Investigating the Impact of Board Structure on the Degree of Operating Leverage in Companies Listed on the Tehran Stock Exchange

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ABSTRACT

The purpose of this study was to evaluate the effect of operating leverage on the board of listed companies in the Tehran Stock Exchange. To achieve the objectives of the study, 81 companies were selected for the fiscal period 2010 to 2015. The results indicate that the structure of the board on the degree of operating leverage is not significantly affected.

INTRODUCTION

1- The problem statement:

Agency issue is the main topic proposed in board structure discussions, because the conflict of interest between managers and shareholders leads to the creation of agency cost [2]. According to the agency theory, the main role of the board of directors is to monitor management decisions [11]. Control and monitoring is the predominant function of the board; so it seems that the board reviews and evaluates the management’s performance in running the company; also it has a responsibility to ensure that the wealth of shareholders is maximized and agency problems are minimized. Accordingly, the board of directors is the key factor for defending efficient management [4]. In order to control agency problems, agency costs (monitoring, contracting, and residual loss) are tolerated to reduce conflicts of interest between the owner and the agent. The board of directors is considered as the highest position in an organization and plays an important role in strategic decisions of the organization [12]. Empirical evidence suggests that there is no consensus regarding the optimal size of the board. Green believes that the number of board members should be limited to allow for discussion about the problems of the company. The larger the board size is, the less the power of the board will be. In such a board, a consensus on a particular topic is very difficult. On the other hand, some believe that board size should be large enough to contain a range of skills and experiences of different people, but it is clear that the board should have a reasonable size [14]. Considering the importance of board tenure, limiting tenure on the board affects both firm value and policies (Huang, 2013). Managers who have been board member for a certain period have implemented better governance through obtaining additional information and becoming more familiar with the company [8]. Board tenure changes as a result of changes in the composition of the board or the passage of time.

Here, operating leverage has been selected as the dependent variable. Operating leverage expresses the effect of changes in sales on operating profit.

Thus, the present study attempts to answer the question “What is the impact of board structure on the degree of operating leverage in companies listed on the Tehran Stock Exchange?”

2- The research variables:

2-1- Board structure (the independent variable):

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Based on the theoretical literature and common guidelines of corporate governance, the board of directors has a multilateral role. In this regard, according to the common guidelines of corporate governance, the role of the board of directors is to lead the company cannily based on the control framework, which enables it to evaluate and manage the risk [5]. In corporate governance, the goal is to have an effective and efficient board; and achieving this goal requires the evaluation of board features, especially the desirable ones [1]. The main responsibility of the board is to establish efficient corporate governance in line with the interests of shareholders and balance the interests of various beneficiaries including customers, employees, investors, and local communities [8]. The board of directors is the highest decision making body in organizations (whether large or small ones) and a major part of consequences of decisions taken by them will not influence their wealth. Appointment and dismissal of the highest executive authority in the organization as well as the adoption of many important decisions and monitoring their implementation are done by the board of directors. In fact, the right to control exercised by a group (the board) leads to ensuring effective separation of decision-making and control of the highest levels of organization [6].

2-2- The degree of operating leverage (the dependent variable):

Operating leverage expresses the effect of changes in sales on operating profit. If a company has a high degree of operating leverage, slight variations in sales will have a large impact on operating profit. If changes are in line with increasing sales, this will substantially increase the profits as well [2].

Since the degree of operating leverage shows the error occurred in the prediction of earnings before interest and taxes (EBIT), it can be used to determine business risk. The higher the degree of operating leverage is, the higher the risk of prediction error of EBIT will be; as a result, it will be more likely that the actual value of EBIT becomes negative. Also, the degree of business risk changes when the company wants to make new decisions about the composition of its assets, so that fixed and variable costs of production change. If a change in a company’s production costs leads to a change in its break-even point (BEP), the company’s degree of business risk will change as well. In general, an increase in break-even point leads to increased business risk and vice versa [10].

3- The research literature:

Guest (2008) investigated and determined the size and composition of the board. The statistical sample of this research consisted of a large number of English companies during 1981 to 2002. Key results of the study indicated that firm size, debt ratio, standard deviation of returns, and return on assets (ROA) are among the factors affecting the size and the percentage of outside directors, but the Tobin’s Q ratio, R&D costs, market concentration, and free cash flows only affect the size of the board.

Lehn et al. [13] investigated and determined the size and composition of the board in American companies. The results of studying a sample of 81 companies during 1935 to 2000 indicated that firm size and growth opportunities explain major changes in the size and composition of the board. Also, the results showed that merger of corporations and the geographical development of the company are among the important and effective variables in determining the size and composition of the board. Pathan and Skully [15] investigated the internal structure of the board in American banks. The results of studying a sample of 1534 observations from 212 banks during 1997 to 2004 indicated that the larger and more diverse the activities of banks are, the greater the board size, the percentage of outside directors, and the combination of the role of chairman and CEO will be.

Lakshan and Wijekoon (2012) in a study as “Corporate governance and corporate failure” found that some characteristics of corporate governance including board size, CEO duality, outside directors, shareholders, audit opinion, presence of an audit committee, and remuneration of board members are negatively associated with the probability of corporate failure; on the other hand, there is a direct relationship between CEO duality and the probability of corporate failure. Also, board size, auditor’s opinion, and shareholders do not appear to be significant determinants.

Hsu Wang (2013) investigated the relationship between board composition and operational risk events of financial institutions during the period 1996-2010. The results of this study indicated that there is a negative and non-linear relationship between firm size and operational risk events. In this study, variables of clients, products, and business practices are considered as the operational risk events. Also, the results on age and tenure heterogeneity indicated that having a more diverse board can have a negative impact on the board monitoring function. These results can shed new light on board demographics and operational risk management in financial institutions.

4- The research hypotheses:

1- Board independence affects the degree of operating leverage.
2- The number of board members affects the degree of operating leverage.
3- Tenure of executives affects the degree of operating leverage.
5- The research population and sample:
The research population consists of all companies listed in Tehran Stock Exchange in the period from March 20, 2009 to March 19, 2013. The systematic elimination has been used as the sampling method. Accordingly, the companies with the following conditions have been selected for the study:
1- They should not be among insurance and investment companies as well as banks and financing institutions.
2- For comparability of data, their fiscal year-end should be on March 19.
3- During the period of research, the trade intervals of companies under study should not exceed 6 months.
Considering the above restrictions, 81 companies (or 405 companies in 5 years) were selected as samples and were used as the population under study (available population) to test the research hypotheses.

6- The data analysis method:
Based on the research hypotheses, the data analysis method is a correlation al-descriptive type. The statistical tests have been performed after processing the preliminary data and matching the statistical data of the research using Excel and Stata software. Data have been tested and analyzed using a multiple regression model.

7- The research models:
Model 1: FL = α + β₁ Growth opportunities + β₂ Profitability
Model 2: FL = α + β₁ Board Size + β₂ Firm size + β₃ Profitability
Model 3: FL = α + β₁ Exec. Tenure + β₂ Growth opportunities + β₃ Profitability

FL: it stands for financial leverage which is here the dependent variable of the research and the degree of operating leverage. Operating leverage expresses the effect of changes in sales on operating profit; and the amount of this effect is measured using an index called the degree of operating leverage which is equal to the percentage of changes in operating profit or a percentage of sales. The degree of operating leverage is calculated through dividing the sale by EBIT as follows:

\[
FL = \frac{Sale}{EBIT}
\]

In above formula, FL, Sale, and EBIT respectively stand for the degree of operating leverage, sales income, and operating profit (loss).

Board composition: it is an independent variable and implies the index “number of outside (non-executive) directors”.
- Executive members of the board: Some board members have taken responsibility for the firm’s governance and executive responsibilities as well.
- Non-executive members of the board: they are part-time members of the board and have no executive responsibilities in the company. According to Article 5 of the draft code of corporate governance, the majority of board members in stock companies shall be composed of non-executive directors.

Board independence: it is calculated through dividing the number of non-executive directors by the total number of board members. In cases where being an executive or non-executive board member is not disclosed in financial reports or the report of the board to the general assembly or company’s website and it is only content with mentioning the positions (president, vice president, and member) in the board, the members are considered as non-executive ones.

Board Independence = \[
\frac{Number\ of\ Non-executive\ Directors}{Total\ Number\ of\ Board\ Members}
\]

Board size: it is an independent variable and implies the index “total number of board members” in the company. The optimum number of board members should be set so that it is ensured there are enough members to respond and doing various tasks. The results of several studies have shown that larger boards are more capable to monitor the activities of senior managers.

Tenure of executives (Exec. Tenure): it is an independent variable and implies the index “tenure of executive directors” in the company and is equal to average tenure of executive directors and calculated through dividing total years of tenure by number of non-executive directors.

Growth opportunities: it is a control variable representing the company’s growth opportunities and calculated by the book value of assets minus the book value of equity plus the market value of equity divided by the book value of assets.

One of the factors affecting the performance of companies is “growth opportunities” which indicates the potential of a company in profitability and investment. Investment opportunities have different life cycles during different stages. A company with high flexibility to use these opportunities is expected to have a clear vision of the future.

Profitability: it is a control variable and implies the index of profitability and obtained from dividing net profit (loss) of the company by its total assets. In fact, the profitability measure shows a company’s business performance which is defined as its ability to earn income and profit.
Firm size: it is a control variable representing the size of the company and is obtained from the natural logarithm of total assets.

8- The results of testing hypotheses:
The first hypothesis: board independence affects the degree of operating leverage.

Analysis of variance for the first model:
Here, analysis of variance (ANOVA) has been used to test the significance of regression equations.

Table 1: The results of ANOVA.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Degree of Freedom</th>
<th>Mean Squares</th>
<th>F-statistic</th>
<th>Significance Level (Prob)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>2363.93</td>
<td>3</td>
<td>788.64</td>
<td>18.38</td>
<td>0.000</td>
</tr>
<tr>
<td>Intragroup (Error)</td>
<td>16210.32</td>
<td>382</td>
<td>42.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18574.25</td>
<td>385</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As observed in table 1, since the Prob. related to F-statistic is lower than the significance level of 5%, it is concluded that the model is statistically significant.

The results of testing the impact of board independence on the degree of operating leverage have been presented in table 2.

Table 2: Results of the regression test related to the first hypothesis.

<table>
<thead>
<tr>
<th>Model 1: ( FL = \alpha + \beta_1 \text{Board Composition} + \beta_2 \text{Growth opportunities} + \beta_3 \text{Profitability} )</th>
<th>Variables</th>
<th>Coefficients</th>
<th>Student’s t-test</th>
<th>Significance</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>10.09</td>
<td>4.12</td>
<td>0.000</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>Board Composition</td>
<td>-3.14</td>
<td>-1.13</td>
<td>0.26</td>
<td>Insignificant</td>
<td></td>
</tr>
<tr>
<td>Growth Opportunities</td>
<td>-21.84</td>
<td>-5.57</td>
<td>0.000</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>0.2</td>
<td>1.86</td>
<td>0.06</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>Hausman test statistic</td>
<td></td>
<td></td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td></td>
<td></td>
<td>1.27 (0.73)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-Limer test</td>
<td>2.25 (0.000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Autocorrelation test</td>
<td></td>
<td></td>
<td>1.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>386</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to table 2, it is observed that the Prob. of F-statistic is lower than 0.05; as a result, the panel data method has been selected. Also, considering the results of Hausman test, the random effects method was selected.

The results obtained from the model estimation in table 2 shows that growth opportunities and profitability are respectively significant at the levels of 5% and 10%. Hence, it can be concluded that these two variables respectively have negative and positive effects on operating leverage. Regarding the variable “ratio of non-executive members to total members”, it should be said that its impact on operating leverage is negative and insignificant. On the other hand, since the value of t-statistic is higher than 1 for this variable, it is concluded that it is a necessary variable in the model.

Considering the above results, the hypothesis indicating that the ratio of non-executive members to total members affects the degree of operating leverage is not confirmed.

The second hypothesis: the number of board members affects the degree of operating leverage.

Analysis of variance for the second model:
Here, analysis of variance (ANOVA) has been used to test the significance of regression equations.

Table 3: The results of ANOVA.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Degree of Freedom</th>
<th>Mean Squares</th>
<th>F-statistic</th>
<th>Significance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>2265.61</td>
<td>3</td>
<td>755.20</td>
<td>17.69</td>
<td>0.000</td>
</tr>
<tr>
<td>Intragroup (Error)</td>
<td>16310.83</td>
<td>382</td>
<td>42.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18576.44</td>
<td>385</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As observed in table 3, since the Prob. related to F-statistic is lower than the significance level of 5%, it is concluded that the model is statistically significant.

The results of testing the second hypothesis have been presented in table 4.

Table 4: Results of the regression test related to the second hypothesis.

<table>
<thead>
<tr>
<th>Model 2: ( FL = \alpha + \beta_1 \text{Board Size} + \beta_2 \text{Firm size} + \beta_3 \text{Profitability} )</th>
<th>Variables</th>
<th>Coefficients</th>
<th>Student’s t-test</th>
<th>Significance</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>8.72</td>
<td>1.4</td>
<td>0.16</td>
<td>Insignificant</td>
<td></td>
</tr>
</tbody>
</table>
According to table 4, it is observed that the Prob. of $F$-statistic is lower than 0.05; as a result, the panel data method has been selected. Also, considering the results of Hausman test, the random effects method was selected. The results obtained from the model estimation in table 4 shows that profitability and firm size are respectively significant at the levels of 5% and 10%. Hence, it can be concluded that these two variables respectively have negative and positive effects on operating leverage. Regarding the variable of “board members”, it should be said that its impact on operating leverage is negative and insignificant. On the other hand, since the value of $t$-statistic is higher than 1 for this variable, it is concluded that it is a necessary variable in the model. Considering the above results, the hypothesis indicating that the number of board members affects the degree of operating leverage is not confirmed.

The third hypothesis: tenure of executives affects the degree of operating leverage.

**Analysis of variance for the third model:**

Here, analysis of variance (ANOVA) has been used to test the significance of regression equations.

**Table 5:** The results of ANOVA.

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Degree of Freedom</th>
<th>Mean Squares</th>
<th>$F$-statistic</th>
<th>Significance Level (prob)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intergroup</td>
<td>2776.65</td>
<td>3</td>
<td>925.55</td>
<td>22.25</td>
<td>0.000</td>
</tr>
<tr>
<td>Intragroup (Error)</td>
<td>15764.2</td>
<td>379</td>
<td>41.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>18540.85</td>
<td>382</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As observed in table 5, since the Prob. related to $F$-statistic is lower than the significance level of 5%, it is concluded that the model is statistically significant.

The results of testing the third hypothesis have been presented in table 6.

**Table 6:** Results of the regression test related to the third hypothesis.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficients</th>
<th>Student’s $t$-test</th>
<th>Significance</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>6.10</td>
<td>3.87</td>
<td>0.000</td>
<td>Significant</td>
</tr>
<tr>
<td>Exec. Tenure</td>
<td>0.068</td>
<td>0.85</td>
<td>0.39</td>
<td>Insignificant</td>
</tr>
<tr>
<td>Growth Opportunities</td>
<td>2.57</td>
<td>2.82</td>
<td>0.005</td>
<td>Significant</td>
</tr>
<tr>
<td>Profitability</td>
<td>-10.42</td>
<td>-1.26</td>
<td>0.20</td>
<td>Insignificant</td>
</tr>
<tr>
<td>$R^2$</td>
<td></td>
<td>0.32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

According to table 6, it is observed that the Prob. of $F$-statistic is lower than 0.05; as a result, the panel data method has been selected. Also, considering the results of Hausman test, the random effects method was selected. The results obtained from the model estimation in table 6 shows that the variable “growth opportunities” is significant. Hence, it can be concluded that this variable has a positive effect on operating leverage. The variables “profitability” and “tenure of executives” respectively have negative and positive effects and are not significant. It should be said that the value of $t$-statistic is higher than 1 for the variable of profitability, which indicating that it is a necessary variable in the model.

Considering the above results, the hypothesis indicating that tenure of executives affects the degree of operating leverage is not confirmed.

**The conclusion:**

The results of testing the research hypotheses showed that the criteria of board structure (such as tenure, board members, and board independence) have no significant effect on operating leverage. In other words, board structure does not affect the items of operating leverage. The results of this study are consistent with the
results of the study conducted by Esamo (2011). Also, the results of this study are not consistent with the results of studies conducted by Chen et al. (2011), Gell and Obradovich (2012), Bukopin (2011), and Mansourinia et al. (2013).

REFERENCES


