

Understanding the combined effect of financial ratios and economic indicators on enterprise value of cement sector in India

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ABSTRACT

The aim of this study is to understand how enterprise value of Indian cement manufacturing companies is affected by the combined effects of its own performance measures and the indicators of national economy. The uncertainties due to covid-19 pandemic and an impending recession has raised concerns about the level of economic activity in the near future. Hence, looking at the past financial performance alone will not be enough to ascertain future direction. For this study, financial data of the top four cement manufacturing companies / enterprises has been taken along with the Economic Indicators during the study period between 2005 to 2019. Three econometric models have been analyzed to see the impact of financial performance ratios and macro-economic indicators on Enterprise Value. High return on equity and lower interest rates have most helped companies see increase in Enterprise Value followed by dividend payments to the investors. While growth in GDP has had positive impact on the cement industry, same cannot be said about FDI. Investors and company management will get an empirical understanding of how enterprise value has been impacted by the combined effect of its own performance measures and economic indicators. Limited research is observed on cement industry in India, even though there has been sufficient research on enterprise value, effect of macroeconomic indicators and performance measures.

Keywords

Cement Sector, Enterprise Value, Macro-economic Indicators, Financial Ratios

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Introduction

The fundamental purpose of any company is to increase its worth. Company's worth or valuation is done mainly based on three factors, its assets, earnings and market capitalisation, but Enterprise value is considered as a comprehensive metric by investors to determine a company's worth as it also considers the company's cash and debt position along with market capitalisation. Hence, enterprise value has been selected in this paper as a measure of a company's worth. Stock prices are sensitive to both financial ratios of the firm and economic conditions. Even though valuation of firms is primarily based on its key ratios which indicate its performance during the given period, a conducive economic environment is necessary for the companies to get business opportunities. Hence, understanding the effects of macroeconomic factors on enterprise value is equally important.

Cement industry in India (second largest producer of cement, 7% of global installed capacity) has played a key role in the country's economic development. Almost two third of cement demand in FY 2019 came from the housing and real estate sector (65%) while public infrastructure constituted 25% of the demand (IBEF, 2020). Infrastructure in India has been largely underdeveloped and has been a key focus area for the government over the years along with housing which is expected to create high demand for cement. But the covid-19 pandemic along with slowing growth rate has raised questions over the level of economic activities in the near future. This makes it important to understand how variation in macroeconomic factors are going to affect enterprise value of firms in the cement manufacturing industry in India.

Literature Review

Limited literature is observed with respect to combined effects of financial ratios and economic indicators on firm value. Existing literature proposes many research models with respect to effects of financial ratios on stock price of listed companies as well as the effect of macro-economic factors on the firm performance. Also, stock price is considered as the dependent variable for representing the companies worth, which is not a comprehensive metric.

Two different approaches are observed in existing literature while selecting independent variables. One of the approaches is to select variables from the pool of available data with the help of statistical tools, which would give best fit models. While empirical analysis is based on prima facie evidence, the regression models based on this approach may give correlations which are statistically significant but do not practically affect the dependent variables. The other approach is to arbitrarily select variables based on universally accepted convictions.

Karakus [1] have used the first approach mentioned above to select financial performance ratios by carrying out regression by stepwise backward elimination method on a bunch of variables available with them. Then they have added lagged variables as per the Schwarz Information Criterion and latter added the Macro-economic indicators to the regression model.

Ruhomaun et al. [2] have used generalized method of moments (GMM) regression technique to measure firm performance of listed Malaysian Industrial products manufacturing companies. They have used Return on Asset, Exchange Rates, Interest Rates and Debt Ratio as dependent

variables and also regressed Interaction measure between Interest Rates and Debt Ratio.

Haider & Tariq [3] have compared impact of macro-economic indicators on market indexes in India and Pakistan. They have used GDP, inflation, exports, imports, unemployment and interest rates as independent variables for Ordinary Least Squares (OLS) regression analysis.

Ramani & Dholakia [4] have developed a decision support system for forecasting the demand for cement. They have refined the model for every state in the country but overall determinants have been the same. They tried to find relation between the purchasing power of the consumer in the domestic economy and actual demand. They have also analyzed impact of infrastructure development by public expenditure.

Nageswararao et al. [5] have modeled aggregate impact on financial performance of individual companies on the Standards and Poor's BSE Sensex. They have used size of the firm, return on assets, asset turnover ratio, liquidity, inventory turnover ratio, retained earnings and debt to equity ratio as their determinants.

Egbunike [6] have selected Nigerian manufacturing firms by non-probability sampling method. They have used 3 models using different dependent variables i.e. Return on assets, Return on Equity and Net profit to revenue ratio. Independent variables used for regression are lending rates, inflation which has been measured by consumer price index CPI exchange rate, change in GDP, size of the firm, its leverage by debt to equity ratio and liquidity.

Sasongko [7] have analyzed how stock prices of manufacturing firms listed on the Indonesian stock market are impacted by the debt to equity ratio, dividend payout ratio and return on assets.

Dewi et al. [8] have selected GDP, inflation, unemployment rate, interest rate and exchange rate to examine effects on Return on assets for Fast Moving Consumer Goods companies in which are listed on the Indonesian stock market.

While studying the role of macroeconomic variables on from performance, Issah & Antwi [9], have used principal component analysis to while selecting macroeconomic indicators from the available information. Return on assets has been taken as overall indicator of company's performance, which would be affected by both internal workings and external factors.

Denizel and Özdemir [10] found out that internal attributes of the company are the determinants of its performance in a competitive market.

Humpe and Macmillan [11] and Rjoub et al. [12] examined the impacts of macroeconomic factor stock return using arbitrage principal theory and observed huge dissimilarity among market portfolio against macroeconomic variable.

Diacogiannis et al. [13] clarified the eccentricities of changing financial condition with risk premia credited to perceptible macroeconomic factor. Usually, the gauges for portraying the presentation of economy included other genuine GDP, inflation and numerous different factors.

Firm worth is achieved from the consequences of examination of income expected to be made and association's benefits, authoritative structure, the innovation utilized and human resources. Shareholders as well as the lenders who provide monetary credit for the organizations

have rights to the benefits from these organizations. So, as and when these organizations disintegrate, creditors have the first claim on its assets and have to be paid before the investors' contributions are returned. Therefore, "firm value is equal to total of firm's net financial debt (after liquid assets and stocks are decreased) and values of the share" as mentioned by Chambers & Dimson [14].

Considering the concept of market valuation, enterprise value is the most important concept which has been developed for the world of accounting. Also considered as the true worth of companies from a more practical view. Similarly, "The financial reports are affected by two factors, firms' activities and accounting system adopted by the firms" as mentioned by Palepu et al. [15]. There have been numerous investigations for estimating finance related reports data (both yearly and break reports). Some of these studies explore book keeping data for anticipating firms' future budgetary presentation, for example, profit and development observed by Lev and Thiagarajan [16]. On the other hand, Abarbanell and Bushee [17] have presented evidence that fundamental analysis can predict stock returns while announcements of earnings can result in abnormal returns.

Research Methodology

The key financial ratios of the top 4 cement manufacturing companies in India have been collected from the annual reports published by these companies. The period for study is from the year 2005 to 2019. Data of economic indicators has been collected from the World Bank open database. Econometric models have been proposed and results are analyzed

Selection of performance measures and macro-economic indicators

Enterprise value of the companies is the dependent variable for our model. Natural logarithm of Enterprise value is taken in the regression model in order to bring the values to scale. As the major component of enterprise value is market capitalization, importance has to be given key financial performance ratios which affect investor's gains and their sentiments over the years, which would decide the company's stock price. The most important concern for investors is their profit. Hence, the first independent variable selected for our model is return on equity. This ratio can be considered as the ultimate indicator of company management's performance for gains to equity owners. Other ratio which directly affects investors games dividend payout ratio. It is the measure of dividend or profits paid out to the equity investors with respect to the net income of the company. This ratio has another significance to enterprise value as dividend payments also affect the capital structure of the company. Dividend payout ratio indicates the proportion of earned income which is returned to the investors instead of being added back to the company's equity. Immediate realization of profits has an effect on investor sentiment and in turn impacting share prices and market capitalisation.

The Second component of enterprise value is debt. long term debt to equity ratio has been incorporated in the model

	Ln_EV	Ln_EV (-1)	Ch_EV	ROE	LTDTE	DPR	QR	FDI	GDP	LIR
N	60	56	56	60	60	60	60	60	60	60
Range	4.470139	4	2	0.48	1.94	3.21	0.01	0.03	0.05	0.05
Minimum	23.39823	23	-1	0	0	0.06	0	0.01	0.03	0.08
Maximum	27.86837	28	2	0.48	1.94	3.27	0.02	0.04	0.08	0.13
Mean Statistic	26.09102	26.03	0.25	0.1893	0.3157	0.3164	0.0096	0.0189	0.068	0.1055
Mean Std. Error	0.119944	0.122	0.06	0.015	0.05867	0.05537	0.00044	0.00079	0.00194	0.00173
Std. Deviation	0.929085	0.915	0.452	0.11616	0.45445	0.42893	0.00344	0.00615	0.01505	0.01343
Variance	0.863	0.837	0.204	0.013	0.207	0.184	0	0	0	0
Skewness Statistic	-0.413	-0.433	1.329	0.898	2	5.763	0.555	1.281	-0.996	0.737
Skewness Std. Error	0.309	0.319	0.319	0.309	0.309	0.309	0.309	0.309	0.309	0.309
Kurtosis Statistic	0.382	0.405	2.489	-0.16	3.746	39.365	-0.187	2.328	0.219	-0.115
Kurtosis Std. Error	0.608	0.628	0.628	0.608	0.608	0.608	0.608	0.608	0.608	0.608

Table 1: Selected Variables

value. Long term debt can be used to leverage available resources and increase both net income and overall assets. Third component of enterprise value is captured in the model with the help of quick ratio, which is also called as ‘acid test’. Quick ratio is a good measure of a company's cash / liquidity position and compares the available cash and cash equivalents to the company's current liabilities.

Together these 4 financial performance ratios comprehensively capture microeconomics indicators of enterprise value. These factors directly depend on management actions. But market capitalisation and debt position of the company is also influenced by market conditions. By general understanding we can see that macroeconomic factors affect the cement industry in 2 ways. Firstly, as the general economic conditions in the country affect the real estate market, it has phenomenal impact on the overall demand for cement. Secondly, stock prices are also sensitive to macroeconomic news as mentioned earlier. Macroeconomic indicators like foreign direct investment, growth in gross domestic product and lending interest rates are also added in the model. FDI and change in GDP are indicators of the level of economic activity in the country. Lending interest rates influence the decision of raising debt not only for the company but also for the clients which in turn affects the business of these companies

Dependent Variable	Symbol
Natural Log of Enterprise Value (in Cr.)	Ln_EV
Change in Enterprise Value (%)	Ch_EV
Independent variables (Financial Performance Indicators)	Symbol
Return On Equity (%)	ROE
Long Term Debt To Equity (%)	LTDTE
Dividend Payout Ratio (%)	DPR
Quick Ratio (X)	QR
Independent variables (Macro-economic Indicators)	Symbol
Foreign direct investment, net inflows (% of GDP)	FDI
GDP growth (%)	GDP
Lending interest rate (%)	LIR

Table 2: Descriptive Statistics

Table 3: Correlations

Ln_EV		Ch_EV	ROE	LTDTE	DPR	QR	FDI	GDP	LIR
	Pearson Correlation	-.087	-.446**	-.588**	-.230	.070	-.239	-.031	-.524**
	Sig. (2-tailed)	.523	.000	.000	.077	.596	.066	.813	.000
	Sum of Squares and Cross-products	-1.850	-2.839	-14.640	-5.414	.013	-.081	-.026	-.386
	Covariance	-.034	-.048	-.248	-.092	.000	-.001	.000	-.007
	N	56	60	60	60	60	60	60	60

Ch_EV	Pearson Correlation	-.087	.168	.199	.033	-.180	-.189	.410**	-.198
	Sig. (2-tailed)	.523	.215	.141	.807	.185	.163	.002	.144
	Sum of Squares and Cross-products	-1.850	.476	2.203	.154	-.016	-.027	.156	-.068
	Covariance	-.034	.009	.040	.003	.000	.000	.003	-.001
	N	56	56	56	56	56	56	56	56
**. Correlation is significant at the 0.01 level (2-tailed).									
*. Correlation is significant at the 0.05 level (2-tailed).									

Stationarity of Data

Stationarity of the time series data is checked by carrying out the unit root test with the help of Augmented Dickey Fuller test using Fisher Chi-square as well as Choi Z-stat. Both Individual intercept and trend have been included in the equation and data is found to be stationary. From the discussion mentioned above, following model is proposed:

$$\ln_EV_{i,t} = \beta_1 + \beta_2 ROE_{i,t} + \beta_3 LTDTE_{i,t} + \beta_4 DPR_{i,t} + \beta_5 QR_{i,t} + \beta_6 FDI_{i,t} + \beta_7 GDP_{i,t} + \beta_8 LIR_{i,t}$$

Model 1

The panel data consists of four cross-sections with 15 years data for each, giving a total of 60 observations per variable. The panel is balanced with no missing data. Fixed effects panel data regression is selected for the data as the samples do not show any signs of random effects. Also, random effects estimation requires number of cross sections to be more than the number of co-efficient for between estimator for estimate of RE innovation variance. Wald rest has been used for confirming panel data regression model type. Results of the Wald test give significance above 99% and revealed suitability of the fixed effect model for the panel.

Table 4: Wald test results:

	Test Statistic	Value	df	Probability
Model 1	F-statistic	17255.1	4 (8, 49)	0.0000
	Chi-square	138041.	1 8	0.0000
Model 2	F-statistic	62126.4	4 (9, 44)	0.0000
	Chi-square	559138.	0 9	0.0000
Model 3	F-statistic	6.45133	5 (8, 45)	0.0000
	Chi-square	51.6106	8 8	0.0000

Selection of Lag

In order to check if previous periods enterprise valuation plays any part and determining valuation in the given year lagged variable enterprise value is added to the regression model. Durbin Watson test statistic has also suggested autocorrelation. Hence, lagged variables should be added. Optimal lag selection was carried out using the vector autoregression estimates of Ln_EV. One period lag was

suggested by the Akaike information criteria and a second model is proposed

$$\ln_EV_{i,t} = \beta_1 + \beta_2 ROE_{i,t} + \beta_3 LTDTE_{i,t} + \beta_4 DPR_{i,t} + \beta_5 QR_{i,t} + \beta_6 FDI_{i,t} + \beta_7 GDP_{i,t} + \beta_8 LIR_{i,t} + \beta_9 \ln_EV_{i,t-1}$$

Model 2

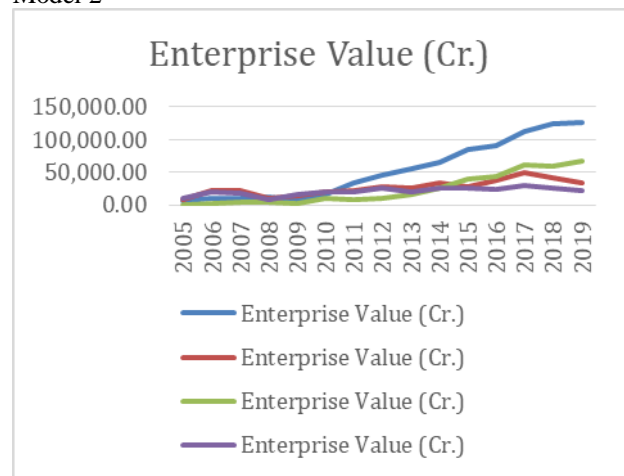


Fig 1: Enterprise values of the companies

Enterprise Value of Ultratech Cement has increased phenomenally higher than other three cement manufacturing companies in our study. In order to see if this difference in the panels has any effect on the regression, change in Enterprise value has been considered as the dependent variable. After taking this factor in consideration, a third model has been proposed:

$$Ch_EV_{i,t} = \beta_1 + \beta_2 ROE_{i,t} + \beta_3 LTDTE_{i,t} + \beta_4 DPR_{i,t} + \beta_5 QR_{i,t} + \beta_6 FDI_{i,t} + \beta_7 GDP_{i,t} + \beta_8 LIR_{i,t}$$

Analysis of errors in Regression

Results of Levene's Tests support the null hypothesis that the error variance of the dependent variable is equal across groups for all the models. Model 1 has shown smaller significance with respect to the other two models. All the Heteroskedasticity Tests for model 1 support the null hypothesis that the variance of the errors does not depend on the values of the independent variables. For Model 2, Homoskedasticity is supported only by the White Test while all other tests suggest Heteroskedasticity. On the other hand, only Breusch-Pagan Test suggests Heteroskedasticity for model 3 while all other tests including the Modified Breusch-Pagan Test support the null hypothesis for Homoskedasticity.

Table 5: Levene's Test of Equality of Error Variances

Dependent Variable: Ln_EV

	F	df1	df2	Sig.
Model 1	1.954	3	56	.131
Model 2	.078	3	52	.972
Model 3	.303	3	52	.823

Table 6: Tests for Heteroskedasticity

		White Test	Modified Breusch-Pagan	Breusch-Pagan Test	F Test
Model 1	Chi-Square	60	0.009	0.012	0.008
	df	59	1	1	1
	df2	-	-	-	58
	Sig.	0.439	0.926	0.913	0.927
Model 2	Chi-Square	56	11.025	12.841	13.238
	df	55	1	1	1
	df2	-	-	-	54
	Sig.	0.437	0.001	0	0.001
Model 3	Chi-Square	56	3.213	4.811	3.287
	df	55	1	1	1
	df2	-	-	-	54
	Sig.	0.437	0.073	0.028	0.075

Result And Analysis

Table 7: Regression Results of Panel Model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	27.3041	5	1.073180	25.44227 0.0000
ROE	-1.25652	8	0.978455	-1.2841960.2051
LTDTE	1.21689	7	0.249242	-4.8823850.0000
DPR	0.38761	7	0.222746	-1.7401720.0881
QR	79.6069	7	26.92249	2.956895 0.0048
FDI	10.7355	5	16.86530	0.636547 0.5274
GDP	3.20365	0	5.933573	0.539919 0.5917
LIR	15.6885	9.178628	-1.7092520.0937	

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Effects Specification			
Cross-section fixed (dummy variables)			
Root MSE	0.49174	R-squared	0.71511
Mean dependent var	26.0910	Adjusted R-squared	0.65697
S.D. dependent var	0.92908	S.E. of regression	0.54415
Akaike info criterion	1.78495	Sum squared resid	14.5088
Schwarz criterion	2.16892	Log likelihood	42.5487
Hannan-Quinn criter.	1.93514	F-statistic	12.2999
Durbin-Watson stat	0.88986	Prob(F-statistic)	0.00000

Model 1 is significant according to the probability of the F statistic and has explanatory power of 65.69% as per the adjusted R square. According to this model, return on equity actually has a negative effect on Enterprise value but it is not significant. Dividend payout ratio also has a negative relationship with enterprise value but it is not significant at 95% level of confidence with probability of 0.0881. LTDTE has negative and highly significant relationship with enterprise value. Quick Ratio has a high positive relationship to enterprise value with beta of 79.60 and significance of 0.0048. FDI and GDP also have positive relationships with enterprise value but not significant. LIR has a negative relation but significance is only at 90% confidence level.

Table 8: Regression Results of Panel Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.870375	1.990220	3.452068	0.0012
ROE	0.584752	0.635399	0.920290	0.3624
LTDTE	0.139452	0.152683	-0.913343	0.3660
DPR	0.276538	0.356087	0.776600	0.4415
QR	10.82792	16.15350	-0.670314	0.5062
FDI	16.79973	10.62643	-1.580939	0.1211
GDP	3.322580	2.966041	1.120207	0.2687
LIR	7.968676	4.832900	-1.648839	0.1063
LN_EV(-1)	0.777124	0.072140	10.77248	0.0000

Effects Specification			
Cross-section fixed (dummy variables)			
Root MSE	0.232421	R-squared	0.92483
Mean dependent var	26.18983	Adjusted R-squared	0.90604
S.D. dependent var	0.855405	S.E. of regression	0.26220
Akaike criterion	0.348035	Sum squared resid	2.25501
Schwarz criterion	0.782039	Log likelihood	6
Hannan-Quinn criter.	0.516298	F-statistic	3
Durbin-Watson stat	2.674475	Prob(F-statistic)	0

Specification			
Cross-section fixed (dummy variables)			
Root MSE	0.34058	R-squared	0.4212
Mean dependent var	0.24553	Adjusted R-squared	0.2925
S.D. dependent var	0.45172	S.E. of regression	0.3799
Akaike criterion	1.07655	Sum squared resid	6.4959
Schwarz criterion	1.47439	Log likelihood	19.143
Hannan-Quinn criter.	1.23079	F-statistic	89
Durbin-Watson stat	2.57506	Prob(F-statistic)	0.0029

When lagged dependent variable is added to the list of regressors, Durbin Watson stat has increased above 2 suggesting that the autocorrelation / serial correlation problem has been eliminated from model 1. This has also increased value of adjusted r square for Model 2 at 0.9066 which makes the model highly explanatory with very low standard error, residual and constant coefficient. With F statistic of 49.1 the model is highly significant. Addition of lagged dependent variable, Ln_EV (-1) has proved to be highly significant at 99% confidence level positive relation of 0.77. Coefficient of constant has reduced from 27.304 in model 1 to 6.87 in model 2. In this model ROE, DPR and GDP have positive but insignificant effects on the enterprise value. LTDE, QR, FDI and LIR have negative effect on enterprise value but they too are insignificant.

Table 9: Regression Results of Panel Model 3

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.503357	0.766658	1.960923	0.0561
ROE	2.234072	0.825406	2.835844	0.0068
LTDE	3.097203	0.191370	0.655186	0.5157
DPR	8.359984	0.486672	1.997317	0.0519
QR	0.851776	22.586571	1.593797	0.1180
FDI	12.90779	15.378350	0.553880	0.5824
GDP	4.158404	4.295864	0.676882	0.5019
LIR	5.6980575	2.269219	0.0281	

Effects

In the third model, ROE has show significant positive relation with change in enterprise value. LIR also has a significant but negative relation with Ch_EV. LTDE, GDP and DPR have shown positive relation with change in enterprise value. DPR is slightly insignificant at 0.0519 but LTDE and GDP are clearly insignificant with probability value above point five. Durbin Watson test statistic is above 2 suggesting that there is no problem of autocorrelation and hence no need to add lagged variables. This model has reduced explanatory power at 29.25% as per the adjusted R square but is still significant with F statistic of 3.27 and probability of 0.0029.

Discussion

The three models provide varying results with respect to relation as well as significance of the independent variables with respect to the Enterprise Value. Though Model 1 has high explanatory power, is significant, has equal variance across groups and is free of Heteroskedasticity as per all the four tests, it has to be dismissed due to the problem of autocorrelation.

Model 2 has the highest R squared value but explanatory power of above 90% may be seen as suspicious for spurious regression. But it is important to note that past valuations of the company play very important role in explaining Enterprise Value. The corrected model has given results which are somewhat in line with the thought process while selecting the independent variables for estimating enterprise value with only changes with respect to FDI which was expected to increase enterprise value due to its generally positive effect on economic activity. And the same phenomenon is observed with the third model.

As model 3, incorporates change in the Enterprise Value, it avoids the need of lagged dependent variable and it is also free of serial correlation as per the Durbin Watson test. It is giving an overall significant regression with acceptable explanatory power.

Limitation

- A. The study has been carried out for limited time period.
- B. Use of secondary data has brought in its own set of limitations.
- C. Factors such as expansion of manufacturing facilities by these companies, capital restructuring, mergers and de mergers, etc. have not been considered.

Validation

The model's predictions are in-line with generalized theory about company accounting and macroeconomics except for FDI, for which negative correlation has been predicted. Better ROE and DPR have direct benefits to investors while higher LTDTE means higher capital employed which gives better enterprise value. In the same way, better GDP output and lower rate of interest increase the level of economic activity and hence prove beneficial to the Cement Industry's enterprise value. As cash is subtracted from the market capitalization and debt while calculating enterprise value, it has expected negative relationship. FDI is also supposed to increase economic activity but it does not seem to have made much impact on the real estate, and infrastructure industries which are the main clients of cement industry. Also, the relation is not statistically significant.

Conclusions

- A. Enterprise Value in the cement industry is positively impacted by ROE, LTDTE, DPR and GDP.
 - B. LIR, QR and FDI have negative impact on the Enterprise Value.
 - C. Enterprise Value in the cement industry is related with earlier valuations.
- Lower interest rates and growth in GDP have proven beneficial for the investors but FDI in the country has not helped in increasing the Enterprise Value of Indian cement industry.

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