participating in Australian DRPs within the framework of a dividend tax imputation system.

CHAPTER TWO
AUSTRALIAN INSTITUTIONAL ENVIRONMENT

2.1 Introduction

This chapter provides an overview of the institutional environment and the features of DRPs in the Australian equity market. The chapter is organized as follows. Section 2.2 describes the characteristics of Australian DRPs, Section 2.3 explains the legal requirements of implementing a DRP, Section 2.4 describes equity ownership in the Australian market and Section 2.5 discusses the methods used to raise equity in the Australian market. This is followed by a description of Australian tax system in section 2.6. In section 2.7, the taxation of DRPs in the Australian market is reviewed. Finally, section 2.8 concludes the chapter.

2.2 Features of an Australian DRP

This section examines the characteristics of an Australian DRP. The most common type of DRP is the new-issue DRP that offers shareholders the opportunity to invest their dividends in additional shares in the firm. However, changes over time to Australian tax rules have created incentives for firms to adopt a number of variations on the basic DRP. These variations can be classified into four main groups: (i) dividend election plans, (ii) dividend selection plans, (iii) overseas dividend plans, and (iv) scrip dividend plans.

2.2.1 Introduction of DRPs in Australia

DRPs were initially introduced in Australia to enhance the corporate shareholder relationship (Anderson, 1986). However, an improved relationship with the shareholders was not the only benefit. The issue of new shares under a DRP plan provided the firm with a predictable source of new equity capital (Skully, 1982). From a corporate viewpoint, a DRP provides a relatively cheap source of additional equity capital and an effective means of increasing dividend payout without committing cash outflows. All major industry groupings in the Australian market now offer DRPs (see Chapter 4 titled “Data and Sample”).

2.2.2 New-issue DRPs

The focus of this study is on new-issue DRPs that are Dividend Election Plans. New-issue DRPs allow shareholders to have cash dividends on all of a specified portion of their shares in a firm automatically reinvested into newly issued shares. New shares issued to participating shareholders under the DRP are usually issued at a discount from the weighted average market price of the shares traded on the Australian Stock Exchange, typically during the five trading days after the ex-dividend date. Shareholders are not charged brokerage fees, commission or stamp duty for any allotment of shares under the DRP. Where the issue formula results in a fraction of a share, the entitlement is usually rounded up to the next whole issue. A transaction statement and a certificate for the new shares are forwarded to participants at each dividend payment. Most Australian DRPs allow shareholders to vary their participation or withdraw from the DRP at any time.

Table 2.1 presents an example of a DRP in the Australian market. The Westpac dividend reinvestment plan allows shareholders in Westpac (WBC)to reinvest all or part of the dividends payable on their Westpac fully paid ordinary shares in additional fully paid ordinary shares in the firm. All shareholders of fully paid Westpac ordinary shares who are resident in or whose address on the register of shareholders is in Australia or New Zealand may participate in the DRP, to the limit of their shareholding.[6]The prospectus of Westpac DRP states that(i) a participant may at any time give notice to Westpac to vary the participant's participation in the DRP or give notice of termination of the participant's participation in the DRP and (ii) where a fraction of a share would result from the calculation of a participant's entitlement, the value of that fraction of a share will be carried forward in the participant's DRP Account, without interest, to be applied towards the calculation at the time of the next dividend. The value of a

[6] Some DRPs may have a maximum number of shares that are eligible for participation. However, this is not a common feature in Australian DRPs.

fraction of a share will be calculated in accordance with the following formula: F x C**,** where Fis the fraction of a share and C is the market price.

Table 2.1
An example of a New-issue DRP in the Australian market (Westpac Australia)

Summary	Terms and conditions
Eligibility for participation	All shareholders of fully paid Westpac ordinary shares who are resident in or whose address on the register of shareholders is in Australia or New Zealand may participate in the DRP, to the limit of their shareholding.
Type of DRP	New-issue DRP.
Discount on market price	2.5%
Price of shares under DRP	‘Market Price’ means the arithmetic average (rounded to the nearest cent) of the daily volume weighted average market price per share (rounded to four decimal places) sold on the ASX during the ten Trading Days commencing on the second Trading Day following the relevant Record Date (or such other period as the Directors determine and announce to the ASX), less any discount (up to 2.5%) the Directors may determine from time to time and announce to the ASX.
Nature of participation	Full or partial. Shareholders can participate partially by nominating a specific number of their shares; part of their dividends may be reinvested in additional shares.
Participation limit	There is no limit. Shareholders may elect to participate in the DRP in respect of all fully paid ordinary Westpac shares registered in the name of shareholders.
More than one shareholding	Shareholders are required to lodge a separate DRP application or variation form for each registered shareholding.
Commencement of DRP	Participation will begin with the first dividend payment after receipt of the application form. The form must be received by 5:00 pm Australian Eastern Time on the record date to be effective for that dividend.
Cost of participation	There are no brokerage fees, commission or other costs associated with the DRP.
Sale of DRP shares	Shareholders can sell any or all of their shares at any time. If shareholders elect for 'full participation' and then sell some of their shares, the dividends on their remaining shares will continue to be reinvested under the DRP. If shareholders elect for 'partial participation' and then sell some of their shares, the number of shares sold will be deemed to the full extent possible to be non-participating shares and the balance, if any, will be deemed to be participating shares under the DRP.
Plan Statement	After each issue of shares under the DRP, a dividend statement will be forwarded to shareholders.
Plan Variation /Termination	Westpac's Directors may alter, suspend or terminate the DRP at any time by notification to the ASX or, at the Directors' discretion, in accordance with the provisions regarding the giving of notice to shareholders contained in the Constitution. Shareholders can also withdraw from DRP at any time.

Source. Westpac Australia: DRP Terms and Conditions (April 2007).

The Westpac DRP booklet also provides details about the plan statement and the termination of DRP in the case of the participant's death. Participant will be sent a dividend statement detailing, as at each Dividend Payment Date, (i) the number of the participant's participating shares subject to the DRP as at the Record Date, (ii) the aggregate amount of the dividend payable to the participant in respect of the participant's participating shares, (iii) the number of shares allotted or transferred under the DRP to the participant on that Dividend Payment Date and the price at which those shares were allotted or transferred, (iv) the residual cash balance carried forward in the participant's DRP Account (if any) and (v) the participant's total holding of participating shares after that allotment or transfer. If a participant dies, participation in the DRP by that participant and any other participants with whom the deceased was a joint participant will be terminated upon receipt of notice by Westpac of the death of the participant, but any such termination takes effect only with respect to the next occurring Record Date.

2.2.3 DRP variations to the New-issue DRP

We briefly discuss below the four variations of the New-issue DRP.[7]

2.2.3.1 Dividend Election Plans

Dividend Election Plans allow shareholders to receive bonus shares in lieu of their normal cash dividends. Under Australian tax law, if the bonus shares are issued from share premium account reserves, they are not considered as income in the hands of their recipients, but rather a tax-free distribution of existing capital. On their sale, most investors will have to pay capital gains tax effectively based on nil purchasing cost. However, if the shares were acquired prior to the introduction of capital gains tax in 1985, then the bonus shares are not subject to capital gains tax on disposal. Prior to 1990, the bonus share issue was not considered a dividend and did not have any franking credits. However, post 1990, issue of bonus shares was treated as dividends

[7] See Chan et al. (1995) for a broader discussion.

and they deplete a company's franking credit reserves similar to a cash dividend with attached imputation credits.

2.2.3.2 Dividend Selection Plans

Dividend Selection Plans allow shareholders to choose between franked and unfranked dividend streams.[8]Shareholders who are unable to benefit directly from franking credits (e.g., foreign investors) can select to receive unfranked dividends. This enables the firm to save franking credits for those shareholders who can utilize the credits (e.g., domestic super funds). However, the incentive to use the Dividend Selection Plan to conserve franking credits ended in 1988. Post 1988, the firm paying franking credits to some shareholders and unfranked dividends to others is required to debit its franking credit account as if a franking credit has been paid to all shareholders.

2.2.3.3 Overseas Dividend Plan

Under the Overseas Dividend Plan (ODP), certain Australian companies could restructure their operations so that they had an offshore holding company gather all of the taxes paid in one foreign country and then offer their shareholders the alternative of receiving dividends from that holding company.[9] This arrangement had two advantages: (i) the funds did not leave the country where the income was earned and they were not subject to any withholding taxes that might apply on repatriating the money to Australia, and (ii) as the dividend was not paid from Australia, these ODP payments were not subject to any Australian dividend withholding tax requirements. However, the Australian government removed this facility in July 1990.

2.2.3.4 Scrip Dividend Plan

Under the Scrip Dividend Plan, shareholders have no choice on participation and receive scrip dividends only (new shares in the firm) with no cash dividend. The scrip dividends are fully

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[8] See Section 2.6 for a discussion of the franking of dividends.

[9]For example, UK shareholders in Australian companies could receive the equivalent of the Australian dividend in British pounds and potentially access UK franking credits the firm had accumulated in that country.

franked[10] and they are taxable when they are in the hands of Australian resident shareholders. These scrip dividends help firms to distribute any excess franking credits to their shareholders without any associated cash outflow. These plans sought to distribute maximum franking credits with minimum increase in issued capital by issuing shares priced at a substantial premium to par value. However, in 1990, the Australian Taxation Commissioner stipulated that if scrip dividend shares are issued, shareholders will receive franking credits to an amount equal to the share's par value. This amount is also considered the share's purchase cost for tax purposes. This ruling effectively ended the tax benefits of scrip dividend plans.

2.3 Legal requirements of a DRP

The two main regulatory mechanisms in Australia governing the issue and sale of "securities" are The Corporations Act, 2001 and the ASX Listing Rules. The legislation that regulates the raising of equity capital from the public at large, by way of issue or sale of "securities", is Chapter 7 of the Corporations Act 2001.The offer of securities under a DRP is considered similar to a pro-rata offer of securities (or a rights issue) as dividends and distributions are paid at the same rate per security to holders of ordinary securities. All holders of ordinary securities are able to participate equally under a DRP plan.

The analogy of a DRP with a pro-rata rights offer is recognized by Item 11 of the Corporation Act, which provides for an exception where the acquisition is a result of participation in a DRPand the plan is available to all shareholders.[11]The exception is also extended to securities issued to underwriters. The terms of a DRP should, however, be fully disclosed to shareholders.

[10] The scrip dividend plan is a variant of the Australian DRP where the scrip dividends are invariably franked in order to distribute franking credits to shareholders.

[11]Rights issues and private placements are the other favoured methods of secondary equity offering in the Australian market. The Corporations Legislation Amendment (Simpler Regulatory System) Act 2007 (the SRS Act) amended the Corporations Act to allow listed entities to raise funds under a rights issue without a prospectus. ASX listing rule 7.1 deals with private placements. This rule provides that a listed company cannot issue ordinary securities amounting to more than 15 percent of the ordinary securities it had on issue twelve months earlier. The underlying rationale of the rule is that shareholders should be afforded certain pre-emptive rights in respect of ordinary security issues, that is, above a certain level of capital raising (today 15%, originally 10%). If a company then seeks to issue additional ordinary securities, shareholders should be offered these on a pro-rata basis unless they agree to do otherwise.

In the case of a DRP established before a firm lists, a summary of the terms of the DRP should be contained in a prospectus or information memorandum. In the case of a DRP established after the firm lists, the terms of the plan should be made available to investors.

2.4 Equity ownership in the Australian market

2.4.1 Types of equity owners

This section examines the types of investors who invest in the equity market. It also details the changes in the ownership of Australian firms. Australian investors in the equity market can be grouped into three broad categories: households, domestic institutional investors and foreign investors.

2.4.1.1 Domestic institutional investors

The domestic institutions in the Australian equity market include banks, life and other insurance companies, superannuation and pension funds and other financial institutions. During the 1980s, restrictions on capital flow in Australia were removed. The pension system was changed from "pay as you go" to a "funded" system. These reforms led to large amount of funds flowing to Australian institutional investors.

Australian institutional investors are mostly made up of households' indirect holding of assets in superannuation and other managed funds as well as holdings by authorized deposit taking institutions (ADIs) and insurance companies. The growth of Australia's superannuation funds and pension funds can be largely attributed to Australia's government-mandated retirement income scheme, which requires employers to contribute a minimum of 9% of staff wages to staff superannuation (pension) schemes.[12] Additional voluntary contributions to superannuation funds are encouraged by generous tax concessions. Most of these funds are managed by private sector institutions.

[12] For a broader discussion, see "Superannuation Trends and Implications" (Australian Centre for Financial Studies, November 2011).

Australia's superannuation industry played an important role in helping firms maintain funding and liquidity during the height of the Global Credit Crisis. A key part of the financial crisis was the withdrawal of liquidity in overseas debt markets. During that time, Australian companies were able to raise equity in Australian capital markets largely thanks to off-market purchases substantially funded by superannuation funds.[13] This was especially true for Australian banks, which were among the biggest players in the capital raising market during the Global Credit Crisis period.

2.4.1.2 Foreign investors

The 2007 equity data from the Australian Bureau of Statistics shows that the residents of USA, UK and Japan hold the largest proportion of foreign owned Australian equity on issue.[14]The proportion of ownership of total non-resident equity in Australia held by residents of each of these countries varies significantly by sector.[15]Non-residents are defined as any individual, enterprise or other organization ordinarily domiciled in a country other than Australia. A sectoral decomposition of the value of equity ownership by non-residents shows that banks, non-bank deposit taking institutions, non-financial corporations and other non-financial sub-sectors are the main sectors in which non-residents predominantly make investments.

[13] See "Capital raisings in Australia" (ASX Information Paper, 2010) and "Enhancing financial stability and growth, the contribution of superannuation" (Allen Consulting Group, August 2011).

[14]For example, at 30 June 2007 USA residents owned $212b (33%) of the foreign-owned equity in Australian enterprise groups, accounting for 10% of total equity on issue. At the same time, UK residents owned $183b (29%) of the foreign equity holdings in Australian enterprise groups, while residents of Japan owned a further $27b (4%). The UK and Japanese holdings accounted for 8% and 1%, respectively, of total equity on issue. Residents of APEC economies accounted for $290b (46%) of foreign-owned equity in Australian enterprise groups at 30 June 2007, while residents of EU countries accounted for $242b (38%). The holdings of residents of APEC and EU countries accounted for 13% and 11% respectively of the total equity on issue. The holdings of residents of OECD member countries amounted to $524b, which accounted for 83% of total foreign-owned equity and 24% of total equity on issue(Australian Bureau of Statistics, 2007).

[15] At 30 June 2007, residents of the UK owned 48% of the total non-resident equity investment in Australian banks, and held 8% in non-bank deposit taking institutions. Residents of the USA dominate the foreign ownership of equity in non-bank deposit taking institutions (66%), but hold less equity in banks than UK residents (29%). While residents of Japan owned 6% of the total non-resident equity investment in non-bank deposit taking institutions at 30 June 2007, their participation rates in the banks and other financial sub-sectors were relatively small(Australian Bureau of Statistics, 2007).

2.4.1.3 Households

The Australian household category covers a household's direct holdings only and does not include investments in managed funds or superannuation. The definition of direct ownership includes shares in a company listed on the stock exchange that are held directly and not part of a fund or other investments listed on a stock exchange (e.g., listed property trusts, options, warrants, etc.). The share registers of small companies are generally dominated by retail investors. The ASX model of listing both large and small companies under a single framework means that the listing rule standards applied to large companies are also available to retail investors who invest in smaller companies. The households spread their share portfolio across a range of industry sectors, with 40% having shares across more than three industry sectors and 35% across two to three sectors. The most popular sector is financial services (34%) followed by mining and manufacturing (25%) (ASX Share Ownership Study, 2006).Duong, Kalev and Krishnamurti (2009) and D'Aloisio (2005) also report that individual investors are an important investment group in Australia. In terms of market value, individual investors account for about 22% of the Australian equity market (D'Aloisio, 2005).Most of the households entered the market via demutualization, employer sponsored schemes or at the time of large public floats.

2.4.2 Dollar value of equity ownership

Column 8 of Table 2.2 shows the combined equity ownership value in dollar terms held by domestic institutions, foreign institutions and households. The combined equity ownership value in dollar terms was $290 billion in 1995. This increased to $1,040 billion in 2009, but there was a decline in the combined equity ownership value in the post 2007 period due to the Global Credit Crisis.

Columns 2, 4 and 6 of Table 2.2 present the dollar value of the equity ownership of ASX listed companies held by each major class of shareholder. The evidence in Column 2 indicates a steady growth in the dollar value of equity ownership of domestic institutions from $103 billion in 1995 to $400 billion at the end of the sample period in 2009. In 2007, the dollar value of equity ownership of domestic institutions reached the highest level, at 653 billion dollars. There was a decline in the dollar value of equity ownership held by domestic institutions in 2008 and 2009, which was again likely due to the Global Credit Crisis.

Column 4 of Table 2.2 shows the dollar value of the equity ownership of ASX listed companies held by foreign institutions. Overall, the figures show a gradual increase in the dollar value of the equity ownership held by foreign institutions from $135 billion in 1995 to $ 451 billion dollars in 2009. The foreign institutions also experienced a decline in the dollar value of their holdings during the Global Credit Crisis as the figures declined from $527 billion in 2007 to $481 billion in 2008 and $451 billion in 2009.

The dollar value of the equity ownership of ASX listed companies held by the households increased from $52 billion in 1995 to $189 billion in 2009 (see Column 6 in Table 2.2). Households also experienced a steady growth in equity ownership in dollar terms until 2007. Like domestic institutions and foreign institutions, households also had a decline in the value of their equity ownership during the Global Credit Crisis. The dollar value of equity ownership held by households declined from $350 billion dollars in 2007 to $260 billion in 2008 and $189 billion in 2009.

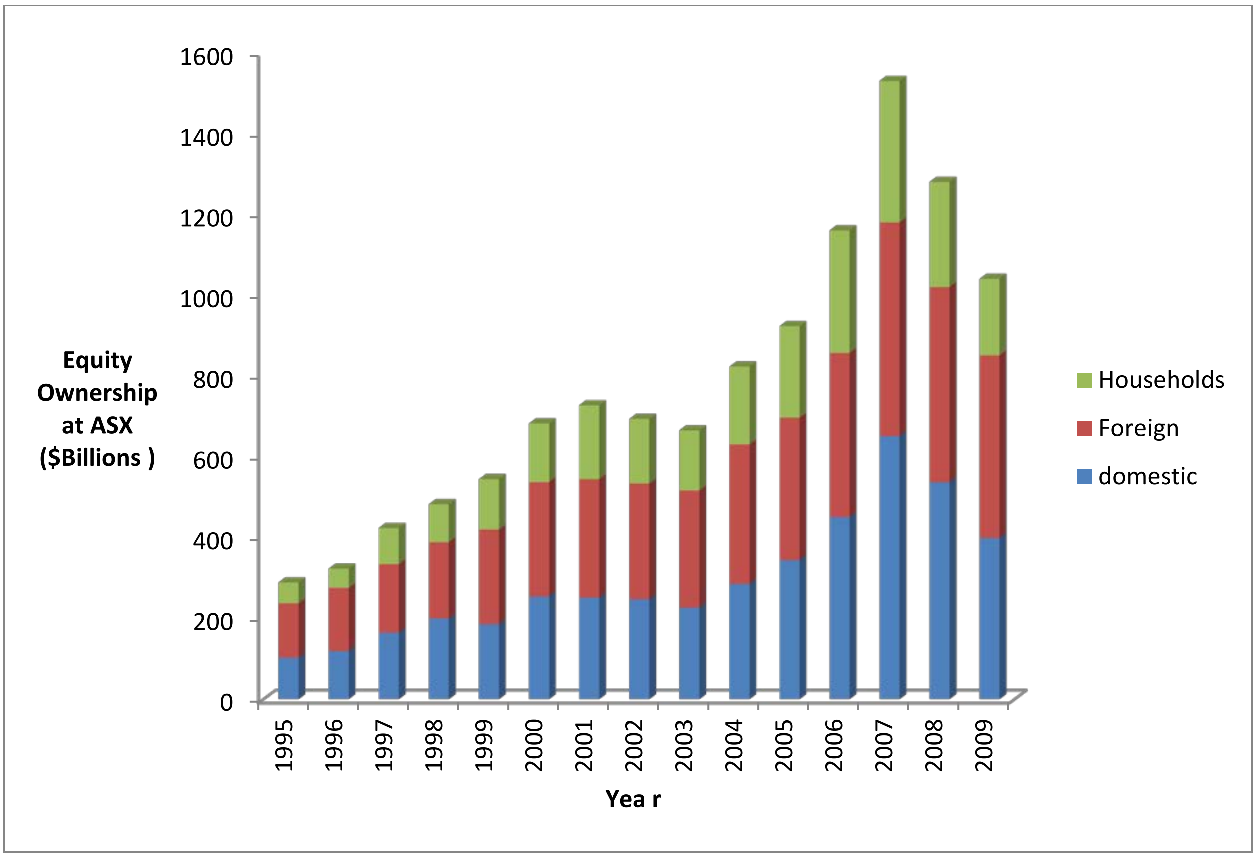
The dollar value of the equity ownership of ASX listed companies held by each class of shareholder is also presented in Figure 2.1. The figure shows that in 2007, all the three classes (domestic institutions, foreign institutions and households) reached their highest levels of equity ownership in dollar terms ($653 billion, $527 billion and $350 billion). As noted earlier, the holdings of all the three classes showed a decline in dollar terms during the Global Credit Crisis period.

Table 2.2
Equity Ownership of ASX listed companies (1995-2009)

(1) Year	(2) Domestic Institutions ($ Billion)	(3) %Domestic Institutions	(4) Foreign Institutions ($Billion)	(5) % Foreign Institutions	(6) Households ($Billion)	(7) % Households	(8) Total($Billion)
1995	103	32.52	135	46.55	52	17.93	290
1996	120	37.04	156	48.15	48	14.81	324
1997	165	38.82	170	40.00	90	21.18	425
1998	200	41.32	190	39.26	94	19.42	484
1999	186	34.07	235	43.04	125	22.89	546
2000	255	37.28	284	41.52	145	21.20	684
2001	252	34.57	294	40.33	183	25.10	729
2002	248	35.68	287	41.29	160	23.02	695
2003	227	34.03	291	43.63	149	22.34	667
2004	286	34.75	346	42.04	191	23.21	823
2005	345	37.38	353	38.24	225	24.38	923
2006	452	38.97	405	34.91	303	26.12	1160
2007	653	42.68	527	34.44	350	22.88	1530
2008	539	42.11	481	37.58	260	20.31	1280
2009	400	38.46	451	43.37	189	18.17	1040

Source.Australian Bureau of Statistics and ASX Information Paper (2010).

Figure 2.1
Equity ownership of ASX listed companies (1995-2009)



2.4.3 *Trends in percentage ownership relative to total value*

Table 2.2 also shows the trends inequity ownership of ASX listed companies held by domestic institutions, foreign institutions and households for the sample period between 1995 and 2009. The flow of funds into compulsory superannuation has provided a source of demand for equity securities issued by companies. The percentage value of equity ownership of ASX listed companies held by domestic institutions registered an overall increase, from 32.52% in 1995 to 42.68 % in 2007(see Column 3). Foreign institutions showed a decline in the percentage value of equity ownership from 46.55% in 1995 to 34.44% in 2007. Table 2.2 also shows that foreign ownership declined from 2003 to 2006 before trending up again post 2007. However, there was a small increase in the percentage value of equity ownership of foreign institutions in 2008 and 2009 (37.58%, 43.37%).

The household sector also showed an overall rise in the percentage value of equity ownership from 17.93% in 1995 to 26.12 % in 2006. In the post 2006 period, there was a decline in the percentage value of equity ownership held by households, with a fall in the percentage value of equity ownership held by households to 18.17% by 2009. In fact the biggest decline in ASX ownership during the GFC was actually households. The change in the household equity ownership percentage may be explained by a transitional arrangement in 2006 under which households could make up to $1 million dollars in undeducted (after-tax) contributions to superannuation between May 2006 and 30 June 2007 (see Table 2.4). This led to a peak in household equity ownership in the 2006 year. The Global Credit Crisis, where households significantly reduced their holdings in equity, also contributed to a decline in household equity ownership in 2009.

2.5 Equity raising by method/year

This section examines capital raising by year through floats, rights, private placements and DRPs over the sample period 1995-2009. A float is a market term for selling shares of a company into the stock exchange for the purpose of raising capital. This is typically an initial public offering. A rights issue is an offer to all existing shareholders to subscribe for additional securities in the company in proportion to their holding, usually at a discount to the current market price of the shares. Shareholders have the choice of accepting the offer in whole or part. A rights issue is renounceable if the right of each security holder to subscribe for their entitlement may be sold to a third party (who need not be an existing security holder). The entitlements of security holders under non-renounceable rights issues cannot be transferred.

A placement involves the issue of securities to a limited number of significant and /or predominantly institutional investors. They can be made to a select group of existing shareholders or may be used to introduce a new cornerstone investor to the share register. Under DRPs, shareholders are permitted to reinvest all or part of their dividend payments to new issues. The opportunity to participate is available to all eligible shareholders.

Table 2.3 presents the amount of equity capital raised through floats, rights, private placements and DRPs for the period 1995-1996 to 2009-2010 inclusive. The data is sourced from Australian Financial Market Reports.

2.5.1 Total equity capital raised

The total equity capital raised through floats, rights, private placements and DRPs in the Australian market over the sample period between 1995 and 2009 increased from 13,998 million dollars in 1995-1996 to 67,945 million dollars in the 2009-2010 period (Column 6, Table 2.3). Column 6 of Table 2.3 also shows that the highest amount of new equity capital raised was $83,636 million in the 2008-2009 period. However, there was a decline in the total equity capital raised to $ 67,945 million in the 2009-2010 period.

To examine capital raisings in the ASX, we also divide the sample period into pre and post-tax credit refund periods. The pre-tax credit refund period refers to the pre-July 2000 tax credit refund reform period (1995-1996 to 2000-2001) and the post-tax credit refund period is the period (2001-2002 to 2009-2010). The tax changes introduced in the post-tax credit refund period allow investors to obtain a cash refund on excess franking credits and this may explain the greater use of DRPs for raising new equity capital.[16]

2.5.2 Equity capital raised through floats

The equity capital raised through floats increased from 4,960 million dollars in the 1995-1996 period to 11,459 million dollars in the 2009-2010 period. However, during the 2008-2009 period, the equity capital raised through floats declined to the lowest level (1,885 million dollars) due to the Global Credit Crisis.

[16] See Section 2.6 for details.

Table 2.3
Equity capital raisings by type by year

(1) Year	(2) Floats (A$ million)	(3) Rights (A$ million)	(4) Private Placements (A$ million)	(5) DRP (A$ million)	(6) Total (A$ million)	(7) % of Equity Capital raised through a DRP
1995-1996	4,960	3,492	2,105	3,441	13,998	24.58
1996-1997	4,376	1,886	5,406	3,207	1,4875	21.56
1997-1998	15,157	3,812	3,714	3,619	26,302	13.76
1998-1999	5,650	2,993	5,367	3,630	17,640	20.58
1999-2000	6,939	4,587	9,024	3,638	24,188	15.04
2000-2001	8,519	549	4,293	3,308	16,669	19.85
2001-2002	2,857	992	5,310	3,625	12,784	28.36
2002-2003	5,961	2,446	7,032	4,174	19,613	21.28
2003-2004	12,753	8,753	7,640	5,309	34,455	15.41
2004-2005	14,883	3,242	7,896	7,343	33,364	22.01
2005-2006	23,108	2,139	8,869	7,321	41,437	17.67
2006-2007	19,694	14,312	19,984	8,994	62,984	14.28
2007-2008	11,206	12,450	21,222	11,563	56,441	20.49
2008-2009	1,885	28,506	38,235	15,010	83,636	17.95
2009-2010	11,459	23,182	23,118	10,186	67,945	14.99
Pre-tax credit refund period (1995-1996 to 2000-2001)	45,601	17,319	29,909	20,843	113,672	18.34
Post-tax credit refund period(2001-2002 to 2009-2010)	103,806	96,022	139,306	73,525	412,659	17.82

*Sources.*Australian Financial Market Reports, 2001, 2003, 2007, 2008 and 2010.Australian Financial Market Association (AFMA) and ASX Market Data Reports.

2.5.3 Equity capital raised through placements

Private placements are also an important source of new equity capital for Australian listed companies. Column 4 of Table 2.3 shows that there has been an overall growth in the amount of equity capital raised through placements over the sample period between 1995 and 2009, with the equity capital raised through private placements increasing from 2,105 million dollars in the 1995-1996 period to 23,118 million dollars in 2009-2010 period. A total of 790 companies made placements during the 2008-2009 period, raising a record of more than 38 billion dollars (ASX Information Paper, 2010) as companies sought to strengthen their balance sheets. At the height of the Global Credit Crisis (six months to March 2009), the ASX data shows that private placements made up 55% of the value of secondary capital raisings, followed by rights issues of 20%. As markets recovered in the second half of 2009 the proportions reversed with placements accounting for 30% and rights issues 50% of new equity capital raised. The amount of equity capital raised through placements increased from 29,909 million dollars in the pre-tax credit refund period to 139,306 million dollars in the post-tax credit refund period.

2.5.4 Equity capital raised through DRPs

Equity capital raisings through DRPs have increased from 3,441 million dollars in the 1995-1996 period to 10,186 million dollars in the 2009-2010 period. The amount of equity capital raised through DRPs in the post–tax credit refund periods between 2001-2002 and 2009-2010 was 73,525 million dollars. This is much higher than the $20,843 million dollars of equity capital raised through DRPs in the pre–tax credit refund period between 1995-1996 and between 2000-2001.We may observe greater use of DRPs by firms in the post-tax credit refund period for the following reasons: (i) superannuation and pension funds and resident Australian investors may seek DRP stocks as they are perceived to have the ability to provide greater franking credits, and (ii) firms adopt DRPs to raise dividend payouts in order to pass on greater franking credits to their resident Australian shareholders and superannuation and pension funds and to retain funds within the firm.

However, the percentage of the total equity capital raised through DRPs in the post-tax credit refund period declined to 17.82% from 18.34% in the pre-tax credit refund period. This may again be explained by a larger than normal volume of equity raisings by way of rights issues and placements undertaken by Australian firms to strengthen their balance sheets during the period of the Global Credit Crisis. The amount of equity raised through DRPs also peaked at $15,010 million in the 2008-2009 period at the height of the Global Credit Crisis.

2.6 Australian tax system

2.6.1 Tax reforms

Table 2.4 presents the key tax changes in Australia that impact on the taxation of equity income between 1985 and 2010. The main tax changes are: (i) the introduction of a capital gains tax in 1985, (ii) the introduction of the dividend tax imputation system in 1987, (iii) the imposition of a 15% tax on superannuation fund's investment income in 1988, (iv) the introduction of the related payment rule, the 45-day holding period rule and the 30% delta rule in 1997, (v) the cessation of indexation for capital gains in 1999, (vi) the introduction of the refund of excess imputation credits in July 2000, (vii) a transitional arrangement for superannuation funds in 2006, and (viii) a cap on superannuation contributions ($150,000 per annum) in 2007. These taxation changes have the following implications.

First, from September1985 to November 1999, realized capital gains were subject to normal income tax rates. Under these new provisions, the indexation of capital gains was frozen in 1999. The indexation was replaced by the provision that 50% of nominal gains for individual taxpayers and 33.3% for superannuation funds were deducted from the nominal gains and the remainder was taxable at the appropriate marginal rate of taxation. Companies did not receive such concessions and all of their nominal capital gains were taxable at the statutory corporate tax rate. If a firm retained funds for internal use instead of paying franked dividends and the retained earnings translated into share prices, then Australian tax resident shareholders were taxed on the resultant capital gains when they were realized (assuming the shares were purchased after 19 September 1985).

Second, the introduction in 1987 of the Australian imputation regime enables the payment of cash dividends to shareholders with attached imputation credits. Australian tax-resident shareholders are liable to tax at their marginal personal tax rate on the cash dividend plus attached imputation credits. The attached franking credits are then available for offset against the personal tax liability of the shareholder. Thus, the imputation system removed the "double taxation of dividends" for tax resident shareholders and superannuation funds (see Section 2.6.3, "Creation and distribution of franking credits "for further discussion).

Third, effective 1 July 1988, superannuation funds were only taxable at the rate of 15% on dividend income. Also pension funds, which were previously tax-exempt, were subject to the same 15% tax rate. Franking credits were not able to be carried forward to future income years.

Fourth, in 1997 the Australian government announced three sets of measures: (i) the Related Payment Rule, (ii) the 45-Day Holding Period Rule and (iii) the 30% Delta Rule. The Related Payment Rule prevented franking credit trading by foreign firms and tax exempt investors. The 45-Day Holding Period Rule required that traders hold a share for 45 days around the ex-dividend date in order to gain entitlement to the franking credit. The 45-day rule stopped investors from trading around the ex-dividend date in order to gain entitlement to the franking credits. An additional measure, the 30% Delta Rule also introduced in 1997, stipulated that investors seeking to claim franking credits had to remain at least 30% exposed to movements in the value of underlying stock.[17]Legislation supporting these rules was retrospective law and was not enacted until two years after the announcement in 1997. These rules reduced the capacity of

[17] The rule was made effective from July 1997 but was not enacted until 1999.

important classes of investors to use franking credits (e.g., foreign investors that make up around half of the investor base for the combined value of Australian equities and bonds).

Table 2.4
Recent tax reforms in Australia

Year	Tax reforms
1985	Introduction of Capital Gains Tax.
1987	Introduction of Imputation Tax System.
1988	Imposition of 15% Tax on Superannuation and Pension Funds' investment Income.
1997	Related Payment Rule, 45-Day Holding Period Rule and 30% Delta Rule.*
1999	Termination of indexation of capital gains provision. **
2000	Introduction of the Refund of Excess Imputation Credits.
2006	Transitional Arrangement for Superannuation Funds. ***
2007	Cap on Superannuation Fund contributions ($150,000 per annum).

*The holding period rule requires that traders hold a share for 45 days around the ex-dividend date in order to gain entitlement to the franking credit. The rule was made effective from July 1997 but was not enacted until 1999.

**Introduced the provision that 50% of nominal gains for individual taxpayers and 33.3% for super funds are to be deducted from nominal gains and the remainder is taxable at the appropriate marginal rate of taxation.

*** Under a transitional arrangement, households could make up to $1 million dollars in undeducted (after-tax) contributions to superannuation between 10 May 2006 and 30 June 2007, before new caps on Superannuation Funds contributions ($150,000 per annum) commenced from 1 July 2007.
Source: ATO (Australian Taxation Office).

Fifth, under the capital gains tax laws introduced in 1999, (i) capital assets purchased before 30 September 1999 and held for one year remained subject to indexation discounting, (ii) capital assets purchased after 30 September1999 and held for one year became subject to the new discounting method, and (iii) the new discounting introduced the provision that 50% of nominal gains for individual tax payers and 33.3% for superannuation funds are to be deducted from nominal gains and the remainder is taxable at the appropriate marginal rate of taxation.

Sixth, the July 2000 tax reform introduced a cash refund for unused imputation tax credits. This enabled individuals, superannuation and pension funds to become entitled to a tax refund for their excess or unused franking credits. Previously when an individual, superannuation or pension fund received franking credits in excess of their payable tax, they were not entitled to any benefit from unusable credits. The July 2000 tax changes were perceived as being particularly valuable to many Australian resident superannuation and pension funds that had excess franking credits, if their tax rate on dividend income was less than the statutory corporate tax rate.

Seventh, in 2006 under a transitional arrangement, households could make up to one million dollars in undeducted (after-tax) contributions to superannuation funds between 10 May 2006 and 30 June 2007. This reform created an incentive for households to increase their superannuation investments before July 2007. However, new caps on Superannuation Funds contributions ($150,000 per annum) introduced in2007 ended this facility.

2.6.2 Tax rates

The changes in Australian tax rates for companies, individuals and superannuation funds are presented in Table2.5.There has been a decline in tax rates for different classes of investors post July 2000. Between 1995 and 2009, there has been an overall reduction in company tax rates from 36% to 30%. In 1998, the statutory company tax rate increased to 40% from 36% in 1997. However, the statutory company tax rate declined to 35% in 1999 and remained stable until 2001. In 2002, the statutory company tax rate was brought down to the current level of 30%.

The maximum individual tax rate was 47% for the period from 1995 to 2005, and since 2006 it has been reduced to the current level of 45%. Similarly, the maximum individual capital gains tax rate has fallen from 47% in 1995 to 45% in 2005.

Over the period of our study between 1995 to 2009, the tax rate on superannuation funds investment income remained stable at 15%. Similarly, there was no change in the tax rate on pension funds income, which remained stable at a concessional rate of 15%.

Table 2.5

Tax Rates in Australia by year

Period	(1) Year	(2) Statutory Corporate Tax Rate (%)	(3) Maximum Individual Tax Rate (%)	(4) Maximum Capital Gains Tax Rate (%)	(5) Superannuation Funds Tax Rate (%)	(6) Pension Fund Tax Rate (%)
Pre-tax credit refund period	1995	36	47	47	15	15
	1996	36	47	47	15	15
	1997	36	47	47	15	15
	1998	40	47	47	15	15
	1999	35	47	47	15	15
	2000	35	47	47	15	15
Post-tax credit refund period	2001	35	47	47	15	15
	2002	30	47	47	15	15
	2003	30	47	47	15	15
	2004	30	47	47	15	15
	2005	30	47	47	15	15
	2006	30	45	45	15	15
	2007	30	45	45	15	15
	2008	30	45	45	15	15
	2009	30	45	45	15	15

Source.Australian Taxation Office (ATO).

2.6.3 Creation and distribution of franking credits

There are three aspects of franking credits: (i) they are created when company tax is paid, (ii) they are distributed when cash dividends with attached franking credits are paid to shareholders, and (iii) they are redeemed when shareholders lodge their personal tax claims. When companies complete their Calculation Statement (CS) of Form C they show gross taxable income including dividend income, the gross tax payable on that income, the offsetting franking credits redeemed (if so allowed[18]) and any intercompany dividend rebates (abolished in 2002). Companies then report net tax payable, and it is the payment of this tax item that creates franking credits.

Under the Australian imputation regime, corporate tax paid by firms is credited to a franking or imputation account. This enables the payment of cash dividends to shareholders with attached franking credits. Australian tax-resident shareholders are liable to tax at their marginal personal tax rate on the cash dividend plus attached franking credits. Franking credits are limited to the minimum of the actual corporate tax paid by the firm or the ratio of $t_c/(1-t_c) \times$ cash dividend paid, where t_c is the statutory corporate tax rate. The attached franking credits are then available for offset against the personal tax liability of the shareholder. In the case of an excess of tax credits over the shareholder's personal tax liability, the shareholder receives a net credit that can be applied against other tax liabilities in that year or claim a refund (only since July 2000) from the Australian Taxation Office. However, tax credits cannot be carried across tax years by personal investors.

In essence, under the Australian imputation regime, company tax may be regarded as a withholding tax on account of personal tax. If shareholders can access all company tax payments as tax credits on account of personal tax the effective company tax rate is zero. However, in practice the effective company tax rate is not zero because (i) not all company tax payments are

[18]For example, Life Offices operating compliant funds are allowed to redeem credits as if they are "virtual" superannuation funds.

distributed as franking credits (companies rarely have a policy of 100% payout of earnings), (ii) in respect of franking credits that are distributed, not all can be utilized by the recipients and/or a time delay exists in the use of the franking credits, and (iii) some recipients of dividends are non-resident investors or not liable for Australian taxation, such as foreign shareholders and Australian tax-exempt investors who are unable to fully utilize the value of the franking credits. The anti-streaming provisions also mean that the sale or transfer of franking credits to Australian resident investors is costly and difficult to implement.

2.6.4 Tax preferences

Table 2.6 documents investor tax rates and the after-tax value of a dollar of pre-Australian corporate tax earnings on dividend income and capital gains for different classes of investors. From these tax rates, we compute the after-tax value of a dollar of pre-Australian corporate tax earnings as it flows to an investor through dividends or capital gains with and without attached franking credits.

In Panel A of Table 2.6we show the after-tax return of $1 of pre-Australian corporate tax earnings for domestic individual investors with varying personal tax rates (20%, 30% and 45%) and the superannuation and pension funds with a 15% tax rate.[19] The assumed corporate tax rate is the current rate of 30% and the assumed effective capital gains tax rates for individuals and super funds are 25% and 33% of rates applicable to ordinary income respectively.[20]We also assume that retained imputation credits are not capitalized into the share price. The after-tax returns are calculated in the post-tax credit refund period under the imputation tax system.

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[19]Australian resident individuals, complying superannuation funds, registered organizations 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 utilize them, then the imputation system effectively eliminates the double taxation of dividends (Officer, 1994).

[20]Protopapadakis (1983) estimates that the opportunity to defer capital gains reduces the effective tax rate on capital gains by about 50%.In 1999, the indexation of capital gains was replaced by the provision that 50% of nominal gains for individual taxpayers and 33.3% for superannuation funds were deducted from nominal gains and the remainder was taxable at the appropriate marginal rate of taxation. This feature of investor behaviour and the Australian taxation concession regime for capital gains suggest that, on average, individual investors and superannuation funds will pay capital gains tax at only 25% and 33% respectively of the rates applicable to ordinary income.

When a dollar of pre-Australian corporate tax earning is distributed to a shareholder under a classical tax system or where dividends have no attached franking credits, the after-tax value of the dollar to the shareholder with a marginal tax rate of 45% is $0.39. However, under the imputation tax system the shareholder receives $0.55 as the after-tax value of the dollar. The after-tax value of $1 pre-corporate tax earnings for the shareholder with a marginal tax rate of 30% is $0.70 under the imputation regime where dividends have maximum attached franking credits. The same shareholder receives $0.49 under the classical tax system. Similarly, the shareholder with a low marginal tax rate of 20% receives $0.80 as after-tax value of one dollar of income under the tax imputation system. This is higher than the after-tax value of one dollar of income equal to $0.56 that the shareholder receives under the classical tax system. In the case of superannuation and pension funds, the funds receive $0.60 under a classical tax system compared to $0.85 under the imputation system when $1 pre-corporate tax earnings are fully distributed.

Panel B of Table 2.6 compares the after tax return of $1 of pre-Australian corporate tax earnings for domestic superannuation and pension funds with a 15% tax rate between the pre and post-tax credit refund periods. The dividend payout ratio is assumed to be 100%. We also assume that dividend is the only source of income for the superannuation and pension funds. In the pre-tax credit refund period (1995-2000), the franking credits of $0.15 attached to the cash dividend of $0.70 remain unused and lost.

However, in the post-tax credit refund period (2001-2009), the superannuation and pension funds with a 15% tax rate receive an after-tax value of one dollar of income of $0.85 (cash dividend $0.70 plus $0.15 tax credit refund). This is $0.15 higher than the after-tax value of one dollar of income received in the pre-tax credit refund period of $0.70 (cash dividend only).

Table 2.6

After-tax value of a dollar of pre-Australian corporate tax earnings

Panel A: After- tax returns with and without imputation (classical regime and post-tax credit refund period)

Share holder type	Tax rates (%)	Classical tax regime	Imputation tax regime with dividends having maximum attached franking credits
Individuals	20	$1(1-0.30) (1-0.20) = $0.56	$1(1-0.30) (1+ 0.30 /1-0.30) (1-0.20) = $0.80
	30	$1(1-0.30) (1-0.30) = $0.49	$1(1-0.30) (1+ 0.30 /1-0.30) (1-0.30) = $0.70
	45	$1(1-0.30) (1-0.45) = $0.39	$1(1-0.30) (1+ 0.30 /1-0.30) (1-0.45) = $0.55
Superannuation and Pension Funds	15	$1(1-0.30) (1-0.15) = $0.60	$1(1-0.30) (1+ 0.30/1-0.30) (1- 0.15) = $0.85

Panel B: After tax shareholder return (Comparison between pre and post- tax credit refund periods)

Superannuation and Pension Funds	Tax Rates (%)	Pre-tax credit refund period (1995-2000)		Post-tax credit refund period (2001-2009)
	15	Total pre-tax income	$1.00	$1.00
		Tax	($0.15)	($0.15)
		Tax offset (Franking credit utilization)	$0.15	$0.15
		Refund of tax credit form ATO	–	$0.15
		Net gain	$0.70	$0.85
		(Cash dividend only)		(Cash dividend $0.70 + Tax credit refund $0.15)

Panel C: After-tax return of retention (Both classical and imputation regime)

	Tax Rates (%)	Effective capital gains tax rates (%)	After-tax shareholder returns	
Individuals	20	(20*0.25) = 5	$1(1-0.30) (1-0.05)	=$ 0.67
	30	(30*0.25) = 7.5	$1(1-0.30) (1-0.075)	=$0.65
	45	(45*0.25) = 11.25	$1(1-0.30) (1-0.1125)	=$0.62
Superannuation and Pension Funds	15	(15*0.33) = 4.95	$1(1-0.30) (1-0.0495)	=$0.67

Notes for Table2.6:

The after-tax value of $1 of pre-Australian corporate tax earnings is calculated using the following formulae:

1) Classical tax (no imputation) regime:$1(1-corporate tax rate) (1-dividend tax rate)
2) Imputation tax regime:$1 (1-corporate tax rate) (1+ imputation tax credit) (1-dividend tax rate)
3) Under retention:$1(1-Corporate tax rate) (1-effective capital gains tax)
4) Effective capital gains tax rate: Individuals (25% of rates applicable to ordinary income) and Superannuation funds (33%of rate applicable to ordinary income). In 1999, the indexation of capital gains was replaced by the provision that 50% of nominal gains for individual taxpayers and 33.3% for superannuation funds were deducted from nominal gains and the remainder was taxable at the appropriate marginal rate of taxation.
5) The effective capital gains tax rate is calculated using the effective rates estimated by Protopapadakis (1983), who estimates that the opportunity to defer reduces the effective tax rate on capital gains by about 50%. This feature of investor behaviour and the Australian taxation concession regime for capital gains suggest that, on average, individual investors and superannuation funds will pay capital gains tax at only 25% and 33% respectively of the rates applicable to ordinary income.
6) Assumed corporate tax rate is the current rate of 30%.
7) Assumed that retained imputation credits are not capitalized into the share price.
8) Assumed that the only source of income for superannuation funds and pension funds is dividend income.
9) ATO = Australian Taxation Office.

The after-tax return of retention of one dollar of pre-Australian corporate tax earnings is presented in Panel C of Table 2.6. As already noted, we assume retained franking credits are not capitalized into the share price. Under retention, the after-tax value of the dollar to the shareholder with a marginal tax rate of 45% is $0.62. The shareholder with a marginal tax rate of 30% receives $0.65as after-tax value of one dollar of income under retention. Similarly, the shareholder with a low marginal tax rate of 20% receives $0.67 as the after-tax value of one dollar of income under retention. Superannuation and pension funds receive $0.67if earnings are retained.

Panel A of Table 2.6 demonstrates that superannuation and pension funds benefit most in the post-tax credit refund period under the tax imputation regime when compared to individual shareholders with higher marginal tax rates. The evidence in Panel B of Table 2.6 also indicates that superannuation and pension funds gain significantly under the imputation tax system in the post-tax credit refund period (2001-2009) compared to the pre-tax credit refund period (1995-2000).

The implications are that (i) all Australian taxpaying resident investors benefit from imputation, (ii) taxpaying resident investors with high marginal tax rates still benefit from retention of earnings because the after tax return to these shareholders from dividend distributions is still higher under an imputation regime compared to a classical tax regime,and (iii) superannuation and pension funds benefit most from the July 2000 tax changes in the post-tax credit refund period.

We make the following inferences. First, there is a tax-based preference for distribution of earnings as dividends with attached franking credits to taxpaying resident investors and superannuation and pension funds with marginal tax rates that are less than the statutory corporate tax rate. Second, there remains a tax-based preference for retention (of dividends) from taxpaying resident investors with high marginal tax rates.[21]Third, compared to the pre-tax credit refund period, superannuation and pension funds are likely to have greater preference for franking credits in the post-tax credit refund period.

In summary, the impact of a dividend imputation tax regime is to reduce the tax advantage of debt and encourage greater distribution of dividends with attached franking credits. The reasons are as follows. First, the payment of cash dividends, with attached franking credits, is subject to an effective lower personal tax rate compared to the tax payable under a classical tax system. Second, post the July 2000 tax credit refund reforms, many superannuation and pension funds are able to redeem for cash the value surplus franking credits from the Australian Tax Office. Third, payment of dividends will reduce the firm's share price and lower any capital gains tax that is payable on disposal of the shares.

2.7 Taxation of DRPs in the Australian market

Shareholders who elect to reinvest dividends under the DRP are taxed in Australia as if a cash dividend is paid to them and the dividend is then applied to acquire new shares in the firm. Accordingly, participating shareholders who are Australian tax residents will be required to

[21]The tax-based preference for the retention of dividends arises from the change in capital gains tax structure, where only realized capital gains are taxed and tax concessions still apply to the taxation of capital gains.

include the amount of the cash dividend, which is applied to pay up the shares issued, and any attached franking credits in their assessable income.

Australian tax resident shareholders are also subject to Australian tax on any capital gain they earn when they dispose of shares they receive under the DRP. For the purpose of calculating any capital gain (or capital loss), the cost of the shares acquired under the DRP is the price calculated in accordance with the formula stated in the DRP prospectus.[22] If the shares are issued at a discount to market value, the cost of the shares will be the discounted price (i.e. the cost per share is the amount of the net cash dividend divided by the number of shares received).

2.8 Conclusion

This chapter provides an overview of the Australian institutional environment. Specifically this chapter discusses (i) the features and legal requirements of adopting a DRP in the Australian market, (ii) the equity ownership and equity raisings through the DRP in the Australian market, (iii) the tax based preference for franked dividends, and (iv) the taxation of DRPs.

The evidence shows that DRPs are an important source of new equity capital in the Australian market. The chapter also shows that the Australian tax reforms have created a tax-based preference for payment of fully franked dividends.

[22]For example, a shareholder owns 1,200 shares in a firm. In November 2011, the firm declared a dividend of 25 cents per share. The shares are currently worth $4 each on an ex-dividend record date. The shareholder could either take the $300 dividend as cash (1,200 x 25 cents) or receive 75 additional shares in the company (300 /4). The shareholder decided to participate in the DRP and received 75 new shares in December 2011. The shareholder included the $300 cash dividend plus any attached franking credits in his/her 2011-2012 assessable income. For capital gains tax purpose, the shareholder acquired the 75 shares for $300 in December 2011.

CHAPTER THREE
LITERATURE REVIEW

3.1 Introduction

This chapter provides an overview of the prior literature on DRPs. There are two main types of DRPs that currently exist, open market purchase plans and new-issue plans. Under open market purchase plans, the company acquires outstanding shares either directly or indirectly through an investment banker, broker or trustee and assigns ownership of these shares to the reinvesting shareholder. The shares are purchased on a stock market or through a negotiated purchase, or in the over-the-counter market. The share price for each participant is an average price of all shares purchased for that investment period. The participants gain lower brokerage fees due to larger trading lots; their cost is based on their proportion to the total reinvestment.

Open market purchase plans are common in the US. In Australia, DRPs are mostly new issue DRPs. Under the new issue DRPs, shareholders may elect to have dividends on some or all of their ordinary shares automatically reinvested in additional shares of the firm. In both types of DRPs, shareholders participate voluntarily and retain the flexibility of leaving at any time. The number of shares credited to a shareholder's reinvestment account depends on the price determined by applying a stated formula that is generally based on the market values of the stock on trading days around the dividend payment date.

Prior studies suggest that a number of benefits accrue to the firm and its shareholders from the operation of DRPs. We divide prior studies on DRPs into the following groups: (i) practices of firms adopting a DRP, (ii) incentives to adopt a DRP, (iii) impact of DRPs on shareholder wealth, and (iv) DRP as a source of new equity capital.

The remainder of this chapter is organized as follows. Section 3.2 presents a review of prior studies on DRPs, focusing on the DRP features in different markets. Section 3.3 discusses the general incentives to adopt a DRP. In section 3.4,we discuss the tax incentives to adopt a DRP. Section 3.5 analyses the impact of DRPs on shareholder wealth. Section 3.6 considers the impact of any discount for the price of new shares on shareholder wealth and shareholder participation rates. Section 3.7 reviews the cost of DRPs as a source of new equity capital. The extent of literature review provided in other chapters in the thesis is discussed in section 3.8. Section 3.9 concludes the chapter.

3.2 Prior research on DRPs

3.2.1 Practices of firms adopting a DRP in US

In the United States, DRPs were first associated with investment funds operated by brokers on behalf of small investors and with employee share plans. In both of these cases, dividends were reinvested for shares in the firm. The main practices followed by the US firms in adopting a DRP are as follows:[23]

First, DRPs are offered as full DRPs and partial DRPs. Full DRPs offer reinvestment of dividends on all shares of stock registered in the participant's name. Under the partial DRP, participants are able to reinvest dividends on a portion of their registered shares while receiving cash dividends on the remaining shares.

Second, in the US shareholders can often also participate in an Optional Cash Payment DRP, which allows participants to purchase additional shares by making cash payments directly to the plans. Since the maximum allowable amounts are usually large, these plans offer participants a low-cost way to increase their shareholding in a firm. The payments are optional, that is, participants are not committed to making periodic cash payments. However, there are minimums for each payment made and often there is a maximum. There are two versions of this optional cash payment DRP. In the first version, firms allow registered shareholders to make cash investments without requiring them to reinvest dividends on the shares they are holding,

[23]Section 3.2.1 is based on the material documented in "Guide to Dividend Reinvestment Plans" published by the American Association of Individual Investors in 1998 and 2005.

although they may do so if they want. This is called Cash Payment Only DRP. The second version is an Automatic Investment DRP, where the firm automatically debits the investor's cheque or saving account at regular intervals to purchase additional shares.

Third, participant costs come in two forms: service charges and prorated brokerage commissions. Service charges cover administrative costs and are generally levied on each transaction. Participants can reduce costs by combining a cash payment with a DRP transaction. Brokerage commissions levied on open market shares are at institutional rates and are lower than the rate an investor would pay on his/her own account. Many firms cover all of the costs for share purchases from both optional cash payments and reinvested dividends. Some firms levy service charges; others prorate brokerage costs or charge participants for both.

Fourth, when shares are purchased directly from the firm, the prospectus will describe the terms and conditions. Some firms offer participants discounts on the share price, which are generally applied to shares purchased with reinvested dividends. However, some firms offer discounts on shares purchased both with the reinvested dividends and with cash payments, while others offer discounts only on newly issued shares.

Fifth, when participation is terminated, some firms will sell the shares under the DRP for the shareholders. The cost to the participant is usually any prorated brokerage commissions, a lower-cost alternative than selling through a broker. Some firms sell shares under the DRP even if participants are not terminating.

Sixth, firms with different classes of shares outstanding may allow all shareholders who hold different classes of shares to participate. Sometimes, reinvestment of dividends is in the stock of the same form (e.g., preferred reinvests in preferred) and sometimes it is all reinvested in one form (all reinvestment is in common stock).

3.2.2 Practices of firms adopting a DRP in UK

Under a UK DRP, a firm usually pays a cash dividend which is then used to buy existing shares on the open market. Once the shareholders elect to take shares, the company's registrars will arrange for the shares to be purchased on the market. The Plan may be operated by an administrator and there is no entry fee to join the Plan. However, participants will be charged a dealing commission (e.g., 0.5%) on the value of shares purchased. The participant will also have to pay stamp duty reserve tax at the prevailing rate (currently 0.5%). The participants are charged because under section 151 of the Companies Act 1985 it is not lawful for a firm to give financial assistance to a person acquiring shares in that firm. Some firms also offer new issue DRPs similar to scrip dividends.

The procedure for implementing a UK DRP is as follows.[24]A circular is sent to shareholders advising them that the company is introducing a DRP and setting out its terms and conditions. Shareholder approval for the scheme is not required. The circular will be accompanied by a mandate form by which shareholders may elect to join the DRP. Schemes may give shareholders the choice to participate in the forthcoming dividend or on a continuing basis. Alternatively, an "evergreen "scheme enables a continuing election only.

On the dividend payment date, the dividends of all participants in the scheme are paid to the registrar who then instructs a designated broker to purchase shares in the company using the whole of the cash dividend (after the deduction of a dealing charge and stamp duty). Shareholders are not free to specify the minimum or maximum price at which shares will be purchased. The transaction prices on all deals will be averaged with all shareholders receiving the same price.

Generally, elections to receive shares must relate to a whole shareholding. Shareholders receive the highest number of shares that can be bought with their cash. Any surplus cash will be carried

[24] Section 3.2.2 is based on the DRP Booklets and prospectus of different UK based firms such as British American Tobacco, Equiniti Financial Services and Barclays.

forward (without interest) and added to future dividend payments for re-investment under the scheme. For one-off participants, it is returned in cash if it is above a minimum amount.

Once the shares have been purchased in the market, a share purchase advice must be sent to each participant together with a share certificate (unless the shares are held in CREST)[25] and tax voucher. A shareholder's election to join a DRP is revocable at any time by the shareholder. The firm is also free to withdraw suspend or vary the DRP at any time.

3.2.3 Practices of firms adopting a DRP in Australia

DRPs were introduced in Australia in the early eighties. Australian DRPs enable existing shareholders to acquire new shares in a firm often at a discount on the market price. The participants incur neither brokerage nor stamp duty. Some firms allowed participants to add sufficient cash to purchase a round lot on reinvestments (e.g., Advance Bank in 1984). Changes to Australian taxation law have also created incentives for Australian firms to adopt a number of variations on the basic new issue DRP. These variations are (i) dividend election plans, (ii) dividend selection plans, (iii) overseas dividend plans, and (iv) scrip dividend plans.[26] Our study focuses only on new-issue DRPs in the Australian market.

DRPs are often part of a firm's strategy to improve shareholder relations and they primarily serve existing shareholders.[27]The firm establishes and maintains a DRP account in respect of each participant. For each dividend payable to the participant, the firm determines the amount of dividend payable to the participant in respect of participant's participating shares and credits that amount to the participant's DRP account. Most firms offer two types of participation: full

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[25]CREST is the Central Securities Depository for the U.K., Republic of Ireland, Isle of Man, Guernsey, and Jersey equities and UK gilts, named after its securities settlement system, CREST. CREST allows shareholders and bondholders to hold assets in a dematerialised, i.e. electronic form, rather than holding physical share certificates. CREST also serves a number of other important functions, such as assisting in the payments of dividends to shareholders.

[26]See Chapter 2 (Section 2.2) for details.

[27]Section 3.2.3 is sourced from the material documented in ShareDividends.com.au, Australian Taxation Office, DRP Booklet of ASX (2009) and the DRP Booklets of different firms such as Commonwealth Bank (2006), National Bank of Australia (2011), Echo Entertainment Group Limited (2011) IAG Insurance Australia Ltd (2012), and Westpac (2007). Also see Chan et al. (1995).

participation and partial participation. Under full participation, the shareholder can participate in respect of all of the shares registered in the shareholder's name as at each record date for a dividend. Partial participation involves the shareholder's participation in respect of some but not all of the shares registered in the shareholder's name as at each record date for a dividend.

To participate in the DRP, the shareholder needs to register by completing and returning the DRP Nomination Advice to the Share Registry. The shareholder's participation will remain in force until the shareholder withdraws from the DRP. In operating the DRP, the firm may issue new shares to the participating shareholders, arrange for the DRP to be fully or partially underwritten in respect of any dividends, vary the participation limits applicable to the DRP, and change, suspend or terminate the DRP at any time.

The firm also ensures that an application is made following the issuance of shares pursuant to the DRP plan to list those shares on stock exchanges where ordinary shares of the firm are currently listed. A Plan Statement is issued to each participant following each dividend payment, which includes (i) the number of participating shares in the Plan at the Record Date, (ii) the amount per share applied to the acquisition of shares under the Plan, (iii) the number of Ordinary Shares issued under the Plan and the date of acquisition,(iv) the residual amount carried forward (if any) in the Participant's Plan Account, and (v) the franked amount (if any) of the dividend and the attached franking credits (if any).

3.3 General incentives to adopt a DRP

Cherin and Hansen (1995) identify the following incentives that may explain why firms adopt a DRP. First, firms wishing to avoid large institutional ownership concentration may adopt a DRP to attract and hold small, individual shareholders. This is to avoid the monitoring of the management behaviour by large shareholders and to keep control in the hands of management. Second, firms may adopt a DRP in order to moderate share price volatility caused by institutional trading. Moreover, regular lump sum purchases of shares under an open market purchase DRP may create an upward pressure on the stock's market price, providing a degree of price support for the stock.[28] Third, by using authorized but previously unissued shares, the firm builds a reservoir of new equity capital, obtains regular cash flows and reduces dependence on other sources of external equity capital. Fourth, the regular amounts raised under the DRP avoid the need for large but irregular share offerings that have greater adverse signalling effects. A DRP also allows new capital to be raised in a cost-effective manner and potentially enhance earnings stability. Fifth, by providing regular equity inflows, DRPs enable the firm to maintain a balanced debt-equity ratio, improve corporate liquidity and lower financing costs. Sixth, DRPs promote improved shareholder relations and greater shareholder loyalty, which may reduce the likelihood of an unwanted takeover.

Mcleod, Weeks and Phillips (1989) consider DRPs as a low cost method of wealth accumulation where the plan participant is able to take advantage of dollar cost averaging.[29]They also argue that, in the US market, a DRP enables the shareholder to (i) avoid or minimize transaction costs, (ii) receive discounts on shares purchased, (iii) make optional cash payments, and (iv) purchase fractional shares.

Gillan and Starks (2000), in their study of US equity markets, conclude that firms adopt new-issue DRPs to broaden the ownership base when their shareholder base consists of a high proportion of institutional ownership. In their survey of research on corporate activism, Gillan and Starks (2000) describe the monitoring role that institutional shareholders play to keep

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[28]However, compared to OMP (Open Market Purchase DRP Plan), a new issue DRP can actually depress prices if the underwriter has to pick up the shortfall and they then off-load that shortfall into the market.

[29]Dollar cost averaging is the practice of investing a fixed dollar amount at regular intervals in a particular investment or portfolio, regardless of its share price. In this way, more shares are purchased when prices are low and fewer shares are bought when prices are high. Brennan et al. (2005) suggest that when DCA (Dollar Cost Averaging) is applied to purchases of the market portfolio, the results are heavily dependent on the assumed risk aversion of the investor. Brenna et al.'s study provides evidence that DCA is superior to BH (Buy-Hold) for more risk adverse investors. They also conclude that when DCA is applied to the purchase of a single security it easily dominates a BH strategy. Further, the DCA prescription is that it should be applied to the purchase of securities that are being added to portfolios that are already well diversified.

management in check. Small individual investors, on the other hand, have little initiative to take on the task of monitoring managers.

Baker and Seippel (1980) surveyed 305 US firms offering a DRP. They find that: (i) utility firms more frequently offer discounts, show a greater liking for supplementary cash infusions, and have an overall higher participation rate than non-utility firms, (ii) utility firms consider their plans as a means of raising equity capital, while other firms tend to see their plans as improving shareholder goodwill, and (iii) managers of utility firms perceive their plans as advantageous primarily from a cost-saving viewpoint. Managers of non-utility firms weigh the convenience factor more heavily. Both groups of executives agree that participation in DRPs would increase if the reinvested dividends were treated as capital gains rather than as income for tax purposes.

Tamule, Bubnys, and Sugrue (1993) study a sample of 158 US firms distributed among 38 SIC groupings and argue that firms which have exhausted internal funds and debt source might adopt DRPs as substitutes for outright equity issues. The choice of plan appears to be affected by the extent of inside ownership of stock. Firms with original issue DRPs reflect a higher percentage of shares owned by top management. Their fear of ownership erosion appears to be compensated by a motive to lower the cost of capital to the firm. The authors find evidence that the use of a specific type of plan is tied closely to the firm's dividend and capital structure policy.

Mukherjee, Baker and Hingorani (2002) surmise that the need for external equity motivates firms to adopt a DRP. They limit the sample to US firms that adopted or discontinued new-issue plans between 1983and 1992.They examine several features- past performance, capital structure adjustment, and broadening the ownership base-to discover why firms adopt and discontinue new-issue dividend reinvestment plans. Their evidence provides some support for the past performance argument but none for the capital structure adjustment argument. Limited support also exists for the broadening the shareholder base argument. Overall, the results support the notion that firms needing funds initiate new-issue DRPs and then discontinue them when the need for external funding diminishes.

Landy (1996), Roden and Stripling (1996) and Chang and Nichols (1992) view new issue DRPs as a means for the firm to raise external equity capital. Carlson (1992) and Burns (1994) consider DRPs as a mechanism for shareholders to invest without paying brokerage fees. Davey (1976) considers the introduction of the DRP as a service to current shareholders. Michal (1999) contends that firms adopt new-issue DRPs to decrease reliance on debt. Participants in a DRP can also benefit from a discount, which allows shareholders to apply dividends to buy additional shares at a discount from the market price (Baker and Johnson 1989; Baker and Meeks 1990).

3.4 Tax incentives to adopt a DRP

3.4.1 Tax incentives to adopt a DRP in UK

Under the UK tax system, when a dividend has been paid, the shareholder will receive a tax voucher attached to the share purchase advice statement showing the net amount of dividend received and the tax deemed to be paid (the ‘tax credit’). An individual shareholder is deemed to have paid income tax at the dividend ordinary rate of 10%. If the shareholder pays income tax at the starting or the basic rate, the shareholder will have no further tax to pay on the dividends. Shareholders who pay tax at the higher rate will have a further liability to pay tax at the Schedule F upper rate (currently 32.5%) which, after taking account of the 10% tax credit, leaves an effective rate lower than the statutory tax rate. Capital gains tax may also be payable when the shares are subsequently disposed of. The actual cost of the shares (including dealing, commission and stamp duty) will form an individual's capital gains base cost for the shares purchased (Bell and Jenkinson, 2002).[30]

[30]For a broader discussion on the UK tax system see Devereux and Loretz (2011).

Lasfer (1997a, 1997b) investigates why some UK companies favour paying dividends in the form of shares rather than cash.[31] First, an increasing number of companies in the United Kingdom have given their shareholders the option to receive shares in lieu of cash dividends. Unlike other forms of dividend distributions such as cash dividends and share repurchases, DRPs and scrip dividends involve lower cash outflows since they enable shareholders to receive dividends in shares. Second, DRPs and scrip dividends are taxed at the personal income tax rate. Third, UK firms are able to retain cash without altering their payout policies through DRPs and scrip dividends. Fourth, DRPs and scrip dividends provide shareholders with an opportunity to increase their holdings without incurring any transaction costs. Thus, new issue DRPs and scrip dividends offer similar benefits.

Lasfer's tax incentive arguments for scrip dividends are also applicable to new issue DRPs. First, under the dividend tax imputation system in the UK, the tax credit on scrip dividends can be claimed only by taxpaying individual shareholders. Individual shareholders who have tax relief in excess of their income and corporate and tax-exempt investors cannot claim tax credits when they opt for a scrip dividend. This tax discrimination between cash and scrip dividends implies that corporate and non-taxable individual investors prefer cash dividends, and that taxpaying individual shareholders may have a tax based preference for scrip dividends. In other words, the taxpaying individual investors may not be indifferent between cash and scrip dividends because the scrip dividends provide the individual investors both the tax credit and an opportunity to increase their holdings in the firm without incurring any transaction costs.

Second, a scrip dividend is likely to affect the value of the firm and the post-tax return of the shareholder under the UK tax imputation system.[32] A firm that pays a cash dividend is liable for advanced corporation tax (ACT) equal to the basic rate of income tax on the gross dividend. The

[31] Lasfer (1997a, 1997b) discusses the motivations for scrip dividends. Scrip dividends have a 100% participation rate and shareholder participation is compulsory, whereas shareholder participation in a DRP is voluntary.

[32] Between 1973 and July 1997 the UK operated an imputation tax system. The Finance Act 1997 (FA97) ended the UK imputation system.

ACT is first paid to the tax authorities 14 days after the end of the quarter in which the dividend is paid and then deducted from the firm's corporate tax liability, which is usually payable nine months after the end of the accounting period. However, there are two main conditions for the recoverability of ACT: (i) ACT can only be offset against UK taxes. Therefore, firms that distribute cash dividends out of earnings made abroad may not be able to recover their ACT, and (ii) taxable profits should not exceed gross cash dividends. The firm may be able to set this surplus ACT against its corporate tax liabilities of preceding or immediately following periods, but any offset of surplus ACT against corporate tax may be difficult.

In the case of scrip dividend, however, no payment of ACT is made at the firm level. Thus, issuing firms can retain the cash that would otherwise have been paid out as ACT. Furthermore, the scrip dividend can overcome the problem of surplus ACT. Thus, the UK imputation system means that scrip dividends are preferred by firms with potentially irrecoverable ACT (by those with low taxable profits and high accumulated recoverable ACT) and by firms that have a high percentage of their earnings from abroad.

3.4.2 Tax incentives to adopt a DRP in US

In the US, when a dividend is reinvested, the IRS (Internal Revenue Service) considers the dividend to be equal to the fair market value of shares acquired with reinvested dividends. The fair market price is the price on the exchange or market where shares are traded and not any discounted price. Furthermore, any brokerage commission paid by the company in open market purchases is considered additional dividend income to the participant. When shares are sold, the tax basis is the fair market value as of the date the shares were acquired plus any brokerage commissions paid by the company.

The 1981 tax legislation (Internal Revenue Code (IRC) Section 305(e)) created a tax deferral benefit for DRPs of qualifying utility companies. The intent of the legislation was to assist public utilities in raising new equity capital by encouraging reinvestment of dividends in qualifying firms. The legislation applied for the 1982-1985 periods. Therefore, between 1982 and 1985, participants in DRPs of qualified utilities had a tax deferral benefit in the US. Participating in DRPs of qualified utilities allowed investors to defer the tax on reinvested dividends and convert the dividend return into capital gain (Boyles & Kramer, 1982). This tax deferral benefit may draw new investors to the firm (who want to take advantage of the tax deferral) and entice current shareholders (who previously were non-participants) to join the DRP.

Peterson, Peterson and Moore (1987) suggest that the benefits of tax deferment for DRPs of qualifying companies outweigh the negative signalling that occurs when new stock is issued. Chang and Nichols (1992) find that there was an increase in DRP participation for qualifying utility firms but no increase for the non-qualifying firms during the 1982-1985 periods. Todd and Domian (1997) posit that the tax deferment of dividends that were reinvested during 1982-1985 period was positively related to DRP participation. Roden and Stripling (1996) found a significant wealth effect for announcement of DRPs by qualifying utility firms. Finnerty (1989) argues that the tax deferral envisaged in the 1981 tax legislation benefits shareholders by reducing the effective rate at which the reinvested dividends and discount are taxed.

3.4.3 Tax incentives to adopt a DRP in Australia

The introduction of the dividend imputation tax system in Australia in 1987 was a major change in the taxation of Australian dividends as it essentially removed double taxation of these dividends for Australian resident shareholders (Heaney, 2009).[33] The impact of a dividend imputation tax regime is to reduce the tax advantage of debt and encourage greater distribution of dividends with attached imputation credits. In the context of the Australian tax imputation system, Nicol (1992) argues that a listed company should pay franked dividends to the limit of

[33] Prior to this change earnings were taxed once at the corporate level at the corporate tax rate and then at the individual investor level tax rate when dividends were paid out. This change to the Australian tax system creates an integrated tax system for Australian resident shareholders with dividend income being taxed at the investor's marginal income tax rate.

its franking account while still maintaining its investment activity. A DRP achieves this objective for Australian firms by enabling the firm to raise new equity and adopt a high dividend payout ratio to distribute the maximum level of franking credits.

Bellamy (1994) studies the development of shareholder clienteles in the Australian capital market during the 1985-1992 periods and finds that companies paying franked dividends have significantly increased dividend payments relative to companies paying dividends with little or no franking credits. Bellamy also finds that the use of DRPs has increased considerably post the introduction of dividend imputation, which supports the existence of shareholder clienteles related to the firm's payout ratio and ability to attach franking credits to dividends. Similarly to Nicol (1992), Bellamy (1994) also contends that a DRP enables the firm to increase its dividend payout in order to distribute higher franking credits to the shareholders.[34]

Beggs and Skeels (2006) study the impact of dividend imputation including the 2000 tax credit refund reform (for the 1986-2004 period) and suggest that the reforms, which allowed a tax rebate on unused franking credits, significantly increased the value of franking credits to the marginal investor. Twite (2001) also argues that the dividend imputation tax system establishes a tax-preferred dividend distribution policy. With the taxing of pension funds, domestic investors have a tax preference for the distribution of franked dividends and the retention of unfranked dividends.[35]A later study by Pattenden and Twite (2008) for the 1982-1997 period shows that after the introduction of the imputation regime, Australian firms with a high proportion of income available as franked dividends increased their gross dividend payouts in

[34]Hathaway and Officer (2004) also show that there is a clientele effect associated with companies' imputation credits distribution policies. The dividend clientele effect is discussed within the framework of the tax imputation system but testing this effect is beyond the scope of this study.

[35]Howard and Brown (1992) state that, under imputation, the optimal dividend policy for most Australian companies is to pay the maximum possible franked dividends. Brown and Clarke (1993) maintain that changes to the Australian taxation laws have substantially affected the attractiveness of dividends relative to capital gains and by 1990 shareholders typically obtained80% of the benefit of the imputed tax credit, which favours dividends over capital gains.

order to satisfy investor demand for franking credits. They also report an increase in the number of firms offering a DRP subsequent to the introduction of dividend imputation.

Lastly, Graw (1993) argues there are tax benefits of Australian DRPs from the perspective of share repurchases. In Australia, if a share is repurchased off market through retained earnings, only an amount equal to the share's paid up capital (par value) will be considered a return of capital and the remainder will be considered a dividend to the seller for taxation purpose. The par value portion is not taxable. However, if the share repurchase is accomplished through a capital surplus account or a share premium, the entire repurchase will be considered a return of capital and hence, not taxable to the seller. Since DRPs are issued at a much lower discount than Australian rights issues (Graw, 1993), DRPs increase a firm's share premium/ capital surplus account and enable a greater level of non-taxable share repurchases. Thus, a firm may be motivated to adopt a DRP to increase the share premium/capital surplus.

3.5 Impact of DRPs on shareholder wealth

3.5.1 US Evidence

Peterson, Peterson and Moore (1987) examine the security price reaction to the adoption of DRPs for a sample of 135 companies, following the May 1981 tax legislation for qualified utility dividends in the US.[36] They examine three sub-samples of DRPs: non-utilities, utilities adopting DRPs before May 1981(no tax benefit), and utilities adopting DRPs after July 1981 (tax benefit). To assess the impact of DRPs on the value of equity, the returns of the common stocks of companies adopting DRPs are compared to their predicted returns. Peterson et al. (1987) find a significant negative reaction, at the 5% significance level, five days following the initial filing for the non-utility issuers. They also find that the market reaction differs among the three sub-samples. The most significant one day reaction for the non-utility sample occurs five days after the filing, whereas for the utility pre-May 1981 sample, there is a significant negative

[36]The adoption of a new issue DRP is detected from initial filings of security registrations with the SEC (Securities Exchange Commission) for DRPs as indicated on the Registration and Offerings Statistics (ROS) file prepared by the SEC.

abnormal return the day following the filing day. The post July 1981 utility sample experiences a positive reaction following the filing. In summary, the study by Peterson et al. (1987) confirms that US companies adopting DRPs after July 1981 (whose dividends receive preferential tax treatment) experience positive abnormal returns that are significantly greater than those of the utilities without preferential tax treatment. This finding supports the contention that the DRP is valuable when tax benefits accrue to investors.

Other major studies regarding the impact of DRP announcements on stock prices (related to the US 1981 tax legislation) have reported a positive or mixed price reaction to the announcement. Chang and Nichols (1992) find positive announcement effects for announcements regarding the 1981 tax legislation for qualifying utility DRP firms, and Roden and Stripling (1996) find significant wealth effects for announcements of DRPs for qualifying utility firms in the 15 day period before the announcements but not during the announcement period. Perumpral (1983), using monthly data, found that the US market reacted positively to companies announcing the introduction of a DRP, but that these announcements were by no means universally received. Perumpral et al. (1991) also investigate the stock market reaction upon announcement of DRPs and find an average positive significant abnormal return in the month of announcement. Dhillon et al. (1992) find that announcements of industrial new issue DRPs result in significantly fewer negative wealth effects than for other new equity issue announcements. Hansen et al. (1985) further examine the valuation consequences of the DRP announcement. Their analysis suggests that the share price will increase so long as the current value of additional expected earnings resulting from the adoption of the DRP exceeds the current value of reinvested dividends.

3.5.2 Australian Evidence

Under the Australian tax imputation system, Chan, McColough and Skully (1995) examined the effect of the announcement of DRPs on share returns before and after the introduction of dividend imputation. They find evidence that before the introduction of the dividend imputation regime, the market reacted indifferently when the firm announced the implementation of a DRP. However, the firm's share price reacted positively to the introduction of a DRP subsequent to the introduction of dividend imputation in 1987. They also surmise that the firm's share price reaction was positive to the introduction of a DRP and higher once superannuation funds could utilize the imputation credits. Chan et al.'s (1993) evidence supports the argument that under an imputation regime, the firm should distribute the maximum franked dividends and adopt a DRP to retain cash. Skully (1982) suggests that, all things being equal, DRP firms may be valued more highly than non-DRP firms and investors might prefer DRP companies to other similar companies as DRPs benefit shareholders and their firms. Zammit (1995) (as cited in Chan et al., 1996) argues that the main reason for Australian firms to introduce DRPs is to enable shareholders to save on the transaction costs that they would normally pay in share purchases. Zammit (1995) also argues that DRPs will enhance share value through increased demand for shares.

3.6 Impact of discount on shareholder wealth

The announcement effect of a DRP on shareholder returns may also depend on price discounts to the market price for shares issued under the DRP. The empirical evidence on the discount DRP announcement effect on shareholder wealth is mixed. At a theoretical level, Finnerty (1989) argues that the price discount results in a transfer of wealth from non-participants to participants and the greater the discount, the greater the amount of wealth transferred. Similarly Reilly and Nantell (1979) posit that there is no new wealth created by a discount DRP and that the price discount results in a transfer of wealth from non-participating shareholders to participating shareholders. Thus, the wealth transfer argument predicts the announcement effect to be zero or negative. However, Hansen, Pinkerton and Keown (1985) suggest that the discount should be viewed as akin to flotation costs for new equity capital and if the discount is established in accordance with value maximization principles, the impact should be either positive or zero. Under this view, there is no wealth redistribution between current shareholders, a conclusion that contradicts the wealth transfer argument.[37]

Scholes and Wolfson (1989) agree with the flotation cost view and suggest that discount DRPs allow participating shareholders to capture part of the underwriting fee incurred in new share offerings and also allow companies to save the portion of the underwriting costs for new equity issues. That is, non-participating current shareholders may end up with increased wealth if the DRP share issue costs, including the discount, are less than the cost of the traditional underwriting syndicate contract. This argument may hold for Australian companies which raise relatively small amounts of capital on a continuous basis via a DRP and where the fixed costs associated with other types of equity issues are much higher.[38]

Other studies in the US have also reported mixed results on the impact of any discount for new shares issued under a DRP. Dubofsky and Bierman (1988) found the market reaction to the announcement of discount DRPs to be positive. Dhillon et al. (1992) also found that the negative wealth effects are significantly smaller for discount industrial new issue DRPs than for the equivalent non-discount DRPs. Todd (1992) found that US firms that offered the discount feature in their DRPs had, on average, higher participation levels than firms that did not offer the discount feature.

Similarly Wills (1989) reported that participation in Australian DRPs is positively related to the size of the discount offered. Zammit (1995) (as cited in Chan et al., 1996) also found that Australian executives regard the level of discount offered to be an important feature in attracting a greater volume of dividend reinvestment. Chan et al. (1996) report that the market reaction to discount DRPs with different levels of discounts varied significantly in the Australian market.

[37]However, the benefit of avoiding the underwriting fee for new share offerings would be substantially reduced for underwritten DRPs.

[38]Booth and Smith (1986) and Benveniste and Spindt (1989) surmise that high prestige underwriters may charge higher underwriting fees. How and Yeo (2000) find a positive relationship between the level of underwriting fees and underwriter prestige in the Australian market. Chan et al. (1995) posit that Australian DRPs have provided a continuing flow of new equity capital and that they are a cost-effective method of obtaining new equity capital.

Themarket reaction to the 10% and 5% discount samples were at best indifferent, with the 7.5% discount sample the only one to produce a statistically significant positive abnormal return.[39]Anderson (1986) also reports that the Australian DRP participants benefited from purchasing shares at a discount from the market value. Anderson (1986) further states that about half of the dividend paying firms introduced a DRP with a discount and many of these DRPs achieved a participation rate of about 50%.[40]

3.7 DRPs and new equity capital

Another stream of the DRP literature examines DRPs as a source of outside firm financing. Finnerty (1989) argues that it is advantageous for the company to offer a DRP at a small discount in order to increase the substitution of cheaper DRP-financed equity capital for some portion of the stock financing. Finnerty (1989) also posits that if the administrative cost of implementing a DRP is not sufficiently close to the flotation cost,[41]introducing a DRP reduces the cost of equity capital to the extent that reinvested dividends replace funds raised externally. As already noted, Scholes and Wolfson (1989) view discount DRPs as providing an investment banking function in raising new capital for a firm. Eckbo and Masulis (1992) posit that DRPs are tantamount to periodic rights issues of new shares. They also surmise that the widespread use of DRPs by firms who formerly used rights offerings will contribute to the disappearance of equity offerings through rights offerings methods. Soporoschenko (1998) argues that firms with growth potential are more likely to use DRPs because of their need for outside funding. Tamule

[39] Chan et al. (1996) explain the differing results in terms of market timing. First, the 5% discount DRP was generally introduced before the implementation of dividend imputation in1987. Prior to 1987, investors were attracted to the DRP due to low or nil transaction costs. Second, the 7.5% and10% plans were common following dividend imputation. These DRPs were well received by shareholders and many DRPs had a participation rate of 50% or more. Third, the indifferent reaction to the 10% discount DRP could be due to investor concern over the potential transfer of wealth from non-participants to participating shareholders and the free-cash-flow problem.

[40]This may imply that the firms introduced the DRP with a discount in order to achieve a higher participation rate so that they can raise dividend payouts and retain funds within the firm. Anderson (1986) also points out that these DRPs with a discount were well received by the shareholders and supported by the management.

[41]This may mean that as long as the administration cost of implementing a DRP is sufficiently lower than the floatation cost of raising external equity capital through stock-financing, DRP-financed equity capital is relatively cheaper than stock-financed equity capital.

et al. (1993) also find that firms with a greater need for financing will use new issue DRPs, and firms which have exhausted internal funds and debt sources might sponsor DRPs as substitutes for external equity issues. Mukerjee, Baker and Hingorani (2002) conclude that firms needing funds adopt a new-issue DRP and then discontinue the DRP when the need for external funds diminishes.

3.8 Extent of literature review provided in other chapters

In our study, we primarily examine the determinants of the adoption, underwriting and participation decisions of new-issue DRPs in the Australian market under the dividend tax imputation system. Our study postulates that specific differences exist between firms that adopt new–issue DRPs and firms that do not adopt new-issue DRPs. We also address, in the current study, the firm characteristics that motivate the firm to underwrite a DRP and the shareholder to participate in a DRP. Thus, in Chapters 6, 7 and 8of this thesis, we also provide an overview of the literature relevant to the factors that may explain a firm's decision to adopt and underwrite and the existing shareholder's decision to participate in a DRP.

3.9 Conclusion

This chapter has provided an overview of the existing literature on: (i) the current practices of firms adopting a DRP in the markets of US, UK and Australia, (ii) the incentives of the firm to adopt and the motivations of shareholders to participate in a DRP, and (iii) the impact of DRPs on shareholder wealth. The chapter also reviewed the effect of a discount DRP on shareholder wealth, and briefly discussed the role of DRPs as an equity raising mechanism.

CHAPTER FOUR
DATA AND SAMPLE

4.1 Introduction

This chapter describes the data used in this thesis. The main empirical aspects of the research, the determinants of the decision by the firm to adopt a DRP, the underwriting decision of the DRP and the non-underwritten DRP participation rate, are empirically tested using cross-sectional time-series data for Australian companies for the period 1995 to 2009.

This chapter is structured as follows. In section 4.2, we discuss the sampling strategy adopted in the study. Section 4.3describes the industry distribution of the sample firms. The distribution of the sample between the pre and post-tax credit refund periods is discussed in section 4.4. Section 4.5 describes the main firm characteristic variables used in our analysis and Section 4.6 concludes the chapter.

4.2 Sample and data sources

4.2.1 Sample

The sample consisted of dividend paying firms traded in the Australian capital market drawn from the population of all firms listed on the ASX (Australian Securities Exchange) over the period 1995 to 2009. The sample was determined by the availability of financial data. We excluded firms from the sample if they had been listed for less than 6 years.[42]

Non-dividend paying firms were also excluded from the sample. Using these criteria, the preliminary sample of listed firms by year for the sample period (1995-2009) was prepared.

[42] For most firms that were listed for less than 6 years we were unable to obtain a complete set of financial and other data. In our sample, we found firms listed more than 6 years had a complete set of financial and other data, and therefore we decided to include in the sample firms that were listed for six or more years.

Table 4.1
Sample selection procedure

Total number of firm observations	19,763
Less number of non-dividend firm observations	13,532
Equal number of dividend-paying firm observations	6,231
Less Data errors	170
Equal number of correct dividend-paying observations	6,061
Number of dividend-paying DRP firm observations	2,243
Number of dividend–paying non-DRP firm observations	3,818
	6,061
Number of dividend-paying firms	934

Table 4.1 shows the sample selection procedure. We prepared a preliminary sample of 19,763 firm observations obtained from the Aspect Huntley's DAT-Analysis and FIN-Analysis databases. From this preliminary sample, we identified a sample of 6,231 dividend- paying firm observations. We deleted 170 firm observations due to obvious data errors related to dividend payouts, franking ratio and financial statements, and where we were not able to correct the identified data errors from original data sources such as the Annual Reports of firms.

We identified DRP firms by searching announcements made to the ASX and from a search on DAT-Analysis (Capital History of Companies and Company Announcements). Based on the firm's dividend history and DRP announcements, firm observations were grouped into dividend paying firms with and without a DRP. The final sample of 6,061 dividend paying firm observations (934 firms) comprises 2,243 DRP firm observations and 3,818 non-DRP firm observations.[43]The final data is both cross-sectional and time-series in nature.

4.2.2 Data sources

Table 4.2 presents the data collected and data sources for each DRP and non-DRP observation in the sample. Financial, equity and dividend data were obtained primarily from Aspect Huntley's DAT Analysis and Fin Analysis databases. DAT-Analysis provides comprehensive

[43]Some of the variables contained extreme values and we winsorized them at 1 and 99 percent levels to mitigate the outlier problem. That is, we replaced the values of variable beyond the 99th percentile with this percentile, while the values falling before the 1st percentile are replaced with this 1st percentile.

data related to dividend history, DRP details and financial statements for all ASX listed firms. FIN-Analysis provides up to a 12-year history of detailed financial information for all firms listed on the ASX. Annual reports of companies are also provided by FIN-Analysis.

In collating our data, company annual reports were extensively reviewed to cross check the information for errors. A number of companies changed their names, ASX codes and/or delisted from the stock exchange during the sample period. Where we identified suspect data or a data discrepancy between the financial databases (DAT Analysis, FIN Analysis) and the company reports, we relied on company reports.

The firm characteristics variables that may help explain the decision to adopt a DRP were computed using financial data sourced from the firm's financial statements (Balance sheets, Profit and Loss Account and Cash Flow Statements) that was provided by DAT Analysis. The dividend and franking credit ratio details were extracted from the Dividend History sections of DAT Analysis and FIN Analysis.

To measure the DRP participation rate and underwriting of the DRP, we collected data on the number of shares issued under the DRP at each dividend date, the per share price of the DRP shares and the discount on the market price offered. We also checked whether DRP is underwritten or not underwritten. This data was collected from DAT Analysis (Capital History and Company Announcements) and FIN Analysis (Company Announcements). DRP details were also obtained from the DRP prospectuses of companies.[44] The statutory company tax rates were sourced from the ATO (Australian Taxation Office).

[44] Some company prospectuses may mention that the DRP is underwritten but the underwriting details are not given. Therefore, we searched both DRP prospectuses and company announcements from DAT Analysis and FIN Analysis to ascertain whether DRP is underwritten or not underwritten.

Table 4.2
Data and data sources

Data collected	Data Source
Interim, Annual and Special Dividends	FIN Analysis, DAT Analysis & Company Annual Reports
Earnings Per Share	FIN Analysis, DAT Analysis & Company Annual Reports
Dividend Yield	FIN Analysis
Franking credits and franking credit ratio on Interim, Annual and Special Dividends	FIN Analysis, DAT Analysis & Company Annual Reports.
Market Capitalization	FIN Analysis, DAT Analysis
Total Equity	FIN Analysis, DAT Analysis & Company Annual Reports
Short term debt	FIN Analysis, DAT Analysis & Company Annual Reports
Long term debt	FIN Analysis, DAT Analysis & Company Annual Reports
Cash at the end of period	FIN Analysis, DAT Analysis & Company Annual Reports
EBIT (Earnings before interest and tax)	FIN Analysis, DAT Analysis & Company Annual Reports
Operating cash Flow	FIN Analysis, DAT Analysis & Company Annual Reports.
Total Assets	FIN Analysis, DAT Analysis & Company Annual Reports
Total Current Assets	FIN Analysis, DAT Analysis & Company Annual Reports
Total Current Liabilities	FIN Analysis, DAT Analysis & Company Annual Reports
Discount	Capital History from DAT Analysis and Company Announcements from DAT Analysis and Fin Analysis
Underwriting details	Company Announcements from DAT Analysis and FIN Analysis
Shares issued under the DRP	Company DRP Prospectus, Capital History from DAT Analysis
DRP Announcements	Company Announcements, DRP Prospectus and Capital History DAT Analysis
Tax Rates	Australian Taxation Office Reports
Industry Sector Code (GICS Code)	ASX (Australian Securities Exchange) documents and Company Reports
ASX company code	ASX website and company reports
DRP-NDRP Status*	Company Announcements and Reports and Capital History from DAT Analysis

* DRP-NDRP Status refers to whether a firm has or has not a DRP in a particular year.

4.2.3 Data on shareholder characteristics

In undertaking this study we filed a request to SIRCA for CHESS data on the shareholder characteristics of each company split between foreign and domestic shareholder ownership. For the percentage of the company owned domestically we also sought details of the split between institutional ownership (Superannuation and Pension Funds), corporate ownership and individual shareholder ownership. Our objective was to empirically test the presence of domestic shareholder concentration in the ownership of firms offering DRPs where the dividend had attached franking credits. Unfortunately we identified significant errors in the CHESS data provided to us, and our attempts to get accurate shareholder data did not materialize.[45] Therefore, we did not undertake this part of the study in the thesis.

4.3 Industry distribution of the sample firms

Table 4.3 shows the industry distribution of the final sample of firm observations and the number of sample firms, based on the GICS (Global Industry Classification System) code. The largest number of DRP observations come from Diversified financials (352 observations, 96 firms) followed by Real estate (327 observations, 84 firms) and Capital goods (218 observations, 47 firms). There are 194observations (51 firms) from Materials and 163 observations (31 firms) from the Food, beverage and tobacco industry. Banks provide 121 DRP observations (14 firms) and Transportation accounts for 96 observations (16 firms). The remainder of the DRP observations is spread over other industry sectors.

The bulk of the non-DRP observations belong to Materials (508 observations, 102 firms). This is followed by Real estate (491observations, 112 firms) and Diversified financials (485 observations, 132 firms).Capital goods accounts for 384 observations (83 firms), while Retailing has 238 observations (38 firms). The other major industry sectors represented in the non-DRP

[45] For example in the case of Westpac (WBC), the CHESS data reported that the level of ownership by domestic firms was 97%, which clearly is not true. We also found negative values in the percentage ownership of shareholders in many instances such as GPT Group (GPT) and Telstra (TLS). When we brought this matter to the attention of SIRCA, they were unable to explain these anomalies and provide us with corrected data.

sample are Commercials and professional services (190 observations, 41 firms), Media (184 observations, 27 firms), Software services (165 observations, 38 firms), Consumer services (159 observations, 37 firms), and Health care equipment and services (125 observations, 29 firms). The remaining observations are spread over other industry groupings. Overall our sample covers most of the major industrial sectors in Australia.

Table 4.3
Industry Distribution of Sample Firms

GICS Code	Industry	No. of Observations in Total Sample	No. of Firms in Total Sample	No. of DRP Observations	No. of DRP Firms	No. of Non-DRP Observations	No. of Non-DRP Firms
1010	Energy	197	33	51	11	146	32
1510	Materials	702	111	194	51	508	102
2010	Capital goods	602	91	218	47	384	83
2020	Commercials and professional services	298	47	108	28	190	41
2030	Transportation	185	22	96	16	89	17
2510	Automobiles and components	78	7	25	4	53	7
2520	Consumer durables and apparels	149	20	49	14	100	17
2530	Consumer services	209	38	50	16	159	37
2540	Media	258	29	74	17	184	27
2550	Retailing	298	38	60	20	238	38
3010	Food and staples retailing	84	8	41	7	43	8
3020	Food, beverage and tobacco	334	45	163	31	171	41
3510	Health care equipment and services	231	33	106	23	125	29
3520	Pharmaceuticals, biotechnology and life services	44	13	5	3	39	12
4010	Banks	174	15	121	14	53	13
4020	Diversified financials	837	154	352	96	485	132
4030	Insurance	85	11	45	10	40	11
4040	Real estate	818	123	327	84	491	112
4510	Software services	231	47	66	27	165	38
4520	Technology, hardware and equipment	66	16	16	7	50	15
4530	Equipment	4	1	4	1	0	0
5010	Telco communication services	79	14	16	4	63	14
5510	Utilities	98	18	56	15	42	18
	Total	6,061	934	2,243	546	3,818	844

Note. The total number of firms in the combined (Total) sample (934) is less than the total number of DRP and non-DRP firms (546+844) because of the possibility of double counting (a firm may have a DRP status in one year and a non-DRP status in another year).

4.4 Distribution of the sample firms between pre and post-tax credit refund periods

Table 4.4 presents the number of DRPs and non-DRP firm observations in the pre and post-tax credit refund rule periods. The post-tax credit refund period (2001-2009) accounts for 1,766 observations. This exceeds the number of DRPs in the pre-tax credit refund period (1995-2000) of 477 firm observations. The percentage of DRPs out of the total number of firm observations in the post-tax credit refund period is 40.65%. This is greater than the percentage of DRPs (27.78%) out of the total number of firm observations in the pre-tax credit refund period. In Chapter 6 we examine the impact of the introduction of the tax credit refund rule on the likelihood that firms may adopt a DRP.

Table 4.4
Distribution of firm observations between pre and post-tax credit refund periods

Period	DRP Firm Observations	Non-DRP Firm Observations	Total	%DRP	%Non-DRP
Pre-tax credit refund period (1995-2000)	477	1,240	1,717	27.78	72.22
Post-tax credit refund period (2001-2009)	1,766	2,578	4,344	40.65	59.35
Total	2,243	3,818	6,061	37.00	63.00
Unique number of firms in the Pre-tax credit refund period (1995-2000)	443				
Unique number of firms in the post-tax credit refund period (2001-2009)	880				

4.5 Variable description

The set of firm characteristic variables employed to conduct univariate and multivariate analyses are Dividend Payout Ratio, Dividend Yield, Franking Credit Ratio, Franking Credit Yield, Tobin's Q, Leverage (Debt/Total Assets and Interest Coverage Ratio),Size(Natural logarithm of Total Assets and Natural logarithm of Market Capitalization), Return on Assets, Operating Cash Flow/Total Assets and Current Ratio. Table 4.5 provides the definition of these firm characteristic variables. Detailed definitions and descriptive statistics of these variables are provided in Chapters 6, 7 and 8.

Table 4.5
Definition of variables

Panel A: Main Tests

Variable	*Definition*
Dividend payout ratio	Total Dividends paid (Interim Dividends+ Final Dividends) per share / Unadjusted EPS from the Profit &Loss Account.* Dividend payout ratio is assumed to be 100% when there is dividend per share in the presence of negative or zero earnings per share.
Franking credit ratio	$\frac{\text{Final and Interim franking credits}}{\text{Final and Interim cash dividends}}$ x $\frac{(1-\text{Corporate tax rate})}{\text{Corporate tax rate}}$
Dividend Yield	Annual dividends per share / Closing share price on the last day of the company's financial year
Franking credit yield	$\frac{\text{Final and Interim franking credits}}{\text{Share Price}}$
Period Dummy	Takes a value of 1 for post-tax credit refund period observations (2001-2009) and 0 for pre-tax credit refund period observations (1995-2000)
Tobin's Q	(Market Capitalization at end of year t + (Short term Debt at end of year t + Long term Debt at end of year t)) / (Total book value of equity at end of year t + (Short term Debt at end of year t + Long term Debt at end of year t))
Debt/ Total Assets	(Short term debt at end of year t + Long term Debt at end of year t-Cash at end of year t) / Total Assets at end of year t.
Size	Natural log of Total Assets at end of year t
Return on Assets	[Net Income at end of year t + Interest Expense at end of year t*(1-Corporate Tax Rate)] / [Total Assets at end of year t - Outside Equity Interests at end of year t]
Operating Cash Flow	Operating cash flow at end of year t / Total Assets at end of year t
Current Ratio	Total Current Assets at end of year t / Total Current Liabilities at end of year t

Note. All variables are calculated using data at the end of year t (Financial year). *In Chapters 6, 7 and 8we also perform robustness checks where total dividends include special dividends.

Panel B: Robustness Tests

Variable	*Definition*
Size	Natural logarithm of Market Capitalization at end of year t.
Return on Assets	EBIT at end of year t/ Total Assets at end of year t.
Interest Coverage Ratio	EBIT at end of year t / Interest expense at end of year t.

Note. All variables are calculated using data at the end of year t. (Financial year)

4.6 Conclusion

The chapter provides a description of the sample DRP and non-DRP dividend paying firm observations and sources of data. Only dividend paying DRP and dividend paying non-DRP firms were included in the sample. The final sample (from the population of ASX listed firms) is determined, based on the availability of data to construct the variables to undertake the empirical tests on the determinants of a firm's decision to adopt a DRP, the shareholder participation rate and the underwriting decision. The motivation for choosing the sample period (1995-2009) is the significant tax changes that occurred during that period. The type of data employed is cross-sectional and time-series, which are appropriate for the sample firms that cut across all types of industries.

CHAPTER FIVE

MODIFICATIONS OF THE FINNERTY MODEL TO EXAMINE THE COST OF DRP-FINANCED EQUITY CAPITAL

5.1 Introduction

A DRP represents a significant source of equity capital to a dividend paying company in the Australian market. However, the cost of funds from this source has not been explored in detail despite the large number of studies dealing with the cost of common equity capital. For example, Gordon and Gould (1978) established the cost of retention-financed equity capital and the cost of stock-financed equity capital in the presence of personal income taxes and flotation costs. However, they did not consider the cost of DRP-financed equity capital. Therefore, in view of the importance of DRPs as a means of raising equity capital post the introduction of imputation in Australia (Bellamy, 1994), the relative cost of raising capital through a DRP deserves further discussion.

In this context, this chapter examines (i) the cost of equity capital raised through DRP under the dividend tax imputation system, and (ii) compares the cost of DRP-financed equity capital with the costs of retention-financed and stock–financed equity capital under the imputation system. Extending the model of Finnerty (1989), our modified model suggests that DRP adoption under an imputation tax regime is partly motivated by the reduced cost of DRP financed equity capital.

The remainder of this chapter is structured as follows. Section 5.2 reviews the Finnerty model, and Section 5.3 explains the cost of equity expressions of Finnerty. This is followed by a discussion of the motivation for adapting the model in section 5.4. Section 5.5 discusses the value of imputation credits, and in section 5.6, the costs of equity capital under retention, stock financing and DRP under the Australian tax imputation system are discussed. Section 5.7 concludes the chapter.

5.2 Review of Finnerty Model

Finnerty (1989) establishes the cost of DRP-financed equity capital[46]under the following assumptions.

1) The firm is an all-equity financed firm[47] and the expected value of the firm's capital investment rate is q = b + s +d (1-z).That is, the expected capital investment rate (q) is equal to the retention rate (b) plus the stock financing rate (s) plus the dividend reinvestment rate (d(1-z)), all expressed as fractions of expected earnings. z is the company cost, net of corporate taxes, of administering the DRP expressed as a fraction of the reinvested dividends (z > 0).

2) The funds available to the firm for capital investment during period t consist of retained earnings, funds obtained through external equity and the amount of dividends reinvested (net of DRP administration costs).The amount of funds available for capital investment is $qX_{1,}$ where X_1 is the expected earnings in period 1. The term$dX_1 \leq (1\text{-}b)\ X_1$, where dX1 is the amount of reinvested dividends (d is the expected amount of dividends that are reinvested, expressed as a fraction of earnings $0 \leq d \leq (1\text{-}b)$).

3) The payment of dividends takes place at the end of the period prior to the sale of shares by the shareholders and the firm's sale of new shares to the outside investors.

4) Shareholders hold their shares for at least one period and any capital gains accrued are deferred until the shares are sold.

Under this set of assumptions, Finnerty (1989) presents a model for the valuation of the new-issue DRP firm in a classical tax system. The model is:

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[46]Miller (1977) may be considered as the founder of marginal tax investor literature. He argues that to entice taxable investors into the market for corporate bonds, the rate of interest on such bonds has to be high enough to compensate for the taxes on interest income under personal income tax.

[47]This assumption is made for the sake of convenience as it does not materially affect the conclusions of the model.

$$V_0 = \frac{X_1(1-b)(1-T_d)}{1+k} - \frac{dX_1}{1+k} - \frac{T_d hdX_1/(1-h)}{1+k} + \frac{V_1 - sX_1/(1-w)}{1+k} -$$

$$\frac{T_g\{V_1 - sX_1/(1-w) - [V_0 + dX_1 + hdX_1/(1-h)]\}}{1+k}$$

(5.1)

Where

Vo Current stock market value of the DRP firm

$V1$ Stock market value of DRP firm in period 1

$X1$ Firm's expected earnings after interest payments and corporation tax in period 1

b Firm's expected retention rate as a fraction of earnings

T_d Personal statutory income tax rate on dividends

k After-personal tax required rate of return[48]

d Expected amount of dividends that are reinvested, expressed as a fraction of earnings (0 ≤ d ≤1-b)

w Flotation costs for a new share issue sold to the public, expressed as fraction of the funds raised from the issue

s Expected value of firm's stock financing rate, expressed as a fraction of earnings

T_g Capital gains tax rate

h Discount from the market price at which the share is issued under the DRP

The first term in Eq. (5.1)[49] is the discounted value of the after-tax dividends paid at the end of the period. The second term in Eq. (5.1) is the discounted value of the amount of reinvested dividends. This amount is used to buy new shares through the DRP. The third term represents the discounted value of the ordinary income tax liability on the aggregate discount. The fourth

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[48] k is assumed to be independent of the firm's capital investment rate ($\partial k / \partial q = 0$).

[49] In Eq. (5.1), X_1(1-b) is the amount paid out as dividends. (1-h) is the price of one share issued under the DRP, where h is the discount to market price of the share. Therefore, dX_1.1/ (1-h) = dX_1 / (1-h) is the amount of shares dX_1 amount of dividends can buy. The total aggregate amount of discount is calculated as hdX_1.1/ (1-h) = hdX_1/ (1-h). In a similar fashion, sX_1 is the amount of cash the DRP firm has to raise through stock financing net of flotation costs, *w*. Hence SX_1.1/ (1-w) = sX_1/ (1-w) is the amount of stocks to be sold to outsiders to raise sX_1cash net of flotation costs.

term shows the discounted value of the investor's holdings after the new stock financing, including the value of any shares the shareholders buy through the DRP.The fifth term is the discounted value of the capital gains tax liability at the time the shares are sold.

Under a classical tax system the main arguments of Finnerty (1989) may be summarized as follows: (i)the cost of equity capital raised through new issue DRP is greater than the cost of retention-financed equity capital but it is less than the cost of stock-financed equity capital when shares are sold through the DRP at their market value; (ii) when shares are sold through the DRP at a discount from market value, there is a transfer of wealth from non-participants to participants, raising the cost of DRP-financed equity capital; (iii)when the discount becomes large, DRP-financed equity capital becomes even more expensive than stock-financed equity capital; and(iv)the tax deferral benefits that can benefit US shareholders under the US classical tax regime reduce the effective tax rate at which reinvested dividends and discounts are taxed.

5.3 Cost of equity capital

We extend the model of Finnerty (1989) to recognize the presence of dividend tax imputation and the absence of income tax liability on discounts in the Australian market. We retain the assumptions of Finnerty (1989) since they simplify the modeling process. Our modified model takes the following form:

$$V_0 = \frac{X_1\,(1\text{-}b)\,(1\text{-}t_d)}{1+k} - \frac{dX_1}{1+k} + \frac{V_1 - sX_1/(1-w)}{1+k} - \frac{T_g\left\{V_1 - sX_1/(1-w) - \left[V_0 + dX_1\right]\right\}}{1+k} \quad (5.2)$$

where, other than specified below, the variables and parameters take the same meaning as defined in Eq. (5.1). The income tax liability on the discount is omitted in Eq. (5.2) since discount is not taxable as ordinary income in Australia. The statutory personal income tax rate (T_d) is replaced with the effective income tax rate (t_d) as defined in Eq. (5.3) below. The effective tax rate on dividend income (t_d) for Australian resident shareholders is a function of the statutory personal tax rate (T_d) and the ability of investors to utilize the credits (reflected in U).This relationship (see Lally, 2000) is modeled as:[50]

$$t_d = T_d - U\,(1 - T_d)\,IC/D \qquad (5.3)$$

where

t_d	Effective personal tax rate
T_d	Statutory personal income tax rate
U	Utilization rate of imputation credits
IC	Imputation credits attached to cash dividends
D	Cash dividends

Finnerty (1989) derives the following expressions for the cost of equity under the classical tax system by differentiating Eq. (5.1) with respect to b, s and d under a set of assumptions and assuming the term h (tax drain on the discount) is zero. We derive the cost expressions of Finnerty under the Australian dividend tax imputation system by differentiating Eq. (5.2) with respect to b, s and d (see Appendix 2 for formal proof).

$$C_b = k \,/\, (1 - T_g) \qquad (5.4)$$

[50] See Appendix-1 for the proof of Eq. (5.3). For a broader discussion see also Lally, M., & van Zijil, T. (2003). Capital gains tax and the capital asset pricing model, *Accounting and Finance,* 43, 187-210.

$$C_s = k / (1-t_d)(1-w) \tag{5.5}$$

$$C_d = k / (1-t_d)(1-z) \tag{5.6}$$

Where C_b is the cost of retention-financed equity capital, C_s is the cost of stock-financed equity capital and C_d is the cost of DRP financed equity capital. Other parameters take the same meaning as defined in Eq. (5.1).

Finnerty (1989) argues that under a classical tax system $C_s > C_b$ because $(1-T_d)(1-w) < (1-T_g)$. Similarly, Finnerty (1989) surmises that $(1-T_d)(1-z) < (1-T_d) \leq (1-T_g)$ .Thus, Finnerty (1989) argues that new-issue DRP financed equity capital will be cheaper whenever h = 0 (the tax drain on discount does not occur) and w > z (flotation cost per unit of stock–financed equity capital is greater than the administrative cost per unit of DRP-financed equity capital).

Alternative specifications of equations 5.4, 5.5 and 5.6[51]

We can also use an alternative method to explain equations 5.4, 5.5 and 5.6 based on the formulism developed by Dempsey and Partington (2008).[52] The formulism is algebraically

[51] I thank one of the examiners for noting this alternative approach.

[52] For a broader discussion, see the following references: (i) Dempsey, M., &Partington, G. (2008). The cost of capital equations under Australian imputation tax system.*Accounting and finance*, 48, 439-460 and (ii) Dempsey, M. (2001). Valuation and cost of capital formulae with corporate and personal taxes: A synthesis using Dempsey discounted dividends model. *Journal of Business Finance and Accounting*, 28, 357-378.

equivalent to the formulations of equations 5.5 and 5.6 based on equation 5.3 (Lally, 2000). With the formulism of Dempsey and Partington, we have equation 5.4 as:

$$C_b = K = k / (1-T_g) \tag{5.7}$$

Where K is the cost of equity as the required growth rate of the stock (inclusive of the market value of dividends) and k is the after-tax required rate of return (as defined in Eq.5.1 and Dempsey, 2001). Rearranging equations 5.5 and 5.6, we then have:

$$C_s = K/ [Q (1-w)] \tag{5.8}$$

$$C_d = K / [Q (1-z)] \tag{5.9}$$

$$Q = (1-t_d) / (1- T_g), \tag{5.10}$$

where t_d is the effective tax rate on cash dividends. Thus,

$$C_b/ C_d = Q (1-z),^{53} \tag{5.11}$$

[53]We may compare the method specified in equations 5.4 and 5.6 with the alternative formulism stated in equations 5.7 and 5.9. According to the alternative formulism of Dempsey and Partington (2008), C_b = K and C_d = K/Q (for convenience sake we avoid w and z from equations 5.7 and 5.9). Q is defined as $(1-t_d) / (1-T_g)$ in equation 5.10. If

so that the relation between the cost of a DRP (C_d) and retained earnings (C_b) is a function of Q and z. However, following Elton and Gruber (1970), Q is the rational market value of the firm's disbursement of \$1 as a cash dividend. Thus at any time, the value of Q avoids the need to worry about the *differentiation* of tax liabilities across the firm's shareholders. This approach also affords an additional approach to considering the relative value of C_d and C_b via the work of Partington and Walker (1999). A consideration of the likely value of Q replaces the need to estimate either the "imputation credit pay-out ratio" (F) or the utilization rate (theta or U) that is otherwise required in equation 5.3. The insight afforded by this formulism provides a worthwhile additional assessment of the C_b/C_d ratio as either greater or less than 1.0.

5.4 Motivation for a modified model

Our main motivation to apply the Finnerty model is to explore the relative cost of DRP-financed equity capital under the Australian tax imputation system. We incorporate an effective income tax rate on dividend income in the model. As noted above, Finnerty (1989) establishes the cost of equity capital raised through DRP and compares the cost of these funds with the costs of retention-financed and stock-financed equity capital under a classical tax system. He posits that the cost of equity for DRP financed equity is comparatively cheaper than the cost of stock-financed equity, though the cost of retention-financed equity capital is still lower than the cost of DRP financed equity capital.

Our model addresses the cost of equity issue by comparing the cost of equity expressions for retention financed equity, stock financed equity and DRP financed equity under the tax imputation system. We demonstrate that, under certain conditions that depend upon personal investor tax rates and the utilization rate of imputation tax credits, the cost of equity capital for

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C_b/C_d = Q, then C_d/C_b = 1/Q. As a result $C_b = C_d.Q$. Dempsey and Partington (2008) assumes that Q >1. This means $t_d < t_g$ (effective tax rate on dividend income is less than effective tax rate on capital gains). Consequently, DRP becomes a cost-effective source of new equity capital compared to retained earnings. This is the same conclusion that is reached in equations 5.4 and 5.6 where $t_d < t_g$ due to U or theta.

DRP financed equity is less than the costs of retention financed equity and stock financed equity. This may explain the increasing use of DRPs in the Australian equity market subsequent to the introduction of the imputation tax regime.

5.5 Value of imputation tax credits

To apply the Finnerty model under an imputation system, an important parameter input is the value or utilization rate of an imputation credit. For eligible shareholders under the Australian dividend tax imputation system, imputation tax credits represent a benefit from the investment in addition to any cash dividend or capital gains received. The impact of imputation on the value of the firm can be modelled from the perspective of either a reduction of corporate taxes or personal taxes on dividends. Depending on the tax status and domicile, imputation or franking credits are used by investors to reduce their personal taxes. Our focus in this chapter is on the reduction of the effective personal tax rate on dividend income due to the utilization of imputation credits.

The evidence on the value of imputation credits in the Australian market is mixed. Handley and Maheswaran (2008) examine Australian taxation statistics in order to estimate the extent to which franking credits have ex-post reduced the personal taxes of various classes of resident and non-resident equity investors in Australian firms. Their study covers the seventeen year period from 1988 to 2004. By comparing the (estimated) aggregate dollar amount of credits received by investors to the (estimated) aggregate dollar amount of credits utilized by investors (to reduce personal taxes), Handley and Maheswaran (2008) report an average utilization rate across all investors of around 70%–80%. The estimate of 70% is based on pre-2001 data and does not include an allowance for cash refunds of excess franking credits. The estimate of 80% assumes that the cash refund provisions introduced in July 2000 would have taken full effect in 2001.

Beggs and Skeels (2006) analyze the ex-dividend behaviour of share prices in the Australian market from 1986 to 2004. They argue that the year 2000 tax change that allowed for a tax rebate of unused franking credits increased the value of franking credits to the marginal investor, and raised the estimated gross drop-off ratio. Beggs and Skeels (2006) concluded that the utilization rate of imputation credits in the Australian market was 0.57. However, the results of Beggs and Skeels analysis for the most recent period of 2001–2004 showed that franking credits were valued at 58 cents in the dollar.

A further study by Hathaway and Officer (2004), using the dividend drop-off method, concluded that the average access factor across Australia for the period 1988-2000 was 78% and 72% for the period 1988-2001. They also estimate the value of imputation credits at about 42% of their face value.

The Strategic Finance Group (SFG)[54]also undertook a dividend drop-off study using data on dividend paying events and examined the average ex-dividend price change associated with the dividend and imputation credits paid. The SFG study (2011) uses data from DAT Analysis from 1 July 2000 to 30 September 2010. The SFG concludes that the utilization rate of imputation credits is 0.35.

Cannavan, Finn and Gray (2004) estimated the value of imputation credits in Australia by inferring the value of cash dividends and tax credits from the relative prices of share futures and the individual shares on which those futures are written. The study determined the value of dividend imputation credits from two types of derivative securities: individual share futures (ISFs) and low exercise price options (LEPOs). They found that prior to the 45-day rule imputation credits were valued at up to 50% of the face value for high-yielding firms.

However, after the 45-day rule[55], imputation credits were effectively worthless to the marginal investors of ISFs and LEPOs. The implied value of dividend imputation credits from this study

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[54]SFG, *Dividend drop-off estimate of theta – Final report*, Re: Application by ENERGEX Limited, March 2011.

[55]The holding period rule requires that traders hold a share for 45 days around the ex-dividend date in order to gain entitlement to the franking credit. The rule was made effective from July 1997 but was not enacted until 1999.

is between 0 and 0.5.[56]

5.6 Cost of equity capital under an imputation tax system

A firm can have different sources of new equity capital: (i) retention, (ii) a public or private offering of shares to new investors, and (iii) a DRP. We illustrate below that the modified Finnerty model shows that a DRP may represent a potentially cheaper source of equity capital under the tax imputation system when compared to retention and stock-financed equity capital. This provides a tax-based reason for Australian companies to increase the substitution of DRP-financed equity capital for stock financed equity capital.

5.6.1 Key assumptions

We now apply the Finnerty definitions of costs of retention-financed equity, stock financed equity and DRP-financed equity (Eq.5.4, Eq.5.5 and Eq.5.6) under the Australian dividend imputation tax system.[57]We replace Td in Finnerty equations (5.5) and (5.6) with the definition of td stated in Eq. (5.3).The assumed corporate tax rate (t_c) is the current rate of 30% and the assumed effective tax rates for individuals and superannuation and pension funds are set at 25% of the statutory personal tax rates (see Protopapadakis, 1983).The assumed after-tax required rate of return (k) is 10%. We also assume that all dividends can be fully franked with IC/Div = tc/1-tc = 0.30/0.70 = 0.4286.

Finnerty (1989) argues that the incremental administrative expenses of DRPs are small in relation to the amount of funds raised. If participant's shareholdings are highly concentrated,

[56]The jurisdictional regulators in Australia often separate estimates of the 'imputation credit payout ratio' (F) and the utilization rate (θ *or* theta). They have consistently adopted a value of gamma of around 0.5 (with a range of 0.3 to 0.5 in their most recent decisions (AER, 2009). Despite the consistency in the final value of gamma adopted by the jurisdictional regulators in past decisions, there have been widely divergent views among jurisdictional regulators on the three key variables: the payout ratio (ranging from 0.71 to 1.00), the utilization rate (ranging from 0.50 to 1.00) and the range adopted for gamma, from which a point estimate is determined (lower and upper bounds of 0.30 and 1.00). The most recent estimates of the payout ratio (F) quoted by Australian energy regulators have ranged between 0.39 and 1.00 (AER, 2009). However, in a recent regulatory decision, the Australian Energy Regulator ("AER") concluded that the value of an imputation credit in the Australian market was between 0.67 and 0.81 for the post-2000 tax refund reform period. These estimates were taken from the study by Handly and Maheswaran (2008) as an upper bound estimate.

[57] Appnedix-2 shows the full derivation of Eq.5.4, Eq.5.5 and Eq.5.6 under the Australian dividend tax imputation system.

administrative expenses will be even less. Davey (1976) found that it was cheaper in the US market to administer DRPs and that the bulk of these costs are tax deductible. Finnerty (1989) also argues that administrative expenses for DRPs are less than 2%. Accordingly, we set the administrative expense for a DRP at 1% (term ‘z’). Similarly, Finnerty (1989) contends that, with significant economies of scale, flotation costs would exceed 2% for very large new share issues.

The ISS study (2010)[58] on equity capital raising in Australia during the 2008 and 2009 period reports that flotation costs for new share issues differed considerably depending on the form the capital raising took and the reason for the capital raising. Capital raisings for the purpose of paying down debt were the most costly, with fees representing 2.26 percent of funds raised, followed by new equity to strengthen the balance sheet, which cost 1.99 percent, and new equity for funding projects, which cost 1.81 percent. Woo and Lange (1992) report that the average flotation cost of raising equity in the Australian market varies from 3.75% of funds raised, and the evidence of their study supports the contention that the costs of raising equity are inversely related to firm size. We set the flotation costs for new share issues (term ‘w’) equal to 2%.

5.6.2 Shareholders with a marginal tax rate of 15%

Table 5.1 documents investor tax rates and the costs of equity of retained earnings, stock-financed equity capital and DRP-financed equity capital. Panel A of Table 5.1 shows that the effective tax rate on dividend income for superannuation and pension funds with a concessional statutory tax rate of 15% varies with the level of the utilization rate of imputation credits.

Between the 0% and 25% utilization rate of imputation tax credits, retained earnings are the cheapest source of new equity capital, followed by DRP-financed equity capital and then stock-financed equity capital. At the 0% utilization rate of imputation credits, the effective tax rate for superannuation and pension funds is equal to their statutory concessional tax rate of 15%. As the

[58] www.issgovernance.com

utilization rate of imputation credits rises from 0% to 100%, there is a decline in effective tax rates from 15% to-21.43%. Consequently, the cost of DRP financed equity falls from 0.1165 to 0.0815. Similarly, the cost of new stock-financed equity also declines from 0.1200 to 0.0840.

The cost of equity of retained earnings does not change as the utilization rate of imputation credits increases from 0% to 100%.

The cut-off utilization rate of imputation credits for the DRP to become the cheapest source of new equity capital relative to retained earnings and stock-financed equity is 29%. At the cut-off utilization rate of 29%, superannuation and pension funds have an effective tax rate of 4.4%. Between the 37% and 100% utilization rate of imputation credits, stock-financed equity becomes less expensive than retained earnings. However, DRP financed equity capital is still the cheapest source of new equity capital.

The evidence in Panel A of Table 5.1 implies that where firms are owned by superannuation and pension funds on a 15% personal tax rate, DRPs provide the most cost effective source of new equity capital where the investor's utilization rate of imputation credits is 29% or greater.

Table 5.1

Comparison of cost of equity capital under Australian dividend tax imputation system

Panel A: Superannuation funds and pension funds with a 15% concessional tax rate

Assumptions	Personal tax rate on dividends is 15% Cost of Equity				Cost of Equity - rank (Cheap to expensive)		
Utilization Rate of Imputation Credits	Effective Tax Rates (%)	Retained earnings (Eq.5.4)	New Stock- Financing (Eq.5.5)	DRP (Eq.5.6)	Retained earnings rank	Stock rank	DRP rank
0.00	15.00	0.1039	0.1200	0.1165	1	3	2
0.25	5.89	0.1039	0.1084	0.1052	1	3	2
0.29	4.44	0.1039	0.1068	0.1036	2	3	1
0.37	1.52	0.1039	0.1036	0.1005	3	2	1
0.50	-3.21	0.1039	0.0989	0.0959	3	2	1
0.75	-12.32	0.1039	0.0908	0.0881	3	2	1
1.00	-21.43	0.1039	0.0840	0.0815	3	2	1

Input variables

k	10%	After-personal –tax required rate of return
T_g	3.75%	Effective personal tax rate on capital gains (25% of statutory rate)
T_d	15%	Statutory personal tax rate of dividends
tc	30%	Corporate tax rate
w	2%	Flotation cost of a new share issue as fraction of the new funds raised
z	1%	Company costs of administering the DRP as fraction of dividends reinvested
IC/DIV	0.4286	Imputation credit ratio

5.6.3 Shareholders with a marginal tax rate of 30%

The evidence in Panel B shows that between the 0% and 50% utilization rate of imputation tax credits, retained earnings are the cheapest source of new equity capital, followed by DRP and new stock financing. At the utilization rate of 0%, the costs of equity of retained earnings, stock-financed equity and DRP-financed equity are 0.1081, 0.1458 and 0.1414 respectively.

At a utilization rate of between 72% and 82%, DRP-financed equity is the cheapest source of equity capital, followed by retained earnings and stock-financed equity capital. At the 82% utilization rate of imputation credits, the costs of equity of DRP-financed equity, stock-financed equity and retained earnings are 0.1047, 0.1079 and 0.1081 respectively. The retained earnings are now the most expensive source of equity compared to stock-financed equity and DRP-financed equity. The DRP-financed equity is still, however, the cheapest source of new equity capital.

The implication of the results in Panel B of Table 5.1 is that the firm with shareholders on a marginal statutory tax rate of 30% will have incentives to adopt a DRP to raise new equity capital if the utilization rate of imputation credits is 72% or greater.

Table 5.1 (Continued)

Panel B: Shareholders with a marginal tax rate of 30%

Assumptions	Personal tax rate on dividends is 30% Cost of Equity				Cost of Equity - rank (Cheap to expensive)		
Utilization Rate of Imputation Credits	Effective Tax Rates (%)	Retained earnings (Eq.5.4)	New Stock-Financing (Eq.5.5)	DRP (Eq.5.6)	Retained earnings rank	Stock rank	DRP rank
0.00	30.00	0.1081	0.1458	0.1414	1	3	2
0.25	22.50	0.1081	0.1317	0.1277	1	3	2
0.50	16.39	0.1081	0.1200	0.1165	1	3	2
0.72	8.40	0.1081	0.1114	0.1081	2	3	1
0.75	7.50	0.1081	0.1103	0.1070	2	3	1
0.82	5.40	0.1081	0.1079	0.1047	3	2	1
1.00	0.00	0.1081	0.1020	0.0990	3	2	1

Input variables

k	10%	After-personal –tax required rate of return
T_g	7.5%	Effective personal tax rate on capital gains (25% of statutory rate)
T_d	30%	Statutory personal tax rate of dividends
tc	30%	Corporate tax rate
w	2%	Flotation cost of a new share issue as fraction of the new funds raised
z	1%	Company costs of administering the DRP as fraction of dividends reinvested
IC/DIV	0.4286	Imputation credit ratio

5.6.4 Shareholders with a marginal tax rate of 45%

We show the case of a resident Australian investor with a marginal statutory tax rate of 45% in Panel C of Table 5.1. The results in Panel C show that retained earnings are the cheapest source of equity capital irrespective of variation in the utilization rate of imputation credits between 0% and 100%. Retained earnings are followed by DRPs and the most expensive source of new equity capital is stock. The results imply that even for a resident Australian investor with a marginal tax rate of 45% DRP-financed equity capital is still cheaper than new stock-financing.[59]

Overall the following conclusions may be drawn from Table 5.1. The dividend tax imputation system has created a greater incentive for the firm to adopt DRP where imputation credits have value to investors. A DRP enables the firm to distribute more franking credits through increased dividend payouts and raise the effective retention rate. Superannuation and pension funds and resident Australian investors benefit from franked dividends as they can utilize the franked dividends to fund their tax liabilities.

[59]This conclusion holds when $z < w$. When $z < w$, the administrative cost of DRP per unit of equity capital raised is less than the flotation cost per unit of equity capital raised through new issue stock.

Table 5.1 (Continued)

Panel C: Shareholders with a marginal tax rate of 45%

Assumptions	Personal tax rate on dividends is 45% Cost of Equity				Cost of Equity - rank (Cheap to expensive)		
Utilization Rate of Imputation Credits	Effective Tax Rates (%)	Retained earnings (Eq.5.4)	New Stock-Financing (Eq.5.5)	DRP (Eq.5.6)	Retained earnings rank	Stock rank	DRP rank
0.00	45.00	0.1127	0.1855	0.1800	1	3	2
0.25	39.11	0.1127	0.1676	0.1626	1	3	2
0.50	33.21	0.1127	0.1528	0.1482	1	3	2
0.75	27.32	0.1127	0.1404	0.1362	1	3	2
1.00	21.43	0.1127	0.1299	0.1260	1	3	2

Input variables

k	10%	After-personal –tax required rate of return
T_g	11.25%	Effective personal tax rate on capital gains (25% of statutory rate)
T_d	45%	Statutory personal tax rate of dividends
tc	30%	Corporate tax rate
w	2%	Flotation cost of a new share issue as fraction of the new funds raised
z	1%	Company costs of administering the DRP as fraction of dividends reinvested
IC/DIV	0.4286	Imputation credit ratio

5.7 Conclusion

This chapter has applied the Finnerty (1989) model to the Australian DRP under the tax imputation system. We retain most of the Finnerty assumptions to simplify the modeling process. Our model analyses the costs of raising new equity from retained earnings, DRPs and new equity capital in the Australian equity market.

The main conclusions drawn from this chapter are: (i) where firms are owned by superannuation and pension funds on a 15% personal tax rate, DRPs provide the most cost-effective source of new equity capital where the utilization rate of imputation credits is 29% or greater; (ii) the DRP-financed equity is the cheapest source of equity capital followed by retained earnings and stock-financed equity where firms are owned by investors with a marginal tax rate of 30% and the utilization rate of imputation credits is 72% or greater; and (iii) even for resident Australian investors with a marginal tax rate of 45% the DRP-financed equity is still cheaper than new stock-financing.

Overall, a DRP becomes a more cost-effective source of new equity capital for the firm following the introduction of the dividend imputation regime.

CHAPTER SIX
DETERMINANTS OF A FIRM'S DECISION TO ADOPT A DRP

6.1 Introduction

This chapter examines the characteristic of companies that adopt dividend reinvestment plans (DRPs). Several theoretical explanations for the adoption of a DRP exist and are tested. The explanations can be grouped into five broad categories: (i) taxes, (ii) growth, (iii) free-cash-flow and leverage, (iv) transaction costs and firm size, and (v) profitability and liquidity.

Our results show a strong tax motive in the adoption of DRPs. The results suggest that DRPs are motivated by both tax and non-tax considerations. We find evidence of differences in the size, dividend payout ratio and growth opportunities of DRP and non-DRP firms. Firms that adopt DRPs, on average, have higher leverage and distribute greater franking credits compared to firms that do not adopt DRPs[60].

The remainder of the chapter is organized as follows. Section 6.2 formulates a set of testable hypotheses to test the determinants of a firm's decision to adopt a DRP. Section 6.3 describes the sample. Section 6.4 discusses the methodology we employ in our empirical tests. Section 6.5 presents the summary statistics and empirical results and examines the robustness of the findings compared with alternative measures of the proxy variables. The conclusions are set out in Section 6.6.

6.2 Hypothesis development

In this section, we classify the testable hypotheses into five main groups: taxation, growth, free-cash flow (agency cost) and leverage, transaction costs and firm size, profitability and liquidity. To test our hypotheses we undertake both univariate and multivariate analysis.

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60. Chiang, Frankfurter and Arman (2005) explore the salient features of US DRPs and analyze the difference between firms that offer DRPs and those that do not. They suggest that out of seventeen financial and accounting variables, DRP firms differ from non-DRP firms in only three variables. Firms that adopt DRPs pay more dividends than non-DRP firms. DRP firms have lower growth prospects and lower inside ownership than non-DRP firms.

6.2.1 Taxation

The unique features of the tax imputation system in Australia provided motivation to specifically test the determinants of a firm's decision to adopt a DRP. Australia's imputation tax system provides tax-based preference for a dividend distribution policy that comprises (i) the distribution of franked dividends, (ii) the retention of unfranked dividends, and (iii) the adoption of a DRP.

Prior research suggests that there is a tax-based preference for DRP in the Australian market. For example, Bellamy (1994) provides evidence on the impact of the imputation tax system on dividend policy and the use of DRPs in Australia. Bellamy concludes that (i) firms pay a constant level of imputation credits to satisfy the demands of their clienteles, (ii) firms paying dividends increase their payout ratios to ensure that imputation credits are passed on to shareholders, and (iii) firms are more likely to use DRPs following the introduction of dividend imputation. Similarly, Pattenden and Twite (2008) find that dividend payouts and use of DRPs increased with the introduction of dividend imputation. Nicol (1992) also found that companies used DRPs to increase dividend payouts post the introduction of dividend imputation in Australia.

The benefits of imputation are constrained to situations where firms pay dividends. In the absence of dividend payouts, neither domestic nor foreign shareholders[61] receive imputation credits.[62] Furthermore, the taxation of superannuation funds and the July 2000 tax credit refund

[61]Under the Australian imputation tax system, shares which are fully franked are exempt from the dividend withholding tax and overseas investors only have to pay withholding tax on the unfranked component of the dividend.

[62]An effective reduction in the corporate tax rate also occurs under imputation provided the dividend payout ratio is not zero. As shareholders cannot access imputation credits until dividends are paid, the size of the reduction in the corporate tax rate will be a function of the dividend payout ratio.

reform also create an incentive for superannuation and pension funds to actively seek franking credits. [63]

Consistent with this tax preference for the distribution of franking credits, Monkhouse (1993) suggests that under an imputation system, the optimal dividend policy is for a firm to distribute all its franking credits. The view that an optimal dividend policy for a listed firm post-imputation is to pay franked dividends to the limit of its franking account is also found in other studies (e.g., Howard & Brown, 1992; Brown &Clarke, 1993).

These arguments suggest that with the introduction of dividend imputation, firms will increase their dividend payouts with attached imputation credits. In increasing dividend payouts it must be recognized that management may also choose to pay a dividend and concurrently raise new equity. The tax preference for the distribution of franked dividends will result in firms increasing the use of external equity financing to compensate for the increased distribution of earnings. Twite (2001) finds that the proportion of capital raised by Australian firms via new equity increased following the introduction of the dividend imputation system. DRPs allow shareholders to use all or part of their dividends to subscribe to new shares, and this results in firms retaining cash for investment and shareholders receiving franking credits.

We predict that under the Australian dividend imputation regime, DRP firms will have higher dividend payout ratios and distribute more franking credits than dividend paying non-DRP firms.

Our first and second hypotheses in alternative form are:

H1: DRP firms have higher dividend payout ratios (higher dividend yields) than dividend paying non-DRP firms;

[63] A DRP allows firms to increase their dividend payout ratio and distribute greater levels of franking credits to the firm's shareholders. At the same time, a DRP enables managers to retain cash in the firm to undertake new investment opportunities. A good example is Wesfarmers, as cited in Harris, Hubbard and Kemsley (2001). In order to decide whether franked dividends should be distributed, Wesfarmers surveyed its shareholders' ability to access imputation tax credits. They found that the weighted average tax rate was less than half of the corporate tax rate and they created a dividend reinvestment plan to pass on the benefits of imputation tax credits.

H2: DRP firms pay dividends with a higher franking ratio (franking credit yield) than dividend paying non-DRP firms.

In the Australian market DRPs may form part of a manager's tool to raise new equity to compensate for the distribution of earnings. The modification of the Finnerty (1989) model (see Chapter 5) presents Australian DRPs as less expensive sources of equity than retained earnings. DRPs seem to avoid many of the costs associated with seasoned equity issuance. Adverse selection costs and wealth transfer are much less relevant with pro-rata issues than public offers (Eckbo&Masulis, 1992).Under the Australian imputation tax system, DRPs could be cheaper than retained earnings if retained earnings prevent distribution of valuable franking credits. Therefore, under an extended pecking order hypothesis, firms with large franking credit balances would rank DRPs above retained earnings as a source of equity finance.

Thus, we posit that more firms will offer DRPs in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000).[64]

We hypothesize that:

H3: Firms will be more likely to offer a DRP in the post-tax credit refund period (2001-2009) compared to the pre-tax credit refund period (1995-2000).

6.2.2 Growth

Growth firms require capital to fund their new profitable investment opportunities. In a classical tax system, the pecking order theory (Myers &Majluf, 1984) hypothesizes that firms have an order of preference in raising funds based on their signal to the market.[65]In the presence of information asymmetry between managers and outside investors, internal funds are chosen before debt and equity as they have the least adverse signalling costs. Dividend payments are

[64] We posit a change in the shareholder pattern of DRP firms in favour of domestic shareholders due to imputation benefits. However, we are unable to test this hypothesis due to the non-availability of accurate ownership data. We received the ownership data (CHESS data) through SIRCA but could not pursue further due to the presence of many errors in the data.

[65]The 'pecking order theory' is based on the notion that external financing transaction costs in the presence of adverse selection costs creates an environment in which firms have a preference for particular sources of financing. Internally generated funds are the most preferred, new debt is next, and new equity is the least preferred source.

also likely to signal the firm's high quality and favourable earnings prospects (e.g., John & Williams, 1985; Miller & Rock, 1985; Ravid&Sarig, 1991; Yoon & Starks, 1995). Signalling theory argues that managers have superior private information, and that dividend announcements change the information set available to shareholders, which results in a revaluation of a firm's share price. However, if the firm's share price is temporarily depressed and managers have information about a valuable new investment opportunity, simultaneously paying out cash dividends and financing the investment project with new external equity (or, alternatively cutting the cash dividend) could be expensive if the firm cannot effectively inform its investors about its investment opportunities.

Finnerty (1989) also develops a theoretical model based on a tax-based preference for raising funds in a classical tax system and shows that the order of preference is debt, retained earnings, and lastly new equity issues. In a dividend imputation regime, however, where investors also face capital gains tax, the application of Finnerty's model (see Chapter 5) suggests that the cost of equity capital raised through a DRP is lower than the cost of equity capital from retained earnings, if the shareholder's marginal tax rate is less than the statutory corporate tax rate and shareholders can utilize imputation credits. Scholes and Wolfson (1989) also report that DRPs, as a continuous fund raising alternative, might not just mitigate adverse signalling effects from raising new equity; they could also increase share prices.

Compared to rights issues, DRPs may be a cheaper method of financing growth due to the lower flotation and issuance costs of new equity. Saporoschenko (1998) argues that firms with higher growth opportunities adopt a DRP because of their need for outside funding and the relatively low flotation costs compared to a rights issue or seasoned equity offering. Other researchers (e.g., Agrawal&Jayaraman, 1994; Gosh&Sirmans, 2006; Mancinelli&Ozkan, 2006; Ooi, 2001; Rozeff, 1982) also argue that firms with greater investment opportunities will limit dividend payments to retain cash for new positive NPV investments. However, as previously noted, under an imputation system firms with growth opportunities will still have incentives to adopt a high dividend payout to distribute maximum imputation tax credits.

Empirical evidence from the Australian market suggests that following the introduction of dividend imputation, the announcement by the firm of a DRP has a positive impact on firm value (Chan et al., 1995). Chan et al.'s study indicated that the announcement to introduce a DRP was received indifferently by the market prior to imputation, but was valued positively post-imputation. The study also showed that the positive market reaction to the announcement of the DRP was interlinked with specific firm characteristics, as well as the DRP features, such as the participation rate and the size of the discount. [66]

Moreover, the application of Finnerty's model to the Australian dividend imputation system suggests that DRP-financed equity is a cost effective way of raising new equity capital. Thus, we posit that under Australia's imputation tax environment, firms with high growth opportunities that cannot finance all new investment projects with internally generated funds or retained earnings have a greater incentive to implement a DRP to access new capital.[67]Thus, we hypothesize:

H4: Growth firms are more likely to offer a DRP compared to low growth firms.

6.2.3 Free - cash flow and leverage

In addition to tax and growth incentives, firms may want to adopt DRPs to reduce agency costs. When a company has insufficient funds to finance the payment of its dividend, it must either raise external funds or cut its distribution. While a new equity issue leads to an increase in the monitoring of managerial behavior (e.g., Easterbrook, 1984; Hansen & Torregrosa, 1992;

[66]This finding is in contrast to the findings of Chiang, Frankfurter and Arman (2005) cited in footnote 60 which suggest that the US DRP firms have lower growth prospects under a classical tax regime. The difference in Australian findings is due to the imputation tax system setting.

[67] In Chapter 5 we adapted the Finnerty (1989) model to the Australian dividend imputation system. Our model predicts a lower cost of equity for DRP-financed equity as compared to retention-financed cost of equity and stock-financed cost of equity under certain conditions. Thus, under the dividend imputation system, there is a cost-induced preference for a DRP on the part of the firm.

Rozeff, 1982), a dividend cut is likely to convey unfavourable information about the current and or future cash flows of the firm (e.g., John& Williams, 1985; Miller& Rock, 1985). Adopting a DRP to conserve cash and avoid a dividend cut may convey less negative information to the market.

Higher leverage reduces the free cash flow available to managers, thus restricting their capacity to engage in value decreasing activities. Stulz (1990) also argues that debt has a disciplinary effect by forcing managers to disgorge cash flows. In an agency cost framework, this suggests that agency costs for those firms that adopt a DRP will be lower the more the leverage firm is leveraged. High debt also increases the incentives for the firm to adopt a DRP to minimize financial distress costs and receive cash inflows on a regular schedule. This may also avoid the potential adverse signalling costs from any reduction in dividend payments (see Lintner, 1956).

On the other hand, DRPs provide additional resources to management on a regular basis, which may lead to wasteful investment. If managers have surplus cash flow under their control, they will have incentives to increase their compensation by enlarging the firm size beyond the optimal level (Jensen, 1986).Debt requires firms to meet non-discretionary interest payments to debt holders and thus lowers the possibility of free cash flow abuse. High debt reduces agency costs associated with a DRP because managers are less able to consume any surplus cash flows. In summary, if the DRP is motivated by agency cost considerations, then DRP firms should have higher leverage compared to non-DRP firms.

We predict that firms with high relative debt levels, ceteris paribus, are more likely to have a DRP than firms with low relative debt levels. We hypothesize:

H5: Firms with high leverage are more likely to offer a DRP compared to firms with low leverage.

6.2.4 Size

Large firms can reduce bookkeeping costs due to economies of scale. Thus, a DRP should be proportionately less expensive for larger firms where the costs of any plan have a significant fixed component. For example, legal departments in large firms may prepare a prospectus or plan booklet for a DRP. In contrast, small firms will need to incur the costs of external legal advice. Shareholder registry services used for other stockholder-related activities may also be able to provide DRP processing support at a lower marginal cost per shareholder for larger firms.

In addition, Australian firms may only wish to implement a DRP if the DRP is underwritten. This is to guarantee that adequate funds for reinvestment are still retained in the firm. An underwriter may prefer to underwrite the DRP for large firms due to greater liquidity, less information asymmetry and a higher underwriting fee. Large firms have wider coverage by analysts and brokerage houses, which reduces research costs for any further dealings. Large firms can also afford to pay higher underwriting commissions than small firms.

The stage dependency theory suggests that there will be contracts that investors would reject for a small firm but accept for a large firm (when the two firms have identical projects). Consequently, the profitability threshold that subsequent claim holders require for financing a project in a large firm will be lower than the threshold for financing the same project in a small firm (see Fluck, 1999).

We predict, ceteris paribus, that large firms are more likely to introduce a DRP than small firms due to lower transaction costs and greater economies of scale. We hypothesize:

H6: Large firms are more likely to offer a DRP compared to small firms.

6.2.5 Profitability and liquidity

Dickens et al. (2003) assert that higher profitability helps firms to stabilize operating cash flows and lowers the probability of business failure. Jensen et al. (1992) posit that firms tend to avoid the commitment to higher dividends when uncertainty about earnings is high. Amidu and Abor (2006) suggest that a firm with stable earnings is more likely to pay a higher percentage of its earnings as dividends than a firm with fluctuating earnings because the former is more easily able to predict future earnings. Cherin and Hanson (1995) note that firms with low cash liquidity have incentives to offer DRPs to improve corporate liquidity. This also minimizes the cost of financial distress.

Other prior literature also posits a positive relationship between profitability and dividend payouts. The study by Myers and Majluf (1984) suggests that higher profitability can result in higher dividends because greater profitability implies a greater availability of internal funds for dividend distributions. Jensen et al. (1992), Pruitt and Gitman (1991) and Wang et al. (1993) found that high profitability is associated with high dividends. Similarly, firm liquidity is hypothesized to positively impact dividend payouts. According to Amidu and Abor (2006), poor liquidity means a cash shortage and thus fewer or no dividends, whereas good liquidity implies sufficient cash for large dividends.

Under the dividend imputation tax system, the only way to increase the distribution of franking credits is through increased dividend payouts. Profitable firms with a good liquidity position are more likely to have sufficient cash for large dividends. On the other hand, firms with low profitability and liquidity may adopt a DRP to ensure sufficient funds for higher dividend payouts. Therefore, we predict that, ceteris paribus, firms with low profitability and liquidity are more likely to adopt a DRP as compared to firms with high profitability and liquidity. We hypothesize:

H7: Firms with low profitability are more likely to offer a DRP compared to firms with high profitability.

H8: Firms with low liquidity are more likely to offer a DRP compared to firms with high liquidity.

6.3 Data

The DRP and non-DRP samples are identified from the population of all listed firms on the ASX (Australian Securities Exchange), from 1995 through to 2009 (see Chapter 4). This sample period spans the introduction of the July 2000 tax credit refund rule that enables domestic investors to claim a cash refund for unused tax credits from the Australian Taxation Office. Financial data (sourced from the firm's balance sheet, profit and loss account and cash flow statements) and equity and dividend data are obtained from the DAT Analysis and Fin Analysis databases. Where necessary the extracted information is cross-checked with ASX's share market event files and company annual reports. Firms with incomplete data are removed from the sample. Firm observations are grouped into dividend-paying stocks with and without a DRP. The final sample comprises cross-sectional time-series data, with 2,243 observations of firms with a DRP and 3,818 observations of firms with a non-DRP (see Table 4.1).The sample of observations is drawn from a range of industry groups (see Table 4.3 and Chapter 4).The firm characteristic variables, which we use to conduct the univariate and multivariate analysis, are computed using the data from the firm's financial statements and the firm's dividend history (see Table 4.5).

6.4 Methodology

To identify the factors distinguishing DRP firms and dividend paying non-DRP firms we first undertake univariate analysis and compare the independent variables for both the DRP and non-DRP samples. In multivariate analysis we use a logistic regression model. Our logistic regression model to identify the factors distinguishing DRP firms from dividend paying non-DRP firms is:[68]

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[68]We run separate regressions for the natural log of total assets and the natural log of market capitalization, as these variables are highly correlated. Logistic models are estimated with robust and cluster options to deal with problems about normality, heteroscedasticity, large residuals and intra-group correlation. Many applied studies have used bootstrap standard error estimates as a measure of the precision of their parameter estimates (see, e.g., Efron 1979; Efron&Ibshirani 1986; Li &Maddala, 1996). Thus we use the bootstrap method to correct for standard errors. Marginal effects are estimated for logistic models to obtain an approximation for the change in DRP decision making that will be motivated by a one unit change in the firm characteristic variables.

$DRPDummy_{i,t} = \beta_0 + \beta_1$ Dividend Payout $Ratio_{i,t} + \beta_2$ Average Franking $Ratio_{i,t} + \beta_3$ Period Dummy$+ \beta_4$ Tobin's $Q_{i,t} + \beta_5$ Debt/Total $Assets_{i,t} + \beta_6$ Natural logarithm of Total $Assets_{i,t} + \beta_7$ Return on $Assets_{i,t} + \beta_8$Operating Cash Flow / Total $Assets_{i,t} + \beta_9$ Current $Ratio_{i,t}$ + Error.

(6.1)

The variables are expressed for the i^{th} firm in the t^{th}period. The dependent variable is a dummy, with 1 for firms with a DRP and 0 for firms without a DRP. The Period Dummy variable takes a value of 1 for firm observations in the post-tax credit refund period (2001-2009) and 0 for firm observations in the pre-tax credit refund period (1995-2000).We run a logistic regression similar to Eq. (6.1) with alternative variables (Dividend Yield and Franking Credit Yield) to proxy for the taxation hypothesis.

Table 4.5 shows the definition of explanatory variables used in Eq. (6.1). We predict that firms with a high dividend payout ratio or dividend yield are more likely to implement a DRP (H1).The dividend payout ratio is the annual dividends per share divided by the annual earnings per share.[69]The dividend yield is the annual dividends per share divided by the fiscal year-end share price. The Franking Ratio or Franking Credit Yield is added as a further explanatory variable to test the effect of the tax changes and the shareholder's preferences for franked dividends. The franking ratio percentage is calculated as:

$$\text{Franking Ratio \%} = \frac{\text{Final and Interim franking credits}}{\text{Final and Interim cash dividends}} \times \frac{(1-\text{Corporate tax rate})}{\text{Corporate tax rate}}$$

The franking credit yield is calculated as:

$$\text{Franking Credit Yield} = \frac{\text{Final and Interim franking credits}}{\text{Share Price}}$$

We predict the Franking Ratio/ Franking Credit Yield to have a positive coefficient (H2). The Period Dummy variable tests for the impact of the July 2000 tax credit refund reforms (H3). We expect a positive coefficient on Period Dummy. Tobin's Q is used as a proxy for growth to test

[69]If the firm paid dividends but earnings per share were negative we set the dividend payout ratio to 100%.

the growth hypothesis (H4). The coefficient on Tobin's Q is expected to be positive since growth opportunities are predicted to be positively associated with the adoption of a DRP.

Leverage is defined as net interest bearing debt over total assets. We predict that firms with high leverage are likely to adopt a DRP (H5). Firm size is measured by the natural logarithm of total assets and predicted to be positively related to the implementation of a DRP (H6). We use two proxies for profitability. The first is return on assets, which is defined as (Net Income + Interest Expense*(1-Corporate Tax Rate))/ (Total Assets-Outside Equity Interests). The second profitability measure is a cash flow measure, defined as Operating Cash Flow/Total Assets. These coefficients are expected to be negative under the profitability hypothesis (H7). We use the firm's Current Ratio defined as Total Current Assets/Total Current Liabilities to test the impact of liquidity constraints on the decision to adopt the DRP (H8).The coefficient on Current Ratio is also predicted to be negative.

Since the literature does not offer single measures of profitability, leverage and relative firm size, we test the sensitivity of our results by using a number of alternative measures of these variables. We use EBIT/Total Assets to measure Return on Assets to test the profitability hypothesis. Similarly, the natural logarithm of Total Assets is replaced by the natural logarithm of Market Capitalization to test the size hypothesis. We use Interest Coverage Ratio defined as EBIT/Interest Expense in the place of Debt/Total Assets to test the leverage hypothesis.[70]We re-estimate Eq. (6.1) with these alternative variables proxying for profitability, firm size and leverage for robustness.

[70]Two firms with identical leverage could have vastly different Interest Coverage Ratios due to a number of reasons other than just leverage. For example, one might earn a superior return and another may be charged higher interest costs due to higher operational risk, etc. We have employed the variable Interest Coverage Ratio in the robustness tests.

We estimate both random effects and fixed effects models (logistic panel regressions) in our multivariate analysis using panel data.[71] We also estimate a two-stage least-squares logistic model (2SLS) using the Instrument Variable Method to test whether there is any endogeneity between the dividend payout ratio/dividend yield and the decision to adopt the DRP. In this respect, firms that increase the dividend payout ratio to distribute franking credits to investors then decide to implement a DRP to enable retention of funds within the firm. Alternatively a firm that decides to adopt a DRP may then decide to increase its dividend payout ratio, as not all dividends are ultimately distributed to shareholders. The estimated 2SLS logistic regression is:

$$\text{DRP Dummy}_{i,\,t} = \beta_0 + \beta_1\text{Predicted value of Dividend Payout Ratio}_{i,\,t} + \beta_2\,\text{Firm Size}_{i,\,t} + \text{Error} \qquad (6.2)$$

The variables are expressed in the i^{th} firm in the t^{h} period. The other dependent and explanatory variables take the same meaning as defined in Eq. (6.1).[72]We run separate logistic 2SLS regressions using Dividend Payout Ratio and Dividend Yield, the proxies for tax change. When Dividend Payout Ratio is used as an endogenous variable, the instrument variables used are Period Dummy, Franking Ratio, Tobin's Q, Return on Assets, Operating Cash Flow/Total Assets and Current Ratio. If Dividend Yield is used in place of Dividend Payout Ratio, then Franking Ratio will be replaced by Franking Credit Yield as an instrument variable.

We select these instrumental variables for the following reasons. First, under the Australian dividend tax imputation system, Australian resident shareholders attribute value to franking credits (Brown & Clarke, 1993; Bellamy, 1994; Walker and Partington, 1999) and an optimal dividend policy for a listed firm post imputation is to pay franked dividends to the limit of its franking account (Nicol, 1992; Twite, 2001). Franking credits can only be attached where firms

[71]Random effect models are used if the levels of the independent variables are thought to be a small subset of all possible values. The random effect model compares the variance of means across the levels of a random factor. In the fixed effect model, we make explicit comparison of one level against another.

[72] We run separate regressions with the natural log of Total Assets and natural log of Market Capitalization (proxies of the size variable) for estimating equation (6.2) as these variables are highly correlated.

pay dividends. Second, a positive relationship between growth and dividend payout has been suggested in previous studies (D’Souza, 1999; Wang et al., 1993; Omran &Pointon, 2004). Third, the prior empirical literature suggests that profits are an important indicator of the firm’s capacity to pay dividends (Farrelly,Baker, & Edelman, 1986; Pruitt & Gitman, 1991; Baker &Powell, 2000). Fourth, the liquidity position of the firm is also an important determinant of dividend payouts (Alli et.al., 1993).

6.5 Empirical results

6.5.1 Summary statistics

Table 6.1shows the number of observations for firms with a DRP and firms that are not offering a DRP over the sample period between 1995 and 2009. There are 477 DRP and 1,240 non-DRP observations in the pre-tax credit refund period between 1995 and 2000.In the post-tax credit refund period between 2001 and 2009, the numbers of DRPs and non-DRPs are1,766 and2,578 respectively. The percentage ASX-listed firms with a DRP arehigher in the post-tax credit refund rule period: 40.65% versus 27.78%. The difference in means is significant at the 0.01 level under the t-test. The evidence is consistent with H3that firms are more likely to have a DRP in the post-tax credit refund period.

Table 6.1
Sample Characteristics

Year	DRP Observations	Non-DRP Observations	Total (DRP and Non-DRP)	%DRP	%Non-DRP
1995	45	180	225	20	80
1996	55	193	248	22.2	77.8
1997	67	207	274	24. 5	75.6
1998	67	233	300	22.3	77. 7
1999	115	209	324	35.5	64.5
2000	128	218	346	37.0	63.0
2001	143	244	387	37.0	63.1
2002	147	238	385	38.2	61.8
2003	152	246	398	38.2	61.8
2004	180	276	456	39.5	60.5
2005	203	306	509	39.9	60.1
2006	233	314	547	42.6	57.4
2007	249	341	590	42.2	57.8
2008	249	335	584	42.6	57.4
2009	210	278	488	43.0	57.0
Pre-tax credit refund rule period (1995-2000)	477	1240	1717	27.8	72.2
Post-tax credit refund rule period (2001-2009)	1766	2578	4344	40.7	59.4
Total	2243	3818	6061	37.0	63.0
T-test (Sig) (% mean difference between pre and post-tax credit refund periods).				5.1795 (0.0002)***	5.1795 (0.0002)***

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

6.5.2 Univariate results

6.5.2.1 Full sample period (1995-2009)

Table 6.2 reports the univariate results for the key variables for the full sample period (1995-2009) and the two sub-periods (pre-tax and post–tax credit refund periods). Panel A of Table 6.2 presents the results for the full sample period between 1995 and 2009. The mean (median) Dividend Payout Ratio for the DRP firms is 0.705 (0.721). This is significantly higher than the mean (median) payout for the non-DRP firms of 0.655 (0.657) at the 0.01 level under both the t-test and Wilcoxon test. The mean (median) Dividend Yield, an alternative measure of dividend policy, is 0.059 (0.051) for the DRP firms. This is higher than the mean (median) Dividend

Yield for the non-DRP firms of 0.058 (0.048). The difference between the means is not significantly different from zero. However, the difference in medians is significant at the 0.01 level under the Wilcoxon test. The evidence supports H1 that DRP firms have higher Dividend Payout Ratios than dividend paying non-DRP firms. The evidence is consistent with the finding of Nicol (1992) in the Australian market, that firms use DRPs to increase dividend payouts post the introduction of dividend imputation.

The mean (median) Franking Ratio for the DRP firms is 0.711 (1.000), compared to the mean (median) Franking Ratio for the non-DRP firms of 0.702 (1.000).However, the difference between the means and medians for the two samples are not significantly different from zero. The mean (median) Franking Credit Yield for DRP firms is 0.017 (0.016), which is higher at the 0.10significance level than the mean (median) Franking Credit Yield for the non-DRP firms of 0.016(0.015).The evidence only weakly supportsH2 that DRP firms have a higher franking credit yield compared to non-DRP firms. Thus, the full sample period results provide only limited support for the taxation hypotheses (H1, H2) that firms offering a DRP are likely to distribute more dividends with attached franking credits than firms not offering a DRP.

The univariate results in Panel A of Table 6.2 also show that DRP firms show higher growth prospects compared to non-DRP firms. The mean (median) Tobin's Q for DRP firms is 1.223 (0.978), which is higher (lower) than the mean (median) Tobin's Q for the non-DRP firms of 1.177 (0.988).

Table 6.2
Univariate Analysis

Panel A: Variables used for Main Tests (Full sample period, 1995-2009)

		DRP Firms						Non-DRP Firms							
Variables	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	2243	0.705	0.721	0.261	0.512	1.000	3818	0.655	0.657	0.283	0.438	0.974	6.916 (0.000)***	6.418 (0.000)***
Franking Ratio	Positive	2243	0.711	1.000	0.427	0.250	1.000	3818	0.702	1.000	0.437	0.000	1.000	0.765 (0.444)	0.770 (0.441)
Dividend Yield	Positive	2243	0.059	0.051	0.041	0.036	0.074	3818	0.058	0.048	0.060	0.031	0.069	0.373 (0.709)	5.565 (0.000)***
Franking Credit Yield	Positive	2243	0.017	0.016	0.015	0.003	0.025	3818	0.016	0.015	0.014	0.000	0.026	1.807 (0.071)*	1.649 (0.099)*
Tobin's Q	Positive	2243	1.223	0.978	1.015	0.764	1.292	3818	1.177	0.988	0.693	0.728	1.425	2.064 (0.039)**	0.745 (0.456)
Debt/Total Assets	Positive	2243	0.152	0.173	0.294	-0.010	0.305	3818	0.095	0.112	0.328	-0.049	0.263	6.789 (0.000)***	8.766 (0.000)***
Natural log of Total Assets	Positive	2243	20.028	19.763	2.157	18.522	21.415	3818	19.239	18.955	2.037	17.672	20.578	14.245 (0.000)***	13.789 (0.000)***
Return on Assets	Negative	2243	0.072	0.065	0.154	0.042	0.091	3818	0.089	0.072	0.108	0.047	0.114	-4.924 (0.000)***	-8.094 (0.000)***
Operating Cash Flow/Total Assets	Negative	2243	0.076	0.060	0.146	0.022	0.108	3818	0.097	0.078	0.168	0.036	0.140	-4.866 (0.000)***	-9.517 (0.000)***
Current Ratio	Negative	2243	2.610	1.410	2.092	1.070	2.030	3818	2.719	1.510	2.626	1.090	2.300	-1.678 (0.093)*	-4.060 (0.000)***

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Table 6.2 (Continued)

Panel B: Variables used for Robustness Tests (Full sample period, 1995-2009)

		DRP Firms						Non-DRP Firms							
Variables	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	2243	19.678	19.503	1.933	18.222	20.974	3818	19.024	18.806	2.116	17.452	20.452	11.991 (0.000)***	12.310 (0.000)***
Return on Assets = EBIT /Total Assets	Negative	2243	0.095	0.075	0.222	0.042	0.116	3818	0.110	0.086	0.207	0.044	0.140	-2.594 (0.010)***	-6.061 (0.000)***
Interest Coverage Ratio	Negative	2243	3.606	3.930	3.412	1.020	5.015	3818	4.261	3.820	4.334	2.124	5.715	-6.128 (0.000)***	0.502 (0.616)

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Only the difference between means is significant at the 0.05 level. These results provide weak support for H4, that DRP firms have higher growth prospects compared to non-DRP firms.

The mean (median) Debt/Total Assets ratio for the DRP firms is 0.152 (0.173). This is significantly higher than the mean (median) Debt/Total Assets ratio for the non-DRP firms of 0.095 (0.112) at the 0.01 level under both the t-test and Wilcoxon test. Panel B of Table 6.2 shows that the mean (median) Interest Coverage Ratio for the DRP firms is 3.606 (3.930). This is lower than the mean (median) Interest Coverage Ratio for the non-DRP firms of 4.261 (3.820). The difference in means is significant at the 0.01 level under the t-test. However, the median Interest Coverage Ratio for DRP firms (3.930) is higher compared to non-DRP firms (3.820). The evidence does not provide strong support for H5, that DRP firms have higher leverage than non-DRP firms. The mean (median) natural logarithm of total assets for DRP firms is 20.028 (19.763), compared to the mean (median) for non-DRP firms of 19.239 (18.955). Both the difference in means and medians is significant at the 0.01 level. The evidence supports H6 that large firms are more likely to offer a DRP compared to small firms. Similarly, the result in Panel B of Table 6.2 shows that the mean (median) level of natural logarithm of Market Capitalization for the DRP and non-DRP firms is 19.678(19.503) and 19.024(18.806) respectively. The difference in means and medians is significant at the 0.01 level. The evidence again provides strong support for H6, that larger firms are more likely to adopt a DRP than smaller firms.

Return on Assets, a measure of accounting profitability, has a mean (median) for the DRP firms of 0.072(0.065), which is lower than the mean (median) for the non-DRP firms of 0.089 (0.072). This difference is significant at the 0.01 level, both under the t-test and Wilcoxon test. Similarly, the mean (median) Operating Cash Flow/Total Assets ratio for the DRP firms of 0.076(0.060) is significantly lower than the mean (median) Operating Cash Flow/Total Assets ratio for the non-

DRP firms of 0.097 (0.078).There is strong support for hypothesisH7, that firms with low profitability are more likely to offer a DRP than firms with high profitability.

Liquidity, measured by the Current Ratio, is lower for DRP firms as compared to non-DRP firms. The difference between means is significant at the 0.10 level while the difference between medians is significant at the 0.01level. Thus, there is some evidence to support the liquidity hypothesis (H8).

6.5.2.2 Pre-tax credit refund period (1995-2000)

Panel C of Table 6.2 presents the univariate results for the pre-tax credit refund period (1995-2000). In the pre-tax credit refund period the results are broadly similar to the results for the whole sample period. DRP firms have a significantly higher Dividend Payout Ratio, Dividend Yield and a higher Franking Ratio and Franking Credit Yield compared to non-DRP firms. Dividend payout ratio has a mean (median) for the DRP firms of 0.698 (0.704), which is higher than the mean (median) for the non-DRP firms of 0.647 (0.648). Both the difference in means and medians is significant at the 0.01 level. The mean (median) Dividend Yield for DRP firms is 0.057 (0.053). This is higher than the mean (median) for non-DRP firms of 0.056 (0.050). The difference in medians is significant at the 0.01 level. The mean (median) Franking Ratio for the DRP firms is 0.706 (1.000). This is higher (same) than the mean (median) Franking Ratio for the non-DRP firms of 0.683 (1.000) at the 0.01 level under both the t-test and Wilcoxon test. Franking Credit Yield has a mean (median) for the DRP firms of 0.021(0.020), which is higher than the mean (median) for the non-DRP firms of 0.019 (0.019). The difference in medians is significant at the 0.01 level. The results support H1 and H2, that firms with a higher dividend payout ratio and franking credit yield are more likely to adopt a DRP than firms with a lower dividend payout ratio and franking credit yield.

Table 6.2 (Continued)

Panel C: Variables used for Main Tests (Pre -tax credit refund period, 1995-2000)

		DRP Firms						Non-DRP Firms							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	477	0.698	0.704	0.248	0.537	0.941	1240	0.647	0.648	0.274	0.451	0.921	3.502 (0.000)***	3.405 (0.001)***
Franking Ratio	Positive	477	0.706	1.000	0.421	0.330	1.000	1240	0.683	1.000	0.440	0.000	1.000	0.992 (0.321)	0.908 (0.364)
Dividend Yield	Positive	477	0.057	0.053	0.029	0.038	0.073	1240	0.056	0.050	0.047	0.033	0.070	0.544 (0.587)	2.522 (0.012)***
Franking Credit Yield	Positive	477	0.021	0.020	0.018	0.004	0.031	1240	0.019	0.019	0.016	0.000	0.030	2.488 (0.013)***	1.967 (0.049)**
Tobin's Q	Positive	477	1.092	0.948	1.066	0.684	1.177	1240	1.044	0.890	0.660	0.669	1.205	1.118 (0.264)	0.624 (0.533)
Debt/Total Assets	Positive	477	0.136	0.166	0.230	-0.006	0.275	1240	0.129	0.147	0.236	-0.010	0.268	0.517 (0.605)	1.466 (0.143)
Natural log of Total Assets	Positive	477	19.785	19.484	2.204	18.297	20.905	1240	19.060	18.720	2.065	17.472	20.456	6.401 (0.000)***	6.186 (0.000)***
Return on Assets	Negative	477	0.052	0.062	0.284	0.041	0.084	1240	0.081	0.066	0.121	0.046	0.092	-2.908 (0.004)***	-2.658 (0.008)***
Operating Cash Flow/Total Assets	Negative	477	0.073	0.066	0.101	0.021	0.109	1240	0.080	0.070	0.109	0.033	0.117	-1.290 (0.197)	-1.704 (0.088)*
Current Ratio	Negative	477	1.585	1.336	1.764	1.060	1.765	1240	2.012	1.410	2.217	1.070	2.035	-3.772 (0.000)***	-2.819 (0.005)***

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

There is no strong evidence to support the growth hypothesis, H4. The mean (median) Tobin's Q for DRP firms is 1.092 (0.948). This is higher than the mean (median) for non-DRP firms of 1.044 (0.890). However, both the difference in means and medians is not significant. Similarly, the mean (median) Debt/Total Assets ratio for DRP firms is 0.136 (0.166), which is higher than the mean (median) Debt/Total Assets ratio for the non-DRP firms of 0.129 (0.147).

The result in Panel D of Table 6.2 shows that the mean Interest Coverage Ratio for DRP firms is 3.581, which is lower than the mean Interest Coverage Ratio for the non-DRP firms of 4.123. However, DRP firms have a higher median Interest Coverage Ratio of 4.400 compared to the median Interest Coverage Ratio for the non-DRP firms of 4.135. The difference in means is significant at the 0.01 level under the t-test. Therefore, there is some evidence to support hypothesis H5, that DRP firms are likely to have higher leverage than non-DRP firms (H5).

The mean (median) natural logarithm of Total Assets for DRP firms is 19.785 (19.484). This is significantly higher than the mean (median) for non-DRP firms of 19.060 (18.720). The differences between means and medians are significant at the 0.01 level, which supports the size hypothesis (H6). The mean (median) Return on Assets for DRP firms is 0.052 (0.062). This is significantly lower than the mean (median) Return on Assets for non-DRP firms of 0.081(0.066), which supports the profitability hypothesis (H7). There is strong evidence to support the liquidity hypothesis (H8) that DRP firms are likely to have lower Current Ratio compared to non-DRP firms. The mean (median) Current Ratio for DRP firms is 1.585 (1.336). This is lower, at the 0.01 significance level, than the mean (median) Current Ratio for non-DRP firms of 2.012 (1.410).

Table 6.2 (Continued)

Panel D: Variables used for Robustness Tests (Pre -tax credit refund period, 1995-2000)

		DRP Firms						Non-DRP Firms							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	477	19.371	19.211	1.928	17.866	20.550	1240	18.698	18.453	2.148	16.996	20.197	5.979 (0.000)***	6.280 (0.000)***
Return on Assets = EBIT /Total Assets	Negative	477	0.104	0.078	0.425	0.051	0.112	1240	0.107	0.082	0.314	0.048	0.122	-0.181 (0.857)	-0.875 (0.381)
Interest Coverage Ratio	Negative	477	3.581	4.400	3.861	3.274	6.360	1240	4.123	4.135	3.875	2..803	6.788	-2.599 (0.009)***	0.564 (0.573)

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

6.5.2.3 Post-tax credit refund period (2001-2009)

In the post-tax credit refund period, the evidence in Panel E of Table 6.2 again suggests that DRP firms have a significantly higher Dividend Payout Ratio and Franking Credit Yield. The mean (median) Dividend Payout Ratio for DRP firms is 0.707 (0.728), which is higher, at the 0.01 significance level, than the mean (median) Dividend Payout Ratio for the non-DRP firms of 0.658 (0.667). The mean (median) level of Dividend Yield for the DRP and non-DRP firms is 0.060 (0.051) and 0.059 (0.047) respectively. DRP firms have a higher mean and median level of Dividend Yield, but both the difference in means and medians is not significant. The mean (median) Franking Credit Ratio for the DRP firms is 0.712 (1.000). This is higher (same) than the mean (median) Franking Credit Ratio for the non-DRP firms of 0.711(1.000). The mean (median) Franking Credit Yield for DRP firms is 0.016 (0.015). This is higher than the mean (median) Franking Credit Yield for the non-DRP firms of 0.015 (0.014),at the 0.05 significance level, which supports hypothesis H2that DRP firms pay dividends with a higher franking credit yield as compared to non-DRP firms. The results also provide some support for H1, that firms with a higher dividend payout ratio are more likely to adopt a DRP compared to firms with a lower dividend payout ratio.

The mean (median) Tobin’s Q for DRP firms is 1.258 (0.987), which is higher (lower) than the mean (median) Tobin’s Q for the non-DRP firms of 1.241(1.046). The difference between medians is significant at the 0.01 level under the Wilcoxon test. The evidence does not support H4, that DRP firms have higher growth prospects than non-DRP firms. The statistical evidence based on Wilcoxon z-score shows that non-DRP firms have higher growth than DRP firms.

DRP firms have significantly greater leverage (measured by Debt / Total Assets and Interest Coverage Ratio) compared to non-DRP firms (supporting H5).The mean (median) Debt/Total Assets ratio for DRP firms is 0.157 (0.176). This is higher at the 0.01 significance level than the mean (median) Debt/Total Assets ratio for the non-DRP firms of 0.079 (0.090).

Table 6.2 (Continued)

Panel E: Variables used for Main Tests (Post -tax credit refund period, 2001-2009)

		DRP Firms						Non-DRP Firms							
Variables	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	1766	0.707	0.728	0.264	0.503	1.000	2578	0.658	0.667	0.287	0.435	0.997	5.716 (0.000)***	5.174 (0.000)***
Franking Ratio	Positive	1766	0.712	1.000	0.429	0.227	1.000	2578	0.711	1.000	0.435	0.097	1.000	0.067 (0.946)	0.032 (0.975)
Dividend Yield	Positive	1766	0.060	0.051	0.044	0.036	0.074	2578	0.059	0.047	0.065	0.030	0.069	0.076 (0.940)	5.261 (0.000)
Franking Credit Yield	Positive	1766	0.016	0.015	0.014	0.003	0.023	2578	0.015	0.014	0.013	0.002	0.023	1.987 (0.047)**	2.101 (0.036)**
Tobin's Q	Positive	1766	1.258	0.987	0.999	0.788	1.331	2578	1.241	1.046	0.699	0.771	1.559	0.647 (0.517)	-2.981 (0.003)***
Debt/Total Assets	Positive	1766	0.157	0.176	0.309	-0.011	0.315	2578	0.079	0.090	0.362	-0.085	0.261	7.374 (0.000)***	9.505 (0.000)***
Natural log of Total Assets	Positive	1766	20.093	19.855	2.139	18.574	21.506	2578	19.325	19.060	2.019	17.714	20.679	12.026 (0.000)***	11.637 (0.000)***
Return on Assets	Negative	1766	0.078	0.065	0.090	0.042	0.093	2578	0.093	0.077	0.101	0.048	0.126	-5.082 (0.000)***	-8.645 (0.000)***
Operating Cash Flow/Total Assets	Negative	1766	0.077	0.058	0.156	0.022	0.107	2578	0.105	0.084	0.190	0.037	0.151	-5.111 (0.000)***	-10.325 (0.000)***
Current Ratio	Negative	1766	2.887	1.438	2.633	1.070	2.200	2578	3.060	1.560	2.446	1.110	2.503	-1.401 (0.161)	-3.894 (0.000)***

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

The evidence in Panel F of Table 6.2 shows that the mean (median) level of Interest Coverage Ratio for the DRP and non-DRP firms is 3.612(3.870) and 4.327(4.100) respectively. DRP firms have a significantly higher mean level of Interest Coverage Ratio, with the t-statistic significant at the 0.01 level.

The mean (median) natural logarithm of Total Assets for DRP firms of 20.093 (19.855) is higher than the comparative figures of 19.325 (19.060) for non-DRP firms at the 0.01 level of significance. Panel F of Table 6.2 also shows that the mean (median) level of natural logarithm of Market Capitalization for DRP and non-DRP firms is 19.761 (19.584) and 19.180 (18.935) respectively. DRP firms have a significantly higher mean and median level of natural logarithm of Market Capitalization, with both the t-statistic and Wilcoxon statistic significant at the 0.01 level. The results support H6 that DRP firms are significantly larger in size compared to non-DRP firms.

There is strong evidence to suggest that DRP firms have lower accounting profitability, measured by Return on Assets, than non-DRP firms. The mean (median) Return on Assets for DRP firms is 0.078 (0.065). This is lower than the mean (median) Return on Assets for the non-DRP firms of 0.093 (0.077). The difference between both means and medians is significant at the 0.01 level. The mean (median) Operating Cash Flow/Total Assets for DRP firms is 0.077 (0.058). This is lower than the mean (median) Operating Cash Flow/Total Assets for non-DRP firms of 0.105 (0.084). The difference between means and medians is significant at the 0.01 level. The difference in medians for the Current Ratio is significant at the 0.01 level.

Table 6.2 (Continued)

Panel F: Variables used for Robustness Tests (Post -tax credit refund period, 2001-2009)

		DRP Firms						*Non-DRP Firms*							
Variables	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	1766	19.761	19.584	1.926	18.336	21.057	2578	19.180	18.935	2.083	17.671	20.610	9.294 (0.000)***	9.626 (0.000)***
Return on Assets = EBIT /Total Assets	Negative	1766	0.093	0.074	0.118	0.040	0.118	2578	0.111	0.089	0.125	0.042	0.152	-4.834 (0.000)***	-6.572 (0.000)***
Interest Coverage Ratio	Negative	1766	3.612	3.870	3.145	1.295	5.940	2578	4.327	4.100	4.654	2.715	6.368	-5.635 (0.000)***	-0.729 (0.466)

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Overall, the univariate results in Table 6.2 suggest that firms that adopt DRPs have a higher dividend payout ratio and dividend yield, have higher leverage, and are larger in size and are less profitable than non-DRP firms. There is some evidence to suggest that DRP firms pay dividends with a higher level of attached franking credits compared to non-DRP firms. There is some weak evidence in support of the liquidity hypothesis. There is no strong evidence to support the growth hypothesis.

6.5.3 Multivariate logistic results[73]

The logistic estimates of the regression model for the full sample period between 1995 and 2009 are reported in Table 6.3.[74] Each logistic regression is estimated with the robust, cluster and bootstrap options to correct for standard errors. The marginal effect is also estimated for each model. In models (1a) to (1e) the coefficient on Dividend Payout Ratio is positive and significant at the 0.01 level. The coefficient on Dividend Yield is also positive, as predicted, in models (2a) to (2e). However, the coefficient on Dividend Yield is not significant in any of the models (2a) to (2e). In the robust models (3a) to (3e), the coefficient on Dividend Payout Ratio is again positive and significant at the 0.01 level. The coefficient on Dividend Yield is also positive and significant at the 0.05 level in the robust models (4a) to (4c). Overall, the results support H1, that DRP firms have a higher dividend payout ratio and higher dividend yield than non-DRP firms.

[73] We also estimated the logistic model (Eq. 6.1) with the lagged accounting variables for robustness. The results, not tabulated, are qualitatively the same as reported in Table 6.3.

[74] Prior to the estimation of logistic models, correlations between key variables were tested. There was significant correlation between Franking Ratio and Franking Credit Yield, between Dividend Payout Ratio and Dividend Yield and between Total Assets and Market Capitalization (see Appendix 3). In order to reduce the likelihood of problems with multicollinearity and to ensure robustness, separate regressions were run using these correlated variables.

Table 6.3

Logistic Model Results (Full sample period, 1995-2009)

Model 1: Estimated logistic regression: DRP $\text{Dummy}_{i,t} = \beta_0 + \beta_1$ Dividend Payout $\text{Ratio}_{i,t} + \beta_2$ Average Franking $\text{Ratio}_{i,t} + \beta_3$ Period Dummy + β_4Tobin's $Q_{i,t} + \beta_5$ Debt/Total $\text{Assets}_{i,t} + \beta_6$ Natural log of Total $\text{Assets}_{i,t} + \beta_7$ Return on $\text{Assets}_{i,t} + \beta_8$ Operating Cash Flow / Total $\text{Assets}_{i,t} + \beta_9$ Current $\text{Ratio}_{i,t}$ + Error.

Model 2: Estimated logistic regression: DRP $\text{Dummy}_{,i,t} = \beta_0 + \beta_1$ Dividend $\text{Yield}_{i,t} + \beta_2$ Franking Credit $\text{Yield}_{i,t} + \beta_3$ Period Dummy + β_4Tobin's $Q_{i,t} + \beta_5$ Debt/Total $\text{Assets}_{i,t} + \beta_6$ Natural log of Total $\text{Assets}_{i,t} + \beta_7$ Return on $\text{Assets}_{i,t} + \beta_8$ Operating Cash Flow / Total $\text{Assets}_{i,t} + \beta_9$ Current $\text{Ratio}_{i,t}$ + Error.

Logistic regression results Variable	Expected Sign	(1a) Logistic Coefficient (Sig.)	(1b) Robust Coefficient (Sig.)	(1c) Cluster Coefficient (Sig.)	(1d) Bootstrap Coefficient (Sig.)	(1e) Margin Effect (Sig.)	(2a) Logistic Coefficient (Sig.)	(2b) Robust Coefficient (Sig.)	(2 c) Cluster Coefficient (Sig.)	(2d) Bootstrap Coefficient (Sig.)	(2e) Margin Effect (Sig.)
Constant		-4.607 (0.000)***	-4.607 (0.000)***	-4.607 (0.000)***	-4.607 (0.000)***		-4.682 (0.000)***	-4.682 (0.000)***	-4.682 (0.000)***	-4.682 (0.000)***	
Dividend Payout Ratio	Positive	0.521 (0.000)***	0.521 (0.000)***	0.521 (0.000)***	0.521 (0.000)***	0.114 (0.000)***					
Franking Ratio	Positive	0.225 (0.001)***	0.225 (0.001)***	0.225 (0.001)***	0.225 (0.001)***	0.049 (0.001)***					
Dividend Yield	Positive						0.419 (0.449)	0.419 (0.378)	0.419 (0.378)	0.419 (0.222)	0.092 (0.378)
Franking Credit Yield	Positive						12.669 (0.000)***	12.669 (0.000)***	12.669 (0.000)***	12.669 (0.000)***	2.780 (0.000)***
Period Dummy	Positive	0.527 (0.000)***	0.527 (0.000)***	0.527 (0.000)***	0.527 (0.000)***	0.116 (0.000)***	0.582 (0.000)***	0.582 (0.000)***	0.582 (0.000)***	0.582 (0.000)***	0.128 (0.000)***
Tobin's Q	Positive	0.120 (0.001)***	0.120 (0.001)***	0.120 (0.001)***	0.120 (0.000)***	0.026 (0.000)***	0.163 (0.000)***	0.163 (0.000)***	0.163 (0.000)***	0.163 (0.000)***	0.036 (0.000)***
Debt/Total Assets	Positive	0.432 (0.000)***	0.432 (0.000)***	0.432 (0.000)***	0.432 (0.000)***	0.095 (0.000)***	0.468 (0.000)***	0.468 (0.000)***	0.468 (0.000)***	0.468 (0.000)***	0.103 (0.000)***
Natural log of Total Assets	Positive	0.156 (0.000)***	0.156 (0.000)***	0.156 (0.000)***	0.156 (0.000)***	0.034 (0.000)***	0.170 (0.000)***	0.170 (0.000)***	0.170 (0.000)***	0.170 (0.000)***	0.037 (0.000)***
Return on Assets	Negative	-0.384 (0.152)	-0.384 (0.104)*	-0.384 (0.103)*	-0.384 (0.134)	-0.084 (0.130)	-0.667 (0.028)**	-0.667 (0.012)***	-0.667 (0.012)***	-0.667 (0.043)**	-0.146 (0.012)***
Operating Cash Flow / Total Assets	Negative	-0.836 (0.000)***	-0.836 (0.002)***	-0.836 (0.002)***	-0.836 (0.000)***	-0.184 (0.000)***	-0.851 (0.000)***	-0.851 (0.002)***	-0.851 (0.002)***	-0.851 (0.000)***	-0.187 (0.002)***
Current Ratio	Negative	-0.003 (0.555)	-0.003 (0.553)	-0.003 (0.557)	-0.003 (0.057)*	-0.001 (0.055)*	-0.005 (0.308)	-0.005 (0.301)	-0.005 (0.307)	-0.005 (0.005)***	-0.001 (0.307)
Log likelihood		-3814.211	-3814.211	-3814.211	-3814.211		-3810.478	-3810.478	-3810.478	-3810.478	
Chi-Square		359.900 (0.000)***	315.240 (0.000)***	313.050 (0.000)***	311.093 (0.000)***		367.360 (0.000)***	312.870 (0.000)***	311.350 (0.000)***	317.243 (0.000)***	
Total Number		6061	6061	6061	6061	6061	6061	6061	6061	6061	6061

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Table 6.3 (Continued)

Model 3: Estimated logistic regression: DRP Dummy$_{, i ,t}$ = β_0 + β_1 Dividend Payout Ratio$_{, i, t}$ + β_2 Average Franking Ratio$_{, i, t}$ + β_3 Period Dummy + β_4Tobin's Q$_{, i, t}$ + β_5Interest Coverage Ratio$_{, i ,t}$ + β_6 Natural log of Market Capitalization$_{, i ,t}$ + β_7 Return on Assets-$_{, i ,t}$ +β_8 Operating Cash Flow / Total Assets$_{, i ,t}$ + β_9 Current Ratio$_{, i ,t}$ + Error.

Model 4: Estimated logistic regression: DRP Dummy$_{, i ,t}$ = β_0 + β_1 Dividend Yield$_{, i, t}$ + β_2 Franking Credit Yield$_{, i, t}$ + β_3 Period Dummy + β_4Tobin's Q$_{, i, t}$ +β_5Interest Coverage Ratio$_{, i ,t}$ + β_6 Natural log of Market Capitalization$_{, i ,t}$+ β_7 Return on Assets$_{, i ,t}$ +β_8Operating Cash Flow / Total Assets$_{, i ,t}$ + β_9 Current Ratio$_{, i ,t}$ + Error.

Logistic (Robust regression) results Variable	Expected Sign	(3a) Logistic Coefficient (Sig.)	(3b) Robust Coefficient (Sig.)	(3c) Cluster Coefficient (Sig.)	(3d) Bootstrap Coefficient (Sig.)	(3e) Margin Effect (Sig.)	(4a) Logistic Coefficient (Sig.)	(4b) Robust Coefficient (Sig.)	(4c) Cluster Coefficient (Sig.)	(4d) Bootstrap Coefficient (Sig.)	(4e) Margin Effect (Sig.)
Constant		-4.143 (0.000)***	-4.143 (0.000)***	-4.143 (0.000)***	-4.143 (0.000)***		-4.409 (0.000)***	-4.409 (0.000)***	-4.409 (0.000)***	-4.409 (0.000)***	
Dividend Payout Ratio	Positive	0.582 (0.000)***	0.582 (0.000)***	0.582 (0.000)***	0.582 (0.000)***	0.129 (0.000)***					
Franking Ratio	Positive	0.142 (0.027)**	0.142 (0.029)**	0.142 (0.029)**	0.142 (0.000)***	0.032 (0.000)***					
Dividend Yield	Positive						1.103 (0.038)**	1.103 (0.026)**	1.103 (0.026)**	1.103 (0.147)	0.245 (0.147)
Franking Credit Yield	Positive						11.253 (0.000)***	11.253 (0.000)***	11.253 (0.000)***	11.253 (0.000)***	2.498 (0.000)***
Period Dummy	Positive	0.523 (0.000)***	0.523 (0.000)***	0.523 (0.000)***	0.523 (0.000)***	0.116 (0.000)***	0.563 (0.000)***	0.563 (0.000)***	0.563 (0.000)***	0.563 (0.000)***	0.125 (0.000)***
Tobin's' Q	Positive	0.024 (0.483)	0.024 (0.527)	0.024 (0.526)	0.024 (0.525)	0.005 (0.522)	0.052 (0.141)	0.052 (0.182)	0.052 (0.181)	0.052 (0.342)	0.011 (0.343)
Interest Coverage Ratio	Negative	-0.004 (0.134)	-0.004 (0.124)	-0.004 (0.123)	-0.004 (0.116)	-0.001 (0.118)	-0.002 (0.182)	-0.002 (0.170)	-0.002 (0.168)	-0.002 (0.114)	-0.001 (0.114)
Natural log of Market Capitalization	Positive	0.147 (0.000)***	0.147 (0.000)***	0.147 (0.000)***	0.147 (0.000)***	0.033 (0.000)***	0.171 (0.000)***	0.171 (0.000)***	0.171 (0.000)***	0.171 (0.000)***	0.038 (0.000)***
Return on Assets = EBIT/Total Assets	Negative	-0.111 (0.540)	-0.111 (0.671)	-0.111 (0.671)	-0.111 (0.489)	-0.025 (0.489)	-0.266 (0.213)	-0.266 (0.486)	-0.266 (0.486)	-0.266 (0.345)	-0.059 (0.345)
Operating Cash Flow / Total Assets	Negative	-1.299 (0.000)***	-1.299 (0.000)***	-1.299 (0.000)***	-1.299 (0.004)***	-0.289 (0.003)***	-1.380 (0.000)***	-1.380 (0.000)***	-1.380 (0.000)***	-1.380 (0.000)***	-0.306 (0.000)***
Current Ratio	Negative	-0.005 (0.287)	-0.005 (0.285)	-0.005 (0.292)	-0.005 (0.277)	-0.001 (0.274)	-0.004 (0.486)	-0.004 (0.483)	-0.004 (0.489)	-0.004 (0.156)	-0.001 (0.157)
Log likelihood		-3846.229	-3846.229	-3846.229	-3846.229		-3844.777	-3844.777	-3844.777	-3844.777	
Chi-Square		295.860 (0.000)***	261.950 (0.000)***	260.180 (0.000)***	278.342 (0.000)***		298.760 (0.000)***	258.330 (0.000)***	256.960 (0.000)***	264.678 (0.000)***	
Total Number		6061	6061	6061	6061	6061	6061	6061	6061	6061	6061

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The Period Dummy is significantly positive at the 0.01 level in all models (1a) to (4e). The coefficient on Franking Credit Ratio in models (1a) to (1e) is positive and significant at the 0.01 level. In models (3a) to (3c), the coefficient on Franking Credit Ratio is positive and significant at the 0.05 level, and also positive and highly significant at the 0.01 level in models (3d) and (3e). Similarly, Franking Credit Yield is also positively significant in all models (2a) to (2e) and (4a) to (4e). These results support H2, that DRP firms pay dividends with a higher franking ratio and higher franking credit yield than non-DRP firms. Consistent with our hypothesis H3 on the impact of the July 2000 tax reform, we find more firms adopt a DRP in the post-tax refund reform period.

Overall, the multivariate logistic regression analysis supports hypotheses H1, H2 and H3. The evidence is consistent that with the tax incentives, particularly in the post-July 2000 tax reform period, firms distribute maximum franking credits to shareholders and at the same time adopt a DRP to retain funds within the firm. The results are consistent with the evidence of Bellamy (1994) in the Australian market, that firms use DRPs and increase their payout ratios to ensure that imputation credits are passed on to shareholders.

Of the non-tax related variables, the coefficient on Tobin's Q is positive and significant at the 0.01 level or better in models (1a) to (1e) and in models (2a) to (2e). However, the coefficient on Tobin's Q is positive but not significant in all of the robust regressions (3a) to (3e) and (4a) to (4e). The evidence generally supports H4, that growth firms are more likely to offer DRPs than firms with low growth.

The coefficient on leverage (Debt/Total Assets) is also positive and significant in all the main models (1a) to (1e) and (2a) to (2e) at the 0.01 level. The coefficient on the alternative proxy for leverage, Interest Coverage Ratio, is negative as predicted but not significant in any of the robust regressions (3a) to (4e). The evidence weakly supports H5, that firms with high leverage adopt a DRP to ensure the firm retains sufficient cash flow to minimize financial costs and avoid the need to cut the dividend per share payment.

The coefficient on the variable proxying for size (natural logarithm of Total Assets and natural logarithm of Market Capitalization) is highly significant at the 0.01 level in all regression models presented in Table 6.3. The evidence is consistent with H6, that large firms are more likely to implement a DRP than small firms due to relative transaction costs.

The coefficient on Return on Assets is negative as predicted in models (1a) to (1e). In models (2b), (2c) and (2e), the coefficient on Return on Assets is negative and significant at the 0.01 level. However, in models (2a) and (2d), the Return on Assets coefficient is negative as predicted and significant only at the 0.05 level. When models (1) and (2) are estimated with the alternative proxy for profitability, EBIT/Total Assets, the coefficient is negative and not significant in all the robust regressions (3a) to (4e). However, the coefficient on Operating Cash Flow/Total Assets is negative and significant at the 0.01 level in all models (1a) to (4e). The evidence supportsH7, that firms with low profitability are more likely to adopt a DRP compared to firms with high profitability.

The results in Table 6.3provide some support for H8,that firms with low liquidity are more likely to adopt a DRP than firms with high liquidity. The coefficient on Current Ratio is negative and highly significant at the 0.01 level in model (2d) and significant at the 0.10 level in models (1d) and (1e). In all the other models, the coefficient on Current Ratio is negative as predicted but not significant. The Chi-Square in all models is significant at 0.01 level showing a higher explanatory power for the estimated models.

6.5.4 Multivariate panel logistic results[75]

Table 6.4 presents the results of the panel logistic estimates (random effects and fixed effects models) for the full sample period. The coefficient on Dividend Payout Ratio is positive and

[75]In multivariate panel logistic models, time effects (year) and firm effects (ASX Code) are controlled for.

highly significant at the 0.01 level in fixed effects models (1) and (3) and also in random effects models (1) and (3). The coefficient for Dividend Yield is positive as predicted in all models, however, it is significant only in fixed effects model (4) and random effects model (4) at the 0.10 level. The coefficient on Franking Ratio is positive and significant at 0.01 level in fixed effects model (1) and random effects model (1) and significant at the 0.05 level in fixed effects model (3) and random effects model (3). The coefficient on the variable Franking Credit Yield is positive and highly significant at the 0.01 level in all fixed and random effects models. The results support H1 and H2, that the DRP firms are likely to pay dividends with higher franking credits than the non-DRP firms.

The coefficient on Period Dummy is positive and significant at the 0.01 level in all fixed effects and random effects models (1) to (4). This evidence strongly supports H3, that firms are more likely to adopt a DRP in the post-tax credit refund period(2001-2009) than in the pre-tax credit refund period (1995-2000).The results show that the proxy for growth (Tobin's Q) is positively significant at the 0.01 level in fixed effects models (1) and (2) and in random effects models (1) and (2). In other models, the coefficient on Tobin's Q is positive as hypothesized but not significant.

The proxy for leverage, Debt/Total Assets, is positively significant at the 0.01 level in all fixed effects and random effects models. However, the alternative proxy for leverage, Interest Coverage Ratio, is negative as predicted but not significant in all models. The proxies for size, natural logarithm of Total Assets and natural logarithm of Market Capitalization, are positively significant at the 0.01 level in all fixed effects and random effects models, which supports H6. The coefficient on Return on Assets is significant at the 0.05 level in fixed effects model (2) and in random effects model (2). In fixed effects model (1), the Return on Assets coefficient is negatively significant at the 0.10 level. The coefficient on Return on Assets (EBIT/Total Assets) is negative but not significant in all models.

Table 6.4
Panel (logistic) model (Full sample period, 1995-2009) results

Full sample period (1995-2009) Variable	Expected Sign	(1) Fixed Effects Coefficient (Sig.)	(2) Fixed Effects Coefficient (Sig.)	(3) Fixed Effects Coefficient (Sig.)	(4) Fixed Effects Coefficient (Sig.)	(1) Random Effects Coefficient (Sig.)	(2) Random Effects Coefficient (Sig.)	(3) Random Effects Coefficient (Sig.)	(4) Random Effects Coefficient (Sig.)
Constant						-4.603 (0.000)***	-4.666 (0.000)***	-4.151 (0.000)***	-4.391 (0.000)***
Dividend Payout Ratio	Positive	0.522 (0.000)***		0.580 (0.000)***		0.524 (0.000)***		0.583 (0.000)***	
Franking Ratio	Positive	0.233 (0.000)***		0.154 (0.017)**		0.231 (0.000)***		0.150 (0.020)**	
Dividend Yield	Positive		0.236 (0.677)		0.869 (0.108)*		0.300 (0.594)		0.945 (0.080)*
Franking Credit Yield	Positive		12.999 (0.000)***		11.515 (0.000)***		12.871 (0.000)***		11.403 (0.000)***
Period Dummy	Positive	0.025 (0.000)***	0.065 (0.000)***	0.034 (0.000)***	0.016 (0.000)***	0.555 (0.000)***	0.615 (0.000)***	0.551 (0.000)***	0.596 (0.000)***
Tobin's' Q	Positive	0.114 (0.001)***	0.155 (0.000)***	0.023 (0.511)	0.048 (0.172)	0.116 (0.001)***	0.158 (0.000)***	0.024 (0.491)	0.050 (0.157)
Natural log of Total Assets	Positive	0.153 (0.000)***	0.167 (0.000)***			0.155 (0.000)***	0.168 (0.000)***		
Natural log of Market Cap.	Positive			0.144 (0.000)***	0.167 (0.000)***			0.145 (0.000)***	0.169 (0.000)***
Debt/Total Assets	Positive	0.412 (0.000)***	0.451 (0.000)***			0.420 (0.000)***	0.458 (0.000)***		
Interest Coverage Ratio	Negative			-0.003 (0.154)	-0.002 (0.207)			-0.001 (0.145)	-0.005 (0.196)
Return on Assets	Negative	-0.447 (0.100)*	-0.735 (0.018)**			-0.426 (0.115)	-0.715 (0.021)**		
Return on Assets = EBIT/Total Assets	Negative			-0.147 (0.431)	-0.306 (0.159)			-0.134 (0.468)	-0.292 (0.178)
Operating Cash Flow / Total Assets	Negative	-0.846 (0.000)***	-0.857 (0.000)***	-1.313 (0.000)***	-1.386 (0.000)***	-0.844 (0.000)***	-0.857 (0.000)***	-1.312 (0.000)***	-1.388 (0.000)***
Current Ratio	Negative	-0.002 (0.746)	-0.004 (0.443)	-0.007 (0.200)	-0.005 (0.368)	-0.002 (0.681)	-0.004 (0.394)	-0.006 (0.224)	-0.004 (0.403)
Log likelihood		-3746.014	-3742.297	-3776.719	-3775.858	-3809.424	-3805.909	-3840.567	-3821.450
Chi-Square		263.650 (0.000)***	271.080 (0.000)***	202.240 (0.000)***	203.960 (0.000)***	275.920 (0.000)***	277.650 (0.000)***	218.050 (0.000)***	228.020 (0.000)***
Total Number		6061	6061	6061	6061	6061	6061	6061	6061

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Notes for Table 6.4:

1) Random effect models are used if the levels of the independent variables are thought to be a small subset of all possible values. The random effect model compares the variance of means across the levels of a random factor. In fixed effect model, we make explicit comparison of one level against another. Prior studies have recommended the estimation of both the fixed effects and random effects models (Clarke, et al., 2010). .
2) STATA'.s random effects estimator is a weighted average of fixed effect and between-effects. A random effects model gives more efficient estimators than fixed effects models.

The coefficient on Operating Cash Flow/Total Assets, the proxy for cash flow profitability, is significantly negative in all random effects and fixed effects models. Thus, there is support for H7, that DRP firms are likely to have lower profitability than non-DRP firms. The coefficient on Current Ratio is negative but not significant, showing no strong support for liquidity hypothesis (H8).

6.5.5 2SLS logistic results[76]

A 2SLS logistic model is used to test whether there is any endogeneity between the dividend payout ratio/dividend yield and the decision to adopt the DRP. The 2SLS logistic model estimates for the full sample period are presented in Table 6.5. The models (1a) to (4d) seek to control for any endogeneity between the decision to adopt a DRP and the distribution of dividend payouts. In models (1a) to (1d) and (3a) to (3d), the coefficient on the predicted value of Dividend Payout Ratio is positive and significant at the 0.01 level. Similarly, in models (2a) to (2d) and (4a) to (4d), Dividend Yield is significant and positive at the 0.01 level. These results again support H1 that DRP firms have higher dividend payout ratios and higher dividend yields than dividend paying non-DRP firms. In all models (1a) to (4d), the size variable (natural log of Total Assets and natural log of Market Capitalization) is positive and significant at the 0.01 level. The results support H6, that larger firms are more likely to adopt a DRP than smaller firms.

[76]To mitigate the problem of correlation between the independent variable and the error term, we estimate a 2SLS model (Instrumental variable procedure) for robustness.

Table 6.5

2 SLS Logistic Model Results (Full sample period, 1995-2009)

Model 1: Estimated 2SLS logistic regression: DRP Dummy$_{i,t}$= β0 + β1Dividend Payout Ratio (predicted value)$_{i,t}$ + β2 Natural log of Total Assets$_{i,t}$+ Error.

Model 2: Estimated 2SLS logistic regression: DRP Dummy$_{i,t}$= β0 + β1Dividend Yield (predicted value)$_{i,t}$ + β2 Natural log of Total Assets$_{i,t}$ + Error.

Full sample period (1995-2009)		(1a) Logistic	(1b) Robust	(1c) Cluster	(1d) Bootstrap	(2a) Logistic	(2b) Robust	(2c) Cluster	(2d) Bootstrap
Variable	Expected Sign	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)
Constant		-1.132 (0.000)***	-1.132 (0.000)***	-1.132 (0.000)***	-1.132 (0.000)***	-0.972 (0.000)***	-0.972 (0.000)***	-0.972 (0.000)***	-0.972 (0.000)***
Dividend Payout Ratio (predicted value)	Positive	1.180 (0.000)***	1.180 (0.000)***	1.180 (0.000)***	1.180 (0.000)***				
Dividend Yield (predicted value)	Positive					3.621 (0.000)***	3.621 (0.000)***	3.621 (0.000)***	3.621 (0.000)***
Natural logarithm of Total Assets	Positive	0.035 (0.000)***	0.035 (0.000)***	0.035 (0.000)***	0.035 (0.000)***	0.057 (0.000)***	0.057 (0.000)***	0.057 (0.000)***	0.057 (0.000)***
Chi-Square		250.130 (0.000)***	276.120 (0.000)***	273.630 (0.000)***	199.710 (0.000)***	286.490 (0.000)***	271.060 (0.000)***	269.380 (0.000)***	1123.530 (0.000)***
Total Number		6061	6061	6061	6061	6061	6061	6061	6061

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. Endogenous variable: Dividend Payout Ratio (Instrument variables: Period Dummy, Franking Ratio, Tobin's Q, Debt/Total Assets, Return on Assets, Operating Cash Flow/Total Assets and Current Ratio).Endogenous variable: Dividend Yield (Instrument variables: Period Dummy, Franking Credit Yield, Tobin's Q, Debt/Total Assets, Return on Assets, Operating Cash Flow/Total Assets and Current Ratio).

Table 6.5 (Continued)

Model 3: Estimated 2SLS logistic regression: DRP Dummy$_{,\ i,\ t}$= β_0 + β_1Dividend Payout Ratio (predicted value)$_{i,\ t}$ + β_2Natural log of Market Capitalization$_{i\ ,t}$+ Error.
Model 4: Estimated 2SLS logistic regression: DRP Dummy$_{i,\ t}$= β_0 + β_1Dividend Yield (predicted value)$_{i,\ t}$ + β_2Natural log of Market Capitalization$_{i\ ,t}$ + Error.

Full sample period (1995-2009)		(3a) Logistic	(3b) Robust	(3c) Cluster	(3d) Bootstrap	(4a) Logistic	(4b) Robust	(4c) Cluster	(4d) Bootstrap
Variable	Expected Sign	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)
Constant		-1.051 (0.000)***	-1.051 (0.000)***	-1.051 (0.000)***	-1.051 (0.000)***	-1.265 (0.000)***	-1.265 (0.000)***	-1.265 (0.000)***	-1.265 (0.000)***
Dividend Payout Ratio (predicted value)	Positive	1.460 (0.000)***	1.460 (0.000)***	1.460 (0.000)***	1.460 (0.000)***				
Dividend Yield (predicted value)	Positive					5.845 (0.000)***	5.845 (0.000)***	5.845 (0.000)***	5.845 (0.000)***
Natural log of Market Capitalization	Positive	0.022 (0.000)***	0.022 (0.000)***	0.022 (0.000)***	0.022 (0.000)***	0.066 (0.000)***	0.066 (0.000)***	0.066 (0.000)***	0.066 (0.000)***
Chi-Square		155.470 (0.000)***	145.670 (0.000)***	144.710 (0.000)***	642.310 (0.000)***	162.180 (0.000)***	108.210 (0.000)***	107.950 (0.000)***	81.190 (0.000)***
Total Number		6061	6061	6061	6061	6061	6061	6061	6061

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. Endogenous variable: Dividend Payout Ratio (Instrument variables: Period Dummy, Franking Ratio, Tobin's Q, Debt/Total Assets, Return on Assets, Operating Cash Flow/Total Assets and Current Ratio).Endogenous variable: Dividend Yield(Instrument variables: Period Dummy, Franking Credit Yield, Tobin's Q, Debt/Total Assets, Return on Assets, Operating Cash Flow/Total Assets and Current Ratio).

6.6 Conclusion

This chapter investigates the determinants of a firm's decision to adopt a DRP in the Australian market. DRPs allow shareholders to reinvest their dividends back into the firm with minimal or no transaction costs and they also enable the firm to maintain a high dividend payout while retaining funds within the firm.

The Australian market provides a unique institutional environment to study a firm's decision to implement a DRP. The introduction of a dividend imputation system on 1 July 1987 reduced the tax advantages of debt financing and provided incentives for a firm to distribute dividends to the maximum level of allowable franking credits. Our sample period between 1995 and 2009 is subsequent to the introduction of the dividend imputation but spans the period of significant reforms in July 2000 to corporate and personal taxation of equity income in Australia. This reform introduced tax legislation that allowed tax resident investors to claim back or redeem surplus franking credits from the Australian Taxation Office.

Overall this chapter provides empirical results that support the role of taxation on dividends and capital gains from equity returns in determining a firm's decision to adopt a DRP. Consistent with tax-based arguments for Australian firms, we find evidence that firms adopting a DRP had a higher dividend payout ratio and a higher franking credit ratio than non-DRP firms. Firms were also more likely to adopt a DRP subsequent to the July 2000 tax reforms. In our multivariate analysis there was evidence that DRP firms paid dividends with higher levels of franking credits, particularly in the post-tax 2000 reform period. Consistent with theoretical predictions, our results also suggest that DRP firms, when compared to non-DRP firms, (i) had significantly greater leverage, (ii) were significantly larger in size, (iii) had lower profitability, and(iv) were less liquid.

CHAPTER SEVEN
CHARACTERISTICS OF FIRMS THAT HAVE AN UNDERWRITTEN DRP

7.1 Introduction

This chapter examines the determinants of a firm's decision to underwrite a dividend reinvestment plan (DRP). An underwritten dividend reinvestment plan (UDRP)[77] is a DRP in which the underwriter guarantees a set participation rate, that is, the underwriter offers to purchase sufficient shares at the issue price to reach the guaranteed participation level.[78] UDRPs enable firms to increase and maintain a high dividend payout without depleting capital reserves. With an UDRP, a shareholder opting not to participate in the DRP will still receive their dividends in cash. However, in the event shareholders in aggregate do not choose to reinvest cash dividends in new shares at a minimum target level, new shares, equivalent to the value of that dividend, will be issued by the company to the underwriter.[79]Thus, the underwriter for a fully underwritten DRP guarantees the firm that it can issue a minimum number of new shares to ensure the company retains the desired level of profits.

The remainder of the chapter is organized as follows. Section 7.2 explains the motivations for undertaking this study. Section 7.3 provides a brief overview of the relevant literature, and

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[77]For example, assume that a shareholder holds 50 out of a total of 100 shares in a company and this shareholder is the only shareholder who opts to receive shares instead of a cash dividend under the DRP. In this case the participation rate is 50 per cent. If the underwriter guarantees participation of 70 per cent, then the underwriter would have to purchase the amount of shares equal to the dividend reinvestment amount on that 20 per cent of the outstanding shares. Suppose the dividend is five cents per share and the issue price under the DRP is 50 cents. The shareholder invests his/her $2.50 dividend (50 shares* 5 cents) into 5 shares ($2.50 /$0.50). However, the participation is only 50 percent (50 shares held by the shareholder / 100 total numbers of shares). The underwriter guarantees 70 percent participation rate. So, the underwriter must buy the amount of shares under the DRP 20 shares (70-50). Thus the underwriter will buy two additional shares at $1.00 (20 shares* 5 cents per share).

[78]A number of companies including ANZ, Westpac, Bank of Queensland and Billabong International have issued UDRPs to augment capital reserves and retain a minimum level of cash profits.

[79] Bank of Queensland Limited (BOQ) in its November 2008 DRP announcement stated that BOQ entered into an agreement with Macquarie Capital Advisers Limited to underwrite BOQ's Dividend Reinvestment Plan (DRP) in respect of the 2008 Final Dividend. The shareholder could then opt to receive some cash dividends and also increase his/her shareholding by participation in BOQ's UDRP.

Section 7.4 discusses the legal requirements of a UDRP. This is followed by the hypothesis development in section 7.5. Section 7.6 describes the data and sample period of our study. The methodology we employ in our empirical tests is outlined in section 7.7. Section 7.8 presents the summary statistics and empirical results, and Section 7.9 concludes this chapter.

7.2 Motivations for study

The study of DRP underwriting is motivated by several characteristics that are unique to the Australian market setting. First, underwritten DRPs are a common feature in the Australian market and underwriters play an important role in guaranteeing a set participation rate to ensure the firm retains a minimum level of funds. As far as we are aware, the factors that explain the decision to underwrite a DRP have not been examined in the Australian market.[80]

Second, in the case of IPOs, the underwriting fee model is motivated by several institutional and firm characteristics unique to the Australian market setting. Australian firms that seek to implement a DRP will, therefore, be interested in the firm characteristics associated with the underwriting of a DRP. The benefit of an underwriter to the firm is the guarantee of a minimum participation rate so that the firm will know the level of funds that will be retained within the firm in respect of each dividend where the DRP is underwritten. Unlike the situation in the US, underwriting fees in Australia vary across issue size and over time. Although there is a clustering of fees at 3 to 5%, the underwriting fee is not fixed at one particular percentage. Underwriting and brokerage fees constitute about 75% of total cost, excluding underpricing.[81] The Australian underwriting fees consist of the underwriting fee, the management fee and the handling fee. The management fee compensates the lead underwriter mainly for its advisory role in managing the issue, and the handling fee provides a means of compensating the ASX for bearing their stamps or other acceptable identifications. These three fees are separately quoted

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[80] In Chapter 2 we show that DRPs are a significant source of new funds in the Australian market.

[81] Submission to the Committee of Inquiry into the Australian Financial System, 1979, 1981, Australian Merchants Bankers Association.

on a per share basis. Since all issues may not be fully underwritten, the underwriting fee is therefore defined as the dollar underwriting fee per underwritten share as a percentage of the offer price.

Third, in Australia, underwriting services[82] are typically provided by brokerage firms and investment banks and, to a lesser extent, commercial banks and life and general insurance companies. In the US, investment banks are the major providers of underwriting services in the IPO market.

Fourth, another aspect where the Australian capital market is different from that in the US is its legal environment. Anderson et al. (1993) note that Australia has a much less litigious environment than the US. Relative to the US, the availability of a class action to challenge the underwriter in Australia is much more restrictive (Law and Cullum, 1999). The fact that litigants in Australia must launch and fund their own actions further deters shareholders from bringing a lawsuit against the underwriter.

Though some of these institutional characteristics pertain to IPO underwriting, they may be also equally applicable to DRP underwriting. Furthermore, the study by How and Yeo (2000) provides evidence that underwriting services in Australia are priced to compensate underwriters for the cost of underwriting and the risk of suffering capital loss-a feature that is unique in standby underwriting agreements. In this context, a study of the characteristics of firms that have an underwritten DRP may add further insights into the firm specific variables that may impact the underwriting process in the Australian capital market. Unlike the study of How and Yeo (2000), which covers a period between 1980 and 1996 for the industrial IPO market, our

[82]Australian underwritings are on a standby agreement basis. The underwriting services in Australia are priced to compensate underwriters for the cost of underwriting and the risk of suffering capital loss. This is a typical feature of a standby underwriting agreement. Because of the standby agreement, issuers (of IPOs) in Australia do not receive the proceeds upfront (from the underwriter) but rather at the close of subscription. Under the standby agreement, underwriters in Australia are liable to meet the shortfall in demand by purchasing the unsubscribed shares at the offer price. In Australia, the offer price and issue size are often set about 2 months prior to the issue date. In contrast, in the US, the offer terms are set at the pricing meeting the day prior to the issue.

study examines the characteristics of Australian firms that have an underwritten DRP for the period between 1995 and 2009, spread over all industry sectors.

7.3 Brief overview of the literature

Most prior studies in the literature have examined the determinants of the level of underwriting fees. In a recent study on underwriting fees in the Korean market, Ahn, Kim and Son (2007) suggest that the underwriter's fee is influenced by the offer size, firm profitability, offer price and the capital gains that form a portion of the underwriter's income. In the context of IPOs, Ahn et al. (2007) provide evidence that IPO offer size is an important determinant of underwriting fees. They also surmise that underwriters charge lower fees for firms that offer IPOs during a hot issue market period, more profitable issuing firms pay lower underwriting fees, corporate governance influences the underwriting fees and the longer the subscription period the higher the underwriting fee (implying the influence of market demand on underwriting fees).

Pugel and White (1988) examine the determinants of underwriting fees in the US market using firm-commitment basis IPOs that were listed in the first six months of 1981. They find that various proxies for underwriting cost and issuer specific risk explain a significant fraction of variance in underwriting fees. The two proxies for underwriting cost that they examine are the offer size and the complexity of the issue. For a given dollar amount of the underwriting fee, the larger the number of securities offered, the smaller the proportion of underwriting fee per share. They also find that the negotiation process between the issuer and the underwriter for a complex issue is likely to be longer so that the complexity of the issue is likely to be taken into account when determining the underwriting fee.

Booth and Smith (1986), Smith (1986), and Benveniste and Spindt (1989) argue that as prestigious underwriters tend to bring more reputational assets to the issuance process, they should be compensated more. Similarly, Gilson, Kraakman (1984) and Tinic (1988) state that prestigious underwriters tend to charge a higher fee from issuers in order to maintain their reputational capital.

James (1992) examines the pricing of underwriting services in the context of a long term relationship between the underwriter and the issuer in the US market. He proposes that the underwriter must first acquire relationship-specific information in setting the issue price. This process often involves costly set-up expenses. The capitalization of these expenses results in relation-specific assets, which are neither transferable nor marketable. Ang and Zang (2006) also emphasize the impact of underwriting relationships on underwriting fees.

Jain and Kini (1999) conjecture that firms with higher retained ownership have less agency problems. They find a negative relationship between the underwriting fees and ownership in the US market and suggest that underwriters charge higher fees for firms with more agency problems.

A study by How and Yeo (2000) also finds that Australian underwriters systematically priced their services based on firm–specific variables. How and Yeo (2000) investigate underwriting fees in Australia for a sample of 282 industrial IPOs issued from 1980 to 1996 and provide evidence of an average underwriting fee of 3.7%.They show that the underwriters price their services based upon underwriting costs, offer size, the subscription period of the issue, the retained ownership after the IPO, the offer price, and whether underwriters receive overallotment options as part of their compensation.[83]

Unlike the study of How and Yeo (2000), which covers a period between 1980 and 1996 for the industrial IPO market, our study examines the characteristics of Australian firms that have an underwritten DRP for the period between 1995 and 2009 spread over all industry sectors.

[83] The study by How and Yeo (2000) provides the following conclusions (i) underwriters in Australia do not fix or collude in setting underwriting fees, (ii) underwriting services in Australia are priced to compensate underwriters for bearing the cost and the risk of suffering capital loss in the event of under-subscription (a feature that is unique in standby underwriting agreements), (iii) Australian underwriting fees vary across issue size and over time, and (iv) firms with a longer subscription period for their offer pay significantly higher fees, reflecting the possible risk of underwriting an IPO with low expected demand.

7.4 Legal requirements of an UDRP

UDRPs enjoy a number of special exemptions under the Australian regulatory framework. First, UDRPs enable companies to issue new capital without the requirement for a prospectus (section708 (13) of the Corporations Act 2001). Second, large shareholders can participate in UDRPs notwithstanding that the additional shares they receive may breach the takeovers provisions (section 611 Item 11 of the Corporations Act 2001). This exemption applies provided the plan is available to all shareholders resident in Australia (foreign shareholders do not have to be included in the plan for the exemption to apply). A recent initiative taken by ASIC (Australian Securities and Investment Commission) has been to exempt underwriters from a breach of the takeover provisions if they acquire 20% or more of a company's shares due to their underwriting commitment under an UDRP (ASIC Consultation Paper 105 issued 24 February 2005). Third, as a general rule, listed companies are not allowed to issue more than 15% of their ordinary shares in any 12 month period, and they are prohibited from issuing capital to related parties without shareholder approval (ASX Listing Rules 7.1 and 10.11). UDRPs are exempt from these rules, subject to the proviso that the offer is made to all shareholders.[84]

7.5 Hypothesis Development

This section develops hypotheses to empirically test the characteristics of firms with a UDRP. Theories that may explain reasons why firms underwrite DRPs are broadly classified into (i) signalling and taxation, (ii) growth, (iii) firm size, (iv) financial distress and agency costs, and (v) discount on the market price of the new shares issued under the DRP.

[84] Exception to the listing rule 7.1 is applicable to UDRPs if an issue under an underwriting agreement to an underwriter is a pro-rata issue to holders of ordinary securities and if the underwriter receives the securities within 15 business days after the close of the offer. In our underwriting sample there are only 10 UDRP observations out of a total of 405 UDRP observations using special dividends. Further, out of the 10 UDRP observations using special dividends, none of them have issued more than 15% of their ordinary shares in any 12 months period. Therefore the practical/economic benefits arising from UDRPs enjoying the exception to the listing rule 7.1 is nil.

7.5.1 Signalling and taxation

The use of an UDRP reduces the likelihood of a need to reduce cash dividends and negative adverse signalling costs. Lintner (1956) argues that a long-lasting shift in net income does not translate into an immediate proportional shift in dividends; instead, dividends adapt gradually. Lintner’s (1956) contention that managers are reluctant to reduce dividends[85] is supported by empirical evidence. Charitou, Lambertides and Theodoulou (2011) document that market reaction to dividend reductions for firms with long patterns of relatively stable past earnings and dividend payouts is significantly negative. They argue that dividend cuts are perceived as an indication that earnings difficulties will persist in the future. Studies that examine dividend smoothing (Kumar, 1988; Allen, Bernardo &Welch, 2000) also posit that a firm’s dividends are more stable than a firm’s performance and prospects.

The tax based arguments for underwriting a DRP are as follows. First, the Australian dividend imputation system reduces the tax advantages of capital gains over dividends and creates an incentive for firms to distribute franked dividends. If a company retains funds for internal use instead of paying franked dividends and the retained earnings are translated into share prices, then shareholders will be taxed on the resultant capital gains when they are realized (assuming the shares were purchased after 19 September 1985).Dividend imputation is likely to reduce the taxation of equity returns for resident taxed investors and provide incentives for investors to place greater emphasis on dividend income in their investment decisions. A high dividend payout is particularly attractive to Australian tax resident shareholders where the franking credits attached to the dividend exceed their personal tax liability on dividend income.[86]

[85] This is because firms tend to smooth dividends (Lintner.1956). Managers are reluctant to cut (raise) dividends immediately following a decrease (increase) in earnings. Therefore, dividend changes appear to lag behind changes in earnings by a number of periods. Subsequent empirical work confirms Lintner's findings (e.g., Fama and Babiak, 1968).

[86]Underwritten DRPs enable firms to increase dividend payouts with attached imputation credits and retain cash within the firm. A study by Allen et al. (2000) supports these arguments on dividend clientele impact. They conclude that institutional investors are relatively less taxed than individual investors and that this induces the dividend clientele effect.

Second, Howard and Brown (1992) argue that where imputation credits are valued by investors, firms should seek to adopt a policy of paying the maximum franked dividends to maximize the price of the firms' shares or the wealth of its shareholders. Accordingly, firms that undertake a commitment to make high dividend payouts to maximize shareholder wealth but who also require retained earnings to fund growth or repay debt have incentives to opt for an UDRP.

We posit the likelihood of firms with high payouts underwriting a DRP to enable the firm to increase and maintain high dividend payouts. Underwriting a DRP also reduces the likelihood that the firm with a high dividend payout ratio will need to reduce dividends if the majority of existing shareholders elect to receive cash dividends and not participate in the DRP. We hypothesize:

H1: Firms that have a high dividend payout (dividend yield) are more likely to underwrite a DRP.

Murray and Skully (2003) postulate that shareholders become more concerned about share liquidity when subscribing to a DRP because they must pay tax on the reinvested dividends that do not provide them with cash inflow. However, under the tax imputation system, franking credits at least partially offset the tax liability for Australian taxpaying residents and, therefore, ease liquidity pressures and the need to pay any tax from alternative cash resources. Thus, the taxpaying domestic investors and superannuation funds have less need for cash to fund their tax liabilities and are more likely to participate in the DRP. This means that shareholder participation should be positively associated with the level of franking credits attached to dividends and there is less need for the firm to engage the services of an underwriter. Thus, we predict that firms with higher a franking credit ratio, ceteris paribus, are less likely to underwrite a DRP than firms with a lower franking credit ratio. We hypothesize that:

H2: Firms with a high dividend franking ratio (franking credit yield) are less likely to underwrite a DRP.

We also posit that the 2000 tax reform has prompted firms to increase their dividend payouts and, hence, they are more likely to underwrite the DRP. Therefore, we posit that, ceteris paribus, firms are more likely to underwrite a DRP in the post-tax credit refund period than in the pre-tax credit refund period (1995-2000).[87] We hypothesize:

H3: Firms are more likely to underwrite a DRP in the post-tax credit refund period (2001-2009) than in the pre-tax credit refund period (1995-2000).

7.5.2 Growth

The growth based arguments for underwriting a DRP are as follows. Smith and Watts (1992), Glen et al. (1995) and Naceur et al. (2005) argue that investment opportunities have a negative relationship with dividend payouts. Higgins (1972) also posits that the dividend payout ratio is negatively related to a firm's need for funds to finance growth opportunities. In an imputation system, however, the optimal dividend policy from a taxation perspective is to increase the dividend payout where dividends have attached franking credits. Thus, the likelihood of adopting a UDRP rises with growth opportunities, that is, firms with higher growth potential will underwrite their DRPs to preserve cash and pursue their growth opportunities. These firms have more positive net present value projects and wish to maintain a minimum level of scarce cash.

When Graham and Harvey (2001) surveyed the evidence drawn from responses by 392 US CFOs about the firm's capital budgeting decisions, they found that firms issue debt or equity when internal funds are insufficient to fund growth opportunities. A new equity issue sends the worst signal since it suggests that the firm cannot afford the project without external finance. However, the modified Finnerty model (see Chapter5) shows that DRP financed equity may be

[87].The argument is that the 2000 tax reform has prompted firms to increase their dividend payouts and hence they are more likely to underwrite their DRPs. This argument may be based on the following: (i) growth firms require funds for reinvestment, (ii) when there is an increase in dividend payout, dividends per share increases relative to EPS and managers are reluctant to cut dividends (Lintener, 1956), and (iii) UDRPs enable managers to avoid dividend cuts and a negative market reaction.

relatively cheaper than retention financed equity and new stock financed equity depending on investor tax rates and the valuation of imputation credits. UDRPs may enable firms to avoid the need for a new equity issue.

In summary, we posit that under Australia's dividend imputation tax environment, firms with high growth opportunities have greater incentives to underwrite a DRP to ensure access to new equity capital. Thus, we hypothesize:

H4: Growth firms are more likely to underwrite a DRP than non-growth firms.

7.5.3 Size

An underwriter who must subscribe for any shortfall in the issue of new shares under the DRP will then typically sell such stocks acquired under the DRP. The underwriter, therefore, faces a liquidity risk, which may force the underwriter to accept a discounted price on sale. Thus, an underwriter will prefer to underwrite the DRP of a firm with more liquid stock. Butler, Grullon and Weston (2005) show that underwriters charge higher investment banking fees when the firm's stock is less liquid.[88]

From a cost perspective, the underwriter will prefer to underwrite the DRP of a firm on which it already has information. This reduces the underwriter's research costs. Underwriters are more likely to have an existing business relationship with large firms. Moreover, from a revenue perspective, the underwriter may prefer firms than can afford higher underwriting commissions and give a greater volume of transactions.

Large firms are likely to meet these criteria of liquidity, cost reduction and revenue enhancement. The stock of large firms is typically more actively traded, reducing liquidity risk. Analysts and brokerage houses tend to give greater coverage of large firms, which reduces research costs for any further dealings. Large firms can also afford higher underwriting

[88] This represents a risk premium for liquidity risk (Chalk &Peavy, 1987).

commissions, engage in more capital market transactions, offer new business opportunities and strengthen the existing business relationship with the underwriter.[89]

Lastly, the underwriter's fee is the compensation paid to the underwriter for selling the firm's security issue, as a percent of the capital raised. Prior studies show that there are economies of scale in the issuance of new securities, and the empirical evidence shows that larger issues have lower relative fees than smaller issues (Smith, 1977; Booth & Smith 1986; Eckbo & Masulis, 1992). This is because issues by larger firms have lower monitoring, certification and marketing costs per dollar of new capital raised than small firms. These findings are consistent with predictions that underwriters prefer to underwrite the DRPs of large firms due to economies of scale.

Thus, we predict, ceteris paribus, that large firms are more likely to underwrite a DRP than small firms due to economies of scale and lower relative costs. We hypothesize that:

H5: Large firms are more likely to underwrite their DRP than small firms.

7.5.4 Financial distress and agency costs

As previously noted, Lintner (1956) argues that firms are reluctant to cut dividends given the adverse signal on the firm's future earnings prospects. Managers of the firm, therefore, will seek to underwrite their DRPs to preserve cash when facing financial constraints. This suggests that the likelihood of adopting a UDRP will increase if the firm is facing financial distress or a cash shortage.

Lasfer (1997a, 1997b) also examines why firms issue scrip dividends[90] instead of cash dividends and proposes the cash shortage (financial distress) hypothesis. The cash shortage hypothesis implies that firms with high debt, high dividend payout commitments and low cash

[89]James (1992) finds empirical support for the firm-specific relationships that the underwriter may establish with the issuers in the context of IPOs.

[90]A scrip dividend is similar to DRP but with the following differences; shares are not offered at a discount (Lasfer, 1997a) and shareholders have no choice on participation (Chan et al., 1995).

will adopt a scrip dividend plan as an alternative to their cash dividend to mitigate or reduce the likelihood of financial distress. Similarly, Mukherjee et al. (2002) surmise that firms needing funds initiate new-issue DRPs.

Firms also have an incentive to issue debt or new equity when internal funds are insufficient to fund the firm's cash requirements. Tamule, Bubnys and Sugrue (1993) suggest that firms with high debt and low cash flows will be forced to raise equity, and these firms will adopt a DRP since they do not want to send a negative signal to the market. Chan et al. (1995) argue that in the Australian market a DRP enables the firm to increase dividend payouts and maintain its cash levels.

We proxy the degree of financial distress in terms of low operating cash flow and low current ratio (low liquidity) and predict that firms facing financial distress are more likely to underwrite the DRP than firms not facing financial distress. Thus we hypothesize:

H6: Firms with low operating cash flows are more likely to underwrite their DRP than firms with high operating cash flows.

H7: Firms with low liquidity are more likely to underwrite their DRP than firms with high liquidity.

Leverage may reduce agency costs between managers and shareholders by reducing the ability of managers to use surplus free cash flow for excessive managerial perquisites. The agency theory advanced by Jensen and Meckling (1976) and extended by Rozeff (1982) and Easterbrook (1984) derives from the conflict of interest between corporate managers, outside stockholders and bondholders. In perfect markets, management works in the best interests of the shareholders. However, management has incentives to maximize their own wealth at the expense of the shareholders. Therefore, a more highly leveraged firm subject to greater financial constraints has greater incentives to underwrite the DRP since the firm does not want to violate its debt covenants or be unable to pay coupon/principal payments.

Thus, we predict that firms with higher relative debt levels, ceteris paribus, are more likely to have an UDRP than firms with lower debt levels. We hypothesize:

H8. Firms with high leverage are more likely to underwrite their DRP than firms with low leverage.

7.5.5 Discount

The discount on new shares issued under a DRP may impact on a firm's decision to underwrite a DRP for the following reasons. First, the underwriter will have the incentive to underwrite those DRPs where discounts on the issue price are offered. A high discount offer allows the underwriter to acquire shares under the DRP at a price lower than the market price. For IPOs, Logue and Lindvall (1974) suggest a trade-off between the level of the underwriting fee and the offer price. Similarly, How and Yeo (2000) find the offer price for an IPO is significant in explaining underwriting fees in the Australian market. A high discount will, therefore, lower the underwriting fee and make it more attractive for the firm to have their DRP underwritten.

However, a high discount is likely to encourage greater shareholder participation and there will be less need for the firm to engage an underwriter. Todd and Domian (1997) find that in the US, institutions[91] such as tax-exempt pension plans participate in dividend reinvestment plans to take advantage of the issue price discount. This benefits their investors since institutions pay no tax on the reinvestment or the discount. Wills (1989) reports that greater participation in Australian DRPs can be expected where higher discounts on issue price are offered to shareholders.[92]Hansen et al. (1985) and Scholes and Wolfson (1989) posit that the discount should be viewed as a flotation cost and the announcement impact of discount DRP should be positive. They argue that discount DRPs allow participating shareholders to capture some of the

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[91]In 1990, the Wall Street Journal (as cited in Todd and Domian, 1997) reported that AMAX, Inc. amended its DRP to eliminate discounts in order to reduce the abuse by some large institutional traders. Institutional traders can buy large blocks of stock shortly before the dividend is declared, take advantage of the reinvestment of dividends at a discount and sell the stock shortly thereafter.

[92] Chapter 8 provides further evidence to show that participation in Australian DRPs is greater where higher discounts on issue price are offered to shareholders.

underwriting fees incurred in new share offerings and also save companies on the portion of the underwriting costs required for new equity issues. Baker and Seippel (1980) and Anderson (1986) report that discount DRPs had more widespread approval by shareholders. This evidence suggests that a high discount DRP is likely to encourage greater existing shareholder participation in the DRP and there will be less need for the firm to engage an underwriter.

Overall, the impact of the discount on the decision to underwrite a DRP is not clear. A high discount will make it easier to attract an underwriter willing to underwrite the DRP. On the other hand, a high discount is likely to increase the level of existing shareholder participation and means there is less need to have the issue underwritten. We hypothesize:

H9: The decision to underwrite a DRP is unrelated to the discount.

7.6 Data and sample

We identified the underwritten DRPs from Company Announcement Sections from DAT Analysis and FIN Analysis and DRP prospectuses.[93]We identified the sample of DRP observations into underwritten and non-underwritten. However, although we could identify the DRPs as underwritten or non-underwritten, we could not obtain data pertaining to the level of underwriting and the underwriting fees for most of the sampled observations. This is because the level of underwriting and the underwriting fees are often not mentioned in DRP announcements.

Our final sample consists of Australian DRP firms listed at the Australian Securities Exchange (ASX).[94]We identified 61 firms (405 observations) that had an underwritten DRP and 440 firms (1,647 observations) that had a non-underwritten DRP. We divide the sample period (1995-2009) into pre-tax-credit refund period (1995-2000) and post-tax credit refund period (2001-2009) for our analysis. The post-tax credit refund period (2001-2009) has 303 UDRP

[93] Generally, Company Announcements were the primary source of identifying underwritten DRPs. However, in some cases the DRP prospectuses of companies mention whether DRPs are underwritten or not underwritten.

[94]See Chapter 4 ("Data and Sample") for details on sampling.

observations. This is greater than the number of UDRP observations (102) in the pre-tax credit refund period.

The UDRPs and non-UDRPs belong to various industry groupings (see Table 7.1). Banks (64) and Real estate (64) account for the largest number of UDRP observations. They are followed by Capital goods (56) and Health care equipment and services (35). Transportation has 30 UDRP observations while 27 UDRP observations belong to the Insurance sector. The remaining UDRP observations are scattered over different industries. In the case of non-UDRP observations, Diversified financial has the highest number (297).

Table 7.1
Industry distribution of underwriting sample

GICS Code	Industry	UDRP Observations	UDRP Firms	Non-UDRP Observations	Non-UDRP firms
1010	Energy	17	2	32	9
1510	Materials	16	3	168	46
2010	Capital goods.	56	9	154	38
2020	Commercials and professional services.	27	5	70	20
2030	Transportation	30	4	62	12
2510	Automobiles and components	0	0	21	3
2520	Consumer durables and apparels	11	2	33	9
2530	Consumer services	4	1	37	13
2540	Media	0	0	69	15
2550	Retailing	2	1	50	16
3010	Food and staples retailing	19	2	22	5
3020	Food, beverage and tobacco	12	2	142	28
3510	Health care equipment and services	35	5	42	15
3520	Pharmaceuticals, biotechnology and life services	0	0	4	2
4010	Banks	64	5	44	7
4020	Diversified financials	14	3	297	84
4030	Insurance	27	3	17	6
4040	Real estate	64	12	258	71
4510	Software services	1	1	46	17
4520	Technology, hardware and equipment	0	0	15	7
4530	Equipment	0	0	4	1
5010	Telco communication services	0	0	11	2
5510	Utilities	6	1	49	14
	Total	405	61	1647	440

This is followed by Real estate (258) and Materials (168). The Capital goods sector accounts for 154 non-UDRP observations, while the Food, beverages and tobacco sector has 142 non-UDRP observations. The remaining non-UDRP observations are distributed over various industries.

7.7 Methodology

We first undertake univariate analysis of the explanatory variables in order to examine the decision to underwrite a DRP in terms of the set of firm characteristics. We then use a logistic model to test the taxation, growth, agency cost and free-cash flow, size, financial distress, and discount hypotheses. Logistic models are estimated with robust and cluster options to deal with problems about normality, heteroscedasticity and large residuals. We also use bootstrap methods to correct for standard errors. Marginal effects are measured to estimate an approximation for the change in the underwriting decision that will be motivated by a one unit change in the firm characteristic variables. The estimated logistic model takes the form:

Underwriting $\text{Dummy}_{i,t}$ = β_0 + β_1 Dividend Payout $\text{Ratio}_{i,t}$ + β_2 Average Franking $\text{Ratio}_{i,t}$+ β_3 Period Dummy + β_4 Tobin's $Q_{i,t}$+ β_5Natural log of Total $\text{Assets}_{i,t}$ + β_6Operating Cash Flow / Total $\text{Assets}_{i,t}$ + β_7Current $\text{Ratio}_{i,t}$+ β_8Debt/Total $\text{Assets}_{i,t}$+ $\beta_9$$\text{Discount}_{i,t}$+ Error.

(7.1)

The variables are expressed for the i^{th} firm in the t^{th} period. The underwriting dummy variable takes a value of 1 for underwriting firm observations and 0 otherwise. The Period Dummy variable takes a value of 1 for the post-tax credit refund period (2001-2009) and 0 for the pre-tax credit refund period (1995-2000).Table 4.5 in Chapter 4 describes the other variables used in Eq. (7.1).

We replace Dividend Payout Ratio and Average Franking Ratio in Eq. (7.1) with Dividend Yield and Franking Credit Yield respectively to test the taxation hypothesis. We use the natural logarithm of Market Capitalization and Interest Coverage Ratio (proxies for firm size and leverage) for robustness tests. We run variations of the model to check for robustness.

We posit that firms will have a high dividend payout ratio[95] (dividend yield) and are more likely to underwrite the DRP. Thus, we expect a positive coefficient on Dividend Payout Ratio (H1). The Average Franking Ratio (Franking Credit Yield) tests the taxation hypothesis and we expect a negative coefficient on Average Franking Ratio (H2). The Period Dummy variable assesses the July 2000 tax credit refund rule impact (H3). We expect a positive coefficient on the Period Dummy variable.

Tobin's Q is a proxy for testing the growth hypothesis. Since we posit that growth firms are more likely to underwrite the DRP in order to preserve cash for investment, we expect a positive coefficient on Tobin's Q (H4).To test the firm size hypothesis we use the natural logarithm of Total Assets and natural logarithm of Market Capitalization. We predict a positive coefficient on these variables (H5).

Operating Cash Flow/Total Assets ratio, Current Ratio and Debt/Total Assets are employed to test the financial distress hypotheses. We expect Operating Cash Flow/ Total Assets ratio and Current Ratio to have negative coefficients, indicating that firms facing greater potential financial constraints (measured in terms of low operating cash flow and low current ratio) are more likely to underwrite the DRP (H6 and H7).We predict a positive coefficient on Debt/Total Assets ratio indicating a positive association between leverage and the decision to underwrite the DRP (H8). We replace Debt/Total Assets ratio with Interest Coverage Ratio for leverage in robustness tests. We predict a negative coefficient on Interest Coverage Ratio under the financial distress hypothesis. We predict the coefficient on Discount to be not significant (H9).We estimate logistic panel regressions since the data is cross-sectional and time-series in nature. Under the logistic panel model, both the fixed effects and random effects regressions are estimated.[96]

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[95] The results are not sensitive to the inclusion of special dividends from the definition of the dividend payout ratio.

[96]Random effects models are used if the levels of the independent variables are thought to be a small subset of all possible values. The random effects model compares the variance of means across the levels of a random factor. In

We also estimate a two stage least squares logistic model (2SLS) using the Instrument Variable Method to test for any potential endogeneity between the decision to underwrite and dividend payouts[97].Firms that raise the dividend payout ratio to distribute franking credits to shareholders usually decide to underwrite their DRPs to ensure a guaranteed participation level and retain funds within the firm. Alternatively, a firm that decides to underwrite the DRP may, in terms of the underwriting agreement, be able to increase its dividend payout ratio and distribute more franking credits. The estimated 2SLS model takes the form:

Underwriting $\text{Dummy}_{i,\,t} = \beta_0 + \beta_1$ Dividend Payout Ratio $\text{(predicted value)}_{i,\,t} + \beta_2$ Natural log of Total $\text{Assets}_{i,\,t} + \beta_3 \text{Discount}_{i,\,t}$ + Error.

(7.2)

The variables are expressed for the i^{th} firm in the t^{th} period. The Underwriting Dummy variable takes a value of 1 for underwriting firm observations and 0 otherwise. The Dividend Payout Ratio variable is the predicted value estimated through the Instrumental Variable Method. We replace Dividend Payout Ratio (predicted value) in Eq. (7.2) with Dividend Yield (predicted value) to test the taxation hypothesis. We also use natural logarithm of Market Capitalization (proxy for firm size) in robustness tests.

We expect a positive coefficient on the predicted value of Dividend Payout Ratio (Dividend Yield). Similarly, the firm size variable (natural logarithm of Total Assets and natural logarithm of Market Capitalization) is predicted to have a positive coefficient. The sign of the Discount variable is expected to be indeterminate.

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the fixed effects model, we make an explicit comparison of one level against another. Studies have recommended that the estimation should use both the fixed effects and random effects models (Clarke et al. 2010).

[97] We run separate regressions with the Natural log of Total Assets and Natural log of Market Capitalization (proxies of the size variable) for estimating the 2SLS regressions as these variables are highly correlated. The 2SLS model is also estimated using Discount as an independent variable.

7.8 Empirical results

7.8.1 Summary statistics

Table 7.2 shows the number of observations for firms with an UDRP and firms not offering an UDRP over the sample period between 1995 and 2009. There are 102UDRP observations in the pre-tax credit refund rule period between 1995 and 2000. The number of non-UDRP observations in the same period is 343. The post-tax credit refund period between 2001 and 2009 has a greater number of UDRPs (303) and non-UDRPs (1,304) than the pre-tax credit refund period.

Table 7.2
Underwriting Sample Characteristics (Number of firm-level observations)

Year	UDRP	Non-UDRP	Total	%UDRP	%Non-UDRP
1995	13	31	44	29.6	70.5
1996	11	40	51	21.6	78.4
1997	12	49	61	19.7	80.3
1998	19	44	63	30.2	69.8
1999	21	87	108	19.4	80.6
2000	26	92	118	22.0	78.0
2001	28	103	131	21.4	78.6
2002	30	105	135	22.2	77.8
2003	35	108	143	24.5	75.5
2004	38	126	164	23.2	76.8
2005	37	140	177	21.0	79.1
2006	36	167	203	17.7	82.3
2007	37	186	223	16.6	83.4
2008	33	202	235	14.0	86.0
2009	29	167	196	14.8	85.2
Pre-tax credit refund rule period (1995-2000)	102	343	445	22.9	77.1
Post-tax credit refund rule period (2001-2009)	303	1304	1607	18.9	81.1
Total	405	1647	2052	19.7	80.3
T-test (Sig) between pre and post-tax credit refund periods % differences.				-5.180 (0.000)***	5.180 (0.000)***

UDRP =Underwritten DRP. The figures in the parentheses are the statistical significance values. The asterisk (***) in the table indicates statistical significance at the 0.01 level.

However, the results in Table 7.2 show that the percentage of UDRPs implemented by Australian listed firms in the post-tax credit refund period (18.86) is smaller than the percentage of UDRPs in the pre-tax credit refund period (22.92). The difference is significant at the 0.01 level under the t-test. A possible explanation for this lower percentage of UDRPs is that the July

2000 tax credit refund reform might have created incentives for the firm to distribute greater franking credits, resulting in a higher participation level in the DRP by existing shareholders. Thus, the evidence does not support H3, that firms are more likely to underwrite a DRP in the post-tax credit refund period than in the pre-tax credit refund period.

7.8.2 Univariate results

7.8.2.1 Full sample period (1995-2009)

Table 7.3 reports the univariate results for the non-dichotomous variables used in the empirical analysis. Panel A of Table 7.3 presents the results for the combined pre and post-tax credit refund period between 1995 and 2009. The mean (median) Dividend Payout Ratio[98]for the UDRP firm observations is 0.717 (0.702). This is higher (lower) than the mean (median) payout ratio for the non-UDRP firm observations of 0.705 (0.730). The difference in both means and medians is not significant. The mean (median) level of Dividend Yield for UDRP firm observations and non-UDRP firm observations is 0.063 (0.052) and 0.058 (0.053) respectively. The UDRP firm observations have a higher mean level of Dividend Yield with the t-statistic significant at the 0.10 level. The results provide weak support for H1, that the firm is more likely to underwrite a DRP where the firm has a high dividend yield.

Panel A of Table 7.3 also shows that UDRP firms distribute lower franking credits, with a mean (median) Franking Ratio of 0.676 (1.000) for UDRP firm observations compared to 0.706 (1.000) for non-UDRP firm observations. The mean (median) Franking Credit Yield for the UDRP firm observations is 0.017(0.017), which is below (same as) the mean (median) Franking Credit Yield for the non-UDRP firm observations of 0.021 (0.017), with the difference in means significant at the 0.05 level under the t-statistic. The evidence provides some support for H2, that the firm is less likely to underwrite a DRP where the firm has a high franking credit yield.

[98] We also perform robustness checks where total dividends include special dividends and the results do not show any marked difference.

Table 7.3
Univariate Analysis

Panel A: Variables used for Main Tests (Full sample period, 1995-2009)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	T- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	405	0.717	0.702	0.224	0.571	0.964	1647	0.705	0.730	0.267	0.500	1.000	0.845 (0.398)	-0.155 (0.877)
Franking Ratio	Negative	405	0.676	1.000	0.432	0.180	1.000	1647	0.706	1.000	0.431	0.170	1.000	-1.245 (0.213)	-1.200 (0.230)
Dividend Yield	Positive	405	0.063	0.052	0.051	0.041	0.073	1647	0.058	0.053	0.033	0.037	0.075	2.071 (0.039)*	-1.149 (0.251)
Franking Credit Yield	Negative	405	0.017	0.017	0.014	0.004	0.024	1647	0.021	0.017	0.041	0.002	0.026	-1.958 (0.050)**	-0.495 (0.620)
Tobin's Q	Positive	405	1.175	0.954	0.904	0.675	1.334	1647	1.151	0.969	0.780	0.770	1.235	0.542 (0.588)	-1.561 (0.118)
Natural log of Total Assets	Positive	405	21.229	20.928	2.581	19.235	22.770	1647	19.906	19.746	1.893	18.544	21.134	11.648 (0.000)***	9.038 (0.000)***
Operating Cash Flow/Total Assets	Negative	405	0.060	0.051	0.067	0.015	0.097	1647	0.067	0.059	0.122	0.024	0.103	-1.137 (0.256)	-2.100 (0.036)**
Current Ratio	Negative	405	1.579	1.257	1.649	0.985	1.755	1647	2.893	1.420	2.780	1.070	2.060	-4.532 (0.000)***	-4.264 (0.000)***
Debt/Total Assets	Positive	405	0.187	0.177	0.206	0.040	0.304	1647	0.163	0.187	0.340	0.000	0.315	1.370 (0.171)	-0.238 (0.812)
Discount	Indeterminate	405	1.725	1.500	1.974	0.020	2.500	1647	1.604	1.300	2.217	0.010	2.500	1.003 (0.316)	0.095 (0.036)**

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

The mean (median) Tobin's Q for the UDRP firm observations is 1.175 (0.954). This is higher (lower) than the mean (median) Tobin's Q for the non-UDRP firm observations of 1.151 (0.969). The difference in both means and medians is not significant. Thus, there is no support for H4, that growth firms are more likely to underwrite the DRP than non-growth firms.

The UDRP firm observations have a higher mean (median) level of natural logarithm of Total Assets of 21.23 (20.928) compared to the mean (median) of 19.906 (19.746) for the non-UDRP firm observations. Similarly, the results in Panel B of Table 7.3 show that the mean (median) natural logarithm of Market Capitalization for the UDRP firm observations is 20.570 (20.638) compared to the mean (median) of 19.505 (19.382) for the non-UDRP firm observations, with both the difference in means and medians significant at the 0.01 level under the t-statistic and Wilcoxon test. The results support H5, that large firms are more likely to underwrite their DRP than small firms. These results are consistent with the evidence of How and Yeo (2000), that economies of scale influence the underwriting services in the Australian IPO market.

The mean (median) Operating Cash Flow/Total Assets for the UDRP firms is 0.060 (0.051), which is below the mean (median) Operating Cash Flow/ Total Assets for the non-UDRP firms of 0.067 (0.059), with the Wilcoxon statistic significant at the 0.05 level. The evidence provides weak support for H7, that UDRP firm observations are likely to have lower cash flow profitability compared to non-UDRP firm observations. The mean (median) Current Ratio for the UDRP firm observations is 1.579 (1.257), which is below the mean (median) Current Ratio for the non-UDRP firm observations of 2.893 (1.420), with both the difference in means and medians significant at the 0.01 level. The evidence supports H8, that UDRPs with lower liquidity are more likely to be underwritten than non-UDRPs with higher liquidity.

The mean (median) Debt/Total Assets ratio for the UDRP firm observations is 0.187 (0.177) compared to the mean (median) of 0.163 (0.187) for the non-UDRP firm observations. The difference in means and medians is not significant. In Panel B of Table 7.3, the mean (median)

Table 7.3 (Continued)

Panel B: Variables used for Robustness Tests (Full sample period, 1995-2009)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	T- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	405	20.570	20.638	2.163	18.848	22.303	1647	19.505	19.382	1.823	18.127	20.713	10.144 (0.000)***	8.737 (0.000)***
Interest Coverage Ratio	Negative	405	3.653	2.840	2.971	1.627	3.940	1647	4.202	4.100	3.115	1.216	4.787	-3.026 (0.001)***	-3.570 (0.000)***

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Interest Coverage Ratio for UDRP observations is 3.653 (2.840), which is lower than the mean (median) Interest Coverage Ratio for non-UDRP observations of 4.202 (4.100). The difference in means and medians is significant at the 0.01 level. The results support H8 that firms with a low interest coverage ratio are more likely to underwrite their DRP than firms with a high interest coverage ratio.

The UDRPs have a higher discount, with a mean (median) discount of 1.725 (1.500) for UDRPs compared to 1.604 (1.300) for non-UDRPs. The difference in medians is significant at the 0.05 level. The evidence does not support H9, that the decision to underwrite is unrelated to the discount.

7.8.2.2 Pre-tax credit refund period (1995-2000)

Panel C of Table 7.3 presents the univariate results for the pre-tax credit refund period (1995-2000). The mean (median) Dividend Payout Ratio for the UDRPs is 0.706 (0.702). This is higher (lower) than the mean (median) payout for the non-UDRPs of 0.701 (0.713). The mean (median) level of Dividend Yield for UDRPs and non-UDRPs is 0.061(0.057) and 0.058 (0.054) respectively. There is only very weak evidence to support H1, that firms with a DRP and a high dividend payout ratio are more likely to underwrite than firms with a DRP and a low payout ratio.

The mean (median) Franking Ratio for the UDRPs is 0.661(1.000), which is lower than (same as) the mean (median) Franking Ratio for the non-UDRPs of 0.718 (1.000).Similarly, UDRPs have a lower Franking Credit Yield, with a mean (median) Franking Credit Yield of 0.020 (0.019) compared to 0.029 (0.022) for non-UDRPs. Again, none of the differences are statistically significant. These results only provide weak support for H2, that firms with a DRP and a higher franking credit ratio are less likely to underwrite than firms with a DRP and a lower franking credit ratio.

Table 7.3 (Continued)

Panel C: Variables used for Main Tests (Pre-tax credit refund rule period, 1995-2000)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	102	0.706	0.702	0.223	0.561	0.920	343	0.701	0.713	0.252	0.528	0.955	0.181 (0.857)	-0.120 (0.905)
Franking Ratio	Negative	102	0.661	1.000	0.426	0.164	1.000	343	0.718	1.000	0.419	0.366	1.000	-1.197 (0.232)	-1.420 (0.155)
Dividend Yield	Positive	102	0.061	0.057	0.031	0.042	0.073	343	0.058	0.054	0.030	0.038	0.076	0.754 (0.451)	0.452 (0.652)
Franking Credit Yield	Negative	102	0.020	0.019	0.018	0.004	0.030	343	0.029	0.022	0.060	0.005	0.033	-1.362 (0.174)	-0.905 (0.365)
Tobin's Q	Positive	102	1.053	0.845	0.766	0.555	1.412	343	1.038	0.955	0.728	0.698	1.177	0.178 (0.859)	-1.126 (0.260)
Natural log of Total Assets	Positive	102	21.000	20.447	2.548	18.962	22.555	343	19.553	19.461	1.845	18.277	20.504	6.328 (0.000)***	4.761 (0.000)***
Operating Cash Flow/Total Assets	Negative	102	0.065	0.055	0.071	0.011	0.105	343	0.068	0.066	0.080	0.028	0.103	-0.415 (0.678)	-1.494 (0.135)
Current Ratio	Negative	102	1.377	1.140	0.816	0.961	1.655	343	1.676	1.380	2.017	1.090	1.780	-1.463 (0.144)*	-3.152 (0.002)***
Debt/Total Assets	Positive	102	0.151	0.156	0.147	0.019	0.255	343	0.128	0.188	0.311	0.024	0.284	0.714 (0.476)	-1.154 (0.248)
Discount	Indeterminate	102	1.706	1.050	2.188	0.070	3.500	343	1.532	1.020	2.441	0.040	2.500	0.646 (0.519)	1.287 (0.198)

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

The mean (median) Tobin's Q for the UDRPs is 1.053 (0.845). This is higher (lower) than the mean (median) Tobin's Q for the non-UDRPs of 1.038 (0.955). The evidence does not show any strong support for H4, that firms with a DRP and higher growth are more likely to underwrite their DRP than firms with a DRP and lower growth.

There is support for H5, that larger firms are more likely to underwrite the DRP than smaller firms. The mean (median) natural logarithm of Total Assets for the UDRPs is 21.000 (20.447), compared to the mean (median) of 19.553 (19.461) for the non-UDRPs, with the difference in means and medians significant at the 0.01 level. The mean (median) natural logarithm of Market Capitalization for the UDRPs is 20.085 (19.649), compared to the mean (median) of 19.166 (19.098) for the non-UDRPs (Table 7.3, Panel D). Both the difference in means and medians is significant at the 0.01 level.

Panel C of Table 7.3 also shows that UDRPs: (i) have lower cash flow profitability, with a mean (median) Operating Cash Flow/Total Assets ratio of 0.065 (0.055) for UDRPs compared to a mean (median) of 0.068 (0.066) for non-DRPs, and (ii) have significantly lower liquidity, with a mean (median) Current Ratio of 1.377 (1.140) for UDRPs compared to a mean (median) Current Ratio of 1.676 (1.380) for non-UDRPs. The difference in means and medians for the Current Ratio is significant at the 0.01 level. The results support H7,that firms with low liquidity are more likely to underwrite their DRP than firms with high liquidity.

The mean (median) Debt/Total Assets ratio for the UDRPs is 0.151 (0.156), compared to the mean (median) of 0.128 (0.188) for the non-UDRPs. The evidence does not show any strong support for H8, that firms with a DRP and higher leverage are more likely to underwrite than firms with a DRP and lower leverage. However, the evidence in Panel D of Table 7.3 indicates that the mean (median) Interest Coverage Ratio for the UDRPs is 2.148(2.120). This is lower than the mean (median) Interest Coverage Ratio for the non-UDRPs of 3.829 (3.252), with the difference in means and medians significant at the 0.01 level.

Table 7.3 (Continued)

Panel D: Variables used for Robustness Tests (Pre-tax credit refund rule period, 1995-2000)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	102	20.085	19.649	2.149	18.233	21.877	343	19.166	19.098	1.780	17.804	20.251	4.360 (0.000)***	3.569 (0.000)***
Interest Coverage Ratio	Negative	102	2.148	2.120	2.017	1.664	2.879	343	3.829	3.252	2.937	1.855	3.926	-2.838 (0.005)***	-2.175 (0.002)***

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables

The result supports H8, that firms with a DRP and higher leverage are more likely to underwrite their DRP than firms with a DRP and lower leverage.

UDRPs have a higher discount, with a mean (median) discount of 1.706 (1.050) for UDRPs compared to 1.532 (1.020) for non-DRPs. However, the difference in both means and medians is not significant. The result supports H9, that the decision to underwrite a DRP is unrelated to the discount.

7.8.2.3 Post-tax credit refund period (2001-2009)

Panel E of Table 7.3 presents the univariate results for the post-tax credit refund period (2000-2009). The mean (median) Dividend Payout Ratio for the UDRP firm observations is 0.721 (0.701). This is higher (lower) than the mean (median) Dividend Payout Ratio for the non-UDRP firm observations of 0.706 (0.734).The mean (median) level of Dividend Yield for UDRP and non-UDRP firm observations is 0.063 (0.051) and 0.058 (0.052) respectively. The difference in means and medians for the Dividend Payout Ratio is not significant. However, the difference between the dividend yield means is significant at the 0.10 level. The median dividend yield is higher for non-underwritten DRPs and no significance is found in the sub-period analysis (see Panels C and D of Table 7.3). Thus there is no support for H1, that the firm is more likely to underwrite a DRP where the firm has a high dividend payout ratio (dividend yield).

The mean (median) Franking Credit Ratio for the UDRP firm observations is 0.681(1.000). This is lower than (same as) the mean (median) Franking Credit Ratio for the non-UDRP firm observations of 0.703 (1.000). UDRP firms have a lower level of franking credit yield, with a mean (median) Franking Credit Yield of 0.015 (0.016) for UDRP firm observations compared to 0.019 (0.016) for non-UDRP firm observations. The difference in means for the franking credit yield variable is significant at the 0.10 level under the t-test. The results provide very weak support for H2, that the firm is less likely to underwrite a DRP where the firm has a high franking credit yield.

Table 7.3 (Continued)

Panel E: Variables used for Main Tests (Post-tax credit refund rule period, 2001-2009)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	303	0.721	0.701	0.225	0.575	0.971	1304	0.706	0.734	0.270	0.490	1.000	0.885 (0.376)	-0.302 (0.763)
Franking Ratio	Negative	303	0.681	1.000	0.435	0.180	1.000	1304	0.703	1.000	0.435	0.099	1.000	-0.781 (0.435)	-0.566 (0.571)
Dividend Yield	Positive	303	0.063	0.051	0.057	0.041	0.072	1304	0.058	0.052	0.033	0.036	0.075	1.951 (0.051)**	-1.018 (0.309)
Franking Credit Yield	Negative	303	0.015	0.016	0.013	0.004	0.023	1304	0.019	0.016	0.033	0.001	0.025	-1.631 (0.103)*	-0.292 (0.770)
Tobin's Q	Positive	303	1.216	0.973	0.943	0.705	1.331	1304	1.180	0.974	0.790	0.793	1.261	0.681 (0.496)	-0.964 (0.335)
Natural log of Total Assets	Positive	303	21.306	21.025	2.592	19.334	23.019	1304	19.999	19.824	1.895	18.608	21.379	10.022 (0.000)***	7.837 (0.000)***
Operating Cash Flow/Total Assets	Negative	303	0.058	0.049	0.066	0.018	0.092	1304	0.066	0.056	0.131	0.023	0.103	-1.091 (0.275)	-1.631 (0.103)*
Current Ratio	Negative	303	1.646	1.300	1.843	1.000	1.795	1304	3.213	1.430	2.375	1.067	2.240	-4.237 (0.000)***	-3.228 (0.001)***
Debt/Total Assets	Positive	303	0.199	0.194	0.222	0.045	0.315	1304	0.172	0.187	0.347	-0.001	0.323	1.305 (0.192)	0.837 (0.403)
Discount	Indeterminate	303	1.731	1.500	1.900	0.038	2.500	1304	1.623	1.300	2.155	0.035	2.500	0.804 (0.421)	1.738 (0.082)

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.01 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Table 7.3 (Continued)

Panel F: Variables used for Robustness Tests (Post-tax credit refund rule period, 2001-2009)

		Underwritten DRP observations						Non-underwritten DRP observations							
Variable	Expected Sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	T- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	303	20.734	20.691	2.146	19.099	22.474	1304	19.594	19.436	1.824	18.181	20.819	9.464 (0.000)***	8.253 (0.000)***
Interest Coverage Ratio	Negative	303	3.828	3.175	2.977	1.579	3.926	1304	4.562	4.030	3.116	0.773	4.834	-3.725 (0.000)***	-3.156 (0.000)***

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.01 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables

The mean (median) Tobin’s Q for the UDRPs is 1.216 (0.973), which is higher (lower) than the mean (median) Tobin’s Q for the non-UDRPs of 1.180 (0.974). The difference in means and medians is not significant. The evidence does not support H4, that growth firms are more likely to underwrite the DRP than non-growth firms.

The DRP firms are significantly larger in size (supporting H5), with a mean (median) natural logarithm of Total Assets of 21.306 (21.025) compared to a mean (median) of 19.999 (19.824) for non-UDRP firms. The difference in means and medians is significant at the 0.01 level. The mean (median) natural logarithm of Market Capitalization for the UDRP firms is 20.734 (20.691) compared to the mean(median) of 19.594 (19.436) for the non-UDRP firms (Table 7.3, Panel F), again with both the difference in means and medians significant at the 0.01 level.

In Panel E in Table 7.3 the mean (median) Operating Cash Flow/Total Assets ratio for the UDRPs is 0.058 (0.049), which is below the mean (median) Operating Cash Flow/Total Assets ratio for the non-UDRPs of 0.066 (0.056). The difference in medians is significant at the 0.10 level under the Wilcoxon test, providing limited support for H6. The mean (median) Current Ratio for the UDRPs is 1.646 (1.300). This is below the mean (median) Current Ratio for the non-UDRPs of 3.213 (1.430).UDRP firms have a significantly lower mean and median level of Current Ratio, with both the t-statistic and Wilcoxon statistic significant at the 0.01 level, supporting H7.

The mean (median) Debt/Total Assets ratio for the UDRPs is 0.199 (0.194) compared to the mean (median) of 0.172 (0.187) for the non-UDRPs. The results in Panel F of Table 7.3 indicate a higher level of leverage for UDRP firm observations, with the mean (median) Interest Coverage Ratio of 3.828 (3.175) for UDRPs compared to 4.562(4.030) for non-UDRPs. The difference in means and medians is significant at the 0.01 level under the t-test and Wilcoxon test. The results give some support for H8, that firms with a DRP and higher leverage are more likely to underwrite their DRP than firms with a lower leverage.

The mean (median) Discount for the UDRPs is 1.731 (1.500), which is higher than the mean (median) Discount for the non-UDRPs of 1.623 (1.300). The difference in both means and medians is not statistically significant. The results support H9, that the decision to underwrite is unrelated to the discount.

Overall, the univariate results in Table 7.3 suggest that firms that underwrite the DRP are larger in size (supporting H5), have lower liquidity (supporting H7) and have higher leverage (supporting H8) compared to non-UDRP firms. The difference in means for the dividend pay-out ratio variable is not significant. The difference between the dividend yield means is significant only at the 0.10 level. The median dividend yield is higher for non-underwritten DRPs and no significance is found in the sub-period analysis (see Panels C and D of Table 7.3). Thus there is no support for H1, that the firm is more likely to underwrite a DRP where the firm has a high dividend payout ratio (dividend yield).

Similarly, there is no evidence to suggest that UDRP firms have a higher level of growth compared to non-UDRP firms.

7.8.3 Multivariate logistic results

Panel A of Table 7.4 presents the results of the logistic model[99] for the full sample period between 1995-2009.[100]We also estimated the logistic and other models with lagged accounting variables for robustness.[101]

The coefficient on Dividend Payout Ratio[102]is positive but not significant in all models (1a) to (1e). In all models, the coefficient on Dividend Yield is positive, with the coefficient significant

[99] Prior to the estimation of logistic models, correlations between key variables were tested. There was significant correlation between Franking Ratio and Franking Credit Yield, between Dividend Payout Ratio and Dividend Yield and between Total Assets and Market Capitalization (see Appendix 3). In order to reduce the likelihood of problems with multicollinearity and to ensure robustness, separate regressions were run using these correlated variables.

[100] Logistic model is estimated with robust and cluster options to deal with problems of normality, hetroscedasticity and large residuals. The bootstrap method is used to correct for standard errors.

[101]The results (not tabulated) are qualitatively the same.

at the 0.01 level in models (2a), (2b), and at the 0.05 level in model (2c). The results provide support for H1, that firms that have a high dividend yield are more likely to underwrite a DRP.

The coefficient on Franking Credit Yield is negative as predicted in all models, butthe coefficient is negative and significant at the 0.05 level in regression model (2b) only.The evidence provides weak support for H2, that firms with a high franking credit yield are less likely to underwrite a DRP.

The coefficient on Period Dummy is negative and significant at the 0.01 level in models (1c) to (2c) and negative and significant at the 0.05 level in models (1a), (1b) and (2d) and (2e). The results do not support H3, that firms are more likely to underwrite a DRP in the post-tax credit refund period than in the pre-tax credit refund period. A possible reason is that the July 2000 tax credit refund reform might have prompted firms to distribute greater franking credits resulting in higher participation rate in the DRP by existing shareholders.

The coefficient on the variable Tobin's Q is positive and significant at the 0.01 level in models (2d) and (2e) and positive and significant at the 0.10 level in models (1b) to (1e) and (2a) to (2c). The results provide some support for H4, that growth firms are more likely to underwrite the DRP than non-growth firms. The results in all models (1a) to (2e) in Panel A show that the coefficient on the variable firm Size is positive, with the coefficient significant at the 0.01 level. The results provide strong support for H5, that large firms are more likely to underwrite their DRP than small firms.

The coefficient on Operating Cash Flow/Total Assets ratio is negative as predicted but not significant in all models (1a) to (2e). The results provide limited support for H6, that firms with low operating cash flows are more likely to underwrite their DRP than firms with high operating cash flows. The coefficient on Current Ratio is negative and significant at the 0.05 level or better in all models (1a) to 2(e). The evidence supports H7, that firms with low liquidity are

[102] The results are not sensitive to the inclusion of special dividends in the definition of the dividend payout ratio.

more likely to underwrite their DRP than firms with high liquidity under the financial distress hypothesis. The coefficient on the variable Debt/Total Assets ratio is positive in models (1a) to (2e) but not significant. The results only provide very weak support for H8 that firms with a higher leverage are more likely to underwrite their DRP than firms with a lower leverage.

Table 7.4

Logistic model results

Panel A: Logistic model results (Full sample period, 1995-2009)

Model 1: Underwriting $\text{Dummy}_{i,t} = \beta_0 + \beta_1$ Dividend Payout $\text{Ratio}_{i,\ t} + \beta_2$ Average Franking $\text{Ratio}_{i,\ t} + \beta_3$ Period Dummy $+ \beta_4$ Tobin's $Q_{i,\ t} + \beta_5$ Natural log of Total $\text{Assets}_{i,\ t} + \beta_6$ Operating Cash Flow / Total $\text{Assets}_{i,\ t} + \beta_7$ Current $\text{Ratio}_{i,\ t} + \beta_8$ Debt/Total $\text{Assets}_{i,t} + \beta_9$ $\text{Discount}_{,\ i,t} +$ Error.

Model 2: Underwriting $\text{Dummy}_{i,t} = \beta_0 + \beta_1$ Dividend Yield $_{i,\ t} + \beta_2$ Franking Credit Yield $_{i,\ t} + \beta_3$ Period Dummy $+ \beta_4$ Tobin's $Q_{i,\ t} + \beta_5$ Natural log of Total $\text{Assets}_{i,\ t} + \beta_6$ Operating Cash Flow / Total $\text{Assets}_{i,\ t} + \beta_7$ Current $\text{Ratio}_{i,\ t} + \beta_8$ Debt/Total $\text{Assets}_{i,t} + \beta_9$ $\text{Discount}_{,\ i,t} +$ Error.

Variable	Expected sign	(1a) Logistic Coefficient (Sig.)	(1b) Robust Coefficient (Sig.)	(1c) Cluster Coefficient (Sig.)	(1d) Bootstrap Coefficient (Sig.)	(1e) Margin Effect (Sig.)	(2a) Logistic Coefficient (Sig.)	(2b) Robust Coefficient (Sig.)	(2c) Cluster Coefficient (Sig.)	(2d) Bootstrap Coefficient (Sig.)	(2e) Margin Effect (Sig.)
Constant		-6.861	-6.861	-6.861	-6.861		-7.221	-7.221	-7.221	-7.221	
		(0.000)***	(0.000)***	(0.000)***	(0.000)***		(0.000)***	(0.000)***	(0.000)***	(0.000)***	
Dividend Payout Ratio	Positive	0.059	0.059	0.059	0.059	0.009					
		(0.798)	(0.789)	(0.824)	(0.278)	(0.277)					
Franking Ratio	Negative	-0.070	-0.070	-0.070	-0.070	-0.010					
		(0.613)	(0.623)	(0.817)	(0.661)	(0.659)					
Dividend Yield	Positive						4.671	4.671	4.671	4.671	0.677
							(0.002)***	(0.000)***	(0.022)**	(0.070)*	(0.065)*
Franking Credit Yield	Negative						-3.367	-3.367	-3.367	-3.367	-0.488
							(0.191)	(0.042)**	(0.242)	(0.323)	(0.322)
Period Dummy	Positive	-0.322	-0.322	-0.322	-0.322	-0.047	-0.352	-0.352	-0.352	-0.352	-0.051
		(0.020)**	(0.019)**	(0.012)***	(0.000)***	(0.000)***	(0.011)***	(0.011)***	(0.005)***	(0.022)**	(0.023)**
Tobin's Q	Positive	0.102	0.102	0.102	0.102	0.015	0.118	0.118	0.118	0.118	0.017
		(0.153)	(0.138)*	(0.118)*	(0.075)*	(0.074)*	(0.102)*	(0.094)*	(0.084)*	(0.011)***	(0.009)***
Natural log of Total Assets	Positive	0.281	0.281	0.281	0.281	0.041	0.288	0.288	0.288	0.288	0.042
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Operating Cash Flow / Total Assets	Negative	-0.451	-0.451	-0.451	-0.451	-0.066	-0.339	-0.339	-0.339	-0.339	-0.049
		(0.522)	(0.447)	(0.523)	(0.497)	(0.500)	(0.626)	(0.562)	(0.630)	(0.682)	(0.682)
Current Ratio	Negative	-0.103	-0.103	-0.103	-0.103	-0.015	-0.101	-0.101	-0.101	-0.101	-0.015
		(0.002)***	(0.003)***	(0.003)***	(0.000)***	(0.000)***	(0.002)***	(0.003)***	(0.002)***	(0.046)**	(0.044)**
Debt/Total Assets	Positive	0.171	0.171	0.171	0.171	0.025	0.259	0.259	0.259	0.259	0.038
		(0.484)	(0.449)	(0.331)	(0.239)	(0.241)	(0.280)	(0.240)	(0.245)	(0.300)	(0.293)
Discount	Indeterminate	0.050	0.050	0.050	0.050	0.007	0.045	0.045	0.045	0.045	0.007
		(0.063)*	(0.050)**	(0.059)*	(0.020)**	(0.019)**	(0.091)*	(0.074)*	(0.094)*	(0.231)	(0.237)
Log likelihood		-940.736	-940.736	-940.736	-940.736		-935.269	-935.269	-935.269	-935.269	
Chi-Square		157.120	127.610	150.580	155.342		168.050	139.670	130.750	132.654	
		(0.000)***	(0.000)***	(0.000)***	(0.000)***		(0.000)***	(0.000)***	(0.000)***	(0.000)***	
Total Number		2052	2052	2052	2052	2052	2052	2052	2052	2052	2052

Note. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The coefficient on Discount is positive and significant at the 0.05 level in models (1b), (1d), (1e) and positive and significant at the 0.10 level in models (1a), (1c) and (2a) to (2c). The evidence provides no support for H9, that the decision to underwrite a DRP is unrelated to the discount for new shares issued under the DRP. Rather, the evidence supports the alternative hypothesis, that a high discount is necessary to attract an underwriter who is willing to underwrite the DRP.

In Panel B of Table 7.4, we use the alternative proxies of firm size and leverage variables (Interest Coverage Ratio and natural logarithm of Market Capitalization) to estimate the logistic model. The coefficient on Dividend Payout Ratio is positive but not significant. The coefficient on Dividend Yield is positive and significant at the 0.01 level in models (4a) and (4b), at the 0.05 level in model (4c) and at the 0.10 level in models (4d) and (4e). Thus, there is some support for H1, that firms that have a high dividend yield are more likely to underwrite a DRP.

The coefficient on Average Franking Ratio is negative as expected but not significant in all models (3a) to (3e). The coefficient on the variable Franking Credit Yield is negative and significant at the 0.10 level in model (4b) only. The results provide very limited support for H2, that firms with a high franking credit yield are less likely to underwrite a DRP.

The coefficient on Period Dummy variable is negative and significant in models (3c) to (4d) at the 0.01 level and negative and significant at the 0.05 level in models (3a), (3b) and (4e). Consistent with the poor evidence, the results provide no support for H3, that firms are more likely to underwrite a DRP in the post-tax credit refund period than in the pre-tax credit refund period.

The coefficient on Tobin's Q is positive but not significant in all models (3a) to (4e). The results in all models (3a) to (4e) in Panel B of Table 7.4 show that the coefficient on the variable firm size (natural logarithm of Market Capitalization) is positive, with the coefficient significant at the 0.01 level. The results support H5, that large firms are more likely to underwrite their DRP than small firms.

Table 7.4 (Continued)

Panel B: Logistic (robust) regression results (Full sample period, 1995-2009)

Model 3: Underwriting Dummyi,t = β0 + β1 Dividend Payout Ratio$_{i,\ t}$ + β2 Average Franking Ratio$_{i,\ t}$ + β3 Period Dummy + β4 Tobin's Q$_{i,\ t}$+ β5 Natural log of Market Capitalization$_{i,t}$ + β6 Operating Cash Flow / Total Assets$_{i,\ t}$ + β7 Current Ratio$_{i,\ t}$ + β8 Interest Coverage Ratio$_{i,t}$ + β9 Discount, $_{i,t}$ + Error.

Model 4: Underwriting Dummyi,t = β0 + β1 Dividend Yield $_{i,\ t}$ + β2 Franking Credit Yield $_{i,\ t}$ + β3 Period Dummy + β4 Tobin's Q$_{i,\ t}$+ β5 Natural log of Market Capitalization$_{i,\ t}$ + β6 Operating Cash Flow / Total Assets$_{i,\ t}$ + β7 Current Ratio$_{i,\ t}$ + β8 Interest Coverage Ratio$_{i,t}$ + β9 Discount, $_{i,t}$ + Error.

Variable	Expected sign	(3a) Logistic Coefficient (Sig.)	(3b) Robust Coefficient (Sig.)	(3c) Cluster Coefficient (Sig.)	(3d) Bootstrap Coefficient (Sig.)	(3e) Margin Effect (Sig.)	(4a) Logistic Coefficient (Sig.)	(4b) Robust Coefficient (Sig.)	(4c) Cluster Coefficient (Sig.)	(4d) Bootstrap Coefficient (Sig.)	(4e) Margin Effect (Sig.)
Constant		-6.534 (0.000)***	-6.534 (0.000)***	-6.534 (0.000)***	-6.534 (0.000)***		-7.120 (0.000)***	-7.120 (0.000)***	-7.120 (0.000)***	-7.120 (0.000)***	
Dividend Payout Ratio	Positive	0.070 (0.759)	0.070 (0.749)	0.070 (0.791)	0.070 (0.855)	0.010 (0.856)					
Franking Ratio	Negative	-0.045 (0.734)	-0.045 (0.741)	-0.045 (0.878)	-0.045 (0.887)	-0.007 (0.887)					
Dividend Yield	Positive						5.314 (0.001)***	5.314 (0.000)***	5.314 (0.022)**	5.314 (0.137)*	0.781 (0.144)*
Franking Credit Yield	Negative						-2.539 (0.282)	-2.539 (0.085)*	-2.539 (0.322)	-2.539 (0.457)	-0.373 (0.460)
Period Dummy	Positive	-0.321 (0.018)**	-0.321 (0.018)**	-0.321 (0.010)***	-0.321 (0.000)***	-0.048 (0.000)***	-0.360 (0.008)***	-0.360 (0.008)***	-0.360 (0.004)***	-0.360 (0.013)***	-0.053 (0.015)**
Tobin's Q	Positive	0.011 (0.881)	0.011 (0.882)	0.011 (0.875)	0.011 (0.778)	0.002 (0.776)	0.029 (0.685)	0.029 (0.687)	0.029 (0.680)	0.029 (0.727)	0.004 (0.727)
Natural log of Market Cap.	Positive	0.278 (0.000)***	0.278 (0.000)***	0.278 (0.000)***	0.278 (0.000)***	0.041 (0.000)***	0.294 (0.000)***	0.294 (0.000)***	0.294 (0.000)***	0.294 (0.000)***	0.043 (0.000)***
Operating Cash Flow / Total Assets	Negative	-1.197 (0.077)*	-1.197 (0.043)**	-1.197 (0.044)**	-1.197 (0.136)*	-0.177 (0.118)*	-1.080 (0.107)*	-1.080 (0.069)*	-1.080 (0.059)*	-1.080 (0.089)*	-0.159 (0.091)*
Current Ratio	Negative	-0.111 (0.001)***	-0.111 (0.001)***	-0.111 (0.004)***	-0.111 (0.000)***	-0.016 (0.000)***	-0.104 (0.001)***	-0.104 (0.001)***	-0.104 (0.006)***	-0.104 (0.001)***	-0.015 (0.001)***
Interest Coverage Ratio	Negative	-0.007 (0.257)	-0.007 (0.272)	-0.007 (0.332)	-0.007 (0.356)	-0.002 (0.355)	-0.004 (0.276)	-0.004 (0.284)	-0.004 (0.338)	-0.004 (0.402)	-0.001 (0.406)
Discount	Indeterminate	0.049 (0.068)*	0.049 (0.055)*	0.049 (0.070)*	0.049 (0.001)***	0.007 (0.000)***	0.044 (0.103)*	0.044 (0.087)*	0.044 (0.109)*	0.044 (0.337)	0.006 (0.334)
Log likelihood		-951.292	-951.292	-951.292	-951.292		-944.899	-944.899	-944.899	-944.899	
Chi-Square		136.010 (0.000)***	100.570 (0.000)***	124.210 (0.000)***	126.421 (0.000)***		148.790 (0.000)***	117.280 (0.000)***	105.400 (0.000)***	112.423 (0.000)***	
Total Number		2052	2052	2052	2052	2052	2052	2052	2052	2052	2052

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The coefficient on the variable Operating Cash Flow/Total Assets ratio is negative and significant at the 0.05 level in models (3b) and (3c), and negative and significant at the 0.10 level in regressions (3a), (3d), (3e) and (4a) to (4e). The evidence supports H6, that firms with low cash flow profitability are more likely to underwrite their DRP than firms with high cash flow profitability. The coefficient on Current Ratio is negative and significant at the 0.01 level in all models (3a) to (4e). The evidence supports H7, that firms with low liquidity are more likely to underwrite their DRP than firms with high liquidity.

The results in Panel B of Table 7.4 indicate that the Interest Coverage Ratio is negative but not significant in all regressions (3a) to (4e). There is only very limited support for H8, that firms with a high leverage are more likely to underwrite their DRP than firms with a low leverage.

The results in Panel B of Table 7.4 also show that the coefficient on the variable Discount is positive and significant at the 0.01 level in models (3d) and (3e) and positive and significant at the 0.10 level in regressions (3a) to (3c) and (4a) to (4c). The results again reject H9 in favour of an alternative hypothesis, that the decision to underwrite is related to the discount for new shares issued under the DRP.

Overall, the results of Table 7.4 show that underwritten DRPs: (i) are significantly larger in size (supporting H5), (ii) have a lower liquidity (supporting H7), (iii) have moderately higher growth (supporting H4), and (iv) have a higher discount (rejecting H9) compared to non-UDRPs. There is some evidence to support H1,that underwritten DRPs have a higher dividend yield than non-underwritten DRPs. The results provide no support for H3, that firms are more likely to underwrite a DRP in the post-tax credit refund period than in the pre-tax credit refund period. A possible explanation is a higher participation rate in the post-tax credit refund period by the existing shareholders in the DRP and, hence, not so much need to have the DRP underwritten. Our results in Table 7.4 also suggest that UDRPs compared to non-UDRPs (i) have lower franking credit yield, and (ii) have lower operating cash flows, providing weak support for H2 and H6.

7.8.4 Multivariate panel logistic results

The results from our fixed effects and random effects panel logistic models[103]for the period 1995-2009 are presented in Table 7.5. In all models, the coefficient on the Dividend Payout Ratio is positive, though not significant. The Dividend Yield coefficient is positive and significant at the 0.01 level in all fixed effects and random effects models. There is some evidence to support H1,that firms with a high dividend yield are more likely to underwrite than firms with low dividend yield. The coefficient on Franking Ratio is negative as predicted but not significant in any of the models. The coefficient on Franking Credit Yield is also negative but not significant in all fixed effects and random effects models (1) to (4). These results do not provide strong support for H2, that firms with a high franking credit ratio are less likely to underwrite the DRP. The coefficient on the variable Period Dummy is negative and significant at the 0.05 level in random effects models (3) and (4) and negative and significant at the0.10 level in random effects models (1) and (2).Contrary to our prediction on the impact of the July 2000 tax reform, we reject H3 and find firms are less likely to underwrite their DRPs in the post-tax refund reform period.

In the fixed effects model (2) and the random effects model (2), the coefficient on the variable Tobin's Q is significant and positive at the 0.10 level. In all other fixed effects and random effects regressions, the coefficient on Tobin's Q is positive but not significant. The results provide only weak evidence that growth firms are more likely to underwrite their DRP than non-growth firms (supporting H4). The size variable measured in terms of natural logarithm of Total Assets is positive and significant at the 0.01 level in fixed effects models (1) and (2), and in random effects models (1) and (2).

[103]In panel logistic models, both time effects (year) and firm effects (ASX Code) are controlled for.

Table 7.5

Panel logistic model results (Full sample period, 1995-2009)

Variable	Expected sign	(1) Fixed Effects Coefficient (Sig.)	(2) Fixed Effects Coefficient (Sig.)	(3) Fixed Effects Coefficient (Sig.)	(4) Fixed Effects Coefficient (Sig.)	(1) Random Effects Coefficient (Sig.)	(2) Random Effect Coefficient (Sig.)	(3) Random Effects Coefficient (Sig.)	(4) Random Effects Coefficient (Sig.)
Constant						-6.953 (0.000)***	-7.448 (0.000)***	-6.578 (0.000)***	-7.301 (0.000)***
Dividend Payout Ratio	Positive	0.043 (0.855)		0.050 (0.829)		0.051 (0.827)		0.060 (0.796)	
Franking Ratio	Negative	-0.065 (0.640)		-0.046 (0.733)		-0.068 (0.628)		-0.045 (0.734)	
Dividend Yield	Positive		6.328 (0.000)***		6.979 (0.000)***		5.571 (0.001)***		6.168 (0.000)***
Franking Credit Yield	Negative		-3.631 (0.153)		-2.914 (0.216)		-3.469 (0.174)		-2.697 (0.251)
Period Dummy	Positive					-0.316 (0.063)*	-0.350 (0.059)*	-0.318 (0.050)**	-0.362 (0.042)**
Tobin's' Q	Positive	0.091 (0.227)	0.111 (0.147)*	0.006 (0.932)	0.027 (0.718)	0.098 (0.184)	0.115 (0.124)*	0.009 (0.902)	0.028 (0.702)
Natural log of Total Assets	Positive	0.288 (0.000)***	0.301 (0.000)***			0.285 (0.000)***	0.297 (0.000)***		
Natural log of Market Cap.	Positive			0.284 (0.000)***	0.306 (0.000)***			0.281 (0.000)***	0.302 (0.000)***
Operating Cash Flow / Total Assets	Negative	-0.532 (0.466)	-0.369 (0.609)	-1.351 (0.053)**	-1.196 (0.084)*	-0.491 (0.494)	-0.361 (0.612)	-1.263 (0.067)*	-1.147 (0.093)*
Current Ratio	Negative	-0.100 (0.003)***	-0.097 (0.003)***	-0.110 (0.001)***	-0.101 (0.001)***	-0.102 (0.002)***	-0.099 (0.003)***	-0.111 (0.001)***	-0.103 (0.001)***
Debt/Total Assets	Positive	0.107 (0.668)	0.226 (0.359)			0.143 (0.564)	0.241 (0.322)		
Interest Coverage Ratio	Negative			-0.007 (0.295)	-0.009 (0.306)			-0.002 (0.268)	-0.004 (0.289)
Discount	Indeterminate	0.059 (0.028)**	0.055 (0.042)**	0.056 (0.035)**	0.052 (0.056)*	0.054 (0.044)**	0.051 (0.059)*	0.052 (0.053)**	0.048 (0.074)*
Log likelihood		-893.390	-885.210	-904.700	-895.657	-939.313	-932.502	-950.359	-942.745
Chi-Square		158.240 (0.000)***	174.600 (0.000)***	135.620 (0.000)***	153.710 (0.000)***	132.750 (0.000)***	141.600 (0.000)***	111.330 (0.000)***	121.740 (0.000)***
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. Random effect models are used if the levels of the independent variables are thought to be a small subset of all possible values. The random effect model compares the variance of means across the levels of a random factor. In fixed effect model, we make explicit comparison of one level against another.

Similarly, the natural logarithm of Market Capitalization, proxying for firm size, is positive and significant at the 0.01 level in fixed effects models (3) and (4) and in random effects models (3) and (4). These results strongly support hypothesis H5, that larger firms are more likely to underwrite their DRP than smaller firms.

The coefficient on Operating Cash Flow/Total Assets ratio is negative and significant at the 0.05 level in fixed effects (3) and at the 0.10 level in fixed effects model (4) and in random effects models (3) and (4). The coefficient on the variable Current Ratio is significant and negative in all fixed effects and random effects models at the 0.01 level of significance. DRPs with a lower cash flow profitability and liquidity are more likely to be underwritten, weakly supporting H6 and H7. The results of the leverage variables (Debt/Total Assets ratio and Interest Coverage Ratio) do not provide any strong evidence tosupportH8, that firms with a high leverage are more likely to underwrite their DRP than firms with a low leverage.

The coefficient on the variable Discount is positive and significant at the 0.05 level in fixed effects models (1) to (3) and random effects models (1) and (3) in other models the coefficient is positive and significant at the 0.10 level. The evidence does not support H9, that the decision to underwrite the DRP is unrelated to the discount for new shares issued under the DRP. Underwriters may prefer a DRP with a higher discount due to lower risk, and firms that have a low discount may not seek to underwrite the DRP due to likely higher underwriting fees.

7.8.4.1 2SLS logistic results

We estimate a 2SLS logistic model with Underwriting Dummy as the dependent variable and the variables firm size and discount as independent variables. The endogenous variable included in the model is Dividend Payout Ratio (Dividend Yield).[104]

[104]If the independent variables and the error term are correlated then this violates an assumption of the regression framework. That is, even as the sample size approaches infinity the estimates of the parameters on average will not equal the population estimates. To mitigate this problem we apply 2SLS, also called the instrumental variables (IV) procedure.

Table 7.6

2SLS Logistic model results

Panel A:2 SLS Logistic Model (Main Tests) Results (Full sample period, 1995-2009)

Estimated 2SLS logistic regression: Underwriting Dummy$_{i,\,t}$= β_0 + β_1Dividend Payout Ratio (predicted value)$_{i,\,t}$ + β_2 Natural log of Total Assets$_{i\,,t}$+ β_3 Discount$_{i\,,t}$ + Error.

Variable	Expected Sign	(1a) Logistic Coefficient (Sig.)	(1b) Robust Coefficient (Sig.)	(1c) Cluster Coefficient (Sig.)	(1d) Bootstrap Coefficient (Sig.)	(2a) Logistic Coefficient (Sig.)	(2b) Robust Coefficient (Sig.)	(2c) Cluster Coefficient (Sig.)	(2d) Bootstrap Coefficient (Sig.)
Constant		-0.807 (0.000)***	-0.807 (0.000)***	-0.807 (0.000)***	-0.807 (0.000)***	-0.818 (0.000)***	-0.818 (0.000)***	-0.818 (0.000)***	-0.818 (0.000)***
Dividend Payout Ratio(predicted value)	Positive	0.113 (0.427)	0.113 (0.229)	0.113 (0.550)	0.113 (0.243)	0.103 (0.468)	0.103 (0.272)	0.103 (0.589)	0.103 (0.302)
Natural log of Total Assets	Positive	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***	0.046 (0.000)***
Discount	Indeterminate					0.006 (0.108)*	0.006 (0.090)*	0.006 (0.085)*	0.006 (0.233)
Chi-Square		135.640 (0.000)***	116.740 (0.000)***	96.360 (0.000)***	317.250 (0.000)***	138.280 (0.000)***	121.560 (0.000)***	111.990 (0.000)***	351.910 (0.000)***
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.
Endogenous variable: Dividend Payout Ratio (Instrument variables: Period Dummy, Franking Ratio, Tobin's Q, Debt/Total Assets, Operating Cash Flow/Total Assets and Current Ratio).

In Panel A of Table 7.6, the coefficient on the predicted value of the Dividend Payout Ratio is positive but not significant in all models (1a) to (2d). Thus, there is no strong support for H1, that firms that have a high dividend payout are more likely to underwrite a DRP. The coefficient on the natural logarithm of Total Assets is positively significant at the 0.01 level in models (1a) to (2d). The evidence strongly supports H5, that larger firms are more likely to underwrite their DRP than smaller firms. The estimated coefficient on the variable Discount is positive and significant at the 0.10 level in models (2a) to (2c). The evidence rejects H9, that the firm’s decision to underwrite its DRP is unrelated to the discount for new shares issued under the DRP.

Panel B of Table 7.6 estimates the 2SLS model with the natural logarithm of Market Capitalization replacing the natural logarithm of Total Assets for robustness. The results in Panel B provide strong support for H1. The coefficient on the predicted value of Dividend Payout Ratio is positive and significant at the 0.01 level in models (3b), (4a) and (4b), positive and significant at the 0.05 level in model (3a) and positive and significant at the 0.10 level in model (4d). Similar to the results in Panel A of the variable natural logarithm of Total Assets, the coefficient on the natural logarithm of Market Capitalization is also positive and significant at the 0.01 level in all models (3a) to (4d). The evidence supports H5, that larger firms are more likely to underwrite their DRP than smaller firms. The coefficient on the variable Discount is positive and significant at the 0.10 level in models (3a) to (3d).The evidence again provides no support for H9, that the decision to underwrite is unrelated to the discount for new shares issued under the DRP.

Table 7.6 (Continued)

Panel B: 2 SLS Logistic Model (Robustness Tests) Results (Full sample period, 1995-2009)

Estimated 2SLS logistic regression: Underwriting $Dummy_{i,t} = \beta_0 + \beta_1$Dividend Payout Ratio (predicted $value)_{i,t} + \beta_2$Natural log of Market Capitalization $_{,t} + \beta_3 Discount_{i,t}$ + Error.

Variable	Expected Sign	(3a) Logistic Coefficient (Sig.)	(3b) Robust Coefficient (Sig.)	(3c) Cluster Coefficient (Sig.)	(3d) Bootstrap Coefficient (Sig.)	(4a) Logistic Coefficient (Sig.)	(4b) Robust Coefficient (Sig.)	(4c) Cluster Coefficient (Sig.)	(4d) Bootstrap Coefficient (Sig.)
Constant		-0.892 (0.000)***	-0.892 (0.000)***	-0.892 (0.000)***	-0.892 (0.000)***	-0.875 (0.000)***	-0.875 (0.000)***	-0.875 (0.000)***	-0.875 (0.000)***
Dividend Payout Ratio (predicted value)	Positive	0.338 (0.017)**	0.338 (0.001)***	0.338 (0.211)	0.338 (0.168)	0.347 (0.014)***	0.347 (0.001)***	0.347 (0.196)	0.347 (0.111)*
Natural log of Market Cap.	Positive	0.043 (0.000)***	0.043 (0.000)***	0.043 (0.000)***	0.043 (0.000)***	0.042 (0.000)***	0.042 (0.000)***	0.042 (0.000)***	0.042 (0.000)***
Discount	Indeterminate	0.007 (0.078)*	0.007 (0.062)*	0.007 (0.068)*	0.007 (0.123)*				
Chi-Square		106.340 (0.000)***	102.500 (0.000)***	100.850 (0.000)***	1055.170 (0.000)***	103.600 (0.000)***	98.000 (0.000)***	85.530 (0.000)***	150.280 (0.000)***
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Endogenous variable: Dividend Payout Ratio (Instrument variables: Period Dummy, Franking Ratio, Tobin's Q, Debt/Total Assets, Operating Cash Flow/Total Assets and Current Ratio).

In Panel C of Table 7.6 we introduce Dividend Yield in the place of Dividend Payout Ratio as an endogenous variable. The results in Panel C show that the coefficient on the predicted value of Dividend Yield is positive and significant at the 0.05 level in models (5c), (6b) and (6c) and positive and significant at the 0.10 level in models (5a), (5b), (5d), (6a) and (6d).Similar to the results presented in Panel B of Table 7.6, the evidence in Panel C also supports H1, that firms that have a high dividend yield are more likely to underwrite a DRP. The coefficient on the natural logarithm of Total Assets is positive and significant at the 0.01 level in all models (5a) to (6d). The results suggest that the effect of firm size on the decision to underwrite the DRP is highly significant (supporting H5). The coefficient on Discount is positive and significant at the 0.05 level in model (6b) and positive and significant at the 0.10 level in models (6a) and (6c). The results provide support in favour of the alternative hypothesis, that the decision to underwrite is related to the discount.

Table 7.6 (Continued)

Panel C:2SLS Logistic Model (Main Tests) Results (Full sample period, 1995-2009)

Estimated 2SLS logistic regression: Underwriting $Dummy_{i,t} = \beta_0 + \beta_1$Dividend Yield (predicted value)$_{i,t} + \beta_2$ Natural log of Total $Assets_{i,t} + \beta_3$ $Discount_{i,t}$ + Error.

Variable	Expected Sign	(5a) Logistic Coefficient (Sig.)	(5b) Robust Coefficient (Sig.)	(5c) Cluster Coefficient (Sig.)	(5d) Bootstrap Coefficient (Sig.)	(6a) Logistic Coefficient (Sig.)	(6b) Robust Coefficient (Sig.)	(6c) Cluster Coefficient (Sig.)	(6d) Bootstrap Coefficient (Sig.)
Constant		-0.611	-0.611	-0.611	-0.611	-0.621	-0.621	-0.621	-0.621
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.011)***
Dividend Yield (predicted value)	Positive	1.545	1.545	1.545	1.545	1.664	1.664	1.664	1.664
		(0.135)*	(0.057)*	(0.031)**	(0.057)*	(0.113)*	(0.044)**	(0.023)**	(0.059)*
Natural log of Total Assets	Positive	0.045	0.045	0.045	0.045	0.045	0.045	0.045	0.045
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Discount	Indeterminate					0.008	0.008	0.008	0.008
						(0.055)*	(0.051)**	(0.060)*	(0.311)
Chi-Square		132.510	107.320	67.440	115.560	134.750	111.390	95.150	132.050
		(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Notes. The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.
Endogenous variable: Dividend Yield(Instrument variables: Period Dummy, Franking Credit Yield, Tobin's Q, Debt/Total Assets, Operating Cash Flow/Total Assets and Current Ratio).

The results presented in Panel D of Table 7.6 show that the coefficient on the predicted value of Dividend Yield is positive but not significant in all models (7a) to (8d). The coefficient on the natural logarithm of Market Capitalization is positive and significant at the 0.01 level in all models (7a) to (8d).The coefficient on Discount is positive and significant at the 0.10 level in all models (8a) to (8d). Thus, there is strong support for H5 and H9 and weak support for H1.

Overall the results in Table 7.6 provide some support for H1, that firms that have a high dividend payout (dividend yield) are more likely to underwrite, with the coefficient on the predicted value of Dividend Payout Ratio in Panel B of Table 7.6 positive and significant in models (3a), (3b), (4a), (4b) and (4d). Similarly, the coefficient on the predicted value of Dividend Yield in Panel C of Table 7.6 for all models is positive and significant at the 0.10 level or better. The coefficient on the variable firm size is positive and significant in all models presented in Panels A to D in Table 7.6 (supporting H5). Lastly, the coefficient on the variable Discount is positive and significant in all models (1a) to (8d) shown in Panels A to D in Table 7.6.

Table 7.6 (Continued)

Panel D: 2SLS Logistic Model (Robustness Tests) Results (Full sample period, 1995-2009)

Estimated 2SLS logistic regression: Underwriting $\text{Dummy}_{i,t} = \beta_0 + \beta_1\text{Dividend Yield (predicted value)}_{i,t} + \beta_2\text{Natural log of Market Capitalization}_{,t} + \beta_3\text{ Discount}_{i,t} +$ Error.

Variable	Expected Sign	(7a) Logistic Coefficient (Sig.)	(7b) Robust Coefficient (Sig.)	(7c) Cluster Coefficient (Sig.)	(7d) Bootstrap Coefficient (Sig.)	(8a) Logistic Coefficient (Sig.)	(8b) Robust Coefficient (Sig.)	(8c) Cluster Coefficient (Sig.)	(8d) Bootstrap Coefficient (Sig.)
Constant		-0.657 (0.000)***	-0.657 (0.000)***	-0.657 (0.000)***	-0.657 (0.000)***	-0.663 (0.000)***	-0.663 (0.000)***	-0.663 (0.000)***	-0.663 (0.004)***
Dividend Yield	Positive	0.206 (0.855)	0.206 (0.818)	0.206 (0.798)	0.206 (0.872)	0.319 (0.780)	0.319 (0.726)	0.319 (0.700)	0.319 (0.785)
Natural log of Market Cap.	Positive	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***	0.044 (0.000)***
Discount	Indeterminate					0.007 (0.097)*	0.007 (0.083)*	0.007 (0.120)*	0.007 (0.019)**
Chi-Square		102.180 (0.000)***	86.870 (0.000)***	49.440 (0.000)***	48.400 (0.000)***	104.840 (0.000)***	90.700 (0.000)***	80.400 (0.000)***	750.190 (0.000)***
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Notes.The figures in parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Endogenous variable: Dividend Yield (Instrument variables: Period Dummy, Franking Credit Yield, Tobin's Q, Debt/Total Assets, Operating Cash Flow/Total Assets and Current Ratio).

7.8.5 Summary of results

In summary, the results in Tables 7.4, 7.5 and 7.6 support the univariate analysis in Table 7.3. We find strong evidence to support H5, that the larger the firm size the more likely it will be that the DRP is underwritten. DRPs are more likely to be underwritten for firms with lower liquidity compared to DRPs with higher liquidity. The results also provide some evidence that underwritten DRPs have higher dividend yield and lower franking credit yield, providing limited support for H1 and H2. There is strong evidence to reject H9 in favour of the alternative hypothesis, that a high discount is necessary to attract an underwriter who is willing to underwrite the DRP. There is some evidence to support H6, that UDRPs have lower cash flow profitability than non-UDRPs.

7.9 Conclusion

This chapter investigates the determinants of a firm's decision to underwrite a DRP in the Australian market. A UDRP is a dividend reinvestment plan in which the underwriter purchases sufficient shares at the issue price to ensure the guaranteed participation level. UDRPs enable firms to increase their dividend payout without depleting capital reserves.

Our study is important for the following reasons. First, firms often underwrite their DRPs in the Australian market. Second, as far as we are aware, no prior studies have examined the characteristics of firms that have an underwritten DRP in the Australian market. Third, dividend imputation encourages firms to increase their dividend payout. However, firms with growth opportunities or facing financial constraints may be reluctant to increase their dividend payout (and distribute maximum franking credits), unless they can be certain a sufficient level of funds will be reinvested into the firm. An UDRP ensures the firm has a minimum level of cash dividends reinvested back in the firm.

Overall, this chapter provides empirical results that weakly support the impact of taxation factors on the characteristics of firms that underwrite their DRP. We find some evidence that firms underwriting a DRP had a higher dividend yield and a lower franking yield, and that firms that underwrite their DRP are larger in size, have higher debt and lower liquidity than non-UDRP firms. We also find evidence to show that discount is related to the decision to underwrite, rejecting the null hypothesis H9.

The results may have the following implications. First, characteristics that motivate the decision to underwrite a DRP may provide insights to the firm that help them to decide whether it is in the best interests of the firm to engage the services of an underwriter. In this respect, our study provides evidence to suggest that firm characteristic variables influence the decision to underwrite a DRP. Second, where the underwriter is liable to meet the shortfall in demand by purchasing unsubscribed shares at the offer price, getting an insight into the characteristics of the firm may help the underwriter to price the underwriting services to compensate for the risk of incurring any capital loss. Third, our results provide useful information to existing shareholders of firms to make a more informed decision when they are about to participate in an underwritten DRP.

CHAPTER EIGHT
DETERMINANTS OF NON-UNDERWRITTEN PARTICIPATION RATE

8.1 Introduction

This chapter examines factors that explain shareholder participation rates in Australian DRPs. These factors include the discounts on new share issues often offered by these plans, the absence of brokerage costs,[105] the tax benefits of dividend imputation, the accumulation of a larger shareholding through the compounding of dividends over time and the benefit of dollar cost averaging. DRPs are not limited to small shareholders in the US market. Todd and Domian (1997) argue that while the plans were used initially by individual investors, an increase in the usage of the plans has stemmed from institutional participation.

The remainder of this chapter is organized as follows. Section 8.2 discusses the motivation for the study. This is followed by an overview of relevant literature in Section 8.3. The hypotheses to be tested are discussed in Section 8.4, and Section 8.5 outlines the data and sample period of our study. The methodology we employ in our empirical tests is discussed in Section 8.6. Section 8.7 presents the summary statistics and empirical results and Section 8.8 concludes the chapter.

8.2 Motivations for the study

The focus of our study is on the non-underwritten participation rate over a fifteen-year period, 1995-2009.[106] The non-underwritten participation rate is defined as the percentage subscription of DRP shares by the existing shareholders of the firm.

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[105]For example, ANZ in its DRP terms and conditions booklet of 2008 states that no brokerage, commission or other transaction costs will be payable by a shareholder on shares provided under the DRP, and no stamp or other transaction duties will, under the present law, be payable by a DRP participant.

[106]Due to data constraints we exclude from the sample underwritten DRPs in most of our tests. We could not obtain accurate information on the underwriter's subscription to shares issued or take-up of any shortfall under those DRPs that were underwritten. However, in our multivariate analysis we include an underwriting dummy as an independent variable to test the impact of underwriting on the DRP participation rate.

A study of firm characteristics that motivate the non-underwritten participation rate is important for the following reasons. First, by issuing authorized but unissued shares, firms have an influx of new equity capital through DRPs. An investigation of the shareholder participation rate enables the management of the firm to ascertain the firm characteristics and DRP features that motivate the existing shareholders to participate in a DRP. For example, firms that require funds for investment and wish to avoid underwriting costs may consider discounts on new share issues to achieve a higher shareholder participation rate.

Second, an understanding of the factors and firm characteristics that explain shareholder participation rates may help the firm to decide whether or not to underwrite the DRP. Underwritten DRPs are a common feature in the Australian market (see Chapter 7).

Third, unlike Wills (1989), who studied the DRP participation rate in the Australian market for the period between 1982 and 1987, our study covers a period of 15 years between 1995 and 2009 including the post July 2000 tax credit refund period. Will's study concentrates on two aspects: (i) the discounts on new shares issued under the DRP, and (ii) the trading period over which prices are averaged to determine the market price of shares issued under the DRP. Wills (1989) reports that higher discount rates encourage greater shareholder participation and there is greater shareholder participation in DRPs where the issue price for DRP shares is based on ex-dividend trading. We extend Will's analysis by examining the impact of the firm characteristics and the discount, under the Australian dividend tax imputation system, on the existing shareholder participation rate.

Fourth, Chan et al.'s (1996) event study examined the announcement effects on shareholder returns of Australian firms adopting a DRP with 5%, 7% and 10% discounts. Although DRPs as a whole were received positively by the market, market reactions to plans with different levels of discounts varied significantly. The market reaction to the 10% and 5% discount samples were indifferent, with the 7.5% discount sample the only one that produced a statistically significant positive abnormal return on the event day. Chan et al.(1996) give the following explanations for these differing results: (i) the 5% discount plans were generally introduced before the implementation of dividend imputation in1987, (ii) the 7.5% and 10% plans were common following dividend imputation, when DRPs were modified for investors to 'stream' their dividends[107] for maximum tax advantage, and (iii) the indifferent reaction to the10%discount plans could be the investors being concerned about the potential transfer of wealth from non-participants to participating shareholders or perhaps the build-up of free cash flow in firms with a low growth prospect. Chan et al. do not provide any empirical evidence to support these arguments. Our study investigates the effect of firm and DRP characteristics (e.g., taxes, growth, free cash flow and agency costs and the discounts on new share issues under the DRP) on the existing shareholder's decision to participate in a DRP.

Fifth, Zammit (1995) (as cited in Chan et al., 1996) found that both the number of DRPs and participation rates have increased significantly since the introduction of the imputation tax system in 1987. Our study provides further empirical evidence both on the growth of DRPs and the shareholder participation rates post the 2000 tax credit refund reform. Thus, we seek to extend the scope of the existing body of literature by analyzing the factors or determinants that affect the existing shareholder's decision to participate in a DRP.

8.3 Brief overview of participation literature

The empirical evidence from prior literature on the relationship between DRP participation rate and firm characteristics is mixed. Studies that examined the relationship between DRP participation rate and firm characteristic variables include Pettway and Malone (1973) and Malone (1974). Pettway and Malone (1973) regressed the participation rates of 33industrial firms' DRPs on several firm characteristics for the year 1972 in the US market. Their result

[107]Dividend streaming is a strategy that aims to direct ('stream') dividends with imputation credits attached to those shareholders for whom imputation credits are of most value. For example, as resident shareholders are able to use imputation credits to lower their tax liability while non-resident shareholders are not, dividend streaming would see profits that have imputation credits attached to them paid to resident shareholders, while profits without imputation credits attached to them would be paid to non-resident shareholders.

shows that a current high stock return may entice investors to join the DRP in anticipation that future returns will be just as good. Pettway and Malone's (1973) results also show that the shareholder participation rate is positively related to the size of the firm and negatively related to its leverage.

Malone's (1974) study, based on a survey in the US market, finds that among utilities the participation rate is significantly correlated with a lower return on book value and is insignificantly correlated with dividend payout ratio, total assets and higher growth. Among industrials, the DRP participation rate was significantly and positively correlated with lower payout ratio, debt to equity ratio, higher price to earnings ratio, number of shareholders and higher growth.

Todd and Domian (1997) obtained the annual participation rates through a survey conducted in the US market during the year 1990. Each firm was asked to provide information, between 1974 and 1989, on the percent of eligible shareholders that participated, the percent of total outstanding shares that participated, the percent discount offered, whether the plan used new issues or market shares and whether additional cash contributions were allowed. Todd and Domian's study shows that for firms with discount DRPs, participation rates as a percentage of eligible shareholders or outstanding shares were significantly greater, on average, than for firms who did not offer discounts on their DRPs. These results suggest that the discount feature entices shareholders to participate in a firm's DRP. They also tested whether the participation rate in the firm's DRP is directly related to returns on the firm's stock and found that the utility firm's participation as the percent of eligible shareholders is significantly affected by lagged return variables at the 10% significance level. Todd and Domian (1997) tested the impact of tax deferment on DRP participation for qualified utilities for the period 1982-1983, the years in which the tax deferment was in effect. They defined participation rate both in terms of the percentage of eligible shareholders and percentage of outstanding shares. The results show that the effect of the tax deferment on reinvested dividends on DRP participation is evident in the percentage of eligible shareholders but not outstanding shares. The reason for this is that the tax deferment benefits were not as beneficial to large US shareholders, corporations or institutional investors as to individual investors.

Lyroudi (1999) examines the DRP participation rate in the US market during the years 1980-1990. The results indicate that taxes play a significant role for DRP participation.[108]Lyroudi finds that overall, the dividend payout ratio is negatively related to the participation rate and the discount for new shares is positively related to the DRP participation rate.[109]Lyroudi also finds that (i) the DRP participation rate declines for those companies that have excess cash, (ii) there is a significant positive relationship between the participation rate and the leverage of the firm, (iii) the relationship between the DRP participation rate and the price to earnings ratio was negative but not significant, and (iv) there is a negative relationship between the liquidity of the firm and the participation rate. Lyroudi's study shows that DRPs are regarded more favourably by small and individual investors than institutional investors. Lyroudi (1999) finds higher participation rate in smaller firms.

Baker and Meeks (1990) find that the discount feature does not significantly influence the shareholder participation rate in a US DRP. However, in the Australian market, Wills (1989) finds that there is a significant positive relationship between the discount and the DRP participation rate. Wills did not examine how firm specific factors such as quality of management, gearing ratios and industry prospects affect the participation rate.

Zammit (1995) (as cited in Chan et al., 1996) reports that Australian executives regard the level of discount offered to be an important feature in attracting a greater volume of dividend

[108] The Economic Recovery ACT of 1981(ERTA) allowed a stockholder of either common or preferred stock of a public utility that offered a DRP (after December 31, 1981 and before January 1, 1986) to exclude from gross income up to $750 of dividends per taxable year ($1500 for a couple filling a joint return), for any dividend he or she received in the form of stock rather than cash.

[109] Lyroudi (1999) argues that since cash dividends and reinvested dividends were treated similarly by the tax code, there were no tax-motivated clientele effects till the introduction of the Economic Recovery Act in 1981.

reinvestment and that both the number of DRPs and the participation rates have increased significantly since the introduction of the dividend tax imputation system in 1987.Chan et al. (1996) find that the average DRP participation rate in the Australian market increased from 20% in 1987 to 45% in 1993. They conclude that most of the growth of DRPs and the increasing rate of participation occurred post the introduction of the dividend tax imputation system in 1987.

8.4 Hypothesis development

This section develops hypotheses to empirically test the theories concerning the non-underwritten participation rate. Theories that may explain why firms want investors to participate in the DRP, and why shareholders want all or part of their dividend entitlements reinvested in the DRP are broadly classified into (i) the signalling and taxation theory, (ii) the growth hypothesis, (iii) the size hypothesis, (iv) the free-cash flow and agency costs and leverage hypotheses, and (v) the discount hypothesis.

8.4.1 Signalling and taxation

The signalling arguments on DRP participation rate can be summarized as follows. First, within the framework of the signalling theory, the distribution of dividends has been shown to present a strong signal to the market regarding future firm profitability (Michaely et al., 1995). When initiating a dividend stream a firm also considers its ability to continue the dividend payments (Baker et al., 2002). DRPs enable the firm to avoid a dividend cut and a negative market reaction (Lintner, 1956).

Second, DRPs suggest a change in the firm’s dividend policy and its payout ratio and can be interpreted as a positive signal by the market concerning the firm’s future cash flows affecting the price of the firm’s stock (Lyroudi, 1999).

Third, superannuation funds and other taxpaying resident Australian investors who participate in DRPs enable the firm to have a stable stockholder base, which may lower stock price volatility. That is, new-issue DRPs create a steady demand for the purchase of the firm’s stock and this may reduce the wide swings in the firm's stock value or at least provide a level of market value support. This may provide a positive signal to the market and encourage higher shareholder participation.

Fourth, Bellamy (1994) provides evidence that firms paying dividends increase their payouts to ensure that franking credits are passed on to shareholders, and that firms pay a constant level of franking credits to satisfy the demands of their clientele. Therefore, under the Australian dividend imputation tax system, firms with a DRP and high dividends with attached franking credits may provide a positive signal of future earnings. This may enhance the existing shareholder participation rate in a DRP.

Similarly, we suggest the following taxation arguments for high DRP participation under the Australian dividend tax imputation system. First, most Australian resident shareholders attribute value to franking credits (Brown & Clarke, 1993; Bellamy, 1994; Walker &Partington, 1999). Thus, the dividend imputation system (i) creates a tax-based preference for dividends with attached franking credits[110] and (ii) reduces the tax penalty associated with personal taxes on dividends. When dividends are franked, shareholders who participate in the DRP will not face a cash shortfall by funding tax payment on the dividends compared to a cash tax shortfall under the classical tax system.

Second, the July 2000 tax credit refund reform enables superannuation funds and tax-paying domestic investors to claim a refund for unused franking credits. This incentivizes these shareholders to participate in the DRP for the following reasons: (i) there is less tax leakage for shareholders, because shareholders have no or only a small requirement to pay taxes on dividends if dividends are franked, and (ii) if shareholders fail to participate, firms will not be able to commit to high payouts to distribute franking credits. This may suggest an interaction

[110] See Chapter 2, Section 2.6 for details.

between franking credit ratio and dividend payout ratio with respect to the non-underwritten participation rate.[111]

In summary, the dividend imputation system and the changes to the taxation of capital gains will have shifted Australian resident shareholders' preferences in favour of franked dividends. A DRP enables firms to increase their dividend payout ratio and distribute higher levels of franking credits to the firm's shareholders. Superannuation and pension funds taxed at a concessional rate of 15% are important shareholders in the Australian market (Chan et al., 1995). They and other resident Australian shareholders may prefer DRP stocks, as these are perceived as having the ability to offer higher payouts with attached franking credits. To enable the firm to maintain a high dividend payout ratio and distribute maximum franking credits, shareholders may, therefore, be willing to provide a minimum level of participation in the DRP.

Therefore, consistent with the findings of Nicol (1992) that the overall dividend payout ratios of Australian firms have increased significantly since imputation and the incentives for the firm to increase franked dividends, we posit that DRP firms with a higher participation rate are likely to have higher dividend payout ratios and distribute more franking credits than DRP firms with a lower participation rate. We hypothesize:

H1: DRP firms with a higher dividend payout ratio (dividend yield) have a higher shareholder participation rate than DRP firms with a lower dividend payout ratio (dividend yield).

H2: DRP firms with a higher franking ratio (franking credit yield) have a higher shareholder participation rate than DRP firms with a lower franking ratio (franking credit yield).

The ability to utilize and claim a refund for the unused franking credits can significantly affect the shareholder participation rate. Chan, McColough and Skully (1993) found that the announcement to introduce a DRP was valued positively once superannuation funds could utilize the imputation credits. The July 2000 tax credit refund reform enables the superannuation funds and tax-paying domestic investors to claim a refund for unused franking credits. Given

[111] In multivariate analysis we test the effect of this interaction.

that DRPs enable most Australian firms to increase dividend payouts while maintaining their investment activities, the introduction of a DRP could be viewed by investors as good news that the firm would payout more franked dividends. Thus, the July 2000 tax credit refund reform may further incentivize the existing resident Australian shareholders and institutional investors (superannuation and pension funds) to reinvest their dividends in a DRP.

We, therefore, posit that there will be a greater shareholder participation rate in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000) and hypothesize that:

H3: The shareholder participation rate is higher in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000).

8.4.2 Growth

The studies of Keown, Perumpral and Pinkerton (1991) and Finnerty (1989) suggest that firms perceive DRPs as a relatively inexpensive (through lower transaction costs) and cost-effective way to raise new outside equity capital (see Chapter 3). Hansen, Pinkerton and Keown (1985) reported that in 1974 new issue DRPs accounted for five percent of new equity offerings, and in 1985 they accounted for more than seventeen percent of all externally raised equity capital by US firms. Chan et al. (1996) reported that in 1995 DRPs accounted for 28.3 percent of the new equity capital raised by Australian firms. The evidence presented in Table 2.3 in Chapter 2 shows that the equity capital raisings through DRPs have increased from 3,441 million dollars in the 1995-1996 period to 10,186 million dollars in the 2009-2010 period. Table 2.3 also shows that the amount of equity capital raised through DRPs in the post–tax credit refund periods between 2001-2002 and 2009-2010 was 73,525 million dollars. This is much higher than the $20,843 million dollars of equity capital raised through DRPs in the pre–tax credit refund period between1995-1996 and between 2000-2001.DRPs had a strong appeal for those investors who were willing to reinvest their dividends for higher expected returns in the future (Lyroudi, 1999). By investing further in their firms, investors may have high expectations for future growth.

A new issue DRP may also signal that the management perceives that there are sufficient positive net present value projects within the firm and that the new equity raised under the DRP will not lead to excess cash flows and wasteful investment. Thus, existing shareholders are more likely to provide additional equity to a growth firm with a DRP (as it has positive NPV investments) than to a non-growth firm with a DRP.

Prior studies have documented a positive relationship between firm growth and DRP adoption. Hansen et al. (1985) posit that the share price will increase so long as the present value of additional expected earnings resulting from the adoption of the DRP exceeds the present value of reinvested dividends. Roden and Stipling (1996) show positive abnormal stock returns for DRP announcements. Chan et al. (1995) also provide evidence of a positive DRP announcement effect in the Australian market. In the US market, Todd and Domian (1997) argue that firms with more growth opportunities are more likely to have a higher participation rate than firms with few growth opportunities. Thus, shareholders that participate in DRPs perceive higher growth over time (Baker & Seippel, 1980).

In summary, we posit that firms with high growth will have a greater participation rate. Thus, we hypothesize:

H4: High growth firms with a DRP have a greater shareholder participation rate than low growth firms with a DRP.

8.4.3 Size

Firm size may motivate shareholders to participate in a DRP. Superannuation funds and pension funds that participate in a DRP may preferentially seek liquid stocks that are actively traded on the stock exchange. The stocks of large firms are typically more actively traded, reducing liquidity risk. Information on large firms is more easily and publicly available, and analysts and brokerage houses tend to give greater coverage to larger firms. This enables the participating investors to reduce research costs for any further investment dealings.

Pettway and Malone (1973) find that the shareholder participation in a DRP in the US market is positively related to the size of the firm. We predict, ceteris paribus, that large firms are more likely to have greater shareholder participation rate than small firms due to greater liquidity and more publicly available information. We hypothesize:

H5: Large firms with a DRP have a greater shareholder participation rate than small firms with a DRP.

8.4.4 Free-cash-flow and leverage

Lang and Litzenberger (1989) argue that if there is cash flow in excess of the required amount to finance all positive net present value projects, conflicts of interest will arise between stockholders and managers. Lyroudi (1999) posits that new issue DRP will generate more equity funds and will increase the firm's cash reserves and borrowing capacity. The firm may then not have enough positive net present value projects in which to invest surplus funds. Thus, a DRP could exacerbate the free cash flow agency costs problem.

This suggests that investors might be less willing to participate in the DRPs of firms with a high level of operating cash flow (operating cash flow profitability) and a high level of current ratio (liquidity). This is because shareholders perceive there could be significant agency costs issues if the firm has excess cash and there is a risk of wasteful investment or excessive managerial perquisites.

Thus, we predict that firms with lower operating cash flow profitability and lower liquidity/current ratio will have a greater shareholder participation rate than firms with higher operating cash flow profitability and a higher liquidity or current ratio. We hypothesize:

H6: DRP firms with lower operating cash flows have a greater shareholder participation rate than DRP firms with higher operating cash flows.

H7: DRP firms with lower liquidity (current ratios) have a greater shareholder participation rate than DRP firms with higher liquidity (current ratios).

Debt contracts oblige the firm to make a fixed set of cash payments over the life of the loan. Adding more debt to the firm's capital structure can serve as a credible signal of high future cash flows. By committing the firm to making future interest payments to bondholders, managers communicate their confidence that the firm will have sufficient cash flows to meet these obligations. Smith and Watts (1992) suggest that debt reduces the agency cost of equity. Therefore, for DRP firms, debt can have substantial benefits in controlling the "free-cash-flow" problem(Jensen, 1986).Debt payments may also serve as a mechanism to reduce cash flows under management control, and thus mitigate the agency costs problem. In addition, the pecking order theory suggests that high growth firms with lower operating cash flows will have high debt ratios (Myers, 1984).This suggests that investors concerned with agency costs issues prefer to participate in DRP stocks with high leverage.

Thus, consistent with the finding of Lyroudi (1999) in the US market, we predict that firms with higher relative debt levels, ceteris paribus, are more likely to have greater shareholder participation rate than firms with lower debt levels. We hypothesize:

H8. DRP firms with higher leverage have greater shareholder participation rate than DRP firms with lower leverage.

8.4.5 Discount

The price discount feature of the DRP provides shareholders with an additional incentive to participate in the plan by allowing shares to be acquired at a price below the prevailing market price. The price is typically the weighted average market price of the shares traded on the Australian Stock Exchange during a five to ten day period after the relevant ex-dividend date.[112]

[112]For example, the ANZ "DRP terms and conditions, 2008" states that the price of shares issued under the DRP is the arithmetic average of the daily volume weighted average sale price of all shares sold on ASX in the ordinary course of trading on ASX during the pricing period (defined as five to ten days) less a discount (if any) rounded to

Anderson (1986) states that discount DRPs have had strong support from the firm's management in the Australian market and that they are met with widespread approval from shareholders. Lyroudi (1999) argues that the participation rate is expected to be higher for discount DRPs compared to non-discount DRPs as the discount feature has been introduced by managers in order to make the DRPs more attractive. Wills (1989) found that participation in Australian DRPs is positively related to the size of the discount offered. Todd (1992) states that US companies that offered the discount feature in their DRPs had significantly higher participation levels than firms that did not offer the discount feature. Lowenstein (1990) suggests that DRP discount levels underlie the increasing reliance on DRPs among major Australian companies.

A 1994 survey of Australian shareholder preferences by Green Chip Funds Management reported that, of over 2,700 shareholders, 52% of respondents preferred a 10% DRP discount to market price while 23% of shareholders preferred a 7.5% discount and only 10% of investors preferred a 5% discount. Zammit (1995) (as cited in Chan et al., 1996) found that Australian executives regard the level of discount offered to be an important feature in attracting a greater volume of dividend reinvestment. Industry interviews in the Australian market suggest that Australian firms are aware of the positive relationship between the discount and the participation rate and they offer a discount for new shares in the DRP to raise the participation levels (Chan et al., 1995).

Thus, we posit that discount DRPs are likely to have a greater shareholder participation rate compared to non-discount DRPs and, ceteris paribus, the higher the discount the greater the participation rate. Thus we hypothesize:

H9: DRP participation rate increases with the level of the discount for new shares issued.

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the nearest whole cent, but if the fraction is one half of a cent the amount is to be rounded down to the nearest whole cent.

8.5 Data

We collected data for firms that introduced a DRP over the years 1995 to 2009. A database consisting of all DRP observations was constructed using data sourced from DAT Analysis, FIN Analysis, Company Annual Reports, Company Announcements and Company DRP Prospectuses. The final sample of DRP firms was determined, based on the availability of DRP details and accounting and equity data for the sample period. The final sample comprised 343 observations from firms with a DRP in the pre-tax credit refund period (1995-2000) and 1,304 observations from firms with a DRP in the post-tax credit refund period (2001-2009).[113] We divided the sample period into pre and post-tax credit refund periods for our univariate analysis.

The focus of our study is on the participation rate for non-underwritten DRPs, albeit we also undertake some empirical analysis on the participation rate for the combined sample of underwritten and non-underwritten DRPs. The reason is that we could not obtain accurate information on the underwriter's subscription to shares issued or the take-up of any shortfall under those DRPs that were underwritten. We could also not obtain sufficient information on the underwriting trigger level, that is, the participation rate where the underwriter is obliged to make-up any shortfall.

8.6 Methodology

We define the DRP participation rate as:

$$\text{DRP participation rate} = \frac{\text{Total Annual Dividends Reinvested}}{\text{Total Annual Dividends declared in the year}}$$

The Total Annual Dividends Declared for the Year (i.e., the sum of the dollar value of the Interim, Final and Special dividends) is obtained from the firm's Profit & Loss or Statement of Income Account. The Total Annual Dividends Reinvested is the (Issue Price of Shares under Interim Dividend * No. of DRP Shares issued under an Interim Dividend) + (Issue Price of Shares under Final Dividend * No. of DRP Shares issued under the Final Dividend) + (Issue

[113] See Table 7.2 in Chapter 7.

Price of Shares under Special Dividend * No. of DRP Shares issued under the Special Dividend).

For the univariate analysis of the non-dichotomous independent variables we divide the DRP sample of firm observations into two groups based on a split of the median participation rate. HPR group includes DRP firms with a high participation rate and LPR group has DRP firms with a low participation rate. We present a univariate analysis of the participation rate variable for the HPR and LPR groups (i) by year and periods, and (ii) for both the non-underwritten and underwritten DRPs. In the multivariate analysis we use a linear regression model. The dependent variable is the participation rate and the independent variables are the firm characteristics and the discount variable. Our linear model is:

DRP participation rate $_{i,\,t}$ = β_0+ β_1Dividend Payout Ratio$_{i,\,t}$ + β_2 Average Franking Ratio$_{i,\,t}$ + β_3 Period Dummy+ β_4Tobin's Q$_{i,\,t}$+ β_5 Natural log of Total Assets$_{i,\,t}$ + β_6 Operating Cash Flow/ Total Assets$_{i,\,t}$ + β_7 Current Ratio$_{i,\,t}$ + β_8 Debt/ Total Assets $_{i,\,t}$+ β_9Discount$_{i,\,t}$ + Error term.

(8.1)

The variables are expressed for the i^{th} firm in the t^{th} period. In robustness tests, we run a linear regression similar to Eq. (8.1) with alternative variables (Dividend Yield and Franking Credit Yield) to test the taxation hypothesis and Interest Coverage Ratio to test the leverage hypothesis. We use the bootstrap method to correct for standard errors.

We also estimate Eq. (8.1) using the full sample of underwritten and non-underwritten DRPs with an Underwriting Dummy as an additional independent variable (Underwriting Dummy takes a value of 1 for underwritten DRP observations otherwise 0). We include an Underwriting Dummy variable to test the effect of underwriting of DRP on participation rate.[114]

Table 4.5 in Chapter 4 lists the definitions of the explanatory variables used in Eq. (8.1). We predict that firms with a high dividend payout ratio/dividend yield will have a greater non-

[114] We run this regression for robustness tests.

underwritten participation rate than firms with a low dividend payout ratio/dividend yield. We predict a positive coefficient on the variable Dividend Payout Ratio/Dividend Yield (H1). The Average Franking Credit Ratio/Franking Credit Yield is added as an explanatory variable to test the effect of the tax changes and we expect a greater non-underwritten participation rate for firms with a high franking credit ratio than firms with a low franking credit ratio. We predict that the Average Franking Credit Ratio/Franking Credit Yield will have a positive coefficient (H2). The Period Dummy variable tests for the impact of the July 2000 tax credit refund reform effect (H3). We expect a positive coefficient on Period Dummy.

Tobin's Q is used as a proxy for growth to test the growth hypothesis (H4). The coefficient on Tobin's Q is expected to be positive since growth opportunities are predicted to be positively associated with the non-underwritten participation rate. Size is defined as either the natural logarithm of Total Assets or the natural logarithm of Market Capitalization, and is predicted to be positively related to the non-underwritten participation rate (H5). The coefficient estimates for cash flow profitability, defined as Operating Cash Flow/Total Assets, and liquidity, defined as the firm's Current Ratio (Total CurrentAssets/Total Current Liabilities), are expected to be negative under the free-cash-flow hypothesis (H6 and H7).Debt is defined as Debt/Total Assets, which is a proxy for firm leverage. The coefficient estimate for Debt/Total Assets is expected to be positive under the free-cash-flow and leverage hypotheses. We predict firms with high debt will have a greater non-underwritten participation rate compared to firms with low debt (H8). The coefficient estimate of Interest Coverage Ratio, the alternative proxy for leverage, is expected to be negative. We predict that discount DRPs are likely to have greater shareholder participation in the DRP than non-discount DRPs. Thus, we predict a positive coefficient on Discount (H9).

We estimate both random effects and fixed effects models (logistic panel regressions) in our multivariate analysis using panel data.[115] We also estimate a two-stage least-squares linear model (2SLS) for robustness.[116]The estimated 2SLS linear regression is:

DRP participation rate $_{i,\,t}$= β_0 + β_1Predicted Dividend Payout Ratio (Dividend Yield)$_{i,\,t}$ + β_2 Firm Size$_{i,\,t}$+ β_3 Discount$_{i,\,t}$ + Error

(8.2)

The variables in Eq. (8.2) are expressed in the i^{th} firm in the t^{th} period. We estimate the Predicted Dividend Payout Ratio (Dividend Yield) using the instrumental variables of Franking Credit Ratio (Franking Credit Yield), Period Dummy, Tobin's Q, Operating Cash Flow/Total Assets and Current Ratio. The other variables in Eq. (8.2) take the same meaning as in Eq. (8.1).

8.7 Empirical results

8.7.1 Summary statistics

Table 8.1 details the sample of DRPs over the sample period between 1995 and 2009, split between non-underwritten DRPs and total DRPs. Over the period 1995 to 2009, there is some evidence of an upward trend in the percentage of non-underwritten DRPs. The percentage of non-underwritten DRP observations was 70.5% in 1995. This is lower than the percentage of non-underwritten DRP observations at the end of the sample period in 2009 (85.2%). Between 1995 and 2000, there was an overall increase in the percentage of non-underwritten DRP observations except for a decline in 1998.

Between 2001 and 2004, there was a decline in the percentage of non-underwritten DRP observations from 78.6 % in 2001 to 76.8% in 2004. However, between 2005 and 2008, there is

[115]Random effect models are used if the levels of the independent variables are thought to be a small subset of all possible values. The random effect model compares the variance of means across the levels of a random factor. In the fixed effect model, we make explicit comparison of one level against another.

[116]If the independent variables and the error term are correlated then this violates an assumption of the regression framework resulting in inconsistent estimates. That is, even as the sample size approaches infinity, the estimates of the parameters on average will not equal the population estimates. To mitigate this problem we apply 2SLS, also called the instrumental variables (IV) procedure. The 2SLS linear model is estimated using STATA 12 version.

an increase in the percentage of non-underwritten DRP observations from 79.1% to 86% in 2008. In 2009, the percentage of non-underwritten DRP observations declined to 85.2%.

Table8.1
Participation sample characteristics

Year	No. of Non-underwritten DRP observations	Total (Non-underwritten and underwritten DRP observations)	% Non-underwritten DRP observations
1995	31	44	70.5
1996	40	51	78.4
1997	49	61	80.3
1998	44	63	69.8
1999	87	108	80.6
2000	92	118	80.0
2001	103	131	78.6
2002	105	135	77.8
2003	108	143	75.5
2004	126	164	76.8
2005	140	177	79.1
2006	167	203	82.3
2007	186	223	83.4
2008	202	235	86.0
2009	167	196	85.2

DRP = Dividend Reinvestment Plan

8.7.2 Univariate results

8.7.2.1 UDRPs and non-UDRPs

Table 8.2 presents the univariate analysis for the participation rate variable for the sample of underwritten DRPs ("UDRPs") and non-underwritten DRPs ("non-UDRPs"). The descriptive statistics for the participation rate variable for both groups are shown by year for the full sample period and for the two sub-periods of pre and post-tax credit refund. The evidence presented in Panel A of Table 8.2 shows an overall increase in participation rate when a DRP is underwritten.

Table 8.2

Univariate analysis of participation rate variable by year and period

Panel A: Univariate analysis (Participation Rate) by year and period

	UDRP						NUDRP							
Year	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
1995	13	0.359	0.209	0.296	0.118	0.591	31	0.303	0.238	0.244	0.129	0.366	0.651 (0.518)	-0.399 (0.690)
1996	11	0.283	0.293	0.241	0.119	0.471	40	0.243	0.186	0.180	0.120	0.332	0.591 (0.557)	0.298 (0.766)
1997	12	0.291	0.214	0.194	0.134	0.441	49	0.291	0.274	0.202	0.147	0.406	-0.013 (0.990)	-0.212 (0.710)
1998	19	0.308	0.197	0.258	0.139	0.470	44	0.272	0.214	0.214	0.121	0.357	0.581 (0.563)	-0.210 (0.834)
1999	21	0.334	0.292	0.214	0.186	0.391	87	0.347	0.306	0.236	0.178	0.444	-0.223 (0.824)	-0.136 (0.892)
2000	26	0.376	0.315	0.286	0.155	0.533	92	0.326	0.258	0.254	0.141	0.478	0.862 (0.390)	-0.870 (0.384)
2001	28	0.368	0.345	0.226	0.199	0.483	103	0.279	0.216	0.206	0.131	0.412	1.987 (0.049)*	2.100 (0.036)**
2002	30	0.351	0.279	0.267	0.165	0.482	105	0.299	0.263	0.225	0.132	0.368	1.067 (0.288)	0.942 (0.346)
2003	35	0.430	0.348	0.289	0.191	0.622	108	0.310	0.236	0.241	0.155	0.378	2.425 (0.017)**	2.305 (0.021)**
2004	38	0.379	0.315	0.240	0.199	0.517	126	0.270	0.216	0.211	0.097	0.347	2.706 (0.008)***	2.950 (0.003)***
2005	37	0.364	0.307	0.224	0.189	0.426	140	0.259	0.231	0.183	0.096	0.355	2.950 (0.004)***	2.857 (0.004)***
2006	36	0.411	0.390	0.241	0.229	0.566	167	0.264	0.217	0.188	0.124	0.375	4.023 (0.000)***	3.472 (0.001)***
2007	37	0.394	0.335	0.267	0.172	0.569	186	0.285	0.226	0.200	0.139	0.395	2.832 (0.005)***	2.277 (0.023)**
2008	33	0.380	0.312	0.269	0.159	0.533	202	0.248	0.185	0.209	0.088	0.340	3.214 (0.001)***	2.997 (0.003)***
2009	29	0.368	0.313	0.273	0.139	0.559	167	0.234	0.192	0.176	0.098	0.323	3.444 (0.001)***	2.470 (0.014)***
Pre-tax credit refund period (1995-2000)	102	0.332	0.246	0.250	0.143	0.455	343	0.308	0.252	0.230	0.140	0.393	0.937 (0.349)	0.643 (0.520)
Post-tax credit refund period (2001-2009)	303	0.384	0.325	0.253	0.182	0.535	1304	0.269	0.218	0.204	0.118	0.365	8.452 (0.000)***	7.772 (0.000)***
Full sample period (1995-2009)	405	0.371	0.312	0.253	0.171	0.506	1647	0.277	0.225	0.210	0.123	0.372	7.752 (0.000)***	7.158 (0.000)***

Note. UDRP = Underwritten DRP. NUDRP = Non-Underwritten DRP. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The mean (median) participation rate for UDRPs for the full sample period is 0.371(0.312). This is higher than the mean (median) participation rate for the non-UDRPs of 0.277 (0.225). The differences in means and medians are significant at the 0.01 level. The mean (median) participation rate for the UDRPs and non-UDRPs in the pre-tax credit refund period is 0.332 (0.246) and 0.308 (0.252) respectively. However, the differences in means and medians are not significant. The mean (median) participation rate for the UDRPs in the post-tax credit refund period is 0.384 (0.325). This is higher than the mean (median) participation rate for the non-UDRPs of 0.269 (0.218), with the mean and median differences significant at the 0.01 level. The results are consistent with the expectation that UDRPs are more likely to have a higher participation rate than non-UDRPs.

The results in Panel B of Table 8.2 show that the mean (median) participation rate for UDRPs in the pre-tax credit refund period of 0.332 (0.246) is lower than the mean (median) participation rate for UDRPs in the post-tax credit refund period of 0.384 (0.325). The mean difference is significant at the0.10 level and the median difference is significant at the 0.05 level. The mean (median) participation rate for non-UDRPs in the pre and post-tax credit refund periods is 0.308 (0.252) and 0.269 (0.218) respectively. Both the mean and median differences are significant at the 0.01 level. The results for the combined sample of UDRPs and non-UDRPs show that the mean (median) participation rate in the post-tax credit refund period of 0.290 (0.230) is lower than the mean (median) participation rate of 0.313(0.252) in the pre-tax credit refund period. The difference in means is significant at the 0.05 level and the difference in medians is significant at the 0.10 level. The results do not support H3, that the shareholder participation rate is higher in the post-tax credit refund period than in the pre-tax credit refund period.

Table 8.2 (Continued)

Panel B: Univariate analysis of participation rate (of UDRPs and non-UDRPs) by period

	Pre-tax credit refund period (1995-2000)						Post-tax credit refund period (2001-2009)							
	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Underwritten DRP (UDRP)	102	0.332	0.246	0.250	0.143	0.455	303	0.384	0.325	0.253	0.182	0.535	1.775 (0.077)*	-2.177 (0.029)**
Non-underwritten DRP	343	0.308	0.252	0.230	0.140	0.393	1304	0.269	0.218	0.204	0.118	0.365	3.084 (0.002)***	2.793 (0.005)***
Combined (UDRP& non-UDRPs)	445	0.313	0.252	0.234	0.141	0.403	1607	0.290	0.234	0.218	0.128	0.395	1.942 (0.052)**	-1.719 (0.086)*

Note. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.

8.7.2.2 Univariate results (Non-UDRP sample)

HPR and LPR groups

To undertake our univariate analysis we divide the non-UDRP participation sample into a high participation rate group (HPR) and a low participation rate group (LPR), based on the median participation rate for the combined period between 1995 and 2009. The summary statistics of the participation rate for the two groups by year and by period are shown in Table 8.3. The evidence in Table 8.3 shows that the differences in means and medians are significant at the 0.01 level for all the years between 1995 and 2009 in the sample period. Similarly, both the pre and post-tax credit refund periods and the combined period also show a significant difference in means and medians of the shareholder participation rate variable at the 0.01 level between the two groups.

Table 8.3

Univariate Analysis of HPR and LPR groups (Participation Rate)

	HPR group						LPR group							
Year	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t -test (Sig.)	*Wilcoxon (Sig.)*
1995	16	0.463	0.354	0.247	0.276	0.605	15	0.133	0.129	0.052	0.102	0.176	5.057 (0.000)***	4.743 (0.000)***
1996	17	0.407	0.385	0.159	0.273	0.519	23	0.123	0.139	0.058	0.071	0.177	7.948 (0.000)***	5.349 (0.000)***
1997	27	0.431	0.393	0.161	0.297	0.533	22	0.120	0.139	0.069	0.045	0.163	8.462 (0.000)***	5.970 (0.000)***
1998	21	0.438	0.357	0.196	0.302	0.527	23	0.125	0.127	0.059	0.064	0.177	7.160 (0.000)***	5.612 (0.000)***
1999	57	0.460	0.376	0.214	0.307	0.614	30	0.130	0.135	0.059	0.075	0.179	8.150 (0.000)***	7.550 (0.000)***
2000	56	0.477	0.358	0.236	0.281	0.633	36	0.112	0.097	0.059	0.063	0.161	9.192 (0.000)***	8.132 (0.000)***
2001	50	0.453	0.414	0.189	0.307	0.542	53	0.131	0.136	0.054	0.088	0.176	11.894 (0.000)***	8.743 (0.000)***
2002	58	0.441	0.354	0.210	0.274	0.578	47	0.126	0.127	0.055	0.085	0.165	9.984 (0.000)***	8.784 (0.000)***
2003	56	0.467	0.364	0.236	0.284	0.634	52	0.131	0.144	0.058	0.086	0.180	9.979 (0.000)***	8.952 (0.000)***
2004	59	0.436	0.355	0.192	0.275	0.553	67	0.119	0.106	0.065	0.062	0.183	12.646 (0.000)***	9.629 (0.000)***
2005	72	0.409	0.355	0.160	0.280	0.510	68	0.114	0.096	0.063	0.060	0.169	14.217 (0.000)***	10.171 (0.000)***
2006	86	0.425	0.381	0.171	0.294	0.502	81	0.120	0.125	0.061	0.070	0.171	15.346 (0.000)***	11.223 (0.000)***
2007	93	0.432	0.395	0.185	0.288	0.521	93	0.139	0.140	0.054	0.096	0.190	14.654 (0.000)***	11.779 (0.000)***
2008	91	0.439	0.398	0.190	0.286	0.525	111	0.105	0.100	0.057	0.056	0.151	17.656 (0.000)***	12.191 (0.000)***
2009	65	0.421	0.365	0.167	0.300	0.520	102	0.121	0.126	0.061	0.066	0.172	16.538 (0.000)***	11.031 (0.000)***
Pre-tax credit refund period (1995-2000)	194	0.454	0.374	0.210	0.296	0.582	149	0.122	0.130	0.059	0.069	0.168	18.697 (0.000)***	15.847 (0.000)***
Post-tax credit refund period (2001-2009)	630	0.434	0.376	0.187	0.287	0.537	674	0.122	0.123	0.059	0.072	0.173	41.210 (0.000)***	31.277 (0.000)***
Pre and post (combined) tax credit refund periods	824	0.439	0.376	0.193	0.288	0.545	823	0.122	0.124	0.059	0.071	0.172	45.118 (0.000)***	35.157 (0.000)***

Note. HPR= High participation rate, LPR= Low participation rate.

8.7.2.3 Univariate analysis of independent variables

HPR and LPR groups (Full sample period, 1995-2009)

Table 8.4 provides univariate results of the firm characteristic variables used in the empirical analysis over the sample period 1995-2009 for the non-UDRPs. The participation sample is divided into the HPR and LPR groups.

The mean (median) level of the Dividend Payout Ratio for HPR and LPR groups is 0.705 (0.723) and 0.696 (0.722) respectively. The differences in means and medians are not significant under either the t-test or the Wilcoxon test. The mean (median) level of Dividend Yield for the HPR group is 0.066 (0.055). This is higher than the mean (median) level of Dividend Yield for the LPR group of 0.062 (0.054). However, the differences in means and medians are not significant. The results in Table 8.4 do not support H1, that HPR firms have a higher dividend payout ratio (dividend yield) than LPR firms.

The mean (median) Average Franking Credit Ratio for the firms in the HPR group is 0.718 (1.000). This is slightly higher (same) than the mean (median) Average Franking Credit Ratio of firms in the LPR group of 0.704 (1.000).

Table 8.4 also illustrates that the mean (median) level of Franking Credit Yield of 0.020(0.017) in the HPR group is higher than the mean (median) level of Franking Credit Yield of firms in the LPR group of 0.017(0.015), with the t-statistic significant at the 0.05 level. The results provide weak support for the hypothesis (H2) that HPR firms have a higher franking ratio (franking credit yield) than LPR firms. Our results are different from the finding of Lyroudi (1999) in the US market, that tax legislation has a significant impact on shareholder participation rate.

Table 8.4
Univariate Analysis

Panel A: Variables used for Main Tests (Full sample period, 1995-2009)

		HPR group						LPR group							
Variable	Expected sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	824	0.705	0.723	0.262	0.503	0.900	823	0.696	0.722	0.278	0.481	0.971	0.688 (0.491)	0.437 (0.662)
Average Franking Ratio	Positive	824	0.718	1.000	0.427	0.264	1.000	823	0.704	1.000	0.434	0.095	1.000	0.672 (0.502)	0.696 (0.487)
Dividend Yield	Positive	824	0.066	0.055	0.054	0.040	0.077	823	0.062	0.054	0.047	0.037	0.076	1.343 (0.179)	1.557 (0.120)
Franking Credit Yield	Positive	824	0.020	0.017	0.041	0.003	0.026	823	0.017	0.015	0.014	0.002	0.024	1.984 (0.047)**	0.445 (0.657)
Tobin's Q	Positive	824	1.244	1.024	0.867	0.841	1.335	823	1.216	0.969	0.920	0.794	1.267	0.628 (0.530)	2.939 (0.003)***
Natural log of Total Assets	Positive	824	19.997	19.933	1.958	18.553	21.311	823	19.785	19.471	1.832	18.528	20.943	2.268 (0.023)**	2.259 (0.024)**
Operating Cash Flow / Total Assets	Negative	824	0.058	0.056	0.088	0.023	0.097	823	0.074	0.061	0.150	0.024	0.109	-2.658 (0.008)***	-1.740 (0.082)*
Current Ratio	Negative	824	2.812	1.420	3.511	1.064	2.938	823	3.099	1.421	3.496	1.085	3.120	-0.970 (0.332)	-0.728 (0.467)
Debt /Total Assets	Positive	824	0.185	0.202	0.218	0.024	0.315	823	0.177	0.188	0.344	-0.002	0.321	0.576 (0.565)	1.108 (0.268)
Discount	Positive	824	1.760	0.000	2.244	0.000	2.500	823	1.480	0.000	2.211	0.000	2.500	2.557 (0.011)***	3.123 (0.002)***

Note. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

In Table 8.4 firms in the HPR group have higher growth, with a mean (median) Tobin's Q of 1.244 (1.024) for the HPR group firms compared to a mean (median) of 1.216 (0.969) for the LPR group firms. The difference in medians is significant at the 0.01 level, providing weak support for hypothesis (H4), that high growth firms with a DRP have a higher participation rate than low growth firms with a DRP.

The mean (median) level of the natural logarithm of Total Assets of 19.997 (19.933) is higher for the firms in the HPR group compared to a mean (median) size of 19.785(19.471) for the firms in the LPR group, with the differences in means and medians significant at the 0.05 level. The mean (median) level of the natural logarithm of Market Capitalization is higher for firms in the HPR group compared to firms in the LPR group, with the difference significant at the 0.10 level under the t-test and at the 0.05 level under the Wilcoxon test (see Panel B of Table 8.4). The evidence supports H5, that large firms with a DRP have a greater participation rate than small firms with a DRP. The evidence is consistent with the findings of Pettway and Malone (1973), that the shareholder participation rate in the US is positively related to the firm's size.

Firms in the HPR group have a lower Operating Cash Flow/Total Assets, with a mean (median) Operating Cash Flow/Total Assets of 0.058 (0.056) for the firms in the HPR group compared to 0.074 (0.061) for the firms in the LPR group. The difference in means is significant at the 0.01 level while the difference in medians is significant at the 0.10 level. The results provide support for H6, that DRP firms with lower operating cash flows have a greater participation rate than DRP firms with higher operating cash flows.

The results in Table 8.4 also show that firms in the HPR group have a lower level of liquidity, with a mean (median) Current Ratio of 2.812 (1.420) for firms in the HPR group compared to 3.099 (1.421) for firms in the LPR group. The differences in means and medians are not significant. Thus, there is no evidence to support H7, that DRP firms with lower liquidity (Current Ratios) have a greater participation rate than DRP firms with higher liquidity (Current Ratios).

Table 8.4 (Continued)

Panel B: Variables used for Robustness Tests (Full sample period, 1995-2009)

		HPR group						LPR group							
Variable	Expected sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	824	19.570	19.545	1.857	18.156	20.781	823	19.405	19.195	1.804	18.059	20.541	1.831 (0.067)*	2.231 (0.026)**
Interest Coverage Ratio	Negative	824	3.476	3.380	2.970	1.330	4.170	823	4.194	3.940	3.327	1.090	4.293	-4.614 (0.000)***	-3.498 (0.000)***

Notes. The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Firms in the HPR group have higher leverage, with a mean (median) Debt/Total Assets level of 0.185 (0.202) for the HPR group firms compared to a mean (median) Debt/Total Assets level of 0.177 (0.188) for the firms in the LPR group. However, the differences in means and medians are not significant for the variable Debt/ Total Assets ratio. The mean (median) level of the Interest Coverage Ratio is significantly negative and lower for the HPR group firms compared to the LPR group firms, with the differences significant at the 0.01 level both under the t-test and the Wilcoxon test (see Panel B of Table 8.4). Overall the evidence to support H8, that DRP firms with higher leverage have a greater participation rate than DRP firms with lower leverage is mixed.

The HPR group firms have a significantly higher mean and median level of discount, with both the t-statistic and Wilcoxon statistic significant at the 0.01 level. The mean percentage level of the discount for the HPR group firms is 1.760. This is higher than the mean percentage level for the LPR group firms of 1.480. The median percentage discount is the same for both groups. The differences in means and medians are both significant at the 0.01 level under the t-test and the Wilcoxon test. The evidence shows that the DRP participation rate increases with the discount (supporting H9). The evidence is consistent with the finding of Todd and Domian (1997), that the discount feature entices US shareholders to participate in a DRP and contrary to the assertion of Baker and Meeks (1990), that the discount feature does not significantly influence the shareholder participation rate in a US DRP.

In summary, the univariate results for the full sample period suggest that firms with a high shareholder participation rate in a DRP (i) are larger in size (supporting H5), (ii) have lower cash flow profitability (supporting H6), (iii) have significantly lower interest coverage ratio (providing some support for H8), and (iv) offer greater discounts (supporting H9) compared to firms with a low participation rate. There is very limited evidence to show that the firms in the higher participation rate group had higher dividend payouts/dividend yield and distributed greater franking credits compared to the firms in the lower participation rate group. There is weak evidence for H4, that firms with a high participation rate showed higher growth prospects compared to firms with a low participation rate.

8.7.2.4 Pre-tax credit refund period (1995-2000)

Table 8.5 presents the univariate results for the pre-tax credit refund period between 1995 and 2000. The results show that firms in the HPR group (i) have higher dividend payout ratios, with a mean (median) Dividend Payout Ratio of 0.705 (0.732) for the HPR group firms compared to a mean (median) of 0.698 (0.705) for the LPR group firms, and (ii) have higher dividend yields, with a mean (median) Dividend yield of 0.067(0.058) for the HPR group firms compared to 0.057 (0.053) for the LPR firms. The differences in means and medians for the variable Dividend Payout Ratio are not significant. However, the median difference for the Dividend Yield variable is significant at the 0.10 level under the Wilcoxon test. There is very limited evidence to support H1, that firms with a higher participation rate have a higher dividend yield than firms with a lower participation rate.

The mean (median) level of Average Franking Ratio is 0.727 (1.000) for the HPR group firms. This is higher (same) than the mean (median) level for the LPR group firms of 0.710 (1.000). Similarly, the mean (median) level of Franking Credit Yield is 0.025 (0.024) for the HPR group firms. This is higher than the mean (median) level for the LPR group firms of 0.021 (0.020). The evidence provides no support for H2, that DRP firms with a higher franking ratio (franking credit yield) have a higher participation rate than DRP firms with a lower franking ratio (franking credit yield).

Table 8.5
Univariate Analysis

Panel A: Variables used for Main Tests (Pre-tax credit refund period, 1995-2000)

		HPR group						LPR group							
Variable	Expected sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	194	0.705	0.732	0.264	0.512	0.993	149	0.698	0.705	0.241	0.539	0.898	0.254 (0.800)	0.411 (0.681)
Average Franking Ratio	Positive	194	0.727	1.000	0.413	0.415	1.000	149	0.710	1.000	0.428	0.201	1.000	0.370 (0.712)	0.163 (0.870)
Dividend Yield	Positive	194	0.067	0.058	0.071	0.043	0.081	149	0.057	0.053	0.030	0.034	0.073	1.579 (0.115)	1.751 (0.080)*
Franking Credit Yield	Positive	194	0.025	0.024	0.039	0.005	0.033	149	0.021	0.020	0.018	0.003	0.033	1.137 (0.256)	0.940 (0.347)
Tobin's Q	Positive	194	1.216	1.026	1.297	0.784	1.269	149	1.085	0.970	0.621	0.784	1.196	1.130 (0.259)	0.869 (0.385)
Natural log of Total Assets	Positive	194	19.717	19.779	1.961	18.324	20.758	149	19..312	19.052	1.643	18.154	20.207	2.026 (0.043)**	2.217 (0.027)**
Operating Cash Flow/Total Assets	Negative	194	0.064	0.063	0.070	0.025	0.095	149	0.075	0.071	0.091	0.029	0.113	-1.326 (0.186)	-1.434 (0.152)
Current Ratio	Negative	194	1.650	1.345	2.500	1.061	1.720	149	1.699	1.415	1.119	1.153	1.897	-0.220 (0.826)	-1.770 (0.077)*
Debt/Total Assets	Positive	194	0.175	0.197	0.168	0.038	0.302	149	0.134	0.190	0.200	-0.006	0.269	2.057 (0.040)**	1.709 (0.087)*
Discount	Positive	194	1.550	0.000	2.445	0.000	2.500	149	1.470	0.000	2.438	0.000	2.500	0.305 (0.761)	0.463 (0.644)

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a non-parametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall. See Table 4.5 for the definition of variables.

Table 8.5 (Continued)

Panel B: Variables used for Robustness Tests (Pre-tax credit refund period, 1995-2000)

		HPR group						LPR group							
Variable	Expected sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	194	19.267	19.366	1.850	17.845	20.298	149	18.998	18.695	1.739	17.757	20.134	1.366 (0.173)	1.644 (0.100)
Interest Coverage Ratio	Negative	194	3.144	3.060	2.949	2.450	3.250	149	4.502	3.440	3.924	1.870	4.600	-3.655 (0.000)***	-4.591 (0.000)***

Notes. The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a nonparametric alternative to the two sample *t*-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Firms in the HPR group have higher growth prospects and are larger in size compared to firms in the LPR group. The mean (median) level of growth (Tobin's Q) is 1.216 (1.026) for the HPR group firms. This is higher than the mean (median) level for the LPR group firms of 1.085 (0.970). The differences in means and medians for the growth variable Tobin's Q are not significant. Therefore, the results do not support H4 that high growth firms with a DRP have a greater participation rate than low growth firms with a DRP.

The mean (median) level of size (natural logarithm of Total Assets) for the HPR group firms is 19.717 (19.779), which is higher than the mean (median) level of size for the LPR group firms of 19.312 (19.052). The differences in means and medians are significant at the 0.05 level. The natural logarithm of Market Capitalization is higher, with a mean (median) size of 19.267(19.366) for firms in the HPR group compared to 18.998 (18.695) firms in the LPR group. The differences in means and medians are not significant. Thus, the results in Table 8.5 provide evidence to show that high participation rate firms are larger than low participation rate firms (supporting H5).

Table 8.5 also shows that firms in the HPR group have lower cash flow profitability and liquidity. The mean (median) level of Operating Cash Flow/ Total Assets for firms in the HPR and LPR groups is 0.064 (0.063) and 0.075 (0.071) respectively. Similarly, the mean (median) Current Ratio for firms in the HPR is 1.650 (1.345), which is lower than the mean (median) current ratio for firms in the LPR of 1.699 (1.415). The differences in means and medians are not significant for the variable Operating Cash Flow/ Total Assets, while the difference in medians is significant at the 0.10 level for the variable Current Ratio. Thus, there is no support for H6 and only very limited support for H7, that DRP firms with lower liquidity (Current Ratios) have a greater participation rate than DRP firms with higher liquidity (Current Ratios).

The mean (median) level of Debt/ Total Assets for firms in the HPR group is 0.175 (0.197). This is higher than the mean (median) level of Debt/ Total Assets for firms in the LPR group of 0.134

(0.190). The difference in means is significant at the 0.05 level and the difference in medians is significant at the 0.10 level. Similarly, difference between the HPR and LPR groups in the Interest Coverage Ratio is negative and significant at the 0.01 level both under the t-test and Wilcoxon test, with a mean (median) Interest Coverage Ratio of 3.144 (3.060) for firms in the HPR group compared to 4.502 (3.440) for firms in the LPR group (see Panel B, Table 8.5). The results provide support for H8, that firms with higher relative debt levels are likely to have a greater participation rate than firms with lower relative debt levels.

The mean discount for the HPR group firms is 1.550. This is lower than the mean of LPR firms of 1.470. The median discount is the same for both groups of firms. The differences in means and medians are not significant, providing no support for H9, that DRP participation rate increases with the discount.

8.7.2.5 Post-tax credit refund period (2001-2009)

Table 8.6 reports the univariate results for the HPR and LPR groups in the post-tax credit refund period. The evidence in Panel A of Table 8.6 shows that the HPR group firms have a higher dividend payout ratio /dividend yield. However, both the differences in means and medians for the variables Dividend Payout Ratio and Dividend Yield are not significant. The results do not support H1, that DRP firms with a higher dividend payout ratio (dividend yield) have a higher participation rate than DRP firms with a lower dividend payout ratio (dividend yield).

The mean (median) average Franking Credit Ratio for the HPR and LPR groups is 0.715 (1.000) and 0.702 (1.000) respectively. Similarly, the mean (median) Franking Credit Yield for the HPR and LPR groups is 0.019 (0.015) and 0.016 (0.012) respectively. The firms in the HPR group have a higher mean (median) level of Average Franking Credit Ratio/Franking Credit Yield compared to the firms in the LPR group. However, none of the differences are statistically significant. Thus, the evidence presented in Panel A of Table 8.6 provides no support for H2, that DRP firms with a higher franking ratio (franking credit yield) have a higher participation rate than DRP firms with a lower franking ratio (franking credit yield).

The mean (median) level of Tobin's Q for the firms in the HPR group is 1.253 (1.024). This is higher than the mean (median) Tobin's Q for the firms in the LPR group of 1.245 (0.969). The difference in medians is significant at the 0.01 level under the Wilcoxon test. There is some support for H4, that high growth firms with a DRP have a greater participation rate than low growth firms with a DRP.

The firms in the HPR group are larger in size, with a mean (median) natural logarithm of Total Assets of 20.083 (19.971) for the firms in the HPR group compared to a mean (median) of 19.889 (19.574) for the firms in the LPR group. The differences in means and medians are significant at the 0.10 level. The alternative proxy for size (natural log of Market Capitalization) is higher for the HPR firms compared to the LPR firms. The mean (median) natural logarithm of Market Capitalization for the firms in the HPR group is 19.663(19.627). This is higher than the mean (median) natural logarithm of market capitalization of firms in the LPR group of 19.494 (19.282). The difference in means is positive and significant at the 0.10 level and the difference in medians is significant at the 0.05 level. The evidence provides weak support for H5, that large firms with a DRP have a greater participation rate than small firms with a DRP.

Table 8.6
Univariate Analysis

Panel A: Variables used for Main Tests (Post-tax credit refund period, 2001-2009)

		HPR group						LPR group							
Variable	Expected sign	N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t- test (Sig.)	Wilcoxon (Sig.)
Dividend Payout Ratio	Positive	630	0.707	0.730	0.268	0.492	0.910	674	0.694	0.724	0.281	0.478	0.941	0.874 (0.382)	0.709 (0.478)
Average Franking Ratio	Positive	630	0.715	1.000	0.432	0.186	1.000	674	0.702	1.000	0.436	0.031	1.000	0.534 (0.594)	0.685 (0.493)
Dividend Yield	Positive	630	0.065	0.055	0.048	0.040	0.077	674	0.063	0.054	0.050	0.037	0.078	0.677 (0.499)	0.835 (0.404)
Franking Credit Yield	Positive	630	0.019	0.015	0.042	0.003	0.024	674	0.016	0.012	0.014	0.001	0.025	1.411 (0.159)	0.423 (0.672)
Tobin’s Q	Positive	630	1.253	1.024	0.684	0.857	1.380	674	1.245	0.969	0.971	0.797	1.317	0.163 (0.871)	2.995 (0.003)***
Natural log of Total Assets	Positive	630	20.083	19.971	1.950	18.620	21.553	674	19.889	19.574	1.856	18.582	21.119	1.848 (0.065)*	1.733 (0.083)*
Operating Cash Flow / Total Assets	Negative	630	0.056	0.054	0.093	0.022	0.097	674	0.074	0.058	0.160	0.023	0.108	-2.410 (0.016)**	-1.392 (0.164)
Current Ratio	Negative	630	3.154	1.450	6.109	1.067	2.285	674	3.416	1.460	7.114	1.062	2.245	-0.712 (0.477)	-0.092 (0.927)
Debt/Total Assets	Positive	630	0.189	0.202	0.231	0.014	0.320	674	0.187	0.188	0.367	-0.002	0.341	0.114 (0.909)	0.574 (0.566)
Discount	Positive	630	1.820	1.000	2.176	0.000	2.500	674	1.480	0.000	2.160	0.000	2.500	2.852 (0.004)***	3.518 (0.000)***

Notes. The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a nonparametric alternative to the two sample *t*-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

Table 8.6 (Continued)

Panel B: Variables used for Robustness Tests (Post-tax credit refund period, 2001-2009)

		HPR group						LPR group							
Variable		N	Mean	Median	SD	Q1	Q3	N	Mean	Median	SD	Q1	Q3	t test (Sig.)	Wilcoxon (Sig.)
Natural log of Market Capitalization	Positive	630	19.663	19.627	1.851	18.305	20.908	674	19.494	19.282	1.807	18.137	20.642	1.675 (0.094)*	1.945 (0.052)**
Interest Coverage Ratio	Negative	630	3.900	3.880	2.850	1.090	3.960	674	4.871	4.275	3.950	1.705	4..880	-5.115 (0.000)***	-4.734 (0.000)***

Note. The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels. The Wilcoxon rank-sum test is a nonparametric alternative to the two sample t-test which is based solely on the order in which the observations from the two samples fall.See Table 4.5 for the definition of variables.

There is also some evidence to show that the firms in the HPR group have lower profitability than the firms in the LPR group. The mean (median) level of Operating Cash Flow/Total Assets for firms in the HPR and LPR groups is 0.056 (0.054) and 0.074 (0.058) respectively. The difference in means is significant at the 0.05 level. Thus, there is only very weak evidence to support H6, that DRP firms with lower operating cash flows have a greater participation rate than DRP firms with higher operating cash flows. The mean (median) Current Ratio for the firms in the HPR and LPR groups is 3.154 (1.450) and 3.416 (1.460) respectively. The differences in means and medians are not significant. The results do not support H7.

The mean (median) level of Debt/Total Assets for firms in the HPR and LPR groups is 0.189 (0.202) and 0.187 (0.188) respectively. The differences in means and medians are not significant. The mean (median) Interest Coverage Ratio of 3.900 (3.880) for the firms in the HPR group is lower than the mean (median) Interest Coverage Ratio of 4.871(4.275) for the firms in the LPR group. Both the differences in means and medians are significant at the 0.01 level. The evidence provides some support for H8, that DRP firms with a lower interest coverage ratio (higher leverage) have greater participation rate than DRP firms with a higher interest coverage ratio (lower leverage).

Panel A of Table 8.6 also indicates that the firms in the HPR group offer a higher discount, with a mean (median) discount of 1.820 (1.000) for the firms of the HPR group compared to a mean (median) of 1.480 (0.000) for the firms in the LPR group. The differences in the means and medians are significant at the 0.01 level. The results provide strong support for H9, that DRP participation rate increases with the discount. The evidence is consistent with the findings of Wills (1989) in the Australian market, that shareholder participation in DRPs is positively related to the size of the discount.

8.7.3 Multivariate linear results[117]

8.7.3.1 Results of DRP underwritten and non-underwritten combined sample[118]

Table 8.7 presents the results of our linear model using the full sample of underwritten and non-underwritten DRPs. The coefficients on Dividend Payout Ratio[119] and Franking Ratio are positive but not significant in all models (1a) to (2d). The coefficient on Dividend Yield is positive and significant at the 0.10 level in all models (2a) to (2d). The coefficients on the Average Franking Ratio and the Franking Credit Yield variables are positive in all models (1a) to (2d) but not significant. The evidence does not provide any strong support for H1 and H2. Contrary to our expectation, the coefficient on Period Dummy variable is negative in all models and significant at the 0.01 level in model (2d), at the 0.05 level in model (1d) and at the 0.10 level in other models. The evidence in Table 8.7 does not support H3, that the shareholder participation rate is higher in the post-tax credit refund period than in the pre-tax credit refund period.

Consistent with our expectation, the Underwriting Dummy variable is positive and significant at the 0.01 level in all models (1a) to (2d). The results indicate that underwriting increases the participation rate.

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[117] We estimated the linear model (Eq.8.1) with the lagged accounting variables for robustness. We report that the results obtained are qualitatively the same. We also estimated the linear model (Eq.8.1) with the interaction variable (Franking Credit Ratio* Dividend Payout ratio (Franking Credit Yield*Dividend Yield)) as an independent variable. The results show that the coefficient on the interaction variable is positive but not significant.

[118] Prior to the estimation of linear models, correlations between key variables were tested. There was significant correlation between Franking Ratio and Franking Credit Yield, between Dividend Payout Ratio and Dividend Yield and between Total Assets and Market Capitalization (see Appendix 3). In order to reduce the likelihood of problems with multicollinearity and to ensure robustness, separate regressions were run using these correlated variables.

[119] The results are not sensitive to the inclusion of special dividends in the definition of the dividend payout ratio.

Table 8.7
Results of linear model (Combined full sample of underwritten and non-underwritten DRPs)

Variable	Expected sign	(1a) Linear Coefficient. (Sig.)	(1b) Robust Coefficient. (Sig.)	(1c) Cluster Coefficient. (Sig.)	(1d) Bootstrap Coefficient. (Sig.)	(2a) Linear Coefficient. (Sig.)	(2b) Robust Coefficient. (Sig.)	(2c) Cluster Coefficient. (Sig.)	(2d) Bootstrap Coefficient. (Sig.)
Constant		0.277 (0.000)***	0.277 (0.000)***	0.277 (0.000)***	0.277 (0.000)***	0.311 (0.000)***	0.311 (0.000)***	0.311 (0.000)***	0.311 (0.000)***
Dividend Payout Ratio	Positive	0.009 (0.617)	0.009 (0.602)	0.009 (0.599)	0.009 (0.575)				
Annual Average Franking Ratio	Positive	0.003 (0.993)	0.003 (0.993)	0.003 (0.994)	0.003 (0.994)				
Dividend Yield	Positive					0.254 (0.058)*	0.254 (0.069)*	0.254 (0.070)*	0.254 (0.130)*
Franking Credit Yield	Positive					0.163 (0.226)	0.163 (0.240)	0.163 (0.242)	0.163 (0.181)
Period Dummy	Positive	-0.020 (0.091)*	-0.020 (0.113)*	-0.020 (0.122)*	-0.020 (0.049)**	-0.021 (0.084)*	-0.021 (0.106)*	-0.021 (0.114)*	-0.021 (0.000)***
Underwriting Dummy	Positive	0.089 (0.000)***	0.089 (0.000)***	0.089 (0.000)***	0.089 (0.000)***	0.091 (0.000)***	0.091 (0.000)***	0.091 (0.000)***	0.091 (0.000)***
Tobin's' Q	Positive	0.003 (0.656)	0.003 (0.683)	0.003 (0.692)	0.003 (0.704)	0.002 (0.960)	0.002 (0.963)	0.002 (0.964)	0.002 (0.976)
Natural log of Total Assets	Positive	0.001 (0.739)	0.001 (0.763)	0.001 (0.786)	0.001 (0.761)	0.002 (0.950)	0.002 (0.955)	0.002 (0.960)	0.002 (0.941)
Debt/Total Assets	Positive	0.004 (0.803)	0.004 (0.819)	0.004 (0.821)	0.004 (0.829)	0.005 (0.767)	0.005 (0.789)	0.005 (0.793)	0.005 (0.682)
Operating Cash Flow / Total Assets	Negative	-0.131 (0.003)***	-0.131 (0.003)***	-0.131 (0.003)***	-0.131 (0.006)***	-0.130 (0.003)***	-0.130 (0.003)***	-0.130 (0.003)***	-0.130 (0.001)***
Current Ratio	Negative	-0.001 (0.576)	-0.001 (0.501)	-0.001 (0.503)	-0.001 (0.475)	-0.001 (0.502)	-0.001 (0.423)	-0.001 (0.425)	-0.001 (0.402)
Discount	Positive	0.009 (0.000)***	0.009 (0.000)***	0.009 (0.000)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.000)***
R-square		0.042	0.042	0.042	0.042	0.045	0.045	0.045	0.045
Total Number		2052	2052	2052	2052	2052	2052	2052	2052

Note. The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The coefficients on the non-tax related variables of Tobin's Q, natural logarithm of Total Assets and Debt/Total Assets ratio are positive but not significant in all models (1a) to (2d). The results do not support H4, H5 or H8. The coefficient on Operating Cash Flow/Total Assets ratio is negative and significant at the 0.01 level in all models (1a) to (2d). The evidence provides strong support for H6, that DRP firms with lower operating cash flows have a greater participation rate than DRP firms with higher operating cash flows. The coefficient on the variable Current Ratio is negative as predicted but not significant. There is no support for H7. The discount variable is positive and significant at the 0.01 level in all models (1a) to (2d). The results provide strong support for H9, that the DRP participation rate increases with the discount. The evidence is consistent with the prior studies of Todd and Domian (1997) and Wills (1989) in the US and Australian markets respectively and contrary to the results of Baker and Meeks (1990) in the US market.

Overall the results in Table 8.7 show that firms achieve a high level of participation rate when their DRPs are underwritten. This evidence is consistent with our expectation that firms engage an underwriter to subscribe to any shortfall in the subscription of DRP shares by the existing shareholders. The results provide strong support for the profitability hypothesis that DRP firms with lower operating cash flows have a greater participation rate than DRP firms with higher operating cash flows. The evidence also supports the discount hypothesis that the DRP participation rate increases with the discount.

8.7.3.2 Main test results (non-underwritten sample)

The results from our linear regressions for the non-underwritten sample only are presented in Table 8.8.[120] In all models (1a) to (1d) the coefficient estimate on the Dividend Payout Ratio is positive but not significant. Similarly, the estimate of the coefficient on Dividend Yield is also

[120] Linear models are estimated with robust and cluster options to deal with problems of normality, heteroscedasticity, large residuals and intra-group correlations. The bootstrap method is used to correct for standard errors. STATA version 12 is used to estimate the linear model.

positive in models (2a) to (2d) but not significant. The results do not support H1, that firms with a DRP and higher dividend payout ratio (dividend yield) are more likely to have a higher participation rate than firms with a DRP and lower dividend payout ratio (dividend yield).

The estimated coefficient on Average Franking Ratio is positive in all models (1a) to (1d) but not significant, while the coefficient on Franking Credit Yield is positive and significant at the 0.05 level in models (2b) and (2c), significant at the 0.01 level in model (2a) but not significant in model (2d). These results provide weak support for H2, that the firms with greater franking credit yield are likely to have a higher participation rate compared to the firms with smaller franking credit yield. Contrary to our expectation, the coefficient on Period Dummy is significant and negative in all models (1a) to (2d). The results do not support H3.

The coefficient estimate for Tobin's Q is positive and significant at the 0.01 level in models (1a), (1b) and (1c) and at the 0.10 level in (1d). The coefficient estimate on Tobin's Q is also positive and significant at the 0.01 level in models (2a) to 2(d). The results provide strong support for H4, that high growth firms with a DRP have a greater shareholder participation rate than low growth firms with a DRP. These results are consistent with the findings of Malone (1974) in the US market and Anderson (1986) in the Australian market.

The coefficient estimate on the size variable (natural logarithm of Total Assets) is positive and significant at the 0.01 level in model (1d) and positive but not significant in models (1a) to (1c). The coefficient on the size variable is positive and significant at the 0.10 level in models (2a) to (2d). The results show that large firms with a DRP have a greater shareholder participation rate than small firms with a DRP. The evidence provides some support for H5 and is consistent with the findings of Pettway and Malone (1973) in the US market, that the shareholder participation rate is positively related to the size of the firm. It is contrary to the evidence of Lyroudi (1999) in the same market, which suggests that as the size of the firm decreases the DRP participation rate increases.

Table 8.8

Linear Model results (Full sample period, 1995-2009)

Model 1: DRP participation rate $_{i,t}$ = β_0+ β_1Dividend Payout Ratio$_{i,t}$ + β_2 Average Franking Ratio$_{i,t}$ + β_3 Period Dummy+ β_4Tobin's Q$_{i,t}$+ β_5 Natural log of Total Assets$_{i,t}$ + β_6 Operating Cash Flow/ Total Assets$_{i,t}$ + β_7 Current Ratio$_{i,t}$ + β_8Debt/ Total Assets$_{i,t}$+ β_9Discount$_{i,t}$ + Error term.

Model 2: DRP participation rate $_{i,t}$ = β_0+ β_1Dividend Yield $_{i,t}$ + β_2 Franking Credit Yield$_{i,t}$ + β_3 Period Dummy+ β_4Tobin's Q$_{i,t}$+ β_5 Natural log of Total Assets$_{i,t}$ + β_6 Operating Cash Flow/ Total Assets$_{i,t}$ + β_7 Current Ratio$_{i,t}$ + β_8Debt/Total Assets$_{i,t}$+ β_9Discount$_{i,t}$ + Error term.

Linear model Variable	Expected sign	(1a) Linear Coefficient (Sig.)	(1b) Robust Coefficient (Sig.)	(1c) Cluster Coefficient (Sig.)	(1d) Bootstrap Coefficient (Sig.)	(2a) Linear Coefficient (Sig.)	(2b) Robust Coefficient (Sig.)	(2c) Cluster Coefficient (Sig.)	(2d) Bootstrap Coefficient (Sig.)
Constant		0.155 (0.012)***	0.155 (0.000)***	0.155 (0.010)***	0.155 (0.000)***	0.156 (0.010)***	0.156 (0.013)***	0.156 (0.012)***	0.156 (0.003)***
Dividend Payout Ratio	Positive	0.020 (0.293)	0.020 (0.293)	0.020 (0.220)	0.020 (0.153)				
Average Franking Ratio	Positive	0.012 (0.337)	0.012 (0.349)	0.012 (0.307)	0.012 (0.128)				
Dividend Yield	Positive					0.049 (0.662)	0.049 (0.679)	0.049 (0.764)	0.049 (0.868)
Franking Credit Yield	Positive					0.343 (0.073)*	0.343 (0.035)**	0.343 (0.040)**	0.343 (0.525)
Period Dummy	Positive	-0.041 (0.001)***	-0.041 (0.003)***	-0.041 (0.002)***	-0.041 (0.001)***	-0.040 (0.002)***	-0.040 (0.003)***	-0.040 (0.002)***	-0.040 (0.000)***
Tobin's Q	Positive	0.019 (0.001)***	0.019 (0.013)***	0.019 (0.008)***	0.019 (0.063)*	0.021 (0.000)***	0.021 (0.006)***	0.021 (0.003)***	0.021 (0.008)***
Natural log of Total Assets	Positive	0.004 (0.119)	0.004 (0.134)	0.004 (0.129)	0.004 (0.000)***	0.005 (0.076)*	0.005 (0.088)*	0.005 (0.085)*	0.005 (0.085)*
Operating Cash Flow / Total Assets	Negative	-0.186 (0.000)***	-0.186 (0.000)***	-0.186 (0.000)***	-0.186 (0.012)***	-0.184 (0.000)***	-0.184 (0.000)***	-0.184 (0.000)***	-0.184 (0.000)***
Current Ratio	Negative	-0.005 (0.968)	-0.005 (0.966)	-0.005 (0.961)	-0.005 (0.979)	-0.027 (0.909)	-0.027 (0.904)	-0.027 (0.887)	-0.027 (0.924)
Debt/Total Assets	Positive	0.019 (0.330)	0.019 (0.282)	0.019 (0.224)	0.019 (0.667)	0.017 (0.388)	0.017 (0.343)	0.017 (0.269)	0.017 (0.514)
Discount	Positive	0.008 (0.001)***	0.008 (0.001)***	0.008 (0.000)***	0.008 (0.016)**	0.008 (0.001)***	0.008 (0.001)***	0.008 (0.000)***	0.008 (0.001)***
R-Square		0.035	0.035	0.035	0.035	0.037	0.037	0.037	0.037
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

*Notes.*The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The coefficient on Operating Cash Flow/ Total Assets is negative and significant at the 0.01 level in all models (1a) to (1d) and (2a) to (2d). The evidence supports H6, that DRP firms with low operating cash flows have a greater participation rate than DRP firms with higher operating cash flows. The evidence is consistent with the finding of Lyroudi (1999) in the US market, that the DRP participation rate declines for those firms that have excess cash.

However, there is only limited support for H7 that DRP firms with lower current ratios have a greater participation rate than DRP firms with higher current ratios, with the coefficient on the Current Ratio variable negative as predicted but not significant. The coefficient estimate on the Debt / Total Assets variable is positive but not significant in any of the models, providing no support for H8, that DRP firms with higher leverage have a greater participation rate than DRP firms with lower leverage. The coefficient on the variable discount is positive and highly significant at the 0.01 level in all models, supporting H9, that the DRP participation rate increases with the discount.

Overall Table 8.8 shows that the decision by shareholders to participate in a DRP is affected by growth (weak support for H4), firm size (some support for H5), cash flow profitability (supporting H6) and the discount (supporting H9). There is no strong evidence to support H1 and H2, that DRP firms with a higher dividend payout ratio (dividend yield) and franking ratio (franking credit yield) have a higher participation rate than DRP firms with a lower dividend payout ratio (dividend yield) and lower franking ratio (franking credit yield). There is no evidence to show that there is any significant tax effect on the decision to participate in the post-tax credit refund period (H3).

8.7.3.3 Robust regression results (non-underwritten sample)

Table 8.9 presents the results of our linear model using the natural logarithm of Market Capitalization variable rather than the natural logarithm of Total Assets and the Interest Coverage Ratio variable in the place of Debt/Total Assets ratio. The results for the Dividend

Payout Ratio (Dividend Yield) and Franking Ratio variables are weak in all models. Only the coefficient on Franking Credit Yield is positive and significant at the 0.10 level in models (2b) to (2d). Thus, the evidence in support of H1 and H2 is weak. Similar to the results in Table 8.8, the coefficient estimate for the Period Dummy variable is negative and there is no support for H3.

The coefficient estimate on Tobin's Q is significant and positive at the 0.01 level in models (1a), (1c) and (2b) to (2d), at the 0.05 level in models (1b) and (1d), and positive but not significant in (2a). The evidence supports H4, that growth firms with a DRP are likely to have greater participation rate than non-growth firms with a DRP. The coefficient estimate on the logarithm of Market Capitalization is positive in all models but not significant, providing only very weak support for H5. The effect of the cash flow profitability on the decision to participate is negative and significant at the 0.01 level in all models (supporting H6). However, there is no strong evidence to show that the liquidity effect (H7) has any significant impact on the decision to participate, though the coefficient on the Current Ratio variable is negative in all linear regressions.

Similar to the results presented in Table 8.8, the evidence in Table 8.9 also does not show any significant effect of the leverage variable on the decision to participate in a DRP. The coefficient on Interest Coverage Ratio is negative as predicted but not significant in all models. The results provide no support for H8, that DRP firms with higher leverage have a greater participation rate than DRP firms with lower leverage. The coefficient on the variable discount is positive and highly significant at the 0.01 level in all regressions. These results provide strong support for the discount hypothesis (H9), that the DRP participation rate increases with the discount.

Table 8.9

Linear robust regression results (Full sample period, 1995-2009)

Model 1: DRP participation rate $_{i,t}$ = β_0+ β_1Dividend Payout Ratio$_{i,t}$ + β_2 Average Franking Ratio$_{i,t}$ + β_3 Period Dummy+ β_4 Tobin's Q$_{i,t}$+ β_5 Natural log of Market Capitalization$_{,t}$ + β_6 Operating Cash Flow/ Total Assets$_{i,t}$ + β_7 Current Ratio$_{i,t}$ + β_8 Interest Coverage Ratio$_{i,t}$+ β_9 Discount$_{i,t}$ + Error term.

Model 2: DRP participation rate $_{i,t}$ = β_0+ β_1 Dividend Yield $_{i,t}$ + β_2 Franking Credit Yield $_{i,t}$ + β_3 Period Dummy+ β_4 Tobin's Q$_{i,t}$+ β_5 Natural log of Market Capitalization$_{,t}$ + β_6 Operating Cash Flow/ Total Assets$_{i,t}$ + β_7 Current Ratio$_{i,t}$ + β_8 Interest Coverage Ratio$_{i,t}$ + β_9 Discount$_{i,t}$ + Error term.

Linear robust regression results Variable	Expected sign	(1a) Linear Coefficient (Sig.)	(1b) Robust Coefficient (Sig.)	(1c) Cluster Coefficient (Sig.)	(1d) Bootstrap Coefficient (Sig.)	(2a) Linear Coefficient (Sig.)	(2b) Robust Coefficient (Sig.)	(2c) Cluster Coefficient (Sig.)	(2d) Bootstrap Coefficient (Sig.)
Constant		0.213 (0.000)***	0.213 (0.001)***	0.213 (0.000)***	0.213 (0.001)***	0.201031 (0.001)***	0.201031 (0.001)***	0.201031 (0.001)***	0.201031 (0.000)***
Dividend Payout Ratio	Positive	0.023 (0.235)	0.023 (0.233)	0.023 (0.153)	0.023 (0.545)				
Average Franking Ratio	Positive	0.007 (0.558)	0.007 (0.568)	0.007 (0.514)	0.007 (0.582)				
Dividend Yield	Positive					0.0712 (0.522)	0.0712 (0.541)	0.0712 (0.540)	0.0712 (0.544)
Franking Credit Yield	Positive					0.312 (0.101)	0.312 (0.067)*	0.312 (0.067)*	0.312 (0.062)*
Period Dummy	Positive	-0.039 (0.002)***	-0.039 (0.004)***	-0.039 (0.002)***	-0.039 (0.003)***	-0.039 (0.003)	-0.039 (0.005)***	-0.039 (0.005)***	-0.039 (0.000)***
Tobin's' Q	Positive	0.019 (0.002)***	0.019 (0.019)**	0.019 (0.011)***	0.019 (0.016)**	0.020 (0.001)	0.020 (0.001)***	0.020 (0.001)***	0.020 (0.000)***
Natural log of Market Cap.	Positive	0.002 (0.501)	0.002 (0.509)	0.002 (0.479)	0.002 (0.505)	0.003 (0.289)	0.003 (0.300)	0.0031 (0.303)	0.0031 (0.075)
Operating Cash Flow / Total Assets	Negative	-0.187 (0.000)***	-0.187 (0.000)***	-0.187 (0.000)***	-0.187 (0.000)***	-0.186 (0.000)	-0.186 (0.000)***	-0.186 (0.000)***	-0.186 (0.001)***
Current Ratio	Negative	-0.004 (0.712)	-0.004 (0.692)	-0.004 (0.627)	-0.004 (0.329)	-0.007 (0.798)	-0.007 (783)	-0.007 (0.783)	-0.007 (0.721)
Interest Coverage Ratio	Negative	-0.008 (0.839)	-0.008 (0.827)	-0.008 (0.815)	-0.008 (0.624)	-0.006 (0.791)	-0.006 (0.775)	-0.006 (0.775)	-0.006 (0.749)
Discount	Positive	0.008 (0.001)***	0.008 (0.001)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.001)	0.008 (0.001)***	0.008 (0.001)***	0.008 (0.004)***
R-Square		0.033	0.033	0.033	0.033	0.035	0.035	0.035	0.035
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

8.7.3.4 Multivariate panel linear model results

Table 8.10 showsthe results of our panel linear regressions on the determinants of the participation decision.[121] The fixed effects model uses changes in the variable over time to estimate the effect of the firm characteristic variables (independent variables) on the participation rate. A random effects model gives a more efficient estimator than fixed effects models. Prior researchers (Clarke et al., 2010) have recommended using both random effects and fixed effects models.[122]

The coefficients on Dividend Payout Ratio, Dividend Yield and Average Franking Credit Ratio are positive but not significant in any of the fixed effects and random effects regressions. However, the coefficient estimate on Franking Credit Yield is positive and significant at the 0.10 level in all fixed effects and random effects models. Thus, there is some evidence to show that DRP firms with a higher franking credit yield are likely to have a greater participation rate than firms with a lower franking credit yield. However, overall there is only very weak support for H2.

The coefficient estimates on Tobin's Q are positive and significant at the 0.01 level in all fixed effects and random effects models supporting H4. The coefficient on the size variable (natural logarithm of Total Assets) is positive and significant at the 0.10 level in fixed effects model (1) and random effects model (1) and at the 0.05 level in fixed effects model (2) and random effects model (2). Similarly, the estimated coefficient on the variable natural logarithm of Market Capitalization is positive in all fixed effects and random effects models as predicted, but not significant. Thus, the evidence of the effect of the size on the decision to participate is mixed. The results provide only weak support for H5.

[121]In panel linear model, both time (year) and firm effects (ASX code) are controlled for.

[122]STATA's random effects estimator is a weighted average of fixed effects and between-effects.

Table 8.10
Panel linear regression results (Full sample period, 1995-2009)

Variable	Expected sign	(1) Fixed Effects Coefficient (Sig.)	(2) Fixed Effects Coefficient (Sig.)	(3) Fixed Effects Coefficient (Sig.)	(4) Fixed Effects Coefficient (Sig.)	(1) Random Effects Coefficient (Sig.)	(2) Random Effects Coefficient (Sig.)	(3) Random Effects Coefficient (Sig.)	(4) Random Effects Coefficient (Sig.)
Constant		0.111 (0.072)*	0.103 (0.090)*	0.181 (0.003)***	0.159 (0.009)***	0.141 (0.024)**	0.134 (0.030)**	0.207 (0.001)***	0.201 (0.001)***
Dividend Payout Ratio	Positive	0.019 (0.324)		0.022 (0.253)		0.020 (0.299)		0.023 (0.235)	
Average Franking Ratio	Positive	0.013 (0.327)		0.007 (0.584)		0.012 (0.333)		0.007 (0.585)	
Dividend Yield	Positive		0.108 (0.346)		0.128 (0.262)		0.098 (0.385)		0.071 (0.522)
Franking Credit Yield	Positive		0.350 (0.067)*		0.316 (0.096)*		0.347 (0.068)*		0.312 (0.101)*
Period Dummy	Positive	-0.002 (0.866)	-0.006 (0.864)	-0.003 (0.854)	-0.007 (851)	-0.033 (0.105)*	-0.032 (0.132)*	-0.031 (0.146)*	-0.039 (0.003)***
Tobin's' Q	Positive	0.018 (0.003)***	0.021 (0.001)***	0.018 (0.004)***	0.020 (0.002)***	0.019 (0.002)***	0.021 (0.001)***	0.018 (0.004)***	0.020 (0.001)***
Natural log of Total Assets	Positive	0.005 (0.084)*	0.006 (0.044)**			0.005 (0.088)*	0.006 (0.047)**		
Natural log of Market Cap.	Positive			0.002 (0.497)	0.003 (0.242)			0.002 (0.499)	0.003 (0.288)
Operating Cash Flow / Total Assets	Negative	-0.183 (0.000)***	-0.181 (0.000)***	-0.184 (0.000)***	-0.184 (0.000)***	-0.184 (0.000)***	-0.182 (0.000)***	-0.185 (0.000)***	-0.186 (0.000)***
Current Ratio	Negative	-0.015 (0.805)	-0.026 (0.735)	-0.006 (0.826)	-0.037 (0.942)	-0.006 (0.854)	-0.004 (0.781)	-0.012 (0.789)	-0.016 (0.798)
Debt/Total Assets	Positive	0.022 (0.259)	0.019 (0.336)			0.021 (0.277)	0.018 (0.351)		
Interest Coverage Ratio	Negative			-0.002 (0.749)	-0.004 (0.691)			-0.002 (0.785)	-0.005 (0.791)
Discount	Positive	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.000)***	0.008 (0.001)***	0.008 (0.000)***	0.008 (0.001)***	0.008 (0.001)***
R-Square		0.029	0.030	0.028	0.029	0.035	0.036	0.033	0.035
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

The impact of operating cash flow on the decision to participate is negative and significant at the 0.01 level in all panel regression models (supporting H6). The coefficient estimate on the variable Current Ratio is negative in all fixed effects and random effects models but not significant. Therefore, there is no evidence to support H7, that DRP firms with a lower level of liquidity are likely to have greater participation rate than firms with a higher level of liquidity. The results in Table 8.10 show that the coefficient estimate on discount is positive and significant at the 0.01 level in all panel regressions. The evidence supports H9, that the DRP participation rate increases with the level of the discount for new shares issued. The results are consistent with prior evidence in the Australian market (Wills, 1989).

Overall the results in Table 8.10 provide evidence to support H4, H6 and H9, that high growth firms, firms with lower cash flow profitability and DRPs with a higher discount for new shares have a higher shareholder participation rate in a DRP compared to low growth firms with higher cash flow profitability and lower discounts. These results are consistent with the findings of Pettway and Malone (1973), Lyroudi (1999) and Todd and Domian (1997) in the US market and Wills (1989) in the Australian market. There is no support for H1, that DRP firms with a higher dividend payout ratio (dividend yield) have a higher shareholder participation rate than DRP firms with a lower dividend payout ratio (dividend yield). There is only weak evidence in support of H2, that DRP firms with greater franking credit ratios are likely to have a higher shareholder participation rate than DRP firms with smaller franking credit ratios. There is also some evidence in support of H5, that larger firms with a DRP are likely to have a higher participation rate than smaller firms with a DRP. However, there is no support for H8, with the coefficients on the leverage variables (Debt/Total Assets and Interest Coverage Ratio) not significant in any of the regressions. The results for the Period Dummy variable are contrary to H3, that the shareholder participation rate is higher in the post-tax credit refund period than in the pre-tax credit refund period.

8.7.3.5 2SLS linear model results[123]

Panels A to D in Table 8.11 report the 2SLS estimation results.[124]The evidence in Panel A shows that the estimated coefficient on predicted Dividend Payout Ratio is positive and significant at the 0.05 level in models (1a), (1b), (2a), and (2b). In other models, it is positive but not significant. The coefficient of the firm size variable (natural logarithm of Total Assets) is positive but not significant in all models (1a) to (2d). The impact of the discount on the shareholder participation rate is highly significant, with the coefficient on discount positive and significant in all models (2a) to (2d). The results in Panel A of Table 8.11 support H1 and H9, that DRP firms with a higher dividend payout ratio have a higher shareholder participation rate than DRP firms with a lower dividend payout ratio, and the DRP participation rate increases with the level of the discount for the new shares issued.

The results of Panel B in Table 8.11 again support H1 and H9. The coefficient on Predicted Dividend Payout Ratio is positive and significant at the 0.05 level in models (3a), (3b), (4a) and (4b). In other models the coefficient is positive but not significant. The coefficient on natural logarithm of Total Assets is positive in all models but not significant. Similar to the results in Panel A, the coefficient on the variable Discount is positive and significant in all models (4a) to (4d).

Panel C results in Table 8.11 show that the coefficient on Predicted Dividend Yield is positive in all models (5a) to (6d) and significant at the 0.10 level in models (5a), (5c) and (6a). There is weak support for H1. The coefficient on the firm size variable (natural log of Total Assets) is positive in all models but significant only in model (5d) at the 0.10 level. The coefficient on the

[123] If the independent variable and the error term are correlated, the regression may produce inconsistent estimates. To mitigate this problem we estimate a 2SLS model (Instrumental Variable procedure) for robustness.

[124] We run separate regressions with the Natural log of Total Assets and the Natural log of Market Capitalization (proxies of the size variable) for estimating the 2SLS regressions as these variables are highly correlated (see Appendix 3).

variable Discount is positive and significant at the 0.01 level in models (6a) to (6c) and at the 0.10 level in model (6d). The evidence in Panel C provides strong support for H9.

The evidence in Panel D in Table 8.11 is also similar to the results in Panel C. The coefficient on Predicted Dividend Yield is positive in all models and significant at the 0.10 level in models (7a), (7c), (8a) and (8c). The coefficient on the firm size variable natural logarithm of Market Capitalization is positive but not significant in all models (7a) to (8d). The coefficient on the discount variable is positive and highly significant at the 0.01 level in models (8a) to (8c) and at the 0.05 level in model (8d). The results again provide weak support for H1 and strong support for H9.

Table 8.11

2SLS linear model results (Full sample period, 1995-2009)

Panel A: Main test results with Natural log of Total Assets as size variable

Estimated linear 2SLS Model 1: DRP participation rate $_{i,t}$=$\beta_0 + \beta_1$Predicted value of Dividend Payout Ratio$_{i,t}$ + β_2 Natural logarithm of Total Assets$_{i,t}$+β_3Discount$_{i,t}$ + Error

Variable	Expected Sign	(1a) Linear	(1b) Robust	(1c) Cluster	(1d) Bootstrap	(2a) Linear	(2b) Robust	(2c) Cluster	(2d) Bootstrap
		Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)	Coefficient (Sig.)
Constant		0.139 (0.051)**	0.139 (0.079)*	0.139 (0.203)	0.139 (0.192)	0.128 (0.071)*	0.128 (0.101)*	0.128 (0.238)	0.128 (0.349)
Dividend Payout Ratio (Predicted value)	Positive	0.253 (0.016)**	0.253 (0.053)**	0.253 (0.140)	0.253 (0.239)	0.246 (0.019)**	0.246 (0.052)**	0.246 (0.148)	0.246 (0.499)
Natural log of Total Assets	Positive	0.002 (0.590)	0.002 (0.623)	0.002 (0.540)	0.002 (0.474)	0.002 (0.638)	0.002 (0.665)	0.002 (0.591)	0.002 (0.783)
Discount	Positive					0.007 (0.005)***	0.007 (0.005)***	0.007 (0.001)***	0.007 (0.009)***
Chi-Square		6.310 (0.043)**	4.260 (0.119)*	2.320 (0.314)	1.630 (0.443)	14.860 (0.002)***	14.090 (0.003)***	14.450 (0.002)***	16.150 (0.001)***
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Endogenous variable: Dividend Payout Ratio (Instrumental variables used: Average Franking Ratio, Period Dummy, Tobin's Q, Operating Cash Flow/Total assets and Current ratio).

Table 8.11 (Continued)

Panel B: Main test results with Natural log of Market Capitalization as size variable

Estimated linear 2SLS Model 2: DRP participation rate $_{i, t}$=β0 + β_1Predicted value of Dividend Payout Ratio$_{i, t}$ + β_2 Natural logarithm of Market Capitalization$_{i, t}$+ β_3 Discount$_{i, t}$ + Error

Variable	Expected Sign	(3a) Linear Coefficient (Sig.)	(3b) Robust Coefficient (Sig.)	(3c) Cluster Coefficient (Sig.)	(3d) Bootstrap Coefficient (Sig.)	(4a) Linear Coefficient (Sig.)	(4b) Robust Coefficient (Sig.)	(4c) Cluster Coefficient (Sig.)	(4d) Bootstrap Coefficient (Sig.)
Constant		0.158	0.158	0.158	0.158	0.142	0.142	0.142	0.142
		(0.031)**	(0.048)**	(0.041)**	(0.000)***	(0.051)**	(0.071)*	(0.059)*	(0.324)
Dividend Payout Ratio (Predicted value)	Positive	0.235	0.235	0.235	0.235	0.228	0.228	0.228	0.228
		(0.016)**	(0.047)**	(0.164)	(0.122)	(0.019)**	(0.048)**	(0.173)	(0.417)
Natural log of Market Cap.	Positive	0.002	0.002	0.002	0.002	0.004	0.004	0.004	0.004
		(0.503)	(0.526)	(0.558)	(0.614)	(0.603)	(0.621)	(0.655)	(0.557)
Discount	Positive					0.007	0.007	0.007	0.007
						(0.005)***	(0.005)***	(0.001)***	(0.000)***
Chi-Square		5.900	4.020	2.200	5.040	14.530	13.920	14.750	33.700
		(0.052)**	(0.134)	(0.333)	(0.081)*	(0.002)***	(0.003)***	(0.002)***	(0.000)***
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Endogenous variable: Dividend Payout Ratio (Instrumental variables used: Average Franking Ratio, Period Dummy, Tobin's Q, Operating Cash Flow/Total Assets and Current Ratio).

Table 8.11 (Continued)

Panel C: Robustness test results with Natural log of Total Assets as size variable

Estimated linear 2SLS Model 3: DRP participation rate $_{i,\,t}$=β0 + β_1Predicted value of Dividend Yield$_{i,\,t}$ + β_2 Natural logarithm of Total Assets$_{i,\,t}$+ β_3 Discount$_{i,\,t}$ + Error

Variable	Expected Sign	(5a) Linear Coefficient (Sig.)	(5b) Robust Coefficient (Sig.)	(5c) Cluster Coefficient (Sig.)	(5d) Bootstrap Coefficient (Sig.)	(6a) Linear Coefficient (Sig.)	(6b) Robust Coefficient (Sig.)	(6c) Cluster Coefficient (Sig.)	(6d) Bootstrap Coefficient (Sig.)
Constant		0.192 (0.002)***	0.192 (0.005)***	0.192 (0.001)***	0.192 (0.000)***	0.182 (0.003)***	0.182 (0.007)***	0.182 (0.001)***	0.182 (0.155)
Dividend Yield (Predicted value)	Positive	0.459 (0.077)*	0.459 (0.198)	0.459 (0.128)*	0.459 (0.565)	0.419 (0.105)*	0.419 (0.227)	0.419 (0.187)	0.419 (0.551)
Natural log of Total Assets	Positive	0.003 (0.293)	0.003 (0.316)	0.003 (0.309)	0.003 (0.089)*	0.005 (0.283)	0.005 (0.307)	0.005 (0.298)	0.005 (0.516)
Discount	Positive					0.007 (0.003)***	0.007 (0.003)***	0.007 (0.001)***	0.007 (0.084)*
Chi-Square		3.700 (0.157)	2.180 (0.336)	4.390 (0.112)	4.550 (0.103	12.680 (0.005)***	11.080 (0.011)***	17.630 (0.001)***	7.530 (0.057)*
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.
Endogenous variable: Dividend Yield (Instrumental variables used: Franking Credit Yield, Period Dummy, Tobin's Q, Operating Cash Flow/Total Assets, and CurrentRatio).

Table 8.11(Continued)

Panel D: Robustness test results with Natural log of Market Capitalization as size variable

Estimated linear 2SLS Model 4: DRP participation rate $_{i,t}$=β0 + β_1Predicted value of Dividend Yield$_{i,t}$ + β_2 Natural logarithm of Market Capitalization$_{i,t}$+ β_3 Discount$_{i,t}$ + Error

Variable	Expected Sign	(7a) Linear Coefficient (Sig.)	(7b) Robust Coefficient (Sig.)	(7c) Cluster Coefficient (Sig.)	(7d) Bootstrap Coefficient (Sig.)	(8a) Linear Coefficient (Sig.)	(8b) Robust Coefficient (Sig.)	(8c) Cluster Coefficient (Sig.)	(8d) Bootstrap Coefficient (Sig.)
Constant		0.177 (0.016)**	0.177 (0.037)**	0.177 (0.045)**	0.177 (0.279)	0.164 (0.025)**	0.164 (0.050)**	0.164 (0.070)*	0.164 (0.100)*
Dividend Yield(Predicted value)	Positive	0.507 (0.063)*	0.507 (0.179)	0.507 (0.096)*	0.507 (0.506)	0.468 (0.086)*	0.468 (0.200)	0.468 (0.143)*	0.468 (0.407)
Natural log of Market Cap.	Positive	0.004 (0.265)	0.004 (0.303)	0.004 (0.321)	0.004 (0.566)	0.006 (0.239)	0.006 (0.275)	0.006 (0.310)	0.006 (0.316)
Discount	Positive					0.007 (0.003)***	0.007 (0.002)***	0.007 (0.000)***	0.007 (0.048)**
Chi-Square		3.530 (0.172)	1.920 (0.383)	2.860 (0.239)	0.590 (0.744)	12.530 (0.006)***	10.840 (0.013)***	16.540 (0.001)***	14.480 (0.002)***
Total Number		1647	1647	1647	1647	1647	1647	1647	1647

Notes.The figures in the parentheses are the statistical significance values. The asterisks in the table indicate statistical significance at the 0.01 (***), 0.05 (**) and 0.10 (*) levels.

Endogenous variable: Dividend Yield (Instrumental variables used: Franking credit yield, Period Dummy, Tobin's Q, Operating Cash flow/Total Assets and Current Ratio).

8.8 Conclusion

This chapter investigates the determinants of the decision to participate in a DRP. The Australian equity market under the dividend imputation tax system provides a unique opportunity to examine the tax related motivations to participate in a DRP. Specifically, this chapter investigates whether DRP firms, with a higher dividend payout (dividend yield) and a higher franking ratio (franking credit yield), are more likely to have a higher shareholder participation rate in the DRP than firms with a lower dividend payout (dividend yield) and a lower franking ratio (franking credit yield). We also examine the impact of the July 2000 tax reform on the shareholder participation rate. We predict that the shareholder participation rate is higher in the post-tax credit refund period than in the pre-tax credit refund period. The chapter also hypothesizes that the decision to participate in a DRP may be explained in terms of growth, firm size, free-cash-flow and leverage and DRP discount.

This study is important for the following reasons. First, an insight into the characteristics that motivate shareholder participation enables firms to understand the factors that may explain the participation rate in their DRP. Second, consistent with the findings of prior research (Wills, 1989), this study confirms the role of the discount for new share issues in raising the shareholder participation rate. This suggests that the firm can influence shareholder participation in their DRPs in the Australian market by changing the discount for new share issues.

Overall this chapter provides weak support for the role of taxation as a determinant of the non-underwritten shareholder participation rate. The evidence provides no strong support for H1 and H2, that DRP firms with higher payouts and a greater franking credits ratio have higher shareholder participation rate than DRP firms with lower payouts and a smaller franking credit ratio. The evidence also does not support H3, that the shareholder participation rate is higher in the post-tax credit refund period than in the pre-tax credit refund period.

Our results provide support for the growth and free-cash flow hypotheses (H4 and H6), that high growth DRP firms with cash flow profitability constraints are likely to have a higher shareholder participation rate in the DRP compared to low growth DRP firms with no cash flow profitability constraints. These results are consistent with the findings of Pattway and Malone (1973) and Lyroudi (1999) in the US market. There is very weak support for the size and liquidity hypotheses (H5 and H7). There is also some evidence to show that the shareholder participation rate is positively affected by leverage (H8).

Overall our results show that the key drivers of shareholder participation in an Australian DRP are firm growth (Tobin's Q), Operating Cash Flow/ Total Assets and Discount. Consistent with prior empirical studies (Wills, 1989), we find strong evidence to support the discount hypothesis whereby firms with a higher discount for new shares issued under the DRP are likely to have a higher participation rate compared to firms with a lower discount.

CHAPTER NINE
GENERAL CONCLUSIONS

9.1 Introduction

This study examines new issue DRPs in the Australian market. This chapter is structured as follows. The research questions are outlined in Section 9.2. Section 9.3 summarizes the motivations for undertaking this study, Section 9.4 provides a summary of the findings of this research and Section 9.5 concludes the chapter.

9.2 Research questions

Our study on DRPs in the Australian market spans the sample period between 1995 and 2009. Our research addresses the following three questions:

1) What are the factors that explain a firm's decision to adopt a DRP in the Australian market?

2) What are the firm characteristic variables and DRP features that explain the firm's decision to underwrite its DRP in the Australian market?

3) What are the determinants of the existing shareholder's decision to participate in a DRP in the Australian market?

9.3 Motivations for undertaking the study

The motivations for our study to examine DRPs in the Australian market are as follows. First, the Australian equity market provides a unique setting under the dividend tax imputation system to examine the firm's dividend policy. The dividend tax imputation regime encourages firms to pay dividends to the maximum of the franking credits allowed.

Investor preferences for retained earnings were also further reduced with the July 2000 tax reforms that enabled Australian resident investors to redeem surplus franking credits from the Australian Tax Office. Bellamy (1994) finds that firms paying franked dividends have significantly increased dividend payments when compared to firms paying dividends with little or no attached imputation credits. Similarly, Pattenden and Twite (2008) show that after the introduction of the imputation regime, Australian firms with a high proportion of income available as franked dividends increased their gross dividend payouts. The study by Pattenden and Twite (2008) covers the period between 1982 and 1997. Studies by Chan et al. (1995), Bellamy (1994) and Pattenden and Twite (2008) all report that DRPs have increased post-imputation in the Australian market.

Our study covers the 15 year period between 1995-2009, which includes the period of tax credit refund reform in July 2000.A DRP enables the firm to increase its dividend payout and retain funds within the firm. Specifically, we examine the firm characteristics that explain the adoption of a DRP in the Australian market. We are not aware of any prior empirical studies that specifically explain the adoption of a DRP in terms of firm characteristic variables in the Australian market.

Second, as noted in Chapter 2, DRPs are an important source of equity capital in the Australian market. Under the Australian dividend tax imputation system, a DRP is a cost-effective source of new equity capital at the higher levels of shareholder utilization of imputation credits (see Chapter 5). These findings have further motivated us to examine the characteristics of firms that adopt a DRP in the Australian market, and the decision by the firm to underwrite the DRP.

Third, since underwriters play an important role in guaranteeing a set participation rate, we also examine the firm characteristics and DRP features that explain a firm's decision to underwrite a DRP in the Australian market. Wills (1989) provides empirical evidence that firms that offer a higher discount in the price at which they issue shares under the DRP have a greater shareholder participation rate compared to firms that offer a lower or no discount. Will's study covers the period from 1982 to 1987. We extend prior research by Wills (1989) in the Australian capital market by investigating the relationship between the discount and the existing shareholders' participation rate in the period between 1995 to 2009. This is post the introduction of dividend imputation and includes the post-tax credit refund period (2001-2009) introduced under the July 2000 tax reforms.

9.4 Thesis summary

9.4.1 Chapter-1

Chapter1 provides an overview of DRPs, focusing on (i) DRPs as a source of funds, (ii) DRP announcement effects, and (iii) DRPs as a mechanism to distribute greater franking credits to the Australian resident shareholders. This chapter also outlines the motivation and the methodology used in the thesis.

9.4.2 Chapter-2

Chapter 2 provides an overview of (i) the characteristics of Australian DRPs, (ii) the legal requirements of implementing a DRP, (iii) equity ownership in the Australian market, (iv) the methods used to raise equity in the Australian market, (v) the Australian tax system, and (vi) the taxation of DRPs in the Australian market. The Australian institutional environment of the dividend tax imputation system means that superannuation funds and pension funds are motivated by a tax-based preference for high dividends with attached franking credits. We also show that, when compared to the pre-tax credit refund period (1995-2000), superannuation and pension funds have gained large benefits in the post-tax credit refund period (2001-2009) as the difference in the after-tax value of a dollar of dividend income between the two periods is significant. However, post the introduction of imputation, Australian resident tax-paying shareholders with high marginal tax rates still have a tax-based preference for the retention of dividends.

9.4.3 Chapter-3

Chapter 3 reviews the literature on DRPs. The chapter covers (i) the practices of firms adopting a DRP, (ii) the general incentives that encourage firms to adopt a DRP, (iii) the tax incentives that encourage firms to adopt a DRP in the US, UK and Australian markets, (iv) the impact of

DRPs on shareholder wealth, and (v) DRPs as mechanisms for raising equity capital. This chapter describes the two main types of DRPs that currently exist: open market purchase plans and new-issue plans. Under open market purchase plans, the firm acquires outstanding shares either directly or indirectly through an investment banker or broker or trustee and assigns ownership of these shares to the reinvesting shareholder.

The focus of this study is on new issue DRPs. Under the new issue DRP, the shareholder may elect to have dividends on some or all of the shareholder's ordinary shares automatically reinvested in the additional shares of the firm.

In Chapter 3 we also discuss the main practices of firms adopting a DRP in the UK, US and Australian markets. Firms adopt DRPs in order to build a reservoir of new equity capital. In the Australian context, a DRP enables Australian firms to raise new equity and adopt a high dividend payout ratio in order to distribute the maximum level of franking credits. Shareholders get the benefits of dollar cost averaging, tax deferral and tax imputation through a DRP. The findings from prior studies suggest that there is an overall positive announcement effect from the decision to introduce a DRP (Chang & Nichols, 1992; Chan et al, 1995; Dubofsky&Bierman, 1998). The prior empirical literature also suggests that there is a positive association between the discount on the market price of new shares issued under the DRP and the shareholder participation rate (Wills, 1989; Todd, 1992).

9.4.4 Chapter - 4.

The data used in the thesis is described in Chapter 4.We discuss the sampling strategy, the industry distribution of the sampled firms, and the distribution of the sample between the pre and post-tax credit refund periods. We also describe the main firm characteristic variables used in our analysis, the data sources and the issues faced in data collection. The sample consists of dividend paying firms traded in the Australian capital market, drawn from the population of all firms listed on the ASX over the period 1995 to 2009.

We identified a sample of 6,231 dividend-paying firm observations. Overall, our sample covers most of the major industrial sectors in Australia. The sample period (1995-2009) was chosen because of the significant tax changes that occurred during that period. The type of data employed is cross-sectional and time-series, pertaining to the sample firms cutting across all industries.

9.4.5 Chapter-5

Chapter 5 modifies and applies the Finnerty (1989) model to the Australian dividend imputation system. Our modified model addresses the cost of equity issue by comparing the costs of equity for retention financed equity, stock financed equity and DRP financed equity under the tax imputation system. We show that if the shareholders' marginal tax rate is less than the statutory corporate tax rate and investors can utilize imputation credits, the DRP is a cost effective way of raising external equity compared to retention-financed and stock-financed equity capital. This may explain the increasing use of DRPs in the Australian equity market subsequent to the introduction of the imputation tax regime.

9.4.6 Chapter -6.Determinants of the decision to adopt a DRP

Chapter 6 examines factors that explain the decision of the firm to adopt a DRP. We predict that, under a dividend imputation regime, DRP firms will have higher dividend payout ratios and distribute more franking credits. We also predict that firms adopting DRPs will have higher growth, greater leverage, larger size and lower profitability and liquidity than dividend paying non-DRP firms. We posit that more firms will offer DRPs in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000).

To identify the factors that distinguish DRP firms from dividend paying non-DRP firms, we first undertake univariate analysis and compare the independent variables for both the DRP and non-DRP samples. In the multivariate analysis we use a logistic model to test our hypotheses. A panel logistic model is estimated to deal with the panel data and a 2SLS model is estimated to control for the possible endogeneity between dividend payout and the firm's decision to adopt a DRP.

The evidence in Chapter 6 suggests that firms with a DRP (i) have higher dividend payout ratio (dividend yield), (ii) distribute greater franking credits, (i) are significantly larger in size, and (iv) have lower profitability compared to firms without a DRP. The evidence also shows that firms with a DRP have higher growth and greater leverage than firms without a DRP. There is only weak evidence to show that firms with a DRP have lower liquidity compared to firms without a DRP.

The key implications of the results are as follows. First, there is evidence to suggest that the tax preference for the distribution of franked dividends will result in firms increasing their use of external equity financing via DRP to offset the increased distribution of earnings. Our evidence also suggests that firms are more likely to have a DRP in the post-tax credit refund period. This finding is consistent with Bellamy's (1994) conclusion that the use of DRPs has increased significantly post-imputation. Second, firms use a DRP to provide new equity capital when faced with profitability and leverage constraints.

9.4.7 Chapter-7 Characteristics of firms that have an underwritten DRP

Chapter 7 examines the characteristics of firms that have an underwritten DRP. We posit that firms with high dividend payouts will seek to underwrite their DRP to enable them to maintain their high dividend payout and to ensure that the firm retains sufficient funds to fund growth or to move to a target leverage ratio. Similarly, we predict that firms with a higher franking credit ratio are less likely to underwrite a DRP than firms with a lower franking credit ratio. This is because we predict that firms with a high franking credit ratio are likely to have a greater shareholder participation rate. We also hypothesize that firms with higher growth, larger size, lower operating cash flow and liquidity and higher leverage are more likely to underwrite their

DRP. Lastly, we posit that the decision to underwrite a DRP is unrelated to the discount offered for new shares issued under the DRP.

We first undertake univariate analysis of the explanatory variables in order to examine the firm's decision to underwrite a DRP and then use a logistic model to test the hypotheses. We estimate logistic panel regressions since the data is cross-sectional and time-series in nature. We also estimate a 2SLS logistic model to control for any potential endogeneity between the decision to underwrite and the dividend payout.

Our empirical results show that DRPs are more likely to be underwritten if the firm size is greater, the leverage is higher, and the cash flow profitability and the level of attached franking credits are lower. The evidence also provides some support for the growth and liquidity hypotheses; specifically, we find firms with higher growth and lower liquidity are more likely to underwrite their DRPs. Lastly, we find evidence that the discount on the market price of shares issued under the DRP is positively related to the underwriting decision of the DRP.

9.4.8 Chapter-8 Shareholder participation rate

Chapter 8 examines factors that explain shareholder participation rates in Australian DRPs. The focus of our study is on the non-underwritten participation rate. The hypotheses that may explain the level of shareholder participation in a DRP are broadly divided into taxation, growth, size, free cash flow and leverage and discount. We posit that firms implementing a DRP will have a greater shareholder participation rate the higher the level of franked dividends. This is because there is no or only a small cash shortfall for payment of the investor's tax where dividends are fully imputed. Furthermore, DRP firms with a higher participation rate are likely to have higher dividend payout ratios than DRP firms with a lower participation rate. We posit that there will be a greater shareholder participation rate in the post-tax credit refund rule period (2001-2009) than in the pre-tax credit refund rule period (1995-2000). We also hypothesize that DRP firms with a higher shareholder participation rate will be larger, have greater growth, lower cash flow profitability and liquidity, higher leverage and a higher discount compared to DRP firms with a lower shareholder participation rate.

In our univariate analysis we divide the non-underwritten DRP sample of firm observations into two groups: firms with a high participation rate and firms with a low participation rate, based on the median participation rate for the period 1995-2009. In multivariate analysis we use a linear regression model. We also estimate a panel linear model and a 2SLS linear model to control for any possible endogeneity between dividend payouts or dividend yields and the existing shareholder's decision to participate in a DRP.

The empirical findings reported in Chapter 8 show that firms with a higher discount for new shares issued under a DRP have a higher shareholder participation rate compared to firms with a zero or low discount for new shares issued. The evidence also provides strong support for the profitability hypothesis that DRP firms with lower operating cash flows have a greater participation rate than DRP firms with higher operating cash flows. There is some evidence to suggest that high growth firms with a DRP are more likely to have a greater shareholder participation rate compared to low growth DRP firms. There is only weak evidence to show that DRP firms distributing greater franking credits are more likely to have higher shareholder participation rates than DRP firms that pay lower franking credits.

Our results in Chapter 8 have the following implications. First, consistent with prior studies (Wills, 1989), our results show that the discount on the market price of new shares issued under the DRP increases the shareholder participation rate in the Australian market. This may explain why many Australian firms offer DRPs with a discount. Second, we find evidence that the shareholder participation rate increases in DRP firms where there is high leverage and low profitability. These are characteristics of firms with lower agency costs and thus the existing shareholders may be more willing to reinvest their dividends in firms where expropriation of shareholder wealth is less likely to occur.

9.5 Conclusion

This thesis provides the following significant contributions to the existing literature. First, we modify the Finnerty (1989) model to the Australian dividend imputation system to demonstrate that, at higher levels of the utilization rate of imputation credits, a DRP can be the most cost-effective method of raising new equity capital when it is compared to retention-financed equity and new stock-financed equity.

Second, our study provides evidence to show that DRPs increased in the post-tax credit refund period (2001-2009), consistent with value maximization arguments. We also find evidence in the Australian market of firms adopting a DRP enable the firm to meet the shareholder preference for higher payouts with attached franking credits and to retain funds for new investment opportunities, debt repayment or for working capital purposes.

Third, underwritten DRPs are a common feature in the Australian market. Underwriters play an important role in guaranteeing a set participation rate in the DRP to ensure the firm retains a minimum level of funds. Understanding the characteristics of firms that have an underwritten DRP enables the firm to make a more informed underwriting decision. Fourth, our study on the shareholder participation rate is important for firms that decide to implement a DRP and require funds for new investment, working capital or repayment of debt.

There are a number of areas for additional research. Further research could be an event study to examine the announcement effect of a DRP adoption in the post-tax credit refund period and share price behaviour around the ex-dividend the DRP firms. This is because the share price on the period following the dividend payments sets the price for the issue of new shares under the DRP. Our analysis of DRP underwriting was also constrained by the lack of information on the level of underwriting and underwriting fees, which limited our scope of research on underwriting. These topics are left for future research.

APPENDICES

Appendix1: Proof of Equation 5.3

The proof of Eq. (5.3) can be derived as follows:

D = Cash dividend under the imputation system. The amount D has attached imputation credits equal toIC. The after-personal tax return is D $(1-t_d)$ where t_d is the effective personal tax rate. Alternatively, the after-personal tax return is (D + UIC) $(1-T_d)$, where the cash dividend is grossed up by the IC multiplied by the utilization rate,U.

Thus, equating after-personal tax returns we have: $(1-t_d)$ =(D + UIC) $(1-T_d)$.

By rearranging this expression we have Eq. (5.3).

That is, $t_d = T_d - U (1-T_d)$ IC/D,

Appendix2: Derivation of Equations 5.4, 5.5, 5.6

We modify the Finnerty (1989) equations (5.4), (5.5) and (5.6) under the Australian dividend imputation tax system by replacing Td with an effective personal tax ratetd as defined in equation (5.3). We now restate Eq. (5.2) and Eq. (5.3).

$$V_0 = \frac{X_1 \text{ (1-b) (1- } T_d)}{1+k} - \frac{dX_1}{1+k} + \frac{V_1 - sX_1/(1-w)}{1+k} - \frac{T_g\left\{V_1 - sX_1/(1-w) - \left[V_0 + dX_1\right]\right\}}{1+k} \tag{5.2}$$

where

$$T_d = t_d = T_d - U\,(1-T_d)IC/D \tag{5.3}$$

Now we solve Eq. (5.2), and get Eq. (a) below.

Solution of Eq. (5.2)

$$V_0 = \frac{X_1 \text{ (1-b) (1-} t_d)}{1+k} - \frac{dX_1}{1+k} + \frac{V_1 - sX_1/(1-w)}{1+k} - \frac{T_g\left\{V_1 - sX_1/(1-w) - \left[V_0 + dX_1\right]\right\}}{1+k}$$

$$V_0(1+k) = X_1 \text{ (1-b) (1- } t_d) - dX_1 + V_1 - sX_1/(1-w) - T_g\left\{V_1 - sX_1/(1-w) - \left[V_0 + dX_1\right]\right\}$$

$$V_0(1+k) = X_1 \text{ (1-b) (1-} t_d) - dX_1 + V_1 - sX_1/(1-w) - T_gV_1 + T_g sX_1/(1-w) + \left[T_gV_0 + T_g dX_1\right]$$

$$V_0(1+k) - T_gV_0 = X_1 \text{ (1-b) (1-} t_d) - sX_1/(1-w) + T_g sX_1/(1-w) - dX_1 + T_g dX_1 + V_1 - t_gV_1$$

$$V_0(1+k-T_g) = X_1 \text{ (1-b) (1-} t_d) - (1-T_g)s/(1-w)X_1 - d(1-T_g)X_1 + (1-T_g)V_1$$

$$V_0(1+k-T_g) = X_1 \text{ (1-b) (1-} t_d) - [s/(1-w) + d](1-T_g)X_1 + (1-T_g)V_1$$

$$V_0(1+k-T_g) = X_1A + (1-T_g)V_1$$

$$A = \left(1-b\right)(1\text{-}t_d) - [s/(1-w) + d](1-T_g)$$

$$V_0 = \frac{X_1A + (1-T_g)V_1}{(1+k-T_g)}$$

$$V_0 = \frac{X_1A}{(1+k-T_g)} + \frac{(1-T_g)V_1}{(1+k-T_g)} \tag{a}$$

Assumptions

We now employ the set of definitions stated in Finnerty (1989).

$q\,X_1$ = the amount invested by the firm at the end of period 1

r = the rate of return earned on the investment

$q\,X_1\,r$ = the stream of investment returns at the end of each period in perpetuity.

Firm earns X_1 in each period .All future earnings are distributed as dividends. Future return on investment functions is assumed to be independent of the current investment decision. This final assumption can be maintained if we assume that all net income that is retained earns a rate of return equal to the cost of retained earnings. Thus in each period, the firm earns:

$$X_2 = X_1 + \mathrm{b}\,X_1 r + \mathrm{s}\,X_1 r + \mathrm{d}(1-\mathrm{z})\,X_1 r.$$

Taking out the common factor X_1 and assuming that $q = b + s + d(1-z)$, that is, q is a function of b, s and $d(1-z)$ we get:

$$X_1(1+qr)$$

$$X_2 = X_1(1 + qr)$$

Then we can define V_1 as:

$$V_1 = \frac{X_1(1+qr)(1\text{-}t_d)}{(1+k-T_g)} + \frac{(1-T_g)V_2}{(1+k-T_g)}$$

And generalizing,

$$Vt = \frac{X_1(1+qr)(1\text{-}\ t_d)}{(1+k-T_g)} + \frac{(1-T_g)V_2}{(1+k-T_g)}$$

(b)

Here $X_1 = X_t$

Following the generalization in Eq. (b) and substituting Eq. (b) into Eq. (a) repeatedly gives an infinite series.

Evaluation of infinite series

We evaluate the infinite series in the following manner.

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{(1-T_g)V_1}{(1+k-T_g)}$$

$$V_1 = \frac{X_1(1+qr)(1-\mathrm{t_d})}{(1+k-t_g)} + \frac{(1-T_g)V_2}{(1+k-T_g)}$$

$$V_2 = \frac{X_1(1+qr)(1-\mathrm{t_d})}{(1+k-T_g)} + \frac{(1-T_g)V_3}{(1+k-T_g)}$$

$$V_3 = \frac{X_1(1+qr)(1-\mathrm{t_d})}{(1+k-T_g)} + \frac{(1-T_g)V_4}{(1+k-T_g)}$$

We now replace value of V_2 and then $V_{3,}$ etc. as shown below

$$V_0=\frac{X_1A}{(1+k-T_g)}+\frac{(1-T_g)\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}+\frac{(1-T_g)V_2}{(1+k-T_g)}\right]}{(1+k-T_g)}$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\frac{(1-T_g)}{(1+k-T_g)}\left[\frac{X_1(1+qr)(1-\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}t_d)}{(1+k-T_g)}+\frac{(1-T_g)V_2}{(1+k-T_g)}\right]$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\frac{(1-T_g)}{(1+k-T_g)}\frac{(1-T_g)V_2}{(1+k-T_g)}$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+$$

$$\frac{(1-T_g)}{(1+k-T_g)}\frac{(1-T_g)}{(1+k-T_g)}\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}+\frac{(1-T_g)V_3}{(1+k-T_g)}\right]$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+$$

$$\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^2\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^3[V_3]$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+$$

$$\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^2\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^3\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}+\frac{(1-T_g)V_4}{(1+k-T_g)}\right]$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^2\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]$$

$$+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^3\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}+\frac{(1-T_g)V_4}{(1+k-T_g)}\right]$$

$$V_0=\frac{X_1A}{(1+k-T_g)}+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+$$

$$\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^2\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^3\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)}\right]+\left[\frac{(1-T_g)}{(1+k-T_g)}\right]^4[V_4]$$

Now this equation takes the form of an infinite series:

$V=c+ab+a^2b+a^3b+a^4b+\ldots$

Here we have:

$$c = \frac{X_1 A}{(1+k-T_g)}$$

$$a = \left[\frac{(1-T_g)}{(1+k-T_g)} \right]$$

$$b = \left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)} \right]$$

The solution is: V=c + b (a+a^2+ a^3+ a^4+…)

$$\text{V} = \text{c} + \frac{ba}{1-a}$$

Substituting the values we get:

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)} \right] \left[\frac{(1-T_g)}{(1+k-T_g)} \right]}{1 - \left[\frac{(1-T_g)}{(1+k-T_g)} \right]}$$

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)} \right] \left[\frac{(1-T_g)}{(1+k-T_g)} \right]}{\frac{(1+k-T_g)-(1-T_g)}{(1+k-T_g)}}$$

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{\left[\frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)} \right] \left[\frac{(1-T_g)}{(1+k-T_g)} \right]}{\frac{k}{(1+k-T_g)}}$$

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{(1+k-T_g)}{k} \frac{X_1(1+qr)(1\text{-t}_d)}{(1+k-T_g)} \frac{(1-T_g)}{(1+k-T_g)}$$

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{X_1(1+qr)(1\text{-t}_d)(1-T_g)}{(1+k-T_g)k}$$

(c)

Derivation of Equation (5.4)

We differentiate Eq. (c) with respect to the retention rate (b) expressed as a fraction of expected earnings. We assume that the capital investment rate is a function of the retention rate, the stock-financing rate and the dividend reinvestment rate, that is, q = b + s + d (1-z).

We restate Eq. (c):

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{X_1(1+qr)(1-t_d)(1-T_g)}{(1+k-T_g)k}$$

$$A = (1-b)(1-t_d) - [s/(1-w)+d](1-T_g)$$

Substituting the value of 'A' in the above equation we get:

$$V_0 = \frac{\left[X_1\,(1\text{-}b)\,(1\text{-}t_d) - [s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} + \frac{X_1(1+qr)(1-t_d)(1-T_g)}{(1+k-T_g)k} \qquad \text{(d)}$$

q = b + s + d (1-z)

For a very small change in b we have a small change in $q\ r$ and also a small change in V_0

$$V_0 + \partial V_0 = \frac{X_1\left[\left(1-\left(b+\partial b\right)\right)\left(1-t_d\right) - [s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} + \frac{X_1(1+(qr+\partial qr))(1-t_d)(1-T_g)}{(1+k-T_g)k}$$

$$\partial V_0 = \frac{X_1\left[\left(1-\left(b+\partial b\right)\right)\left(1-t_d\right) - [s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} + \frac{X_1(1+(qr+\partial qr))(1-t_d)(1-T_g)}{(1+k-T_g)k} - V_0$$

Substituting V_0 from equation (d) we get:

$$\partial V_0 = \frac{X_1\left[\left(1-\left(b+\partial b\right)\right)\left(1-\mathrm{t_d}\right)-[s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}$$
$$+\frac{X_1(1+(qr+\partial qr))(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$
$$-\left[\begin{array}{l}\dfrac{X_1\left[\left(1-b\right)\left(1-\mathrm{t_d}\right)-[s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}\\ +\dfrac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}\end{array}\right]$$

$$\partial V_0 = \frac{\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)}}{(1+k-T_g)} - \frac{X_1\partial b\left(1-\mathrm{t_d}\right)}{(1+k-T_g)} - \frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)} +$$
$$\frac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k} + \frac{X_1(\partial qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$
$$-\frac{\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)}}{(1+k-T_g)} + \frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)}$$
$$-\frac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$

This simplifies to:

$$\partial V_0 = -\frac{X_1\partial b\left(1-\mathrm{t_d}\right)}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$

Dividing both sides with ∂b we get:

$$\frac{\partial V_0}{\partial b} = -\frac{X_1\partial b\left(1-\mathrm{t_d}\right)}{\partial b(1+k-T_g)} + \frac{X_1(\partial qr)(1-\mathrm{t_d})(1-T_g)}{\partial b(1+k-T_g)k}$$

From expression q = b + s + d (1-z), we get $\partial q/\partial b=1$, so we can substitute $\partial q\ r/\partial b$ with $\partial q\ r/\partial q$

$$\frac{\partial V_0}{\partial b} = -\frac{\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)}}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-\mathrm{t_d})(1-T_g)}{\partial q(1+k-T_g)k}$$

At the optimum level we have $\frac{\partial V_0}{\partial b}=0$. So we get the above equation as:

$$\frac{\partial V_0}{\partial b} = -\frac{X_1\ (1\text{-}b)\ (1\text{-}t_d)}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-t_d)(1-T_g)}{\partial q(1+k-T_g)k} = 0$$

$$\frac{X_1(\partial qr)(1-t_d)(1-T_g)}{\partial q(1+k-T_g)k} = \frac{X_1\left(1-t_d\right)}{(1+k-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{X1\ (1\text{-}b)\ (1\text{-}t_d)\ (1+k-T_g)k}{X_1(1+k-T_g)(1-t_d)(1-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{k}{(1-T_g)}$$

$$C_b = k/\ (1\text{-}T_g) \tag{5.4}$$

After removing same terms from numerator and denominator, we get equation (5.4) as the value of (C_b) under the Australian dividend tax imputation system.

<u>Derivation of Equation (5.5)</u>

We differentiate Eq. (c) with respect to the stock financing rate (s) expressed as a fraction of expected earnings. We assume that the capital investment rate is a function of the retention rate, the stock-financing rate and the dividend reinvestment rate, that is, q = b + s + d (1-z).

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{X_1(1+qr)(1-t_d)(1-T_g)}{(1+k-T_g)k}$$

$$A = \left(1-b\right)\left(1-t_d\right) - [s/(1-w)+d](1-T_g)$$

Substituting the value of A in the above equation we get:

$$V_0 = \frac{\left[X_1\ (1\text{-}b)\ (1\text{-}t_d)\ -[s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} + \frac{X_1(1+qr)(1-t_d)(1-T_g)}{(1+k-T_g)k} \tag{e}$$

$q = b + s + d\ (1\text{-}z)$

For a very small change in s we have a small change in $q\ r$ and also a small change in V_0

$$V_0+\partial V_0=\frac{\left[\text{X}_1\text{ (1-b) (1-t}_d) -[\left(s+\partial s\right)/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}$$

$$+\frac{X_1(1+(qr+\partial qr))(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}$$

$$\partial V_0=\frac{\left[\text{X}_1\text{ (1-b) (1-t}_d) -[\left(s+\partial s\right)/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}$$

$$+\frac{X_1(1+(qr+\partial qr))(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}-V_0$$

Substituting V_0 from equation (e) we get:

$$\partial V_0=\frac{\left[\text{X}_1\text{ (1-b) (1-t}_d) -[\left(s+\partial s\right)/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}$$

$$+\frac{X_1(1+(qr+\partial qr))(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}$$

$$-\left[\begin{array}{l}\frac{\left[\text{X}_1\text{ (1-b) (1-t}_d) -[s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)}\\ +\frac{X_1(1+qr)(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}\end{array}\right]$$

$$\partial V_0=\frac{\text{X}_1\text{ (1-b) (1-t}_d)}{(1+k-T_g)}-\frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)}-\frac{X_1[\partial s/(1-w)](1-T_g)}{(1+k-T_g)}$$

$$+\frac{X_1(1+qr)(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}$$

$$+\frac{X_1(\partial qr)(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}-\frac{X_1\left(1-b\right)\left(1-\text{t}_d\right)}{(1+k-T_g)}$$

$$+\frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)}-\frac{X_1(1+qr)(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}$$

This simplifies to:

$$\partial V_0=-\frac{X_1[\partial s/(1-w)](1-T_g)}{(1+k-T_g)}+\frac{X_1(\partial qr)(1-\text{t}_d)(1-T_g)}{(1+k-T_g)k}$$

Dividing both sides with ∂s we get

$$\frac{\partial V_0}{\partial s}=-\frac{X_1[\partial s/(1-w)](1-T_g)}{\partial s(1+k-T_g)}+\frac{X_1(\partial qr)(1-\text{t}_d)(1-T_g)}{\partial s(1+k-T_g)k}$$

From the expression $q = b + s + d\ (1\text{-}z)$, we get $\partial q/\partial s=1$, so we can substitute $\partial q\ r/\partial s$ with $\partial q\ r/\partial q$

$$\frac{\partial V_0}{\partial b} = -\frac{X_1[1/(1-w)](1-T_g)}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k}$$

At the optimum level we have $\frac{\partial V_0}{\partial b} = 0$. So we get:

$$\frac{\partial V_0}{\partial s} = -\frac{X_1[1/(1-w)](1-T_g)}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k} = 0$$

$$\frac{X_1(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k} = \frac{X_1[1/(1-w)](1-T_g)}{(1+k-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{X_1[1/(1-w)](1-T_g)(1+k-T_g)k}{X_1(1+k-T_g)(1-\text{t}_\text{d})(1-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{k}{\left[(1-\text{t}_\text{d})(1-w)\right]}$$

$$C_s = \frac{k}{\left[(1-t_d\ )\ (1-w)\right]}$$

(5.5)

After removing same terms from numerator and denominator, we get equation (5.5) as the value of (C_s) under the Australian dividend tax imputation system. The term“ *td* ”in Eq. (5.5) takes the same value as defined in Eq. (5.3).

Derivation of equation (5.6)

We differentiate Eq. (c) with respect to the DRP financed rate (*d (1-z)*) expressed as a fraction of expected earnings. We assume that the capital investment rate is a function of the retention rate, the stock-financing rate and the dividend reinvestment rate, that is, q = b + s + d (1-z).

$$V_0 = \frac{X_1 A}{(1+k-T_g)} + \frac{X_1(1+qr)(1-\text{t}_\text{d})(1-T_g)}{(1+k-T_g)k}$$

$$A = (1-b)(1-\mathrm{t_d}) - [s/(1-w)+d](1-T_g)$$

Substituting the value of A in the above equation, we get:

$$V_0 = \frac{\left[\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)} - [s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} + \frac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$

(f)

q = b + s + d (1-z)

For a very small change in s we have a small change in $q\ r$ and also a small change in V_0

$$V_0 + \partial V_0 = \frac{\left[\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)} - [s/(1-w)+(d+\partial d)](1-T_g)+\right]}{(1+k-T_g)}$$
$$+\frac{X_1(1+(qr+\partial qr))(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k})$$
$$\partial V_0 = \frac{\left[\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)} - [s/(1-w)+(d+\partial d)](1-T_g)\right]}{(1+k-T_g)}$$
$$+\frac{X_1(1+(qr+\partial qr))(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k} - V_0$$

Substituting V_0 from equation (f) we get:

$$\partial V_0 = \frac{\left[\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)} - [s/(1-w)+(d+\partial d)](1-T_g)\right]}{(1+k-T_g)}$$
$$+\frac{X_1(1+(qr+\partial qr))(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$
$$-\left[\begin{array}{l}\dfrac{\left[\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)]]} - [s/(1-w)+d](1-T_g)\right]}{(1+k-T_g)} \\ +\dfrac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}\end{array}\right]$$

$$\partial V_0 = \frac{\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)}}{(1+k-T_g)} - \frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)} - \frac{X_1[\partial d](1-T_g)}{(1+k-T_g)}$$
$$+\frac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k} + \frac{X_1(\partial qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$
$$-\frac{\mathrm{X_1\ (1\text{-}b)\ (1\text{-}t_d)}}{(1+k-T_g)} + \frac{X_1[s/(1-w)+d](1-T_g)}{(1+k-T_g)} - \frac{X_1(1+qr)(1-\mathrm{t_d})(1-T_g)}{(1+k-T_g)k}$$

This simplifies to:

$$\partial V_0 = -\frac{X_1[\partial d](1-T_g)}{(1+k-T_g)} + \frac{X_1(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{(1+k-T_g)k}$$

Dividing both sides with ∂s we get:

$$\frac{\partial V_0}{\partial d} = -\frac{X_1[\partial d](1-T_g)}{\partial d(1+k-T_g)} + \frac{X_1(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial d(1+k-T_g)k}$$

From expression $q = b + s + d\ (1\text{-}z)$, we get $\partial q/\partial d = (1\text{-}z)$ giving us $\partial d = \partial q/\ (1\text{-}z)$, so we can substitute $\partial q\ r/\partial d$ with $(1\text{-}z)\ \partial\ q\ r/\partial q$

$$\frac{\partial V_0}{\partial b} = -\frac{X_1[\partial d](1-T_g)}{\partial d(1+k-T_g)} + \frac{X_1(1\text{-z})(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k}$$

At the optimum level we have $\frac{\partial V_0}{\partial b} = 0$. We also make the second term negative by changing the values of taxes. So we get the above equation as:

$$\frac{\partial V_0}{\partial s} = -\frac{X_1[\partial d](1-T_g)}{\partial d(1+k-T_g)} + \frac{X_1(1\text{-z})(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k} = 0$$

$$\frac{X_1(1\text{-z})(\partial qr)(1-\text{t}_\text{d})(1-T_g)}{\partial q(1+k-T_g)k} = \frac{X_1(1-T_g)}{(1+k-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{X_1(1-T_g)(1+k-T_g)k}{(1+k-T_g)X_1(1\text{-z})(1-\text{t}_\text{d})(1-T_g)}$$

$$\frac{\partial qr}{\partial q} = \frac{k}{(1\text{-z})(1-\text{t}_\text{d})}$$

$$\frac{\partial qr}{\partial q} = k/\left[(1\text{-z})(1-\text{t}_\text{d})\right]$$

$$C_d = \left[k/\left\{(1\text{-z})(1-\text{t}_\text{d})\right\}\right]$$

$$Cd = \frac{k}{\left[(1-t_d\ )\ \ (1-z)\right]} \tag{5.6}$$

After removing same terms from numerator and denominator, we get equation (5.6). Eq. (5.6) is the expression for the cost of DRP-financed equity capital under the Australian dividend tax imputation system. The term "t_d" in Eq. (5.6) takes the same value as defined in Eq. (5.3).

Appendix 3: Correlation of main variables

	D.Payout	D.Yield	AFR	FC.Yield	TQ	lnLTOTAS	lnMARCP	OCFTA	ROA1	ROA	CURATIO	DEBT	IC
D.Payout	1												
D.Yield	0.3102	1											
AFR	-0.0493	-0.2244	1										
FC.Yield	0.1327	0.1566	0.6860	1									
TQ	-0.0018	-0.1414	0.1023	-0.0688	1								
lnLTOTAS	0.0763	-0.1081	-0.1352	-0.184	-0.0684	1							
lnMARCAP	0.0587	-0.217	-0.0715	-0.2183	0.1808	0.9053	1						
OCFTA	-0.063	0.0007	0.057	0.0245	0.2108	-0.1114	0.0406	1					
ROA1	-0.1477	-0.0013	0.0783	0.0605	0.2196	-0.1535	-0.0157	0.1404	1				
ROA	-0.1063	-0.0176	0.0726	0.0451	0.143	-0.096	0.0087	0.1581	0.3853	1			
CURATIO	0.0142	-0.0124	0.0361	-0.0175	-0.0057	-0.1244	-0.1055	-0.065	-0.0288	-0.0254	1		
DEBT	0.0762	0.0417	-0.1595	-0.1042	-0.0949	0.1109	0.1301	0.0137	-0.1835	-0.1317	-0.2402	1	
IC	0.0014	-0.0163	-0.0338	-0.0337	-0.0064	0.0225	0.0232	-0.0019	-0.0068	0.0176	-0.0229	0.053	1

D.Payout = Dividend payout ratio
D.Yield = Dividend Yield
AFR = Average franking credit ratio
FC Yield = Franking credit yield
TQ =Tobin's Q
InTOTAS = Natural logarithm of total assets
In MARCAP = Natural logarithm of market capitalization
OCFTA = Operating Cash Flow/ Total Assets
ROA-1 = [Net Income at end of year t + Interest Expense at end of year t*(1-Corporate Tax Rate)]/ [Total Assets at end of year t - Outside Equity Interests at end of year t]
ROA = (EBIT at end of year t/ Total Assets at end of year t).
CURATIO = Current Ratio
DEBT = Debt/ Total Assets
IC = Interest Coverage Ratio = (EBIT at end of year t / Interest expense at end of year t).

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