

THE MODERATING EFFECTS OF LEVERAGE AND OWNERSHIP STRUCTURE ON FIRM PERFORMANCE

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ABSTRACT

This study investigates the effects of leverage and ownership structure as moderating effects between R&D expenditures and firm performance. Leverage is important for a firm to complete innovation and ensure the financial resources required to launch new products. Ownership structure has the capability to diversify their investments and encourage the invested companies to pursue the projects with prospects. The results indicate leverage and ownership structure moderated R&D expenditures and financial leverage based 336 information technology firms. A noteworthy result is that ownership structure has a positive effect on R&D-performance relationship. However, leverage has a negative effect on the relationship between R&D and firm performance.

Keywords: leverage, ownership structure, firm performance

INTRODUCTION

R&D expenditures create intangible assets and cannot serve as good collateral (Simerly & Li, 2000; Vincente-Lorente, 2001). Information technology firms may use less debt than other firms when innovation outcomes are uncertain. Bhagat and Welch (1995) identified R&D investments are associated with lower leverage. 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. Ownership structure can diversify their investment portfolio to reduce the R&D risk (Baysinger, Kosink, & Turk, 1991).

This study contributes to the literature about the relationship between R&D and performance and has policy implication for practitioners. The results indicate that R&D investment affects performance, but the affects are moderated by leverage and ownership structure. The findings also help practitioners to realize that ownership structure monitor manager's R&D investment to increase performance, but leverage might work against performance.

The Moderating Effect Of Leverage On Firm Performance

Research has suggested that high-technology firms prefer not to presume large amounts of debt to maintain their R&D investments. Bhagat and Welch (1995) show that debt ratio is negatively correlated with R&D expenditures for U.S. firms. O'Brien (2003) finds that R&D intensity is negatively associated with leverage. This finding suggests that firms competing on innovation should choose capital structures with lower financial leverage. Bougheas (2004) explores the financial decisions of small firms on R&D investments and indicates that high ratio of R&D with the high risk nature are unlikely to raise debt in external capital markets. Singh and Faircloth (2005) find a negative relationship between R&D expenditures and leverage for large U.S. manufacturing firms.

R&D expenditures generally need large amounts of funds. Nevertheless, investments in R&D create intangible assets that will likely suffer from market failure. Ou and Haynes (2006) identified that R&D cannot serve as effective collateral to support a high level of debt. Moreover, leverage adversely influences future R&D investments and may in turn lead to a negative impact on performance and future growth. Thus, this study expects that the leverage would affect the relationship between R&D investments and firm performance.

Hypothesis 1: The leverage moderates the influences of R&D investments on firm performance.

THE MODERATING EFFECT OF OWNERSHIP STRUCTURE ON FIRM PERFORMANCE

Studies have found that investors with large ownership serve a monitoring role in reducing manager's prejudiced behavior. The sophistication of ownership structure allows managers to focus on long-term return rather than on short-term earnings. For example, Jarrell and Lehn (1985) find a significantly positive relationship between the R&D investments and the level of ownership structure for the period 1980-83. Bushee (1998) indicates that managers are less likely to decrease R&D to reverse an earnings decline.

Others argue that that the recurrent trading and short-term focus of institutional investors encourage management to engage in prejudiced investment behavior. Graves (1988) demonstrates that ownership structure may continue grow and the decreased spending in R&D could seriously grind down the competitiveness of U.S. firms. Graves (1990) investigates the effect of institutional ownership on corporate R&D investments for 133 companies in six U.S. industries. The result indicates no significant relationship between institutional ownership and R&D investments.

R&D expenditures are hazardous and may result in unsure returns. Investors with large ownership provide their views on corporations and influence managers' strategy-making. Chauvin and Hirschey (1993) confirm that ownership structure may allow long-term R&D investments to increase the competitiveness of I.T. firms and led them to generate profits. Thus, this study expects that ownership structure would affect the relationship between R&D expenditures and firm performance.

Hypothesis 2: The ownership structure moderates the influences of R&D expenditures on firm performance.

METHODOLOGY

Data are collected from a database hold by the Taiwan Economic Journal (TEJ). TEJ provides detailed company profiles and financial data of companies. The samples are information technology firms listed on the TEJ for the period 2006–2009. The initial samples were 353 firms and the final samples consisted of 336 firms by deleting the missing observations and data retrieved.

The empirical model is as the following:

Model 1:

$$PFIRM = \alpha + \beta_1 RD + \beta_2 RD * LEV + \beta_3 OWN + \beta_4 LIQ + \beta_5 FSIZE + \beta_6 CAPI + \epsilon$$

Model 2:

$$PFIRM = \alpha + \beta_1 RD + \beta_2 RD * OWN + \beta_3 LEV + \beta_4 LIQ + \beta_5 FSIZE + \beta_6 CAPI + \epsilon$$

Dependent variables:

Firm performance (PFIRM) is measured by pre-ROA.

Independent variables:

R&D expenditures (RD) is measured by R&D expenditures to total sales (Baysinger et al., 1991). Leverage (LEV) is measured as the ratio of total debt to total assets (Bah & Dumontier, 2001).

Ownership structure (OWN) is measured as the percentage of the shares held by institutional investors.

Control variables:

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.

EMPIRICAL RESULTS

The means, standard deviation, and Pearson correlations among the variable used in the analysis. The average pre-ROA (PFIRM) is 5.35. The average pre-ROA (PFIRM) is 5.35. 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.

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.

Hypothesis 1 predicts that the leverage moderates the influences of R&D on firm performance. In Table 1, model 1 shows that the leverage affect the relationship between R&D investments and firm performance ($t = -6.206, P < 0.01$). Therefore, Hypothesis 1 is supported.

Hypothesis 2 predicts that the ownership structure moderates the influences of R&D expenditures on firm performance. In Table 2, model 2 shows that the ownership structure significantly affect the relationship between R&D expenditures and firm performance ($t = 5.172, P < 0.01$). Therefore, Hypothesis 2 is supported.

Table 1: Regression result between leverage and performance

Independent Variables	PFIRM (Model1)
(Constant)	-4.692 (-0.894)
RD	0.775*** (5.288)
RD * LEV	-0.03*** (-6.206)
OWN	9.561*** (4.697)
LIQ	0.003 (1.501)
FSIZE	0.460 (1.326)
CAPI	-8.586*** (-2.745)
Observations	336
Adjusted R ²	0.234
P-value of F-test	.000

***Significant at 0.01 level. ** Significant at 0.05 level. * Significant at 0.1 level.

t statistic is in parentheses.

PFIRM = pre- ROA

RD = R&D expenditures to total sales

LEV = the ratio of long-term debt to total assets.

OWN = the percentage of the shares held by institutional investors

LIQ = current assets divided by total assets

FSIZE= the natural log of total assets.

CAPI = the ratio of net fixed assets to total assets.

Table 2: Regression result between ownership structure and performance

Independent Variables	PFIRM(Model 2)
(Constant)	-0.048 (-0.009)
RD	0.785*** (-5.436)
RD * OWN	1.886*** (5.172)
LEV	-0.215*** (-7.399)
LIQ	0.002 (0.968)
FSIZE	0.9** (2.888)
CAPI	-9.788** (-3.236)
Observations	336
Adjusted R ²	0.278
P-value of F-test	.000

***Significant at 0.01 level. ** Significant at 0.05 level. * Significant at 0.1 level.

t statistic is in parentheses.

PFIRM = pre- ROA

RD = R&D expenditures to total sales

OWN = the percentage of the shares held by institutional investors

LEV = the ratio of long-term debt to total assets.

LIQ = current assets divided by total assets

FSIZE= the natural log of total assets.

CAPI = the ratio of net fixed assets to total assets.

CONCLUSIONS

This study investigates the effects of leverage and ownership structure as moderating effects between R&D expenditures and firm performance. Leverage is important for a firm to complete innovation and ensure the financial resources required to launch new products. Ownership structure has the capability to diversify their investments and encourage the invested companies to pursue the projects with prospects.

This study addresses that the leverage has a negative effect on the relationship between R&D and performance. The finding indicates that increasing debts in R&D investments will increase debt holder's influence, which might impede management's choices and therefore decrease firm performance. Thus, IT firms may use less debt when investment outcome is unsure. This study also finds the moderating factors such as ownership structure when investigating the effects of R&D on performance. The result shows that the ownership structure positively affect the relationship between R&D expenditures and firm performance. This finding suggests that ownership structure as governance mechanism influence management decision- making on R&D investment and therefore improve performance.

This study makes contributions to literature for its advancing knowledge and implications of the empirical evidences in the context of the moderating effects of institutional ownership and financial leverage in the IT industry. Further research may focus other determinants such dividend policy and cash on hand.

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