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APPLICATION OF VALUE CHANGES METHOD ANALYSIS IN THE DETERMINING OF CAPITAL STRUCTURE: A STUDY OF IRANIAN LISTED FIRMS

Asadullah Khahande Karnama[1], *Farhad Gheisari[2] and Abdolmajid Farokhian[3]
[1]Department of Management, Shahid Bahonar University of Kerman
[2]Department of Management, Ramhormoz Branch, Islamic Azad University, Ramhormoz, Iran
[3]Department of Management, College of Human Sciences, Kerman Branch,
Islamic Azad University, Kerman, Iran
*Author for Correspondence

ABSTRACT

Decision making about capital structure and achieving the optimal capital structure is one of the most difficult issues and important decisions in financial sector for saving company's life. So in this research, determining of optimal capital structure by analysis of value changes had been done on 112 companies in Tehran stock exchange for period 2008-2013. In this study, some factors such as size, profitability, business risk, non-debt tax shield and assets tangibility accepted independent variables and debt ratio(capital structure as a ratio of total debt to the total debt and market value of equity) accepted as a dependent variable in the form of multi regression model according to experimental data is tested. Data panel unit and Limer-F test and Hausman test and Fixed effects test shows that in the analysis of value changes method, size variable has positive and meaning full effect on debt ratio and non-debt tax shield, business risk, profitability and assets tangibility has negative and meaningful effects on it. Then by Econometric means and Excel, estimated optimal capital structure by method of value changes analysis.

Keywords: *Optimal Capital Structure, Method of Value Changes Analysis, Company Size, Profitability, Business Risk, Non-debt Tax Shield, Assets Tangibility*

INTRODUCTION

One of the most important components of economic activity is preparing financial resources. Necessary financial resources can be prepared from equity or debt. Debt with equity in financing shows capital structure. Main aim of capital structure decisions is maximization market value by appropriate mix of long term funds. This structure called optimal capital structure. One of main role of financial managers at company is determining the best financial mixture so for planning optimal capital structure and minimizing capital cost, they must analysis and balancing all of effective factors in firm capital structure (Nasirzade and Mostaghiman, 2010).

Decisions related to capital structure of company have two aspects: amount of required capital and mixture of capital resources. It is hypothesis that economical unit know its capital requirements, so in this situation should consider that what kind of resources can be used? This process that lead to final decision called capital structure determining method (Jahankhani and Parsayian, 2009). The aim for maximizing stock holders wealth, should be in accord other groups aims and financial managers should consider to common aims between interest groups that it's maximizing price of a share at long term. From theoretical point of view maximizing value market may define by a value of clear scope. This scope shows optimal capital structure. One way for determining optimum capital structure scope is considering to pattern of capital structure of companies with value stocks market (Vakilifard, 2013). This method called value changes for determining debt effects on stockholders value. In this method, decision regarding to capital structure and balancing tax shield benefits and cost of financial distress (yet bankruptcy) had been made (Vakilifard, 2013). Following publication of Modigliani and Miller views inconsistent behaviors in companies, some novel theories such trade-off theory introduced. In trade-off theory, assumed that one company determine optimal debt ratio and move toward it (Nikumaram *et al.,* 2012). According to this theory, companies search for optimal capital structure that maximizes firm value. In this theory,

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companies want to balance advantages and costs regarding to issuing debt. Issuing debt benefits can be tax shield of interests and conflict between shareholders and managers and issuing debt costs can contain potential costs for bankruptcy conflict of interests between shareholders and creditors (Nasirzade and Mostaghiman, 2010).

In method of capital structure determining by value changes analysis regarding trade-off theory for optimal debt ratio forecasting, some factors like size, profitability, business risk, and non-debt tax shield and assets tangibility has been estimated.

Trade-off theory is one of the two effective theories of capital structure (Datta, 2013). According to this theory, company should replace stock by debt and debt by stock, until maximize its value (Molla Nazari *et al.,* 2009). Also this theory shows that tax benefits of these liabilities can increase company value and in other word, financial distress and bankruptcy costs of debt can decrease company value (Bagherzadeh, 2003).
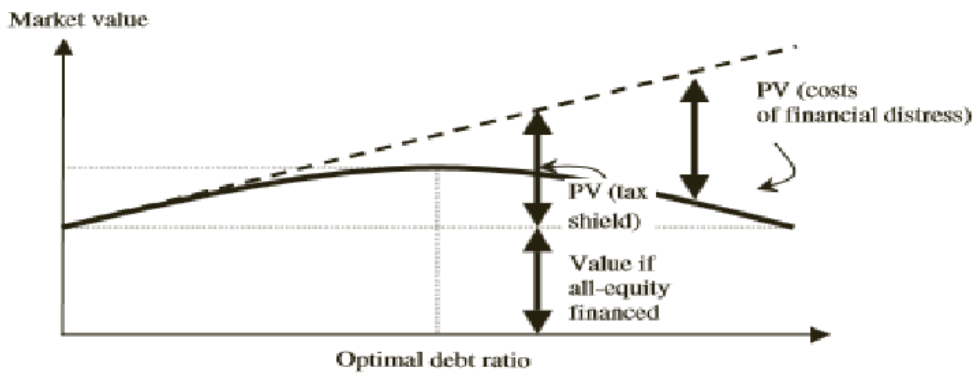
Figure 1: The Optimal Capital Structure when Debt is associated with Tax-shield Benefit and Financial Distress Costs

Literature Review
One of complicating issue for today financial managers is relationship between components of capital structure and mixture of loan and stock for financing. Regarding to this issue that capital structure effects on investment projects with positive or negative current value by accepting or rejecting them, determine of optimal capital structure is one of the most difficult and challenging issues for companies. Main problem for this is how much debt or stock should be existing? Which kind of factors effects on determine of companies capital structure? (Nasirzade and Mostaghiman, 2010). How can determine optimization structure for capital? These questions attract many researcher attention but main problem for it's determining is regarding to stock and liabilities differences for having proper behavior and how much liabilities and stock that is required? (Oolderink, 2013). Main issues in this research are answering to above questions and try to analysis value change method at capital structure determining.

Oolderink (2013) in his research called "Determinate f capital structure at 107 companies at stock market of Netherlands finds:

There is a meaningful and weak relationship between non-debt tax shield and Debt ratio. Although tax has effective role on capital structure decisions relation between business risk and debt ratio. There is positive and weak relation between company size and debt ratio relationship between profitability and debt ratio is negative. Relationship between tangibility assets and debt ratio is weak and negative.

Nikumaram *et al.,* (2012) in their research analysis permanent trade off theory at capital structure of company so 75 companies from accepted list of Tehran stock market had been chosen as a sample. Result shows that size with amount of debt used at capital structure doesn't have any meaningful relationship but profitability and liquidity has meaningful relationship. Finally tangible assets have meaningful and direct relationship by capital structure (Nikumaram *et al.,* 2012).

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Findings of Sernigaj and Meramur (2009) shows that financial leverage by tangibility assets potential has negative and meaningful relationship and meaningful and direct relationship by capital Structure.

Falannry and Rajan (2006) test 12919 industrial company data between 1965-2001 findings shows for nonfinancial company achieving to an optimal debt ratio for a long term, expressed trade off theory and show that companies doesn't compare directly current debt by optimal debt ratio and in average, each year 30% differences between real debt ratio and optimal debt ratio has been covered (Flannery and Rajan, 2006).

Chen and Strong (2005) study effective factors at capital structure of accepted companies in Shanghai stock market at 2003. Results shows that profitability has negative relationship by capital structure. Size and risk for companies has positive relationship by debt ratio, and ta is not effective factor for debt ratio and ownership capital has negative effect on capital structure (Chen and Strange, 2005).

Bagherzadeh (2003) study the most important factors in capital structures for accepted companies at Tehran stock Exchange that is function f sme variables such as fixed assets, company size, and profitability. Results shows that trade off theory for casting is confirmed (bagherzadeh, 2003).

Antoniou *et al.,* (2002), at a research called" determinants at company capital structure" analysis manages effective factors on capital structure such that reach to optimal capital structure (Antoniou *et al.,* 2002).

Effective factors in ten developing countries capital structure has been analyzed by Booth *et al.,* (2001), they show that their capital structure effected by same variables in developed countries results show that more profitable companies have lower debt ratio (Setayesh *et al.,* 2009).

Rajan and Zingales (1995) analyze capital structure pattern at article called "what do we know about capital structure?". Their results show that financial leverage at seven industrial countries with factors market value to Book value and profitability negative relationship and have positive relationship by company size and tangibility assets the main research related to capital structure after Miller and Modigliani. View is owe to Jensen and Mackling (1976) called "economical unit theory: manager behavior, Agency costs and capital structure" to investigate the theoretical factors and reasons for selected model for capital structure from the perspective agency theory and stakeholders interest conflict of economic unit. Jensen and Mackling argue that can create a balance between the benefits and costs of debt and achieved an optimal capital structure.

MATERIALS AND METHODS

This research in terms of target is research-applicable also research method is post-event type, execution method is descriptive and has causal relationship by variables and finally from executing time point of past center and panel data.

In this research required data collected as bellow:

1. Library method: this method has been used for data collection in research background and literature, so with study of books and articles and site search all of required data had been collected.

2. Document research method: used of collection required data for hypothesis test and information gathering by Rahavard-e-novin software and managerial internet site, stock market organization, Kudal site, financial software at Tehran stock exchange.

For choosing sample companies systematic elimination method has been used and 112 companies has selected as a sample.

Research Hypothesis

Main Hypothesis

Method of value changes analysis for determinant an optimal capital structure is suitable.

Sub Hypothesis

1. Non-debt tax shield to debt ratio has meaningful effect.

2. Business risk has meaningful effect on debt ratio.

3. Profitability has meaningful effect on debt ratio.

4. Company size has meaningful effect on debt ratio.

5. Tangibility assets have meaningful effect on debt ratio.
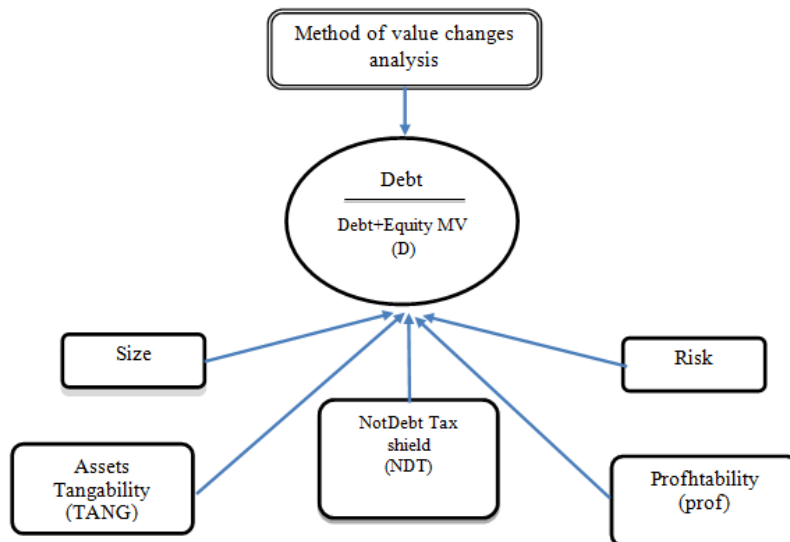

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Conceptual Model

$$D_{it} = \beta_0 + \beta_1 Ndts_{it} + + \beta_2 Risk_{it} + \beta_3 Prof_{it} + \beta_4 Size_{it} + \beta_5 Tang_{it} + \varepsilon_{it}$$

Cross section	$\beta 0$
Regression coefficient related to independent variables	$\gamma\text{.......}\beta_1\beta$
Debt ratio for company i at term t (dependent variable)	D_{it}
Non-debt tax shield for company i at term t (independent variable)	$Ndts_{it}$
Business risk for company i at term t (independent variable)	$Risk_{it}$
Profitability for company i at term t (independent variable)	$Prof_{it}$
Company size for company i at term t (independent variable)	$Size_{it}$
Tangibility assets for company i at term t (dependent variable)	$Tang_{it}$
V-error ratio of model	$_{it}\varepsilon$

Research Variables

Table1: List of study variables

Measuring	Index	Dependent Variable
total debt		
total debt + equity market value	(D)	Debt ratio

Measuring	Index	Independent Variable
Administrative and selling costs		
Annual sells	(Ndts)	Non-debt tax shield
$Ebit_{(t)}-Ebit_{(t-1)}$	(Risk)	Business risk
Book value of total assets		
Ebit-Deprication	(Prof)	Profitability
Total assets		
Ln(volume of annual net sales)	(Size)	Size
Fixed assets	(Tang)	Assets tangibility
Total assets		

Figure 2: Conceptual model

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Findings and Hypothesis Test

For hypothesis test of this research and relationship determining between dependent variables and independent variables, econometric model has used and relation coefficient analysis by multi variable regression and integration data technique, estimated fallow multi regression model:

$$D_{it} = \beta_0 + \beta_1 Ndts_{it} + + \beta_2 Risk_{it} + \beta_3 Prof_{it} + \beta_4 Size_{it} + \beta_5 Tang_{it} + \varepsilon_{it}$$

So, we must ensuring that all of variables are dynamic and then use Residaul Cointegtation test for analysis of relationship between model variables after that all of model interpreted. For determining Pool or Panel of model we use F-limer test, than Hausman test for determining fixed effects or Random effects done.

As table (2) shows, with regard to prob < .05 for Confidence level 95% so null hypothesis rejected and dependent variables of model at all of model statistics are dynamic in the level.

Table 2: Results of panel unit root test, model by cross section and trend

Panel unit root test- by cross section and trend

Prob	pp-Fisher	Prob	ADF-Fisher	Prob	IPS	Prob	LLC	Variable	
0.00	388.26	0.035	263.81	0.00	-15.367	0.00	-214.7	D_{it}	**dependent**
The level		The level		The level		The level		Dynamic order	

As table(3) shows, for $Ndts_{it}$, $Risk_{it}$, $Prof_{it}$ and $Size_{it}$ and $Tang_{it}$ in four test, we have prob <0.05 for Confidence level 95% null hypothesis rejected so above mentioned variables in all test are dynamic in the level.

Table 3: Results of panel unit root test, model by cross section and trend

panel unit root test- by cross section and trend

Prob	pp-Fisher	Prob	ADF-Fisher	prob	IPS	Prob	LLC	Variables	
0.00	544.0	0.00	377.1	0.00	-11.17	0.00	-41.7	$Ndts_{it}$	**independent**
The level		The level		The level		The level		Dynamic order	
0.00	518.5	0.00	354.16	0.00	-11.1	0.00	-52.2	$Risk_{it}$	
The level		The level		The level		The level		Dynamic order	
0.00	550.4	0.00	367.8	0.00	25.1	0.00	-141.3	$Prof_{it}$	
The level		The level		The level		The level		Dynamic order	
0.00	488.7	0.00	318.03	0.00	-37.25	0.00	-162.0	$Size_{it}$	
The level		The level		The level		The level		Dynamic order	
0.00	817.7	0.00	459.3	0.00	-14.8	0.00	-127.4	$Tang_{it}$	
The level		The level		The level		The level		Dynamic order	

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According to Kao co-integration test at table(4) and with regard to P-value=0.05≤0.05 so, long-time relationship dependent variable and independent variable for Confidence level 95% this results shows that there is a strong and long-term relationship between variables.

Table 4: Kao cointegration test results

Kao cointegration test		long-term relationship of model variables
p-value	Test statistic	Model
0.05	-1.642	

Table 5: Limer F test and Hausman test results

Hausman test	Limer-F test	Kind of test
39.155	12.442	Static value
0.00	0.00	P-Value
Fixed effects	Panel	Kind of model

According to Limer F test at table (5) and with regard to P-value≤0.05 so, null hypotheses for polling model has rejected. Therefor for each section in study (each firm) we consider a separate cross section and we can Panel model used. According to Hausman test result and for α=0.05, statistic value is 39.155 and P-value<0.05 so, null hypothesis has rejected. Rejection of H_0 shows that random effects method is incompatible and fixed effects method should be used.

As table (6) shows, P-value in level 95% for all of variable is 0.000, it is clear that mentioned variables has meaning full effects on debt ratio.

Table 6: Fixed effects model results

P-Value	t-Statistic	Std.Error	coefficient	Fixed effects model
0.00	44.158	0.013	0.587	C
0.00	-7.241	0.014	-0.104	$Ndts_{it}$
0.013	-2.479	0.049	-0.121	$Risk_{it}$
0.00	-23.125	0.019	-0.452	$Prof_{it}$
0.00	4.918	0.00	0.001	$Size_{it}$
0.005	-2.788	0.002	-0.008	$Tang_{it}$
0.003	2.990	0.064	0.186	$D_{i(t-1)}$
0.99				R^2
0.98				$\bar{R}^2$
2.2				D.W
295.67 (prob =0.000)				F

Also according to table (6) results, independent variables(Non-debt tax shield, Business risk, profitability and assets tangibility) at model on debt ratio at year t have negative and meaning full effects and one unit increase in each variables lead to debt ratio decline -0.104, -0.121, -0.452, -0.008 respectively. Company size variable on debt ratio has meaning full effects and one unit increase at year t, increase debt ratio at year (t-1) to 0.186. R^2 show that descriptive variables of model can define %99 of changes in dependent

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variable. So with regard to 1.5< D.W=2.2<2.5 show there is no autocorrelation in model and according to Fisher F-test (295.67) and (prop=0.000), overall fit of the regression is valid.

Table 7: Summary of hypothesis test results

Model	Result	Dependent variable / Independent variables	Debt ratio	Hypothesis
Value changes analysis	Null hypothesis rejection	Non-debt tax shield	negative and meaning full effects	1
	Null hypothesis rejection	Business risk	negative and meaning full effects	2
	Null hypothesis rejection	Profitability	negative and meaning full effects	3
	Null hypothesis rejection	Size	positive and meaning full effects	4
	Null hypothesis rejection	Assets tangibility	negative and meaning full effects	5

According to five sub-main hypothesis, the conclusion for main hypothesis we can say, method of value changes analysis the function fallow:

$$D_{it} = 0/587 - 0/104\,Ndts_{it} - 0/121\,Risk_{it} - 0/452\,Prof_{it} + 0/001\,Size_{it} - 0/008\,Tang_{it} - 0/186\,D_{i(t-1)}$$

From determining optimal capital structure of accepted firms in Tehran stock exchange is suitable.

RESULTS AND DISCUSSION
Results
In conditions that main problems of many companies are financing, using a method for answering to this need and determine of optimal capital structure is very vital. So in the paper method of determining optimal capital structure by analysis of value changes to analysis of financial data collected from 112 accepted companies in Tehran stock exchange has employed.

Results shows that capital structure for accepted companies in an inverse function of profitability, non-debt tax shield, business risk, tangibility assets and direct function of company size, so with regard to hypothesis testing we can mention:

1. For using non-debt tax shield, companies can use the charge that is subject to tax laws such as costs of Propaganda and deprecation, decrease tax rate and debt ratio too.
2. When variability of profit at different periods in one company increase, recommended then for decreasing costs of financial distress company use lower debt at its capital structure.
3. High-profit companies can use their profitability to issuing more loans for aims of optimization capital structure and recommended that to reaching this aim cost management system and accounting techniques has employed to increase profitability.
4. With regard to tangibility assets effects on debt ratio and creditors lack of attention to tangible value of fixed assets so, recommended to companies managers that for using debt more and more, don't consider to fixed assets.

ACKNOWLEDGEMENT

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