Study of Interaction Between Capital Structure and Product Markets Companies *Accepted the Tehran Stock Exchange*

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Abstract: Performed researches show that capital structure and level of product-markets competition both influence each other. The purpose of this paper is investigating the relationship between capital structure in accepted manufacturing firms, in Tehran Stock Exchange and competition in their product-market. Statistical population of research has chosen 390 company years consists of 65 firms from the period of 1383 to 1388. We have tested hypothesizes of research by using both ordinary least squares (OLS) linear regressions and seemingly unrelated regression (SUR) methods. The finding of research suggests that the level of product-market competition has no influences on the level of firms' long-term debt; moreover, the level of long term debt has reverse and significant effect on the level of product-market competition. In other word, by growing the level of long-term debt, the share of firm relative to industry sales will decrease. Evidences suggest that competition and relationship between rivals have no significant effect on leverage of long-term debt; moreover by consider to result of other side of relationship, we can find, don't using the leverage of long-term debt in the capital structure, as a signal of their motivation in more active competition in market.

Key words: Capital structure · Long-term debt · Product-markets competition

INTRODUCTION

The main propose of firms is wealth maximization of shareholders. Capital structure is one of the most effective factors on value of the company. Therefore, the optimal capital structure is significant for companies. Meanwhile, to survive the firms, decision making, in the field of determining capital structure is one of the most difficult and the most critical decision for them. In fact, managers are looking to find a way to determination of optimal capital structure that will minimizes the firm's capital cost and will maximize its value.Hence, identifying effective factors is important.

Achievement of optimal financial structure has been a complex issue for a long time. Paying attention to the effect of various factors that each one will affect the financial structure is essential. As a result, studying and identify the factors that somehow will affect on financial structure and optimal composition is significant. Due to internal and external situation of each company, determining the capital structure is affected by various factors such as growth, risk, inflation, firm size, economic sanctions and the product- market competitions.

"Harris" and "Raviv" [1] identified four categories that will determine the capital structure as follows:

- Improving the conflicts of interest, among various groups with various claims, toward the firm's resources, such as managers (the agency approach).
- Transferring private information to capital markets or diminishing side effects of selection (the asymmetric information approach).
- The effect of the firm's control competitions' outcome.
- Influence of products' nature or competition in or to the product/input market

As mentioned above, the product market competition is a determinant of capital structure. Two groups of literature have related capital structure and product market competition to each other. The first one is theory of capital structure stakeholder. This theory argues that the debt not only is affected by shareholders and bondholders but also is affected by customers, employees and suppliers. So, they should be calculated too [2].

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For example, we can mention customers' requirements to a particular product or service workers' requirements to investment on firm human capital, the quality of product and worker's bargaining power or other suppliers [1].

The second group has utilized industrial organization and strategic management literature to determination of capital structure. Most of models in second group have used capital structure as a strategic tool or commitment. Here Capital structure should be observable and the companies are not allowed to change it before the investment and product decision making. Thus, rival firms can observe selecting capital structure and can logically prevent their impact on next product decisions and investment [3].

Generally, in second group, once they consider to product markets, will pay attention to both firm's market structure and its strategic behavior. So the impact of financial decisions on product markets may be pronounced through showing how these decision makings are influencing firm' market structure or strategic behavior. These groups of literatures are divided to three main categories [3].

- The first one is the reason for effect of limited liability debt. Brander and Lewis [4] show that when the liability is limited, Cournot Companies, with regard to some product market uncertainty, Will use the debt as a commitment for larger output positions in an effort to gain strategic advantage
- The second one is predatory behavior. Predatory model is differ from above limited liability, there is a non-leveraged company that has motivation to behave actively (such as increased output or prices omission) to stimulate corporate leverage out of market. However, this model can be divided into four subgroups:

- Strategic bankruptcy and the high purse of Telser (1966).
- Imperfections of Product market.
- Interaction based on tax, between financial markets and product markets.
- Agency aspects of financial structure which are issued by Jensen and Meckling (1976)
- The third and its last category consider to the effect of the investment. Here and along with some previous results of the limited liability (like Brander and Lewis [4] and Maksimovic [5], Phillips [6] showed that how industrial output, by increasing the debt, may be decreased instead of increasing. Since,

the percentage of cash flow is added to pay out in each period; added debt isn't a commitment to invest in future that will decrease cash flow for investments.
- The main purpose for this study comes from recent models in the strategy of using debt. These models show that firms may have incentives to perform a specific product-market strategy.

Decisions to increase the level of debt may affect the market structure and lead to a greater or lesser level of concentration in the industry. On the other hand, increased financial leverage may lead companies to compete or cooperate. Therefore, Financing decisions may affect the market structure (the level of industry concentration) and the strategic behavior of firms (such as increased or decreased).

Also, we can express the opposite of this problem. Thus, it is possible market structure and strategic behavior, corporate financing decisions, affects the company.

This study examines the effect of capital structure on product market competition, in the manufacturing companies which are listed in Tehran Stock Exchange. Also, we try to answer these questions whether the company's capital structure will affect the level of competition on the market? And whether the capital structure on product market competition will affect the industry?

A Review of Research: Overall, a few research has been done in the field of the effects of capital structure on product market, the results of this research is given below.

Often the article of Brander and Lewis [4] are referred as a seminal article on the relationship between financial decisions and capital market decisions. Brander and Lewis by assuming the existence of an oligopoly market, show that a limited liability firm that uses debt, probably by increasing its output, will choose more active trading.

Other theoretical papers, in some cases, were in contrast with the finding of Brander and Lewis. For example Maksimovic [5] showed that in an oligopolistic situation, optimal capital structure is affected by the number of firms in the industry discount rate and the elasticity of demand. Maksimovic can derive comparative static results on the debt capacity as a function of industry and company characteristics, by explicitly modeling the benefits in cost and demand functions and the number of companies. He indicated that the capacity of debt will increase with elasticity of demand and decreasing the discount rate.

Bolton and Scharfstein [7] concluded that firms by relying on external financing sources will be subject of destructive competition. Therefore firms may choose internal source of financing. But this reduction of range that controls the firm's foreign investors will increase the possibility of management's failure. Therefore, external financing has the costs and benefits: On the one hand, it regulates the management and on the other hand, it makes firms more vulnerable in product markets.

Showalter [8] found that the nature of uncertainty in the output market will determine if a firm decides to use the strategic debt. A company did not use debt, because there was no strategic advantage of it. On the other hand, if demand is uncertain. The firm, to increase prices in the industry, will increase its financial leverage and this led to higher profits for it.

Also, characteristics of debt may be related to product market behavior. For example, Glazer [9] argued that the way of firms' competition in product markets is related to their use of short-term or long-term debt and lack of debt. He showed that if firms' competition is based on their output, using long-term debt will encourage collaboration between them. Meanwhile, there will be more active competition between companies if they are competing based on price.

Kanatas and Qi [10] in a well known bilateral monopoly model of Cournot showed that short-term debt capital markets can manage the risk management failure. Their analysis only focuses on product market decisions and the relationship between competitors that seeks to impress the market assessment of the credibility of the company. They show that short-term debt, in order to manipulate the market, does not provide the management of information flow; however, shareholders may prefer short-term debt, due to the stimulation of active management in the product market. They compared the short-term and long-term capital market financing and bank credit. They investigated the decision between the use of bank credit and short-term or long-term debt capital markets when the product market competition was imperfect. In this situation, they showed not only their cost structure and its internal staff motivation problems are not important but also competitors of its industry and the way of their interaction between these two parts is important.

Phillips [6] investigated four U.S. industries and found in three of them, higher leverage, leads firms to carry out less investment opportunities and to behave less aggressively. Zingales [11] found that more efficient transportation companies are more likely resistant to removal of the ban from their industry. Companies that are under the Investment, because of higher leverage are less likely to sustainable. The reason of relationship is more obvious in Zingales' paper. Because the problem of deregulation was an external event that is unpredictable and competition and capital structure choices will affect the transportation industry.

Also, other recent researches tried to find the issue of cause and effect. Istaitieh and Rodriguez [3,12] using data of manufacturing companies in Spain that discovered the concentration of industry and product market competition both influence and are influenced by leverage. Grullon, Kanatas and Kumar (2002) used the cost of advertising as a representative of non-price competition and found that companies that use less debt can compete more actively. Also they studied relationships in opposite direction and found that significant increases in the costs of advertising do not lead to changes in the amount of leverage used.

Smith, Chen and Anderson [13], in a paper investigated the relationship between capital structure and their product markets in New Zealand and concluded long-term leverage both influences and is influenced by product-market competition. In other words, by increasing rate of sale, in firms of an industry, long-term debt will increase too and also, by utilizing more long-term debt, the rate of sale in industry will increase.

The Research Hypotheses: According to the research and the theoretical foundations, research hypotheses are defined as follows:

First Hypothesis: The level of product market competition has a significant effect on the company's long-term debt.

Second Hypothesis: The level of long-term debt of company has a significant effect on product market competition.

Data: Statistical population of this research is all manufacturing and industrial companies listed in Tehran Stock Exchange.

Samples Were Selected Based on the Following Conditions:

- The end of their financial period annually was the end of March, in this period they haven't had change of financial year.
- During the period of study, their shares were not faced to more than six months trading interruption.

- The classification is not part of investment companies.
- Their risk factor is calculated.
- Industry is not monopolistic, but is competitive.
- Book value of equity shareholder is zero or less than zero.

The firms that were classified according to type of industry are presented in Table 1. Classification was based on the classification of industries in the Tehran Stock Exchange.

Models and Variables: In order to examine the relationship between capital structure and level of competition in the market the variable of competitive and long-term debt are used. Control variables for competitiveness are profitability, fixed assets, size, growth and risk and control variables for long-term debt are profitability, fixed assets and size.

The model that is used, in determining the impact of product market competition on long-term debt is regression model (1) and the model in determining in the long-term debt on product market competition is regression model (2):

Model (1): LTDebt = $\alpha 0 + \alpha 1$Comp + $\alpha 2$Prof + $\alpha 3$Fixed1 + $\alpha 4$Fixed2 + $\alpha 5$ Size + $\alpha 6$ growth + $\alpha 7$Risk + u1

Model (2): Comp = $\beta 0 + \beta 1$ LTDebt + $\beta 2$Prof + $\beta 3$ Fixed1 + $\beta 4$ Fixed2 + $\beta 5$ Size +u2

where:

Comp: Representative of the company's product market competition is the firm's sales that divided by total industry sales revenue of the company.

Table 1: Classification of firms according to industry

Industry Name	Companies	Company years
Types of food products	7	42
Materials and chemical products	21	126
Other non-metallic mineral products	14	84
Machinery and equipment	3	18
Petroleum products, coke and nuclear fuel	2	12
Basic metals	4	24
Automobile and Parts	12	72
Manufacture of metal products	2	12
Total	65	390

ltdebt: Long-term debt will be presented as part of the book value of long-term financial liabilities, divided by book value of the firm's assets,.

Prof: Equal to the profitability of the company's operating profit (profit before interest and taxes) divided by book value of assets of the company.

Fixed 1: Represents the book value of tangible fixed assets divided by book value of company assets.

Fixed 2: book value of intangible assets divided by book value of assets of the company's corporate

Size: Size of the firm equal to the book value of the firm's assets.

Growth: A representative of the company's growth. The value of this variable considered the market value of equity divided by book value of equity.

Risk: Variables is indicative of risk. The value of this variable is equal to the standard deviation of the company's operating profit, divided by the average absolute value of profit before interest and taxes that, in a period of five years beginning with year t-4 and ending with year t.

In order to examine the research, hypotheses of inferential statistical tests are used, such as correlation, correlation matrix, the coefficient of determination, adjusted coefficient of determination, ordinary least squares regression and seemingly unrelated regression. Seemingly unrelated regression system, consists of several distinct disorders that are related by this fact that they are closely connected. There are two main motivations for using seemingly unrelated regression. First, the most efficient estimates are combining information in different equations. The second motivation is to impose restrictions or testing of the parameters involved in differential equations.

RESULTS

Table 2 shows Summary of research variables, including number of samples, average, minimum, maximum and standard deviation of the data. Statistical summary of research variables show that average long-term debt is 6.4% of book value of assets. First, the fixed assets variable shows that 27 percent of tangible fixed assets are

Table 2: Descriptive statistics of research variables

	N	Min	Max	Mean	Std dev
LtDebt	390	0	2.406	0. 064	0.165
Comp	390	0.001	0.757	0.123	0.17
Prof	390	-0.105	1.76	0.189	0.151
Fixed1	390	0.003	4.021	0.266	0.309
Fixed2	390	0	0.025	0.003	0.005
Size	390	0.245	35.638	2.81	3.71
Growth	390	35923	79796429	3157408	9332956
Risk	390	0.068	345.57	1.29	17.48

Table 3: Matrix of correlation coefficients

		LTDebt	Comp	Prof	Fixed1	Fixed2	Size	Growth	Risk
LTDebt	Pearson Correlation	1	-.082	.184**	.582**	.156**	-.018	.077	.187**
	Sig. (2-tailed)		.106	.000	.000	.002	.725	.127	.000
Comp	Pearson Correlation	-.082	1	.121*	-.028	-.067	.271**	-.046	-.026
	Sig. (2-tailed)	.106		.017	.585	.184	.000	.364	.603
Prof	Pearson Correlation	.184**	.121*	1	.313**	.106*	-.075	.300**	-.063
	Sig. (2-tailed)	.000	.017		.000	.037	.138	.000	.212
Fixed1	Pearson Correlation	.582**	-.028	.313**	1	.196**	-.088	.044	.100*
	Sig. (2-tailed)	.000	.585	.000		.000	.082	.388	.048
Fixed2	Pearson Correlation	.156**	-.067	.106*	.196**	1	-.113*	.090	.014
	Sig. (2-tailed)	.002	.184	.037	.000		.026	.075	.781
Size	Pearson Correlation	-.018	.271**	-.075	-.088	-.113*	1	-.090	-.003
	Sig. (2-tailed)	.725	.000	.138	.082	.026		.076	.951
Growth	Pearson Correlation	.077	-.046	.300**	.044	.090	-.090	1	-.030
	Sig. (2-tailed)	.127	.364	.000	.388	.075	.076		.551
Risk	Pearson Correlation	.187**	-.026	-.063	.100*	.014	-.003	-.030	1
	Sig. (2-tailed)	.000	.603	.212	.048	.781	.951	.551	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4: Models Summary

Model	Model 1		Model 2	
Regression method	OLS	SUR	OLS	SUR
R	0.605	0.53	0.326	0.412
R^2	0.367	0.281	0.106	0.169
Adjusted R^2	0.355	0.268	0.094	0.159
Std Dev	0.132	0.975	0.162	0.942

book value of assets. Profitability variables indicate that the average operating profit to book value of assets is 19 percent. The second fixed assets variable shows that an intangible asset is 0.3 percent of book value of assets.

Table 3 shows the correlation coefficients in variables of research. The highest correlation between variables in a regression equation is between the long-term debt and fixed assets with coefficient of 0.582. So we can interpret that, long-term debt has a great impact on degree of firms' tangible fixed assets. In other words, firms that have had high investments on tangible fixed assets are interested to get more long-term debt. Also correlation

between variables of profitability and the first fixed assets variable is significant with a coefficient of 0.313 and we can claim that companies that have high profitability, have high investments in fixed assets. Correlation between firms' variable of profitability and growth is also significant with a coefficient of 0.3. Moreover, correlation between variable of competition and size is significant and it can be argued that, larger firms have greater share of industry sales.

Table 4 summarizes the models. As shown in Table, multivariate correlation coefficient (R) for model (1) with ordinary least squares regression method is 0.605 and with seemingly unrelated regression method is 0.53.

Coefficient of determination in the ordinary least squares regression method is equal to 0.367 and in the seemingly unrelated regression method is equal to 0.281. So we can say, in the ordinary least squares regression method (OLS) 36.7 percent of changes in long-term debt are explained by the independent variables in this model and using seemingly unrelated regression (SUR) 28.1 percent of changes in the dependent variable (long-term debt) are described by the independent variables.

Also, Multivariate correlation coefficient (R2) for the second model in the ordinary least squares regression method (OLS) is equal to 0.326 and in the seemingly unrelated regression method (SUR) is equal to 0.412. Coefficient of determination in ordinary least squares regression method is equal to 0.106 and in the seemingly unrelated regression method is equal to 0.169. We can state that, in the ordinary least squares regression method, 10 percent of changes in product market competition can be explained by the independent variables in this model and by using seemingly unrelated regression, about 17 percent of changes in the dependent variables (product market competition) are described by the independent variables.

Table 5 shows the results of multivariate Correlation coefficients of test of significance (ANOVA). Note that F that is obtained for both models and regression method is on acceptable interval of confidence (error less than 5 percent), thus, resulted R2 is significant.

In the first model, the key independent variables, product market competition and long-term debt are dependent variable model. In the second model, the key independent variable, long-term debt and product market competition are the dependent variable. The results of Hypothesis are:

The First Hypothesis Test: Table 6, by using both regression analyses shows the results of regression in the first hypothesis. The results of both regression methods show the effect of a weak, reversed and meaningless in confidence level of 95%. Therefore, the first hypothesis is rejected at the 5% significance level. So, there isn't significant impact between product market competition and the level of long-term debt that is used in the capital structure of manufacturing companies in Tehran Stock Exchange. Istaitieh and Rodriguez [3,12] argue that the firms that have experienced a tough product market competition may use more leverage as a sign of their goal to more active competition. On the other hand, if competition in product markets is easier, the firms may have more leverage as a sign that they will cooperate with rival company. We can explained that the calculated coefficients in this study is negative that shows competition in product markets lead to reduction of long-term debt leverage in the manufacturing companies listed in Tehran Stock Exchange; But there is no significant effect between product market competition and leverage long-term debt.

Table 5: multivariate Correlation coefficients of test of significance (ANOVA)

Model	Method		Sum of squares	df	Mean square	F	Sig
1	OLS	Regression	3.861	7	0.552	31.576	0.000
		Residual	6.673	382	0.017		
		Total	10.534	389			
	SUR		-	-	-	21.310	0.000
2	OLS	Regression	1.197	5	0.239	9.105	0.000
		Residual	10095	384	0.026		
		Total	11.291	389			
	SUR		-	-	-	15.671	0.000

Table 6: Regression coefficients of the first model variables

	OLS					SUR			
	Unstandardized Coefficients		Standardized Coefficients			Unstandardized Coefficients			
Regression Method	B	Std. Error	Beta	t	Sig.	B	Std. Error	t	Sig.
(Constant)	-0.024	0.013		-1.837	0.067	-0.005	0.014	-0.376	0.707
Comp	-0.074	0.042	-0.076	-1.773	0.077	-0.063	0.053	-1.205	0.229
Prof	0.013	0.05	0.012	0.251	0.802	-0.004	0.042	-0.097	0.922
Fixed1	0.297	0.023	0.558	12.657	0.000	0.237	0.024	9.675	0.000
Fixed2	1.281	1.299	0.041	0.986	0.325	0.53	0.992	0.534	0.593
Size	0.000	0.000	0.063	1.461	0.145	0.000	0.000	0.837	0.403
Growth	0.002	0.002	0.052	1.201	0.23	0.002	0.002	1.009	0.314
Risk	0.001	0.000	0.131	3.172	0.002	0.001	0.0002	4.178	0.000

The second hypothesis test:

Table 7: Regression coefficients of the second model variables

	OLS					SUR			
	Unstandardized Coefficients		Standardized Coefficients			Unstandardized Coefficients			
Regression Method	B	Std. Error	Beta	t	Sig.	B	Std. Error	t	Sig.
(Constant)	0.081	0.015		5.491	0.000	0.1	0.016	6.059	0.000
LtDebt	-0.115	0.062	-0.111	-1.874	0.062	-0.051	0.014	-3.591	0.0004
Prof	0.181	0.057	0.161	3.162	0.002	0.1	0.014	7.291	0.000
Fixed1	0.01	0.034	0.019	0.305	0.761	-0.005	0.008	-0.605	0.546
Fixed2	-1.268	1.592	-0.039	-0.796	0.426	-0.927	0.42	-2.206	0.028
Size	0.000	0.000	0.278	5.697	0.000	0.000	0.000	3.229	0.001

Table 7 shows results of Regression for the second model with using both regression methods. Coefficients obtained indicate that the second hypothesis with using ordinary least squares regression method is rejected at the 5% significance level. However, using seemingly unrelated regression method will be accepted at the 5% significance level but this effect is reversed; so it can be argued that long-term corporate debt levels adversely affect the product market competition. Brander and Lewis [4] predicted firms that use more debt are more active in the market. Glazer [14] claimed that use of long-term debt will reduces competition based on the output and will increases competition based on price. According to the obtained results, we can claim that the firms commit high dept to compete in product markets. Our findings with using ordinary least squares regression reflect the lack of impact between the level of long-term debt and product market competition. However, the results of seemingly unrelated regression method shows that there is a significant relationship between the long-term debt and product market competition in the manufacturing companies that are listed in Tehran Stock Exchange. Therefore, by using seemingly unrelated regression (SUR) the second hypothesis can be accepted at 95% confidence level. Regression coefficient of product market competition with using both methods is negative and this suggests that long-term debt has the opposite effect on product market competition. We can interpret that using the long-term debt in capital structure has the opposite effect on product market competition and lead to reducing competition in the market.

CONCLUSION

The result of first hypothesis test shows that the effect of product market competition on long-term debt leverage isn't important at the five percent significance level. The regression results were similar for both methods. Also, the second fixed assets variable is not important at the five percent significance level. However,

the first fixed assets and risk variable is important and long-term debt has a significant effect on the level of manufacturing companies listed in Tehran Stock Exchange. This can be interpreted that, more investments in tangible fixed assets will increase long-term debt.

The second hypothesis tests using ordinary least squares regression suggests that long-term debt variable is not important at the five percent significance level. Variable coefficient is negative, that indicates the opposite effect of long-term debt leverage on product market competition. The second hypothesis tests using seemingly unrelated regression method showed that long-term debt variable is significant at five percent significance level. First fixed asset and second fixed asset variables are important at the five percent significance level but variable in size and profitability variables are important in the five percent significance level. Thus, increasing levels of long-term debt will reduce the level of competition in product markets and increasing profitability will increase the level of competition in product markets. As a result, profitable firms and firms that have less leverage long-term debt, likely will allocate a greater share of their sales to the industry.

As a result, long-term debt leverage does not impress product market competition in manufacturing companies that are listed in Tehran Stock Exchange, but it does affect the product market competition. Due to the result of the first hypothesis, we can conclude, probably, manufacturing companies listed in Tehran Stock Exchange; do not follow a particular strategy of product market competitive.

This result is in contrast with Brander and Lewis [4] model competition and interaction between the competitors, no significant effect on long-term debt.

The result of second hypothesis test by using ordinary least squares regression show that long-term debt variable is not important at the five percent significance level. Variable coefficient is negative, which indicates to the opposite effect of long-term debt leverage on product market competition.

The result of second hypothesis test by using seemingly unrelated regression method shows that long-term debt variable is significant at five percent significance level. Variables of first fixed asset and second fixed asset are important at the five percent significance level but variables of size and profitability are important in the five percent significance level. Thus, increasing the levels of long-term debt, will reduce the level of competition in product markets and increasing profitability, will increase the level of competition in product markets. As a result, profitable firms and firms that have less leverage long-term debt, likely will allocate a greater share of their sales of industry.

As a result, long-term debt leverage does not impress by product market competition in manufacturing companies that are listed in Tehran Stock Exchange, but it will affect the product market competition. We can interpret the result of the first hypothesis so that, manufacturing companies listed in Tehran Stock Exchange, probably do not follow a particular product market competitive strategy. This result is in contrast with Brander and Lewis [4] model, therefore, competition and interaction between the competitors, have no significant effect on long-term debt. By pay attention to other side of relationship, it concludes that the more utilizing long-term debt resulting lead to decreased levels of competition in the product market. On the other hand, greater use of long-term debt resulting in decreased levels of competition in the product market. Thus, the increase in long-term debt leverage reduces competition and reduces the share of sales in the industry.

Consequently, it can be argued, lacks of long-term debt leverage in the manufacturing companies that are listed in Tehran Stock Exchange is symbol of their motivation for active competition in the market and will increase their share of sales, which it would increase shareholder returns and on the other hand, they can put poor rival companies under pressure.

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