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Relationship between Macroeconomic variables and capital structure in Teharan Stock Exchange

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Abstract. Economical information in countries accounts as one of important and effective information as well as one of the most applicable information in capital market of countries. Financial manager of companies consider all dimensions in making descion and planning in optimizing capital structure and one of the dimension is economical condition. We used rate of inflation, rate liquidity, interest rates, and the dollar exchange rate as macroeconomic and their relationship with capital structure which is debt ratio. Therefore, we used information of companies in the Tehran stock exchange and site of Central bank during 2005 and 2013. Following, we used SPSS software in order to test of hypotheses. Results of research indicated that there was not significant relationship between macreconomic variables and capital structure in capital market of Iran; while, by entering controlling variables such as return on total assets ratio, return on equity (ROE), earnings per share (EPS) ratio and fixed assets ratio the relationship become significant. It showed that there is instability in the economic situation of the country and financial manager cannot proper estimate in their financial decision.

Keywords: Inflation rate, Liquidity rate, Capital structure, Dollar rate

1. INTRODUCTION

In today investment, making descion is one of processing investment and investors in order to maximize their benefits and wealth needs making optimal decision. Therefore, the most important factor in processing making decision is information.

These days, issue effect of macroeconomic variables on capital market is one of issue in among of academics, economists, managers. Generally, all of groups are consider effect of macroeconomic variables on capital market. On the other hand, capital structure in each company is one of argument discussion in financial field and it considers ratio of debt to assets. Generally, capital structure is divided into two sections, common stocks and financial debt and managers more pay attention to achieve more profit and meet commitment. Therefore, managers of companies by using two methods try to acheive earnings and return. Various factors are effective on return and profit and these factors have internal and external dimensions and manager's decision about capital structure is one of effective factors on profitability and always are facing with limitations. Therfore, this research introduce some macroeconomic variables such as interest rate, inflation rate, Dollar rate amd liquidity of rate as independent variable and capital structure or ratio of debt to assets as dependent variable. Furthermore, we use fixed assets ratio, total assets, ROE, EPS as controlling variables.

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2. LITERATURE REVIEW

2.1. Capital Structure

Whether measured in levels or flows, there is substantial time variation in the debt-equity financing choice that differs with the degree of capital market access. In general, firms that exhibit low degrees of financial constraints have pronounced counter-cyclical leverage with much of the variation attributed to varying macroeconomic conditions. It is also well documented that debt issues are counter-cyclical and equity issues are pro-cyclical for firms that access public capital markets.

Meanwhile, firms that exhibit higher degrees of financial constraints do not exhibit these pronounced counter-cyclical leverage or debt issue patterns. These observations suggest that financing choices vary systematically with macroeconomic conditions, and this response differs with the degree of capital market access. It is natural to ask why such patterns are observed, and what are their implications for investment and growth. In this paper, a model is developed where the fundamental reasons for these patterns are agency problems whose severity is determined by the distribution of aggregate wealth, which varies endogenously over the cycle. The model predicts that target debt ratios will be relatively high when corporate profits are low or following poor performance in the equity market for firms that are not constrained from increasing leverage. For reasonable parameter values, managers adjust their capital structure and issue securities in patterns similar to those observed in the data.

The link between access to capital markets, investment, and the macroeconomy has traditionallybeen analyzed in the credit channel literature. This literature generally focuses on firms that rely on debt financing and face severe agency problems in accessing external capital. It explains how agency problems in accessing external capital at the firm level result in exaggerated swings in economic activity as feedback effects propagate and magnify aggregate shocks. This is consistent with evidence in Kashyap, Stein andWilcox (1993) (hereinafter KSW), Gertler and Gilchrist (1993), (1994) and Bernanke, Gertler and Gilchrist (1996) (hereinafter BGG) who relate debt issue patterns of firms that have deferential capital market access, using size or bank-dependence as proxies, with aggregate and cohort investment following Federal Reserve monetary contractions or at the onset of recessions. Theoretically, this paper adds to the credit cycle literature by simultaneously considering how differential access to capital markets and investment across firms interacts with the choice of financing (capital structure) and the macroeconomy.

2.2. Conceptual model

First figure shows variables and their relationship

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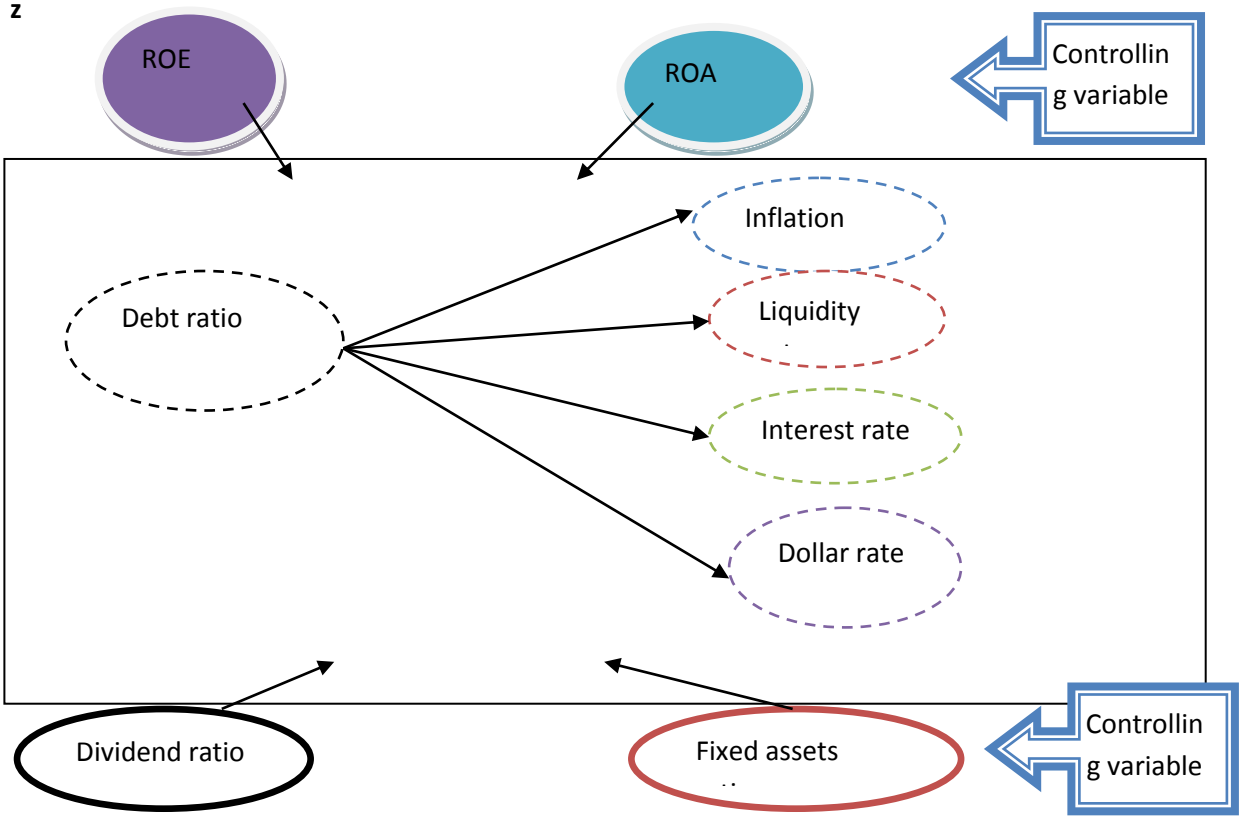

2.3. Hypotheses:

H1: Significant relationship exists between macroeconomic variables and capital structure

H2: Significant relationship exists between interest rate and capital structure

H3: Significant relationship exists between inflation rate and capital structure

H4: Significant relationship exists between Dollar rate and capital structure

H5: Significant relationship exists between liquidity rate and capital structure

2.4. Methodology:

The research is applicable method, and it is also a periodic study because it studies a specific period of time, and it can be an applied research. Eventually, by using regression models the relationship between earnings quality and changes in stock market value is examined. Samples are selected according to the following conditions:

1) The entities should be listed before 2005.

2) Date financial firms should lead to the end of March each year.

3) The entities should be activated during 2005 to 2009.

4) The entities should not change their financial periods.

5) The entities' availability of information is required.

2.5. Variables

2.5.1. Inflation rate

In some conditions after a while average par earnings of companies increase and it leads real increase of profitability which is called inflation rate and in according to global standard which is calculated reference of inflation rate.

$$\text{Infaltion rate} = \frac{Index\ price\ of\ (I-1) - Index\ price\ of\ I}{Index\ price\ of\ (I-1)}$$

2.5.2. Interest rate

This variable is reated each year by central bank and it is one of policy of central bank

Dollar rate:

One of effective economica variable in developing counries is Dollar. This variable pricing on a daily basis and administered by the central bank and other resources are available for users. In this research is used annually.

2.5.3. Liquidity ratio

Monetary and non-monetary items are the variable that contains the variables determining the level of inflation in developing countries. This variable is the calculation of the annual central bank is available to all users

Liquidity: Total amount of Quasi money + Total amount of Moneatury

2.5.4. Dependent variable:

Debt ratio: $= \frac{Total\ debt}{Total\ assets}$

Controlling variable:

ROE: ROE is calculated as following :

$$\text{ROE} = \frac{Operational\ income}{Total\ equity\ owners}$$

ROA: ROA is calculated as following:

$$\text{ROA} = \frac{Operational\ income}{Total\ assets}$$

Fixed assets ratio: Fixed assets ratio is calculated as following:

$$\text{Fixed assets ratio} = \frac{book\ value\ of\ fixed\ assets}{Total\ book\ value}$$

Interest paid rate: Interst paid rate is calculated as following:

$$\text{Interest paid rate} = \frac{\text{Interest paid rate}}{\text{Profit allocation}}$$

2.5.5. Descriptive test:

In order to identify more about naturality of society and more identify about variables of research and analyzing statistic data. Furthermore, Step towards identifying patterns that govern and explain the basis for the relationship between the variables used in the study.

Table 1. Indexes of sescriptivestatistics, central indexes.

	Debt ratio	*Inflation rate*	*Liquidity rate*	*Dollar Rate*	*Interest rate*
Numbers	623	625	625	625	625
Average	0.614	15.5	1620600	4.99399	13
Mean standard erro	0.0077	0.22727	19794.2	12.634	0.06405
Sd	0.19342	5.69173	4.98	3.15864	1.60
Variance	0.037	32.396	2.44	9.977	2.564
Variations	1.66	14.60	1.43	897	4
The highest	1.73	25.4	2.36	9920	15.8
The lowest	1.06	10.8	621019	9023	11.8

Table 2. Test of descriptive statistics**.**

	Debt ratio	Inflation rate	Liquidity rate	Dollar Rate	Interest rate
Numbers	622	622	625	625	625
Average	12.642	25.13	8.77	8.77	0.2541
Mean standard erro	0.50420	3.387	4.556	4.556	0.0078
Sd	1.257	1.477	1.390	1.1390	0.1944
Variance	158.123	7.136	1.297	1.297	0.038
Variations	94.01	58.2176	1.21	1.21	0.89
The highest	62.74	99.1713	90.9195	90.9195	0.89
The lowest	-31.27	-59.462	-2892.57	-57.28292	0

2.5.6. Descriptive statistics:

Table 3. Analyzing regression for debt ratio and interst rate.

ANOVA [b]					
P-value	**F**	**Mean Square**	**Df**	**Sum of Squares**	**Model**
0.000	**117.848**	**2.275**	**5**	**11.375**	**Regression**
		0.019	**616**	**11.891**	**Residual**
			621	**23.266**	**Total**

In according to results of the tables, the first hypothesis is approved with confidence of 95%. Based on table above mentioned, analyzing variance between interest rate and controlling variable and debt ratio and due to p-value is less than 0.05 linear assume is approved**.**

Table 4. Multiple regression by Enter method.

P-value	t	Standardized coefficient	Non-standardized coefficient		Model
			Std.Error	B	
0.000	10.816	-	0.046	0.499	**(Constant)**
0.126	1.531	0.044	0.029	0.044	**Fixed assets ratio**
0.000	9.391	0.433	0.000	0.07	**Earnings per share ratio**
0.000	-21.4	-0.981	0.001	-0.015	**Total assets return**
0.000	5.169	0.152	0.000	0.00	**ROE**
0.000	4.8	0.14	0.017	0.017	**Interest rate**

In according the table, due to p-value of fixed assets ratio is more than 0.05 therefore, fixed assets ratio must be exit from following model:

0.499+0.07EPS-0.015ROA+0.017S= Y

Table 5. Analyzing and test of second hypothesis.

ANOVA					
Model	**Sum of Squares**	**Df**	**Mean square**	**F**	P-value
Regression	10.987	5	2.197	110.234	0.000
Residual	12.279	616	0.02		
Total	23.266	621			

In according to results, ROE, ROA, EPS, and fixed assets ratio are effective on inflation rate and capital structure (with confidence of 95%)

In according table 4, analyzing variance between variable inflation rate and controlling variables and debt ratio. Based on ANOVA and due to sig is less than 0.05; linear hypotheses of research are approved**.**

Table 6. Multiple regression by Enter method.

P-value	t	Standardized coefficient	Non-standardized coefficient		Model
			Std.Error	B	
0.000	**38.414**	**-**	**0.019**	**0.741**	**(Constant)**
0.109	**1.604**	**0.047**	**0.029**	**0.047**	**Fixed assets ratio**
0.000	**9.02**	**0.422**	**0.000**	**0.07**	**Earnings per share ratio**
0.000	**-20.663**	**-0.966**	**0.001**	**-0.015**	**Total assets return**
0.000	**5.2777**	**0.158**	**0.00**	**0.000**	**ROE**
0.009	**-1.689**	**-0.049**	**0.001**	**0.002**	**Interest rate**

In according to the table, variables of inflation rate and fixed assets ratio are more than 0.05; therefore, coefficient regression is zero and approved. Thus, it should be existed from the regression and it shows that there was not any significant relationship between fixed assets ratio and inflation rate with debt ratio**.** However, other variables are rejected and we should not exit from the regression. Therefore, multiple regressions will be as following:

Y= 0.741+0.07EPS-0.015ROA

Table 7. Analyzing variance regression for debt ratio and interest rate and controlling variable.

ANOVA [b]					
P-value	**F[j]**	**Mean Square**	**Df**	**Sum of Squares**	**Model**
0.000	**113.234**	**2.23**	**5**	**11.148**	**Regression**
		0.02	**616**	**12.118**	**Residual**
			621	**23.266**	**Total**

In according to the table, ROE, ROA, EPS, fixed assets ratio are effective on interest rate and capital structure (with confidence of 95%). Furthermore, due to p-value is less than 0.05 and approved linear regression.

Table 8. Multiple regressiom through Enter model.

P-value	**t**	**Standardized coefficient**	**Non-standardized coefficient**		**Model**
			Std.Error	**B**	
0.000	**7.461**	**-**	**0.173**	**1.288**	**(Constant)**
0.106	**1.617**	**0.047**	**0.029**	**0.047**	**Fixed assets ratio**
0.000	**9.36**	**0.437**	**0.000**	**0.07**	**Earnings per share ratio**
0.000	**21.032-**	**0.992-**	**0.001**	**0.015-**	**Total assets return**
0.000	**5.166**	**0.154**	**0.000**	**0.000**	**ROE**
0.01	**3.228-**	**0.099-**	**0.000**	**0.06-**	**Interest rate**

Coeffiicnt regression of variable of fixed assets ratio is more than 0.05; therefore, equal assumption is approved and wil be exist from the regression and there is not significant relationship between fixed assets ratio and debt ratio; however, equal assumption of coefficient regression will be rejected and should not be existed from the regression**.**

$$\mathbf{Y= 1.288+0.07EPS-0.015ROA-0.06D}$$

Table 9. Durbin-Watson test **.**

Model	**Coefficient regression**	**Determined coefficient**	**Adjusted determined coefficient**	**Esstimated error**	**Durbin-Watson**
1	0.695	0.483	0.479	0.13977	**1.84**

Pearson Coefficient regression between two variables of debt ratio and liquidity ratio ig variable s 0.692; therefore, significant relationship between debt ratio and liquidity ratio and controlling variable. Based on SPSS software, determined coefficient is 0.479 and it is good point. Durbin- Watson variable is 1.84 and amount of Durbin-Watson between 1.5 and 2.5 is rejected. Therfore, there is no correlation between variables and we can use the regression.

Table 10. Analyzing variance for debt ratio and liquidity ratio.

ANOVA [b]					
P-value	**F**	**Mean Square**	**Df**	**Sum of Squares**	**Model**
0.000	**114.972**	**2.246**	**5**	**11.231**	**Regression**
		0.02	**616**	**12.035**	**Residual**
			621	**23.266**	**Total**

In according to the table, ROE, ROA, Debt ratio, and fixed assets ratio are effective on liquidity ratio and capital structure (with confidence of 95%). Based on ANOVA test, linear assumption of variable is approved.

Table 11. Multiple regressions through Enter model.

P-value	t	Standardized coefficient	Non-standardized coefficient		Model
			Std.Error	B	
0.000	**34.756**	**-**	**0.023**	**0.793**	**(Constant)**
0.113	**1.589**	**0.046**	**0.029**	**0.046**	**Fixed assets ratio**
0.000	**9.413**	**0.438**	**0.000**	**0.07**	**Debt ratio**
0.000	**21.209-**	**0.996 -**	**0.001**	**0.015-**	**ROA**
0.000	**5.158**	**0.153**	**0.000**	**0.000**	**ROE**
0.000	**3.926-**	**0.116-**	**0.000**	**0.000-**	**Liquidity ratio**

Coeffiicent regression related to fixed assets ratio is more than 0.05 and equal assumption is approved and should be exites from the regression and there is no relationship between fixed assets and debt ratio. Furthermore, coefficient of ROE and liquidity ratio and finally multiple regressions will be as following:

Y= 0.793+0.07EPS-0.015ROA

2.5.7. Test of main hypothesis:

Table 12. Coefficient regression of variables.

Interest rate	Dollar rate	Liquidity ratio	Inflation rate	Variables	
0.554-	0.154	0.266	1	**Correlation**	Infalation rate
0.000	0.000	0.000		**P-value**	
0.887-	0.976	1	0.266	**Correlation**	Liquidity ratio
0.000	0.000		0.000	**P-value**	
0.758-	1	0.976	0.154	**Correlation**	Rate of Dollar
0.000		0.000	0.000	**P-value**	
1	0.758-	0.877-	0.554-	**Correlation**	Interest rate
	0.000	0.000	0.000	**P-value**	

Table 13. KMO test and Bartlet test.

0.39		**KMO**
4.926	R-Square	Bartelet test
6	Df	
0.000	P-value	

Table 14. Test components of variables.

Variables	Components
Inflation rate	0.484
Liquidity rate	0.97
Dollar rate	0.912
Interest rate	-0.949

In according to results of variables such as liquidity rate, inflation rate, Dollar rate were consistent and interest rate was inconsistent

$$Y_1 = 0.484x_1 + 0.97x_2 + 0.912x_3 - 0.949x_4$$

Table 15. Durbin-Watson test between debt ratio and macroeconomic variables.

Model	Coefficient regression	Determined coefficient	Adjusted determined coefficient	Esstimated error	Durbin-Watson
1	0.695	0.483	0.479	0.13977	**1.84**

Pearson coefficient regression between two variable of debt ratio and one controlling variable is 0.695. It shows that significant relationship exists between debt ratio and controlling variables and determined regression is 0.479 and it is good value. Durbin-Watson shows dependency of errors and it should be between 1.5 and 2.5 and it shows that errors are dependent and there is not correlation between variables.

Tabl 16. Analyzing regression for debt ratio and controlling variable.

ANOVA [b]					
P-value	F	Mean Square	Df	Sum of Squares	Model
0.000	**114.972**	**2.246**	**5**	**11.231**	**Regression**
		0.02	**616**	**12.035**	**Residual**
			621	**23.266**	**Total**

Table 17. Multiple regressions by Enter model.

P-value	t	Standardized coefficient	Non-standardized coefficient		Model
			Std.Error	B	
0.004	2.885	-	2.025	5.842	**(Constant)**
0.122	1.549	0.045	0.029	0.044	**Fixed assets ratio**
0.000	9.428	0.434	0.000	0.07	**Debt ratio**
0.000	21.27-	0.988-	0.001	0.015-	**ROA**
0.000	5.052	0.148	0.000	0.000	**ROE**
0.004	2.921	2.079	0.000	0.008	**Liquidity ratio**
0.002	3.061	0.16	0.002	0.005	**Inflation rate**
0.000	3.639	0.987	0.033	0.119	**Interest rate**
0.005	2.796-	1.403-	0.000	0.000	**Dollar rate**

Coefficient regression of debt ratio is more than 0.05; therefore, equal assume of regression is approved and exit from the regression and ti shows there is not significant relationship between debt ratio and fixed assets ratio. However, other variables should not be rejected and finally, multiple regressions will be as following:

5.842+0.044D+0.07EPS-0.015ROA+0.119S= Y

3. CONCLUSION AND DISCUSSION

Results of research indicated that there was not significant relationship between macreconomic variables and capital structure in capital market of Iran; while, by entering controlling variables such as return on total assets ratio, return on equity (ROE), earnings per share (EPS) ratio and fixed assets ratio the relationship become significant.

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