Study on the Effect of Competition at Product Market on the Relationship between Capital Structure and Financial Performance of Companies
Case Study: Polymer Companies

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Abstract
The company management decided on its capital structure in order to maximize corporate value, while the managers have various leverage levels, while managers are facing different levels of leverage in the capital structure and are trying to achieve the best capital structure. Since creation of value and increase of shareholders' wealth in long term are considered as the most important goals of companies and increase of wealth will come to realize as the result of proper performance, maximization of company's value will come to realize only when the company has the financial health, i.e. financial resources of the company have been selected properly and used also properly, as a result change of companies' financial structure can affect company's value, economic added value and market added value. With regard to significance of research, effect of competition in product market on the relationship between capital structure and companies' financial performance is examined.

Keywords: Polymer Companies, competition, product market, financial performance

Introduction
A large body of the capital structure literature indicates that not just financing decisions are under influence of agency contrast between the manager and owner but also the groups out of company such as consumers and other competitors affect these decisions. This literature puts emphasis on this point that financing technique influences the trajectory of business unit and its competitors at product market and causes creation of competitive space [1]. Two ideas play a major role on how the financing restrictions affect decisions by product market at business unit. The first company that intends borrowing considers bankruptcy costs and risk and this causes the business unit takes more precaution at product market. The second puts emphasis on this point that the debt changes the incentive of the business unit for investing [2]. For instance, transfer of risk to the creditors can increase due to limited responsibility of the trade unit (shareholders). In other words, during earning much money, the shareholders are considered as remaining claims, but at the improper modes under increase in loss, the creditors are considered the remaining claim in the business unit. Simply put, bankruptcy costs stimulate the business unit so as to consider the strategies which lead to producing cash flow and reducing the risk of bankruptcy. Some of these influences lead to aggressive behavior in the product market (for example, high production or lower prices) [3]. A large body of the capital structure literature indicates that not just financing decisions are under influence of agency contrast between the manager and owner but also the groups out of company such as consumers and other competitors affect these decisions [4]. This literature puts emphasis on this point that financing technique
influences the trajectory of business unit and its competitors at product market and causes creation of competitive space [6-9]. Two ideas play a major role on how the financing restrictions affect decisions by product market at business unit. The first company that intends borrowing considers bankruptcy costs and risk and this causes the business unit takes more precaution at product market. The second puts emphasis on this point that the debt changes the incentive of the business unit for investing. For instance, transfer of risk to the creditors can increase due to limited responsibility of the trade unit (shareholders). In other words, during earning much money, the shareholders are considered as remaining claims, but at the improper modes under increase in loss, the creditors are considered the remaining claim in the business unit. Simply put, bankruptcy costs stimulate the business unit so as to consider the strategies which lead to producing cash flow and reducing the risk of bankruptcy. Some of these influences lead to aggressive behavior in the product market (for example, high production or lower prices)[5]. The existing literature provides some of the major insights on the relationship between restrictions to product market and financing decisions. Brander & Louis (1986) who have been mentioned as the pioneers at this arena have examined effect of capital structure on behavior of product market. In this regards, they have considered a two-stage bipolar monopoly model. At the first stage, the companies select the amount of their financial leverage and then compete in the amount of manufacturing product. Due to the limited liability of debt, the companies under study than the companies without any debt have showed more aggressive behavior. Bolton & Scharfstein-D.S.(1990) and Dasgupta, S., & Titman, S.(1998) stated that effect of financial leverage on performance depends on the competition degree at capital market. Thus, study on effect of capital structure on financial performance of business unit is required, should not undergo negligence. Thus, the present research examines the relationship between competition at product market and capital structure and performance of company at the polymer companies listed in Tehran stock exchange. In other words, the present research intends to give response to this question whether the extent of competition at product market can affect the extent to which financial leverage affects performance of polymer companies or not.

**Research method**

The research method can be known with a series of authentic and systematic rules and ways to examine facts, discover unknowns and access to the solution for problems. In humanities, a variety of classifications have been considered for the research method, explained as follow. The present research is an applied study in sake of nature and goals of research. It is a correlation study in sake of method. Further, it is a documentary study in sake of data collection. The present research has been a library study in sake of method, and the required information has been collected using books, articles, journals and press so as to conduct the research. Since the subject of research associates to the companies listed in Tehran stock exchange, the sample group has been selected among these companies, i.e. the sample group has been selected among the industries listed in stock exchange in a way to have the capability to generalize it to the statistical population. The research method in sake of the results from the research method is classified to three fundamental, applied and developmental groups. This research is an applied study in sake of the research results. applied study is an attempt to find response to resolve a practical problem which exists in the real world. this research uses the results from the fundamental research to improve and develop the behaviors, methods, tools, devices, structures and patterns used in the human communities. The research method in sake of role of variables in the research in sake of aim can be descriptive, analytical or clinical. This research is an analytical research in sake of aim and a casual research in sake of the role of variables in the research. Analytical research refers to a study which had been designed aiming at testing a hypothesis, classified as an analytical study. Value of such studies is much high as the researcher examines the cause and effect relationship with intervention in a process. In data analysis, firstly Kolmogorov-Smirnov Test is used to examine normality of data distribution, and then Durbin – Watson test is used to test whether the sample size is independent and selected in random. if the value of Durbin – Watson approaches to 2, this means that the considered sample is random indicating lack of autocorrelation. Pearson correlation coefficient among the research variables is examined. Coefficients of regression model variables are tested using t-student test. in this study, Fisher's k-statistics has been used to test significance of fitted regression model at confidence level(95%) and Durbin- Watson test has been used to test lack of correlation between
the model errors. Finally, error component curve has been drawn in the regression model to examine
normality of the error components. Using linear regression, we tested the hypotheses. In this research,
multivariate regression is used as the statistical method. In regression method, the main purpose is to
examine whether a relationship exists between the dependent variables and independent variables or not.
Further, data analysis at descriptive statistics section by calculating central indices including mean, median
and dispersion indices such as standard deviation, skewness and kurtosis will start. These indices will be
made by separation of various industries and in total. The collected data have been entered into software
Eviews using software Excel after the required modifications and classification based on the variables under
study and the final analysis will be made and ultimately the research hypotheses will be will be confirmed
or rejected using the results from the associated software.

**The research hypotheses**

H1: Financial leverage has a positive nonlinear effect on performance of polymer manufacturing company
H2: Competition level has a positive nonlinear effect on performance of polymer manufacturing company
H3: Effect of financial leverage on performance improves or worsens regarding change in competition level
in polymer manufacturing company

**Results**

**Descriptive statistics on research data**

The first step in any statistical analysis and information analysis is to calculate the descriptive
indices. Thus, to enter into the step of information analysis, descriptive statistics of data include central
indices, dispersion and deviation from symmetry as well as Jarque and Bera test which examines the normal
distribution of residues have been calculated and the results have been presented in table 1.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Medium</th>
<th>Maximum</th>
<th>Minimum</th>
<th>Standard deviation</th>
<th>Jarque and Bera test</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>0.140</td>
<td>0.12</td>
<td>0.832170</td>
<td>6.45E-06</td>
<td>0.095233</td>
<td>1419.53</td>
</tr>
<tr>
<td>Levi</td>
<td>0.6238</td>
<td>0.637198</td>
<td>1.480098</td>
<td>0.096415</td>
<td>0.177282</td>
<td>34.05963</td>
</tr>
<tr>
<td>Com</td>
<td>1.59E-05</td>
<td>8.48E-07</td>
<td>0.001350</td>
<td>6.27E-09</td>
<td>8.43E-05</td>
<td>566711.9</td>
</tr>
<tr>
<td>Levi*Com</td>
<td>1.16E-05</td>
<td>4.70E-07</td>
<td>0.001130</td>
<td>5.10E-09</td>
<td>6.64E-05</td>
<td>714371.1</td>
</tr>
</tbody>
</table>

With regard to the estimated probability of Jarque-Bera statistics and the calculated error level of
all the variables under 0.05, this will indicate non-normal distribution of these variables. In this research,
Central Limit Theorem was used on normality of the variables of model. With regard to the
Central Limit Theorem, sum and values of a n-sized sample selected from a statistical population tends to
a symmetric sampling distribution. In Central Limit Theorem, if a n-sized sample is selected among a non-
normal population with mean($X_μ$) and standard deviation($Xδ$), $X$ will be distributed in normal, such that
the larger sample size, the approximation will approach to normal. Many regarding Rules of Thumb believe
that at least a 30-sized sample is required regardless of distribution of a statistical population so as to say
that distribution of $X$ is normal(Adel Azar & Momeni, 2011). Thus, since the sample group consists of 100
companies during 5 years, the research variables will have an approximation of normal distribution.

**Unit root test**

The data used in the econometric studies can be classified to three groups of time series data,
Cross-sectional and panel data. Except for Cross-sectional data, unit root test should be made in rest of data
[15]. Traditional econometric methods in estimation of coefficients of a pattern are based on stationary time
series. Time series variable is stagnant when mean, variance, covariance and as the result correlation
coefficient remain fixed, neglecting at which section of time these indices have to be calculated. Yet, on
other hand, the studies since 1990 later have indicated that most of time series variables are no stagnant in
In other words, mean and variance of these series have been varied over time and their covariance is not fixed per certain pauses, which these features are remembered as non-stationary time series. If the time series used in estimation of coefficient of pattern remain non-stationary, estimation of pattern with such variables might lead to spurious regression, i.e. determination coefficient ($R^2$) obtained from the pattern has been a high estimation, but no significant relationship has existed between the variables of the pattern. Inattention to such point might mislead the researcher and wrong inferences on the relationship between variables. Thus, before using these variables, it requires ensuring on stationary or non-stationary of these variables [17]. As mentioned, one of the ways to avoid spurious regression is ensuring about stationary of data, thus before estimating the model, the statistical features of panel data are examined in sake of stationary or unit root. The results from unit root test for the variables of model are presented in table below, thus we witness that all the variables at zero level are stationary.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Test</th>
<th>Test statistics</th>
<th>P-Value</th>
<th>Result of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROA</td>
<td>Levin, Lin, Chu</td>
<td>-25.64</td>
<td>0.000</td>
<td>Stationary at zero level</td>
</tr>
<tr>
<td>Levi</td>
<td>Levin, Lin, Chu</td>
<td>-76.49</td>
<td>0.000</td>
<td>Stationary at zero level</td>
</tr>
<tr>
<td>com</td>
<td>Levin, Lin, Chu</td>
<td>-3.91</td>
<td>0.000</td>
<td>Stationary at zero level</td>
</tr>
<tr>
<td>Levi*Coin</td>
<td>Levin, Lin, Chu</td>
<td>-21.39</td>
<td>0.000</td>
<td>Stationary at zero level</td>
</tr>
</tbody>
</table>

**Steps on estimation of model**

In this research, panel data model has been used to examine effect of competition in product market on the relationship between capital structure and financial performance of companies. Thus, the function will be as follow:

**The research model**

$$\text{ROA}_{i,t} = \alpha + \beta_1 \text{Levi}_{i,t} + \beta_2 \text{Comi}_{i,t} + \beta_3 \text{Levi}_{i,t} \times \text{Comi}_{i,t} + \epsilon_{i,t}$$

Where, return on assets (ROA), financial leverage(Levi), and competition level(Com).

Firstly, Limer test has been examined and we select among accumulated and non-accumulated data(fixed effects or random effects), in which $H_0$ (the equality of width of origin) is against $H_1$ (Anisotropy of width of origins (panel method)). In software after Limer test, if prob of output of software falls under 0.05, panel method is accepted at 95% level to above, but if falls greater than 0.05, the combined method is accepted.

<table>
<thead>
<tr>
<th>Test Summary</th>
<th>Statistic</th>
<th>d.f.</th>
<th>Prob</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-section F</td>
<td>8.29</td>
<td>99.38</td>
<td>0.000</td>
</tr>
<tr>
<td>Cross-section Chi-square</td>
<td>556.34</td>
<td>99</td>
<td>0.000</td>
</tr>
</tbody>
</table>

As observed, prob is under 0.05, as a result the regression has different width of origin. Now, this question is raised that difference in width of origin of sectional units is in random effects or fixed effects?

Statistics of this chi-square test with freedom degree equals to number of independent variables:

- $H_0$: Random Effect
- $H_1$: Fixed Effect

If Hausman test is made and obtained prob falls under 0.05, fixed effects model is accepted at 95% level to above, but if it falls above 0.05, the random effects model is accepted.
With regard to result from Hausman test, H0 is rejected, because the prob value for it is greater than 0.05, thus the model has to be estimated with random effects, i.e. confirming random effects against fixed effects. Thus, with regard to the results from Limer test and Hausman test, the random combined model should be estimated to estimate the model.

The results from the model estimation

After determining the model and selecting the best method, the results from estimation for the selected companies will be as follows:

With regard to the estimated prob under 0.05, it can say that there is a significant relationship between dependent variables and independent variables for the companies during 2009-2013. Value of $R^2$ states that which percent of the changes in dependent variable can be explained via independent variable. In the present model, value of $R^2$ equals to 72%, i.e. 72% of the changes in dependent variable can be explained via mentioned variables. Value of Durbin-Watson statistics equals to 1.94 and there is not a huge gap with value(2), confirmed the health of model.

Interpretation of hypotheses results and analysis

Results from model estimation have been presented in table 6.

In this regards, the hypotheses are analyzed:

- Financial leverage has a nonlinear positive effect on performance of company.
  With regard to the value of prob which equals to 0.00, significance of effect of financial leverage on performance of company is confirmed. Coefficient (-0.216) indicates negative effect of financial leverage on performance of company.

- Competition level has a nonlinear positive effect on performance of company.
  With regard to the value of prob which equals to 0.002, significance of effect of Competition level on performance of company is confirmed. Coefficient (0.69) indicates positive effect of Competition level on performance of company.

- Effect of financial leverage on performance improves or worsens regarding change of competition level.
  With regard to the value of prob which equals to 0.00, significance of effect of financial leverage regarding change in competition level on performance of company is confirmed. Coefficient (0.055) indicates positive effect of financial leverage regarding change in competition level on performance of company.
Conclusion

The results from estimation of model function indicate that coefficient of competition level has a positive significant effect on performance of company. Coefficient of this variable was estimated equal to 0.69, so that if the competitive level increases per unit under fixed value of rest of variables, then value of company performance will increase per 0.69 unit. Results from financial leverage indicate negative and significant effect of this variable on performance of company, so that if the financial leverage increases per unit under fixed value of rest of variables, then value of company performance will increase per 0.216 unit, and this has been confirmed in the study by Izadinia et al.(2013), so that, the manager's opportunistic behavior reduces by increasing financial leverage which this can intensify the conflict between creditors and shareholders and increase the agency costs, resulting in poorer performance. Levi*Com refers to a term which displays the mutual effect of financial leverage and competition level on performance. If the competitive market and competitors are found leverage, performance improves by increasing leverage; in this regards, if the centralized market and competitors are found less leverage, the company with high leverage will have poorer performance resulting in bankruptcy. Thus, if the competition level reduces, performance improves by increasing financial leverage. Conclusion of the research hypotheses indicates that financial leverage, competition level and mutual effect of financial leverage and competition level put a positive significant effect on performance of company, and all the research hypotheses are confirmed.

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