Studying the effect of structural characteristics of board of directors on financial risk in medicinal products and materials industry

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ABSTRACT

The purpose of this research is to review the effect of structural features of board on financial risk in pharmaceutical products industry. The time period of this research is 2003-2011, and it is done on a sample of 19 pharmaceutical companies. To analyze research assumptions in mentioned industry, we use multivariate regression models in pooled (plan) mode and Eviews 6 program. In this research, we used change in liquidity and change in financial risk variables as dependent variable of financial risk, we used structural features of board, including: board size, board combination, and duality of CEO, as independent variable, and eventually we used company features, including: company size, growth opportunity and profitability, as control variable.

The results indicate that board features (both process and structural features) has no effect of financial risk in pharmaceutical products.

KEYWORD

Board structure, board process, company features, and financial slack.

INTRODUCTION

According to general definition, corporate governance is a tool by which companies are controlled and directed. The position of company board as a leading institution which observes the performance of executive managers gets more and more important. (Mokarrami, 2006). The main responsibility of board is to create an effective control on company tasks in order to meet the benefits of stock holders and make balance in their different beneficiaries such as customers, investors and local societies. In all the tasks the board does, managers are expected to make their business decisions in a way that they believe these decisions carry the best interests for the company (Tehran stock exchange, 2007). Board is the direct mechanism for observing on managers, which plays an important role in regulating the mangers when it is proved that their performances are not appropriate. Board members should be independent from company manager and main stock holders (Chen, 2009).

Collapse of Anron Company in 2001 absorbed the attentions to the effectiveness of unbound managers of board. According to representative theory, the presence of independent unbound managers in company board and their monitoring performance help to decrease conflict in interests between stock holders and managers in board meetings. Of course, we should pay attention that company executive managers play a significant role in creating a proper combination of bound and unbound managers among board members. The presence of such a combination is considered as a main element of an efficient and effective board; because since bound manager’s present valuable information about company activities, unbound managers judge about the decisions of mentioned managers through a professional and fair point of view. So, company board is considered to be a potential powerful mechanism of corporate governance, since it has specialty, independence, and required legal power (Byrd & Hickman, 1992).

Financial crisis, in fact, is the failure of risk management in business relations. Studies in USA done by financial institutions indicate that board features regarding to board decision-making process, have a negative effect on decisions of risk management (Muller-Kahle & Lewellyn, 2011, and Lewellyn & Muller-Kahle, 2012). Finkelestein et al (2009) believe that recent developments in the field of structure and process of decision-making in board require more studies on board behaviors toward organizational outputs.

This study about board decision-making process, is inspired from a research done by Forbes & Milliken (1999) and about the relationships between bound and unbound managers is inspired from a research done by Pettigrew & McNulty (1995), and about the relations between board and company performance, is based on a research done by Zahra & Pearce (1989).
This relationship is ignored in developing markets especially in Iran. So, this study is going to review the effects of board features on financial risk in pharmaceutical industry.

**RESEARCH HISTORY**

McNulty et al (2013) through studying on 140 companies in 2008-2009 time period, concluded that in companies in which unbound members of board try more, and cognitive conflict is lower in board decision-making process, financial risk is lower too. They also concluded that in companies in which the board members have higher level of cohesiveness, cognitive conflict is lower.

Minichilli et al (2012) concluded that using knowledge and skill, is a determinant element of cohesiveness performance. Minichilli et al (2009) indicated that commitment of board members has positive effects on a collection of control and service tasks of these members.

Forbes and Milliken (1999) believe that 3 important processes for task performance of board include: board attempts, cognitive conflict, and use of knowledge and skill. Hassas Yege (2006), in a research studied the role of board in corporate governance, for doing so he reviewed reports and researches done in USA and United Kingdom about executive regulations of corporate governance and their effects. Some topics which are discussed in this research include: separating the responsibilities of board and CEO, the role of unbound managers in board, and observing performance of them as independent individuals. The mentioned topics have helped decrease in conflict between stock holders and company managers in board meetings, and they are considered as a powerful potential mechanism in corporate governance structure.

**RESEARCH ASSUMPTIONS**

1.3. structural features of board has some effects on financial risk (change in liquidity) in pharmaceutical products industry.

2.3. structural features of board has some effects on financial risk (change in financial crisis) in pharmaceutical products industry.

**RESEARCH VARIABLES**

In order to test the assumptions, research variables have been categorized in three groups: independent variables, dependent variables and control variables.

**INDEPENDENT VARIABLES**

Independent variables used in this research is the board structure, which includes:

1. **Board size**: the number of board members at the end of each financial year has been used in order to calculate this variable.

2. **Board combination**: in this research the ratio of unbound members of board to total members of board has been used as board combination.

3. **CEO duality**: this is a dummy variable that if CEO and board chairman is not the same person, its value is equal to 1, unless its value is equal to 0.

**DEPENDENT VARIABLE**

Financial risk is the dependent variable used in this research, that two standards are used in order to calculate it:

1. **Change in liquidity**: This is calculated through below equation (Mc Naulty et al., 2013):

   \[ \Delta L_{it} = L_{it} - L_{it-1} \]

   \[ L_{it} = \text{liquidity in year } t \text{ for company } i \]

   \[ L_{it-1} = \text{liquidity in year } t-1 \text{ for company } i \]

   \[ \Delta L_{it} = \text{change in liquidity in year } t \text{ for company } i \]

   Liquidity is measured through below equation (Mc Naulty et al., 2013):

   \[ L_{it} = \frac{\text{Cash}_{it} + \text{SI}_{it}}{\text{TA}_{it}} \]

   \[ \text{Cash}_{it} = \text{the amount of cash in year } t \text{ for company } i \]

   \[ \text{SI}_{it} = \text{short time investment in year } t \text{ for company } i \]

   \[ \text{TA}_{it} = \text{total assets in year } t \text{ for company } i \]

2. **Change in financial slack** which is calculated as follow (Mc Naulty et al., 2013):

   \[ \Delta FS_{it} = FS_{it} - FS_{it-1} \]

   \[ FS_{it} = \frac{\text{Cash}_{it} + \text{SI}_{it} + 0.7 * \text{REC}_{it} + 0.5 * \text{INV}_{it}}{\text{TA}_{it}} - \frac{\text{PAY}_{it}}{\text{NFA}_{it}} \]

   \[ \text{Cash}_{it} = \text{the amount of cash in year } t \text{ for company } i \]

   \[ \text{SI}_{it} = \text{short time investment in year } t \text{ for company } i \]

   \[ \text{REC}_{it} = \text{business receivable accounts in year } t \text{ for company } i \]

   \[ \text{INV}_{it} = \text{cash balance in year } t \text{ for company } i \]

   \[ \text{PAY}_{it} = \text{payable accounts in year } t \text{ or company } i \]

   \[ \text{NFA}_{it} = \text{net fixed assets in year } t \text{ for company } i \]

**CONTROL VARIABLES**

Control variables (company features) used in this research as other factors that can affect financial risk, include:

A) **Company size** which is calculated as below:

   \[ \text{SIZE}_{it} = \ln(\text{TA}_{it}) \]

   \[ \text{SIZE}_{it} = \text{company size in year } t \text{ for company } i \]

   \[ \ln(\text{TA}_{it}) = \text{normal logarithm of total assets in year } t \text{ for company } i \]

B) **GROW** which is calculated as below:

   \[ \text{GROW}_{it} = \frac{S_{it} - S_{it-1}}{S_{it-1}} \]

   \[ S_{it} = \text{sales amount in year } t \text{ for company } i \]

   \[ S_{it-1} = \text{sales amount in year } t-1 \text{ for company } i \]

C) **Profitability** which is calculated as below:

   \[ \text{ROA}_{it} = \frac{\text{NI}_{it}}{\text{TA}_{it}} \]

   \[ \text{NI}_{it} = \text{net profits in year } t \text{ for company } i \]

   \[ \text{TA}_{it} = \text{total assets in year } t \text{ for company } i \]
RESEARCH POPULATION

Population of this research includes total pharmaceutical product companies quoted in Tehran stock exchange in 2003-2011 time periods. Using screening method, only the companies were chosen that have had all below qualifications:
1.5. They have been quoted in Tehran stock exchange before the end of March, 2003, and their financial year ends in March.
2.5. They have not changed their financial year during the mentioned period.
3.5. They have presented all the financial information needed for this research in 2003-2011 time periods.
4.5. They are not categorized as investing companies, banks and financial intermediation.

By considering above mentioned qualifications, 19 pharmaceutical product companies were selected and reviewed as sample.

DATA ANALYSIS AND ASSUMPTION TESTING METHODS

In this research, the relationship between board structure and financial risk has been reviewed. When designing regression model for measuring financial risk, both change in liquidity and change in financial slack, have been used. Moreover, below pooled/plan regression analysis is used in pharmaceutical products industry (Mc Naulty et al., 2013):

\[ FR_{it} = \beta_0 + \beta_1 BS_{it-1} + \beta_2 BC_{it-1} + \beta_3 DUAL_{it-1} \\
+ \beta_4 SIZE_{it-1} + \beta_5 PROFIT_{it-1} + \beta_6 GROW_{it-1} + \epsilon_{it} \]

FR<sub>it</sub> = the level of financial risk in year t for company i, for calculation of which 2 standards are used: change in liquidity and change in financial slack.
BS<sub>it-1</sub> = board size in year t-1 for company i
BC<sub>it-1</sub> = board combination in year t-1 for company i
DUAL<sub>it-1</sub> = duality of CEO in year t-1 for company i
SIZE<sub>it-1</sub> = company size in year t-1 for company i
GROW<sub>it-1</sub> = company growth opportunity in year t-1 for company i
PROFIT<sub>it-1</sub> = company profitability in year t-1 for company i

Descriptive statistics of other effective factors on financial risk in pharmaceutical products industry shown in table 1, indicate that among research control variables, growth opportunity has the highest level of scattering and subsequently the lowest level stability in research time period, and company size variable has the lowest level of scattering.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Variables</th>
<th>Dependent variables (financial risk)</th>
<th>Independent variables (structural features of board)</th>
<th>Control variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Change in liquidity</td>
<td>Change in financial slack</td>
<td>Board size</td>
</tr>
<tr>
<td>number</td>
<td>171</td>
<td>171</td>
<td>171</td>
<td>171</td>
</tr>
<tr>
<td>mean</td>
<td>-0.0001</td>
<td>-0.05</td>
<td>5.5</td>
<td>0.9</td>
</tr>
<tr>
<td>average</td>
<td>0</td>
<td>-0.02</td>
<td>5</td>
<td>0.6</td>
</tr>
<tr>
<td>maximum</td>
<td>0.09</td>
<td>4.45</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>minimum</td>
<td>-0.10</td>
<td>-7.16</td>
<td>5</td>
<td>0.2</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.03</td>
<td>1.13</td>
<td>0.86</td>
<td>0.15</td>
</tr>
<tr>
<td>Coefficient of variant</td>
<td>300</td>
<td>22.6</td>
<td>0.16</td>
<td>0.25</td>
</tr>
</tbody>
</table>

3
REGRESSION MODEL OF THE EFFECT OF BOARD STRUCTURE ON FINANCIAL RISK IN PHARMACEUTICAL PRODUCTS INDUSTRY

Before testing the first and second assumptions in pharmaceutical products industry, we selected proper regression pattern for regression model by using F-Limer and Hausman tests. If the value of F-Limer test is less than significant level of 5%, pooled data method cannot be used. Unless, using pooled data method is appropriate. If pooled data method is not selected against random data, Hausman test has been performed in order to choose fixed effects pattern against random effects. If the value of Hausman test is less than significant level of 5%, we have not enough proof to reject fixed effects pattern, and we should use fixed effects pattern to test the research assumptions. Unless, if Hausman test value is more than significant level of 5%, using random effects pattern is proper.

Regression models of the effect of board structure on different aspects of financial risk in pharmaceutical products industry are shown in tables 2 and 3. The results of the effect of board structure on financial risk (change in liquidity) in pharmaceutical products industry shown in table 2, indicate that non of board structures have had significant effect on financial risk (change in liquidity). Other results indicate that in pharmaceutical products industry; non of control variables have had effects on change in liquidity. Since the effect of board structure features on financial risk (change in liquidity) is not significant in pharmaceutical products industry, the first research assumption is not approved.

The results of the effects of board structure features on financial risk (change in financial slack) in pharmaceutical products industry are shown in table 3, which indicate that board structure features have no effect on financial risk (change in financial slack). So, the second assumption is not approved.

### Table 2: the effect of board structure on change in liquidity

<table>
<thead>
<tr>
<th>Level- model and variables</th>
<th>Tests</th>
<th>Regression coefficients</th>
<th>Value of t test</th>
<th>T test possibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>pharmaceutical products industry- pooled data</td>
<td>Fixed amount</td>
<td>0.03</td>
<td>0.55</td>
<td>0.5820</td>
</tr>
<tr>
<td></td>
<td>Board size</td>
<td>-0.003</td>
<td>-0.93</td>
<td>0.3547</td>
</tr>
<tr>
<td></td>
<td>Board combination</td>
<td>-0.003</td>
<td>-0.23</td>
<td>0.8173</td>
</tr>
<tr>
<td></td>
<td>Duality of CEO</td>
<td>-0.01</td>
<td>-0.98</td>
<td>0.3296</td>
</tr>
<tr>
<td></td>
<td>Company size</td>
<td>-0.0002</td>
<td>-0.08</td>
<td>0.9394</td>
</tr>
<tr>
<td></td>
<td>Growth opportunity</td>
<td>-0.005</td>
<td>-0.62</td>
<td>0.5371</td>
</tr>
<tr>
<td></td>
<td>Profitability</td>
<td>0.02</td>
<td>0.84</td>
<td>0.4031</td>
</tr>
</tbody>
</table>

### Table 3: the effect of board structure features in change in financial slack

<table>
<thead>
<tr>
<th>Level- model and variables</th>
<th>Tests</th>
<th>Regression coefficients</th>
<th>Value of t test</th>
<th>T test possibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>pharmaceutical products industry- pooled data</td>
<td>Fixed amount</td>
<td>-0.01</td>
<td>-0.54</td>
<td>0.5920</td>
</tr>
<tr>
<td></td>
<td>Board size</td>
<td>0.02</td>
<td>0.17</td>
<td>0.8633</td>
</tr>
<tr>
<td></td>
<td>Board combination</td>
<td>0.69</td>
<td>1.14</td>
<td>0.2571</td>
</tr>
<tr>
<td></td>
<td>Duality of CEO</td>
<td>0.17</td>
<td>0.43</td>
<td>0.6712</td>
</tr>
<tr>
<td></td>
<td>Company size</td>
<td>0.003</td>
<td>0.07</td>
<td>0.9443</td>
</tr>
<tr>
<td></td>
<td>Growth opportunity</td>
<td>0.16</td>
<td>0.46</td>
<td>0.6440</td>
</tr>
<tr>
<td></td>
<td>Profitability</td>
<td>0.62</td>
<td>0.57</td>
<td>0.5665</td>
</tr>
</tbody>
</table>

### Conclusions and Recommendations

The purpose of this research is reviewing the effect of board structure features on financial risk of companies quoted in Tehran stock exchange in pharmaceutical products industry. A number of 19 companies in 2003-2011 time periods have been studied. By considering the result of F-Limer test in research time period, pooled regression models were used in order to analyze and test the research assumptions in the level of board structure features. The results indicate that:

- In pharmaceutical products industry, the effect of board structure features on change in liquidity is not significant. Since board structure features have no effect on change in liquidity in mentioned industry, the first assumption is not approved.
Moreover, the effect of board structure features on change in financial slack has not been significant in mentioned industry. Since the effect of board structure features has no effect on change in financial slack, the second assumption is not approved. According to above mentioned conclusions, below recommendations are provided:

- Since board structure features have no effect on change in liquidity and change in financial slack in pharmaceutical products industry, it seems that in mentioned industry financial risk is not a function of board structure. Therefore, it is recommended to stock holders of companies of pharmaceutical products industry, to pay attention that board structure can not affect the changes in financial risk.

**RECOMMENDATIONS FOR FUTURE RESEARCHES**

On researcher’s opinion, there are still different topics in this field that should be studied in future. So, it is recommended that in order to make use of research results and also to clarify the relationship between board structure and different aspects of risk in future, more attention should be paid to below subjects:

- Studying other risk standards (business, currency fluctuations ...), when reviewing the relationship between board structure and companies’ risk.
- Repetition of this research for loss-making companies comparing to profit-making companies in future researches.
- Repetition of this research by using more time pauses, board structure and reviewing the effect of increasing the pauses in improving the anticipation of companies’ risk model.
- By considering the relatively high fluctuations in political and cultural factors of Iranian companies, it is recommended that non-linear regression design be used when determining the relationship between board structure and companies’ risk.

**REFERENCES**


