



# Ownership and Financial Leverage: Australian Evidence\*

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The present study analyzes the relationship between ownership and leverage levels of a sample of 465 non-financial Australian firms for the period 2004–10. Blockholders in Australia have a significant positive influence on the capital structure but, as their shareholding levels rise, their influence on leverage becomes negative. Managerial ownership, on the other hand, has no influence on the capital structure, but is found to have a significant impact on the short-term debt levels. The relationship between ownership and leverage is bidirectional as both ordinary least squares (OLS) and panel data analyses show significant positive relationships between blockholder ownership and capital structure.

*Keywords:* capital and ownership structure, panel data.  
*JEL classifications:* G32, C33.

## 1. INTRODUCTION

This study examines the relationship between ownership and leverage decisions of Australian firms for the period 2004–10. Capital structure research dates back to its origins in the 1950s and the 1960s and it is still largely unresolved in terms of causes and consequences (Myers 1984). Given the agency costs, the use of debt helps firms reduce the free cash flow (Jensen & Meckling 1976) and, thus, debt may lead to disciplinary benefits. Ownership structure is likely to influence agency costs and, at certain levels of blockholder and managerial ownerships, the interests of managers, shareholders and debtors may align. There are possible interdependencies between capital structure and ownership structure, given the conflicts of interests between shareholders and bondholders. This study therefore proposes to examine the relationship between ownership structure and capital structure of Australian firms.

Prior literature identifies certain company-specific factors as having an influence on the capital

structure of firms. These factors include size, profitability, growth, non-debt tax shields (NDTS) and tangibility (Harris & Raviv 1991; Rajan & Zingales 1995). The present study considers the influence of these variables along with that of ownership structure on capital structure. The present study is unique in that it considers two different dimensions of ownership structure, namely blockholder ownership—ownership held by the top twenty shareholders; and insider ownership—ownership held by both independent and non-independent directors as well as other top executives in the firm. Similarly, the present study contributes to the literature on capital structure as it not only considers the long-term debt but also considers short-term debt. The present study contributes to the growing literature on corporate governance and financial policies by examining the influence of ownership structure on capital structure. Most of the earlier studies on capital structure have focused on North American and European corporate firms. This study extends the empirical literature by examining these issues in the Australian context. Australia, unlike many other Organization for Economic Co-operation and Development (OECD) countries, has a tax imputation system whereby companies could reduce their cost of equity on a relative basis and this may have implications for use of debt as a source of funding by Australian firms. Similarly, the Australian Securities

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Exchange (ASX) introduced the Principles of Good Governance and Best Practice Recommendations in 2003 and corporate firms started adopting these guidelines from 2004. Given the new governance framework, the relative roles of debt and ownership assume additional importance.

The rest of the paper is organized as follows. In section 2, relevant literature on capital structure and ownership structure is considered. This is followed by a description of the sample and presentation of descriptive statistics in section 3. The findings of the study are provided in section 4, and section 5 summarizes the findings of the study.

## 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Many theories have been advanced to explain the financing and capital mix of corporate firms. Modigliani and Miller (1958, 1963) assert that under certain conditions, capital structure has no influence on the cost of capital and value of firms. Subsequent research is focused on relaxing the assumptions relating to taxes, transaction costs and information asymmetry (DeAngelo & Masulis 1980). The simple trade-off theory identifies optimal capital structure as a particular level of leverage where marginal costs and benefits of debt are equal (Bradley, Jarrell & Kim 1984). Firms may increase or decrease leverage depending on the marginal benefits and costs. The pecking order hypothesis refers to the preferences of firms to rely on internal sources of funding rather than external sources in the presence of information asymmetry and the consequent adverse selection (Myers 1984). Accordingly, firms prefer retained earnings, debt and, finally, equity when funding investments. Firms may refuse to issue stock in the presence of information asymmetry, even if firms have valuable investment opportunities (Myers & Majluf 1984). Accordingly, firms prefer to fund new investment opportunities by first using funds available through internal sources in the form of retained earnings. Jensen and Meckling (1976) identify the disciplinary benefits of debt in terms of reducing agency conflicts between shareholders and managers. The free cash flow hypothesis suggests that firms with debt obligations may have fewer opportunities to resort to empire building as firms first need to repay the interest payments and principal payment as it becomes due (Jensen 1986).

Earlier literature has identified five major determinants of capital structure (Titman & Wessels 1988; Rajan & Zingales 1995). These are size, tangibility, profitability, NDTs and growth opportunities. Firm

size may have a negative or a positive effect on the leverage. Large firms have a large borrowing capacity as they are well established and often face lower probability of bankruptcy compared to smaller firms. This implies that large firms may be able to raise more debt and, hence, are likely to have a target capital structure that consists of higher levels of debt. Rajan and Zingales (1995) find that larger firms have higher debt levels in the United States (US), Japan, the United Kingdom (UK), France, Italy and Canada; while in Germany larger firms have lower debt levels. Frank and Goyal (2009) find positive effects of size on leverage, measured using market measures. The positive effect of size on leverage is seen as supporting the trade-off theory of capital structure. Titman and Wessels (1988) find that smaller firms have larger short-term debt levels than larger firms. The negative effect of size on leverage is seen as supporting the pecking order hypothesis.

Tangible assets could be used as a collateral by firms; and the larger the collateral assets, the higher the borrowing capacity as the lenders are willing to lend more on the basis of the security of tangible assets. Higher levels of tangible assets may also lead to higher levels of debt as lenders are willing to lend more for firms with higher tangible assets and lenders are confident that these assets will have relatively more value in liquidation compared to intangible assets (Rajan & Zingales 1995). Higher levels of tangible assets also imply lower default risk for lenders, thus leading to the supply of more debt to firms (Haque, Arun & Kirkpatrick 2009). Tangible assets in the presence of information asymmetry help firms reduce their cost of equity issues and therefore may lead to lower debt levels. The pecking order theory highlights the negative relationship between tangibility and leverage. Qiu and La (2010) find evidence of a positive relationship between tangibility and leverage for Australian firms.

Pecking order theory also predicts a negative relationship between debt levels and profitability (Myers & Majluf 1984). Firms that are profitable could retain their earnings and the availability of this source of funding may lead to lower debt levels. Titman and Wessels (1988) find evidence supporting the negative influence of profitability on debt ratios. Profitable firms are able to attract debt as lenders are willing to lend more to firms that have higher cash flows (Rajan & Zingales 1995). The relationship between profitability and debt levels may also depend on the corporate control market. When the corporate control market is efficient, firms may be forced to pay out more of their profits and raise the necessary funding by borrowing (Jensen 1986). Qiu and La (2010) find

evidence of a negative relationship between leverage and profitability.

Growth opportunities imply higher risks and firms may tend to use less debt as they prefer to avoid issues of debt overhang (Myers 1977). Increased equity may lead to dilution and motivate firms to use debt rather than equity to fund future growth (Du & Dai 2005). Qiu and La (2010) find evidence of a negative relationship between leverage and growth opportunities for Australian firms. NDTs such as depreciation and investment credits help firms reduce the need for debt and therefore are expected to have a negative impact on leverage levels (DeAngelo & Masulis 1980).

Ownership of firms also impacts capital structure, given the information asymmetry and corporate control considerations (Leland & Pyle 1977; Harris & Raviv 1988). Brailsford, Oliver and Pua (2002) find that blockholder ownership and leverage are positively related while managerial shareholding has a non-linear influence on the leverage of Australian firms.

### 3. SAMPLE AND DESCRIPTIVE STATISTICS

The sample firms consist of all non-financial firms included in the All Ordinaries Index at the end of December 2010. Firms from the real estate, banking and finance sectors are not considered as it is hard to separate their business and financial risks and given the public regulation of firms in the banking and finance sectors. The initial sample consists of 465 firms. Of these, 145 firms are in the material sector, followed by 50 firms in the energy sector, and 36 in the capital goods sector. Other sectors include retailing (24 firms), commercial goods (22), consumer goods (20), software and technology (19), transport (15), media (15), food and beverages (15), health care (15), utilities (12), telecommunications (9) and pharmaceuticals (9) (the remainder are either diversified or not classified). These firms accounted for more than 60% of market capitalization of all firms listed (including financials) on the ASX at the end of December 2010. Given the adoption of ASX Principles of Good Governance in 2003, the present study considers the period 2004–10 as the study period. This also represents a changed scenario from the earlier period in terms of changes in institutional factors relating to reporting as increasingly firms have adopted the new Australian International Financial Reporting Standards (AIFRS); and in terms of China's emergence as one of the large trading partners. Despite the recent global financial crisis, the Australian economy has witnessed relative economic stability compared to other OECD countries.

To analyze the impact of ownership structure on capital structure of Australian firms, two separate measures of ownership and leverage are considered. The ownership percentage held by a firm's top twenty shareholders and the percentage ownership held by both executive and non-executive directors of a firm are considered, respectively. Data on ownership is collected from the corporate governance module of the Securities Industry Research Centre of Asia Pacific (SIRCA) database. Separate measures of short-term debt to total debt and equity capital, and of long-term debt to total debt and equity capital are considered as measures of financial leverage.

The present study also considers the influence of company-specific factors such as size, profitability, tangibility, growth and NDTs; and a set of control variables on financial leverage. *Size* is measured as the natural logarithm of net sales revenue. Large firms in general have higher borrowing capacity and are likely to have higher debt levels. *Profitability* is measured as a ratio of operating income to total assets. Profitability may have a positive influence on firms' borrowing, given the higher capacity to service debt. On the other hand, firms that are profitable may retain earnings and use them to fund future projects, thus giving rise to a negative relationship. Tangible assets may be used by firms as collateral and firms with large tangible assets may be able to borrow more funds. Firms may need to venture into new markets and/or new products as they grow and this may increase the volatility of expected cash flows; thus, growing firms face higher risks. Firms that pursue higher growth opportunities may want to use more equity rather than higher debt, given the higher degree of business risk. Growth opportunities may therefore have a negative influence on financial leverage. To the extent that firms have NDTs, they may not need debt to shield profits from taxes. NDTs therefore negatively influence financial leverage. All financial data is collected from the Datastream Thompson database for the period 2004–10.

An examination of the financial leverage of Australian firms over the period 2004–10 shows that the average total debt levels of Australian firms is approximately 16% (Table 1, p. 16). Of this, long-term debt accounts for nearly three-quarters or approximately 13% of average long-term debt. Short-term debt is close to 4% of total debt and equity capital. The majority of the firms have very little debt as the median value for total debt is only 0.4%. Leverage levels, in general, have experienced increases during 2005–08 before dropping off slightly in 2009 and 2010 (Table 2, p. 17). Long-term debt increased from an average of 9% in 2004 to a high of 15.2% in 2008 before ending on a 13% level in 2010. Short-term debt similarly increased from 3.1% in 2004 to a high

TABLE 1. Descriptive statistics for variables employed

Variable	Mean	SD	Minimum	p25	p50	p75	Maximum	Skewness	Kurtosis
<i>Size</i>	12.168	2.599	0.000	11.039	12.476	13.806	18.019	-0.954	4.537
<i>Profitability</i>	0.016	0.210	-0.563	-0.070	0.054	0.127	1.160	-0.592	5.151
<i>Tangibility</i>	0.616	0.251	0.002	0.433	0.603	0.843	1.080	-0.250	2.271
<i>Growth</i>	3.272	2.925	0.000	1.334	2.298	4.061	13.065	1.805	6.002
<i>NDTS</i>	0.183	0.201	0.003	0.039	0.113	0.244	0.717	1.468	4.231
<i>Cash</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.005	22.644	477.632
<i>CAPEX</i>	0.000	0.001	0.000	0.000	0.000	0.000	0.054	48.615	677.298
<i>Beta</i>	1.206	0.799	0.012	0.485	0.987	1.756	2.830	0.687	2.353
<i>Specrisk</i>	0.480	11.747	0.000	0.005	0.014	0.038	395.772	29.163	570.612
<i>Age</i>	18.135	13.191	0.000	9.000	14.000	24.000	132.000	2.480	16.104
<i>Payout</i>	0.145	0.219	0.000	0.000	0.000	0.284	0.905	1.280	3.353
<i>Tobin's Q</i>	2.500	2.431	0.397	1.306	2.106	2.502	30.188	4.884	37.733
<i>Blockholders</i>	0.660	0.174	0.000	0.540	0.680	0.800	0.940	-0.497	2.761
<i>Insiders</i>	0.155	0.208	0.000	0.010	0.066	0.216	0.911	1.925	6.548
<i>LT leverage</i>	0.128	0.198	0.000	0.000	0.000	0.230	0.796	1.591	4.810
<i>ST leverage</i>	0.038	0.081	0.000	0.000	0.000	0.037	0.494	3.185	14.622
<i>T leverage</i>	0.159	0.220	0.000	0.000	0.004	0.301	0.854	1.306	3.848

Notes: *Size* is measured as the natural logarithm of net sales revenue. *Profitability* is measured as a ratio of operating income to total assets. *Tangibility* is measured as a ratio of net tangible assets to total assets. *Growth* is calculated as a ratio of market value to book value. *Non-debt tax shields (NDTS)* is measured as depreciation and amortization as a proportion of net property, plant and equipment. *Cash* is measured as cash and equivalents to total assets. *CAPEX* is capital expenditure as a proportion of total assets. *Beta* captures systematic risk and is estimated using market model. *Specrisk* is specific risk estimated using market model. *Age* captures the number of years elapsed since incorporation of a firm. *Payout* captures average percentage of ordinary dividend paid out of profits over the last five years. *Tobin's Q* captures performance measured as a ratio of total of market value of equity, book value of debt and preferred equity to total of book value of equity, debt and preferred equity. *Blockholder* ownership is captured by computing the total shareholding of top twenty shareholders. *Insider* shareholding is the total shareholding of all directors. *Long-term leverage (LT leverage)* is measured as long-term debt to total capital. *Short-term leverage (ST leverage)* is measured as short-term debt to total capital. *Total leverage (T leverage)* is total debt to total capital.

of 4.4% in 2007 before reaching a level of 3.8% in 2010. The global financial crisis thus appears to have had no significant impact on the leverage levels of Australian firms.

The percentage of ownership held by directors and other top executives in Australian firms is on average 15.5% during the study period and this is similar to the levels observed in other OECD countries. Managerial shareholding declined gradually from a level of 18.3% in 2004 to a level of 13.9% in 2010. Nearly two-thirds of ownership is held by the top twenty shareholders on an average during the period 2004–10. Ownership held by the top twenty shareholders has shown a marginal increase from 63.4% in 2004 to 67.5% in 2010.

*Size* as measured by net sales revenue has shown a marginal increase during the study period from 11.84% in 2004 to 12.59% in 2010. *Profitability*, on the other hand, has shown fluctuations during the study period,

declining in 2005 and 2009 before recovering in 2010. *NDTS* have shown a steady decline during the study period from 21.3% in 2004 to 17.8% in 2010. The average dividend payout has shown a gradual increase during the study period from 9.7% in 2004 to 18% in 2010. Growth opportunities as measured by market value to book value have marginally increased from 2.88% in 2004 to 4.5% in 2007 before declining to 2.85% in 2010.

An examination of correlations shows that *profitability* is positively associated with *size* and average dividend payout and negatively related to tangibility of assets of sample firms (Table 3, p. 17). *Size* is inversely related to cash and equivalents and systematic risk as measured by *beta*. None of the correlations, however, are of very high magnitude although some associations are statistically significant at 1%.

TABLE 2. Mean values for variables employed during the period 2004–10

	2004	2005	2006	2007	2008	2009	2010
<i>Size</i>	11.844	11.729	11.789	12.173	12.349	12.471	12.586
<i>Profitability</i>	0.004	0.002	0.014	0.020	0.019	0.006	0.041
<i>Tangibility</i>	0.617	0.613	0.592	0.604	0.613	0.613	0.651
<i>Growth</i>	2.879	3.354	3.719	4.506	3.181	2.560	2.846
<i>NDTS</i>	0.213	0.199	0.177	0.170	0.170	0.185	0.178
<i>Cash</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>CAPEX</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<i>Beta</i>	1.107	1.162	1.236	1.068	1.304	1.266	1.263
<i>Specrisk</i>	1.442	1.046	0.892	0.093	0.077	0.087	0.093
<i>Age</i>	15.278	16.278	17.278	18.278	19.278	20.278	21.278
<i>Payout</i>	0.097	0.112	0.131	0.153	0.168	0.177	0.180
<i>Tobin's Q</i>	2.252	2.398	2.689	3.177	2.473	2.173	2.316
<i>Blockholders</i>	0.634	0.642	0.653	0.667	0.678	0.670	0.675
<i>Insiders</i>	0.183	0.181	0.164	0.148	0.141	0.132	0.139
<i>LT leverage</i>	0.090	0.114	0.126	0.136	0.152	0.149	0.130
<i>ST leverage</i>	0.031	0.032	0.040	0.044	0.038	0.043	0.038
<i>T leverage</i>	0.116	0.139	0.157	0.171	0.183	0.185	0.162

Note: Variable descriptions are provided in Table 1 (p. 16).

TABLE 3. Correlations among variables

	<i>Size</i>	<i>Prof</i>	<i>Tang</i>	<i>Growth</i>	<i>Cash</i>	<i>Beta</i>	<i>Age</i>	<i>Payout</i>	<i>Tobin's Q</i>	<i>Block</i>	<i>Insiders</i>
<i>Profitability</i>	0.417										
<i>Tangibility</i>	-0.486	-0.303									
<i>Growth</i>	-0.108										
<i>NDTS</i>		0.125	-0.099	0.098			-0.085	0.205			
<i>Cash</i>	-0.209	-0.271	0.089	0.157							
<i>CAPEX</i>	-0.128										
<i>Beta</i>	-0.289	-0.195	0.261								
<i>Specrisk</i>	-0.135	-0.104									
<i>Age</i>	0.257	0.121	-0.135			-0.118					
<i>Payout</i>	0.490	0.424	-0.377		-0.125	-0.287	0.318				
<i>Tobin's Q</i>	-0.257	-0.168	0.218	0.796	0.270	0.129	-0.078	-0.140			
<i>Blockholders</i>	0.162	0.111	-0.112								
<i>Insiders</i>										0.085	
<i>LT leverage</i>	0.364	0.206	-0.733		-0.114	-0.196	0.159	0.318	-0.190	0.088	
<i>ST leverage</i>	0.141	0.099	-0.425	-0.081		-0.108	0.128	0.183	-0.112		0.240

Notes: Only correlations significant at 10% significance level are reported. Prof is profitability. Tang is Tangibility. Block is Blockholders. Variable descriptions are provided in Table 1 (p. 16).



#### 4. FINDINGS

To analyze the influence of ownership structure on leverage, ordinary least square (OLS) models are employed in the first stage. All eight models employ four specifications to analyze the determinants of capital structure or long-term debt and another four specifications to analyze the factors influencing short-term debt. The first specification (Models 1 and 5) analyzes the influence of profitability, size, tangibility, growth opportunities and NDTs on leverage. The second specification (Models 2 and 6) in addition includes the payout ratio, cash holdings, capital expenditure, age of firm, *beta* and firm-specific risk. Specifications 3 (Models 3 and 7) and 4 (Models 4 and 8) capture, in addition to the variables included in specification 2, the effects of ownership held by the top twenty shareholders and managerial shareholding, respectively. Models 1 to 4 identify factors influencing long-term leverage while Models 5 to 8 analyze the determinants of short-term leverage.

In the second stage, factors influencing blockholder ownership and insider ownership are analyzed again using four separate specifications. Specification 1 (Models 1 and 5) analyzes the influence of long-term leverage on ownership, while specification 2 (Models 2 and 6) analyzes the influence of short-term leverage on ownership. Specifications 3 (Models 3 and 7) and 4 (Models 4 and 8) in addition employ *size*, *growth*, *payout*, *Tobin's Q*, year and industry dummies to analyze the determinants of ownership. Models 1 to 4 analyze the factors influencing blockholder ownership, whereas Models 5 to 8 analyze the determinants of insider ownership.

Results from Model 1 show that *profitability* has a significant negative influence on the capital structure of Australian firms (Table 4, p. 19). Firms that experience higher levels of profits tend to reduce their debt levels. This result supports the pecking order hypothesis which argues that firms retain earnings and reinvest them in current as well as future projects.

*Tangibility* has a significant negative influence on the financial leverage of Australian firms. Firms that have higher levels of tangible assets have, in fact, used lower levels of debt. This result contradicts the findings of earlier studies.

As expected, *NDTS* have a negative impact on the capital structure of Australian firms. Firms have fewer incentives to use debt in the presence of other tax savings alternatives.

The results from Model 2 show that profitability, tangibility and NDTs continue to have a negative impact on the financial leverage of Australian firms even in the presence of control variables such as dividend payout ratios, capital expenditure, *age*, *beta*,

specific risk and *cash*. Cash and equivalents have a significant negative influence on capital structure. The results imply that firms with large cash balances tend to employ less debt.

Model 3 introduces the percentage shareholding held by the top twenty shareholders. To capture the non-linear relationship between ownership and capital structure, this model incorporates percentage ownership held by the top twenty shareholders as well as the squared percentage ownership of the top twenty shareholders. Results show evidence of a non-linear relationship between ownership and the capital structure of Australian firms. At low levels of ownership, higher levels of outsider ownership lead to better performance; however, as the ownership levels increase, the top twenty shareholders have a significant negative influence on capital structure.

Model 4 introduces percentage ownership held by both executive and non-executive directors in place of ownership held by the top twenty shareholders. Results show that managerial ownership has no significant influence on the capital structure of Australian firms. Given the relatively low levels of managerial ownership, it is not surprising that managerial ownership has no influence on capital structure.

Models 5 to 8 examine the factors influencing short-term leverage of Australian firms. Results show that *profitability* and *tangibility* have a significant negative influence. Growth opportunities also have a significant negative influence on short-term leverage. Firms that experience higher levels of growth tend to have smaller amounts of short-term debt. Models 6 and 7 confirm the negative influence of *profitability*, *tangibility* and *growth* on short-term debt. The percentage ownership of the top twenty shareholders shows no significant influence on short-term debt. Managerial ownership, on the other hand, shows a positive significant influence on short-term debt. At low levels of ownership, managerial ownership has a significant positive influence on short-term debt while it has a negative influence at higher levels of ownership.

To examine the possible interdependence between capital structure and ownership structure, the present study analyzes the factors influencing ownership (Table 5, p. 20). OLS analysis shows that long-term leverage has a significant positive influence on ownership as measured by the percentage ownership held by the top twenty shareholders. This influence, however, doesn't persist when other control variables are included in the analysis. Similarly, short-term debt has no significant influence on ownership held by the top twenty shareholders. The present study also analyzes the influence of capital structure on managerial ownership. Results show that both

TABLE 4. Influence of ownership structure on leverage: OLS analyses

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>LT Leverage</i>				<i>ST Leverage</i>			
<i>Profitability</i>	-0.092*** (-3.19)	-0.088*** (-3.02)	-0.084*** (-2.80)	-0.085*** (-2.79)	-0.040** (-2.37)	-0.041** (-2.14)	-0.044** (-2.21)	-0.043** (-2.16)
<i>Size</i>	0.001 (0.19)	0.001 (0.51)	0.001 (0.31)	0.001 (0.48)	-0.001 (-0.78)	-0.003 (-1.47)	-0.002 (-1.00)	-0.002 (-1.27)
<i>Tangibility</i>	-0.704*** (-20.60)	-0.633*** (-16.41)	-0.629*** (-15.11)	-0.635*** (-15.13)	-0.166*** (-9.28)	-0.185*** (-8.35)	-0.189*** (-7.79)	-0.189*** (-7.82)
<i>Growth</i>	0.001 (0.27)	0.003 (1.23)	0.002 (0.96)	0.002 (0.88)	-0.003*** (-3.13)	-0.004*** (-3.68)	-0.004*** (-3.08)	-0.004*** (-3.32)
<i>NDTS</i>	-0.158*** (-7.30)	-0.157*** (-6.78)	-0.161*** (-6.74)	-0.159*** (-6.65)	-0.015 (-1.41)	-0.013 (-0.98)	-0.012 (-0.85)	-0.013 (-0.96)
<i>Payout</i>		-0.001 (-0.03)	0.001 (0.05)	0.002 (0.09)		0.012 (0.90)	0.007 (0.47)	0.012 (0.84)
<i>Cash</i>		-396.048** (-2.28)	-433.299** (-2.46)	-443.659*** (-2.62)		-3.076 (-0.03)	18.933 (0.17)	27.859 (0.25)
<i>CAPEX</i>		145.482 (1.20)	166.967 (1.35)	179.046 (1.49)		-4.186 (-0.05)	-18.226 (-0.23)	-23.051 (-0.29)
<i>Age</i>		-0.000 (-1.17)	-0.000 (-0.77)	-0.000 (-0.91)		-0.000 (-1.16)	-0.001 (-1.29)	-0.001 (-1.09)
<i>Beta</i>		0.000 (0.06)	-0.003 (-0.45)	-0.003 (-0.46)		-0.001 (-0.30)	-0.000 (-0.04)	-0.000 (-0.19)
<i>Specrisk</i>		0.001*** (3.38)	0.001*** (3.11)	0.001*** (3.46)		-0.000 (-0.70)	-0.000 (-0.85)	-0.000 (-0.91)
<i>Blockholders</i>			0.479*** (3.15)				-0.028 (-0.34)	
<i>Blockholders<sup>2</sup></i>			-0.384*** (-3.20)				0.001 (0.00)	
<i>Insiders</i>				-0.065 (-0.05)				1.038** (2.22)
<i>Insiders<sup>2</sup></i>				-0.111 (-0.03)				-2.506** (-2.00)
<i>Year dummies</i>		Yes	Yes	Yes		Yes	Yes	Yes
<i>Industry dummies</i>		Yes	Yes	Yes		Yes	Yes	Yes
<i>Intercept</i>	0.639*** (12.95)	0.535*** (9.39)	0.409*** (5.16)	0.545*** (8.84)	0.182*** (6.57)	0.217*** (6.45)	0.229*** (5.10)	0.215*** (5.91)
<i>Firm-years</i>	1341	1310	1203	1203	1330	1304	1199	1199
<i>R<sup>2</sup></i>	0.550	0.620	0.593	0.589	0.145	0.197	0.203	0.203
<i>Adjusted R<sup>2</sup></i>	0.548	0.610	0.581	0.576	0.142	0.176	0.179	0.179
<i>F-value</i>	276.361	91.223	67.949	71.018	36.112	11.213	10.221	11.501

\*, \*\*, and \*\*\* indicate significance at 10%, 5% and 1% respectively.

Notes: *t*-statistics in parentheses. In all, eight models are employed with four specifications to analyze the determinants of capital structure or long-term debt; and another four specifications, to analyze the factors influencing short-term debt. The first specification (Models 1 and 5) analyzes the influence of profitability, size, tangibility, growth opportunities and NDTS on leverage. The second specification (Models 2 and 6), in addition includes payout ratio, cash holdings, capital expenditure, age of firm, beta and specific risk. The third specification (Models 3 and 7) and the fourth specification (Models 4 and 8) capture in addition to variables included in the second specification, effects of ownership held by blockholders and insiders, respectively. Models 1 to 4 identify factors influencing long-term leverage while Models 5 to 8 analyze the determinants of short-term leverage. Variable descriptions are provided in Table 1 (p. 16).

TABLE 5. Influence of leverage on ownership structure: OLS analyses

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>Blockholders</i>				<i>Insiders</i>			
<i>Levlongtd</i>	0.041** (2.10)		0.002* (1.71)		-0.002 (-0.72)		-0.001 (-0.25)	
<i>Levshorttd</i>		-0.045 (-1.02)		-0.084 (-1.42)		0.002 (0.46)		0.005 (0.97)
<i>Size</i>			0.016*** (6.20)	0.016*** (6.61)			0.001 (0.49)	0.000 (0.23)
<i>Growth</i>			0.008** (2.39)	0.008** (2.39)			-0.001*** (-2.77)	-0.001** (-2.35)
<i>Payout</i>			-0.134*** (-5.48)	-0.135*** (-5.48)			-0.0057** (-2.12)	-0.006** (-2.13)
<i>Tobin's Q</i>			0.003 (0.50)	0.003 (0.48)			0.001*** (2.89)	0.001*** (2.77)
<i>Year dummies</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Industry dummies</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Intercept</i>	0.597*** (34.81)	0.607*** (36.55)	0.385*** (11.07)	0.383*** (10.83)	0.003*** (4.09)	0.002*** (3.01)	0.003** (2.10)	0.003* (1.86)
<i>Firm-years</i>	2023	2016	1215	1211	2023	2016	1215	1211
<i>R<sup>2</sup></i>	0.105	0.103	0.164	0.165	0.007	0.006	0.018	0.019
<i>Adjusted R<sup>2</sup></i>	0.095	0.093	0.145	0.146	-0.005	-0.005	-0.004	-0.003
<i>F-value</i>	32.871	50.653	25.522	23.771	5.874	5.508	3.818	3.879

\* \*\*, and \*\*\* indicate significance at 10%, 5% and 1%, respectively.  
Notes: *t*-statistics in parentheses. Factors influencing ownership are analyzed using ordinary least squares. Models 1 to 4 analyze the factors influencing blockholder ownership, whereas Models 5 to 8 analyze the determinants of insider ownership. The first specification (Models 1 and 5) analyzes the influence of long-term leverage on ownership, while the second specification (Models 2 and 6) analyzes the influence of short-term leverage on ownership. The third specification (Models 3 and 7) and the fourth specification (Models 4 and 8) in addition employ size, growth, payout, Tobin's Q, year and industry dummies to analyze the determinants of ownership. Variable descriptions are provided in Table 1 (p. 16).

long-term leverage and short-term leverage have no significant influence on the managerial ownership of Australian firms.

Given that OLS analysis suffers from the problems relating to unobserved heterogeneity and endogeneity, the present study employs panel data analysis. Based on the results of the Hausman test, random effects instrumental variable analysis is employed. This analysis incorporates two-stage least squares given the endogeneity between ownership and leverage.

Two separate models each for long-term debt and short-term debt are employed with Models 1 and 3,

capturing the effect of percentage ownership held by the top twenty shareholders; and with Models 2 and 4, incorporating managerial ownership (Table 6, p. 21.) Results show that *profitability*, *tangibility* and *NDTS* have a significant effect on leverage even after taking into account the unobserved firm heterogeneity. When accounted for endogeneity, however, neither ownership held by the top twenty directors nor ownership held by the directors has a significant influence on both the long-term and the short-term leverage. In other words, there is support for the argument that the ownership structure and the capital structure of Australian firms are related.



TABLE 6. Ownership and leverage: panel two-stage instrumental variable estimation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>LT Leverage</i>		<i>ST Leverage</i>		<i>Blockholders</i>		<i>Insiders</i>	
<i>Profitability</i>	-0.142*** (-3.70)	-0.096** (-2.39)	-0.035 (-1.41)	-0.054* (-1.95)	0.108*** (3.50)	0.079*** (2.63)	0.005 (1.28)	0.006 (1.51)
<i>Size</i>	0.006 (1.27)	0.005 (1.01)	-0.002 (-0.88)	-0.001 (-0.20)	-0.007 (-1.52)	-0.002 (-0.47)	-0.000 (-0.52)	-0.000 (-0.70)
<i>Tangibility</i>	-0.609*** (-15.74)	-0.647*** (-15.66)	-0.219*** (-8.95)	-0.196*** (-7.01)				
<i>Growth</i>	0.001 (0.63)	-0.000 (-0.02)	-0.004*** (-2.85)	-0.003* (-1.69)	0.000 (0.03)	0.003 (1.63)	-0.001 (-1.50)	-0.000 (-1.20)
<i>NDTS</i>	-0.069*** (-2.64)	-0.090*** (-3.51)	-0.012 (-0.72)	-0.009 (-0.50)				
<i>Blockholders</i>	0.336*** (2.84)		0.009 (0.12)					
<i>Blockholders2</i>	-1.511** (-2.56)		0.322 (0.70)					
<i>Insiders</i>		-2.400 (-1.39)		2.206* (1.83)				
<i>Insiders2</i>		-14.987 (-1.33)		-9.082 (-1.28)				
<i>Tobin's Q</i>					-0.004 (-1.44)	-0.007*** (-2.73)	0.000 (0.93)	0.000 (0.64)
<i>LT leverage</i>					0.103** (2.26)		0.005 (1.05)	
<i>ST leverage</i>						0.078 (0.71)		0.026 (1.05)
<i>Industry dummies</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Intercept</i>	0.266** (2.29)	0.541*** (6.64)	0.226*** (3.25)	0.187*** (3.41)	0.734*** (14.98)	0.692*** (13.99)	0.005 (1.41)	0.005 (1.45)
<i>Firm-years</i>	1203	1203	1199	1199	1203	1199	1203	1199
<i>Number of groups</i>	237	237	237	237	237	237	237	237
<i>Overall R<sup>2</sup></i>	0.459	0.487	0.157	0.101	0.001	0.000	0.004	0.004
<i>Rbo</i>	0.558	0.432	0.397	0.350	0.834	0.839	0.067	0.064
<i>Chi<sup>2</sup></i>	693.526	730.857	164.827	144.697	21.095	16.766	6.917	8.882
<i>Probability</i>	0.000	0.000	0.000	0.000	0.002	0.010	0.329	0.180

\*, \*\*, and \*\*\* indicate significance at 10%, 5% and 1%, respectively.  
Notes: z-statistics in parentheses. Interdependence between ownership and leverage is analysed using panel two-stage instrumental variable regressions. Models (1) and (2) analyze long-term leverage. Models (3) and (4) analyze short-term leverage. Models (1) and (3) analyze the influence of blockholder ownership on long-term and short-term leverages, respectively. Similarly, Models (2) and (4) analyze the influence of insider ownership on long-term leverage and short-term leverage, respectively. Models (5) and (6) analyze blockholder ownership, while (7) and (8) analyze insider ownership. Models (5) and (7) capture the influence of long-term leverage on blockholder and insider ownerships, respectively. Models (6) and (8) consider the influence of short-term leverage on blockholder and insider ownerships, respectively. Variable descriptions are provided in Table 1 (p. 16).

## 5. SUMMARY

The present study analyzes the relationship between ownership structure and capital structure of a sample of 465 Australian firms for the period 2004–10. Average total debt levels of Australian firms are approximately 16% during the study period. Of this, long-term debt accounts for nearly three-quarters or approximately

13% of average long-term debt. Leverage has increased during 2005–08 before dropping off slightly in 2009 and 2010. The global financial crisis appears to have no significant impact on the leverage levels of Australian firms. Managerial ownership in Australian firms is very small on average with less than 1%. Directors' shareholding continued at low levels through the sample period. Nearly two-thirds of ownership is held

by the top twenty shareholders on an average during the period 2004–10.

Pooled OLS analysis shows that *profitability* has a significant negative influence on both short-term and long-term leverage of Australian firms. This finding implies that firms prefer to retain earnings and reinvest in future opportunities rather than to increase the debt levels. The present study also finds evidence of negative influence of *tangibility* on both short-term and long-term debt levels. This finding implies that firms reduce their debt levels as their tangible assets increase. OLS analysis also shows that *NDTS* have a significant negative influence on long-term debt. This finding is consistent with earlier literature.

Pooled OLS analysis shows evidence of a significant non-linear relationship between ownership structure and capital structure. Blockholders have a significant positive influence on capital structure but as their shareholding increases, the impact turns negative. This result implies that blockholders prefer additional monitoring and discipline from debt when their ownership levels are low. As the blockholder ownership levels increase, however, reducing financial risk becomes more important than the disciplinary benefits additional debt may provide. Managerial ownership, on the other hand, has no influence on capital structure but has an impact on short-term debt levels. At low levels of managerial ownership, firms prefer additional short-term debt. As the managerial ownership increases, short-term debt levels decline. To examine the two-way relationship, the present study also examines the influence of leverage on managerial ownership. Though long-term leverage has a significant positive influence on blockholder ownership, this impact does not persist when other determinants of ownership such as size, growth, dividend payout and performance are considered.

Given the shortcomings of OLS analysis in terms of unobserved heterogeneity and endogeneity, the present study employs panel data analysis. Random effects instrumental variables regressions are employed to identify the true relationship between ownership structure and capital structure. Panel data analysis confirms the significant negative influence of *profitability*, *tangibility* and *NDTS* on capital structure. Similarly, panel data analysis shows that *tangibility* and growth opportunities have a significant negative influence on short-term leverage.

Panel data analysis shows no significant relationship between ownership structure and capital structure. The earlier observed relationship between blockholder ownership and capital structure is spurious and does not persist when endogeneity and unobserved heterogeneity is taken into account.

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