



An Analysis of Impact of Macro Economic Variables on the Capital structure of the Mining Sector

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ABSTRACT: *The study aims to analyse the impact of macroeconomic variables on the capital structure of the mining sector by using regression analysis on a sample of three industries namely, Crude Oil and Natural Gas industry, Coal and Lignite industry and Minerals industry. The relevant data pertaining to the study are collected for 27 years from 1990-91 to 2016-17 from PROWESS database. The study period is divided into two parts. The first part consists of 13 years from 1991-92 to 2003-04. The second part is the remaining period of 14 years from 2004-05 to 2017-18.*

Key words: Macroeconomic variables, Crude Oil and Natural Gas industry, Coal and Lignite industry and Minerals industry.

INTRODUCTION:

Capital Structure is a proportion of debt and equity mix, a strategic financial decision plays an important role in increase of profitability of an organization and designing of optimal capital structure is the one of the many functions of a financial manager. The main objective of capital structure decision is to minimize the cost of capital and maximize the share holder wealth.

LITERATURE REVIEW

1. Diana Alexandra Toader et, al (2021) examined the impact of microeconomic and macroeconomic drivers of financial structure, through a sample of 30 technology companies listed on the New York Stock Exchange, over the period 2005-2018. The empirical outcomes by means of panel data regression provides support for a positive influence on financial structure of natural logarithm of total assets, financial return, effective tax rate, interest rate and gross domestic product per capita. However, tangibility of assets showed mixed associations with financial structure, while sales variation and inflation rate proved to lack any statistical significance.
2. Bhavna Ranjan_Ahuja,_Rosy_Kalra (2020) investigated the impact of macroeconomic variables on the capital structure of manufacturing companies in the Indian context by using panel regression technique (random effects model) on a sample of 1,029 listed Indian manufacturing companies divided into two categories – large-size companies and mid-size companies for the last ten years from FY 2008–09 to FY 2017–18. Major findings the research show that macroeconomic variables play a relatively more important role in deciding the long-term debt component in the capital structure of the firms as compared to short-term loans. Similarly macroeconomic variables are found to be more significant in case of large-size companies as compared to mid-size companies. Also, there is a negative relationship between market capitalization and leverage and bank credit and leverage, whereas money supply has a positive relationship with leverage.
3. Md. Nur Alam Siddik et al (2016) using the panel data of 22 banks for the period from 2005-2014, empirically examined the impacts of capital structure on the performance of Bangladesh banks assessed by return on equity, return on assets and earnings per share. The results of the pooled ordinary least square analysis showed that capital structure inversely affected the bank performance. The findings of this empirical study are of greater significance for the developing countries like Bangladesh because it calls for the concentration of the bank management and the policy makers to pursue the policies that reduce reliance on debt to achieve the optimal level of capital structure.
4. Tom Jacob and Thomas Paul Kattookaran (2016) analyzed an overview of Indian debt market and to examine the role and growth of Indian debt market compared to equity market in India. Study reveals that Indian debt market has shown growth trend in primary market and secondary market as well as the government security has prominent role in Indian debt market.

OBJECTIVES OF THE STUDY

Methodology

Sources of data:

The study is based on the secondary data. The data required for the study taken from the Center for Monitoring Indian Economy (CMIE)-Prowess database, RBI annual reports <https://www.bseindia.com/> and Economic outlook.

Sample size: The sample includes NSE listed firms of Mining sectors for a period of 27 years (1991 to 2017).

Statistical Tools:

Regression Analysis

RESULTS AND DISCUSSIONS

As mentioned earlier, the mining sector consists of three industries. The impact of select macro economic variables on the capital structure of these three industries is provided as under.

1. Coal & Lignite Industry:

To find out the impact of select macro economic variables on the capital structure during the phase-I (1991-92 to 2003-04) and phase-II (2004-05 to 2017-18) of the study period of the coal and lignite industry, the following hypotheses are formulated.

Ho1: Growth in GDP has no impact on the Capital Structure of the coal and lignite industry during phase-I of the study period.

H1: Growth in GDP has impact on the Capital Structure of the coal and lignite industry during phase-I of the study period.

Ho2: Rate of Inflation has no impact on the Capital Structure of the coal and lignite industry during phase-I of the study period.

H2: Rate of Inflation has impact on the Capital Structure of the coal and lignite industry diversified industry during phase-I of the study period.

Ho3: Interest rate has no impact on the Capital Structure of the coal and lignite industry during phase-I of the study period.

H3: Interest rate has impact on the Capital Structure of the coal and lignite industry during phase-I of the study period.

Ho4: Growth in GDP has no impact on the Capital Structure of coal and lignite industry during phase-II of the study period.

H4: Growth in GDP has impact on the Capital Structure of the coal and lignite industry during phase-II of the study period.

Ho5: Rate of Inflation has no impact on the Capital Structure of the coal and lignite industry during phase-II of the study period.

H5: Rate of Inflation has impact on the Capital Structure of the coal and lignite industry during phase-II of the study period.

Ho6: Interest rate has no impact on the Capital Structure of the coal and lignite industry during phase-II of the study period.

H6: Interest rate has impact on the Capital Structure of the coal and lignite industry during phase-II of the study period.

To test the hypotheses regression analysis is done by taking capital structure (D/E ratio) as dependent variable and the select macroeconomic variables as independent variables. The results of regression analysis are provided in the following table:

Table 3.22: Summary of the results of regression analysis of Coal& Lignite Industry.

CAT	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
Phase-I (1990-91 to 1 2003- 04)	(Constant)	20.617	555.888		.647	.534
	GDP	-.148	2.074	-.026	-.072	.945
	INFLATION RATE	-.294	1.047	-.121	-.281	.785
	INTEREST RATE	.045	1.828	.011	.025	.981
Phase- II (2004-05 to 1 2017-18)	(Constant)	-33.936	40.636		-.835	.423
	GDP	-.221	2.852	-.024	-.078	.940
	INFLATION RATE	-2.196	1.900	-.367	-1.155	.275
	INTEREST RATE	7.988	4.438	.553	1.800	.102

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

It can be seen that the GDP and Inflation rate had negative impact on the capital structure during the phase-I of the study period, the other select macroeconomic variable interest rate had positive impact on capital structure and none of the variable has significant impact on capital structure. Thus, the null hypothesis that the GDP, inflation rate and interest rate has no impact on capital structure of coal and lignite industry during the phase-I

of the study period is accepted. During the phase-II of the study period also continued the same trend that, both GDP and Inflation rate has negative impact and Interest rate has positive impact on capital structure, and none of the macroeconomic variable has significant impact on capital structure, this might be financial decisions of mining industry are under the control of the government.

To find out the impact of select macro economic variables on the capital structure (D/E ratio) of the coal and lignite industry during the entire study period, the following three hypotheses are formulated.

Ho1: Growth in GDP has no impact on the Capital Structure of the coal and lignite industry during the entire study period.

H1: Growth in GDP has impact on the Capital Structure of the coal and lignite industry during the entire study period.

Ho2: Rate of Inflation has no impact on the Capital Structure of the coal and lignite industry during the entire study period.

H2: Rate of Inflation has impact on the Capital Structure of the coal and lignite industry during the entire study period

Ho3: Interest rate has no impact on the Capital Structure of the coal and lignite industry during the entire study period.

H3: Interest rate has impact on the Capital Structure of the coal and lignite industry during the entire study period.

As mentioned earlier, to find out the impact of the select macroeconomic variables on the capital structure of the coal and lignite industry, regression model is used and the results of the analysis are provided in the following table:

Table 3.23: Summary of the results of regression analysis of Coal & Lignite Industry.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	39.468	16.620		2.375	0.026
1 GDP	-0.911	1.651	-0.117	-0.552	0.586
INFLATION RATE	-0.267	1.023	-0.059	-0.261	0.796
INTEREST RATE	-0.604	1.365	-0.101	-0.443	0.662

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

From the above table it can be seen that all the three select macroeconomic variables has negative impact and none of the variable has significant impact on capital structure during the study period this can be reasoned that most of the financial decisions of the industry are under the control of the government. Hence the null hypotheses that the GDP, Inflation rate and Interest rate has no impact on capital structure are accepted.

2. Crude Oil and Natural Gases Industry

To find out the impact of select macro economic variables on the capital structure during the phase-I (1991-92 to 2003-04) and phase-II (2004-05 to 2017-18) of the study period of the Crude Oil and Natural Gases industry, the following hypotheses are formulated.

Ho1: Growth in GDP has no impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-I of the study period.

H1: Growth in GDP has impact on the Capital Structure of the Crude Oil and Natural Gases industry coal and lignite industry during phase-I of the study period.

Ho2: Rate of Inflation has no impact on the Capital Structure of the Crude Oil and Natural Gases industry coal and lignite industry during phase-I of the study period.

H2: Rate of Inflation has impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-I of the study period.

Ho3: Interest rate has no impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-I of the study period.

H3: Interest rate has impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-I of the study period.

Ho4: Growth in GDP has no impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

H4: Growth in GDP has impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

Ho5: Rate of Inflation has no impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

H5: Rate of Inflation has impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

Ho6: Interest rate has no impact on the Capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

H6: Interest rate has impact on the capital Structure of the Crude Oil and Natural Gases industry during phase-II of the study period.

To test the hypotheses regression analysis is done by taking capital structure (D/E ratio) as dependent variable and the select macroeconomic variables as independent variables. The results of regression analysis are provided in the following table:

Table 3.24: Summary of the results of regression analysis of Crude oil and Natural Gases Industry.

CAT	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
Phase-I (1990-91 to 2003-04)	(Constant)	-184.819	289.798		-.638	.540
	GDP	8.184	18.851	.153	.434	.674
	INFLATION RATE	-1.620	9.518	-.070	-.170	.869
	INTEREST RATE	14.307	16.611	.381	.861	.411
Phase-II (2004-05 to 2017-18)	(Constant)	-36.036	18.322		-1.967	.078
	GDP	.566	1.286	.106	.440	.669
	INFLATION RATE	-.134	.857	-.039	-.157	.878
	INTEREST RATE	5.889	2.001	.711	2.943	.015

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

From the above table it can be seen that the rate of inflation has negative impact on the debt equity ratio during phase-I of the study period. Interest rates and GDP has positive impact on the capital structure of Crude Oil and Natural Gases industry. However, among the three macroeconomic variables none of the variable has significant impact on capital structure of the industry; hence the null hypotheses that the GDP, Inflation rate and Interest rate has no impact on capital structure are accepted. During phase-II of the study period also same trend is continued that the GDP and Interest rate has positive impact and inflation rate has negative impact on capital structure and among these three select variables only interest rate has significant impact on capital structure.

To find out the impact of select macro economic variables on the capital structure (D/E ratio) of the coal and lignite industry during the entire study period, the following three hypothesis are formulated.

Ho1: Growth in GDP has no impact on the capital structure of the Crude Oil and Natural Gases industry

H1: Growth in GDP has impact on the Capital Structure of the Crude Oil and Natural Gases industry

Ho2: Rate of Inflation has no impact on the Capital Structure of the Crude Oil and Natural Gases industry

H2: Rate of Inflation has impact on the Capital Structure of the Crude Oil and Natural Gases industry

Ho3: Interest rate has no impact on the Capital structure of the Crude Oil and Natural Gases industry

H3: Interest rate has impact on the Capital Structure of the Crude Oil and Natural Gases industry

As mentioned earlier, to find out the impact of the select macroeconomic variables on the capital structure of the Crude Oil and Natural Gases industry, regression model is used and the results of the analysis are provided in the following table

Table3.25: Summary of the results of regression analysis of Crude oil and Natural Gases industry.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-82.513	64.078		-1.288	0.211
1 GDP	2.114	6.365	0.066	0.332	0.743
INFLATION RATE	-0.519	3.945	-0.028	-0.132	0.896
INTEREST RATE	9.788	5.262	0.396	1.860	0.076

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

From the above table it can be seen that the rate of inflation has negative impact on the debt equity ratio during the study period. Interest rates and GDP has positive impact on the capital structure of Crude Oil and Natural Gases industry. However, among the three macroeconomic variables none of the variable has significant impact on capital structure of the industry; hence the null hypotheses that the GDP, Inflation rate and Interest rate has no impact on capital structure are accepted.

Mineral Industry:

To find out the impact of select macro economic variables on the capital structure during the phase-I (1991-92 to 2003-04) and phase-II (2004-05 to 2017-18) of the study period of the Mineral industry, the following hypotheses are formulated.

Ho1: Growth in GDP has no impact on the Capital Structure of the Mineral industry during phase-I of the study period.

H1: Growth in GDP has impact on the Capital Structure of the Mineral industry during phase-I of the study period.

Ho2: Rate of Inflation has no impact on the Capital Structure of the Minerals industry during phase-I of the study period.

H2: Rate of Inflation has impact on the Capital Structure of the Minerals industry during phase-I of the study period.

Ho3: Interest rate has no impact on the Capital Structure of the Minerals industry during phase-I of the study period.

H3: Interest rate has impact on the Capital Structure of the Minerals industry during phase-I of the study period.

Ho4: Growth in GDP has no impact on the Capital Structure of the Minerals industry during phase-II of the study period.

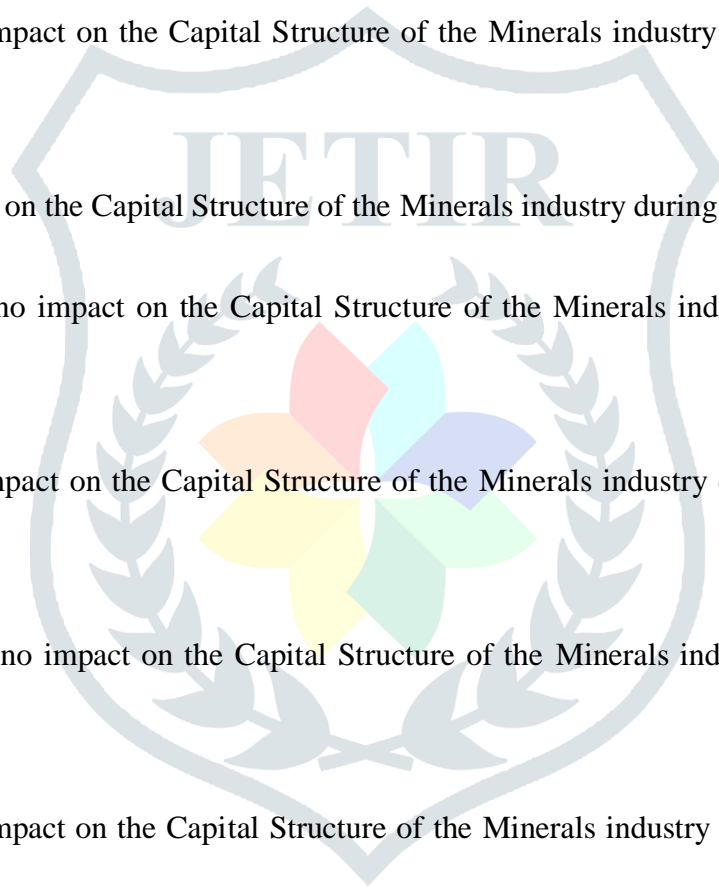
H4: Growth in GDP has impact on the Capital Structure of the Minerals industry during phase-II of the study period.

Ho5: Rate of Inflation has no impact on the Capital Structure of the Minerals industry during phase-II of the study period.

H5: Rate of Inflation has impact on the Capital Structure of the Minerals industry during phase-II of the study period.

Ho6: Interest rate has no impact on the Capital Structure of the Minerals Gases industry during phase-II of the study period.

H6: Interest rate has impact on the Capital Structure of the Minerals industry during phase-II of the study period.



To test the hypotheses regression analysis is done by taking capital structure (D/E ratio) as dependent variable and the select macroeconomic variables as independent variables. The results of regression analysis are provided in the following table:

Table 3.26: Summary of the results of regression analysis of Mineral industry.

CAT	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
Phase-I (1990-91 to ¹ 2003- 04)	(Constant)	4.241	1.144		3.707	.005
	GDP	.076	.074	.165	1.025	.332
	INFLATION RATE	-.037	.038	-.184	-.984	.351
	INTEREST RATE	-.232	.066	-.711	-3.531	.006
Phase- II (2004-05 to ¹ 2017-18)	(Constant)	-21.788	6.469		-3.368	.007
	GDP	-.686	.454	-.294	-1.512	.162
	INFLATION RATE	.483	.302	.322	1.596	.142
	INTEREST RATE	2.670	.706	.736	3.779	.004

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

It can be seen that while the GDP having positive impact on the capital structure during the phase-I of the study period, the other two select variables namely inflation and interest rate had negative impact and only interest rate has significant impact on the capital structure during the study period. Furthermore, the impact of interest rate on capital structure was very high during this period at about -0.80. This could be due to financing of the capital with long term debt funds by the various companies when the debt was available at cheaper rate than the

cost of equity and reducing the debt when it become expensive. Thus, the hypotheses that the interest rate has no impact on capital structure of mineral industry are rejected and the other two null hypotheses that the GDP growth rate and rate of inflation have no impact on capital structure are accepted.

It can also be seen that while the GDP had negative impact on the capital structure during the phase-II of the study period, the other two select variables namely inflation and interest rate had positive impact and only interest rate had significant impact on the capital structure during the period. Furthermore, the impact of interest rate on capital structure was very high during this period at about 0.736, which is perhaps due to low interest regime during the second phase of the study period and the need for funds for expansion by the industry due to increased opportunities provided by liberalised economic environment in the country because of economic reforms. Thus, the hypothesis that the interest rate has no impact on capital structure of mineral industry during the second phase of the study period is rejected and the other two null hypotheses that the GDP growth rate and rate of inflation have no impact on capital structure during the second phase of the study period are accepted.

To find out the impact of select macro economic variables on the capital structure (D/E ratio) of the Mineral industry during the entire study period, the following three hypotheses are formulated.

Ho1: Growth in GDP has no impact on the Capital Structure of the Mineral industry during the entire study period

H1: Growth in GDP has impact on the Capital Structure of the Mineral industry during the entire study period

Ho2: Rate of Inflation has no impact on the Capital Structure of the Mineral industry during the entire study period

H2: Rate of Inflation has impact on the Capital Structure of the Mineral industry during the entire study period

Ho3: Interest rate has no impact on the Capital Structure of the Mineral industry during the entire study period

H3: Interest rate has impact on the Capital Structure of the Mineral industry during the entire study period

As mentioned earlier, to find out the impact of the select macroeconomic variables on the capital structure of the Mineral industry, regression model is used and the results of the analysis are provided in the following table:

Table3.27: Summary of the results of regression analysis of Minerals Industry.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	6.174	3.782		1.632	0.116
1 GDP	-0.165	0.376	-0.090	-0.440	0.664
INFLATION RATE	0.358	0.233	0.332	1.539	0.137
INTEREST RATE	-0.381	0.311	-0.268	-1.226	0.233

a. Dependent Variable: DEBT EQUITY RATIO

(Source: Output from SPSS)

It can be seen that while the GDP had negative impact on the capital structure during the study period, the other two select variables inflation had positive and interest rate had negative impact none of select macroeconomic variable has statistically significant impact on capital structure during the period. Thus, the hypotheses that the GDP, inflation rate and interest rate has no impact on capital structure of mineral industry during the study period are accepted.

Conclusion: During the study period in coal and lignite industry all the three select macroeconomic variables has negative impact and none of the variable has significant impact on capital structure, this can be reasoned that most of the financial decisions of the industry are under the control of the government. Hence the null hypothesis that the GDP, Inflation rate and Interest rate has no impact on capital structure is accepted. Interest rates and GDP has positive impact on the capital structure of Crude Oil and Natural Gases industry and in case of mineral industry. GDP had negative impact on the capital structure during the study period, the other two

select variables inflation had positive and interest rate had negative impact none of select macroeconomic variable has statistically significant impact on capital structure during the period. Thus, the hypothesis that the GDP, inflation rate and interest rate has no impact on capital structure of mineral industry during the study period is accepted.

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