Family Firm and R and D Cost Behavior

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ABSTRACT

We examine whether family firms have more tendency to maintain R and D investment when sales fall than non family firms using R and D costs behavior. While R and D investment is important for the sustainable growth of the firm, it is characterized by long investment horizons and high uncertainty resulting in an earnings decline in immediate periods. Therefore, managers have incentive to cut R and D when the performance of the firm is bad. Regarding this, we examine whether family firms alleviate this problem with long term orientation horizons and better monitoring of the firm. Specifically, stickiness in R and D costs were used as a proxy for "sustained" investment by forward looking managers when sales fall and analyze firm's R and D adjustment decision. Costs are "sticky" when costs increase more for increases in sales than they decrease for decreases in sales. Cost stickiness occurs when managers retain slack resources in response to a demand drop. When dividing the sample into family firms and non family firms, we find that R and D costs are sticky in family firms but not in non family firms. It indicates that family firms have a tendency to maintain R and D investment when sales fall whereas, non family firms do not. On the other hand, additional test shows that SG and A costs behavior does not differ among family firms and non family firms. These results imply that family firms and non family firms make resource adjustment decisions differently regarding R and D which represents long term investment. However, they do not share a similar pattern regarding SG and A costs which includes a broader category of costs. Overall results imply that ownership structures do matter in organizations and that family firms make different strategic choices compared to non family firms. This study contributes to the literature that examines various factors that affect R and D investment decision. This study also adds to the growing literature on cost stickiness and family ownership.

Key words: Family firm, cost behavior, R and D costs

INTRODUCTION

Sustainable competitive advantage of a firm is achieved through the implementation of a value creating strategy and it increasingly depends on intangible assets such as R and D capabilities (Barney, 1991). Indeed U.S. R and D expenditures have been rapidly increased (Boroush, 2012). However, R and D is characterized by long investment horizons and high uncertainty resulting in an earnings decline in immediate periods (Edmans, 2009). Consequently, managers may fail to invest if they are concerned with the firm's short term performance. This underinvestment in long term, intangible projects for the purposes of meeting short term goals is referred to as

"managerial myopia" (Bushee, 1998). Moreover, the fact that CEOs are likely to experience turnover if their stock performance is bad (Kaplan and Minton, 2008; Bebchuk *et al.*, 2011) is also likely to have increased managers' myopic tendencies.

While previous studies have focused on describing various sources of myopia, this study analyzes whether this myopia is alleviated in family firms with respect to R and D investment decisions. A large, controlling shareholder potentially alleviates myopic investments and rather provides the discipline for management to commit resources to long term investments (Shleifer and Vishny, 1986). For example, Edmans (2009) finds that blockholders by trading on private information about firm's fundamental value and impounding it into prices encourage managers to invest for long run growth rather than short term profits. Long term Institutional investors are also found to decrease the likelihood of R and D cuts (Bushee, 1998). These findings suggest that the ownership structure alleviates managerial incentives to pursue myopic investment decisions. In this study, family firms are examined as a potential ownership structure that serves this role. Family firms are focused because they are managed or controlled by founding families and thus suffer less agency problem that arises from the separation of ownership and management. They also constitute about one-third of the S and P500. However, despite the prevalence of family firms, our understanding of the R and D cost behavior of this unique organization form is limited. The analysis on the effect of family firms on R and D cost adjustment will further improve our understanding of different corporate governance mechanisms.

Specifically, it has analyzed whether the degree of R and D costs stickiness is larger in family firms than in non family firms. Costs are "sticky" when costs increase more for increases in sales than they decrease for decreases in sales. Therefore, R and D costs stickiness can be interpreted as unused R and D costs and this results in a decrease of earnings. However, managers with the myopia problem will have incentive to take both revenue increasing and expenditure decreasing actions. In other words, managers have incentives to scale back or reduce R and D expenditure in activities when sales fall. Compared to non family firms, family firms in the U.S. face less severe agency problems that arise from the separation of ownership and management. First of all, family firms have longer investment horizons than other shareholders (Anderson and Reeb, 2003a) and this mitigates manager's short term focus. Second, families have better knowledge of the firm's business activities (Anderson and Reeb, 2003a) and it disciplines managers myopic resource commitment decisions. Third, managers in family firms enjoy benefits other than compensation such as job security and this mitigates manager's preference to short term payoff. Therefore, families are less likely to cut R and D expenditures in order to get a better earnings number.

Using S and P 500 firms from 1994-1999, it is found that the degree of R and D costs stickiness is larger in family firms than in non family firms. However, SG and A costs behavior shows no difference between family firms and non family firms. These results highlight the fact that family firms make different strategic choices in terms of long term investment such as R and D compared to non family firms but not for costs which includes broader category of costs. Overall these results imply that ownership structure does matter in organizations and that family firms make different strategic choices compared to non family firms.

It is contributed to the existing literature in the following ways. First, this study contributes to the literature on cost behavior by focusing on the influence of ownership structure which has been ignored in prior literature. Second, while R and D costs comprise small portion in sales revenue, R and D spending has been extensively investigated due to its unique feature. In this sense, It is believed that study on R and D costs behavior is important and needs to receive more attention.

Third, this study also contributes to the literature on the relationship between ownership and R and D expenditures (Bushee, 1998; David *et al.*, 2001; Hansen and Hill, 1991; Lee and O'Neill, 2003). Although, there are studies that examine the effect of family ownership on the level of R and D intensity (Chen and Hsu, 2009; Anderson *et al.*, 2012a; Block, 2012), this study differs from them in that it examines the R and D cost behavior. To our knowledge, this study is the first attempt to examine whether family ownership explains cost adjustment decisions. Lamerikx (2012) examines the relationship between family ownership and real earnings management using the Roychowdhury (2006) model and finds that family firms involve less real earnings management than non family firms. However, R and D cost behavior in general circumstance is not examined. Moreover, that study is limited in that the sample only consists firms listed on the Frankfurt Stock Exchange. Differences in the sample can lead to huge difference in results across countries. For example, Lamerikx (2012) do not provide evidence for a relation between accrual-based earnings management and whether firms are a family firm while studies using U.S. data provide the evidence that family firms have better earnings quality (Wang, 2006; Ali *et al.*, 2007). Firth and finally, this study adds to the growing body of literature on family firm that follows Anderson and Reeb (2003a). Studies encompass a wide range of topics such as firm performance (Anderson and Reeb, 2003a; Villalonga and Amit, 2006; Lee, 2006; Miller *et al.*, 2007), cost of debt (Anderson *et al.*, 2003b), diversification (Anderson and Reeb, 2003b; Gomez-Mejia *et al.*, 2010), acquisition (Miller *et al.*, 2010), compensation (Gomez-Mejia *et al.*, 2003; Chen, 2006; Combs *et al.*, 2010), CEO dismissal (Gomez-Mejia *et al.*, 2001), accounting quality (Wang, 2006; Ali *et al.*, 2007), Opacity (Anderson *et al.*, 2009), disclosure (Ali *et al.*, 2007; Chen *et al.*, 2008), tax aggressiveness (Chen *et al.*, 2010) and informed trading (Anderson *et al.*, 2012b). Recently, studies also analyze R and D investment strategy of family firms in the US (Anderson *et al.*, 2012a; Block, 2012).

Characteristics of R and D investment and manager's incentives: Investments in R and D generate innovations and also enable firms to exploit knowledge from the environment (Cohen and Levinthal, 1989). Ettlie (1998) finds that R and D intensity to sales is significantly associated with both improvements in markets share and improvement in manufacturing. As such R and D spending is widely considered to be important for both the survival and growth of firms as a source of competitive advantage. However, R and D spending is a unique type of investment and thus managers will be reluctant to invest in R and D projects. First, R and D spending is incurred over the near term whereas the outcomes of it may not occur immediately (Lee and O'Neill, 2003). In this sense, prior studies have used the level of R and D investment to represent long term orientation (Bushee, 1998). In addition, there is a greater uncertainty of the future benefits (Chan *et al.*, 2001; Kothari *et al.*, 2002; Lee and O'Neill, 2003). Kothari *et al.* (2002) compare the relationship between R and D, PP and E and future earnings variability and find that the future benefit of R and D spending is more uncertain than that of PP and E. This result indicates that R and D spending affects risk of the firm to the greater extent than does PP and E. Another feature of R and D projects is its high failure rates (Baysinger *et al.*, 1991). Second, R and D spending is typically expensed immediately under U.S. GAAP. As a consequence, R and D spending has a negative impact on short term accounting and stock performance (Dechow and Skinner, 2000). Due to the above reasons, managers are likely to be reluctant to undertake R and D activities since their compensation and job security are typically tied to the firm's performance (Baysinger *et al.*, 1991), even though R and D spending provides many benefits to the firm.

Effect of ownership on corporate R and D investment: While prior researches have shown that managers tend to underinvest in R and D or cut R and D based on their self interest, the presence of a major powerful shareholder can encourage managers to pursue risky long term investment (Jensen and Meckling, 1976). Regarding this issue, these studies examine institutional owners which have surged in corporate stockholdings since the late 1970s (Hansen and Hill, 1991) and become powerful parties in the corporate governance system. Other mechanisms to control for manager's short term behavior are as follows. Compensation contracts can also provide managers with optimal incentives (Gibbons and Murphy, 1992). Based on this notion, Cheng (2004) shows that the compensation committee designs compensation contracts in a manner that mitigates both horizon problems and myopia problems. Specifically, the association between changes in R and D spending and changes in CEO compensation is positive when the CEO approaches retirement and when the CEO has incentives to meet short term earnings goals. Dikolli (2001) argue that to be an optimal contract, "the shorter the agent's employment horizon the greater the emphasis on the forward looking performance measure". Although this study does not directly refer to R and D spending. R and D can be considered as a forward looking measure. Authors argue that institutions have better knowledge of the firm and have power to exert pressure on managers. Consistent with this, it has been shown that institutional investor ownership and their activism influences firms to invest in innovative activities such as R and D (Baysinger *et al.*, 1991; Hansen and Hill, 1991; Kochhar and David, 1996; Zahra, 1996; David *et al.*, 2001). Institutional activism refers to political actions taken by institutional investors to actively influence managers.

However, there is also criticism that institutional investors are under pressure to perform well and thus they are risk aversion and short term oriented. This translates into concern about firms short term corporate earnings (Graves, 1988). Consistent with this, Bushee (1998) finds that when they categorize institutions into three groups (transient, quasi-indexer, dedicated) by investment behavior, transient institutional investors that have high portfolio turnover and engage in momentum trading encourage managers to cut R and D to reverse an earnings decline. Otherwise institutional ownership serves to reduce manager's myopic R and D cut. Zahra (1996) finds that long term institutional ownership is positively associated with entrepreneurship that is proxied by innovation, venturing and strategic renewal but short term institutional ownership is negatively associated with it. Alternatively, stock concentration (Lee and O'Neill, 2003) and CEO stock ownership (Dechow and Sloan, 1991) are also linked to R and D investment. It is added on to the literature by examining the effect of family ownership on CEO incentive to cut R and D spending when sales fall. Specifically, the relation between family ownership and R and D cost stickiness is examined.

Family ownership and R and D cost behavior: Recently, some studies examine the effect of family ownership on R and D investment (Chen and Hsu, 2009; Anderson *et al.*, 2012a; Block, 2012). Those studies argue that. as large and undiversified shareholders, families have two contrasting incentives. On the one hand, because families hold a concentrated stake in a single firm, they may seek low risk projects. On the other hand, as committed shareholders with a long term orientation and effective monitors of the management, families may pursue investment that enhances long term firm value. While two views are equally fair empirical results show that risk averse family firms usually invest less in R and D than non family firm. Specifically, Chen and Hsu

(2009) find negative association between family ownership and the level of R and D intensity (R and D/Sales) using Taiwanese family firms. Anderson *et al.* (2012a) find that US family firms, relative to non family firms, invest less on long term investments which includes both R and D and capital expenditures (total investment/assets). They also find that family firms prefer capital expenditures to R and D. Block (2012) adds to that by classifying family firms into lone founder firms and family firms building on Miller *et al.* (2007). In his definition, lone founder firms are firms in which the founders are involved as large owners or board members and family firms are firms in which family members of the founder are either lager owners or board members. Block (2012) finds that while family ownership decreases the level of R and D intensity (R and D/Assets or R and D/Sales) consistent with Anderson *et al.* (2012a), lone founders have a positive effect on R and D investment due to their better knowledge of firm's business and power to monitor manages.

However, this study differs from them in that the maintenance of R and D investment is examined rather than the level of R and D intensity. Dierickx and Cool (1989) argue that "maintaining a given rate of R and D spending over a particular time interval produces a larger increment to the stock of R and D know-how than maintaining twice this rate of R and D spending over half the time interval". This characteristics is referred to as "time compression diseconomies" in economics. Therefore, maintaining a smooth continuous rate of R and D investment over long period of time is important (Dierickx and Cool, 1989). Supporting this argument, prior studies identify the firm's effort to maintain R and D spending. For example, O'Brien (2003) emphasizes the importance of financial slack to ensure that investments in R and D are maintained even during bad times. They also demonstrate that the lack of financial slack results in poor performance. Therefore while previous literature on the relationship between family ownership and R and D investment has focused on R and D intensity, firm's R and D commitment decision is analyzed regarding sales change.

HYPOTHESES DEVELOPMENT

Managers with short term focus have incentives to take both revenue increasing and expenditure decreasing actions. Therefore, in order to enjoy personal benefits, managers may increase earnings by scaling back or reducing R and D expenditure when sales fall. On the other hand, it is expected that families are less likely to cut R and D expenditures in order to get a better earnings number. The reasoning is threefolds as follows; long term orientation of family firms, less information asymmetry in family firms and unique compensation contracts in family firms.

Long term orientation of family firms: First of all, family firms have longer investment horizons than other shareholders (Anderson and Reeb, 2003a). Founding families view their firms as an asset to pass on to their subsequent generations rather than as wealth to consume during their lifetime (Casson, 1999; Anderson *et al.*, 2003b). Therefore, families are more interested in the long run survival of the firm and their reputation. Moreover, the average CEO tenure at family firms is typically longer than that of non family firms (Miller and Breton-Miller, 2006). Thus, managers of family firms will usually operate with the expectation that they are secure enough in their positions. This lengthy job tenure motivates managers not to be engaged in short term decisions that may harm the long term viability and health of the firm. Stein (1988) suggests that

relatively patient stockholders may not be discouraged by poor earnings and that they may attribute it to long term investment strategies. As such, the presence of shareholders with relatively long term orientation will mitigate myopia problems and rather induce long term oriented decision making.

Prior empirical researches show that these unique features of family firms lead to diverse economic consequences. Family firms perform better than non family firms because they are long term oriented and have better knowledge of the firm (Anderson and Reeb, 2003a; Lee, 2006). Family firms also enjoy lower cost of debt because families are concerned about firm survival rather than shareholder value maximization and thus debt holders view family firms as an organization that better protects their interest (Anderson *et al.*, 2003b). In this regards, family firms are expected to maintain R and D expenditure when sales fall.

Less information asymmetry in family firms: Second, families have better knowledge of the firm's business activities (Anderson and Reeb, 2003a). R and D is poorly disclosed and thus it serves as a major source of information asymmetry between corporate insiders and outside investors (Aboody and Lev, 2000; Chan *et al.*, 2001). Immediate expensing of R and D also makes it difficult to provide information about changes in asset values. Thus, investors are not informed about the value and productivity changes of R and D (Aboody and Lev, 2000). R and D investments are also characterized by a high degree of specificity or opaqueness (Vicente-Lorente, 2001). If monitoring requires knowledge of the firm's business, families are potentially more effective in the monitoring of managers because their lengthy tenure allows them to learn about the firm's business (Anderson and Reeb, 2003a). The family owner's active involvement in the firm's management also permits them to have better access to information and to monitor management better (Chen *et al.*, 2008).

Consistent with these features, it is found that family's ability to monitor management and concerns on their reputation enhance accounting quality (Wang, 2006; Ali *et al.*, 2007) and moderate tax aggressiveness (Chen *et al.*, 2010). In addition, Chen *et al.* (2008) finds that family firms issue less voluntary disclosure (measured by earnings forecasts and conference call) due to lower information asymmetry between family owners and managers. Due to better knowledge and less information asymmetry between managers and owners as discussed, It is expected that families discipline managers not to sacrifice R and D investment for short term bottom line consideration. Therefore, managers in family firms are expected to maintain R and D expenditure when sales fall.

Compensation contracts in family firms: Family firms have different compensation contracts from non family firms. First, as discussed, non family firms have agency problem between ownership and management. To mitigate this problem, non family firms are more likely to compensate their managers based on observable earnings-based performance measures (Ali *et al.*, 2007). Equity based compensation is also likely to be applied to align goals between firms and management. On the other hand, families are more effective monitors of management. Chen (2006) finds that compared to non family firms, U.S. family firms grant significantly smaller equity based compensation and that CEO total compensation is also lower. Second, Gomez-Mejia *et al.* (2003) analyze compensation contracts in family firms and find that family member CEOs earn less total compensation than non family CEOs. They explain that family member CEOs accept lower

compensation because they are allowed high job security and are less free to choose the best job offer from external market. As such, managers of family firm have less severe agency problem and enjoy benefits other than compensation, they may have little incentive to cut R and D spending when sales fall in favor of short term payoff. Based on above three reasons, it is expected that family firms maintain R and D costs when sales fall. Following hypothesis are deposited.

Hypothesis: Family firms have more tendency to maintain R and D investment when sales fall than non family firms.

To proxy for R and D commitment decision of the firm, management accounting literature is drawn on cost behavior. Traditional textbook model of cost behavior distinguishes costs as fixed and variable costs with respect to different levels of activity. In this model, variable costs change proportionately with changes in the activity driver regardless of the direction of the change. Therefore, traditional model predicts that costs move symmetrically with changes in volume. In contrast Anderson *et al.* (2003a) find empirically that costs decrease less for decrease in sales than they increase for increase in sales and that refer to this costs behavior as "costs stickiness". Anderson *et al.* (2003b) suggest that costs are sticky due to the manager's deliberate resource commitment decision in the presence of adjustment costs. As another reason, stickiness in costs occurs because managers are reluctant to cut if they expect that demand might reverse in the future periods. Both of the above reasons suggest that costs behave as a result of manager's deliberate resource commitment decisions (Banker and Byzalov, 2013). In this study, stickiness in R and D costs is used as a proxy for sustained investment by forward looking managers when sales fall.

MATERIALS AND METHODS

Defining family firm: Family firm data is used that was provided by Anderson and Reeb (2004) and present their definition. Their definition of family firms is analogous to Anderson and Reeb (2003a). Specifically, they use the fractional equity ownership of the founding family and/or the presence of family members on the board of directors to identify family firms.

Research model: Asymmteric cost behaviour is measured based on the Anderson *et al.* (2003a) model:

$$\Delta \ln R \text{ and } D_{i,t} = \beta_0 + \beta_1 \Delta \ln SALE_{i,t} + \beta_2 D_{i,t*} \Delta \ln SALE_{i,t} + \text{Year fixed effects} + \text{Industry fixed effects}_+ \varepsilon_{i,t} \quad (1)$$

Where:

ΔR and $D_{i,t}$ = Log change in research and development expenditure (Compustat data No. 46) for firm i in year t

$\Delta SALE_{i,t}$ = Log change in sales revenue (Compustat data No. 12) for firm i in year t

$D_{i,t}$ = Dummy variable that takes the value of one when sales revenue in year t is less than that in year t-1, zero otherwise

$Famfirm_{i,t}$ = Dummy variable that takes the value of one if the firm is family firm, zero otherwise. Family firm data provided by Anderson and Reeb (2004) was used. They use the fractional equity ownership of the founding family and/or the presence of family members on the board of directors to identify family firms

In this model, β_1 measures the increase in R and D costs for sales increase and $\beta_1+\beta_2$ measures the decrease in R and D costs for sales decrease. If R and D costs are sticky, the slope for sales decreases should be smaller than the slope for sales increases. Thus, condition on $\beta_1>0$, $\beta_2<0$ is expected. Hypothesis 1 examines whether the degree of cost stickiness is larger in family firms. Thus, sample is divided into family firms and non family firms and examine whether β_2 is smaller in family firms.

Sample selection: Family firm data was obtained from 1992-1999 provided by Anderson and Reeb (2004). A list of S and P500 firms classified as family and non family firms is available from the authors. The initial sample consists of 2,686 firm year observations of 401 non utility/non banking firms. Among 2,686 observations, there are 876 (32.6%) family firm observations and the remaining observations are non family firms. Anderson and Reeb (2004) manually collected data from corporate proxy statements on equity ownership structure, CEO attributes, board structure and characteristics etc.The average family holding is 18.11% of the firm's equity and family members occupy nearly 20% of the board seats. Firm specific accounting variables are obtained from COMPUSTAT Industrial files. Because ticker symbols and company names in family firm data originally come from COMPUSTAT Industrial files of family firm data was merged with COMPUSTAT Industrial files using ticker symbols. Discrepancies in different versions of COMPUSTAT result in 2,426 firm year observations of 360 non utility/non banking firms. Specifically, 8 firms (65 observations) are not matched and 195 observations were dropped due to change in industry classification. Executive related data is obtained from ExecuComp. Because lag value for some variables was required. Observations are dropped if lag values are not available. Next, observations with missing data is dropped on R and D costs and sales revenue for the current year and the previous two years. Observations with positive values for SG and A costs, sales revenue and total assets is kept. After this sample selection procedure, final sample consists of 1,000 firm year observations from 1994-1999. The sample selection procedure is presented in Table 1.

Table 1: Sample selection

Section criteria	Drop	Observations
Initial sample: S and P500, 1992-1999[1]		2,686
Merge with Compustat, 1992-1999[2]	260	2,426
Merge with ExecuComp, 1992-1999[3]	0	2,426
Drop 1992 data due to calculation of variable that need lag value	205	2,221
Drop observations with missing data on R and D costs for the current year	723	1,498
Drop observations with missing data on R and D costs for the previous year	124	1,374
Drop observations with missing data on sales revenue for the current year and the previous two years	237	1,137
Keep observations with positive values for R and D costs, sales revenue, total assets and market value	137	1,000
Final sample, 1994-1999[4]		1,000

Initial Sample begins from family firm data provided by Anderson and Reeb (2004). Initial sample consists of 2,686 firm year observations of 401 non utility/non banking firms. Among 2,686 observations, family firm observations were 876 (32.6%) and the remaining observations are non family firms. Firm specific accounting variables are obtained from COMPUSTAT Industrial files. Because ticker symbols and company names in family firm data originally come from COMPUSTAT Industiral files, so, family firm data with COMPUSTAT Industiral files is merged using ticker symbols. Discrepancies in different versions of COMPUSTAT result in 2,426 firm year observations of 360 non utility/non banking firms. Specifically, 8 firms (65 observations) are not matched and 195 observations were dropped due to change in industry classification. There are missing vales for ExecuComp variable. However, this observations is not dropped because ExecuComp variables only for descriptive statistics is used. Many family firms do not report R and D costs, thus the portion of family firm observations decreased to 25.6% in the final sample

RESULTS AND DISCUSSION

Descriptive statistics: Table 2 reports the descriptive statistics for the variables. During the sample period, the mean value of sales and R and D cost is $11,600 million and $431 million, respectively. R and D cost is, on average, 4% of sales. Regarding other firm characteristics, the mean value of total assets are $13,800 million. Leverage and ROA are, on average, 0.24 and 6%, respectively. Market to book ratio is 4.37 on average. Tobin's Q is 2.04. The following rows report the descriptive statistics regarding CEO attributes, ownership and compensation component. First, the mean value of CEO tenure is 6.1 years. Insider ownership which is the fraction of shares held by all insiders as reported by ExecuComp is 0.8% in the sample. CEOs who have more than 20% shares are 0.5% of the sample. Firms where the CEO is the same person as the founder are 5% of the sample. CEOs whose age is more than 60 years old are 33% of the sample. CEO turnover occurs in 13% of the sample. Next, the average total compensation is $6,474 thousand. The proportion of equity compensation in total compensation is 42%. Finally, CEO pay slice which is the fraction of CEO compensation among the total compensation of the group of top five executives is 39%.

Table 3 compares the descriptive statistics of family firms and non family firms. On average, non family firms generate more sales ($12,200 million) than family firms ($9,740 million). The mean of R and D to sales ratio is higher in family firms (5%) compared to non family firms (4%). ROA and Tobin's Q suggest that the firm performance of family firms is better than that of non family firms on average which is consistent with Anderson and Reeb (2003b). CEO tenure is longer in family firms (9.19 years) than in non family firms (5.07 years) and a CEO whose age is greater than 60 years old is more prevalent in family firms (0.38) than in non family firms (0.32). Finally, compensation component was compared. The average total compensation shows that family member CEOs earn less compensation than non family CEOs which is consistent with the findings of Gomez-Mejia *et al.* (2003). The table also shows that equity based CEO pay

Table 2: Descriptive statistics: Total sample

Variables	N	Mean	Std	Q1	Median	Q3
Sales revenue ($mil)	1000	11,600	21,600	2,315	5,116	11,100
R and D expenditure ($mil)	1000	431	954	47	109	352
R and D/sales (%)	1000	4.27%	4.65%	1.15%	2.69%	5.80%
Total assets ($mil)	1000	13,800	36,100	2,229	5,052	11,300
Leverage	1000	0.2435	0.1326	0.1503	0.236	0.3269
ROA	1000	0.0591	0.0772	0.0317	0.0637	0.0944
Market to book	1000	4.3699	7.2735	2.1064	2.9501	4.6909
Tobin's Q	862	2.0427	1.017	1.3434	1.6975	2.396
CEO tenure	937	6.1046	6.3836	2	4	8
Insider ownership	994	0.0078	0.0322	0	0	0
CEO own 20	994	0.005	0.0708	0	0	0
CEO founder	937	0.0502	0.2184	0	0	0
Age 60	944	0.3326	0.4714	0	0	1
CEO turnover	992	0.129	0.3354	0	0	0
Total compensation ($k)	991	6,474	22,000	2,357	3,895	6,342
CEO equity pay	993	0.4155	0.2518	0.2266	0.4258	0.6113

Table 2 reports descriptive statistics for the variables in the test. The sample consists of 999 firm year observations between 1994 and 2009. *Sales revenue* is sales revenue (COMPUSTAT data No. 12). R and D expenditure is research and development expense (COMPUSTAT data No. 46). R and D/Sales is the ratio of R and D costs to sales

Table 3: Descriptive statistics: Family firms versus non family firms

Variables	Family firms			Non family firms			Sig. of difference	
	N	Mean	Median	N	Mean	Median	t-stat	z-stat.
Sales revenue ($mil)	256	9,740	3,583	744	12,200	5,994	1.5712	5.215***
R and D expenditure ($mil)	256	485	74	744	412	125	-1.0459	3.366***
R and D/sales (%)	256	5%	3%	744	4%	3%	-2.8794***	-1.554
Total assets ($mil)	256	12,264	3,517	744	14,400	5,667	0.8002	5.538***
Leverage	256	0.23	0.21	744	0.25	0.24	1.5594	2.822***
ROA	256	0.07	0.08	744	0.06	0.06	-2.9328***	-4.394***
Market to book	256	4.33	3.25	744	4.38	2.89	0.0971	-0.896
Tobin's Q	197	2.19	1.88	665	2.00	1.68	-2.3630***	-2.120**
CEO tenure	235	9.19	6.00	702	5.07	4.00	-8.9029***	-4.690***
Insider ownership	253	0.03	0.00	741	0.00	0.00	-12.3811***	-13.034***
CEO own 20	253	0.02	0.00	741	0.00	0.00	-3.8613***	-3.835***
CEO founder	235	0.17	0.00	702	0.01	0.00	-9.8617***	-9.391***
Age 60	239	0.38	0.00	705	0.32	0.00	-1.8286*	-1.826*
CEO turnover	253	0.11	0.00	739	0.14	0.00	1.2263	1.226
Total compensation ($k)	253	7,513	2,918	738	6,118	4,176	-0.8702	5.044***
CEO equity pay	253	0.36	0.34	740	0.43	0.44	4.0532***	3.915***

is significantly higher for non family firms. The greater use of equity based pay in non family firms is interpreted as a need of solution for managerial myopia because incentives can aligns goal between the firm and managers.

Regression result of family firm and R and D costs behavior: This hypothesis expects that the degree of R and D costs stickiness is larger in family firms than in non family firms. In order to test the hypothesis, it is first examine whether R and D cost stickiness exists on average in the total sample. Then, the sample is divided into family firms and non family firms and compare the R and D cost behavior.

Column 1 of Table 4 shows the results of estimating Eq. 1 for the total sample. The estimated value of β_1 is 0.8042 (t = 10.14) and the estimated value of β_2 is -0.3527 (t = -2.41). This result provides evidence on the presence of R and D cost stickiness for the total sample. Next, column 2 and 3 of Table 4 show the results of estimating Eq. 1 for each sub sample. Column 2 of Table 4 provides strong support that R and D costs are sticky in family firms. The estimated value of β_1 is 0.9579 (t = 6.49) and the estimated value of β_2 is -0.5564 (t = -2.19) indicating that R and D costs are sticky in family firms. On the contrary, column 3 of Table 4 shows that the measure of R and D cost stickiness, β_2, is negative but not significant indicating that R and D costs are not sticky in non family firms. In conclusion, R and D costs are sticky only in family firms.

Additional analysis of family firm and SG and A costs behavior: In this section, it is examined whether SG and A costs behave differently in family firms and non family firms. While R and D costs were analyzed under the conjecture that better represents long term orientation than SG and A costs, SG and A costs behavior has been the primary research subject after Anderson *et al.* (2003b). Indeed SG and A costs management is an important task for managers. First, SG and A costs represent a significant portion in sales. For example, in my sample the SG and A costs to sales ratio is 22%. Second, the SG and A signal is important in fundamental analyses regarding firm

Table 4: Regression result of family firm and R and D costs behavior: Family firm versus non family firm

Variable	Predicted sign	Estimated coefficients		
		Total sample	Family firm	Non family firm
β_1 (ΔSales)	+	0.8042***	0.9579***	0.7198***
		(10.14)	(6.49)	(7.57)
β_2 (D*ΔSales)	+/-	-0.3527**	-0.5564**	-0.2282
		(-2.41)	(-2.19)	(-1.29)
Constant	?	-0.0917**	-0.0700**	-0.0959*
		(-2.40)	(-2.08)	(-1.90)
Year dummy		Yes	Yes	Yes
Ind dummy		Yes	Yes	Yes
Observations		968	248	722
R-squared		0.35	0.39	0.36

Table 4 reports cluster regression of family firm dummy and R and D cost behavior. The dependent variable is ΔR and D costs which is the change in research and development expenditure. Definitions of variables are presented in Table 1. Observations of which absolute value is greater than 3 of studentized residual are removed in each regression test to avoid problems related to outliers. All specifications are estimated with robust standard errors clustered by firm and include year and 2-digit industry fixed effects. The robust t-statistics are in parentheses. *, **, ***Indicated significance at the 10, 5 and 1% level, respectively (two-tailed test)

value and performance (Lev and Thiagarajan, 1993; Abarbanell and Bushee, 1997; Anderson *et al.*, 2007). Third, SG and A costs allow a lot of discretion and thus serve as a good source to examine the managerial incentives. Therefore, it will be helpful to examine whether SG and A costs behave differently in family firms and non family firms.

The research model is same with Eq. 1 except that the dependent variable is now the log change in selling, general and administrative costs. After the sample selection procedure, the sample consists of 1,503 firm year observations from 1994-1999. From family firm data merged with COMPUSTAT and ExecuComp reported in step 4 of Table 1, observations with missing data on SG and A costs and sales revenue for the current year and the previous two year is dropped. Next, observations are kept with positive values for SG and A costs, sales revenue and total assets. In order to test the hypothesis, it is first examined whether SG and A cost stickiness exists on average in the total sample. Then sample is divided into family firms and non family firms and SG and A cost behavior of each sample is compared. Column 1 of Table 5 shows the results of estimating Eq. 1 for total sample. The estimated value of β_1 is 0.8876 (t = 23.03) and the estimated value of β_2 is -0.2394 (t = -3.73). This result provides evidence on the presence of SG and A cost stickiness for the total sample. Next, column 2 and 3 of Table 4 show the results of estimating Eq. 1 for each sub sample. SG and A costs are found to be sticky in both family firms and non family firms.

Main test and additional test imply that family firms make different strategic choices compared to non family firms in terms of long term investment such as R and D spending but not for SG and A costs. This result is attributed to the different characteristics of R and D costs and SG and A costs. R and D costs have been characterized as an investment in literature. However, in contrast to R and D expenditures, there is a debate about the value of SG and A costs. For example, Armstrong *et al.* (2006) shows that after firms go public, SG and A expenditures are perceived as operating expenses rather than investment and are negatively related to equity value. Chen *et al.* (2012) also argue that managers might maximize resource under their control and these empire building incentives lead to SG and A cost stickiness. On the other hand, Banker *et al.* (2011)

Table 5: Regression result of family firm and SG and A costs behavior: Family firm versus non family firm

Variable	Predicted sign	Estimated coefficients		
		Total sample	Family firm	Non family firm
β_1 (ΔSales)	+	0.8876***	0.9027***	0.8922***
		(23.03)	(14.24)	(19.00)
β_2 (D*ΔSales)	-	-0.2394***	-0.2735**	-0.2939***
		(-3.73)	(-2.31)	(-3.70)
Constant	?	0.0440	-0.0178	0.0450
		(1.03)	(-1.21)	(1.06)
Year dummy		Yes	Yes	Yes
Ind dummy		Yes	Yes	Yes
Observations		1,473	475	999
R-squared		0.68	0.72	0.66

Table 5 reports cluster regression of family firm dummy and SG and A cost behavior. The dependent variable is ΔSG and A costs which is the change in selling, general and administrative costs. Definitions of variables are presented in Table 1. Observations of which absolute value is greater than 3 of studentized residual are removed in each regression test to avoid problems related to outliers. All specifications are estimated with robust standard errors clustered by firm and include year and 2-digit industry fixed effects. The robust t-statistics are in parentheses. *, **, ***Significant at the 10, 5 and 1% level, respectively (two-tailed test)

provide a more balanced view suggesting that SG and A spending have different future value creation potential depending on the situation and strategy of the firm. In sum, prior literature implies that the characteristics of SG and A costs are context specific and thus do not represent long term investment horizon of family firms as well as R and D expenditures do.

CONCLUSION AND LIMITATIONS

Differentiating firms based on their ownership structure, the cost stickiness is extanded by examining whether family firms differ from non family firms in R and D expenditure adjustment. Using S and P500 firms from 1994-1999, it is found that R and D costs are sticky in family firms but not in non family firms. On the other hand, SG and A costs behavior does not differ among family firms and non family firms. Overall, these results imply that ownership structure does matter in organizations and that family firms make different strategic choices compared to non family firms.

Existing literature is added by incorporating ownership structures. However, this study has limitations. The basic assumption of this study is that family firms face less severe agency problem caused by separation of ownership and management. However, another implication of founding families concentrated ownership and active involvement in the firms management is that founding families may be entrenched. In addition, family firms have less independent boards and have dominant control over the firm's board of directors (Anderson and Reeb, 2003a, 2004). For example, family members may manipulate accounting earnings to hide inappropriate related party transactions or to facilitate family members entrenchment. Regarding the studies on cost behavior, Chen *et al*. (2012)'s finding that managerial empire building incentives can cause SG and A cost stickiness support the conjecture that costs behavior can represent entrenchment. However, it is not expected that the sticky R and D in family firm reflects potential entrenchment effect of family firm for two reasons. First, regarding the characteristic of cost, SG and A costs encompass various cost objects such as management perquisites consumption or expansion of staff. However, R and D costs are less likely to represent managerial empire building incentives. Second, extant studies

provide evidence that founding families in U.S. family firms do not exhibit severe entrenchment problem whereas, family firms in countries with worse shareholder protection and law enforcement do. As a notable study Anderson and Reeb (2003a) find that U.S. family firms perform better than non family firms. Following Anderson and Reeb (2003a) many studies document that while family firms also suffer from the agency problem, the overall agency problem in family firms could be less severe than that in non family firms (Wang, 2006; Ali *et al.*, 2007; Chrisman *et al.*, 2004). In this regard, maintainance of R and D in family firms may not be caused by the entrenchment problems.

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