

# JARAF

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## **DETECTING ABNORMAL GOODWILL IMPAIRMENT PRACTICES USING PREDICTIVE ANALYTICS**

OWEN P HALL & MICHAEL DAVIS

## **THE GLOBAL FINANCIAL CRISIS (GFC), EQUITY MARKET LIQUIDITY & CAPITAL STRUCTURE: EVIDENCE FROM AUSTRALIA**

AHMAD MOHAMED & LALITH SEELANATHA

## **UNDERSTANDING UNRECOGNISED TAX BENEFITS**

CHARLES W MULFORD & ALEX PFEFFER



THE UNIVERSITY OF  
SYDNEY

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# CONTENTS

<b>EDITORIAL</b> NIGEL FINCH	1
<b>DETECTING ABNORMAL GOODWILL IMPAIRMENT PRACTICES USING PREDICTIVE ANALYTICS</b> OWEN P HALL & MICHAEL DAVIS	2
<b>THE GLOBAL FINANCIAL CRISIS (GFC), EQUITY MARKET LIQUIDITY &amp; CAPITAL STRUCTURE</b> EVIDENCE FROM AUSTRALIA AHMAD MOHAMED & LALITH SEELANATHA	13
<b>UNDERSTANDING UNRECOGNISED TAX BENEFITS</b> CHARLES W MULFORD & ALEX PFEFFER	27

# EDITORIAL

Welcome to this edition of the Journal of Applied Research in Accounting and Finance. Now in its ninth year, JARAF continues to encourage and promote applied research that has practical applications in the contemporary teaching and practice of accounting and corporate finance. In this issue, we examine topics related to evaluating goodwill impairment practices, the relationship between equity market liquidity in the global financial crisis and understanding the value of unrecognised tax benefits.

In our first article, Owen Hall and Michael Davis discussed the ill-practice associated with goodwill impairment by many firms. The authors examined whether predictive analytics can be used to detect abnormal goodwill impairment practices and the effectiveness of it by introducing several predictive analytics models between 2009 and 2011. Their findings suggest that predictive analytics should be used as a complement to existing accounting practices in order to mitigate the use of goodwill impairment as an earnings management tool.

Next, Ahmad Mohamed and Lalith Seelanatha looked at how the recent global financial crisis (GFC) has changed the relationship between equity market liquidity and the capital structure of firms in Australia. Their analysis used a sample of 792 ASX listed companies during the period 2003 to 2011. Their study revealed that the GFC has reduced firms' reliance on debt financing and that the magnitude and significance of the impact of liquidity on leverage have diminished during the post-GFC periods.

Finally, Charles Mulford and Alex Pfeffer examined unrecognised tax benefits for the firms comprising the S&P 100 to clarify their accounting treatment and measure their significance relative to assets, income tax expense and net income. This article would be of interest to analysts and investors as the findings highlight the potential material effects that changes to unrecognised tax benefits can have on income tax expense and net income and to regulators and accounting standard setters as the results show an insight into how accounting and disclosure rules are being applied in estimating the magnitude of uncertain tax positions.

**NIGEL FINCH**  
JULY 2014

# THE GLOBAL FINANCIAL CRISIS (GFC), EQUITY MARKET LIQUIDITY AND CAPITAL STRUCTURE: *EVIDENCE FROM AUSTRALIA*

AHMAD MOHAMED & LALITH SEELANATHA

This study investigates how the recent global financial crisis (GFC) has changed the relationship between equity market liquidity and the capital structure of firms listed on the Australian Securities Exchange (ASX). The study takes into account the recent GFC by splitting the sample period into pre-GFC, GFC and post-GFC periods. It has been suggested that firms whose stocks are liquid incur lower costs of issuing equity in comparison to those with less liquid stocks prefer equity to debt. This study employs least square panel regression analysis using a sample of 792 companies listed on the ASX during the period from 2003 to 2011. The study reveals that stock liquidity has a negative effect on leverage. However, this impact was negligible immediately after the crisis. The other important finding is the alteration of the roles of profitability and earning volatility. While profitability was negatively related to leverage before the GFC, it has become irrelevant in the post-GFC period. On the contrary, earnings volatility was not important during the pre-GFC period, but it has become negatively correlated with leverage in the post-GFC period. Overall, the study has found that the relationship between leverage and the determinants of capital structure has been significantly changed by the GFC.

## INTRODUCTION

Since Modigliani and Miller's (1958) seminal paper on the firm's capital structure, a large number of studies have investigated capital structure decisions and the factors affecting such decisions. Most of those studies were based on the trade-off theory and the pecking order theory of capital structure. They examined extensively the impact of variables such as firm size, growth opportunities, earning volatility, profitability and industry impact. However, the empirical validity of the evidence reported in those studies has been under scrutiny due to the inherent flaws in those theories (Fama and French 2002). Therefore there is a need for further study of corporate capital structure decisions that deviates from the flawed empirical framework used in previous studies. The current study contributes to the capital structure literature by presenting evidence on the impact of equity liquidity on firms' leverage decisions and how the global financial crisis (GFC) has changed the influence of capital structure determinants on firms' capital structure.

The liquidity of securities issued by a firm in the secondary market affects the firm's ability to raise new capital from potential investors. It affects how easily a firm can raise its capital externally and therefore the transaction cost of issuing new security (Butler; Grullon et al. 2005). Traditional trade-off theory in its simple form suggests that, when raising capital, firms attempt to trade off the costs against the benefits. Therefore it is logical that, all else being equal, any factor that reduces the net cost of equity should lead to preferring equity to debt.

Equity liquidity can be regarded as the main factor which determining the issuing cost of new equity. The degree of liquidity is associated with the bid (buy) and asks (sell) spread of security market transactions. The market will set a higher bid and ask spread for shares of low liquidity and it will charge a relatively low bid and ask spread for highly liquid securities. Thus the bid and ask spread affects the transaction cost of issuing new shares and so the cost of capital (Brennan and Subrahmanyam 1996; Brennan, Chordia et al. 1998). Furthermore, the underwriting fee is a significant part of the transaction cost. Butler, Grullon et al. (2005) suggested that underwriting fees are lower for firms with liquid equity. The transaction cost has a significant effect on the firm's cost of capital and so the value of equity investments. As explained by Stoll and Whaley (1983), small firms' stocks with less liquidity cause a high level of transaction cost and so there is a higher rate of return required on such stocks. Thus it is important to know how firm managers consider equity market liquidity in capital structure decisions.

Despite a great number of analytical works in the area of the determinants of capital structure, few studies have addressed the impact of stock market liquidity on leverage. Recently published papers of Lipson and Mortal (2007) and Udomsirikul, Jumreornvong et al. (2011) have reported a negative relationship between equity liquidity and a firm's debt level in the USA and Thailand respectively.

However, there has been no such study conducted in Australia. Inherent characteristics of the Australian financial system, such as the imputation tax and the regulatory and economic environment, illustrate the need to investigate the relationship between liquidity and capital structure in the Australian context.

A firm's financing decisions are also subject to the conditions in the overall financial market. In a crisis-free economic environment, the debt market functions fairly smoothly, allowing firms to raise debt capital fairly easily and quickly when the need arises (Krishnamurthy 2010). A financial market crisis may undermine firms' ability to raise debt capital. A firm may rely on equity capital instead of debt capital during a financial market crisis. Another consideration is that deteriorating investor confidence during a crisis may negatively affect equity liquidity. Therefore financial crises can directly affect the liquidity status of the capital markets. So it is worth investigating whether and how the recent global financial crisis has altered the role of liquidity and other factors in determining a firm's debt level. Thus this study aims to contribute to existing knowledge by investigating the relationship between liquidity and capital structure, taking into account the impact of the GFC.

The paper is organised as follows. The second section presents a brief literature review of liquidity measures and existing studies in corporate capital structure. The third section describes the empirical design of this study. Results and discussions are presented in the fourth section. The final section provides the conclusion.

## LITERATURE REVIEW

A large number of previous researchers have attempted to understand the determinants of a firm's capital structure (as examples Myers 1977; DeAngelo and Masulis 1980; Bradley, Jarrell et al. 1984; Jensen 1986; Titman and Wessels 1988; Graham 2000; Ozkan 2001; Frank and Goyal 2003; Akhtar 2005; Chen and Strange 2005; Huang and Song 2006). The majority of these studies have been based on either the trade-off theory or the pecking order theory. As pointed out by Margaritis and Psillaki (2007), even though there has been remarkable progress on the theoretical work of capital structure, the practical application of those developments has been far from satisfying. Furthermore, some of the other important elements, such as the level of liquidity of firms' issued securities and the impact of a financial crisis on firms' leverage decisions, have not been properly investigated. Thus the recorded evidence in previous empirical works may not be able to explain the real relationship between capital structure choice and a firm's value.

The trade-off theory identifies the optimal level of leverage by weighing the costs and benefits of debt financing (Fama and French 2002). It considers factors such as taxes, agency costs, financial risk and political costs associated with debt financing. Although many previous studies have used

this theory (Ozkan 2001), the major problem with using the trade-off theory is obtaining a reliable measure for representing agency costs, financial risk and political costs (Berger and Bonaccorsi di Patti 2006).

The pecking order theory is based on the information asymmetry argument, which states that insiders possess more private information about a firm's expected return and investment opportunities than outsiders. Such information asymmetry may cause the firm's securities to be underpriced (Myers and Majluf 1984). As explained in the pecking order theory, firms prefer to finance new projects by first using internally-generated capital, then using low-risk debt, and finally using equity. One of the main implications of this theory is that a firm's ability to generate funds internally affects the extent of funds sourced through debt. Therefore the availability of internally-generated funds may diminish a firm's need to generate funds using external sources. However, Fama and French (2005) indicated that a firm's financing decisions may violate the central predictions of the pecking order model about how often and under what circumstances firms issue equity. They argued that most firms issue or retire equity each year and these issues are on average large and not typically done by firms under financial stress.

The free cash flow theory is another theory used in corporate capital structure studies (Jensen 1986). This theory states that the main challenge faced by a firm is how to motivate its managers to avoid making underinvestment decisions that may create a return below the cost of capital. On the other hand, management's desire to avoid this cost of underinvestment to the firm's shareholders may force it to use debt capital to finance projects that have negative net present values, resulting in an increase in financial distress to the firm (Myers 1977). Such behaviour could lead to an increase in risk-taking activity by managers, as they are acting on shareholders' behalf at the cost of debt holders as part of risk-shifting investment strategies (Jensen and Meckling 1976). Consequently, the agency costs of outside equity may exhibit a positive relationship between a firm's performance and its leverage. On the other hand, the agency costs of outside debt may negatively affect the firm's performance because highly leveraged firms, especially those at high risk of default, are more likely to pass up profitable investment opportunities or shift to riskier operating strategies (Jensen and Meckling 1976).

Previous studies have identified a large number of factors as determinants of a firm's financing choices. Some of these factors are: agency costs (Jensen and Meckling 1976; Myers 1977; Harris and Raviv 1990; Seelanatha 2010); corporate control issues (Harris and Raviv 1988); asymmetrical information (Myers 1984; Myers and Majluf 1984); and taxation (DeAngelo and Masulis 1980; Bradley, Jarrell et al. 1984). The current study examines the impact of a firm's equity market liquidity and global financial crises on its financing choices.

Equity market liquidity is related to the transaction cost of raising new capital (Amihud and Mendelson 1986). Stoll and Whaley (1983) showed that a high transaction cost can result in investor demand for a higher rate of return. This may be more relevant for firms with non-liquid equity shares. Previous studies provided evidence to support the conclusion that the level of liquidity is associated with the costs of issuing external equity and suggested that firms with highly liquid financial instruments enjoy a low level of underwriting (Diamond and Verrecchia 1991; Corwin 2003; Butler, Grullon et al. 2005). Therefore firms can lower their cost of external capital by improving the liquidity of issued financial securities. Supporting this argument, Brennan and Subrahmanyam (1996) and Brennan, Chordia et al. (1998) suggested that a decrease in equity liquidity leads to a higher cost of capital.

Lipson and Mortal (2009) examined the relationship between the equity market and capital structure in firms listed on the New York Stock Exchange. Their study explored whether there is a relationship between equity market liquidity and firms' capital structure. The measures used in Lipson and Mortal's study, except for share turnover, were inverse measures of liquidity. Their study found that firms with more liquid shares tend to use less leverage and to finance their projects using equity. A similar study conducted by Udomsirikul, Jumreornvong et al. (2011) in Thailand reported more consistent evidence than the Lipson and Mortal study. The findings of Udomsirikul, Jumreornvong et al. (2011) confirmed that liquid stocks offer an easier and cheaper source of capital to the firm. This suggests that leverage is positively related to size and the non-debt tax shield, and negatively related to profitability.

The global financial crisis significantly affected financial markets, leading to less lending and less issuing of securities (Fosberg 2012). Although it was not as severe in Australia, the GFC caused economic slowdown, firm failures and substantial losses (Brown and Davis 2010). Like all other decisions, financing decisions are affected by all events that change the decision-making environment. This view is supported by the study of Deesomsak, Paudyal et al. (2004), who reported differences in the role of capital structure determinants after the 1997 Asian financial crisis.

The imputation tax system, which is an inherent characteristic of the Australian financial system, may reduce the empirical validity of previous studies conducted in countries such as the USA, the UK, the European Union and Thailand, in the Australian context. Introduced in 1987, the imputation tax system allows Australian shareholders to gain full credit on taxes paid on corporate income when receiving dividends. The benefit enjoyed by equity holders on imputation tax credit has reduced the income tax advantage which firms enjoy on debt financing. For example, Twite (2001) found evidence for the negative effect of the imputation tax system on firms' debt financing decisions. Qiu and La (2010) found that the imputation tax system limits the relative costs and

benefits of debt financing to bankruptcy costs, agency costs and signalling effects. Further to that, they found that Australian firms' capital structure has noticeably changed as a result of the introduction of the imputation tax system. This suggests that, since the introduction of the imputation tax system, firms have shown more interest in external equity financing relative to internal equity and debt financing. In a study which compared the impact of the imputation tax system by using two samples of companies which represented periods before and after the introduction of the imputation tax, Pattenden (2006) found that the imputation tax system has reduced the benefit of debt financing. One of the main implications of these studies (Twite 2001; Pattenden 2006; Qiu and La 2010) is that the empirical evidence reported in different tax regimes may not be comparable. So it is important to investigate the impact of equity liquidity in the Australian context and compare the results with the findings of studies conducted in other countries.

Capital structure decisions are affected not only by firm-specific and industry-specific characteristics, but also by country-specific characteristics such as corporate governance requirements, legal frameworks and institutional environments (Deesomsak, Paudyal et al. 2004). The Australian capital market has some characteristics that differ from those of other national capital markets where previous studies of the impact of liquidity on capital structure have been conducted. For example, the Australian financial system differs from financial systems in other countries due to the dividend imputation tax system (Twite 2001; Pattenden 2006) and relatively high investors' rights protections exist in Australia, which may lead to a preference for equity. Also, as noted, capital structure and its determinants in Australia have not been investigated as much as in some other countries such as the USA.

As highlighted by Qiu and La (2010), research studies on capital structure that have been conducted in Australia have provided inconclusive and conflicting results. Furthermore, no study has been conducted to examine the impact of equity liquidity on firms' capital structure. It is therefore important to investigate the relationship between capital structure and liquidity in the Australian context. Moreover, no study has investigated the impact of the recent global financial crisis (GFC) on firms' capital structure and liquidity. Although the GFC was not as severe in Australia, it caused economic slowdown, firm failures and substantial losses (Brown and Davis 2010). It is therefore important to consider this event, as it may have changed the decision-making environment and process.

**EMPIRICAL DESIGN**

This study examines how the GFC has changed the impact of equity market liquidity on the capital structure decisions of firms listed on the Australian Securities Exchange. So this study investigates the relationship between equity liquidity and leverage. Since liquidity has an impact on the transaction cost of issuing new equity, it could affect firms' financing decisions. As explained above, equity liquidity and transaction cost are negatively related. Firms which enjoy a relatively higher degree of equity liquidity may have the ability to raise equity at a lower cost. Therefore equity should be preferred when it is cheap in comparison to debt, and vice versa. So this study predicts that there is a significant negative relationship between a firm's equity market liquidity and its leverage. This study also expects to investigate how the recent GFC has altered the role of liquidity and other capital structure determinants such as size, growth, profitability, tangibility and earning volatility.

The study has used the following regression model (Equation 1) which was initially used by Bradley, Jarrell et al. (1984) and later extended by Titman and Wessels (1988), Udomsirikul, Jumreornvong et al. (2011), Lipson and Mortal (2007); (2009) and others.

$$LEV_{i,t} = \alpha + \sum_{j=1}^k \beta_j X_{ij} + \delta_1 GFC + \delta_2 PostGFC + \sum_{n=1}^m \phi_n ID_n + \alpha \tag{Equation 1}$$

Where  $LEV_{i,t}$  is the leverage ratio for firm  $i$  in year  $t$ .  $X$  is a vector of  $k$  control variables which include the equity liquidity for firm  $i$  in year  $t - 1$ ; the size of firm  $i$  in year  $t - 1$  is measured by the natural logarithm of total book assets; the profitability of firm  $i$  in year  $t - 1$  is measured by the EBIT to total asset ratio; the asset tangibility of firm  $i$  in year  $t - 1$  is measured by the ratio of net plant property equipment; the growth of firm  $i$  in year  $t - 1$  is measured by the market to book ratio; the volatility of earnings of firm  $i$  in year  $t - 1$  is measured by the absolute difference between the annual percentage change in EBIT and the average of the change in EBIT over the sample period; and the ratio of total depreciation to total assets.  $GFC, PostGFC$ , are two dummy variables which are used for capturing the immediate effect of the GFC and the impact after the GFC;  $ID_n$  is a vector of dummy variables representing data from the  $n$ th industry ( $m$  is the number of industries) and  $\alpha$  is a random error term.

Two leverage measures were estimated using market value and book value data. Liquidity was measured using Amihud's estimate and share turnover. The sample, data and variables used for estimating the model are explained in the next sub-section.



To identify the impact of the GFC on the determinants of capital structure, the study has used Equation 2 with interaction variables. Interaction variables are used to isolate a possible breakdown of relationships due to the GFC.

$$LEV_{i,t} = \alpha + \sum_{j=1}^k \beta_j X_{i,t} + \delta_1 GFC + \delta_2 PostGFC + \sum_{l=1}^k \vartheta_l (PostGFC \cdot X_{i,t}) + \sum_{n=1}^m \phi_n ID_n + \alpha \quad \text{Equation 2}$$

Where  $LEV_{i,t}$  is the leverage ratio for firm  $i$  in year  $t$ .  $\beta_j$  is vector of estimated coefficients for  $j$  number of control variables which were identified in the equation 1.  $GFC$ ,  $PostGFC$ , are two dummy variables which are used for capturing the immediate effect of the GFC and the impact after the GFC.  $\vartheta$  is a vector of estimated variables for  $l$  number of interaction variables which used for impact of GFC on the explanatory variables.  $ID_n$  is a vector of dummy variables representing data from the  $n$ th industry ( $m$  is the number of industries) and  $\alpha$  is a random error term.

Equations 1 and 2 are estimated by applying two liquidity measures (Amihud's estimate and share turnover) separately for the whole period and for three sub-periods (pre-GFC, GFC and post-GFC). To estimate the coefficient of the above regressions, the study has employed panel regression using an unbalanced data set. Panel data comprises both time-series and cross-sectional dimensions, which makes it advantageous in answering more complex questions. It provides better control over the effects of heterogeneity. Furthermore, the use of panel data has the advantage of reducing collinearity among the explanatory variables (Baltagi & Raj 1992).

## SAMPLE

The required financial data for the study were obtained from the Thomson Reuters DataStream and MintGlobal databases. The initial sample consisted of all the firms listed on the ASX that had all required data available on the DataStream and MintGlobal databases for any year between 2003 and 2011. Owing to the uniqueness of capital structure variables, the study excluded property and investment trust companies, insurance firms, banks and regulated utilities. Since small firms have different capital structures from medium and large-scale firms, the study excluded all firms whose total assets were less than two million Australian dollars. As the fiscal year end was taken into account, the study excluded firms whose fiscal year end was not available. The leverage was required to be between zero and 100%. These criteria resulted in a sample of 792 firms from 19 industry groups. The study used the *Australian Financial Review* industry classification.

The data were analysed first for the whole sample period. After that, the sample period was divided into three sub-periods: pre-GFC (period before the GFC, 2003–2006); GFC (impact period, 2007–2008); and post-GFC (period after the GFC, 2009–2011) (Deesomsak, Paudyal et al. 2004). The study assumed that the data set which belonged to the pre-GFC period was free from the impact of the crisis but the GFC and post-GFC data sets were subject to the impact of the crisis. The GFC is the period which can be regarded as the peak of the global financial crisis. The post-GFC period represents observations after the GFC. The study assumed that firms' financial decisions have been greatly affected by the crisis during the GFC and post-GFC periods. The main aim of this subdivision was to separately identify the impact of the GFC on capital structure decisions.

## VARIABLES & MEASUREMENTS

Both book value and market value have been used to estimate firms' leverage. The use of book leverage has been justified by Myers (1977), who stated that book value is related to the value of assets that really exist and can be used to support borrowings, while the market value of assets could be affected by factors that are not collateralised and therefore cannot be used to support borrowings. On the other hand, using book value may lead to a spurious correlation between independent and dependent variables, because managers make financing decisions using a targeted market value of debt (Titman and Wessels 1988). Following recent studies in corporate capital structure such as Campello and Giambona (2010) and Lipson and Mortal (2009), this study has used both book leverage and market leverage. Book leverage<sup>1</sup> is calculated by dividing total debt by total assets. Market leverage<sup>2</sup> is the ratio of total debt to the market value of assets. Assets market value is estimated by subtracting book equity from total book assets and adding the market value of equity. Market equity is calculated by multiplying the number of outstanding shares by the share price at the end of the financial year.

There is no generally-accepted definition for equity liquidity. Downes and Goodman (1998, p. 329) defined liquidity as 'the ability to buy or sell an asset quickly and in large volume without substantially affecting the asset's price'. The ability to trade; trading with affecting the price; trading without affecting the price; buying and selling at about the same price; and immediate trading have been identified as the five levels of liquidity by Von Wyss (2004). Liquidity can have more than one dimension. Previous literature presented five dimensions of liquidity: the time of trading (ability to execute transaction immediately); tightness (extent of transaction cost); resiliency (the elasticity of supply and demand); depth (the trading volume or the flow

and breadth (Sarr and Lybek 2002; Von Wyss 2004). Since liquidity can have more than one dimension, it is difficult to directly observe the level of liquidity. Further to that, there is no single reliable proxy<sup>3</sup> which can represent all its dimensions (Kluger and Stephan 1997; Irvine, Benston et al. 2000) Von Wyss (2004). Sarr and Lybek (2002) classified liquidity measures into four categories: transaction cost measures; volume-based measures; price-based measures; and market-impact measures. Irvine, Benston et al. (2000) classified liquidity measures as *ex ante* and *ex post* measures.

Both one-dimensional and multi-dimensional liquidity measures have been used in previous studies. One-dimensional liquidity measures estimate the level of liquidity by taking into consideration factors such as trading volume, the periods between subsequent trades, the spread or firm size separately (Chordia, Roll et al. 2000; Chordia, Roll et al. 2001; Chordia, Subrahmanyam et al. 2001). Multi-dimensional liquidity measures identify liquidity by considering more than one dimension of liquidity at the same time. Composite liquidity (Chordia, Roll et al. 2000), the quote slope, the log quote slope (Hasbrouck and Seppi 2001) and the adjusted log quote slope (Von Wyss 2004) are some examples of multi-dimensional liquidity measures.

This study has used two liquidity measures, Amihud's measure and share turnover, which have been used by Lipson and Mortal (2009) and Udomsirikul, Jumreornvong et al. (2011). Amihud's measure uses daily market price data that is easily accessible for long periods. It considers the time series effects of liquidity (Amihud 2002). Since the unavailability of required intra-day data limits, the use of high-frequency liquidity measures such as trade and quote spreads, Amihud's liquidity estimate is a good alternative (Hasbrouck 2009). Amihud's estimate captures the tightness and resiliency dimensions of liquidity. As it is a measure of illiquidity, Amihud's measure is negatively related to liquidity. Lipson and Mortal (2009) and Udomsirikul, Jumreornvong et al. (2011) employed the average of daily Amihud's measures in their investigations of the effect of liquidity on leverage. The annual average of monthly Amihud's illiquidity is estimated using the following equations:

$$QILLQ_{iy} = \frac{1}{M_{iy}} \sum_{t=1}^{m_{iy}} \frac{|R_{iytm}|}{VOLD_{iytm}}$$

Where QILLQ<sub>iy</sub> is Amihud's illiquidity estimate for stock *i* in year *y*, *M*<sub>iy</sub> is the number of months for which data is available. |*R*<sub>iytm</sub>| is the absolute return for a particular stock *i* in month *m* in year *y*. *VOLD*<sub>iytm</sub> is the share volume in dollars in month *m* in year *y*.

In addition to Amihud's measure, share turnover has been applied as an alternative measure of equity liquidity. The

turnover (*T*) measure captures the depth aspect of equity liquidity. Share turnover is estimated by dividing the number of traded shares by the number of outstanding shares. Share turnover for a particular period can be estimated using the following equation:

$$T = \frac{\text{The number of shares traded}}{\text{Shares Outstanding}}$$

Where '*T*' is the turnover.

Turnover (*T*) has a negative relationship with the cost of illiquidity (Amihud and Mendelson 1986). There is a strong positive relationship between turnover and the bid-ask spread (Atkins and Dyl 1997). Turnover and trading cost measures are strongly related (Irvine, Benston et al. 2000). According to Irvine, Benston et al. (2000), the absolute share price does not affect turnover per time unit, which makes it useful when comparing the liquidity of different stocks.

Control variables are used to isolate the impact of growth potential, firm size, assets tangibility, profitability and earnings volatility (Bradley, Jarrell et al. 1984; Titman and Wessels 1988; Chiarella, Pham et al. 1992; Chen and Strange 2005; Fama and French 2005; Lipson and Mortal 2009; Qiu and La 2010; Udomsirikul, Jumreornvong et al. 2011). A set of dummy variables have been used to capture industry variation between corporate leverage decisions.<sup>4</sup> To remove a probable causality relationship between liquidity and capital structure, the study has used one-year lagged values of explanatory variables (Lipson and Mortal 2009; Udomsirikul, Jumreornvong et al. 2011).

## RESULTS AND DISCUSSION

After applying the sample selection criteria outlined in the sample section, we collected a sample of 4925 firm-year observations for the whole period. This resulted in 2131 firm-year observations for the pre-GFC sample, 1254 firm-year observations for the GFC sample and 1540 firm-year observations for the post-GFC sample. Table 1 presents the descriptive statistics of the sample data.

The estimated mean and median statistics show that the sample is skewed towards small firms. This indicates that the Australian financial market consists of a larger number of small and mid-sized firms and a relatively small number of very large firms (ASX 2010). Both leverage ratios are low. This is probably because of the reduced debt tax advantage under the dividend imputation tax system adopted in Australia. Another possible reason for this is the high legal protection of shareholders, which leads to preferring equity to debt (Deesomsak, Paudyal et al. 2004). The recorded average market leverage is lower than the recorded average book leverage. This is not surprising, given the fact that the average market to book ratio is greater than one. The other noticeable figures are the negative average operating return over the whole period and the high earning volatility.

**Table 1. Descriptive Statistics**

This table presents summary statistics of the sample over the whole period (2003–11), the pre-GFC (2003–06), GFC (2007–08) and post-GFC (2009–11) periods separately. The last column of the table presents T-statistics for the testing of the difference between pre- and post-GFC periods. The market value of assets is total book assets less book equity plus market equity. Market equity is the result of multiplying the number of outstanding shares by the share price. Book leverage and market leverage are the ratio of total debt to total book assets and assets market value respectively. Amihud illiquidity is the average of the monthly stock return divided by the dollar value of trade volume. Turnover is the trade volume divided by the number of outstanding shares and averaged over the year. Market to book is used to proxy the growth potential of firms. It is the ratio of assets market value to book value. Tangible assets are a ratio which is calculated by dividing the value of property, plant and equipment by total assets. Operation return, which is the ratio of EBIT to total assets, represents the profitability of the firm. Volatility of EBIT is the absolute difference between the annual percentage change in EBIT and the average of the change in EBIT over the sample period.

Financial Characteristics	The Sample (2003-2011) Observations - 4925			Pre-GFC (2003-2006) Observations - 2131			GFC (2007-2008) Observations - 1254			Post-GFC (2009-2011) Observations - 1540			T-test (Difference between Pre-and- Post GFC Periods) (Difference)
	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	Mean	Median	Standard Deviation	
Total Assets (Book Value)	837.63	34.43	5,147.29	740.21	29.34	3,754.06	6,122.36	29.34	3,754.06	879.92	37.45	5,826.39	-0.88
Total Assets (Market Value)	1,580.40	55.82	11,482.23	1,434.84	50.71	8,815.09	13,979.42	50.71	8,815.09	1,496.68	46.50	12,334.48	-0.18
Equity (Book Value)	390.17	23.61	2,301.07	337.88	18.69	1,700.43	2,148.25	18.69	1,700.43	457.18	26.56	3,011.53	1.52
Equity (Market Value)	1,132.94	40.36	8,890.29	1,032.51	36.91	6,883.58	0,708.10	36.91	6,883.58	1,073.93	32.14	9,621.33	-0.15
Debt	220.92	0.75	1,573.05	199.25	1.32	1,031.36	2,410.49	1.32	1,031.36	197.38	0.25	1,280.37	0.05
Leverage (Book Value) (LBV)	11.96	3.02	15.20	12.83	5.81	15.07	15.60	5.81	15.07	10.60	0.94	14.95	4.44
Leverage (Market Value) (LMV)	9.66	1.72	13.89	9.82	3.03	13.01	13.16	3.03	13.01	10.01	0.81	15.54	-0.41
Equity Turn-Over Turnover													
Turnover (TO)	0.56	0.34	1.09	0.52	0.35	0.61	1.88	0.35	0.61	0.51	0.28	0.66	0.92
Amihud_Index (AMI)	0.52	0.02	3.52	0.54	0.01	3.69	1.41	0.01	3.69	0.74	0.04	4.35	-1.50
Other Operating Characteristics													
Growth (GRW)	2.02	1.42	2.33	2.04	1.48	2.30	3.02	1.48	2.30	1.61	1.17	1.53	6.37
Size (SZ)	10.88	10.45	2.01	10.78	10.29	2.03	1.96	10.29	2.03	10.91	10.53	2.01	-1.821
Tangibility (TAN)	0.37	0.33	0.29	0.37	0.32	0.29	0.28	0.32	0.29	0.39	0.37	0.30	-2.72
Profitability (PRF)	-7.96	-0.60	38.34	-5.65	2.37	32.91	40.19	2.37	32.91	-11.66	-4.21	43.22	4.78
Volatility (VOL)	14.00	0.74	475.48	2.85	0.71	8.55	891.06	0.71	8.55	13.47	0.77	276.27	-1.77

The study used T-tests to compare the mean values of the test variables in the pre-GFC period with the mean values of the test variables in the post-GFC period. The estimated T-statistics show that the volatility of earnings was significantly higher in the post-GFC period. While the average operating return for both periods was found to be negative, it was significantly lower during the post-GFC period. The increase in earnings volatility and the decrease in operating return are consistent with the expectation that the GFC has caused substantial losses and instability.

The results for market leverage show no significant difference between the two periods. This is in line with the findings of Deesomsak, Paudyal et al. (2004), who reported almost constant leverage ratios in Australia over their sample period (1993–2001). On the other hand, book leverage is significantly different, with the post-GFC period having a lower book leverage ratio. This supports the prediction that the GFC has led to less lending. While there is no significant difference in Amihud's estimate between the two periods, the decrease in share turnover is significant at the 0.1 confidence level for the post-GFC period. Overall, it can be concluded that share turnover, earnings volatility, market leverage and operation return have all shown significant differences between the pre- and post-GFC periods.

**Table 2. Correlation Coefficients for the Whole Sample Period**

	LBV	LMV	AMI	TOI	SIZ	TAN	PRF	GRW
LMV	0.738							
AMI	0.025	0.090						
TOI	-0.003	-0.047	-0.065					
SIZ	0.490	0.402	-0.111	0.109				
TAN	-0.013	-0.003	-0.021	0.066	-0.043			
PRF	0.235	0.180	-0.009	-0.003	0.408	-0.050		
GRW	-0.106	-0.232	-0.058	0.064	-0.079	-0.098	-0.086	
VOL	0.002	-0.006	-0.003	-0.005	0.015	0.017	0.015	0.010

Table 2 presents estimated correlation coefficients among the test variables. The explanatory variables are lagged one year after the leverage measures. LBV and LMV are the ratio of total debt to total book assets and assets market value respectively. AMI is the average of the monthly stock return divided by the dollar value of the trade volume. TOI is the trade volume divided by the number of outstanding shares and averaged over the year. SIZ is the natural logarithm of the value of total assets. TAN is the ratio of tangible assets to total assets calculated by dividing the value of property, plant and equipment by total assets. PRF is profitability, measured by the ratio of EBIT to total assets. GRW is growth potential, represented by the market to book value ratio. VOL represents the volatility of EBIT measured by the absolute difference between the annual percentage change in EBIT and the average of the change in EBIT over the sample period.

Correlation coefficients, presented in Table 2, show a relatively low correlation among the test variables, indicating that there is no multi-collinearity problem in the study data. The correlation between liquidity measures and leverage measures is in the expected direction, although the magnitude is small. This correlation, however, does not control for the impact of the other explanatory variables on leverage.

Tables 3 and 4 present estimated coefficients for the regression model discussed in the previous section. The regression has been run first for the whole sample period. Then it has been run for the pre-GFC, GFC and post-GFC periods separately. Overall, the recorded R2 ranges from around 0.36 to 0.41 among all regressions. This indicates that the model employed in this study explains reasonably well the dependent variables.

The results presented in Table 3 are for the full sample period; the estimated coefficient of the Amihud's illiquidity estimate shows a positive and statistically significant relationship between book leverage and market leverage. As Amihud's estimate is an inverse measure of liquidity, the positive relationship indicates a negative impact of liquidity on debt level. This estimation is therefore consistent with the findings of Lipson and Mortal (2009) and Udomsirikul,

Jumreornvong et al. (2011), which predicted an inverse relationship between stock market liquidity and leverage ratios. Contradicting the theoretical prediction of the pecking order theory, which regards external equity financing as the least preferred source, this result suggests that firms with liquid equity shares prefer to use equity capital over debt capital when financing new projects. Furthermore, the result supports the trade-off theory, based on which firms need to balance the costs and benefits of debt to reach their optimum capital structure. The dummy variables used for representing the post-GFC period have shown a significant reduction in debt financing during the post-GFC period. This might have been caused by a shortage of funds available in the financial system for lending due to a deterioration in investor confidence during and after the GFC.

**Table 3. Regression Analysis for the Whole Sample Period**

Table 3 presents the regressions results for the whole sample period (2003–11). The equity liquidity has been measured using the Amihud illiquidity (AMI) estimate and turnover (TOI) measure. The market to book value (GRW) ratio is used to proxy the growth opportunities. Profitability (PRF) is measured by the ratio of EBIT to total assets. Size (SIZ) is the firm size measured by the natural logarithm of the value of total assets. Asset tangibility (TAN) is measured by the ratio of property, plant and equipment to total assets. The standard deviation of EBIT is used to proxy volatility (VOL). The study has used dummy variables to control industry effect (results are not tabulated). GFC is the dummy variable which represents the data observation during the peak of the global financial crisis. Post\_GFC is a dummy variable used for the period after the GFC. The regression has been run twice: using book leverage and using market leverage. The explanatory variables including liquidity are lagged one year after leverage. T-statistics are shown in parentheses.

Number of Observations 4913	Amihud Illiquidity Measure		Turnover Liquidity	
	Book	Market	Book	Market
Variable				
Constant	-15.112 (-7.77)	-5.365 (-2.92)	-14.145 (-7.26)	-4.376 (-2.37)
AMI	0.310 (6.38)	0.354 (7.69)		
TOI			-0.137 (-0.87)	-0.333 (-2.23)
GRW	-0.269 (-3.43)	-0.954 (-12.87)	-0.289 (-3.68)	-0.972 (-13.02)
PRF	-0.030 (-6.09)	-0.022 (-4.63)	-0.030 (-5.94)	-0.021 (-4.48)
SIZ	3.187 (32.32)	2.064 (22.12)	3.113 (31.37)	1.997 (21.24)
TAN	6.507 (9.09)	4.533 (6.70)	6.437 (8.96)	4.450 (6.54)
VOL	-0.000 (-1.05)	-0.001 (-1.83)	-0.000 (-1.04)	-0.001 (-1.82)
GFC	-0.621 (-1.47)	-0.321 (-0.80)	-0.674 (-1.59)	-0.363 (-0.91)
Post_GFC	2.213 (-5.565)	0.034 (0.090)	-2.142 (-5.365)	0.105 (0.278)
R-Squared	40.86%	36.61%	40.38%	35.91%
Adjusted R2	40.56%	36.29%	40.07%	35.58%
F-Statistic	135.070	112.913	132.393	109.537

More results consistent with the previous results are provided by the regression results presented in Table 4 for the divided sample. Similarly, the estimated coefficients reveal a positive and statistically significant relationship between the Amihud's measure and book and market leverage. A notable finding of this study is that the significance of equity liquidity in the pre-GFC period has decreased from the 1% significance level to the 10% significance level in the post-GFC period. It has also indicated a decline in the magnitude of the estimated coefficients. This could be the result of firms' management having adopted a more conservative decision-making approach immediately after the crisis. However, the estimated coefficients for the regression model, which used share turnover as the liquidity measure, do not indicate a statistically significant relationship between share turnover and either market leverage or book leverage. However, all estimated coefficients for the share turnover recorded negative signs, confirming the expected direction of the relationship.

For the pre-GFC period, the estimated coefficient of share turnover indicates a statistically significant negative relationship with market leverage. These findings confirm the previous evidence, which concluded that firms with liquid equity shares prefer to use equity capital rather than debt capital in a stable economic environment. However, the estimation shows that share turnover has a negative but not significant correlation with book leverage for the same period. This suggests that, while liquidity was an important determinant of leverage before the GFC, it has become irrelevant in the pre-GFC period. This is probably because decisions to raise equity are motivated by other, stronger factors such as high insolvency risks and difficulties in accessing debt.

The majority of control variables used in the regressions show results consistent with previous studies. In all regressions estimations, the estimated coefficient for the growth potential recorded a statistically significant negative relationship between growth opportunities and market leverage, which is consistent with previous studies such as Bradley, Jarrell et al. (1984), Titman and Wessels (1988) and Qiu and La (2010). As predicted in previous studies, the estimated coefficients for size in all regressions show a statistically significant positive relationship with leverage, consistent with previously reported findings such as Chiarella, Pham et al. (1992) and Deesomsak, Paudyal et al. (2004). The significant positive impact has not changed, even after splitting the sample. In the pre-GFC, GFC and post-GFC periods, the recorded coefficients for size reveal that the relationship remains positive and statistically significant. It can be concluded that firm size is an important determinant of debt level. The role of firm size in determining debt level has not been affected in the post-GFC period. A firm can use its tangible assets as collateral when raising debt capital. Thus previous literature suggested that the relationship between assets tangibility and leverage should be positive. Confirming this prediction and previous empirical evidence, the estimated coefficients for the variable representing tangibility of assets in all regressions recorded a statistically significant positive relationship (Frank and Goyal 2003; Lemmon, Roberts et al. 2008; Qiu and La 2010).

**Table 4. Regression Analysis for Sub-Periods**

Table 4 presents regression results for the whole period (2003–11) using Amihud measure and share turnover to measure liquidity. Stock liquidity has been measured by using the Amihud illiquidity (AMI) estimate and the turnover (TOI) measure. The market to book value (GRW) ratio is used to proxy growth opportunity. Profitability (PRF) is measured by the ratio of EBIT to total assets. Size (SIZ) is the firm size measured by the natural logarithm of the value of total assets. Asset tangibility (TAN) is measured by the ratio of property, plant and equipment to the total assets. The standard deviation of EBIT is used to proxy volatility (VOL). The study has used dummy variables to control for industry effect (results are not tabulated). GFC is the dummy variable which represents the data observation during the peak of the global financial crisis. Post\_GFC is a dummy variable used for the period after the GFC. The regression has been run twice: using book leverage and using market leverage. The explanatory variables including liquidity are lagged one year after leverage. T-statistics are shown in parentheses.

	Amihud Turnover Measure						Turnover Measure					
	Leverage-Book Value			Leverage-Market Value			Leverage-Book Value			Leverage-Market Value		
	Pre_GFC	GFC	Post_GFC	Pre_GFC	GFC	Post_GFC	Pre_GFC	GFC	Post_GFC	Pre_GFC	GFC	Post_GFC
C	-	-24.933	-10.163	-3.458	-10.803	-4.390	-13.698	-24.143	-10.547	-2.303	-9.571	-5.289
	15.288											
		(-6.14)	(-2.72)	(-1.44)	(-3.03)	(-1.11)	(-5.08)	(-5.98)	(-2.81)	(-0.94)	(-2.69)	(-1.34)
	(-5.62)											
AMI	0.482	0.394	0.130	0.561	0.653	0.133						
	(7.03)	(1.61)	(1.81)	(9.27)	(3.03)	(1.76)						
TOI							-0.446	0.046	-1.074	-1.360	-0.052	-1.628
							(-1.02)	(0.26)	(-2.10)	(-3.52)	(-0.33)	(-3.03)
GRW	-0.139	-0.332	-0.392	-0.885	-0.773	-1.634	-0.168	-0.347	-0.372	-0.898	-0.795	-1.594
	(-1.24)	(-2.61)	(-1.86)	(-8.93)	(-6.89)	(-7.35)	(-1.47)	(-2.72)	(-1.76)	(-8.89)	(-7.07)	(-7.17)
PRF	-0.031	-0.047	-0.020	-0.026	-0.024	-0.024	-0.029	-0.046	-0.020	-0.025	-0.023	-0.025
	(-3.53)	(-4.96)	(-2.44)	(-3.37)	(-2.86)	(-2.86)	(-3.27)	(-4.88)	(-2.49)	(-3.14)	(-2.72)	(-2.94)
SIZ	3.132	3.792	2.837	1.832	2.403	2.231	3.036	3.735	2.926	1.786	2.319	2.392
	(21.62)	(18.79)	(15.68)	(14.34)	(13.54)	(11.69)	(20.34)	(18.68)	(15.34)	(13.49)	(13.16)	(11.90)
TAN	7.166	5.724	6.427	5.071	3.852	4.863	7.096	5.727	6.461	5.010	3.563	4.943
	(6.71)	(3.90)	(5.04)	(5.38)	(2.77)	(3.62)	(6.57)	(3.89)	(5.07)	(5.22)	(2.75)	(3.68)
VOL	0.045	-0.000	-0.001	0.049	-0.001	-0.002	0.043	-0.000	-0.001	0.048	-0.001	-0.002
	(1.53)			(1.91)			(1.45)			(1.83)		
		(-0.84)	(-1.16)		(-1.52)	(-1.80)		(-0.84)	(-1.17)	(-1.51)	(-1.82)	
R-squared	44.05%	43.7%	37.32%	41.43%	38.89%	35.41%	42.76%	43.5%	37.4%	39.40%	38.4%	35.67%
Adjusted R-	43.44%	42.6%	36.37%	40.79%	37.74%	34.43%	42.13%	42.5%	36.4%	38.74%	37.3%	34.69%
F-Statistic	71.95	41.33	39.15	64.66	33.95	36.04	68.27	41.13	39.22	59.42	33.31	36.45

**Table 5. Regression Analysis – Impact of GFC on the Impact of Other Variables**

Table 5 presents regression results which used identify the impact of GFC on other explanatory variables. Stock liquidity has been measured using the Amihud illiquidity (AMI) estimate and turnover (TOI) measure. Market to book value (GRW) ratio is used to proxy growth opportunity. Profitability (PRF) is measured by the ratio of EBIT to total assets. Size (SIZ) is the firm size measured by the natural logarithm of the value of total assets. Asset tangibility (TAN) is measured by the ratio of property, plant and equipment to total assets. The standard deviation of EBIT is used to proxy volatility (VOL). The study has used dummy variables to control for industry effect (results are not tabulated). GFC is the dummy variable which represents the data observation during the peak of the global financial crisis. Post\_GFC is a dummy variable used for the period after the GFC. The variables PG\*AMI, PG\*TOI, PG\*grw, PG\*PRF, PG\*SIZ, PG\*TAN and PG\*VOL represent the interactions of the explanatory variables with the Post\_GFC impact. The regression has been run twice: using book leverage and using market leverage. The explanatory variables including liquidity are lagged one year after leverage. T statistics are shown in parentheses.

	Amihud		Turnover	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage
<b>Constant</b>	-17.584 (-8.50)	-5.189 (-2.66)	-16.309 (-7.87)	-3.755 (-1.92)
<b>AMI</b>	0.466 (6.92)	0.552 (8.70)		
<b>TOI</b>			-0.018 (-0.11)	-0.189 (-1.21)
<b>GRW</b>	-0.234 (-2.78)	-0.822 (-10.33)	-0.266 (-3.14)	-0.856 (-10.68)
<b>PRF</b>	-0.040 (-6.22)	-0.027 (-4.52)	-0.038 (-5.88)	-0.025 (-4.10)
<b>SIZ</b>	3.372 (28.91)	1.982 (18.02)	3.278 (28.02)	1.886 (17.07)
<b>TAN</b>	7.319 (8.82)	5.618 (7.18)	7.193 (8.62)	5.437 (6.90)
<b>VOL</b>	-0.000 (-0.75)	-0.000 (-1.37)	-0.000 (-0.74)	-0.000 (-1.35)
<b>GFC</b>	-0.634 (-1.50)	-0.283 (-0.71)	-0.750 (-1.77)	-0.406 (-1.01)
<b>POST_GFC</b>	5.711 (2.41)	-0.153 (-0.07)	4.058 (1.69)	-2.687 (-1.19)
<b>PG*AMI</b>	-0.334 (-3.46)	-0.408 (-4.49)		
<b>PG*TOI</b>			-1.083 (-2.09)	-1.685 (-3.44)
<b>PG*grw</b>	-0.189 (-0.86)	-0.920 (-4.44)	-0.123 (-0.55)	-0.819 (-3.91)
<b>PG*PRF</b>	0.023 (2.29)	0.008 (0.86)	0.020 (1.96)	0.004 (0.42)
<b>PG*SIZ</b>	-0.567 (-2.85)	0.308 (1.64)	-0.404 (-1.96)	0.562 (2.88)
<b>PG*TAN</b>	-2.614 (-2.11)	-3.354 (-2.88)	-2.259 (-1.80)	-2.791 (-2.36)
<b>PG*VOL</b>	-0.001 (-0.71)	-0.001 (-1.16)	-0.001 (-0.73)	-0.001 (-1.20)
R-squared	41.16%	37.33%	40.60%	36.53%
Adjusted R-squared	40.78%	36.93%	40.22%	36.13%
F-statistic	110.12	93.79	107.61	90.61
Wald test statistics for  PG*AMI=PG*TOI =PG*grw=  PG*PRF=PG*SIZ= PG*TAN=0	4.0487	9.3030	2.9843	7.89994

The recorded statistically significant negative coefficients for the variable representing profitability provide evidence to support the theoretical prediction of the pecking order theory, which is that firms prefer internal funding over external funding when financing new projects. This result is consistent with the empirical findings of Allen (1991), Lemmon, Roberts et al. (2008) and Qiu and La (2010). Mixed evidence has been reported on the relationship between volatility and leverage.

The literature has suggested a negative relationship between the volatility of earnings and the level of debt. This prediction has been confirmed for the whole period. The estimated coefficient of EBIT volatility has been found to be negative and statistically significant. This is in line with the trade-off theory. High earning volatility increases the probability of not meeting a firm's debt obligations. Consequently, the financial cost of distress and the probability of bankruptcy increase, leading to lower leverage. However, different results are found when the regression is run for the sub-periods separately. For the pre-GFC sample, although it is negative as predicted, the impact of volatility is insignificant. On the other hand, the estimated coefficient of earning volatility in the post-GFC period shows a negative and statistically significant impact of volatility on both market leverage and book leverage. Clearly this change in significance results from the significant increase in the volatility of earnings, as discussed in the comparison between the two sub-periods. As earning volatility and the risk of bankruptcy become high, managers take volatility into account when they make financing decisions. Therefore, the role that volatility plays has noticeably changed in the post-GFC period.

Table 5 presents results for Equation 2 which measures the impact of the GFC on the capital structure determinants. The estimated coefficients for the interaction variables indicate how the relationships between each capital structure determinant variable and leverage were affected by the GFC. The results show that after the GFC there were significant changes in the impact of liquidity, profitability, size and tangibility. These results suggest that decision-makers change the weights they give to different determinant factors when there is a crisis. The Wald test scores estimated for identifying the significance of the estimated coefficient in the model shows that those factors are more significant in explaining Australian firms' capital structure decisions.

Finally, a set of dummy variables have been used to identify the unobservable impact of industry factors on leverage (results were not tabulated). The results for the whole period, pre-GFC, GFC and post-GFC periods show that leverage varies significantly among industry groups.

## CONCLUSIONS

This study has been carried out to investigate how the recent GFC has affected the relationship between equity liquidity and leverage decisions in firms listed on the Australian Securities Exchange. The study has also re-examined the

relevance of other capital structure determinants, namely, firm size, asset tangibility, profitability, growth opportunity and the volatility of earnings. Furthermore, the study has taken into account the effects of the recent GFC on capital structure decisions by splitting the whole sample period into three sub-periods: pre-GFC; GFC; and post-GFC.

The study findings suggest that equity market liquidity has a negative effect on firms' leverage decisions. Furthermore, the GFC has reduced firms' reliance on debt financing. On the other hand, the magnitude and the significance of the impact of liquidity on leverage have both diminished during the GFC and post-GFC periods. Overall, the control variables used in this study show results consistent with previous studies.

## NOTES

$$^1 \text{ Book leverage ratio} = \frac{\text{Book Debt}}{\text{Asset Book Value}}$$

$$^2 \text{ Market leverage ratio} = \frac{\text{Book Debt}}{\text{Assets Market Value}}$$

<sup>3</sup> Aitken and Comerton-Forde (2003) have identified more than 68 liquidity measures, with no clear agreement as to which measures are the best.

<sup>4</sup> Estimated coefficients for industry dummy variables are not reported and available on request.

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# TABLE OF CONTENTS

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