

Firm R&D Strategies Impact of Corporate Governance

Manohar Singh

The Pennsylvania State University- Abington

Reporting a positive relationship between institutional ownership on one hand and capital expenditures and research and development (R&D) activity on the other, Wahal and McConnell (2000) conclude that powerful investors do not drive managers to behave myopically. We provide complementary evidence by relating managerial power (lower shareholder rights) to R&D investment decisions. We argue that managerial risk aversion may incentivize more powerful managers to underinvest in long-term --and potentially risky-- projects with negative consequences for corporate value. Our evidence suggests that firms with higher managerial entrenchment behave relatively more myopically than those with greater shareholder power. For a sample of 5173 US firms, results indicate that there exists a significant negative relation between managerial entrenchment --proxied by Gompers et al (2003) governance index-- and propensity to undertake in-house R&D, as well as, R&D investment levels. Further, firms with more entrenched management undertake less risk.

INTRODUCTION

Given the conflict of interest between management and shareholders, the original focus of the debate has been on how much power in the hands of shareholders is consistent with the objective of corporate value maximization. One stream of thought suggests that greater the shareholder rights, more disciplined are the management in their pursuit of shareholder wealth creation. The contrasting perspective is that too much power resting with shareholders stifles management creativity and risk taking, as well as, reduces management flexibility to optimally allocate resources for value maximization.

Following Gompers (2003), while a significant body of evidence indicates that greater shareholder rights associate with higher corporate value, it is certainly not a settled issue. More importantly, our understandings of how in reality more entrenched managers actuate their preferences --and in the process destroy shareholder value—is limited at best. Recently, however, researchers have started to analyze corporate strategic choices as an intermediate variable linking corporate value and managerial entrenchment. This entrenchment-strategy-value dynamics is the focus of our paper. Most directly related to our inquiry is the work of Lhuillery (2011) for French firms and Honore et al (2011) for European firms relating corporate governance and firm strategic choices in regard to long-term pay-off of R&D and capital projects. Both these studies point out to the scarcity and inadequacy of the limited research on the topic. Not only are the theoretical underpinnings complex, they are ambiguous in their predictions as to how managerial entrenchment impacts firm investment choices and with what value consequences. In addition, O'Connor et al (2011) point out to the importance of appropriate empirical methodologies in arriving at correct conclusion about the actual relationship between governance and corporate investment strategies.

The purpose of this paper is to seek answers to two specific questions:

1. How does the balance of power between shareholders and management impact managerial behavior in terms of corporate R&D strategies?
2. Do powerful managers avoid risk and focus on short-term shareholder return?

Our results indicate that firms with more entrenched management (weaker shareholder rights) have lower likelihood of undertaking in-house R&D. In addition, within the group of firms that engage in R&D, there is a negative relation between the degree to which management is entrenched and the R&D intensity. Further, the data suggests that firms with more entrenched management undertake less risk--proxied by lower beta and payout larger dividends. Thus, our evidence suggests that with greater power managers become myopic, limit exposure to risky investment, and in the process deviate from value maximizing strategic choices.

Our research relates to several streams of research in corporate governance. In a broad context, we extend governance-corporate value research by discovering possible channel through which poor governance adversely impacts corporate value. Our work also relates to literature on managerial myopia. Consistent with Wahal and McConnell (2003), we report that shareholder power does not force managers to avoid long-term payoff investments. More narrowly, our evidence contributes to the debate on the link between managerial entrenchment and their risk preferences. Our evidence indicates that more powerful managers prefer to follow less risky investment strategies, thereby lowering firm beta and cost of capital.

The paper proceeds as follows: In the next section we discuss the theoretical and empirical framework and develop our hypotheses. Section 2 describes data sources, sample selection, the variables, and the methodology used in the analysis. While Section 3 presents the discussion of our results, Section 4 concludes the paper.

SAMPLE COMPOSITION AND DATA DESCRIPTION

Sample Composition

We study the investment behavior of the sample firms for the period between 1996 and 2003. We focus on a relatively homogenous set of non-financial U.S. firms that appear in the Stern Stewart annual list of best performing firms. At the first stage, we start with the 1,000 firms placed on Stern Stewart's 2003 best performing firms list and trace these firms back for seven years. To measure our main explanatory variable, namely the managerial power, we utilize, a) the 2003 Governance Index developed by Gompers et al. (2003), and b) the Entrenchment Index developed by Bebchuk et al. (2004). To construct these indices, we obtain information on governance provisions from the Investor Responsibility Research Center (IRRC) database. For our main test dependent variables, namely choice to engage in R&D and R&D intensity, we retrieve the annual balance sheet and income statement data from the COMPUSTAT database. Control variables accounting data is also sourced from the COMPUSTAT. Combining the Stern Stewart, IRRC, and COMPUSTAT databases, we arrive at our final sample that consists of 5,452 firm-year observations during the period of 1996 to 2003.

Measurement and Description of Variables

Test Independent Variables

The Investor Responsibility Research Center (IRRC) data on governance provisions are obtained from multiple sources, including annual reports, corporate bylaws, charters, and proxy statements. Using IRRC data on a variety of governance provisions Gompers et. al. focuses on twenty-four unique provisions to arrive at their governance index. For each firm, Gompers et. al. add one point for every restrictive provision that suppresses shareholder rights and increases managerial entrenchment. All provisions, except secret ballots and cumulative voting, enhance managerial entrenchment. For each of these provisions, if absent, one point is added to the Governance Index, reflecting greater managerial power relative to shareholders. In sum, the Governance Index calculation involves summing individual provisions that restrict shareholder rights thereby protecting managers against takeover threats. The

interpretation of the Governance Index is straightforward: the higher the index, the greater is the degree of managerial entrenchment and weaker are the shareholder rights.

In the similar fashion, Bebchuk, Cohen, and Ferrell (2004) construct a more parsimonious “Entrenchment Index” based on 6 of the 24 governance provisions used in Gompers et al. (2003). The six provisions included in the Entrenchment Index are staggered boards, limits to shareholder bylaw amendments, supermajority requirements for mergers, supermajority requirements for charter amendments, poison pills, and golden parachutes. Entrenchment Index has an interpretation similar to that of the GIM index in that a higher value of Entrenchment index associates with greater managerial power relative to that of shareholders.

Test Dependent Variables

Propensity to establish in-house R&D: To identify firm characteristics that determine the likelihood and degree of a firm’s engagement in R&D, we conduct a Heckman’s two-stage estimation where in the first stage the dependent variable is equal to one if the firm reports non-zero R&D expense and zero otherwise.

R&D intensity: We measure R&D intensity by calculating the ratio of R&D expenses to sales revenue. The higher the ratio, the more investment a firm undertakes in its research and development activities.

Control Variables

Firm size: It is suggested (Shefer and Frenkel, 2005) that larger firms have greater resources and are less risky; hence, they have the capability to engage in R&D activities at a higher level. To control for the influence of firm size, we utilize the natural log of the book value of total assets (Log of total assets) as a proxy for firm size.

Leverage: Leverage represents not only the disciplining mechanism against managerial agency conflict but it also reflects financial strength of a firm. Thus, while high leverage may relate to lower R&D outlays because of the risky nature of R&D investments, it may also relate positively to R&D because greater R&D may actually be needed to create value and make equity capital base stronger. We utilize the ratio of total debt to total assets (Debt to total assets ratio) as a measure of financial leverage.

Liquidity: Liquidity is an important determinant of capacity to invest. Firms with higher liquidity may be able to invest more in R&D and vice versa. We use interest coverage ratio as a proxy for liquidity and expect a positive relation between R&D and coverage ratio.

Growth opportunities: Firm R&D strategies are expected to be influenced by growth opportunities as they not only serve as a proxy for potential to grow, but also reflect uncertainty associated with growth. We utilize the Market to Book ratio as a proxy for growth opportunities facing a firm. High growth firms may invest in R&D to realize growth potential, yielding positive relationship between growth opportunities and R&D. At the same time, firms facing low growth opportunities may ramp up R&D investments to escape stagnant revenues, resulting in a negative relation between the two.

Industry effects: Industry competitive dynamics are expected to influence a firm’s R&D behavior. For instance, Matsumura et al. (2013) report that R&D at firm level is materially influenced by the degree of competitiveness; firms in very low and very high competitive industries spend greater on R&D activities. To clearly delineate the influence of a firm’s governance characteristics on its R&D, we use one-digit SIC code industry dummies (Industry controls) to control for industry effects.

Table 1 provides the sample descriptive statistics.

The mean (median) governance index and entrenchment index levels at 9.37 (9.00) and 2.12 (2.00) are similar to those reported in the literature on managerial entrenchment. The sample firms show a large variability in firm size measured in terms of total assets with a mean asset base of \$17764 million. The sample firms, on average, spend 12% of their sales on R&D. The median R&D to sales ratio is much lower at 5%. The sample average debt to asset ratio is at 27%, while the mean coverage ratio is at 1.28. R&D firms pay out fewer dividends and have higher beta. Finally, the sample firms have positive average ROA at 4.2%.

Methods

For analyzing relation between managerial entrenchment and R&D investment, we utilize two main approaches, namely, statistical comparative analysis using t-test and multivariate analysis using Heckman's two-stage model. Heckman's approach allows us to analyze the impact of managerial entrenchment on the R&D investment levels conditional upon a firm's decision to engage in R&D activities. Using Heckman's method ensures that selectivity bias is not distorting our results.

EMPIRICAL FINDINGS AND DISCUSSION OF RESULTS

Mean Comparison Tests: Comparing R&D and Non-R&D Firms

Table 2 results suggest that compared to Non-R&D firms, R&D firms are significantly more value generating in terms of market value added (MVA). While ROA is at the same level across the two groups, the average return on invested capital is also lower for non-R&D firms. Our data also suggests that Non-R&D firms are larger in size and have higher financial leverage. With respect to the main test variables, the evidence suggests that R&D firms have greater managerial entrenchment when measured in terms of Gompers et al. (2003) Governance Index. There seems to be no difference between the two groups in terms of the Bebchuk et al. (2004) Entrenchment Index. Finally, it appears that compared to Non-R&D firms, R&D firms pay out fewer dividends and are more risky in terms of higher beta and higher cost of capital.

The main implication of the statistics in Table 2 is that while R&D firms have weaker shareholder rights they outperform Non-R&D firms in terms of value added and return on invested capital.

Multiple Regression Results

Predictors of Decision to Engage in R&D Activities

To clearly explain the role of management entrenchment in predicting R&D strategies, we analyze our data in a multivariate regression framework using Heckman's model. To predict a firm's R&D engagement, our dependent binary variable in the first stage of the model assumes a value of 1 for R&D firms and 0 Non-R&D firms. In the second stage, to quantify the intensity of R&D investment as determined by managerial entrenchment, the dependent variable is the ratio of R&D expenditure to sales revenue. We estimate four different regression models. The results are presented in Table 3.

Coefficient estimates in Model 1 pertain to Governance Index as the main test independent variable. The coefficient on Governance index in Step-1 being significantly negative indicates that more entrenched managements have lower likelihood of choosing to engage in R&D. The results are consistent with the findings of Wahal and McConnell (2000), in that it is not more powerful shareholders that make management behave myopically. Managers have their own incentives --risk aversion and short-term performance linked compensation--to avoid investing in risky and long-term R&D projects.

With respect to the control variables, the results indicate that highly levered firms have a lower tendency to invest in R&D. We also find that larger firms are less likely to invest in R&D. Contrary to expectation, firms with higher coverage ratio are less likely to engage in R&D. It may be reflective of firms trying to maintain their liquidity by not investing in R&D. Finally, we report that growth opportunities do not seem to affect propensity to invest in R&D.

In Step-1 of Model 2, we replace Governance index with the Bebchuk et al. (2004) Entrenchment Index as a measure of managerial entrenchment. The results corroborate our findings that after controlling for industry level variations, higher level of managerial entrenchment is a significant negative predictor of a firm's choice to invest in R&D. The results pertaining to control variables in this specification are similar to those reported in Model-1 Step-1 regression specification.

Level of R&D Investment and Management Entrenchment

To quantify the degree to which managerial entrenchment affects the level of investment in R&D, we estimate two Step-2 specifications of Heckman's model. The results are reported in Table 3, with Model-1 Step-2 depicting the results where Governance Index (Gompers et. al.) is used as proxy for management

entrenchment, and Model-2 Step-2 depicting the results where Entrenchment Index (Bebchuk et. al.) is used as the proxy. Results in Model-1 Step-2 specification --with the significant negative coefficient of the Governance Index -- indicate that firms with a greater degree of management entrenchment make R&D investments at lower levels. In Model 2 Step-2 Bebchuk et. al. (2004) Entrenchment Index is also related significantly negatively to R&D investment levels. Given that in both models the managerial power variables appear with significant negative coefficients, the results robustly confirm that firms with greater managerial entrenchment spend relatively less on R&D. Arguing in line with agency theory that relatively powerful managements are more likely to engage in self-serving behavior, and that R&D is value adding, our results reveal that more powerful managements make less than optimal investment choices. So, it is not that greater power with shareholders forces managements to focus on short term investment, management may have their own interest to invest less in long-term and risky R&D activities.

With respect to control variables, we find that firms with a greater degree of financial leverage invest less in the R&D projects. This is intuitively appealing. R&D investments are risky, and at higher levels of risk the prohibitive debt financing costs impose limits on risky investments. Our results indicate that larger firms invest less in R&D. It may be because these firms have reached a maturity level in their corporate life cycle and have stable and certain cash flows from their core activities.

Interestingly, firms with greater growth opportunities --measured in terms of Market to Book ratio-- spend less on R&D. The explanation may lie in these firms being young and having limited resources to invest in long-term projects. Also, higher Market to Book ratio firms are generally smaller and more risky than larger and more mature firms with low Market to Book ratio. Given the need for capital for operations and for financing growth, combined with limited debt capacity of these firms, R&D may remain a secondary priority for these firms.

Overall, the results in Table 3 suggest that conditional upon choosing to engage in R&D, firms with a higher degree of managerial entrenchment spend less on R&D activities. Thus, higher shareholder power does not make managements more myopic. Instead, managerial myopia may be agency driven when powerful managers pursue their own self-interest.

To explore the self-interest explanation, next we relate managerial risk aversion to R&D investment strategies.

Managerial Entrenchment and Risk Taking

It is plausible to argue that managers are risk averse and would more likely invest in short-term growth generating and relatively low risk ventures like acquisitions, rather than in long-term and risky R&D projects aimed at organic growth. Thus, it is expected that left to themselves, more powerful self-serving managers would take less risk. To study this possibility, we relate a firm's risk level with managerial entrenchment. We measure firm risk level in terms of equity beta with the expectation that firm beta and managerial entrenchment measures are significantly negatively related. The results are presented in Table 4.

As expected, in both Model 1 (where managerial power is proxied by the Governance Index) and Model 2 (where managerial power is proxied by the Entrenchment Index), the test variable coefficients are significantly negatively related to beta. The results imply that higher managerial power is associated with lower risk levels as measured by beta.

In terms of control variables, various firm characteristics influence firm beta as per theoretical expectations. For instance, while bigger firms are less risky, firm with greater operating leverage, proxied by larger Net Property Plant and equipment (NPP) base, are more risky. Finally, higher R&D outlays are related to greater firm risk.

In Sum, extending the evidence offered by Gompers et. al. (2003) and Bebchuk et. al. (2004) that firms with more entrenched managers perform relatively poor, our results suggest that more entrenched managers pursue less risky policies that may be causing loss in shareholders' value.

CONCLUSION

The paper extends research on corporate governance as it influences corporate R&D strategies. We explore whether the balance between shareholders' and managerial power can explain a firm's long-term investment strategy. Specifically, we ask if managerial entrenchment determines the choice and the level of R&D investment. The results indicate that firms with more entrenched management have lower propensity to engage in R&D activities. Conditional upon the decision to undertake R&D, there is a negative relation between the degree to which management is entrenched and the level of R&D investment. Overall, consistent with Wahal and McConnell, the findings suggest that more powerful shareholders are not the reason for managers behaving myopically. In fact, our evidence --that firms with more entrenched managements have lower level of risk-- suggests that managerial risk aversion may explain why managers choose to avoid investing in long-term but risky R&D projects. The results are broadly consistent with agency theory.

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TABLE 1
SAMPLE DESCRIPTIVE STATISTICS

	Mean	Median	Std. Deviation
Governance index (Gompers et al.)	9.37	9.00	2.76
Entrenchment index (Bebchuck et al.)	2.12	2.00	1.33
Total assets (\$ million)	17764.32	3825.07	62777.83
Market value added (MVA) (\$ million)	7781.33	1669.94	27521.88
Cost of capital (in percent)	8.15	7.85	1.96
Return on invested capital (in percent)	12.39	8.57	117.74
Dividend yield	0.014	0.01	0.017
Debt to total assets ratio	0.27	0.26	0.20
R&D to sales ratio	0.12	0.05	0.30
Return on assets (in percent)	4.20	4.35	14.14
Beta	0.63	0.54	0.60
Number of observations = 5452			

TABLE 2
MEAN COMPARISON OF R&D AND NON-R&D FIRM CHARACTERISTICS

Variable	Non- R&D Firms	R&D Firms	Difference	p-value
Governance index	9.27	9.51	0.24***	0.00
Entrenchment index	2.12	2.12	0.00	0.64
Total assets (\$ million)	22001.38	10994.22	-11007.16***	0.00
Market value added (MVA) (\$ Million)	5223.16	11598.45	6375.28***	0.00
Return on invested capital (in percent)	11.07	14.35	3.28*	0.09
Dividend yield	0.016	0.010	-0.006***	0.00
Debt to total assets ratio	0.29	0.23	-0.05***	0.00
R&D to sales ratio	0.00	0.14	0.14	0.54
Return on assets	0.04	0.04	0.00	0.81
Beta	0.49	0.85	0.36***	0.00

*, ***, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 3
HECKMAN'S SELECTION MODEL RELATING MANAGEMENT ENTRENCHMENT TO A)
FIRM PROPENSITY TO ENGAGE IN R&D AND B) R&D INTENSITY

Step-1 Dependent dichotomous Variable =1 for R&D firms; = 0 otherwise	Model-1 Step-1 (Z statistics)	Model-1 Step-2 (Z statistics)	Model-2 Step-1 (Z statistics)	Model-2 Step-2 (Z statistics)
Intercept	1.469*** (6.49)	0.479*** (11.65)	1.439*** (6.73)	0.450*** (11.69)
Governance index	-0.027*** (-3.50)	-0.008*** (-4.09)		
Entrenchment index			-0.804*** (-4.94)	-0.018*** (-4.13)
Debt to total assets	-0.336*** (-2.91)	-0.145*** (-4.79)	-0.309*** (-2.95)	-0.142*** (-4.67)
Coverage ratio	-0.089*** (-6.04)	-0.348*** (-10.77)	-0.090*** (-6.08)	-0.034*** (-10.76)
Log of total assets	-0.091*** (-5.11)	-0.042*** (-9.81)	-0.099*** (-5.54)	-0.044*** (-10.16)
Market to book ratio	0.002 (0.82)	-0.001*** (-2.09)	0.002 (0.64)	-0.002 (2.15)
Industry controls	Yes	Yes	Yes	Yes
No. of observations	4495	4495	4495	4495

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

TABLE 4
MULTIPLE REGRESSION MODEL REGRESSION MANAGEMENT
ENTRENCHMENT TO RISK

Dependent Variable	Model-1 (Beta) (Z statistics)	Model-2 (Beta) (Z statistics)
Intercept	2.326*** (14.24)	1.955*** (12.11)
Governance index	-0.061*** (-12.54)	
Entrenchment index		-0.944*** (-8.96)
Debt to total assets ratio	-0.110* (-1.61)	-0.963* (-1.39)
Log of total assets	-0.089 *** (-6.46)	0.099*** (-7.09)
Market to book ratio	-0.003 (-1.02)	-0.002 (-0.71)
Net Property & Plant	0.000*** (3.09)	0.0000*** (3.85)
R&D	0.606*** (12.38)	0.631*** (13.20)
Industry Control	Yes	Yes
Adj. R-square	0.3401	0.3216
Model P	0.0000	0.0000
No. of Observations	1895	1895

*, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.