Application of value changes method analysis in the determining of capital structure: a study of Iranian listed firms

Mehrdad Ghanbari¹, Mojtaba Chavoshani²

1. Department of Accounting, Kermanshah Branch, Islamic Azad University, Kermanshah, Iran
2. Department of Accounting, Ghasr-e-Shirin Branch, Islamic Azad University, Ghasreshirin, Kermanshah, Iran

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 meaningful 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 prepare 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 & Mostaghiman, 2010).

Decisions related to capital structure of company has two aspects: amount of required capital and mixture of capital resources. It is hypothesis that economical unit know it’s 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 & Parsayian, 2009:382). 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, 2013:172). 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, 2013:207).

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 maximize firm value. In this theory, 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 & 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, 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 it’s value (Molla Nazari et al, 2009). Also this theory shows that tax benefits of this liabilities can increase company value and in other word, financial distress and bankruptcy costs of debt can decrease company value (Bagherzadeh, 2003).

**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 exist? Which kind of factors effects on determine of companies capital structure? (Nasirzade & 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 issue in this research is 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 company 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 company 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 has meaningful and direct relationship by capital structure (Nikumaram et al. 2012).

Findings of Sernigaj and Meramur (2009) shows that financial leverage by tangibility assets potential have 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 & Rajan, 2006).
Chen & 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 & 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, 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 manage 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 has 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.

Research methodology and data

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:

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.

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 company has selected as a sample.

Research hypothesis

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

Sub hypothesis
Non-debt tax shield to debt ratio has meaningful effect.
Business risk has meaningful effect on debt ratio.
Profitability has meaningful effect on debt ratio.
Company size has meaningful effect on debt ratio.
Tangibility assets has meaningful effect on debt ratio.
**Conceptual model**

\[
D_{it} = \beta_0 + \beta_1 \text{Ndt}_{it} + \beta_2 \text{Risk}_{it} + \beta_3 \text{Prof}_{it} + \beta_4 \text{Size}_{it} + \beta_5 \text{Tang}_{it} + \epsilon_{it}
\]

- **Cross section**
  - $\beta_0$
- **Regression coefficient related to independent variables**
  - $\beta_1, \ldots, \beta_7$

<table>
<thead>
<tr>
<th>Debt ratio for company i at term t (dependent variable)</th>
<th>$D_{it}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-debt tax shield for company i at term t (independent variable)</td>
<td>$\text{Ndt}_{it}$</td>
</tr>
<tr>
<td>Business risk for company i at term t (independent variable)</td>
<td>$\text{Risk}_{it}$</td>
</tr>
<tr>
<td>Profitability for company i at term t (independent variable)</td>
<td>$\text{Prof}_{it}$</td>
</tr>
<tr>
<td>Company size for company i at term t (independent variable)</td>
<td>$\text{Size}_{it}$</td>
</tr>
<tr>
<td>Tangibility assets for company i at term t (dependent variable)</td>
<td>$\text{Tang}_{it}$</td>
</tr>
<tr>
<td>$V$-error ratio of model</td>
<td>$\epsilon_{it}$</td>
</tr>
</tbody>
</table>
Research variables

<table>
<thead>
<tr>
<th>measuring index</th>
<th>dependent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>total debt</td>
<td>(D) Debt ratio</td>
</tr>
<tr>
<td>total debt + equity market value</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. list of study variables

<table>
<thead>
<tr>
<th>measuring index</th>
<th>independent variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative and selling costs</td>
<td></td>
</tr>
<tr>
<td>Annual sells</td>
<td>Non-debt tax shield</td>
</tr>
<tr>
<td>Ebit(t)-Ebit((t-1))</td>
<td>Business risk</td>
</tr>
<tr>
<td>Book value of total assets</td>
<td>Profitability</td>
</tr>
<tr>
<td>Ebit-Depreciation</td>
<td></td>
</tr>
<tr>
<td>Total assets</td>
<td>Size</td>
</tr>
<tr>
<td>Ln(volume of annual net sales )</td>
<td></td>
</tr>
<tr>
<td>Fixed assets</td>
<td>Assets tangibility</td>
</tr>
<tr>
<td>Total assets</td>
<td></td>
</tr>
</tbody>
</table>

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 follow 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 Residual Cointegration 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.

Table 2. results of panel unit root test, model by cross section and trend

<table>
<thead>
<tr>
<th>panel unit root test- by cross section and trend</th>
<th>prob</th>
<th>pp-Fisher</th>
<th>prob</th>
<th>ADF-Fisher</th>
<th>prob</th>
<th>IPS</th>
<th>prob</th>
<th>LLC</th>
<th>D_{it}</th>
</tr>
</thead>
<tbody>
<tr>
<td>The level</td>
<td>0.00</td>
<td>388.26</td>
<td>0.035</td>
<td>263.81</td>
<td>0.00</td>
<td>-15.367</td>
<td>0.00</td>
<td>-214.7</td>
<td>Dynamic order</td>
</tr>
</tbody>
</table>

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.

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.
According to Hausman test result and for α=0.05, statistic value is 39.155 and p-value=0.002, so, random effects method is incompatible and fixed effects method should be used. According to Limer F test at table(5) and with regard to P-value<0.05, null hypothesis for polling model has rejected. Therefore 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.

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. R² show that descriptive variables of model can define %99 of changes in dependent 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>
<thead>
<tr>
<th>model</th>
<th>Result</th>
<th>independent variables</th>
<th>Dependent variable</th>
<th>Debt ratio</th>
<th>hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value changes analysis</td>
<td>Null hypothesis</td>
<td>Non-debt tax shield</td>
<td>negative and meaning full</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Null hypothesis</td>
<td>Business risk</td>
<td>negative and meaning full</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Null hypothesis</td>
<td>Profitability</td>
<td>negative and meaning full</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Null hypothesis</td>
<td>Size</td>
<td>positive and meaning full</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Null hypothesis</td>
<td>Assets tangibility</td>
<td>negative and meaning full</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

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.

CONCLUSION

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:

For using non-debt tax shield, companies can use the charge that is subject to tax laws such as costs of Propaganda and depreciation, decrease tax rate and debt ratio too.

When variability of profit at different periods in one company increase, recommended then for decreasing costs of financial distress company use lower debt at it’s capital structure.

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.

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.

REFERENCES

Baltagi Badi H.1995."Econometric Analysis of Panel Data". John Wiley & Sons, USA.


