# Family Ownership, Investment Behavior,
# and Firm Performance

## Evidence from Japanese Electric Machinery Industry

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## Abstract

We studied family firms in the Japanese electric machinery industry.  First, we compared firm performance between family and non-family firms, and found that family firms show higher profitability.  Second, we tried to distinguish among reasons for better performance of family firms.  The results of several t-tests and regression analyses suggest that selecting top management from the pool restricted to the family is not an important disadvantage of family firms.  They also suggest that neither combining ownership and control nor holding large equity share is the advantage of family firms.  On the other hand, family firms in the sample invest in capacity significantly more than non-family firms in the 1990s.  Therefore, longer investment horizons of family firms may be the reason for better performance, especially during the low growth era.

### Introduction

In contrast to Berle and Means's view that ownership is separated from management in modern corporations, several studies reported that family-owned firms are prevalent in the world.  Family businesses occupy one third of Standard and Poor's 500 (Anderson et al., 2003).  Family firms comprise 80% to 90% of all business enterprises in North America, and employ 62% of the U.S. Workforce.  The ratios in Asia, Europe, and South America are higher than in North America　.

Family ownership is widely believed to be less efficient than dispersed ownership.  Fama and Jensen (1983) argue that the combining ownership and control may allow founding families to exchange profits for private rents.  Demsetz (1983) discusses that founding families may choose nonpecuniary consumption and draw scarce resources away from profitable projects.  Families also often choose CEO from the pool restricted to family members, suggesting that difficulty to obtain qualified and capable talent continuously, potentially leading to competitive disadvantages relative to non-family firms (Anderson and Reeb, 2003).

Nevertheless, several excellent companies in the world are family-owned firms.  Salvatore Ferragamo,

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See Family Firm Institute Web site (http://www.ffi.org/).

for example, has been soundly managed in apparel industry without speculation or irrelevant diversification. Samsung Electronics, for example, has grown in semiconductor industries by aggressive investment. Not only have case studies of individual firms but also systematic empirical analyses found better performance of family firms. McConaughy et al. (2001) find that family firms have greater value, are operated more efficiently, and carry less debt than non-family firms. Anderson and Reeb (2003) also find that family firms perform better than non-family firms.

There are several literatures suggesting the benefits of family firms. Demsetz and Lehn (1985) argue that family members with large equity share have substantial economic incentives to diminish agency conflicts and maximize firm value. James (1999) points out that families have longer investment horizons, resulting in greater investment efficiency. Stein (1988; 1989) discusses how the presence of shareholders with relatively long investment horizons can mitigate the incentives for myopic investment decisions by managers.

As described above, existing studies provide both advantages and disadvantages of family businesses, while empirical analyses show better performance of family firms in the U.S. and Europe. Thus, in this paper, we will compare the performance between family and non-family firms in Japan. Moreover, many studies have compared performance between family and non-family firms, but few studies have distinguished among the theories on why family firms perform better than non-family firms. In this paper, therefore, we compare the performance among different types of family-firms and analyze any difference in investment behavior between family and non-family firms. By doing so, we explore why family firms perform better. In other words, we try to understand which benefit of family firms for their better performance is more important.

The structure of this paper is as follows: The next section briefly reviews existing studies on family firms, and establishes several hypotheses. Section III discusses the data and the method. Section IV shows the empirical results. Section V discusses about the results and provides a summary and future research agenda.

## Theories and Hypotheses

It is widely believed that founding families tend to take actions that benefit themselves at the expense of firm performance. Fama and Jensen (1985) argue that large shareholders employ different investment decision rules from diversified shareholders, who are supposed to evaluate investments using market value rules that maximize the value of the firms' residual cash flows.

Selecting CEO from the pool restricted to family members can be another reason for poor performance of family firms relative to non-family firms. Schleifer and Vishny (1987) suggest that large shareholders remain active in management even if they are no longer competent and qualified to run the firm.

Families can also expropriate wealth from the firm through excessive compensation, special dividends, and so on. Shleifer and Summers (1988) argue that families have incentives to redistribute rents from employees to themselves. Family's action to maximize their personal utility potentially results in poor firm performance relative to non-family firms.

On the other hand, several researchers point out the advantages of family firms. Demsetz and Lehn

(1985) argue that families have strong incentives to monitor managers and minimize the free rider problem inherent with atomistic shareholders, because the family' wealth is closely linked to firm welfare and because the family have knowledge of the firm's technology necessary to monitor managers.

Families may be willing to invest in long-term projects because they have longer horizons than other shareholders (Stein, 1988; 1989; James, 1999).  Since founding families regard their firms as an asset to pass on to their descendants rather than wealth to consume during their lifetime, firm survival is an important concern for families.  Therefore, family firms may maximize long-term value (Casson, 1999).

Since existing literatures point out both advantages and disadvantages of family firms, we set two alternative hypotheses.

*Hypothesis 1a:  Family firms perform better than non-family firms.*

*Hypothesis 1b:  Non-family firms perform better than family firms.*

Supposing that we will find that family firms perform better than non-family firms (consistent with *Hypothesis 1a*) like many existing empirical studies, we will explore why family firms perform well. The disadvantages of family firms pointed out by existing studies are broadly classified into two: prodigality or divergence from maximization of firm value and incompetent and unqualified managers chosen from the restricted pool of family members.  This paper will examine the latter.

Founders may find it difficult to choose a qualified successor from their family. Therefore, firms run by the founders perform better than those run by the successors from their family.  If families understand such a disadvantage, they may search for a talented manager from larger pool.  As a result, they continue to own their firms, but appoint CEO from outside the family.  If so, family firms run by non-family members perform better than those run by the successors from the family.   Therefore, we set the following hypotheses:

*Hypothesis 2: Firms run by the founders perform better than those run by the successors selected from the family.*

*Hypothesis 3: Family firms run by non-family members perform better than those run by successors from the family.*

Existing studies pointed out two kinds of advantages of family firms: less agency conflict and longer investment horizons.  If combining ownership and control, which mitigates agency conflict, is the reason for better performance of family firms, firms not only owned by the families but also run by the CEO from the family members should perform well.  In the firms owned by the families but run by CEO from outside the family members, however, ownership is separated from management.  Therefore, they should not perform as well as the family firms combining ownership and control.  Thus, we have the following hypothesis:

*Hypothesis 4: Family firms not only owned by the families but also run by the CEO from the family members perform better than the firms owned by the families but run by the CEO from outside the family members.*

The reason for better performance of family firms may be not combining ownership and management but large equity share owned by family. Because the families who are large shareholders have strong incentives to monitor managers and mitigate agency problems, even firms owned by the family members with large equity share but run by the CEO from outside the family members may perform well. However this reason is not applied only to family firms. Firms owned by large but non-family shareholders should also perform well. Thus, we have the following hypothesis:

*Hypothesis 5: Firms owned by large but non-family shareholders perform as well as family firms.*

If family firms have longer investment horizons, they can invest in long-term project non-family firms cannot invest in. As a result, family firms tend to make more aggressive investment. Moreover, non-family firms may adjust investment level to economic conditions frequently, while family firms are patient enough to keep their investment level. Therefore, we set the hypotheses as follows:

*Hypothesis 6: Family firms invest more than non-family firms.*

*Hypothesis 7: Family firms show more stable investment than non-family firms.*

These hypotheses will be tested in this paper to compare the performance between family and non-family firms, and distinguish among the reason for the better performance of family firms.

## Data and Methods

### (1) Sample

In this study, we collected the data of the electric machinery manufacturers in Japan from 1992 to 2005, and examined their ownership structure, investment behavior, and firm performance. We specified the founding families of 248 large electronic equipment manufacturers in Japan . To construct other variables described below, we collected the financial data of each firm between 1992 and 2005 from the database of *Nikkei Financial Quest*. As a result, the data was collected for 190 out of 248 firms.

Then, we collected the data of the equity share of ten largest shareholders from Yuka Shoken Hokoku-sho of each firm. We regarded the shareholders whose family name is the same as that of the founder, as founding family members, and considered that sum of the equity share of founding family members is the family share . Moreover, we examined if the current president or chairman is the fami-

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The data source is *Nihon Kaisha-shi Soran* (*A Bibliography of Company History*), Toyo Keizai Shinpo-sha, 1995. This book summarizes the histories of 3072 important firms in Japan.

If there are foundations or other organizations owned by family members, the equity share of them are counted in the family share. The data source is *Oukabunushi Soran* (*A Bibliography of Large Shareholders*), Toyo Keizai, 1994.

ly members.

Family businesses can be defined in terms of management and in term of ownership. We have three kinds of family business dummy variables. First, *FB1* is equal to 1 if the president or the chairman of the firms is from the founding family, and 0 otherwise. Second, *FB2* is equal to 1 if family member is listed in the top 10 shareholders, and 0 otherwise. Third, *FB3* is equal to 1 if the equity share of family among the 10 largest shareholders is more than 5%, and 0 otherwise. Out of 190 sample firms, 69 firms are run by the founding family (*FB1*=1), 80 firms are owned by the family (FB2=1), and 51 firms are largely owned by the family (*FB3*=1).

## (2) Variables and Methods

First, to know if there is significant difference in performance between family and non-family firms (*Hypothesis 1a* and *1b*), we will perform t-tests for difference in means of performance. As performance measures, we construct the return on asset (*ROAt*) and the sales growth rate (*AAGRt*). *ROAt* is the average of ROA of a firm in each year during the period t, and *AAGRt* is the average annual growth rate of the sales during the period t. We set the three periods: from 1992 to 2005 (whole sample period), from 1992 to 1998 (depression), and from 1999 to 2005 (recovery) .

Second, we will examine if the selection of the top management from the pool restricted to the family members causes a disadvantage of family firms. To do so, we will divide the family firms run by founding family members (*FB1*=1) into those run by the founders and those run by the successors of family members. Then, we will perform t-tests for difference in means of performance between the two (*Hypothesis 2*). If restricted pool causes a disadvantage, we expect that family firms run by the founder perform significantly better than those run by the successors of family members. We will also divide family firms into those run by the successor of family members (*FB2*=1 and Successor) and those run by non-family members (*FB2*=1 and *FB1*=0), and will perform t-tests for difference in means of performance (*Hypothesis 3*). If restricted pool causes a disadvantage, we expect that family firms run by non-family members perform significantly better than those run by the family members.

Third, we will examine if combining ownership and control is the advantage of family firms. To do so, we will perform t-tests for difference in means of performance between family firms not only owned by the families but also run by the CEO from the family members (*FB2*=1 and *FB1*=1) and the firms owned by the families but run by the CEO from outside the family members (*FB2*=1 and *FB1*=0) (*Hypothesis 4*).

Fourth, we will examine if not combining ownership and management but large equity share resulting in strong incentive to monitor managers is the advantage of family firms (*Hypothesis 5*). To do so, we will run the regressions. Dependent variables are several kinds of performance measure described above. Independent variables are dummy variables of family firms owned by family members (*FB2*) and equity share of the largest shareholders (*Largest_Share*). If not being owned by family members but being owned by large shareholders is the reason for better performance, *Largest_Share* as well as *FB2*

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Japanese economy had suffered from long depression, "lost ten years," as we call, since the collapse of the bubble economy in 1992, and has recovered early 2000s.

should have significantly positive coefficient  We will also include several control variables described below.

Finally, to examine any impacts of ownership structure on investment behavior, we will run the regressions.  As dependent variables, two kinds of investment, R&D investment (*RDRt* and *CVRDRt*) and capacity investment (*CAPRt* and *CVCAPRt*), will be examined.  *RDRt* is the average of R&D sales ratio of a firm in each year during the period t, and *CAPRt* is the average of capacity investment divided by sales of a firm in each year during the period t (t=1994-2005, 1994-1998, 1999-2005).  *CVRDRt* is the coefficient of variation of R&D sales ratios in each year during the period t and *CVCAPRt* is the coefficient of variation of capacity investment divided by sales in each year during the period t.

Independent variables are family firm dummies such as *FB1*, *FB2*, and *FB3*.  In addition to them, we will include several control variables. *AGE* is the number of years from the year when the firm was established to 2005.  *DEBTR* is debt ratio.  *EMP* is the number of employees, which stands for the size of the firm.  We also include *ROAt* and *Largest_Share*.  The mean, standard deviation, and correlation matrix of the variables are indicated in Table 1.

Table 1: Correlation Matrix, Mean, and Standard Deviation

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. AGE | | | | | | | | | | | | | |
| 2. Largest_Share | -0.100 | | | | | | | | | | | | |
| 3. FB1 | -0.288 | -0.285 | | | | | | | | | | | |
| 4. FB2 | -0.357 | -0.279 | 0.673 | | | | | | | | | | |
| 5. FB3 | -0.330 | -0.161 | 0.596 | 0.725 | | | | | | | | | |
| 6. ROA92-05 | -0.191 | -0.129 | 0.200 | 0.241 | 0.165 | | | | | | | | |
| 7. AAGR92-05 | -0.070 | -0.060 | 0.118 | 0.028 | -0.065 | 0.196 | | | | | | | |
| 8. DEBTR92-05 | 0.083 | 0.069 | 0.002 | -0.132 | -0.088 | -0.111 | -0.110 | | | | | | |
| 9. EMP92-05 | 0.311 | -0.138 | -0.164 | -0.225 | -0.163 | -0.020 | 0.021 | -0.023 | | | | | |
| 10. AVERDR94-05 | -0.093 | -0.042 | -0.006 | -0.047 | -0.032 | 0.058 | 0.096 | -0.184 | 0.188 | | | | |
| 11. AVEINVR94-05 | -0.193 | -0.107 | 0.079 | 0.034 | 0.040 | 0.238 | -0.002 | -0.094 | 0.004 | 0.124 | | | |
| 12. CVRDR94-05 | 0.090 | -0.055 | 0.096 | 0.077 | 0.105 | -0.129 | -0.053 | 0.016 | -0.039 | -0.059 | 0.300 | | |
| 13. CVINV94-05 | -0.092 | -0.055 | 0.026 | 0.026 | 0.083 | -0.136 | -0.055 | 0.050 | -0.180 | -0.132 | 0.284 | 0.377 | |
| Mean | 59.088 | 20.082 | 0.356 | 0.405 | 0.263 | 0.834 | -0.001 | 221.415 | 3276.646 | 0.047 | 0.051 | 0.490 | 0.649 |
| Standard Deviation | 16.090 | 16.559 | 0.480 | 0.492 | 0.442 | 3.572 | 0.086 | 722.158 | 8879.345 | 0.031 | 0.047 | 1.653 | 0.494 |

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. AGE | | | | | | | | | | | | | |
| 2. Largest_Share | -0.100 | | | | | | | | | | | | |
| 3. FB1 | -0.288 | -0.285 | | | | | | | | | | | |
| 4. FB2 | -0.357 | -0.279 | 0.673 | | | | | | | | | | |
| 5. FB3 | -0.330 | -0.161 | 0.596 | 0.725 | | | | | | | | | |
| 6. ROA92-98 | -0.143 | -0.152 | 0.208 | 0.248 | 0.178 | | | | | | | | |
| 7. AAGR92-98 | -0.241 | -0.087 | 0.101 | 0.150 | 0.057 | 0.624 | | | | | | | |
| 8. DEBTR92-98 | 0.060 | 0.081 | -0.017 | -0.123 | -0.077 | -0.216 | -0.314 | | | | | | |
| 9. EMP92-98 | 0.315 | -0.135 | -0.163 | -0.224 | -0.162 | 0.019 | 0.039 | -0.025 | | | | | |
| 10. AVERDR94-98 | -0.031 | 0.005 | 0.005 | -0.053 | -0.063 | -0.039 | 0.068 | -0.122 | 0.214 | | | | |
| 11. AVEINVR94-98 | -0.093 | -0.055 | 0.060 | 0.093 | 0.144 | 0.173 | 0.199 | -0.054 | 0.011 | 0.114 | | | |
| 12. CVRDR94-98 | 0.068 | -0.059 | 0.103 | 0.093 | 0.117 | -0.067 | -0.085 | -0.020 | -0.041 | -0.036 | 0.536 | | |
| 13. CVINV94-98 | -0.103 | -0.066 | 0.042 | 0.065 | 0.146 | -0.088 | -0.067 | -0.005 | -0.191 | -0.181 | 0.201 | 0.358 | |
| Mean | 59.088 | 20.082 | 0.356 | 0.405 | 0.263 | 0.839 | 0.006 | 218.088 | 3731.185 | 0.050 | 0.047 | 0.326 | 0.477 |
| Standard Deviation | 16.090 | 16.559 | 0.480 | 0.492 | 0.442 | 3.088 | 0.056 | 614.073 | 10461.754 | 0.037 | 0.051 | 1.823 | 0.381 |

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. AGE | | | | | | | | | | | | | |
| 2. Largest_Share | -0.100 | | | | | | | | | | | | |
| 3. FB1 | -0.288 | -0.285 | | | | | | | | | | | |
| 4. FB2 | -0.357 | -0.279 | 0.673 | | | | | | | | | | |
| 5. FB3 | -0.330 | -0.161 | 0.596 | 0.725 | | | | | | | | | |
| 6. ROA99-05 | -0.198 | -0.086 | 0.150 | 0.182 | 0.120 | | | | | | | | |
| 7. AAGR99-05 | -0.052 | -0.085 | 0.105 | 0.018 | -0.054 | 0.140 | | | | | | | |
| 8. DEBTR99-05 | 0.094 | 0.059 | 0.015 | -0.133 | -0.093 | -0.074 | -0.003 | | | | | | |
| 9. EMP99-05 | 0.302 | -0.141 | -0.162 | -0.224 | -0.162 | -0.039 | -0.009 | -0.024 | | | | | |
| 10. AVERDR99-05 | -0.105 | -0.068 | -0.012 | -0.029 | -0.002 | 0.110 | 0.127 | -0.167 | 0.147 | | | | |
| 11. AVEINVR99-05 | -0.156 | -0.103 | 0.092 | 0.008 | -0.030 | 0.288 | -0.072 | -0.119 | 0.013 | 0.045 | | | |
| 12. CVRDR99-05 | 0.062 | 0.058 | -0.058 | -0.095 | -0.058 | -0.351 | -0.220 | 0.268 | -0.099 | -0.072 | 0.019 | | |
| 13. CVINV99-05 | -0.052 | 0.008 | -0.018 | -0.017 | 0.040 | -0.102 | -0.165 | 0.088 | -0.158 | 0.012 | 0.402 | 0.346 | |
| Mean | 59.088 | 20.082 | 0.356 | 0.405 | 0.263 | 0.873 | -0.002 | 225.143 | 2821.968 | 0.045 | 0.052 | 0.315 | 0.479 |
| Standard Deviation | 16.090 | 16.559 | 0.480 | 0.492 | 0.442 | 5.001 | 0.097 | 867.144 | 7390.866 | 0.031 | 0.052 | 0.360 | 0.372 |

## Results

### (1) T-Test

First, the results of the t-tests for difference in means of performance between family and non-family firms are shown in Table 2. Regarding ROA, any kinds of family firms perform significantly better than non-family firms. Regarding sales growth rate, the results are mixed. The firms run by the family members (*FB1*) grow significantly more than non-family firms from 1992 to 2005 and from 1999 to 2005, but the difference in growth rate from 1992 to 1998 is insignificant. The firms owned by the family members (*FB2*) grow significantly more than non-family firms from 1992 to 1998 and from 1999 to 2005, but the difference in growth rate from 1992 to 2005 is insignificant. The firms owned by the family members with more than 5% of equity share (*FB3*) do not grow significantly more than non-family firms during any periods. Thus, *Hypothesis 1a* is clearly supported in terms of ROA, and partially supported in terms of sales growth rate, while *Hypothesis 1b* is rejected. In sum, in the Japanese electric machinery manufacturers, family firms perform better than non-family firms as the existing empirical analyses in the different contexts found.

Second, the results of the t-tests for difference in means of performance between family firms run by the founders and those run by the successors are shown in Table 3. In terms of ROA as well as sales growth rate, family firms run by the founders perform better than family firms run by the successors from 1992 to 2005 and from 1992 to 1998. Therefore, during these periods, *Hypothesis 2* is supported. This suggests that the family may have difficulty to obtain qualified and capable CEO from the pool restricted to the family members.

However, the difference in performance may not be caused by the difference between founders and successors. Family firms run by the founders are relatively young. Therefore, better performance of the family firms run by the founders may be caused not by the difference in top management (founders vs. successors) but by the difference in youth. Insignificant difference in performance from 1999 to 2005 when age difference between the two kinds of firms relatively decreases is consistent with the latter interpretation.

The results of another test examining if selection of managers from restricted pool of family members is the disadvantage of family firms are indicated in Table 4. Different from the results in Table 3, any specifications in Table 4 do not show significant difference. That is, there is no significant difference in performance between family owned firms run by the successors from family members and those run by non-family members. Thus, *Hypothesis 3* is rejected. Expanding the pool of managers to outside families does not improve performance. This suggests that the pool restricted to the family members does not cause disadvantages of family firms.

Third, we performed several tests to examine if combining ownership and control is the reason for better performance of family firms. One is the t-tests for difference in means of performance between firms owned by family and run by family members (*FB2*=1 and *FB1*=1) and firms owned by family but run by non-family members (*FB2*=1 and *FB1*=0). The results are shown in Table 5. Any specifications in Table 5 do not show significant difference. That is, there is no significant difference in performance between family owned firms run by the family members and those run by non-family members. Thus, *Hypothesis 4* is rejected.

Table 2: T-Test for Diffence in Means of ROA and AAGR between Family and Non-Family Firms

|  | ROA92-05 | | ROA92-05 | | ROA92-05 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | FB2=1 | FB3=0 | FB3=1 |
| Mean | 0.2934434 | 1.7753225 | 0.1002276 | 1.8348207 | 0.4759872 | 1.8043967 |
| Variance | 15.298745 | 7.0960265 | 16.022412 | 6.7094284 | 13.863905 | 8.6843331 |
| Obs. | 120 | 69 | 109 | 80 | 138 | 51 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 182 | | 184 | | 112 | |
| t stat. | -3.087714 | *** | -3.610114 | *** | -2.55301 | ** |

|  | ROA92-98 | | ROA92-98 | | ROA92-98 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | FB2=1 | FB3=0 | -11.93286 |
| Mean | 0.35213 | 1.6852381 | 0.1838532 | 1.7312143 | 0.5060559 | 2.0126857 |
| Variance | 8.906336 | 9.6283571 | 9.0726771 | 8.8876193 | 8.3867928 | 8.0847765 |
| Obs. | 120 | 69 | 109 | 80 | 138 | 50 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 137 | | 171 | | 88 | |
| t stat. | -2.883374 | *** | -3.510111 | *** | -3.194269 | *** |

|  | ROA99-05 | | ROA99-05 | | ROA99-05 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | FB2=1 | FB3=0 | FB3=1 |
| Mean | 0.307378 | 1.864089 | 0.1004188 | 1.9346101 | 0.5091598 | 1.8635621 |
| Variance | 33.506938 | 8.8069826 | 36.004568 | 8.1756744 | 29.982819 | 10.402456 |
| Obs. | 121 | 69 | 110 | 80 | 139 | 51 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 186 | | 165 | | 151 | |
| t stat. | -2.447483 | ** | -2.79871 | *** | -2.090701 | ** |

|  | AAGR92-05 | | AAGR92-05 | | AAGR92-05 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | FB2=1 | FB3=0 | FB3=1 |
| Mean | -0.008834 | 0.0121716 | -0.003209 | 0.0016198 | 0.0022196 | -0.010325 |
| Variance | 0.0105967 | 0.0017234 | 0.0023405 | 0.0144769 | 0.0022068 | 0.0217866 |
| Obs. | 120 | 69 | 109 | 80 | 138 | 51 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 172 | | 98 | | 54 | |
| t stat. | -1.973581 | ** | -0.339418 | | 0.5958678 | |

|  | AAGR92-98 | | AAGR92-98 | | AAGR92-98 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | FB2=1 | FB3=0 | FB3=1 |
| Mean | 0.0012438 | 0.0129465 | -0.001679 | 0.0153197 | 0.0035705 | 0.010781 |
| Variance | 0.0026094 | 0.0040521 | 0.002561 | 0.0038245 | 0.0025065 | 0.0049348 |
| Obs. | 120 | 69 | 109 | 80 | 138 | 51 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 118 | | 149 | | 70 | |
| t stat. | -1.304571 | | -2.013101 | ** | -0.672603 | |

|  | AAGR99-05 | | AAGR99-05 | | AAGR99-05 | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FB1=0 | FB1=1 | FB2=0 | -1 | FB3=0 | FB3=1 |
| Mean | -0.009801 | 0.0112173 | -0.00361 | 0.0124716 | 0.0009776 | -0.010741 |
| Variance | 0.0133518 | 0.0021125 | 0.0052609 | 0.0022952 | 0.0045676 | 0.0225965 |
| Obs. | 121 | 69 | 110 | 79 | 139 | 51 |
| Hypothesized Mean Dif. | 0 | | 0 | | 0 | |
| df | 172 | | 186 | | 58 | |
| t stat. | -1.770273 | ** | -1.834151 | ** | 0.5371366 | |

Significance levels are using 2-tailed test: **=5%, ***=1%.

Table 3: T-Test for Diffence in Means of ROA and AAGR between Founders and Successors

| | ROA92-05 | | AAGR92-05 | |
| --- | --- | --- | --- | --- |
| | successor | founder | successor | founder |
| Mean | 1.41837302 | 3.06034066 | 0.00368856 | 0.04271039 |
| Variance | 6.42311075 | 7.88968295 | 0.00129247 | 0.00220101 |
| Obs. | 54 | 15 | 54 | 15 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 21 | | 19 | |
| t stat. | -2.0446071 | * | -2.9869689 | *** |

| | ROA92-98 | | AAGR92-98 | |
| --- | --- | --- | --- | --- |
| | successor | founder | successor | founder |
| Mean | 1.32701058 | 2.97485714 | 0.00032954 | 0.05836777 |
| Variance | 9.57364862 | 8.24632093 | 0.00271594 | 0.00657558 |
| Obs. | 54 | 15 | 54 | 15 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 24 | | 17 | |
| t stat. | -1.9325746 | * | -2.6254724 | ** |

| | RAO99-05 | | AAGR99-05 | |
| --- | --- | --- | --- | --- |
| | successor | founder | successor | founder |
| Mean | 1.50973545 | 3.1397619 | 0.00642011 | 0.02848736 |
| Variance | 7.49702704 | 12.1672624 | 0.00193473 | 0.00252829 |
| Obs. | 54 | 15 | 54 | 15 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 19 | | 20 | |
| t stat. | -1.6723854 | | -1.5435754 | |

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 4: T-Test for Difference in Means of ROA and AAGR between Family Owned Firms Run
by Successors of Family  and Run by Non-Family Members

| | ROA92-05 | | AAGR92-05 | |
|---|---|---|---|---|
| | owned by family run by successors | owned by family run by outsiders | owned by family run by successors | owned by family run by outsiders |
| Mean | 1.431825397 | 1.999243851 | 0.003864068 | -0.029340374 |
| Variance | 6.51061678 | 5.820714994 | 0.001273381 | 0.050783275 |
| Obs. | 45 | 21 | 45 | 21 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 41 | | 20 | |
| t stat. | -0.87361621 | | 0.671304065 | |

| | ROA92-98 | | AAGR92-98 | |
|---|---|---|---|---|
| | owned by family run by successors | owned by family run by outsiders | owned by family run by successors | owned by family run by outsiders |
| Mean | 1.300984127 | 1.895782313 | 0.002081232 | 0.01545223 |
| Variance | 10.31608792 | 5.411569077 | 0.002512088 | 0.003332373 |
| Obs. | 45 | 21 | 45 | 21 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 53 | | 35 | |
| t stat. | -0.852377224 | | -0.912938409 | |

| | RAO99-05 | | AAGR99-05 | |
|---|---|---|---|---|
| | owned by family run by successors | owned by family run by outsiders | owned by family run by successors | owned by family run by outsiders |
| Mean | 1.562666667 | 2.092494331 | 0.005681354 | -0.028763831 |
| Variance | 6.834625751 | 8.397549907 | 0.002161549 | 0.051929069 |
| Obs. | 45 | 21 | 45 | 21 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 36 | | 21 | |
| t stat. | -0.71327662 | | 0.686049188 | |

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 5: T-Test for Difference in Means of ROA and AAGR between Family Owned Firms Run
by Family Members and Run by Non-Family Members

|  | ROA92-05 | | AAGR92-05 | |
| --- | --- | --- | --- | --- |
|  | FB1=0&FB2=1 | FB1=1&FB2=1 | FB1=0&FB2=1 | FB1=1&FB2=1 |
| Mean | 1.999243851 | 1.776297262 | -0.029340374 | 0.012639463 |
| Variance | 5.820714994 | 7.118288516 | 0.050783275 | 0.0017365 |
| Obs. | 21 | 59 | 21 | 59 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 39 | | 20 | |
| t stat. | 0.353471438 | | -0.848522043 | |

|  | ROA92-98 | | AAGR92-98 | |
| --- | --- | --- | --- | --- |
|  | FB1=0&FB2=1 | FB1=1&FB2=1 | FB1=0&FB2=1 | FB1=1&FB2=1 |
| Mean | 1.895782313 | 1.672639225 | 0.01545223 | 0.015272571 |
| Variance | 5.411569077 | 10.22619612 | 0.003332373 | 0.004060152 |
| Obs. | 21 | 59 | 21 | 59 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 48 | | 39 | |
| t stat. | 0.339887481 | | 0.011911265 | |

|  | RAO99-05 | | AAGR99-05 | |
| --- | --- | --- | --- | --- |
|  | FB1=0&FB2=1 | FB1=1&FB2=1 | FB1=0&FB2=1 | FB1=1&FB2=1 |
| Mean | 2.092494331 | 1.878414044 | -0.028763831 | 0.009988035 |
| Variance | 8.397549907 | 8.227887563 | 0.051929069 | 0.002232214 |
| Obs. | 21 | 59 | 21 | 59 |
| Hypothesized Mean Dif. | 0 | | 0 | |
| df | 35 | | 21 | |
| t stat. | 0.291504824 | | -0.773392216 | |

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

(2) Regression Analysis

We ran the regressions to examine if large shareholders' strong incentives to control managers are the reason for better performance of family firms.  The results are indicated in Table 6 and 7. According to the tables, the family business dummy (*FB2*) has significantly positive relationship with *ROA92-05* and with *ROA92-98*, while does not have significant relationship with ROA99-05 and with sales growth (*AAGRt*) during any periods.  Therefore, family firms show higher ROA from 1992 to 2005 and from 1992 to 1998 than non-family firms.  On the other hand, the coefficient of *Largest_Share* in any models is insignificant in almost all of the models.  In model (9) in Table 7, it is significant but the sign is negative and opposite to our expectation.  Therefore, shareholders with large equity share do not have a positive impact on firm performance, and *Hypothesis 5* is rejected.  That is, family firms perform better because family with large equity share has strong incentives to monitor managers, while all the large shareholders do not work equivalently.  This suggests that not owning large equity share but family membership does matter.

According to Table 6 and Table 7, some of the variables indicating investment behavior have significant coefficients.  In all the models of Table 6, capacity investment (*AVEINVR*) has significantly positive coefficients and stability of R&D investment and that of capacity investment (*CVRDRt*, *CVINVt*) have significantly negative coefficients.  In model (3) through (6) of Table 7, *AVEINVRt* has a significantly positive coefficient and *CVRDRt* has a significantly negative coefficient.  In model (7) through (9) of Table 7, *AVERDRt* has a significantly positive coefficient and *CVRDRt* has a significantly negative coefficient.  Therefore, in short, the more the firms invest and the less they change the amount of investment, the better they perform.

Then, we examined if there is any difference in investment behavior between family and non-family firms.  The results are shown in Table 8, 9, 10, and 11.  Table 8 indicates the result of the analysis on R&D investment.  In model (8), *FB2*, the dummy for family firms, where family members are listed in the top 10 shareholders, has significant at the 10% level, but the sign is negative.  In the other models, any family firm dummies are not significant.  Therefore, family firms do not invest in R&D more than non-family firms.

In Table 9 indicating the result of the analysis on capacity investment, on the other hand, *FB2* and *FB3*, dummies for the firms owned by the family members have significantly positive coefficients from 1994 to 1998, while they have significantly negative coefficients from 1999 to 2005.  Thus, family firms invest in capacity more than non-family firms from 1994 to 1998, while family firms invest in capacity less than non-family firms from 1999 to 2005.  *Hypothesis 6* is supported only in case of capacity investment from 1994 to 1998.

Table 10 shows the results of the analysis on stability of R&D investment.  In models (1) through (6), all the three kinds of family business dummies have significant coefficients, but the sign is positive.  In Table 11, showing the results of the analysis on stability of capacity investment, *FB3* has a significant coefficient only in model (4), but the sign is positive.  The positive sign is opposite to our expectation, suggesting that family firms change the amount of R&D and capacity investment more than non-family firms.  In other models, family business dummies do not have significant coefficients.  Therefore, *Hypothesis 7* is rejected.

Table 6: The Regression Analysis on the Determinants of ROA

| | ROA92-05 | | | ROA92-98 | | | ROA99-05 | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| Constant | 2.45 | 1.77 | 3.09 | 2.26 | 0.84 | 2.81 | 3.38 | 2.28 | 2.86 |
| | (1.96)* | (1.25) | (2.32)** | (2.15)** | (0.71) | (2.52)** | (2.15)** | (1.25) | (1.69)* |
| AGE | -0.03 | -0.02 | -0.03 | -0.01 | -5.77E-04 | -0.02 | -0.03 | -0.02 | -0.02 |
| | (-1.77)* | (-0.93) | (-1.63)* | (-0.98) | (-0.04) | (-1.11) | (-1.40) | (-0.94) | (-0.96) |
| DEBTRt | 0.00 | -1.66E-03 | -1.77E-03 | 0.00 | -2.55E-03 | -2.49E-03 | 0.00 | -2.85E-03 | -3.03E-03 |
| | (-1.09) | (-1.56) | (-1.66)* | (-3.86)*** | (-3.71)*** | (-3.51)*** | (-2.12)** | (-1.81)* | (-1.93)* |
| EMPt | -1.17E-05 | 1.14E-06 | -1.82E-05 | 5.27921E-06 | 1.13E-05 | 9.04E-07 | -4.71E-05 | -4.07E-05 | -5.70E-05 |
| | (-0.46) | (0.04) | (-0.61) | (0.23) | (0.50) | (0.04) | (-1.02) | (-0.87) | (-1.23) |
| AVERDRt | 0.76 | -3.74 | 0.45 | -8.44 | -7.29 | -7.88 | 13.47 | 14.58 | 16.73 |
| | (0.09) | (-0.51) | (0.05) | (-1.37) | (-1.19) | (-1.27) | (1.26) | (1.36) | (1.56) |
| AVEINVRt | 29.50 | 19.76 | 28.19 | 20.05 | 18.71 | 19.98 | 32.40 | 32.89 | 33.75 |
| | (4.40)*** | (2.83)*** | (4.20)*** | (3.37)*** | (3.18)*** | (3.35)*** | (4.65)*** | (4.72)*** | (4.83)*** |
| CVRDRt | -0.34 | -0.48 | -0.34 | -0.33 | -0.36 | -0.33 | -4.33 | -4.25 | -5.07 |
| | (-2.05)** | (-2.41)** | (-2.08)** | (-2.18)** | (-2.38)** | (-2.18)** | (-4.35)*** | (-4.26)*** | (-4.92)*** |
| CVINVt | -1.41 | -0.98 | -1.49 | -1.10 | -0.99 | -1.19 | -2.09 | -2.09 | -2.16 |
| | (-2.53)** | (-1.66)* | (-2.65)*** | (-1.75)* | (-1.61) | (-1.83)* | (-2.03)** | (-2.03)** | (-2.09)** |
| FB2 | | 1.27 | | | 1.21 | | | 0.89 | |
| | | (2.22)** | | | (2.53)** | | | (1.19) | |
| Largest_Share | | | -0.02 | | | -0.02 | | | -3.83E-03 |
| | | | (-1.57) | | | (-1.55) | | | (-0.19) |
| R2 | 0.16 | 0.17 | 0.19 | 0.17 | 0.20 | 0.19 | 0.29 | 0.29 | 0.31 |
| adj. R2 | 0.13 | 0.13 | 0.16 | 0.14 | 0.17 | 0.15 | 0.26 | 0.26 | 0.28 |
| NOB | 187 | 180 | 185 | 179 | 179 | 177 | 182 | 182 | 180 |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 7: Regression Analysis on the Determinants of Sales Growth Rate

| | AAGR92-05 | | | AAGR92-98 | | | AAGR99-05 | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| *Constant* | 0.02 | 0.02 | 0.05 | 0.04 | 0.04 | 0.05 | 0.04 | 0.04 | 0.06 |
| | (0.49) | (0.55) | (2.47)** | (2.16)** | (1.70)* | (2.47)** | (1.95)* | (1.74)* | (2.36)** |
| *AGE* | 0.00 | -2.79E-04 | -7.40E-04 | 0.00 | -6.28E-04 | -7.40E-04 | 0.00 | -3.47E-04 | -3.84E-04 |
| | (-0.66) | (-0.56) | (-2.78)*** | (-2.57)** | (-2.25)** | (-2.78)*** | (-1.07) | (-1.05) | (-1.20) |
| *DEBTRt* | -2.61088E-05 | -3.50E-05 | -3.80E-05 | -4.07E-05 | -4.03E-05 | -3.80E-05 | -6.18616E-05 | -6.25E-05 | -5.11E-05 |
| | (-1.23) | (-1.24) | (-3.05)*** | (-3.33)*** | (-3.28)*** | (-3.05)*** | (-2.92)*** | (-2.87)*** | (-2.36)** |
| *EMPt* | 5.45269E-08 | 1.30E-07 | 3.08E-07 | 3.35E-07 | 3.53E-07 | 3.08E-07 | -4.50E-07 | -4.59E-07 | -6.18E-07 |
| | (0.08) | (0.15) | (0.76) | (0.84) | (0.88) | (0.76) | (-0.71) | (-0.71) | (-0.97) |
| *AVERDRt* | 0.19 | 0.09 | 5.67E-03 | 0.00 | 6.65E-03 | 5.67E-03 | 0.24 | 0.24 | 0.26 |
| | (0.89) | (0.48) | (0.05) | (0.03) | (0.06) | (0.05) | (1.66)* | (1.64)* | (1.74)* |
| *AVEINVRt* | 0.02 | 0.08 | 0.42 | 0.42 | 0.41 | 0.42 | -0.07 | -0.07 | -0.08 |
| | (0.09) | (0.44) | (4.00)*** | (4.01)*** | (3.95)*** | (4.00)*** | (-0.74) | (-0.74) | (-0.86) |
| *CVRDRt* | 0.00 | -2.48E-03 | -7.56E-03 | -0.01 | -7.55E-03 | -7.56E-03 | -0.03 | -0.03 | -0.03 |
| | (-0.42) | (-0.47) | (-2.82)*** | (-2.80)*** | (-2.81)*** | (-2.82)*** | (-2.18)** | (-2.17)** | (-2.33)** |
| *CVINVt* | -0.01 | -8.66E-03 | -9.94E-03 | -0.01 | -0.01 | -9.94E-03 | -0.02 | -0.02 | -0.02 |
| | (-0.39) | (-0.56) | (-0.87) | (-1.05) | (-1.02) | (-0.87) | (-1.15) | (-1.14) | (-1.12) |
| *FB2* | | -1.99E-03 | | | 3.51E-03 | | | -1.29E-03 | |
| | | (-0.13) | | | (0.41) | | | (-0.13) | |
| *Largest_Share* | | | -2.64E-04 | | | -2.64E-04 | | | -5.41E-04 |
| | | | (-1.13) | | | (-1.13) | | | (-1.93)* |
| R2 | 0.02 | 0.02 | 0.22 | 0.21 | 0.21 | 0.22 | 0.14 | 0.14 | 0.17 |
| adj. R2 | -0.01 | -0.02 | 0.18 | 0.18 | 0.17 | 0.18 | 0.11 | 0.1 | 0.13 |
| NOB | 187 | 180 | 177 | 179 | 179 | 177 | 182 | 182 | 180 |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 8: Regression Analysis on the Determinants of R and D Investment

| | AVERDR99-05 | | | AVERDR94-98 | | | AVERDR99-05 | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| *Constant* | 0.06 | 0.07 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 |
| | (5.70)*** | (5.67)*** | (5.42)*** | (4.67)*** | (4.18)*** | (4.01)*** | (5.54)*** | (5.82)*** | (5.60)*** |
| *AGE* | -2.63E-04 | -2.92E-04 | -2.44E-04 | -2.39E-04 | -2.12E-04 | -1.60E-04 | -2.89E-04 | -3.52E-04 | -3.08E-04 |
| | (-1.61)* | (-1.77)* | (-1.50) | (-1.21) | (-1.05) | (-0.82) | (-1.70)* | (-2.06)** | (-1.82)* |
| *DEBTRt* | -1.84E-05 | -1.90E-05 | -1.94E-05 | -1.70E-05 | -1.74E-05 | -1.75E-05 | -1.46E-05 | -1.58E-05 | -1.57E-05 |
| | (-1.97)** | (-2.04)** | (-2.06)** | (-1.89)* | (-1.94)* | (-1.95)* | (-1.36) | (-1.48) | (-1.46) |
| *EMPt* | 7.81E-07 | 7.37E-07 | 7.81E-07 | 8.88294E-07 | 8.83E-07 | 9.11E-07 | 7.59E-07 | 6.78E-07 | 7.36E-07 |
| | (3.11)*** | (2.90)** | (3.09)*** | (3.29)*** | (3.23)*** | (3.36)*** | (2.43)** | (2.16)** | (2.35)** |
| *ROAt* | 2.12E-04 | 2.88E-04 | 2.07E-04 | -9.39E-04 | -9.64E-04 | -1.06E-03 | 4.73E-04 | 5.24E-04 | 4.90E-04 |
| | (0.34) | (0.46) | (0.33) | (-1.04) | (-1.06) | (-1.18) | (1.02) | (1.14) | (1.06) |
| *Largest_Share* | 2.16E-05 | -2.0352E-05 | 1.59E-05 | 8.72E-05 | 8.80E-05 | 1.28E-04 | -5.39E-05 | -1.23E-04 | -9.16E-05 |
| | (0.16) | (-0.14) | (0.11) | (0.52) | (0.50) | (0.73) | (-0.37) | (-0.82) | (-0.61) |
| *FB3* | -0.01 | | | -0.01 | | | -0.01 | | |
| | (-1.17) | | | (-1.05) | | | (-0.99) | | |
| *FB2* | | -0.01 | | | -3.82E-03 | | | -0.01 | |
| | | (-1.53) | | | (-0.59) | | | (-1.89)* | |
| *FB1* | | | -4.49E-03 | | | 3.28E-04 | | | -0.01 |
| | | | (-0.87) | | | (0.05) | | | (-1.34) |
| R2 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.07 | 0.09 | 0.08 |
| adj. R2 | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.04 | 0.05 | 0.04 |
| NOB | 186 | 186 | 186 | 179 | 179 | 179 | 184 | 184 | 184 |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 9: Regression Analysis on the Determinants of Capacity Investment

| | AVEINVR94-05 | | | AVEINVR94-98 | | | AVEINVR99-05 | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| *Constant* | 66.3E-3 | 0.07 | 0.06 | 0.02 | 0.02 | 0.03 | *0.10* | *0.11* | *0.09* |
| | (4.33)*** | (4.25)*** | (3.92)*** | (1.19) | (1.28) | (1.85)* | *(5.31)**** | *(5.16)**** | *(4.33)**** |
| *AGE* | -2.42E-04 | -2.76E-04 | -2.05E-04 | 3.11E-04 | 2.44E-04 | 1.60E-04 | *-6.59E-04* | *-6.76E-04* | *-5.07E-04* |
| | (-1.08) | (-1.22) | (-0.92) | (1.26) | (0.97) | (0.64) | *(-2.35)*** | *(-2.38)*** | *(-1.79)** |
| *DEBTRt* | -5.30E-06 | -5.48E-06 | -4.66E-06 | -1.80E-05 | -1.66E-05 | -1.60E-05 | *-2.82E-06* | *-4.66E-06* | *-2.91E-06* |
| | (-0.41) | (-0.43) | (-0.36) | (-1.28) | (-1.16) | (-1.11) | *(-0.16)* | *(-0.26)* | *(-0.16)* |
| *EMPt* | 1.89E-07 | 1.63E-07 | 2.10E-07 | 1.97E-07 | 2.32E-07 | 1.55E-07 | *2.57E-07* | *1.61E-07* | *3.24E-07* |
| | (0.55) | (0.47) | (0.61) | (0.52) | (0.60) | (0.40) | *(0.50)* | *(0.31)* | *(0.62)* |
| *ROAt* | 2.33E-03 | 2.37E-03 | 2.28E-03 | 1.32E-03 | 1.29E-03 | 1.43E-03 | *2.72E-03* | *2.78E-03* | *2.68E-03* |
| | (2.71)*** | (2.75)*** | (2.66)*** | (1.40) | (1.34) | (1.49) | *(3.56)**** | *(3.64)**** | *(3.48)**** |
| *Largest_Share* | -1.90E-04 | -2.19E-04 | -1.58E-04 | 9.65E-05 | 1.10E-04 | 4.83E-05 | *-3.69E-04* | *-4.39E-04* | *-3.00E-04* |
| | (-1.00) | (-1.11) | (-0.81) | (0.46) | (0.50) | (0.22) | *(-1.55)* | *(-1.77)** | *(-1.20)* |
| *FB3* | -6.11E-05 | | | 0.02 | | | *-0.02* | | |
| | (-0.01) | | | (2.74)*** | | | *(-2.02)*** | | |
| *FB2* | | -2.98E-03 | | | 0.01 | | | *-0.02* | |
| | | (-0.42) | | | (1.75)* | | | *(-1.98)*** | |
| *FB1* | | | 3.63E-03 | | | 0.01 | | | *-3.66E-03* |
| | | | (0.51) | | | (1.00) | | | *(-0.41)* |
| R2 | 0.07 | 0.07 | 0.07 | 0.07 | 0.05 | 0.03 | *0.13* | *0.13* | *0.11* |
| adj. R2 | 0.04 | 0.04 | 0.04 | 0.04 | 0.01 | 0 | *0.10* | *0.10* | *0.08* |
| NOB | 186 | 186 | 186 | 185 | 185 | 185 | *184* | *184* | *184* |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 10: Regression Analysis on the Determinants of the Stability of R and D Investment

| | CVRDR94-05 | | | CVRDR94-98 | | | CVRDR99-05 | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|---|---|---|---|---|---|---|---|---|---|
| *Constant* | -0.61 | -0.70 | -0.64 | -0.96 | -1.10 | -0.91 | 0.31 | 0.32 | 0.28 |
| | (-0.95) | (-1.02) | (-0.96) | (-1.34) | (-1.40) | (-1.22) | (2.54)** | (2.45)** | (2.25)** |
| *AGE* | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 3.29E-04 | 2.01E-04 | 5.31E-04 |
| | (1.97)** | (1.91*) | (1.87)* | (2.04)** | (2.00)** | (1.85)* | (0.19) | (0.11) | (0.30) |
| *DEBTRt* | -2.60E-04 | -2.07E-04 | -1.35E-04 | -3.86E-04 | -3.50E-04 | -2.59E-04 | 1.92E-05 | 1.72E-05 | 2.30E-05 |
| | (-0.49) | (-0.39) | (-0.25) | (-0.82) | (-0.74) | (-0.55) | (0.17) | (0.15) | (0.20) |
| *EMPt* | -1.21E-05 | -9.69E-06 | -1.14E-05 | -1.15E-05 | -9.24E-06 | -1.11E-05 | -4.75E-06 | -4.82E-06 | -4.59E-06 |
| | (-0.84) | (-0.67) | (-0.79) | (-0.82) | (-0.64) | (-0.78) | (-1.46) | (-1.47) | (-1.41) |
| *ROAt* | -0.07 | -0.07 | -0.07 | -0.06 | -0.06 | -0.06 | -0.03 | -0.03 | -0.03 |
| | (-1.90)* | (-1.97)** | (-1.91)* | (-1.24) | (-1.31) | (-1.18) | (-5.22)*** | (-5.20)*** | (-5.24)*** |
| *Largest_Share* | -2.72E-03 | -8.64E-04 | -1.03E-03 | -2.23E-03 | 4.72E-05 | -8.74E-04 | 2.53E-04 | 1.71E-04 | 4.67E-04 |
| | (-0.34) | (-0.10) | (-0.13) | (-0.25) | (0.01) | (-0.10) | (0.17) | (0.11) | (0.30) |
| *FB3* | 0.70 | | | 0.80 | | | 0.01 | | |
| | (2.28)** | | | (2.30)** | | | (0.14) | | |
| *FB2* | | 0.59 | | | 0.69 | | | -3.89E-03 | |
| | | (1.98)** | | | (2.02)** | | | (-0.07) | |
| *FB1* | | | 0.62 | | | 0.64 | | | 0.03 |
| | | | (2.09)** | | | (1.91)* | | | (0.49) |
| R2 | 0.06 | 0.06 | 0.06 | 0.05 | 0.05 | 0.04 | 0.16 | 0.16 | 0.16 |
| adj. R2 | 0.03 | 0.02 | 0.03 | 0.02 | 0.01 | 0.01 | 0.13 | 0.13 | 0.13 |
| NOB | 185 | 185 | 185 | 177 | 177 | 177 | 180 | 180 | 180 |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

Table 11: Regression Analysis on the Determinants of the Stability of Capacity Investment

| | CVINV94-05 | | | CVINV94-98 | | | CVINV99-05 | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Constant | 0.78 | 0.89 | 0.86 | 0.44 | 0.56 | 0.56 | 0.54 | 0.65 | 0.61 |
| | (4.18)*** | (4.44)*** | (4.45)*** | (3.26)*** | (3.75)*** | (3.95)*** | (3.72)*** | (4.13)*** | (4.04)*** |
| AGE | -1.10E-03 | -2.25E-03 | -1.94E-03 | 1.18E-03 | -5.40E-05 | -1.05E-04 | -6.96E-04 | -1.67E-03 | -1.32E-03 |
| | (-0.41) | (-0.81) | (-0.72) | (0.60) | (-0.03) | (-0.05) | (-0.33) | (-0.78) | (-0.63) |
| DEBTRt | 1.27E-04 | 1.28E-04 | 1.30E-04 | -3.72E-05 | -2.68E-05 | -2.60E-05 | 6.91E-05 | 5.21E-05 | 5.97E-05 |
| | (0.82) | (0.82) | (0.83) | (-0.41) | (-0.29) | (-0.28) | (0.51) | (0.38) | (0.44) |
| EMPt | -9.30E-06 | -9.83E-06 | -9.61E-06 | -6.48E-06 | -6.83E-06 | -6.87E-06 | -7.17E-06 | -7.88E-06 | -7.51E-06 |
| | (-2.23)** | (-2.32)** | (-2.29)** | (-2.48)** | (-2.56)** | (-2.60)*** | (-1.86)* | (-2.02)** | (-1.94)* |
| ROAt | -0.02 | -0.02 | -0.02 | -0.02 | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 |
| | (-2.23)** | (-2.09)** | (-2.14)** | (-1.68)* | (-1.44) | (-1.44) | (-1.49) | (-1.43) | (-1.46) |
| Largest_Share | -3.23E-03 | -3.90E-03 | -3.64E-03 | -1.98E-03 | -2.57E-03 | -2.61E-03 | -6.12E-04 | -1.33E-03 | -1.06E-03 |
| | (-1.40) | (-1.62)* | (-1.53) | (-1.18) | (-1.45) | (-1.49) | (-0.34) | (-0.71) | (-0.57) |
| FB3 | 0.09 | | | 0.13 | | | 0.03 | | |
| | (1.02) | | | (1.94)* | | | (0.45) | | |
| FB2 | | -0.02 | | | 0.01 | | | -0.06 | |
| | | (-0.21) | | | (0.13) | | | (-0.81) | |
| FB1 | | | 0.01 | | | 0.00 | | | -0.03 |
| | | | (0.11) | | | (0.08) | | | (-0.43) |
| R2 | 0.07 | 0.07 | 0.07 | 0.08 | 0.06 | 0.06 | 0.04 | 0.04 | 0.04 |
| adj. R2 | 0.04 | 0.04 | 0.04 | 0.05 | 0.03 | 0.03 | 0.01 | 0.01 | 0.01 |
| NOB | 185 | 185 | 185 | 184 | 184 | 184 | 180 | 180 | 180 |

Number in parenthesis is t-value.

Significance levels are using 2-tailed test: *=10%, **=5%, ***=1%.

### Discussion and Conclusion

This paper examined if family firms perform better than non-family firms and explored what are the advantages of family firms, using the data on the Japanese electric machinery manufacturers. We found that family firms show higher profitability than non-family firms. This is consistent with the existing empirical analyses in different contexts.

It is often pointed out that selecting top management from the pool restricted to the family members is the disadvantage of family firms. We found that family firms run by successors from the family members perform worse than those run by the founders. But we did not find any significant difference in performance between family firms run by the successors and those run by non-family managers. Therefore, whether managers are appointed from the restricted pool or not does not matter. This suggests that better performance of the founders may be caused by the youth of the firms, and that restricted pool of managers is not the important disadvantage of family firms.

It is also argued that combining ownership and control mitigates agency conflicts and is the advantage of family firms. However, we found no significant difference in performance between firms own by and run by family members and those owned by family but run by non-family members. This suggests that combining ownership and control is not the advantage of family firms. Similarly, it is often pointed out that founding family with large equity share has strong incentives to monitor managers, therefore, family firms perform better. However, we found no significantly positive impact of the equity share of the largest shareholders on performance. That is, large equity share by itself does not strengthen monitoring managers.

Other studies pointed out that longer investment horizons of the family are the advantage of family firms. We found family firms invest in capacity significantly more than non-family firms from 1994 to 1998, while we did not find the evidence supporting the hypothesis during other periods or in terms of R&D investment. We did not also find the evidence supporting the hypothesis in terms of stability of investment. However, R&D investment does not have significantly positive impacts on performance in the regression analyses reported in Table 6 and Table 7. That is, R&D investment is not a significant determinant of firm performance in our data, therefore, it is not strange to find insignificant results for R&D investment.

Moreover, taking it into account that Japanese economy did not grow in the 1990s while it has recovered in 2000s, the findings above can be interpreted in the following way. When economy is growing, firms invest in capacity whether they have long horizon or not. Therefore, we did not find a significant difference in investment behavior between family and non-family firms.

When economy is stagnant, on the other hand, firms invest differently depending upon horizon they have. Firms, which are concerned with short-term performance, should decrease capacity investment to recover profitability. On the other hand, firms with long horizon may be patient enough to invest a lot in capacity in spite of low profitability. If so, family firms may invest in capacity aggressively even when economy is stagnant since they have long horizon, and because of such investment behavior, they may perform better. In sum, family firms have advantage of long horizon, which makes the behavior of family firms different from that of non-family firms especially during low growth period.

There are several future research agenda.  First, in this study, we defined family firms in terms of management and in terms of ownership.  In terms of management, the criterion is whether the president or the chairman of the firm is from the founding family.  However, not only the president or the chairman is influential, but also the family members in the board, could influence on firms performance. Therefore, we need to examine family firms in more detail.  Second, this is a single industry study.  We will collect the data of other industries and see if there is any difference among industries and if we can generalize our findings.  Third, we examined only R&D and capacity investment and stability of them as investment behavior.  However, to examine the effect of long horizon, we need to examine other investment such as diversification, global expansion, and so on.

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