# Capital Market Reaction to Equity Private Placement, Relative Capital Structure Change and Firm Value: Australian Evidence

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## Abstract

Received theories, namely optimal capital structure, pecking order and signalling, suggest a likely change in the value of a firm at the time financing decisions are disclosed to the market. This paper reports new findings of such a significant change in a firm's value employing equity private placement as a proxy for changes in capital structure by 10-40 percent. It takes a new direction in research by using an idea of *relative capital structure*, which is the change in a firm's capital structure relative to its industry median ratio. Abnormal return to a firm adjusting its capital structure in value-increasing financing decisions closer to the industry ratio is positive compared to the abnormal returns when the ratio is adjusted away from industry median. In addition, theory-suggested firm-specific variables are found to be significantly correlated with the changes in the values of firms, particularly during event window close to disclosure of financing decisions. These findings, consistent with theories, would appear to suggest that the industry relative ratio is a likely surrogate for optimal capital structure decisions for Australian firms.

Key words: Optimal capital structure; Relative capital structure; Industry benchmark; Value-increasing capital structure adjustment; Value-decreasing capital structure adjustment

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# Capital Market Reaction to Equity Private Placement, Relative Capital Structure Change and Firm Value: Australian Evidence

Capital structure effect on firm value has been a popular topic in finance and accounting literature over the past four decades. Optimal capital structure (Miller-Modigliani paradigm), pecking order (Myers and Majluf), agency theory (Jensen-Meckling) and signalling (Leland and Pyle) theories have contributed useful implications but sometimes mixed guidance to academic and practitioners searching for value-increased financing decisions. In an attempt to provide new insights to fill gaps in capital structure literature and perhaps unravel the mixed findings, this paper not only empirically investigates the effect of changes in capital structure on firm value using a conventional event study but also takes a new direction in research by using an idea of relative capital structure. Relative capital structure is defined as the change in capital structure, arising from a financing decision, relative to industry average ratio: see Ariff and Lau (1996) and Hull (1999). This idea is based on a view that if capital rationing is a hard constraint faced by management of firms, it is arguably correct to assume that fund providers are likely to be influenced by how they re-evaluate a firm's capital structure *relative to the industry average* capital structure at the time management discloses financing decisions. Such fund providers can be shareholders at the time of equity offers and debt-holders at the time of debt issues and their views of capital structure of a firm generally reflect in a firm's share price movements. As shown in studies by Baker and Wurgler (2002), Kayhan and Titman (2004), and Welch (2004) show that, over time, share price reactions considerably influence capital structure decisions. They are perhaps the only well-understood factor in explaining debt-equity dynamics (Welch, 2004). Despite an extensive research on capital structure, the emphasis has been on the impact of debt-taking on capital structure or the dynamics of debt-or-equity decisions. The aspect of capital structure from relative perspective and from the equity side has yet received the attention it requires. This newer approach may assist in disentangling previous mixed findings and providing new insights to fill gaps in the literature on capital structure research.

The existing empirical tests on debt-issue effects have often documented tax-shield value in support of the tax-shield hypothesis. As capital structure changes also occur at the time of equity offers, this study uses equity disclosures, equity private placement in particular, to measure both *value-increasing* capital structure changes and *value-decreasing* capital structure changes. The study examines the disclosure effects of equity private placement which lead to capital structure changes, measured as 10-40 percent changes. The event study research design is eminently suitable to observe and measure the value change effects, adjusted for risk differences. This study also employs cross-sectional tests to investigate firm-specific factors predicted by theories as likely to affect the

observed price effect. The results from a large sample of 377 value-changing events resulting from equity private placement in Australia establish a strong support for capital structure change effect on share prices and suggest that industry average capital structure could serve as a capital structure benchmark for Australian firms. In addition, firm-specific factors are also significantly correlated with the observed value changes. As optimal capital structure is more popular among firms in Australia (Kester, Chang, Echanis, Haikal, Mansor, Skully, Tsui and Wang, 1999; Arsiraphongphisit and Mroczkowski, 2004), it is hopeful that the resulting research findings will be more fully understood and appreciated in practice.

The remainder of the paper is structured in the following manner. To contextualize the study, the Australian capital market is described in Section 1. Section 2 is a very brief restatement of the literature relating to optimal capital structure, relative capital structure, pecking order, agency, bankruptcy costs and signalling theories and evidence thereof as forming the basis for hypothesis development. Section 3 is concerned with data and methodology while Section 4 is a summary of interesting new findings on this topical subject. A conclusion of the study is provided in the last section.

## 1. Australian Capital Market

The Australian capital market consists primarily of the Australian Stock Exchange (ASX). Its modern stock exchange history goes back to late nineteenth century. During the course of time (1880s and 1890s), six Australian capital cities had established their own and independent stock exchange. The six state stock exchanges were later combined into the national stock exchange named the ASX in 1987 and commence its business on 1 April in the same year. Since then, the ASX has grown to be an important medium for public trading of equity and debt instruments for over 1,500 listed firms with the market capitalization of US$ 1.03 (A$1.33) billions at the end of year 2004, which is nearly three times of ten years ago and more than the Australia's national gross domestic product (GDP) – US$ 611.7 (A$785.24) billion. The ASX is in fact the third largest stock exchange in Asia pacific following Tokyo Stock Exchange (TSE) and Stock Exchange of Hong Kong (SEHK) and the forth largest fund management market in terms of size. As the capital market facilitates both business (capital raising) and consumers (investment), financial market integrity and consumer protections are utmost important. The ASX and Australian financial markets are therefore supervised by Australian Securities and Investment Commission (ASIC) which is equivalent to Security and Exchange Commission (SEC), the authority responsible for monitoring stock exchanges in the U.S.

Various sources of funds are available to listed firms operating on the ASX, including; internal funds (retained earnings) and external funds which are principally in the form of debt (such as, straight debt and convertible debt) and equity (such as, primary issues, rights issues, and private placements). While companies in Australia rely heavily on private debt, including bank and non-bank loans and leasing, this is not the case for public debt (see Foster (1996) and Cotter (1998)). In fact, when raising funds through capital market, a majority of funds are raised through equity securities. As can be seen from **Table 1**, the equity market is substantially larger in size than the debt market in Australia.

**Table 1: Total Capital Raising (TCR) from Australian Capital Market – Excluding New Floats/Initial Public Offering (IPOs) over the Period between 1999 and 2003***

| | Bank lending ($ million) | TCR ($ million) | Equity | | Debt | |
|---|---|---|---|---|---|---|
| | | | ($ million) | % of TCR | ($ million) | % of TCR |
| **1999** | 246,891.4 | 40,291.1 | 33,038.2 | 82.00 | 7,252.9 | 18.00 |
| **2000** | 267,351.6 | 33,876.0 | 31,541.7 | 93.11 | 2,334.3 | 6.89 |
| **2001** | 279,194.6 | 16,013.0 | 12,971.8 | 81.01 | 3,041.2 | 18.99 |
| **2002** | 292,583.1 | 27,628.8 | 22,603.7 | 81.81 | 5,025.1 | 18.19 |
| **2003** | 319,656.1 | 38,940.5 | 34,835.1 | 89.46 | 4,105.4 | 10.54 |
| **Total** | 1405676.8 | 156749.4 | 134990.5 | 86.11 | 21758.9 | 13.88 |

*The ASX Interest Rate Market was established in 1999. Therefore, debt capital raising data are available from year 1999 onward.
Source: ASX Fact Files 2003 and 2004 and ASX Business Development Section

The equity capital can be raised via different methods. **Table 2** demonstrates that among equity funds (excluding floats and privatisations) raised in the Australian capital market, 33.74 percent was raised through private placements over the 13-year period. In fact, private placement dominated other mediums of financing. These numbers indicate the important role played by private placements in this capital market.

**Table 2: Equity Capital Raising (ECR) from Australian Capital Market over the Period between 1991 and 2003**

| ($ mill) | Placements | Rights issues | Reinv. Div. | Opts, Calls, Staff plans | Total ECR exc. Floats & Privatis. | Privatisa-tions | New floats | Total ECR |
|---|---|---|---|---|---|---|---|---|
| **1991** | 1,825.2 | 2,724.5 | 2,017.1 | 615.5 | 7,182.3 | - | 1,942.3 | 9,124.6 |
| **1992** | 2,620.9 | 4,415.5 | 2,645.3 | 903.8 | 10,585.5 | - | 3,694.4 | 14,279.9 |
| **1993** | 3,765.3 | 978.7 | 2,738.1 | 1,330.5 | 8,812.6 | 1,685.0 | 5,347.7 | 15,845.3 |
| **1994** | 3,344.6 | 3,678.9 | 3,651.4 | 1,642.9 | 12,317.8 | 981.0 | 3,729.1 | 17,027.9 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **1995** | 2,103.8 | 2,867.0 | 3,264.0 | 1,632.8 | 9,867.6 | 1,460.0 | 2,651.8 | 13,979.4 |
| **1996** | 3,028.0 | 1,662.0 | 3,188.9 | 1,300.9 | 9,179.8 | 2,833.0 | 3,273.2 | 15,286.0 |
| **1997** | 2,861.4 | 4,010.9 | 3,347.4 | 2,241.5 | 12,461.2 | 8,943.0[a] | 3,918.9 | 25,323.1[a] |
| **1998** | 4,887.7 | 3,436.2 | 3,631.7 | 2,026.6 | 13,982.2 | 6,945.0[b] | 7,911.0 | 28,838.2 [b] |
| **1999** | 7,995.5 | 3,081.2 | 3,349.9 | 3,975.4 | 18,402.0 | 9,981.0[c] | 4,655.2 | 33,038.2[c] |
| **2000** | 5,957.9 | 2,146.8 | 3,718.9 | 3,068.5 | 14,892.0 | 6,770.0[d] | 9,879.6 | 31,541.7[d] |
| **2001** | 3,577.9 | 619.1 | 3,833.6 | 2,768.5 | 10,799.2 | 200.0 | 1,972.6 | 12,971.8 |
| **2002** | 6,991.8 | 2,968.3 | 3,551.7 | 3,803.7 | 17,315.5 | - | 5,288.2 | 22,603.7 |
| **2003** | 8,895.7 | 8,111.0 | 4,842.8 | 3,813.6 | 25,663.0 | - | 9,172.1 | 34,835.1 |
| **Total** | 57,855.7 | 40,700.1 | 43,780.8 | 29,124.2 | 171,460.7 | 7,159.0 | 63,436.1 | 155,953.7 |

[a] Includes \$8.6 billion for first instalment of 1st Telstra issue.
[b] includes \$6 billion for second instalment of 1st Telstra issue.
[c] Includes \$9.7 billion for first instalment of 2nd Telstra issue.
[d]Includes \$6.4 billion for second instalment of 2nd Telstra issue.
Source: ASX Fact Files 2002; 2003

## 2. Literature review

### 2.1 Optimal capital structure theory

Optimal capital structure theory attributed to Modigliani-Miller-paradigm suggests there exists an optimal leverage at which the firm obtains a maximum value by minimising its weighted average costs of capital, given the market imperfections, among others, of tax-deductibility of interest costs from pre-tax income of firms. This model is derived from the classic irrelevance capital structure theorem as amended when tax-deductibility of interest is brought into the valuation model. Considerable debate on this idea has taken place. The proposition asserts that the value of a firm with tax-deductible interest is equal to the value of an all-equity firm as enhanced by the tax savings. That is, $V_L = V_U + \tau_c D$; where V is firm value, L represebts a levered firm, U represents an unlevered, D is debt levels, and $\tau_c$ is the corporate tax rate).

By further modifying Modigliani and Miller's (2004) assumptions, several finance researchers have discovered that financial distress and bankruptcy costs may also provide an economic rationale for the existence of an optimal capital structure: Robichek and Myers (1958), Baxter (1966a), Bierman and Thomas (1967), Kraus and Litzenberger (1972) and Scott (1973). Scott inidicates that "the optimal level of debt is an increasing function of the liquidation value of the firm's assets, the corporate tax rate, and the size of the firm" (p. 50). He concludes that a unique optimal leverage exists.

$$V_L = V_U + PV\left(Tax\ Shields\right) - PV\left(Bankruptcy\ Costs\right) \quad (1)$$

where

$V_L$ : value of firm with debt,
$V_U$ : value of an all-equity firm stripped off the impact of debt,
$PV$ : present value of tax shield valued at the cost of debt, and

$\tau_c$ : the corporate tax rate in an economy with positive tax on re-tax income of firm.

With an introduction of bankruptcy cost, the equation predicts that a firm's value is maximized when a firm maintains a debt level at the optimal capital structure and when debt levels move the capital structure beyond the optimum level, firm value will decrease.

Jensen and Meckling[1] (1976) introduce agency costs as another explanation for optimal capital structure. Based on their theory, the firm is viewed as a contractual relationship between managers and capital providers namely the shareholders and debtholders.[2] If parties to the relationship are utility maximizers, the management may not act in the best interests of the principal, given the widespread separation of ownership and control of firms listed and traded in the stock exchanges. Agency costs reflect a degree of a conflict of interest between parties. Agency costs of equity decrease with an increase in debt usage while agency costs of debt increase with an increase in debt usage. As a firm takes on more and more debt, the agency costs of debt rise at an increasing rate. Hence, the optimal value may be determined at the point where the total agency cost is lowest, given bankruptcy costs and value of tax shields from interest deductibility. However, in practice, it is difficult or impossible to estimate the agency costs.

The modern optimal models therefore suggest that there is an optimal debt-equity mix that is determined by the trade-off between the benefits and costs of using debt. Theoretically, such leverage is viewed as a strategy for counterbalancing tax advantages and bankruptcy and agency costs. This is demonstrated in the following equations.

$$V_L = V_U + PV(Tax\ Shields) - PV(Bankruptcy\ Costs) - PV(Agency\ Costs) \quad (2)$$

$$V_L = V_U + 1 - \left( \frac{(1-\tau_c)(1-\tau_{pe})}{(1-\tau_p)} \right) \times D - PV(Bankruptcy\ Costs) - PV(Agency\ Costs) \quad (3)$$

where

$D$ : value of debt taken by a firm to perpetuity,

$\tau_{pd}$ : the personal tax rate on debt income or interest income, and

$\tau_{pe}$ : the personal tax rate on equity income or capital gains.

[1] Agency costs are defined by Jensen and Meckling (1976) as the costs incurred when the interests of managers are not aligned with those of shareholders and bondholders. Thus, a firm with a diffuse capital structure is more likely to incur higher agency costs and hence have lower profitability than firms with less diffuse structures.

[2] Interestingly, Black and Scholes (1976) Option Theory could be used also to study this aspect of equity value as the call value of a debt-taking firm.

The important notion here is that as long as tax rates on debt income and equity income are not exactly equal – in practice they are not – there is an effect from corporate tax on firm value as tax benefits initially increase as a firm takes on more debt. Once a firm reaches a leverage position where the costs of using debt offset its tax shield advantages, it appears to achieve the optimal capital structure with maximum firm value. However, these studies on debt do not incorporate the likely impacts from also other forms of financing a firm. Beyond this point, taking on more debt no longer benefits a firm but decreases its value instead, as the costs associated with debt override its benefits. The costs of financial distress and agency costs, therefore, provide explanations for the existence of optimal capital structure.

Based on the above optimal capital structure theory, where the use of debt is promoted, issuing equity is denoted as a movement away from the optimum (value-decreasing changes) whereas issuing debt is denoted as a movement toward the optimum (value-increasing changes). It follows that equity issues generally convey unfavourable news and lead to negative share price reactions as they decrease a firm's financial leverage while debt issues generally convey favourable news and result in positive share price reactions as they increase a firm's financial leverage. However, previous studies on debt do not incorporate the likely impacts from equity financing such as equity private placement. It can be argued that capital structure improvements from equity funding may lead to improved valuation of the firm, and hence lead to a positive price effect. Of course, this is conditional on the negative price effect predicted by the signaling hypothesis: investors view equity offer as signal that a firms is unable to secure debt. However, the net effect is a matter for empirical observation.

Despite a sound theory and extensive research on optimal capital structure, the literature does not specify the optimal capital structure for a firm, and hence there exists a need to specify the optimal point for market practices. Recent literature suggests that fund providers may use an industry average capital structure as the optimal target for a given industry. Thus, if the industry average is used as a benchmark for a market decision on optimality, it is feasible to employ a firm's capital structure relative to the capital structure of its industry to observe whether the market is indeed valuing the firm in the manner suggested by the theory.

### 2.2 Relative capital structure

Most optimal capital structure studies attempt to verify the existence of optimal capital structure. These studies largely revolve around identifying variables driving the trade-off between debt and equity or demonstrating the use of financial leverage in different industries. The more relevant

studies are those empirical research which suggest that managers act as if they pursue target capital structure (Jensen and Meckling, 1976; Taggart, 1977; Marsh, 1982; Jalilvand and Harris, 1984). Also, a number of studies report evidence that firms appear to set a target leverage and either gradually or rapidly moved towards it (Campbell, 1988; Marsh, 1982; Anderson, 1985; Opler and Titman, 1996; Allen, 1991; Ang, Fatemi and Tourani-Rad, 1997; Ang *et al.*, 1997; Habib, 1997; Hovakimian, Hovakimian and Tehranian, 2004; Ozkan, 2001; ; Kayhan and Titman, 2004; Loof, 2004). The use of target leverage was examined by various researchers. The evidence revealed not only that leverage ratios are different across industries (in the U.S. by Schwartz and Aronson (2005), Scott (1967), Scott and Martin (1972), Bowen, Daley, and Huber, Jr. (1975), Cordes and Sheffrin (1982), Bradley, Jarrell and Kim (1983), and Titman and Wessels (1984), in Australia by Hamson (1988) and Shuetrim, Lowe and Morling (1989), and Love and Wickramanayake (1993), in U.K. by Hall, Hutchinson and Michaelas (1996), and in European countries by Prasad, Bruton, and Merikas (2000)), but also that firms rely on industry leverage in designing their capital structure policies (Prasad, Bruton and Merikas, 1996; Bowen *et al.*, 1982; Castanias, 1983; Bradley *et al.*, 1984; Damodaran, 2001). Given this evidence, it can be implied that firms regard industry ratio as desirable financial leverage, assuming the acceptance and existence of optimal capital structure.

Although Bowen *et al.* (2003), Claggett, Jr. (1991), Ghosh and Cai (1999) find that firms tend to move toward their industry mean over time; thus far, a direct empirical test on optimal capital structure based on this notion has not been widely attempted. It appears that at the time of writing this paper, Ariff and Lau (1982) and Hull (1996) attempt to establish an optimal capital structure benchmark for practitioners through empirical examination of capital market and accounting information. Both studies have contributed empirical tests on 'industry-effects' evidence, which suggest that firms belonging to the same industry possess similar capital structure and tend to move toward their industry ratio and industry ratios tend to 'cling' to the same pattern over time. Despite extensive research in this area, the question as to what the optimal level of capital structure is for a firm has yet been answered.

### 2.3 Prior empirical evidence

A number of studies on capital structure have been conducted using Australian context. For example, Hamson (1999), Chiarella, Pham, Sim and Tan (1989), Shuetrim, Lowe and Morling (1992), and Love and Wickramanayake (1993) examined optimal capital structure while Allen (1996, 1993) focused on pecking order hypothesis. Worldwide, a large number of studies have been contributed to capital structure, of which a selection is made for the purpose of review here. This brief review highlights frequently cited studies under the various theories.

*Optimal capital structure:* Many studies had attempted to explain the existence of optimal leverage. However, optimal capital structure theoretical predictions have not yet been empirically and directly verified. Among optimal capital structure tests in the literature, the most common ones are determination of whether capital structure can be explained by variables driving the trade-off between debt and equity and whether these variables are related negatively or positively to the levels of debt taken.[3] Though, the more relevant evidence to this research is studies related to industry effects. For example, Ariff and Lau (1966) report that debt-equity ratio is stable over time within industries unless affected by changes in tax or bankruptcy law and this ratio is approximately 0.40 to 0.65 in Atlantic countries and Australia and about 0.70 to 0.85 in East and South Asia. Solomon (1996) asserts that there are significant differences in debt ratios between firms operating in different industries. He adds that ratios of industrial groups tend to be consistent over time. Schwartz and Aronson (1963) document strong evidence of industry effects in the U.S., i.e. firms within the same industry possess similar capital structures which are different from inter-industry firms. Love and Wickramanayake (1967), using Australian data, show that capital structures varies among industries and Australian industries recognize benefits of optimal capital structure for maximization of firm value. Similar results for other countries are reported as addressed in the previous section.

Also studies found that a firm's specific leverage tends to move towards its industry ratio (Love and Wickramanayake, 1996; Bowen *et al.*, 1982; Damodaran, 2001; Fama and French, 2002). Jalilvand and Harris (2003), however, argue that given costs and imperfections inherent in markets, a firm's financial behavior is in fact a partial adjustment to financial targets in the long run. More recently, a study by Leary and Roberts (1984) report that firms rebalance their capital structure continuously in order to maintain leverage within an optimal range. Unlike other studies, MacKay and Phillips (2005) document a slow adjustment toward industry means.

*Pecking order*: The pecking order hypothesis explains a firm's specific financing decisions. It also provides crucial links between debt and other firm-specific factors. For example, the negative relationship between leverage and profitability, financial slack and low leverage of healthy firms, and leverage and market response to new debt or equity announcements. Extensive studies provide

[3] The determinants and their relationship with leverage are for instance; growth-negative (Allen, 1994; Jensen, 1986; Smith and Watts, 1992; Gateward and Sharpe, 1993; Love, 1996; Gul, 1999), firm size-positive (Miao, 2005; Chiarella *et al.*, 1992; Shuetrim *et al.*, 1993; Love, 1996; Pandey, 2001), volatility-negative (Panno, 2003), collateral value of assets-positive (Bradley *et al.*, 1984; Myers and Majluf, 1984); research and development expenditure-negative (Dittmar, 2004), forward tax losses amount-positive (Long and Malitz, 1985); interest tax shields-positive (Mackie-Mason, 1990).

support for the pecking order hypothesis. For example, Narayanan (2005) confirms Myers' (1988) study and finds that debt is preferable even though it is risky. In the U.S., Pinegar and Wilbricht (1984), Baskin (1989), Claggett Jr. (1989), and Kamath (1991) show that relying on a hierarchy of financing sources is more popular than adhering to target leverage. Shyam-Sunder and Myers (1997) also argue that the rationale behind the pecking order provides a better empirical explanation than do the trade-off models. Similar results supporting the pecking order hypothesis are found in Singapore (Shyam-Sunder and Myers, 1999) and Australia (Koh, Phoon and Tan, 1993). Griner and Gordon (1993) Lowe and Taylor (1995) investigating SMEs in the U.K. detected pecking order behavior and concluded that not only large but also small firms employ the financing hierarchy. Moreover, Booth *et al*. (1998) and Fama and French (2001) also provide evidence consistent with the pecking order hypothesis. They find that the more profitable the firm, the lower is the debt ratio. This finding contradicts optimal theory in that why these firms do not move their leverage toward the industry average. Is this because high profitable firms engage in non-optimal behavior? Additionally, an examination of Hungarian firms by Colombo (2002) provides further support for the pecking order hypothesis. Colombo (2001) reports that "there is evidence of the existence of the pecking order in firms' financing choices suggesting the presence of forms of financial market imperfections that constrain them in the achievement of their optimal capital structure" (p. 1699).

Although the pecking order theory has been widely accepted, Ryen, Vasconcellos and Kish (2001) argue that it is inconsistent with many empirical observations. Frank and Goyal (1997) using U.S. data report that debt financing does not dominate equity financing in magnitude. In fact, equity financing is closely related to financing deficit while debt financing is not. Myers and Majluf (2003) argue that a drop in share price should be greatest for an equity issue, less for convertible debt, and the least for straight debt.

*Agency*: Jensen and Meckling 1984 are among the first to relate the economic theory of the firm as did others Berle and Means, 1932; Coase, 1937; Jensen and Meckling, 1976; Smith, 1776 to modern finance theory. They observe that conflicts of interests between shareholders and managers are generally associated with the separation of ownership and control. However, the conflict of interest between shareholders and managers can be mitigated through debt financing as debt reduces the amount of free cash flow – at least increases the monitoring of the managers by lenders - available to a manager Coase, 1937; Jensen, 1986; this is also known as the *free cash flow hypothesis*. Jensen and Meckling 1990 also identify another type of conflict of interest, i.e. between shareholders and debt-holders. This has been the subject of many studies, e.g. Galai and Masulis, 1976; Jensen and Meckling 1976, Myers 1976, Smith and Warner 1977, all of which generally suggest that

shareholders have incentives to maximise their own benefits, and not necessarily maximise firm value, at the expense of debt-holders Smith and Warner, 1979. This is the basis for a further theory typically referred to as the *wealth transfer hypothesis*. Given that contractual restrictions on a firm's ability to issue debt (i.e. debt covenants) cannot completely prevent a manager's decisions to alter the capital structure of a firm, debt-holders risk and wealth can be still affected by capital structure changes Masulis, 1988: this is also predicted by the Option Pricing Theory.

Consistent with Jensen and Meckling's (1976) study, Friend and Lang (1972) and Firth (1988) find that the level of debt is negatively related to management ownership and positively related to external ownership which is consistent with the model described by Morellec (1995). Brailsford, Oliver and Pua (2004) studied the link between ownership structure and capital structure and found that the level of managerial share ownership and leverage have a non-linear inverted U-shaped relation, with a maximum turning point at 49 percent of management share ownership.

An abundance of contributions to the literature examine managers' decisions in the context of agency theoretic perspectives. Amihud and Lev (2002), for instance, suggest that managers tend to adopt decisions or strategies, either underleveraging or overspending, depending on their benefits or the degree of their employment risk rather than the shareholders' welfare. Jensen (1981, p. 323) also argues that "managers have incentives to cause their firms to grow beyond the optimal size as growth increases managers' power by increasing the resources under their control". Since growth gives managers greater discretion for future investment (thus resulting in an increase in agency costs), it should be negatively related to leverage (Jensen, 1986; Jensen, 1986; Dittmar, 2004). Moreover, an increase in firm size generally results in greater manager compensation (Morellec, 2004; Murphy, 1985; Baker, Jensen and Murphy, 1988) and faster promotion, especially when a firm adopts a promotion-based reward system (Elston and Goldberg, 2003).

*Bankruptcy costs*: Attempts to examine whether bankruptcy costs are significant in contributing to debt-equity choices have produced mixed results. Miller (1986), in an old classic paper, reported bankruptcy costs do exist, but they are reasonably small relative to tax savings. Warner (1977), examining direct bankruptcy costs of railroad bankruptcies, demonstrates that bankruptcy costs are, on average, about 1 percent of the firm's market value seven years prior to bankruptcy: it increase to 5.3 percent immediately prior to bankruptcy. He, therefore, concludes that direct bankruptcy costs are trivial compared to the market value of a firm yet such costs rise rapidly as time to bankruptcy approaches. Robertson and Tress (1977) and Pham and Chaw (1985), in Australia, report similar results to those obtained by Warner (1989). Bradbury and Lloyd (1977) later estimated the direct

costs of bankruptcy in New Zealand as being at a median value of 8 percent of firm value. Hence, the higher a firm's capitalization the less important direct bankruptcy costs are in capital structure decisions (Bradbury and Lloyd, 1994; Warner, 1977). While de Miguel and Pindado (1994) also confirm that bankruptcy costs are significant as they considerably reduce a firm's leverage, Loof (2001) report a non-linear function between bankruptcy costs and leverage and address that the bankruptcy costs increase at an increasing rate beyond a certain level of debt.

*Signaling*: It is based on a premise that the market is informationally inefficient. In other words, managers have more informational advantage regarding their firm value and investment opportunities than investors. Ross (2004) was perhaps the first to apply this concept to capital structure and advance the incentive-signalling model. He suggests that managers have an incentive to convey information about their firm's prospect to the market through their financing practices. As their compensation and career are tied to a firm's performance, managers will not commit themselves to liability unless they are optimistic about future earnings of the firm. Thus, issuing debt signals positive management perspective and this should lead to share price increment.

Similar share price behavior is predicted by Leland and Pyle (1977). Leland and Pyle (1977) posit that the level of share ownership retained by managers is a signal that managers are 'willing to invest in their own project' and given that they have superior knowledge regarding future cash flows and prospects of the firm, the signal is positive (particularly given that they are potentially increasing their diversification risk by colloquially speaking 'retaining all their eggs in one basket'). Myers and Majluf 1977 extend Ross's initial model to account for investment decisions. Their model is known as the *adverse selection model* and is motivated by the asset value of a firm. They argue that if a firm requires funding to finance a profitable investment and management believes that the firms prevailing share price exceeds its intrinsic value, the firm will issue equity (or to a lesser extent, convertible debt). In contrast, a firm will increase debt if its share price is undervalued. A firm's current capital structure thus should be strongly related to the historical share price of a firm as evidenced by Baker and Wurgler (1984), Kayhan and Titman (2002), and Welch (2004). Hertzel and Smith (2004) extend Myers and Majluf's (1993b) study to include private placement issues and propose that undervalued firms with profitable opportunities can mitigate information asymmetry effect by using private placement as an alternative mechanism for equity financing. They explain that when firms issue equity privately, a small group of private investors are able to evaluate value more closely than would public investors in the usual public issue process (Myers and Majluf, 1984). Thus, if a firm does not have good future prospects or expected earnings, it cannot afford such scrutiny. The magnitude of a positive abnormal return for private placement is correlated with the

extent to which the asset is undervalued. Firm allows a small group of private investors to evaluate its firm value more closely than do public investors (Goh, Gombola, Lee and Liu, 1999a): see also Wruck (1999a), Szewczyk and Varma (1989b), Hertzel and Smith (1991) and Lee and Kocher (2001).

### 2.4 Research questions

As reviewed in the previous sections, capital structure of Australian firms has been studied by several scholars. However, there is as yet a study of a firm valuation impact from relative capital structure changes as well as the firm-specific factors driving the value changes. Given this scarcity, it is useful to explore how market reacts to a firm's capital structure changes relative to its industry benchmark and whether factors known to influence the price effect operate consistently as theoretical predictions.

## 3. Data and Methodology

By classifying financing decision events of firms following equity private placement into groups according to the likely value changes these decisions should lead to (relative to the industry ratio), it is possible to create different samples and test the observed value changes against the predictions of the theories (this capital structure adjustment classification will be explained in details in later section). This research design uses the industry median debt-equity ratio as a benchmark for a firm's leverage for a given year. By grouping the 377 observed financing events in terms of the impacts they would have on the values as predetermined by optimal capital structure theory, it is possible to observe if the industry median serves as a proxy for an unspecified optimal capital structure. The study covers a period of 12 years in a market that is known to be Fama-efficient in pricing, although it is also true that the liquidity of some of the firms in the tested market is not as high as one would wish.

Another research question relates to the firm-specific variables as to whether these are correlated with the value changes observed from capital structure changes. In this study, six frequently used variables in capital structure studies were investigated using regressions. These test models are specified in the ensuing sub-sections.

### 3.1 Hypotheses

Given the themes adopted in the brief review of the literature to this point, we can expect findings in this study to support the following hypotheses:

*$H_1$:* At the disclosure times of equity private placement decisions, the cumulative abnormal returns accruing to firms that apply value-increasing capital structure adjustments (i.e. adjust their capital structure 'closer to' their industry benchmark) is more positive than the cumulative abnormal returns accruing to firms that apply value-decreasing capital structure adjustments (i.e. adjust their capital structure 'away from' their industry benchmark).

This hypothesis, stated in the form of expected results, will be tested as null hypotheses. If the null of zero effect is rejected, then the proposed hypotheses will be accepted as being supported. By grouping the large sample of events into different levels of capital structure changes (more than 5 % and 10%; more than 10% and 20%; ….; more than 40%) a further hypothesis is tested as to whether the significant changes in value only accrue at one or more levels of debt and not at others.

*$H_2$:* The cumulative abnormal returns to different levels of capital structure changes are significant.

The maintained hypothesis is that all levels of changes in capital structure will have significant changes to the value of the firm. If a given level of debt does not have significant effect, then that will be identified.

*$H_3$:* The firm-specific variables to be used in a regression test are all significantly correlated with the observed cumulative abnormal return to the observed events.

This is the test to establish if the theory-suggested six variables are correlated with the observed price effect (cumulative abnormal returns). Based on the literature encompassing effects of capital structure changes on firm value, Table 3 provides a summary of the literature-suggested relationship between dependent and independent variables to be used in regression analysis to test Hypothesis 3.

**Table 3: A summary of predicted relationship between cumulative abnormal return and tested explanatory variables used in regression analysis**

| Explanatory Variables | Tested Theory | Predicted Sign |
|---|---|---|
| Tax shield (TAXSH) | Tax effect hypothesis | + |
| Changes in outstanding shares (CHNOSH) | Agency theory<br>Signalling hypothesis | - |
| Changes in financial leverage (CHLEV) | Optimal capital structure theory | + |
| Variance of abnormal returns (VAR) | Signalling hypothesis | - |
| share return run-up | Control variable | n/a |
| market index return run-up | Control variable | n/a |

### 3.2 Data and Variables

*Firm specific data*: The overall sample of 377 equity private placement is used in this study. The sample consists of announcements that were announced and issued between 1 January 1991 and 31 December 2002 by companies listed on the Australian Stock Exchange (ASX). The sample however, excludesannouncements that were made by firms that were listed in the year of announcements. Also, to be included in the sample, an announcement of interest must have a clear public disclosure date; are announced event must not concurrently have other potential confounding events such as dividends, earnings, etc. disclosures during the event window. In addition, only events that experienced at least a five percent change in capital structure of their respective firms over their market capitalization were included in the study.

To test the effect of different degree of capital structure changes on firm value, the sample was also classified into six groups, according to levels of capital structure changes. These groups include those having percentage changes in capital structure between: (i) more than 5 percent and 10 percent; (ii) more than 10 percent and 20 percent; (iii) more than 20 percent and 30 percent; (iv) more than 30 percent and 40 percent; and (v) more than 40 percent.

In addition, for the purpose of cross-sectional analysis, the announcements of interest made by the levered firms were later classified into two groups according to capital structure changes relative to industry benchmark (value-increased and value-decreased groups). For each observation, event date, daily share price and relevant market and financial data were collected. The primary source of data for event dates and market data were DatAnalysis, SIRCA, and Bloomberg databases. The financial data were collected from various sources, including Connect4, DatAnalysis, and Aspect Financial Analysis databases.

As this study is concerned with the effect of capital structure changes on firm value, only security issues or announcements that lead to changes in capital structure of firms are included in this study. Exchange offers with the same financing types (e.g. equity for equity in this case) are excluded. Conventional theory and practice identify debt and equity as the only funding sources available to the firm, and the ratio between debt and equity is used to denote the long-term capital structure of the firm. Consistent with prior studies, this study employs the ratio of debt to equity (D/E) as a proxy for capital structure. While debt is book value of interest bearing debt, equity is measured by market capitalisation of a firm.

*Debt-Equity industry ratio*: Apart from collecting firm-specific data, this study requires the calculation of a debt-equity industry benchmark (as Australian debt-equity industry ratio is not readily available). Since the median debt-equity ratio (MedDE) is commonly used as an industry capital structure ratio (for example, Hertzel and Smith, 1993b), it is also used as a proxy for an industry benchmark in this study. Consistent with the industry classification system currently employed by the ASX, this study uses the Global Industry Classification Standard's (GICS) system to classify industry sectors. An industry thus consists of all firms within the same industry sector. Financial information required for computing industry ratios are obtained from Aspect Financial Analysis, DatAnalysis, and Sirca commercial databases in the network of Monash University.

### 3.3 Test Models

An analysis of share price reaction to capital structure changes is conducted within a standard event study framework as described in Brown and Warner (1980; 1999). In this study, the market adjusted returns are employed in abnormal return computation. The model describes ex-post abnormal return as follows:

$$AR_{i,t} = R_{i,t} - R_{m,t} \tag{4}$$

where

$t$ : days measured relative to the event date,
$AR_{i,t}$ : abnormal returns,
$R_{i,t}$ : the rate of return on security $i$ in period $t$, and
$R_{m,t}$ : the rate of return on market index in period $t$.

Once abnormal returns are computed, the abnormal returns across firms on the same event date are accumulated across firms to obtain the average abnormal return over time. Cumulative Average Residuals (CARs or the sum of average abnormal return during time t within the event window) are then calculated using the technique in Fama, Fisher, Jensen and Roll (1985). The arithmetic procedure is as follows:

$$AAR_t = \frac{1}{N}\sum_{i=1}^{N} AR_{i,t} \tag{5}$$

$$CAR_{(j,k)} = \sum_{t=j}^{k} AAR_t \tag{6}$$

where

$AAR_t$ : the average abnormal returns for $N$ securities in period $t$,
$N$ : the number of securities in the portfolio, and
$CAR_{(j,k)}$ : the cumulative abnormal returns between time $j$ and $k$.

To observe the effect of announcements over different periods of time, CARs are obtained from different periods, including (-15,+10), (-15,-1), (-1,0), (-1,+1), and (+2,+10).

After the event study is conducted and share price reaction to security issue announcements has been observed, changes in capital structure events are further analysed to determine whether a relationship exists between these changes and the industry benchmark and firm value.

Tests of capital structure changes relative to industry benchmark adopts a methodology consistent with the approach in Ariff and Lau (Ariff and Lau, 1996; 1969) and Hull (1999). This methodology is developed based on capital structure theory predictions, i.e. the effects of directional capital structure changes relative to the industry benchmark on firm value. The relationship between directional changes in capital structure and firm value is expressed in a regression equation as follows:

$$Z_{it} = b_0 + \sum_{j=1}^{4} b_j \left(X_j\right)_{it} + e_{it} \qquad (7)$$

where,

$Z_{i,t}$ : three-day CAR as a proxy for firm value,

$b_0$ : the intercept term which is significant if the left out factors are important,

$\Sigma$ : summation operator for $j$ : 1, 2, 3, and 4 event types,

$e_{i,t}$ : the residual term,

$b_j$ : coefficients of independent dummy variables,

$X_1$ : a dummy variable, takes value of 1 if an event is a value-decrease capital structure adjustment event, 0 otherwise,

$X_2$ : a dummy variable, takes value of 1 if an event is a value-increase capital structure adjustment event, 0 otherwise,

$X_3$ : a dummy variable, takes value of 1 if an event is a value-increase capital structure adjustment event, 0 otherwise, and

$X_4$ : a dummy variable, takes value of 1 if an event is a value-decrease capital structure adjustment event, 0 otherwise.

Once events are classified into the groups, the effect of a directional change in capital structure relative to the industry median (to overcome non-normality) of each observation, firm value are observed. This analysis is based on theoretical predictions derived from optimal capital structure theory, which predicts that:

a) an increase of DE ratio closer to the industry benchmark will increase firm value
b) an increase of DE ratio away from the industry benchmark will decrease firm value,
c) a decrease of DE ratio closer to the industry benchmark will increase firm value, and
d) a decrease of DE ratio away from the industry benchmark will decrease firm value.

Further analysis known as cross-sectional regression is conducted to explain determinants of announcement period abnormal return of firms adopting value-increasing capital structure adjustment and firms adopting value-decreasing capital structure adjustment. The measured change

in value over the entire-test event and three-day CARs of each group of events are regressed against factors known to influence CARs. The regression equation is expressed as follows:

$$CAR_s = \beta_0 + \beta_1 CHCS + \beta_2 ISSIZE + \beta_3 VAR + \beta_4 RUN + \beta_5 MRUN + \beta_6 CTAF + \beta_7 CHNOSH \quad (8)$$

where

| | |
|---|---|
| CARs | : cumulative abnormal return; |
| CHCS | : changes in a firm's financial leverage, as measured by the amount of issuing firm's interest-bearing debt over market value of equity; |
| ISSIZE | : the planned proceeds (dollar amount) of each offer divided by the pre-announcement market value of a firm's equity; |
| VAR | : variance of daily common share's return over day -52 and -2; |
| RUN | : the common share's return run-up over day -52 and -2 as measured by its CAR; |
| MRUN | : the market index's return run-up over day -52 and -2 as measured by its CAR; |
| CTAF | : directional changes in a firm's capital structure – it is a dummy variable that takes value of 1 if the event is considered value increasing(ed) event, i.e. ratio of debt/equity of a firm moves closer to its respective industry median, 0 otherwise; and |
| CHNOSH | : Changes in number of outstanding shares. |

CHCS, VAR, CTAF, and CHNOSH are motivated by theoretical considerations. They are used as proxies to test capital structure related theories, including optimal capital structure, agency, and signalling hypotheses. While ISSIZE and RUN are used to control for firm characteristics, MRUN is used to control for the market condition effect.

The significance of AR in this study is tested using conventional *t*-test statistics discussed in Brown and Warner (1996) and Corrado (1985), and Corrado and Zivney (1989). The significance tests for CARs however are calculated slightly difference.[4] The independent *t*-test statistic is used to test whether there are significant differences in the means of CARs over different windows between value-increased group and value-decreased group. The regression coefficients are then re-estimated and the overall model is assessed for robustness. In this study, the standard *F*-test is employed to test the significance of the overall model.

[4] The *t*-statistics of cumulative abnormal return for any specific interval is $\frac{CAR_{(k,l)}}{SEE_{CAR}}$ while $SEE_{CAR}$ is equal to $\sqrt{T \text{ var}(AAR)}$, where $SEE_{CAR}$ is the standard error of estimates of CARs of observations within the event period, $\text{var}(AAR)$ is variance of AAR, *k*is the beginning of the event period, *l* is the end of the event period, and *T* is the event period or $|k\text{-}l|+1$.

## 4. Findings

The findings from this study are presented in four sub-sections. The first sub-section reports capital market reactions to equity private placement employing conventional event study. The second sub-section is a summary of the value change measures as cumulative abnormal returns, CARs. Broadly, the abnormal returns observed are as predicted by the theories. The third sub-section reports findings related to effects of the degree of capital structure changes on firm value. The last sub-section deals with firm-specific variables that drive the value changes. Generally, the findings are in the direction predicted by theories.

### 4.1 Capital market reaction to equity private placement

Daily AARs and CARs for the sample of private placement are presented in **Table 4**.

## Table 4: Daily Average Abnormal Returns and Cumulative Abnormal Returns Surrounding Equity Private Placements

The daily abnormal returns (AARs) and cumulative abnormal returns (CARs) are calculated using market adjusted method at the time surrounding announcement day (day 0) of equity private placement issues. The sample includes 377 equity private placement issues between 1 January 1991 and 31 December 2002.

| | AAR (%) | CAR (%) | Std Dev. | SEE | *t*-statistics |
|---|---|---|---|---|---|
| **Panel A: AAR and CAR** | | | | | |
| -15 | 0.6672 | 0.6672 | 0.0590 | 0.0030 | 2.1953** |
| -14 | 0.4787 | 1.1459 | 0.0575 | 0.0030 | 1.6175 |
| -13 | 0.4174 | 1.5633 | 0.0573 | 0.0030 | 1.4147 |
| -12 | 1.0317 | 2.5950 | 0.0543 | 0.0028 | 3.6910*** |
| -11 | 0.4779 | 3.0729 | 0.0604 | 0.0031 | 1.5360 |
| -10 | -0.0049 | 3.0680 | 0.0566 | 0.0029 | -0.0168 |
| -9 | 0.2406 | 3.3086 | 0.0729 | 0.0038 | 0.6412 |
| -8 | 0.9258 | 4.2344 | 0.0636 | 0.0033 | 2.8265*** |
| -7 | 0.9048 | 5.1392 | 0.0473 | 0.0024 | 3.7175*** |
| -6 | 0.6127 | 5.7519 | 0.0559 | 0.0029 | 2.1269*** |
| -5 | 0.3618 | 6.1138 | 0.0621 | 0.0032 | 1.1314 |
| -4 | 0.8123 | 6.9260 | 0.0626 | 0.0032 | 2.5201** |
| -3 | -0.0464 | 6.8796 | 0.0554 | 0.0029 | -0.1627 |
| -2 | -0.0391 | 6.8405 | 0.0606 | 0.0031 | -0.1251 |
| -1 | 0.8017 | 7.6422 | 0.0586 | 0.0030 | 2.6577*** |
| 0 | 1.2654 | 8.9077 | 0.0694 | 0.0036 | 3.5399*** |
| 1 | 1.3601 | 10.2678 | 0.0735 | 0.0038 | 3.5945*** |
| 2 | 0.3625 | 10.6303 | 0.0593 | 0.0031 | 1.1877 |
| 3 | 0.3594 | 10.9896 | 0.0605 | 0.0031 | 1.1537 |
| 4 | 0.2558 | 11.2454 | 0.0565 | 0.0029 | 0.8790 |
| 5 | 0.0570 | 11.3024 | 0.0530 | 0.0027 | 0.2089 |
| 6 | -0.2647 | 11.0377 | 0.0540 | 0.0028 | -0.9516 |
| 7 | -0.0112 | 11.0265 | 0.0479 | 0.0025 | -0.0454 |
| 8 | -0.4256 | 10.6009 | 0.0524 | 0.0027 | -1.5785 |
| 9 | -0.1018 | 10.4991 | 0.0618 | 0.0032 | -0.3199 |
| 10 | -0.6025 | 9.8966 | 0.0546 | 0.0028 | -2.1415*** |
| **Panel B: Cumulative windows** | | | | | |
| -15,+10 | | 9.8966 | 0.5030 | 2.5649 | 3.8585*** |
| -15,-1 | | 7.6422 | 0.3580 | 1.3864 | 5.5121*** |
| -1,0 | | 2.0672 | 0.3279 | 0.4637 | 4.4576*** |
| -1,+1 | | 3.4273 | 0.2988 | 0.5176 | 6.6214*** |
| +2,+10 | | -0.3712 | 0.3425 | 1.0276 | -0.3612 |

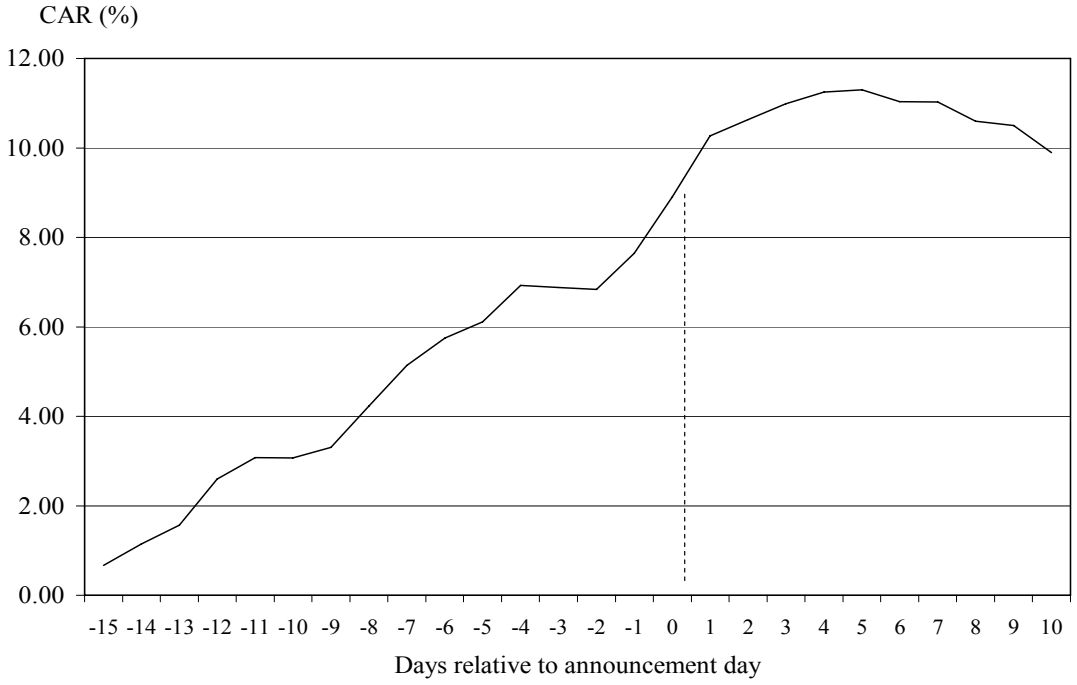
*** and ** indicate statistical significance at the 0.01 and 0.05 level, respectively.

The results show that the AARs for day -1, day 0, and day -1 are 0.80 percent, 1.27 percent, and 1.36 percent, respectively. They all are positive and statistically significant at 0.01 level with *t* values of 2.658, 3.54, and 3.595, respectively. Moreover, the CARs for the entire test period (days -15 to +10), the pre-event period (days -15 to -1), and the on-event periods (days -1 to 0 and days -1 to +1) are

positive at 9.90 percent, 7.64 percent, 2.07 percent, and 3.43 percent, respectively and they all are statistically significant at the 0.01 level with *t* values of 3.859, 5.512, 4.458, and 6.621, respectively. However, the CARs for the post-event period (days +2 to +10) is negative and not statistically significant. These results are consistent with a market that is informationally efficient in the semi-strong form in which share prices adjust rapidly to new information.

The time series plot of CARs in Figure 1 shows that the equity private placement announcements are associated with positive market reaction and after the announcement date, share prices tend to plateau. Generally, equity private placements are considered a low-cost method of fund raisings as they have much lower issuing costs compared to other methods. Furthermore, when issuing equity privately, a firm allows a small group of private investors to scrutinise its firm value and future prospects closely. Thus, if professional investors take large positions in a firm after an extensive analysis, it is considered good news and share prices are consequently boosted.

**Figure 1: Daily Cumulative Abnormal Returns Surrounding Equity Private Placements**




It is noted also that the average positive market responses to equity private placement announcements are consistent with results obtained from a number of studies[5].

[5] For example, in U.S. by Wruck 1992, Hertzel and Smith 1989a, Varma and Szewczyk 1993a, Hertzel and Rees 1993, and Goh, Gombola, Lee and Liu 1998, in UK by Slovin, Sushka, and Lai 1999b, in Sweden by Cronqvist and Nilsson 2000, in Japan by Kang and Stulz 2003, and in Hong Kong by Wu and Wang 1994.

The significantly positive AARs before the announcement date and the significantly positive CARs during the pre-announcement period are consistent with the adverse selection model, proposed by Myers and Majluf 2002, in which a firm will issue equity if it believes that its prevailing share price exceeds its intrinsic value. Also, information leakage that a firm will place equity privately, can explain the positive AARs prior to the announcement day.

The positive share price reaction resulting from equity private placement announcements in this study are also consistent with previous evidence. Although many hypotheses (tax hypothesis, agency hypothesis, including free cash flow and wealth transfer hypotheses, optimal capital structure hypothesis, and signalling hypothesis) generally predict that the market will react negatively to equity issue announcements, evidence show that the method of issue is likely to influence share price responses to new security issues.[6] Researchers who concur with positive share price reaction to equity private placement indeed argue that private investors are likely to enhance monitoring system and improve expertise of an issuing firm, which in turn mitigates agency costs. Public offerings however do not offer monitoring mechanism and increase cash in hands of manager, resulting in an increase in agency costs. Market participants thus view a private placement as favourable news and react positively to it.

### 4.2 Abnormal returns of firms relative to capital structure changes

The CARs surrounding the equity private placement announcements of value-increased and value-decreased firms are presented in Table 5.

**Table 5: Cumulative Abnormal Returns (CAR) Surrounding Equity Private Placement Announcements of Value-Increased and Value-Decreased Firms[#]**

| Cumulative Periods | Value-Increased Group (87) | | Value-Decreased Group (151) | | Value-Increased Versus Value-Decreased Group | |
|---|---|---|---|---|---|---|
| | CARs | *t*- statistics | CARs | *t*- statistics | Diff. between CARs | *t*-statistics |
| -10,+10 | 8.164 | 2.523** | 2.458 | 1.159 | 5.706 | 2.763*** |
| -5,+5 | 6.522 | 2.852*** | 2.151 | 2.096** | 4.371 | 3.012*** |
| -2,0 | 1.203 | 0.620 | 0.850 | 1.263 | 0.353 | 0.913 |
| -1,0 | 1.903 | 1.617 | 0.893 | 1.671* | 1.010 | 1.323 |
| -1,+1 | 3.123 | 2.962*** | 1.087 | 2.061** | 2.036 | 2.009** |
| +2,+10 | 1.447 | 0.689 | -0.486 | -0.352 | 1.933 | 2.062** |

***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.1 levels, respectively.
[#]Among 377 equity private placement issues included in the sample, 139 issues were offered by unlevered firms.

[6] For example, in the U.S., Asquith and Mullins 1984, Masulis and Korwar 1986, Mikkelson and Partch 1986, and Ghosh, Nag and Sirmans 1986 detected statistically significant negative abnormal returns surrounding public equity offerings while Wruck 1999, Hertzel and Smith 1989a, and Goh, Gombola, Lee and Liu 1993a found statistically significant positive abnormal returns surrounding equity private placement.

As shown in Table 5, the equity private placement announcements are generally associated with positive CARs. For the value-increased group, although all CARs shown in the table are positive, not all CARs are statistically significant from zero. In fact, CARs for both of the entire test periods (days -10 to +10 and days -5 to +5) indicate a large degree of positive association between equity private placement announcements and market reaction as the CARs for both periods are highly positive at 8.164 percent and 6.522 percent and statistically significant at 0.05 level with *t*-value of 2.523 and at 0.01 level with *t*-value of 2.852, respectively. In addition, such a large degree of positive effect is indicated by positive CARs of 3.123 percent for the three day on-event period (days -1 to +1), which is statistically significantly different from zero at the 0.01 level with *t*-value of 2.962.

The share price reaction to equity private placements of the value-decreased group also shows significant CARs. To the lesser degree compared to the value-increased group, the entire test period (days -5 to +5) has positive CARs of 2.151 percent, statistically significant at 0.05 level with *t*-value of 2.096. Moreover, the on-event periods (days -1 to 0 and days -1 to +1) also experienced a positive effect between equity private placement announcements and market reaction. While the former indicates positive CARs of 0.893 percent, statistically significant at 0.1 level with *t*-value of 1.671, the latter shows a more robust result of 1.087 percent, also statistically significant at 0.05 level with *t*-value of 2.061.

When observing the difference between CARs of the two groups, although CARs of the value-decreased group are positive (except for the post-event period of days +2 to +10), they have a lesser degree of positive effect than those of the value-increased group for all event periods. CARs of the value-increased group for the entire test periods (days -10 to +10 and days -5 to +5) indicate a larger positive market reaction to private placements than those of the value-decreased group for the same periods. Specifically, the differences in CARs for these periods are 5.706 percent and 4.371 percent, respectively and they both are significantly different from zero at 0.01 level with *t*-values of 2.763 and 3.012, respectively.

To conclude, the positive and significant differences in CARs obtained from the entire test periods (days -10 to +10 and days -5 to +5), the on-event period (days -1 to +1), and the post-event period (days +2 to +10) shown in Table 3 support Hypothesis 1.

### 4.3 Effects of directional changes of capital structure on firm value

This section reports results used to test Hypothesis 2. This study further used White test to detect for heteroskedasticity in regression equations. The problem of heteroskedasticity was corrected by performing White's heteroskedasticity-corrected (HC) standard errors. Table 6 shows models revealing the effects of directional changes of different degree of capital structure changes on firm value based on theoretical predictions.

**Table 6: Effects of directional changes of different capital structure (Debt-Equity ratio) on firm value and theoretical predictions**

| Event types | Hypotheses | | Results from different filters | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | **A** | **B** | **C** | **D** | **E** | **F** |
| | | | All sample (n = 377) | 5%<ΔD/E ≤10% (n = 128) | 10%<ΔD/E≤20% (n = 141) | 20%<ΔD/E≤30% (n = 52) | 30%<ΔD/E≤40% (n = 22) | >40% % (n = 34) |
| Model evaluation | $H_0$ = the model is not significance. | Adjusted $R^2$ | 0.134 | 0.217 | 0.105 | 0.091 | 0.483 | -0.044 |
| | | *F* value | 20.365 | 11.478 | 6.482 | 3.541 | 7.534 | 0.304 |
| | | Sig. | 0.000*** | 0.000*** | 0.000*** | 0.037* | 0.002*** | 0.740 |
| $X_1$: D/E moves away from Med, without overshooting (Value-decreasing group) | $\beta < 0$ | β | -0.104 | -0.086 | -0.116 | -0.110 | -0.109 | -0.088 |
| | | *t*-value | -6.790 | -4.332 | -3.859 | -2.649 | -3.372 | -0.764 |
| | | Sig. | 0.000*** | 0.000*** | 0.000*** | 0.011** | 0.003*** | 0.451 |
| $X_2$: D/E moves away from Med, with overshooting (Value-decreasing group) | $\beta < 0$ | β | -0.082 | -0.040 | -0.082 | n/a | -0.133 | n/a |
| | | *t* -value | -2.297 | -0.862 | -1.169 | n/a | -3.204 | n/a |
| | | Sig. | 0.022** | 0.390 | 0.245 | n/a | 0.005*** | n/a |
| $X_3$: D/E moves closer to Med, without overshooting (Value-increasing group) | $\beta > 0$ | β | 0.043 | 0.065 | 0.051 | -0.007 | 0.059 | -0.030 |
| | | *t* -value | -2.252 | 2.803 | 1.391 | -0.119 | 1.213 | -0.190 |
| | | Sig. | 0.025** | 0.006*** | 0.167 | 0.906 | 0.241 | 0.851 |
| $X_4$: D/E moves closer to Med, with overshooting (Value-increasing group) | $\beta > 0$ | β | 0.050 | 0.028 | 0.053 | 0.066 | 0.071 | 0.066 |
| | | *t* -value | 7.282 | 2.687 | 4.531 | 3.495 | 3.698 | 2.351 |
| | | Sig. | 0.000*** | 0.008*** | 0.000*** | 0.001*** | 0.002*** | 0.025** |

***, **, and * indicate statistical significance at the 0.01, 0.05 and 0.1 levels, respectively.

Column A of Table 6 shows the results obtained from the overall sample of 377 observations. The adjusted $R^2$ of 13.4 percent is statistically significant at 0.01 level with an *F* value of 20.365. The coefficient signs in the model illustrate that $X_1$ and $X_2$ (value-decreased groups) are negatively correlated whereas $X_3$ and $X_4$ (value-increased groups) are positively associated with CARs. The test parameters of these variables are statistically significant at 0.01 level: $t$ = -6.790, -2.297, -2.252, and 7.282 for $X_1$, $X_2$, $X_3$, and $X_4$, respectively. These results are consistent with the optimal capital structure predictions in which a firm having its capital structure moving away from/closer to its relative optimal capital structure (measured as industry median ratio) will experience a decrease/increase in firm value. The authors believe that this is a direct test of the optimal capital structure theory. For the Australian market this result suggests behaviour consistent with the theory.

To test whether different levels of capital adjustments affect firm value differently, the observations were classified into five groups, varying between more than 5 percent and more than 40 percent, according to their percentage change in D/E ratio as stated previously. Columns B to F of Table 6 reveal test results for different filter sizes of changes in capital structure. Although the sample size in column E and F appears to be small, it meets marginally the assumptions underlying the Central Limit Theorem.[7] As can be seen from the table, the relationship between capital structure adjustment and firm value is statistically significant when firms change their capital structure between more than 5 percent and 40 percent. However, interestingly, adjustment of capital structure beyond 40 percent does not provide firms with statistically significant changes in their firm value. The last behaviour is consistent with the assumption that such firms would have become so unattractive for investors hold and trade that the price changes are no longer an indication of the state of the firm.

To conclude, the statistical significances of the models evident in columns A to E of Table 6 support Hypothesis 2.

### 4.4 Firm-specific variables

[7]According to the Central Limit Theorem, the sampling distributions of means approach normal as the sample size increases and the sample size larger than 20 or 30 is sufficient for the normal distribution to provide an acceptable approximation and allow for inference about population parameters (Levin, 1987; Tabachnick and Fidell, 2001; Studenmund, 2001).

In addition to the problem of heteroskedasticity, these test results had to correct for multicollinearity. While the heteroskedasticity issue was addressed by corrections as explained in a previous section, multicollinearity problem is handled by measuring the variance inflation factor (VIF).[8] Where there is evidence of multicollinearity, some variables were dropped so as to obtain robust estimators. Table 7 shows the results of cross-sectional regressions for equity private placement announcements.

**Table 7: Regression Results for the Sample of Private Placement Announcements Made During 1 January 1991 and 31 December 2002**

CARs is cumulative abnormal returns; CHCS is changes in a firm's capital structure, as measured by the amount of issuing firm's interest-bearing debt over market value of equity; ISSIZE is the planned proceeds (dollar amount) of each offer divided by the pre-announcement market value of a firm's equity; VAR is variance of daily common share returns over day -52 and -2; RUN is the common share return 'run-up' over day -52 and -2 as measured by its CARs; MRUN is the market index return 'run-up' over day -52 and -2 as measured by its CARs; CTAF is dummy variable that takes value of 1 if the ratio of debt/market value of equity of a firm moves closer to its respective industry median, 0 otherwise; and CHNOSH is changes in the number of outstanding shares. The regression model in Panel A is estimated using White Heteroskedasticity-Consistent Standard Errors and Covariance model whereas that in Panel B is estimated using OLS model. All values are measured in percentages, except for the dummy variable. Panels and B provides cross-sectional models of abnormal period return over days -10 and +10 and days -1 and +1, respectively.

| | |
|---|---|
| | |
| | **Panel A: CARs (-10,+10)** |
| | |

[8] According to Kleinbaum, Kupper and Muller (1999b) and Gujarati (1988), as a rule of thumb, the VIF value of more than 10 indicates the potential multicollinearity problem an the closer is the tolerant value, the greater degree of multicollinearity. The VIF value in all models in this study, however, below the suggested level and the tolerant values are closer to 1. All independent variables were therefore remained in the regression models.

| | | |
|---|---|---|
| | | |
| | **Panel B: CARs (-1,+1)** | |
| | | |

| | |
|---|---|
| | |

***, ** and * indicate statistical significance at the 0.01, 0.05 and 0.1 levels, respectively.

Panel A of Table 7 shows the regression result based on twenty-one-day (-10,+10) CARs has significant explanatory power in predicting CARs: *F*-value of 5.320 ($p$<.01) and an adjusted $R^2$ value of 0.118. The signs of coefficients of the tested

independent variables in the model are consistent with the theoretical predictions, i.e. changes in a firm's capital structure and directional changes in a firm's capital structure are positively correlated with the CARs whereas the variance of share returns and changes in the number of outstanding shares are negatively correlated with the CARs. Among these variables, only the variance of share returns is significant in explaining the CARs with a *t*-value of 2.058 ($p<.05$). Among the control variables; including, issue size, share return 'run-up', and market index return 'run-up', only share return 'run-up' significantly influences the variation in CARs with *t*-value of 2.305 ($p<.05$).

The findings reported in Panel B of Table 7 demonstrates a model based on three-day (-1,+1) CARs. The results show a significant relation between the CARs and potential explanatory variables, given the *F*-value of 2.679 ($p<.05$) and an adjusted $R^2$ value of 0.049. Similar to the model in Panel A, the sign of the tested coefficients are consistent with the hypothesised directions. Additionally, this model show that directional changes in a firm's capital structure and changes in the number of outstanding shares significantly influence variations in the CARs with *t*-values of 2.010 ($p<.05$) and -2.354 ($p<.05$), respectively.

The regression results obtained from the private placement sample lend some support to the tested hypotheses. The variance of share returns in the model based on twenty-one-day (-10,+10) shows a significant relationship with CARs. Also, directional changes in a firm's capital structure and changes in the number of outstanding shares in the model based on three-day (-1,+1) CARs significantly explain the respective CARs. These results are discussed in detail below.

The signs of the coefficients for changes in the number of outstanding shares in both Models A and B are negative as predicted by the theory. However, while the coefficient is statistically significant at 0.05 when testing CARs over days -10 and +10, it is not statistically significant when testing CARs over days -1 and +1. The result observed in Model B demonstrates a significant and negative correlation between the CARs and changes in the number of outstanding shares. This is consistent with hypothesis proposed by Jensen and Meckling's (1976) agency theory and Ross's (1977) and Leland and Pyle's (1977) firm quality hypothesis. Although

the signs of the coefficients for changes in a firm's capital structure in Both Models A and B are positive as expected, the variable is not statistically significant when testing for CARs over both days -10 and +10 and days -1 and +1.

The signs of the coefficients for directional changes in a firm's capital structure in both Models A and B are positive and consistent with the hypothesised direction. The variable is however statistically significant, i.e. at 0.05 level, only when testing for CARs over days -1 and +1. This result shows a significant and positive relationship between the CARs and directional changes in a firm's capital structure. Given this finding, firms with value-increasing capital structure adjustment (i.e. firms with capital structure moving closer to industry benchmark) will experience a significant positive CARs associated with the announcements and firms with value-decreasing capital structure adjustment (i.e. firms with financial leverage moving away from industry benchmark) will experience negative CARs associated with the announcements. These phenomena are consistent with the optimal capital structure theory.

The signs of the coefficients for variance of share returns in both Models A and B are negative as predicted. However, only Model A indicates that the cross-sectional correlation between the CARs and variance of share returns is significant, i.e. at 0.05 level. The negative coefficient sign for variance of share returns is consistent with Tan, Chng, and Tong's (2002) study, examining private placements in Singapore and reporting no significant evidence. Given the result in Model A, the market uncertainty regarding value of a firm's asset is negatively and significantly correlated with CARs of equity issues and this is consistent with signalling hypothesis.

To conclude, the results obtained from cross-sectional analysis for equity private placement sample are mixed. Thus, it is inconclusive to state that the findings support or do not support hypothesis 3. In addition, the result in Table 7 shows that the model is more significant and has more explanatory power in predicting value change over the long term period of twenty-one days (-10,+10) than over the shorter period of three days (-1,+1). One plausible explanation for this is perhaps because the observed sample firms issue early warning signs before the announcement of the actual financing decisions. As the Australian market is Fama-efficient, market participants

respond quickly to new information, i.e. prior to the announcement of financing decisions. This mechanism results in a more significant effect on a longer test window than on the shorter one.

## 5. Conclusions

The main motivation for this study is the verification of the relative capital structure as proxy for a management of a firm to make financing decisions – the study employs equity private placements as proxy for financing decisions. Received theories so far suggest that there is an optimal capital structure although what is the optimal capital structure of a firm remains unspecified to-date. A second aim of this study is to identify - in a multi-variable context as opposed to mostly the single variables tests found in the literature - the key variables that are correlated with the changes in value when relative capital structure of a firm changes at the time of financing decisions. Thus, the aims of this study address core practical issues that management faces to grow the firm by taking financing decisions that would not lead to loss of value for the firm. This issue is also of academic interest to sort out the mixed findings in the literature in support of the optimal capital structure idea and, most of all, also to identify the market dynamics on financing issue.

The research design is centred on the concept of relative capital structure by comparing a firm's debt-equity ratio to that of the industry median in each year over a 12-year period. Next, the study proceeds to identify the price impact by measuring the abnormal returns at the time of capita-structure-changing events, and the events are carefully identified by excluding confounding other events during the test windows. Regression methodology with appropriate refinements for variable behaviour and need for econometric robustness is also applied to identify the cross-sectional dynamics of how theory-suggested variables impact on share prices.

The findings indicate that the market reacts positively to equity private placement announcements that lead to capital structure moving closer to their relative industry median debt-equity ratio. Firms changing debt-equity ratios away from the median (value decreasing events) leads to either less positive or negative abnormal returns. These are consistent with the idea of optimal capital structure, if relative capital

structure is a proxy for optimal ratio. Thus, the market perceives the industry median as an appropriate capital structure benchmark in the Australian market.

Tests of changes in value as abnormal returns against the directional changes in the capital structure, i.e. moving closer to and moving away from the industry median, yielded a direct test of the optimal capital structure proposition using relative capital structure concept. These tests also affirm that the results are consistent with the prediction of the optimal capital structure. Market participants appear to use the information on changes in capital structure of firms at the time of announcements to react quickly by changing the value in the direction suggested by theory. Such market reactions have strong effect on firm value, particularly when firms adjust their capital structure between more than 5 percent and 40 percent.

The study found the effects of directional changes of capital structure on firm value against theoretical predictions. It demonstrates that more than half of the observations (71.3 percent) have capital structure changes ranging between more than 5 percent and 20 percent via equity private placements. A possible reason for this behaviour is the fact that managers are generally risk averse, and are cautious about financial distress cost increases if there are rapid changes in capital structure. Alternatively, it could be that fund providers would not like sudden changes in the capital structure beyond a certain percentage of the existing size.

The search for the set of variables that determine the size of the price reaction to capital structure changes yielded further significant results. The tested models using full event window and on-event-windows registered a significant model fit as determined by the *F*-ratios: the adjusted $R^2$ values suggest a high degree of accountability for the variation in the price changes. When testing the on-event-period CARs, directional changes in a firm's capital structure (optimal theory) was found to be significant and change in outstanding shares (agency theory) are consistent with theoretical predictions. Signalling variables such as variance of rates of returns are statistically significant however when testing the full event window CARs. Thus, the multi-variable regression tests identified seven key variables as driving the changes in values of firms at the time of changes in capital structure relative to the industry median. These findings are limited to the one market where

this study is conducted. Further studies on more markets are encouraged so as to be able to generalise these findings to a wider literature.

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