

## Institutional Ownership, Capital Structure and R&D Investment

Hsuehen-En Hsu

Fortune Institute of Technology

Kaohsiung

Hsuehen33@hotmail.com

**Abstract**—Research and development (R&D) is vital for IT firm's innovation. This study investigates the relationship among institutional ownership, capital structure, and R&D investment for 336 listed IT firms from 2006 to 2009 by using OLS regression model. Empirical evidence shows that there is no significant relationship between institutional ownership and R&D investment. The finding suggests that institutional investors may not influence management decision making on R&D investment. This study also finds that capital structure has a negative relationship with R&D investments. The result indicates that IT firms may use less debt when investment outcome is uncertain.

**Keywords**- *Research and Development; Institutional Ownership; Capital Structure; Information Technology component*

### I. INTRODUCTION

R&D investments make significant contributions to information technology (IT) firms (Lee & O'Neill, 2003; Noriyuki Doi, 1985). The development of IT plays a key role in Taiwan economic growth over the last decade. Since 1995, Taiwan has become the world's third-largest supplier of IT industry after the United States and Japan.

Ownership structure has been recognized as one important determinant of its R&D spending (Baysinger, Kosnik, & Turk, 1991; Lee & O'Neill, 2003). For the influence of ownership on R&D investment, some reports show that institutional investors are risk-averse and would not like to invest in R&D activities (Graves & Waddock, 1990). Others argue that institutional investors have the capability to diversify their investments and encourage the invested companies to pursue the projects with prospects (Bushee, 1998).

Capital structure (i.e., leverage) is also important for a firm to complete innovation and ensure the financial resources required to launch new products. R&D investment generally requires large amounts of capital. However, IT firms may have difficulty accessing debt markets because R&D investment is risky and cannot serve as good collateral (Simerly & Li, 2000; Vicente-Lorente, 2001).

This study investigates the relationship between the institutional ownership, capital structure, and R&D investments for 336 listed IT companies in Taiwan. I hypothesize that the institutional ownership has a positive relationship with R&D investment. Empirical results find no association between institutional ownership and R&D expenditures, suggesting that institutional investors may not

influence management decision making on R&D investment. I also hypothesize that capital structure has a negative relationship with R&D investment. Consistent with my hypothesis, an increase in R&D investment is associated with lower debt.

The rest of this paper is structured as follows. I first review theory and develop the hypotheses. The second section describes the sample data and research design. I then present the results of the tests and the primary conclusions.

### II. THEORIES AND THE DEVELOPMENT OF HYPOTHESES

#### A. Institutional Ownership And R&D Investment

Information asymmetry exists between investors and managers. Information asymmetry arises from the inability of managers to convey information and from the reluctance of investors to gather information. Institutional investors with large ownership have incentives to gather more information and reduce information asymmetry (Lee & O'Neill, 2003). Managers are hesitant to invest long term R&D because innovate projects have a high failure rate. Institutional ownership can diversify their investment portfolio to reduce R&D risk (Baysinger, Kosink, & Turk, 1991). Some studies find that the recurrent trading and short-term focus of institutional investors encourage management to engage in prejudiced investment behavior. Others argue that the large stockholdings and sophistication of institutions allow managers to focus on long-term return rather than on short-term earnings.

Jarrell and Lehn (1985) study the association between institutional ownership and R&D spending in 324 firms for the period 1980-83. They find a significantly positive relationship between the level of institutional ownership and the R&D intensity, based on OLS regression equations with dummy variables for the 19 industries.

Graves (1988) analyzes the relationship between institutional ownership and R&D spending used 10 years of data from Standard and Poor's Securities Owner's Stock Guide. The analysis results show that institutional ownership is negatively associated with R&D for the period of 1976-1985. Graves (1988) concludes that institutional ownership may continue grow and the decreased spending in R&D could seriously grind down the competitiveness of U.S. firms.

Graves (1990) describes the effect of institutional ownership on corporate R&D investment for 133 companies in six U.S. industries over the period 1965-1984. The result

shows no significant relationship between institutional ownership and R&D investment. This study does not provide support for the hypothesis that higher levels of institutional ownership result in lower levels of R&D expenditure.

Bushee (1998) examines whether institutional investors increase or reduce incentives for managers to reduce investment in R&D expenditures to meet short-term earnings. The results indicate that managers are less likely to decrease R&D to reverse an earnings decline when institutional ownership is high. The study suggests that institutions are sophisticated investors and serve a monitoring role in reducing pressures for prejudiced behavior.

Donga and Gou (2010) test the hypotheses on the relations between R&D intensity and managerial discretion of CEOs, independent directors, and managerial ownership. The results show that the discretion of CEOs has a negative correlation with the firm R&D investment. Moreover, the proportion of independent directors has a positive influence on the R&D investment.

R&D investments are risky and may induce uncertain returns. Institutional investors are diversified and they can spread R&D risk (Baysinger, Kosink, & Turk, 1991). Additionally, Institutional investors provide their opinions on corporations and influence managers' decision making. Particularly, the high levels of institutional ownership may inhibit long-term R&D investments to increase the competitiveness of I.T. firms (Chauvin & Hirsche, 1993). This expectation leads to the following hypothesis:

H1: The institutional ownership has a positive relationship with R&D investment.

#### B. Capital Structure And R&D Investment

A proper capital structure is a critical decision for any industry because an organization needs to maximize returns and deals with competitive environment (Simerly & Li, 2000). Myers and Majluf (1984) develop the pecking order theory for financing decisions. Firms finance new investments first with retained earnings, followed by debt, and finally with equity. R&D investments create intangible assets and cannot serve as good collateral (Simerly & Li, 2000; Vicente-Lorente, 2001). Therefore, Intense R&D is associated with lower leverage (Bhagat & Welch, 1995).

Bhagat and Welch (1995) explore the determinants of R&D investment for U.S., Canadian, British, European, and Japanese firms. Bhagat and Welch suggest that high-technology firms are likely to be financial distress and prefer not to presume large amounts of debt to maintain their R&D investments. They find that debt ratio is negatively correlated with R&D expenditures for U.S. firms. Nevertheless, the debt ratio is positively associated with R&D for Japanese firms.

O'Brien (2003) proposes that financial slack (i.e., lower leverage) provides lagging against cash flow fluctuation and ensures sufficient financial resources. They find that R&D intensity is negatively associated with financial leverage. This finding suggests that firms competing on innovation should choose capital structures with financial slack.

Bougheas (2004) examine the financial decisions of small firms on R&D in United States, United Kingdom and

Canada. The result indicates that high ratio of R&D investments with the high risk nature are unlikely to raise debt in external capital markets. Moreover, financing R&D with bank loans may be possible, if banks will to monitor the investment activities.

Singh and Faircloth (2005) examine the relationship between financial leverage and R&D expenditure by using a sample of large U.S. manufacturing firms. The results indicate that there is a negative relationship between financial leverage and R&D expenditure. In addition, financial leverage adversely influences future R&D investment and may in turn lead to negative impact on performance and future growth.

R&D investment generally requires large amounts of capital. However, investments in R&D create intangible assets that will likely suffer from market failure and they cannot serve as effective collateral to support a high level of debt (O'Brien, 2003; Ou & Haynes 2006). Therefore, IT firms may use less debt than other firms when innovation outcomes are uncertain. This expectation leads to the following hypothesis:

H2: The capital structure has a negative relationship with R&D investment.

### III. RESEARCH DESIGN

#### A. Sample Selection

The samples are IT firms listed on the Taiwan Stock Exchange (TSE) for the period 2006–2009. The IT firms were chosen because of its dependence on R&D for innovation (Tsai & Wang, 2004). Data are collected from a database hold by the Taiwan Economic Journal (TEJ), a leading research database in Taiwan. TEJ provides detailed company profiles and financial data of companies. The initial samples were 353 firms, which continually listed on the TSE between 2006 and 2009. The final samples consisted of 336 firms by deleting the missing observations and data retrieved.

#### B. Regression Model

The empirical model is as the following:

$$R\&D = \alpha + \beta_1 OWN + \beta_2 LEV + \beta_3 LIQ + \beta_4 FSIZE + \beta_5 SCAPI + \beta_6 PFIRM + \epsilon$$

Dependent variables: R&D investment (RD) is measured by R&D expenditures to total sales (Baysinger et al. 1991; O'Brien, 2003).

Independent variables: Institutional ownership (OWN) is measured as the percentage of the shares held by institutional investors. Leverage (LEV) represents capital structure and is measured as the ratio of total debt to total assets (Bah & Dumontier, 2001).

Several control variables are included in the model. Liquidity (LIQ) is current assets divided by total assets. Firm size (FSIZE) is controlled by using the natural logarithm of the firm's total assets to avoid the problems of extreme values. Capital intensity (CAPI) is calculated by net fixed assets to total assets. Prior firm performance (PFIRM) is measured by pre-ROA.

## IV. EMPIRICAL RESULTS

### A. Means, Standard Deviation, and Pearson Correlations

The average (Std. Deviation) of R&D ratio (RD) is 4.26 (4.67). The mean percentage of the shares held by institutional investors (OWN) is 0.36. The mean (Std. Deviation) of total debt to total assets (LEV) is about 34.31 (14.62). The model also includes control variables related to R&D investment. The average liquidity index (LIQ) is 244.23. Firm size (FSIZE), the natural log of total assets (in millions), has a mean of about 15.73, a standard deviation of 1.32. The mean firm spends about 13 of its assets on capital expenditures (CAPI) is 0.13. Finally, the average prior ROA (PFIRM) is 5.35.

The Pearson correlation analysis shows that the correlation coefficients of the independent variables are less than 0.8. The variance inflation factor (VIF) statistics for the independent variables are less than 2. These results indicate that multicollinearity does not appear to be an issue.

### B. Multiple Regression Results

Hypothesis 1 predicts a positive relationship between the institutional ownership and R&D investment. The regression model shows that there is no significant relationship between institutional ownership (OWN) and R&D investment (RD) ( $t = -0.083$ ,  $p > 0.1$ ). Therefore, Hypothesis 1 is not supported. The result is similar to Graves (1990), who find no association between institutional ownership and R&D investment.

Hypothesis 2 predicts that the capital structure has a negative relationship with R&D investment. In the model, the relationship between capital structure (LEV) and R&D investment (RD) is negatively significant ( $t = -5.718$ ,  $p < 0.01$ ). Therefore, Hypothesis 2 is supported. The result is similar to Bougheas (2004) and Singh and Faircloth (2005), who find a negative association between capital structure and R&D investment.

## V. CONCLUSIONS

This study investigates the relationship between institutional ownership, capital structure and R&D for 336 listed IT firms from 2006 to 2009 in Taiwan. The result shows that there is no significant relationship between institutional ownership and R&D investment. This is similar to Graves (1990), who finds no significant relationship between institutional ownership and R&D investment. The result suggests that institutional investors may not influence management decision making on R&D investment.

This study also finds that the capital structure has a negative relationship with R&D investment. This is similar to Bougheas (2004) and Singh and Faircloth (2005), who find a negative association between capital structure and R&D investment. The finding indicates that innovative firms will be less inclined to follow the mechanistic pecking order model and they will use equity capital instead of debt to avoid liquidity pressure. Thus, IT firms may use less debt when investment outcome is unsure.

The increasing number of institutional investors and their dominance as owners has a significant influence on corporate decisions. This study investigates whether institutional ownership as governance mechanics affects R&D activity. Future research may include other governance mechanics.

This study also examines whether firms involved in R&D activity show a specific financial behavior about their capital structures. To provide a better understanding of R&D-intensive firms' financial choices, further investigations may focus R&D and other corporate financial policy. Possible determinants would include dividend policy and cash on hand.

## REFERENCES

- [1] R. Bah and Dumontier. "R&D intensity and corporate financial policy: Some international evidence," *Journal of Business Finance & Accounting*, vol. 28, no. 5(6), 2001, pp. 671-692.
- [2] S. Bhagat and I. Welch. "Corporate research & development investments: International comparison," *Journal of Accounting and Economics*, vol. 19, 1995, pp. 443-470.
- [3] S. Bougheas. "Internal vs External Financing of R&D," *Small Business Economics*, vol. 22, 2004, pp. 11-17.
- [4] B. D. Baysinger, R. D. Kosnik and T. A. Turk. "Effects of board and ownership structure on corporate R&D strategy," *Academy of Management Journal*, vol. 34, 1991, pp. 205-214.
- [5] B. J. Bushee. "The Influence of Institutional Investor on Myopic R&D Investment Behavior," *The Accounting Review*, vol. 73(3), 1998, pp. 305-333.
- [6] K. Chauvin and W. Hirschey. "Market advertising, R&D expenditures and the market value of the firm. *Financial management*," vol. 22 (4), 1993, pp. 128-140.
- [7] J. Dong and Y. Gou. 2010. "Corporate governance structure, managerial discretion, and the R&D investment in China," *International Review of Economics and Finance*, vol. 19(2), pp. 180-188.
- [8] S. B. Graves. "Institutional ownership and corporate R&D in the computer industry," *Academy of Management Journal* 31, 1988, pp. 417-427.
- [9] S.B. Graves. "Institutional Ownership and Corporate R&D Investment: A Multi-Industry Study," *Technological Forecasting and Social Change*, vol. 37, 1990, pp. 59-61
- [10] S. A. Graves and S. Waddock. "Institutional ownership and control: Implication for long-term corporate strategy," *Academy of Management Executive*, vol. 4 (1), 1990, pp. 75-83
- [11] G. A. Jarrell and K. Lehn. "Institutional ownership, tender offers, and long-term investments," Working paper. Office of the Chief Economist, Securities and Exchange Commission, Washington, DC. 1985.
- [12] P. M. Lee and H. M. O'Neill. "Ownership structures and R&D investments of U.S. and Japanese firms: Agency and stewardship perspectives," *Academy of Management Journal*, vol. 46, 2003, pp. 212-225
- [13] S. C. Myers and N. S. Majluf, "Corporate financing and investment decisions when firms have information those investors do not have," *Journal of Financial Economics*, vol. 13, 1984, pp. 187-221.
- [14] D. Noriyuki. "Diversification and R & D activity in Japanese manufacturing firms," *Managerial and Decision Economics*, vol. 6(3): 1985, pp. 147-152.
- [15] C. Ou and G. W. Haynes. "Acquisition of additional equity capital by small firms-findings from the National Survey of Small Business," *Financial Small Business Economics*, vol. 27, 2006, pp. 157-168.
- [16] J. P. O'Brien. "The capital structure implications of pursuing a strategy of innovation," *Strategic Management Journal*, vol. 24(5), 2003, pp. 415-431.

- [17] R.L.Simerly and M. Li. "Environmental dynamism, capital structure and performance: a theoretical integration and an empirical test," *Strategic Management Journal*, vol. 21(1), 2000,31-49
- [18] M. Singh and S. Faircloth. "The impact of corporate debt on long term investment and firm performance," *Applied Economics*, vol. 37, 2005, pp. 875–883.
- [19] K. H. Tsai, and J. C. Wang. "The R&D performance in Taiwan's electronics industry: A longitudinal examination," *R&D Management*, vol. 34,2004,179–189.
- [20] J.D Vincente-Lorente. "Specificity and opacity as resource-based determinants of capital structure: evidence for Spanish manufacturing firms," *Strategic Management Journal*, vol. 22(2),2001,pp.157-177.