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The impact of working capital on Profitability of Some Selected Steel companies: An Empirical Panel Data Study

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Working capital, which represents a company's liquid assets, is one of the most important indicators of its efficiency. It indicates a business's capacity to cover its ongoing operating costs and shows its near-term financial stability. To maintain a balance between its liquidity and profitability, a company should plan the effective use of its working capital. As a result, this research paper investigates how working capital management affects the steel industries of India. This research paper investigates how working capital impacts the steel industry's profitability in India. The study, which will cover the ten-year span from 2013 to 2022, has chosen twenty companies from the Indian steel sector. Working capital and profitability were modelled using four independent variables: current ratio, quick ratio, debtor turnover ratio, and inventory turnover ratio. The dependent variable was the Return on Capital Employed, a profitability metric. Panel data regression and pooled Ordinary Least Square regression were used in this investigation. According to the study's findings, working capital has a big impact on how profitable the Indian steel sector performs.

Keywords: Working Capital, Return on Capital Employed, Panel Data Regression, Current Assets, Current Liabilities, Profitability.

Introduction:

The four aspects of a company's financial management decision are investment, financing, dividend, and liquidity. Working capital management is a crucial aspect of a company's liquidity and short-term investment decisions. It impacts the firm's liquidity as well as its profitability. Optimal working capital management generates value for the company (Baghci & Khamrui, 2012).

Working capital refers to a company's available funds required to maintain a company's day-to-day expenditures on operational activities. It is essential to the firm's operation (Mandal & Goswami, 2010). Working capital management is intended to boost theprofits, which reduces the danger of not being able to pay down maturing short-term debt. The effectiveness of working capital management depends on the equilibrium between profitability and liquidity (Faulkender & Wang, 2006). A company's elevated liquidity risk enhances profitability. In order to effectively manage working capital, a company must evaluate everything within both accounts and achieve a balance between risk and return.

The iron ore and steel sector are one of the country's core industries, which significantly boosts the economy. In 2016, India overtook Japan to become the second-largest steel manufacturer in the world after China, according to figures given by the International Stainless-Steel Forum. In 2003, India ranked eighth in the world regarding crude steel production (ISSF). ISSF reported during their annual conference in Tokyo, Japan, that India's stainless-steel production grew to 3.32 million tonnes in 2016, a 9 per cent increase over the 3.0 million tonnes produced in 2015.

This study examines the relationship between the management of working capital and the profitability of Indian steel companies. We anticipate that how enterprises manage their working capital will substantially impact their profitability. Whether it has a favorable or negative effect, it influences businesses' overall efficiency and profitability (The Hindu, May 22, 2017).

Review of Literature

The value of working capital management has been widely acknowledged by researchers. **Venkatraman and Ramanujana (1987)** observed that corporate economic performance is judged

based on sales growth, net income growth, and return on investment.Sharma and Kumar (2010) determined that working capital demonstrated an expanding tendency of financing working capital using short-term funds.Raheman and Nasr (2007) investigated the impact of working capital management on the performance of Pakistani firms and found that profitability is inversely correlated with the collection period and the cash conversion cycle. Dong &Su (2010) conducted a study on the influence of working capital on the liquidity and profitability of businesses in Vietnam and discovered a significant negative correlation between profitability and the cash conversion cycle. He believes that managers can add value to their organisations by shortening the cash-conversion cycle. Bhatia and Srivastava (2016) examined the association between working capital management and the performance of enterprises in India using panel data and ordinary least squares and concluded that working capital management should always be improved for greater profitability.

Objectives of the study:
The study's primary objective is to ascertain how working capital affects the profitability of Indian steel companies.

Research Methodology

Data Source:
The study examines various aspects of working capital and attempts to establish a relationship between these variables and the profitability of steel companies. The research was carried out from 2013 to 2022, with a duration of ten years. Data about companies was gathered from their annual reports and the CMIE Prowess database. To accomplish the objectives of the study, this data has also been reorganized and tabulated. This information has also been reorganized and tabulated to meet the study`s objectives.

Sample Frame:
An analysis of the effect of working capital management on profitability in Indian steel industries provided the basis for the empirical work. The study was conducted on those Steel businesses listed on the National Stock Exchange to examine the contribution of the targeted field (NSE). Thus, the study period is from 2013 to 2022, and the sample size is twenty. The following list of twenty chosen companies:

1.Tata Steel Company Limited
2.JSW Steel Limited
3.Steel Authority of India Limited (SAIL)
4.Jindal Steel & Power Limited
5.Godawari Power &Ispat Limited
6.APL Apollo Tubes
7.Jindal Stainless Ltd
8. Ratnamani Metals and Tubes Ltd
9. Kalyani Steels Ltd
10. NMDC Ltd
11. Welspun Corp
12. Maharastra seamless
13. Hindalco Industries Ltd
14. Lloyds Metals and Energy Ltd
15.Usha martin ltd
16.Mishra dhatu nigam ltd
17.Sarda Energy & Minerals
18.The Tinplate Co. of India Ltd
19.Jindal Saw Limited

20.Tata Steel Long Products Ltd

Regression Model:

The data set is subjected to panel data regression analysis to develop a model for examining the effects of various liquidity variables on the steel industry's profitability. By panel data regression, an effort has been made to build a study model incorporating cross-sectional and time series data. The model is shown below.

ROCE = βo + β1 CR it + β2 QR it + β3 DTR it + β4ITR it+ e it

Where, "i" represents number of firms and "t" represents number of years. B represents coefficients of 0, 1, 2, 3, 4, 5 independent variables and error term represented by "e".
CR = Current Ratio
QR = Quick Ratio
DTR = Debtors Turnover Ratio
ITR = Inventory Turnover Ratio

Return on Capital Employed, a dependent variable in the regression model we attempt to develop, is calculated by dividing the firm's EBIT by shareholders' equity and long-term liabilities, which could then be divided by the firm's EBIT by total assets minus total current liabilities. The current ratio and quick ratio, which indicate the firm's liquidity condition, and the debtor turnover ratio and inventory turnover ratio, which demonstrate the firm's operational effectiveness, are the independent variables in the model. These factors are described as follows:
CR - To evaluate a company's short-term liquidity, one employs the proportion of current assets to current liabilities (within one year).
QR- It is a quick ratio that measures the firm's very short-term liquidity position and is computed as the difference between current assets and current liabilities less inventories and prepaid expenses.
DTR – It is the turnover ratio of the average debtors, which is calculated as net sales.
ITR – The inventory turnover ratio, which is calculated as a ratio of net credit sales on average stock, indicates how effectively inventory is rotated in a company.

StepsinModelDevelopment

Numerous efforts have been made to create the study's model. After this, the cross-sectional data of all 20 companies were grouped throughout the time series and tested for the pooled ordinary least square regression's ability to fit the data. In order to determine if panel data regression analysis could be performed or not, this was done.
The next step was to determine whether fixed effect regression was fit or not to ensure that while the intercept could vary between variables, the slope remained constant throughout time. The next step is to proceed with random effect regression to determine whether or not the intercept represents the common mean value for all variables. The Hausman test is applied as the final stage to determine if the fixed effect or random effect regression model is applicable. This is done using alternate hypotheses for the fixed effect regression model and null hypotheses for the random effect regression model.

Hypotheses oftheStudy

Thestudyhasbeendonetotestthefollowinghypotheses:
H1: There is no significant relation between CR and ROCE.
H2: There is no significant relation between QR and ROCE.
H3: There is no significant relation between DTR and ROCE.
H4: There is no significant relation between ITR and ROCE.

Data Analysis

Table1Descriptive Statistics of the steel Industries in India

	ROCE	CR	QR	DTR	ITR
Mean	10.736	2.010	1.368	16.737	6.117
Median	11.140	1.485	0.870	13.450	4.785
Maximum	64.250	17.800	17.290	100.360	24.380
Minimum	-7.282	0.350	0.210	1.860	0.330
Std. Dev.	16.537	2.077	1.859	14.109	4.246

Source:Theauthor

NotesCR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE-Return on Capital Employed.

Descriptive statistics to describe the nature of data. Table 1 provides a descriptive summary of five companies during ten years from 2013 to 2022, with a total of 200 firm-year observations. With a standard deviation of 16.537, a wide range of ROCE values from –7.282 to +64.250 can be observed. The average return of the steel industry is approximately 10.736%, which is a satisfactory rate of return. The average industry current and quick ratios are 2.010 and 1.368, respectively, indicating a good short-term liquidity position. However, the minimum and maximum values for both the current and quick ratios fluctuate widely between risky and secure.

Test of Stationarity:

H_0: Data is not stationery

H_a:Data is stationery

The stationery property of the dataset is examined: The Levin-Lin-Chu test for unit root. The stationarity of the study's data set was examined using the Actual result test, and the results are shown in Table 2. All p-values are less than 0.05, indicating that our null hypothesis that data is not stationary is rejected and alternative hypotheses are accepted, leading us to conclude that all collected data is stationary. In addition, this verifies that panel data regression may be utilised for further research.

Table2: Levin-Lin-Chu Unit root test Result

Variables	T Statistics	p-value
CR	10.4275	0.000
QR	12.122	0.000
DTR	-4.887	0.000
ITR	-4.887	0.000
ROCE	12.018	0.000

Source:Theauthor

NotesCR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE-Return on Capital Employed.

Test of Multi-collinearity

Before applying a panel regression model, a multicollinearity test must be conducted. Variance Inflation Factor determines the level of test correlation between multiple independent variables (VIF). If the VIF values are greater than 10, multicollinearity will be a concern. After applying the test to the data set, we determined that the VIF values for all independent variables are less than 10 and that these four variables can be used for additional panel regression analysis. The VIF values are shown in Table 3.

Table 3: Test for Multi-collinearity

Variables	VIF	1/VIF
CR	48.165	5.770
QR	39.514	5.999
DTR	6.828	1.077
ITR	21.838	1.165

Source:Theauthor

NotesCR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE-Return on Capital Employed.

Panel Data Analysis

In our empirical model, which was developed to study the effect of working capital management on the return on capital employed of the Indian Steel Industry, time series elements are indicated by 't' and cross-sectional details are denoted by 'I'. This is the model to be evaluated

$$ROCE_{it}=\alpha+ \beta_0+\beta_1 CR_{it} +\beta_2 QR_{it} +\beta_3 DTR_{it} + \beta_4 ITR_{it}+e_{it}$$

Only after deciding which model to be used, can thepaneldataregressionresultsbeanalyzed.Thefollowing stepswereundertakenforthispurpose:

As a first phase, we combined 20-year time series dataand cross-sectional data for twenty Indian Steel companiesfrom 2013 to 2022. The common intercept term andcommon slope coefficient were obtained in the secondstage using pooled OLS regression.

Table 4: Results for Pooled OLS Regression

Model Specification	Constant	CR	QR	DTR	ITR	Adjusted R -squared	Test	p-value
Common slopes with cross section specific intercept (p-value)	2.34 (0. 00)*	-0.37 (0. 41)*	0.37 (0. 15)*	0.35 (0. 00)*	0.04 (0. 02)*	0.40	F	0.000000*

Notes: *significant at 5% level; CR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE- Return on Capital Employed.

Table 5. Fixed Effect Regression Results

Model Specification	Constant	CR	QR	DTR	ITR	Adjusted R - squared	Test	p-value
Common mean value for the intercept (p-value)	3.06 (0. 00)*	-0.30 (0. 44)*	0.33 (0. 15)*	0.35 (0. 00)*	-0.14 (0. 60)*	0.19	F	0.000000*

Notes: *significant at 5% level; CR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE- Return on Capital Employed.

The coefficients QR, CR, DTR, and ITR in Table 4 reveal that the explanatory power of the regression was extremely low, as indicated by the R square value of 0.11. Only the ITR and DTR coefficients are significant in the model, as the probabilities of both coefficients are less than 5%. Yet, the probabilities of both the CR and QR coefficients are greater than 5%. The conclusion is that hypotheses H3 and H4 are not accepted, i.e. ITR and DTR have a substantial impact on the profitability of the industry, whereas hypotheses H1 and H2 are accepted, i.e. CR and QR have no significant impact on the profitability of the industry. The
pool ability test was conducted to test the null hypothesis of a common intercept and slope coefficient as opposed to the alternative of conducting individual regressions for each cross section. As the calculated probability value of F statistics of the regression equation is less than the 5% level of significance, the null hypothesis is rejected. So,we can conclude that the data should therefore not be pooled for regression purpose.

Model Specification	Constant	CR	QR	DTR	ITR	Adjusted R - squared	Test	p-value
Data pooled and common intercept and slopes(p-value)	3.23 (0. 00)*	-0.31 (0. 41)*	0.25 (0. 25)*	-0.30 (0. 00)*	0.17 (0. 02)*	0.11	F	0.000000*

Table 6: Random Effect Regression Results

Notes: *significant at 5% level; CR-Currentratio,QR-Quickratio,DTR-Debtturnoverratio,ITR-Inventory turnover ratio, ROCE- Return on Capital Employed.

The Third step, the validity of fixed effects and fixed time effects was examined, and the results are shown in Table 5. R square is 0.40, indicating that 40% of the variance in the dependent variable, ROCE, can be accounted for by the change in the explanatory factors. The majority of the slopes are close to one another. On the other hand, the computed probability of F statistics indicates rejection of the null hypothesis, as the threshold of significance is less than 5%. This indicates that the model is well-fit and that the coefficients are not equal to zero. Yet in this test, the DTR probability was less than 5%, indicating that only the DTR fit well, but the cash ratios CR, QR, and ITR did not, since the coefficient probabilities were greater than 5%. The conclusion is that hypotheses H1, H2, and H4 are not accepted, i.e. DTR has a major impact on the profitability of the industry, whereas
hypothesis H3 is accepted, i.e. CR, QR, and ITR have no significant impact on the profitability of the company.
In the fourth step, the validity of random effects was then tested and the results are presented in Table 6. Theresults indicate that the explanatory power of the regression is better than fixed effect, that is, R square is 0.19which implies 19 per cent of the variation in the dependent variable, ROCE, can be explained by the variation in the explanatory variables. The slopes are very close to each other. But in this model also DTR coefficient only significant as the probabilities of both the coefficients are less than 5 per cent. But CR, QR and ITR were not fitted well as the probabilities of the coefficients are more than 5 per cent. It is concluded that hypotheses H1,H2 and H4 are not accepted, that is, DTR has significant impact on the profitability of the industry whereas hypothesis H3 accepted, that is, CR ,QR and ITR do not have significant impact on the profitability of the industry.

Model Specification	**Constant**	**CR**	**QR**	**DTR**	**ITR**	**Adjusted R - squared**	**Test**	**p-value**
To check whether the model is fixed effect or random effect							Chi squared	0.000*

Table 7: Fixed Effect Versus Random Effect: Hausman Test

As the last step of model development, appropriateness of either fixed effect or random effect is checked. This was done through the application of Hausman test. The null hypotheses of the study emphasized on the appropriateness of the random effect model while the alternate hypotheses explained the utility of the fixed effect model. For taking up Hausman test, we formulated following hypotheses:
H0: Random Effect Model is Applicable
Ha: Fixed Effect Model is Applicable

The results are tabulated in table 7 which indicates the appropriateness of Fixed Effect Model Over Random Effect Modelas the p-value of Chi-square is less than 5% level of significance leading to the reject the null hypotheses. From the Fixed effect model, it was apparent that two variables i.e.,ITR and DTR have a notable positive effect on the firm's ROCE with less than 5% probabilities. The model revealed 40% of the disparity in the dependent

variable, ROCE, is described by the variations in the descriptive variables. Hence, it can finally be concluded that all the variables i.e. DTR &ITR have significant impact over the companies' profitability in steel industry. The variable QR, on the other hand, appears to have a negative or inverse association with profitability. Panel data regression was applied to the data set after validating their stationarity through Levin-Lin-Chu test and their multi-collinearity
through unit root test to reveal that CR, QR, DTR & STR have a notable impact on the performance of the steel industry. Thus, the study's conclusion also clearly indicates that the steel companies in Indiacan increase their profitability by managing their working capital efficiently.

Conclusion:

According to the research of Asghar and Syed (2012), a company can boost its profitability by efficiently managing its working capital, which benefits its total assets and financial performance. In addition, the study by Shubita (2013) demonstrates that if working capital is well managed, it will increase profitability and that liquidity and profitability are inversely associated. In this study, the influence of working capital management on the profitability of six Indian paint companies was explored, and it was found that working capital had a significant impact on the organization's level of profitability.

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