

## MANAGERIAL OWNERSHIP, CAPITAL EXPENDITURES, AND FIRM PERFORMANCE: EVIDENCE FROM THE TAIWAN STOCK EXCHANGE

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### Abstract

This paper examines the relationship among managerial ownership, capital expenditures and firm performance using data of 359 firms listed on the Taiwan Stock Exchange over the period 1998-2005. The empirical results indicate a concave relationship between managerial ownership and future firm performance and a positive relationship between managerial ownership and capital expenditures. Moreover, for firms with larger capital expenditures, the interactive effect of managerial ownership and capital expenditures is significantly positively related to firm performance.

**Keywords:** managerial ownership, capital expenditures, firm performance

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### 1. Introduction

The objective of this paper is to examine the relationship among managerial ownership, capital expenditures and firm performance. First, we examine the relationship between managerial ownership and firm performance. Then, we examine how managerial ownership affects firm performance through firms' decision on capital expenditures.

The issues of how managerial ownership, capital expenditures and firm performance are related are important for several reasons. Although previous research on the relationship between managerial ownership and firm performance is extensive, empirical evidence varies greatly. One reason for the mixed results is that ownership structure differs a lot from country to country. Thus, further evidence from an emerging market such as the Taiwan stock market will enhance our understanding of how managerial ownership affects firm performance. Moreover, less research has addressed the issue of how managerial ownership affects firm performance through capital expenditures. Since firm value can be enhanced through the adoption of value-maximizing capital projects, the role of managerial ownership on capital expenditures decisions provides important insight regarding how managers enhance firm value through investing in capital projects.

The issue of how managerial ownership affects firm performance has attracted much attention among academicians and practitioners. Two hypotheses have been proposed. On the one hand, the incentive hypothesis proposes a positive association between

managerial ownership and firm performance. Jensen and Meckling (1976) suggest that the separation of ownership and control rights results in potential conflicts of interest between managers and shareholders. As managerial ownership increases, the potential agency costs between incumbent management and outside shareholders tend to reduce. Thus, an increase in managerial ownership provides incentives for managers to reduce the potential agency costs. As a result, firm value is enhanced with higher managerial ownership.

On the other hand, the entrenchment hypothesis proposes that an increase in managerial ownership may lead incumbent managers with control rights to protect their self interest. For example, managers might design a favorable compensation system to protect their own job security, or undertake projects that benefit themselves rather than maximize the wealth of outsider shareholders. Managers with control rights may also block tender offers that benefit existing shareholders with a higher market premium. Thus, the entrenchment effect of managerial ownership leads to lower firm value as managerial ownership exceeds a certain level. Stulz (1988) analyzes the entrenchment costs of manager ownership due to managers' ability to block value-enhancing takeovers. According to the entrenchment hypothesis, an increase in managerial ownership has a negative impact on firm value when managerial ownership and control increases above a certain level. When both incentive benefits and entrenchment costs of managerial ownership exist, the relationship between managerial ownership and firm value may be a concave pattern. That is, at first firm

performance improves with higher managerial ownership until managerial ownership reaches an optimal level. As managerial ownership exceeds this optimal level, managers become entrenched and tend to pursue private interests at the expenses of outside shareholders. Morck, Shleifer, and Vishny (1988) examine the concave relationship between management ownership and market valuation of the firm. Measuring firm performance by Tobin's  $Q$  for 371 Fortune 500 firms, Morck, Shleifer, and Vishny (1988) document an inverse U-shaped relationship between managerial equity ownership and firm valuation. Their empirical evidence supports the concave relationship between managerial ownership and firm performance. Similarly, McConnell and Servaes (1990) find significantly, curvilinear relationships between insider ownership and firm performance. And Claessens et al. (2002) find evidence in favor of both incentive and entrenchment effects. However, the effects of ownership on firm performance are not conclusive and may be affected by the business environment in different countries. Thomsen and Pedersen (1996) find that the ownership of the one hundred largest firms in six European countries is affected by the firm's country, industry, and size. Moreover, Seifert, Gonenc, and Wright (2005) find that the effect of ownership on firm performance depends very much on local laws or the business environment. Their results indicate the impact of insider ownership on firm performance is negative for firms in the U.S. and the U.K. but positive for firms in Germany and Japan. Similarly, Gorton and Schmid (2000) find a positive relationship between insider ownership and firm value using data from Germany, while Short and Keasey (1999) document a negative effect of ownership on firm value in U.K.

Moreover, managerial ownership may affect firm performance through their decision on capital expenditures. Two hypotheses have been offered regarding managers' decision on capital expenditures. The information asymmetry hypothesis (see, for example, Myers (1984) and Myers and Majluf (1984)) suggests that managers have inside information that outside investors do not have. As a result, external financing sources would be more expensive than internal sources. The information asymmetry leads managers to under-invest due to the financial constraints of internal cash flow. In contrast, the agency cost hypothesis proposes that managers with a small ownership may undertake a level of capital expenditures more than what is optimal for the wealth of outside shareholders.

Griner and Gordon (1995) examine whether managers make capital expenditures to maximize their own interest or to maximize firm value. Examine a subset of Fortune 500 firms over the years 1985-88, Griner and Gordon (1995) document a significantly positive association between capital expenditures and

internal cash flow. In contrast, the association between capital expenditures and managerial ownership is not significant. Their empirical results support the incentive hypothesis in that managers choose the level of capital expenditures to maximize firm value.

Similarly, McConnell and Muscarella (1985) examine the common stock prices for a sample of 658 corporations around the dates on which they announced their future capital expenditure plans. For industrial firms, announcements of increased capital expenditures are associated with significant positive excess stock returns. The results are consistent with the hypothesis that managers seek to maximize the firm value in making their capital expenditure decisions.

However, empirical evidence on the effects of capital expenditures on firm value is mixed. Seifert, Gonenc, and Wright (2005) find that capital expenditures have a positive effect on firm performance in the U.S. and the U.K. but an insignificant effect in Germany and Japan. Similarly, Wei and Zhang (2008) document empirical evidence in favor of the over-investment hypothesis by managers. They find that too much free cash flow in the hands of entrenched managers leads to over-investment.

## **2. Sample and Methodology**

To examine the relationship among managerial ownership, capital expenditures, and firm performance, sample firms listed on the Taiwan Stock Exchange were collected over the eight-year sample period 1998-2005. Data on managerial ownership, capital expenditures, and financial performance were collected. A total of 359 firms satisfy the screening process. Managerial ownership involves both board members and top executives. Capital expenditures are measured as the ratio of capital expenditures divided by the total assets. Firm performance is measured by the market-to-book ratio. The sample period is divided into two four-year sub-periods: the formation period from 1998-2001 and the holding period from 2002-2005. Since it generally takes several years for capital projects to generate profits, the division of the sample period allows an analysis of how capital expenditures in the first sub-period (the formation period) affect the performance in the second sub-period (the holding period).

Our analysis focuses on the following issues: (1) the effects of managerial ownership on subsequent firm performance, (2) the effects of managerial ownership on capital expenditures, (3) the effects of capital expenditures on subsequent firm performance, and (4) the role of managerial ownership on the relationship between capital expenditures and firm performance. To address these issues, both the grouping method and the regression analysis are

conducted. The grouping method involves sorting sample firms into eight portfolios each year in the formation period according to the explanatory variable and then the trend of the dependent variable in the holding period is examined. The regression analysis provides a multivariate analysis of the relationship between the dependent variable and explanatory variables. To analyze the effects of managerial ownership on future firm performance, the following equations are estimated:

$$M/B_{02-05} = \beta_0 + \beta_1 \text{Own}_{98-01} + \beta_2 M/B_{98-01} \quad (1)$$

$$M/B_{02-05} = \beta_0 + \beta_1 \text{Own}_{98-01} + \beta_2 \text{OwnSqr}_{98-01} + \beta_3 M/B_{98-01} \quad (2)$$

where,

$M/B_{98-01}$  = the market-to-book ratio measured over the formation period 1998-2001;

$M/B_{02-05}$  = the market-to-book ratio measured over the holding period 2002-2005;

$\text{Own}_{98-01}$  = the managerial ownership measured over the formation period 1998-2001;

$\text{OwnSqr}_{98-01}$  = the squared managerial ownership measured over the formation period 1998-2001.

The first regression assesses the impact of managerial ownership in the formation period on firm performance in the holding period. In the regression, the formation period market-to-book ratio,  $M/B_{98-01}$ , is added as the control factor. Thus, the regression examines the additional impact that managerial ownership in the formation period has on firm performance in the holding period. The second regression examines whether the relationship between managerial ownership on firm performance is monotonic or curvilinear. To examine the effects of managerial ownership on capital expenditures, we focus on the association between ownership and capital expenditures in the formation period. The following regressions are estimated:

$$\text{CapExp}_{98-01} = \beta_0 + \beta_1 \text{Own}_{98-01} + \beta_2 M/B_{98-01} \quad (3)$$

where,  $\text{CapExp}_{98-01}$  is the capital expenditures ratio measured over the formation period 1998-2001.

To examine the effects of capital expenditures on subsequent firm performance, the following regressions are first estimated for the whole 359 sample firms:

$$M/B_{02-05} = \beta_0 + \beta_1 \text{CapExp}_{98-01} \quad (4)$$

$$M/B_{02-05} = \beta_0 + \beta_1 \text{CapExp}_{98-01} + \beta_2 M/B_{98-01} \quad (5-7)$$

Then, the regressions are estimated for sub-samples with higher and lower capital expenditures ratios respectively. To do this, firms are sorted into two halves according to capital expenditures ratio. Firms with a higher capital expenditures ratio are considered to have a higher operating leverage. The effects of a higher operating leverage on firm performance would be positive if the subsequent market conditions turn out to be favorable. In contrast, the effects of a higher operating leverage on firm performance would be negative if the

subsequent market conditions turn out to be unfavorable. That is, we would expect the impact of capital expenditures on firm performance to depend on future market conditions. Moreover, we would expect the impact of capital expenditures on future firm performance to be more sensitive to future market conditions for firms with a higher operating leverage than firms with a lower operating leverage.

Finally, we examine the role of managerial ownership on the relationship between capital expenditures and firm performance by examining the interactive term between ownership and capital expenditures,  $\text{CapExp}_{98-01} * \text{OwnDummy}_{98-01}$ , in the following regressions.

$$M/B_{02-05} = \beta_0 + \beta_1 \text{CapExp}_{98-01} + \beta_2 \text{Own}_{98-01} + \beta_3 \text{OwnSqr}_{98-01} + \beta_4 \text{CapExp}_{98-01} * \text{OwnDummy}_{98-01} + \beta_5 M/B_{98-01} \quad (8-10)$$

where  $\text{OwnDummy}_{98-01}$  is a dummy variable that assumes a value of zero if the managerial ownership in the formation period 1998-2001 is in the lower half among all sample firms, and assume a value of one if the managerial ownership is in the upper half among all sample firms. This regression examines whether a higher level of managerial ownership interacts with capital expenditures in affecting firm performance. If higher managerial ownership contributes to higher firm performance through interaction with capital expenditures, we would expect a positive coefficient on the interactive term,  $\text{CapExp}_{98-01} * \text{OwnDummy}_{98-01}$ .

### 3. Empirical results

#### 3.1. Summary statistics of ownership, capital expenditures, and performance

Table 1 reports summary statistics of managerial ownership, capital expenditures, and firm performance for 359 sample firms over the period 1998-2005. Over the portfolio formation period 1998-2001, Panel A of Table 1 indicates that the average managerial ownership (board members and top executives) is 25.44%, ranging from a minimum level of 2.66% to a maximum level of 72.32%. The corresponding capital expenditures ratio (capital expenditures/total assets) is 4.67% ranging from a minimum of 0.01% to a maximum of 31.43%. The average firm performance, measured as the ratio of market-to-book ratio is 1.50 in the formation period 1998-2001 and 1.17 in the holding period 2002-2005. The relatively lower market-to-book ratio in the holding period reflects the declining market conditions following the collapse of the internet bubble in 2000. Panel B and Panel C of Table 1 report the average market-to-book ratios for each year in the sample period. For the formation period 1998-2001, the average market-to-book ratio declines from 2.05 in 1998 to 0.96 in 2000. In comparison, for the holding period, the average market-to-book ratio recovers from 1.07 in 2002 to 1.23 in 2004.

### 3.2 Effects of managerial ownership on firm performance

Table 2 reports empirical results for the association between managerial ownership and firm performance. Panel A of Table 2 reports firm performance in the holding period for portfolios formed on the basis of managerial ownership in the formation period 1998-2001. When managerial ownership increases from 9.13% for the first portfolio to 50.24% for the last portfolio, the corresponding market-to-book ratio increases from 0.86 for the first portfolio to 1.34 for the fifth portfolio and then falls back to 1.17 for the last portfolio. Thus, firm performance appears to be positively associated with managerial ownership although the relationship is concave. Panel B of Table 2 reports regression results of firm performance against managerial ownership. In the first regression, the coefficient for the managerial ownership,  $Own_{98-01}$ , is 0.005 with a t-statistic of 2.58. Thus, managerial ownership is positively related to firm performance. Moreover, when the squared managerial ownership,  $OwnSqr_{98-01}$ , is added into the explanatory variables, the results indicate a negative coefficient of -0.0002 with a t-statistic of -1.73 for the squared managerial ownership. The results support a concave association between managerial ownership and subsequent firm performance.

### 3.3 Effects of managerial ownership on capital expenditures

Table 3 reports the association between managerial ownership and capital expenditures in the formation period. Panel A of Table 3 indicates a positive association between managerial ownership and capital expenditures in the formation period. As the managerial ownership increases from 9.13% for the first portfolio to 50.24% for the last portfolio, the corresponding capital expenditures ratio increases from 3.79% to 6.98%. Moreover, the regression result in Panel B of Table 3 indicates a significant positive relation between managerial ownership and capital expenditures. The coefficient for the managerial ownership is 0.05 with a t-value of 2.60. The results suggest that firms with a higher level of managerial ownership tend to spend more capital expenditures in the formation period.

### 3.4 Effects of capital expenditures on firm performance

Table 4 reports empirical results on the effects of capital expenditures and subsequent firm performance. Panel A of Table 4 reports firm performance for portfolios sorted by capital expenditures ratio. As the capital expenditures ratio increases from 0.38% for the first portfolio to 14.74% for the last portfolio, the

corresponding market-to-book ratio increases from 1.0 to 1.19. At a first glance, capital expenditures may appear to be positively related to subsequent firm performance. However, Panel B of Table 4 indicates that the coefficient on capital expenditures is only insignificantly positive at 0.008 with a t-value of 1.13. Moreover, when the control variable of the formation-period market-to-book ratio is added, the coefficient on the capital expenditures is in fact negative at -0.01 with a t-value of -1.82. Thus, contrary to our expectation, an increase in capital expenditures is related to a lower subsequent firm performance.

One plausible explanation is that a higher level of capital expenditures is typically related to a higher level of fixed costs and hence a higher operating leverage. A higher level of operating leverage contributes to firm performance only when future market condition is favorable. When future market condition turns out to be unfavorable, a higher level of operating leverage may actually diminish firm value. Since market conditions in the holding period 2002-2005 turns out to be worse than those in the formation period 1998-2001 as can be seen in Panels B and C in Table 1, the negative impact of capital expenditures on firm performance may be due to the adverse impact of higher operating leverage under unfavorable market conditions. To examine this possibility, we partition sample firms into two halves according to capital expenditures ratio and re-estimate the regression for each sub-sample. Panel C of Table 4 indicates that, for the first sub-sample with lower capital expenditures, the effect of capital expenditures on firm value is close to zero. In contrast, for the second sub-sample with higher capital expenditures, the impact of capital expenditures on subsequent firm performance is much more negative. The coefficient is -0.009 with a t-value of -1.08. Thus, although the coefficient is not statistically significant, the estimated regression results are consistent with the notion that larger capital expenditures diminish firm value when market conditions are unfavorable.

### 3.5 Effects of managerial ownership on the relationship between capital expenditures and firm performance

Table 5 reports regression results for the role of managerial ownership on the relationship between capital expenditures and firm performance. In particular, we focus on the effect of the interactive term between managerial ownership and capital expenditures on subsequent firm performance. The dummy variable for managerial ownership,  $OwnDummy$ , assumes a value of zero if the managerial ownership is in the lower half among all sample firms and a value of one if the managerial ownership is in the upper half of all sample firms. If

higher managerial ownership contributes to firm performance through its interaction with capital expenditures, we would expect a positive coefficient on the interactive term. Panel A of Table 5 indicates that the coefficient on the interactive term is positive at 0.01 with a t-value of 1.10. Thus, the empirical results indicate that a higher managerial ownership is positively related to subsequent firm value through its interaction with capital expenditures although the interactive effect is not statistically significant.

To further examine the role of managerial ownership on the association between capital expenditures and firm performance, we divide the sample into two halves by capital expenditures ratio. Panel B of Table 5 indicates that, for the sub-sample with lower capital expenditures, the interactive effect of managerial ownership and capital expenditures is insignificant different from zero. This result suggests that the interactive effect is not important for firms with smaller capital expenditures. However, for the sub-sample with higher capital expenditures, Panel C of Table 5 indicates that the interactive effect is significant. The estimated coefficient on the interactive term is 0.03 with a t-value of 2.01. The results from Panels B and C of Table 5 suggest that for firms with low capital expenditures, the impact of managerial ownership is not significant. However, for firms with large capital expenditures, managerial ownership is an important moderating factor. For these firms with larger capital expenditures, a higher level of managerial ownership contributes to higher firm performance through its interaction with capital expenditures.

#### 4. Conclusion

This paper examines the relationship among managerial ownership, capital expenditures and firm performance. Using data of 359 firms from the Taiwan Stock Exchange over the eight-year period 1998-2005, we find that managerial ownership is positively related to future firm performance. Moreover, the relationship is concave rather than monotonic. That is, as managerial ownership increases, firm performance begins to improve until reaching a certain level. Beyond that level, firm performance begins to decline as managerial ownership increases. This pattern is consistent with the hypotheses of both an enhancement effect and an entrenchment effect of managerial ownership.

Moreover, the empirical results indicate a positive relationship between managerial ownership and capital expenditures in the formation period. However, capital expenditures are not positively related to future firm performance especially for firms with larger capital expenditures. The negative relationship between capital expenditures and firm performance for firms with larger capital expenditures reflects the negative

impact of higher operating leverage under unfavorable market conditions. Finally, the empirical results indicate that, for firms with larger capital expenditures, the interaction between managerial ownership and capital expenditures contributes to higher firm performance.

#### References

1. Cho, M. (1998), "Ownership structure, investment, and corporate value: An empirical analysis", *Journal of Financial Economics*, 47, 103-121.
2. Claessens, S., S. Djankov, S. Fan, and L. Lang, (2002), "Disentangling the incentive and entrenchment effects of large shareholders", *Journal of Finance*, 57, 2741-2771.
3. Demestz, H. and B. Villalonga, (2001), "Ownership structure and corporate performance", *Journal of Corporate Finance*, 7, 209-33.
4. Griner, E. and L. Gordon, (1995), "Internal cash flow, insider ownership, and capital expenditures: a test of the pecking order and managerial hypotheses", *Journal of Business Finance & Accounting*, 22(2), March, 179-199.
5. Gorton, G. and F. Schmid, (2000), "Universal banking and the performance of German firms", *Journal of Financial Economics*, 58, 29-80.
6. Hadlock, C. (1998), "Ownership, liquidity, and investment", *RAND Journal of Economics*, 29, 487-508.
7. Jensen, M. C., and W. H. Meckling, (1976), "Theory of the firm: managerial behavior, agency cost and ownership structure", *Journal of Financial Economics*, 3, pp.305-360.
8. Loderer, C. and K. Martin (1997), "Executive stock ownership and market valuation: An empirical analysis", *Journal of Financial Economics*, 45, 223-255.
9. McConnell, J. and C. Muscarella, (1985) "Corporate capital expenditures decisions and the market value of the firm", *Journal of Financial Economics*, 14, m399-422.
10. McConnell, J. and H. Servaes, (1990), "Additional evidence on equity ownership and corporate value", *Journal of Financial Economics*, 27, 595-612.
11. Minguez-Vera, A. and J. Martin-Ugedo, (2007) "", *International review of Financial Analysis*, 16, 81-98.
12. Morck, R., A. Shleifer, and R. W. Vishny (1988), "Management ownership and market valuation: an empirical analysis", *Journal of Financial Economics*, 20, pp.293-315.
13. Myers, S. (1984), "The capital structure puzzle", *Journal of Finance*, 39, 575-592.
14. Myers, S. and N. Majluf, (1984), "Corporate financing and investment decisions when firms have information but investors do not have", *Journal of Financial Economics*, 13, 187-221.
15. Seifert, B., H. Gonenc, and J. Wright, (2005), "The

- international evidence on performance and equity ownership by insiders, blockholders, and institutions”, *Journal of Multinational Financial Management*, 15, 171-191.
16. Short, H. and K. Keasey, (1999), “Managerial ownership and the performance of firms: evidence from the U.K.”, *Journal of Corporate Finance*, 5, 79-101.
17. Stulz, Rene. (1988), “Managerial control of voting rights: Financing policies and the market for corporate control”, *Journal of Financial Economics*, 20, 25-54.
18. Thomsen, S. and T. Pedersen, (1996), “Nationality and ownership structures: the 100 largest companies in six European nations”, *Management International Review*, 36, 149-166.
19. Wei, J. and Y. Zhang, (2008), “Ownership structure, cash flow, and capital investment: Evidence from East Asian economies before the financial crisis”, *Journal of Corporate Finance*, forthcoming.

**Appendices**

**Table 1.** Statistics of managerial ownership, capital expenditures and market-to-book ratios for the whole 359 sample firms in the sample period 1998-2005

<b>Panel A</b>	Firms	Mean	Std	Min	Max
Managerial ownership (1998-2001, in %)	359	25.44	13.09	2.66	72.32
Capital expenditures ratio (1998-2001, in %)	359	4.67	4.64	0.01	31.43
Market-to-book ratio (1998-01)	359	1.50	1.14	0.28	6.92
Market-to-book ratio (2002-05)	359	1.17	0.63	0.36	3.98

**Panel B.** Yearly market-to-book ratios in the formation period 1998-2001

	1998	1999	2000	2001	Average
Market value /book value	2.05	1.90	0.96	1.08	1.50

**Panel C.** Yearly market-to-book ratios in the holding period 2002-2005

	2002	2003	2004	2005	Average
Market value /book value	1.07	1.26	1.23	1.13	1.17

**Table 2.** Effects of managerial ownership on firm performance for 359 samples

**Panel A.** Firm performance for portfolios sorted by managerial ownership

Variables	Portfolios								
	1 (smallest)	2	3	4	5	6	7	8 (largest)	All
Managerial ownership (1998-2001, in %)	9.13	13.1	16.39	20.97	26.05	30.94	37.21	50.24	25.44
Market/book ratio (2002-2005)	0.86	1.01	1.10	1.06	1.34	1.26	1.49	1.27	1.17

**Panel B.** Effects of managerial ownership on firm performance

Regression	Dependent variable	Explanatory variables				
		Intercept	Own <sub>98-01</sub>	OwnSqr <sub>98-01</sub>	M/B <sub>98-01</sub>	R <sup>2</sup>
(1)	M/B <sub>02-05</sub>	0.56 <sup>a</sup> (8.89)	0.005 <sup>a</sup> (2.58)		0.31 <sup>a</sup> (13.07)	0.36
(2)	M/B <sub>02-05</sub>	0.41 <sup>a</sup> (3.83)	0.018 <sup>b</sup> (2.36)	-0.0002 <sup>c</sup> (-1.73)	0.31 <sup>a</sup> (12.88)	0.37

M/B<sub>98-01</sub> is the average market-to-book ratio over the formation period 1998-2001.  
M/B<sub>02-05</sub> is the average market-to-book ratio over the holding period 2002-05.  
Own<sub>98-01</sub> is the average managerial ownership in the formation period 1998-01.  
OwnSqr<sub>98-01</sub> is the average squared managerial ownership in the formation period 1998-01.  
Superscripts a, b, and c indicate significance at the 0.01, 0.05, 0.1 level.

**Table 3.** Effects of managerial ownership on capital expenditures for 359 samples

**Panel A.** Capital expenditures for portfolios sorted by managerial ownership

Variables	Portfolios								
	1 (smallest)	2	3	4	5	6	7	8 (largest)	All
Managerial ownership (1998-2001, in %)	9.13	13.1	16.39	20.97	26.05	30.94	37.21	50.24	25.44
Capital Exp ratio (1998-2001, in %)	3.79	3.32	4.60	4.74	4.57	4.54	4.88	6.98	4.67

**Panel B.** Effects of managerial ownership on capital expenditures

Regression	Dependent variable	Explanatory variables				
		Intercept	Own <sub>98-01</sub>	OwnSqr <sub>98-01</sub>	M/B <sub>98-01</sub>	R <sup>2</sup>
(3)	CapExp <sub>98-01</sub>	2.23 <sup>a</sup> (3.98)	0.05 <sup>a</sup> (2.60)		0.81 <sup>a</sup> (3.79)	0.07

CapExp<sub>98-01</sub> is the average capital expenditures in the formation period 1998-01.  
Ownpnt<sub>98-01</sub> is the average managerial ownership in the formation period 1998-01.  
Ownsqr<sub>98-01</sub> is the average squared managerial ownership in the formation period 1998-01.  
M/B<sub>98-01</sub> is the average market-to-book ratio over the formation period 1998-2001.  
Superscripts a, b, and c indicate significance at the 0.01, 0.05, 0.1 level.

**Table 4.** Effects of capital expenditures on firm performance for 359 samples

**Panel A.** Firm performance for portfolios sorted by capital expenditures

Variables	Portfolios								
	1 (smallest)	2	3	4	5	6	7	8 (largest)	All
Capital Exp ratio (1998-2001, in %)	0.38	1.12	2.0	2.74	3.74	5.13	7.74	14.74	4.67
Market/book ratio (2002-2005)	1.0	1.17	1.21	1.2	1.11	1.19	1.32	1.19	1.17

**Panel B.** Effects of capital expenditures on firm performance based on the whole 359 sample firms

Regression	Dependent variable	Explanatory variables			
		Intercept	CapExp <sub>98-01</sub>	M/B <sub>98-01</sub>	R <sup>2</sup>
(4)	M/B <sub>02-05</sub>	1.13 <sup>a</sup> (23.9)	0.008 (1.13)		0.004

(5)	M/B <sub>02-05</sub>	0.72 <sup>a</sup> (14.8)	-0.01 <sup>b</sup> (-1.82)	0.34 <sup>a</sup> (13.95)	0.36
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**Panel C.** Effects of capital expenditures on firm performance based on the 179 sample firms with lower capital expenditures

Regression	Dependent variable	Explanatory variables			
		Intercept	CapExp <sub>98-01</sub>	M/B <sub>98-01</sub>	R <sup>2</sup>
(6)	M/B <sub>02-05</sub>	0.62 <sup>a</sup> (7.32)	0.0008 (0.02)	0.40 <sup>a</sup> (10.9)	0.41

**Panel D.** Effects of capital expenditures on firm performance based on the 180 sample firms with higher capital expenditures

Regression	Dependent Variable	Explanatory variables			R <sup>2</sup>
		Intercept	Invm <sub>98-01</sub>	M/B <sub>98-01</sub>	
(7)	M/B <sub>02-05</sub>	0.79 <sup>a</sup> (9.30)	-0.009 (-1.08)	0.29 <sup>a</sup> (9.02)	0.32

**Table 5.** Effects of managerial ownership on the relationship between capital expenditures and firm performance

**Panel A.** Interaction effects of managerial ownership and capital expenditures on firm performance based on the whole 359 sample firms

Regression	Dependent Variable	Explanatory variables						R <sup>2</sup>
		Intercept	CapExp <sub>98-01</sub>	Own <sub>98-01</sub>	OwnSqr <sub>98-01</sub>	CapExp <sub>98-01</sub> *OwnDummy <sub>98-01</sub>	M/B <sub>98-01</sub>	
(8)	M/B <sub>02-05</sub>	0.51 <sup>a</sup> (4.16)	-0.02 <sup>b</sup> (-2.26)	0.01 <sup>c</sup> (1.80)	-0.0002 (-1.40)	0.01 (1.10)	0.32 <sup>a</sup> (13.16)	0.37

**Panel B.** Interaction effects of managerial ownership and capital expenditures on firm performance based on the 179 sample firms with lower capital expenditures

Regression	Dependent Variable	Explanatory variables						R <sup>2</sup>
		Intercept	CapExp <sub>98-01</sub>	Own <sub>98-01</sub>	OwnSqr <sub>98-01</sub>	CapExp <sub>98-01</sub> *OwnDummy <sub>98-01</sub>	M/B <sub>98-01</sub>	
(9)	M/B <sub>02-05</sub>	0.21 (1.06)	0.02 (0.33)	0.03 <sup>b</sup> (2.12)	-0.0004 <sup>c</sup> (-1.70)	-0.03 (-0.56)	0.38 <sup>a</sup> (9.89)	0.43



**Panel C.** Interaction effects of managerial ownership and capital expenditures on firm performance based on the 180 sample firms with higher capital expenditures

Regression	Dependent Variable	Explanatory variables						R <sup>2</sup>
		Intercept	CapExp <sub>98-01</sub>	Own <sub>98-01</sub>	OwnSqr <sub>98-01</sub>	CapExp <sub>98-01</sub> * OwnDummy <sub>98-01</sub>	M/B <sub>98-01</sub>	
(10)	M/B <sub>02-05</sub>	0.87 <sup>a</sup> (4.09)	-0.03 <sup>b</sup> (-2.35)	-0.002 <sup>c</sup> (-0.20)	0.00002 (0.10)	0.03 <sup>b</sup> (2.01)	0.28 <sup>a</sup> (8.88)	0.34

M/B<sub>98-01</sub> is the average market-to-book ratio over the formation period 1998-2001.

M/B<sub>02-05</sub> is the average market-to-book ratio over the holding period 2002-05.

Own<sub>98-01</sub> is the average managerial ownership in the formation period 1998-01.

OwnSqr<sub>98-01</sub> is the average squared managerial ownership in the formation period 1998-01.

CapExp<sub>98-01</sub> is the average capital expenditures ratio in the formation period 1998-01.

OwnDummy<sub>98-01</sub> is a dummy variable with a value of zero for firms with managerial ownership ranked the lower half among all sample firms, and with a value of one when managerial ownership ranked the upper half among all 359 samples.

Superscripts a, b, and c indicate significance at the 0.01, 0.05, 0.1 level.