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EFFICIENCY ANALYSIS - A STUDY OF LIQUIDITY AND PROFITABILITY

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ABSTRACT

The overall efficiency is important from the viewpoint of the impact of short-term liquidity process on the profitability. Management of working capital is always considered, among others, as the vital factor that decides success or failure of business enterprises. Profitability of the business may be dependent on many factors including the adequacy of liquidity level as well as debt-paying ability of a concern because inadequate level of liquidity impairs profitability. Liquidity-profitability relationship is linked with the continuance of the appropriate intensity of working capital. The study aims to provide the reader with appropriate information for sharper decision-making on liquidity-profitability relationship with the help of multiple correlations and multiple regression analysis.

Introduction :

Working capital tenders a common front for profitability and liquidity management. Management of working capital has obtained an immense importance for accomplishing the desired goal through 'profitability and liquidity'. The relationship between liquidity and profitability is one of the most important areas requiring management review.

Liquidity-profitability relationship is associated with the maintenance of the proper level of working capital. This concept tries to strike a level of liquidity that offers a comfortable balance of liquidity and profitability, that is to say, the investment of the company in working capital must be adequate, and neither excess nor less than what it should be. Where investment in working capital is much in excess of requirement, it will no doubt impair the firm's profitability. On the other hand, less than adequate investment in working capital will tell upon the profitability of the firms through impaired liquidity. Therefore, it may generally be assumed that there is always a negative relationship between the two. But it is not true in all the cases. The existence of a linear relationship, though not continuous, between profitability and liquidity corresponding to the holding of current assets at least up to a certain level by firms, is not an impracticable proposition.

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Steel industry is the back-bone of economic growth of any country. Economic liberalization in 1991 initiated to make rapid economic development, marked the emergence of several domestic players in this space. Private investment flowed into the sector, adding fresh capacities. The private sector produced 59 per cent of the crude steel in 2005. India occupied the eighth position in terms of worldwide crude steel output. India's per capita steel consumption is low at 30 kg compared to global standards for developed countries at 400 to 500 kg. The Indian steel industry comprises producers of finished steel, semi-finished steel, stainless steel and pig iron. The private sector controls almost two-thirds of the steel market, while the public sector producers have the remaining one-third market share.

In this paper an effort has been made to make a study of Indian private sector steel Industry for assessing the impact of working capital policies & practices on profitability during the period 1997-98 to 2005-06. The impact of working capital policies on profitability has been examined by computing multiple correlation and regression analysis between profitability ratio and some key working capital policy indicator ratios.

Objectives of the Study

The main objective of the present study is to make a study on the efficiency of the management of working capital in operating selected private sector Iron and Steel enterprises in India. More specifically, it seeks to dwell upon mainly the following issues:

To observe the key variables that are responsible for low-level of profitability;

To explore the liquidity-profitability relationship.

Methodology of the Study

The Centre for Monitoring Indian Economy (CMIE) makes every year a study of private and public sector companies operating in India. In 2005-06, it made a similar study based on 140 private and public steel companies operating in India. Out of 140, total 136 private sector steel companies are taken as the population for the study. From the 136 steel companies we selected 27 companies (20 per cent of the population). The simple random sampling without replacement was done on these 27 companies. 10 companies are rejected through sampling and the remaining 17 companies were then approached based on the information available from the website of the Department of Company Affairs to supply annual

Sample Design based on Simple Random Sampling without Replacement

Sl. No.	Selected Companies	Random Sampling		Status	Replacement
		2 Digit Random No.	For Number above 27, (Remainder when divided by 27)		
1.	AHW Steel Ltd.	97	16	--	No
2.	Aditya Ispat Ltd	87	06	--	No
3.	Bhushan steel Ltd.	37	10	--	Yes
4.	Essar Steel Ltd.	92	11	--	No
5.	Gangotri Iron & Steel Co Ltd	52	25	--	No
6.	Hisar Metal Inds.	41	14	--	No
7.	Ispat Inds Ltd	05	05	--	Yes
8.	JSW Steel Ltd.	56	02	--	Yes
9.	Jai Corp Ltd.	70	16	Rejected	--
10.	Juhi Alloys.	70	16	Rejected	--
11.	Kalyani Steel Ltd	07	07	--	Yes
12.	Kamdhenu Ispat	86	05	Rejected	--
13.	Llyods Steel Inds ltd	74	20	--	Yes
14.	Mahindra Ugine Steel Co Ltd	31	04	--	Yes
15.	Mark steel	71	17	--	No
16.	Mukand Ltd.	57	03	--	No
17.	National Steel & Agro Inds Ltd.	85	04	Rejected	--
18.	Omex Steels.	39	12	--	No
19.	Panchmahal Steel	41	14	Rejected	--
20.	Real Strips	18	18	--	No
21.	Sharada Ispat	44	17	Rejected	--
22.	Sunflag Iron & Steel Co Ltd	79	25	Rejected	--
23.	Tata Steel Ltd.	13	13	--	Yes
24.	Tulsyn NEC Ltd.	97	16	Rejected	--
25.	Unison Metals	84	08	Rejected	--
26.	Uttam galva Steel Ltd.	35	08	--	No
27.	Vijaya Steels	35	08	Rejected	--

reports for the year ended 31st March 2006. Out of the 17, only 7 responded favorably and the remaining 10 did not respond in spite of several reminders.

The Efficiency Analysis of selected Private sector steel companies in India is thus based on 7 companies whose annual reports are available. This represents 5.15 per cent of the population. An average response rate of 43.3 per cent which, going by the general experience of data collection in India (B. Banerjee, 2005) may be considered satisfactory. Therefore, we select seven private sector steel companies operating in India in the present study i.e., (i) Bhusan Steel Ltd. (ii) Ispat Industries Ltd. (iii) J S W Steel Ltd. (iv) Kalyani Steels Ltd. (v) Mahindra Ugine Steel Co Ltd. (vi) Lloyds Steel Inds Ltd. and (vii) Tata Steel Ltd.

The study is based on the secondary data obtained from the audited balance sheets and profit & loss accounts and also the annual reports of the respective companies. Besides, the facts, figures and findings advanced in similar earlier studies and the government publications are also used to supplement the secondary data.

The study relates to a period of 9 years**,** starting from 1997-98 and ending on 2005-06**.** In the course of analysis in this study, accounting techniques include ratio analysis, while among statistical technique the multiple correlations and multiple regression analysis, co-efficient of determination (R^2) have been applied. The use of the technique has been made in the light of the requirement of the analysis.

Findings of the study

To assess liquidity-profitability relationship of selected steel companies, relevant ratios namely, current ratio (CR), liquid ratio (LR), absolute liquid ratio (ALR), debt-equity ratio (DER), age of inventory (AOI), age of debtors (AOD) and age of creditors (AOC) and the most popular profitability ratio, best indicator of overall profitability of the business, return on capital employed (ROCE) have been taken.

An attempt has been made to examine combined impact of liquidity indicators on profitability through the sophisticated statistical techniques. Accordingly, multiple correlation and multiple regression techniques have been applied to study the joint influence of the selected ratios indicating company's liquidity position and performance on the profitability and the regression coefficients have been tested with the help of the most popular 't' test. In this study, CR, LR, ALR, DER, AOI, AOD and AOC have been taken as the independent variables and ROCE has been used as the dependent variable. The regression model used in this analysis is ROCE = a + b_1CR + b_2 LR + b_3 ALR + b_4 DER + b_5 AOI + b_6 AOD + b_7 AOC where a, b_1, b_2, b_3, b_4 b_5, b_6 and b_7 are the parameters of the ROCE line.

An extreme variation could be explained as the effect of change in demand, pricing policy, environment, etc. which have not been explained in the study, in addition to the effect of the variables considered in the study.

An assessment of liquidity-profitability relation on the basis of multiple correlation, multiple regression analysis and co-efficient of determination of the selected companies under the study is given below company-wise.

Joint Impact of Liquidity Indicators on Profitability of Bhushan Steel Ltd.

Results of Multiple correlations and multiple regression analysis of Bhushan Steel Ltd. have been shown in Table 1.

Table 1: Multiple Correlations and Multiple Regression Analysis of Bhushan Steel Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	17.728	43.088	0.411	0.752	R = 0.963
CR	0.485	7.656	0.063	0.960	
LR	14.736	11.990	1.229	0.435	R^2=0.926
ALR	(-) 106.605	104.413	(-) 1.051	0.484	
DER	(-) 1.893	9.983	(-) 0.190	0.881	Adj.R^2=0.411
AOI	(-) 0.222	0.599	(-) 0.370	0.774	
AOD	(-) 0.151	0.125	(-) 1.212	0.439	Std. Error of
AOC	0.184	0.307	0.598	0.657	the R=1.81471

Table 1 explains the strength of relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability. It was observed that increase in CR by one unit; the ROCE increased by 0.485 units that were statistically significant at 1 per cent level. When LR increased by one unit, the ROCE increased by 14.736 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company decreased by 106.605 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 1.893 units though the influence of DER on ROCE was very significant. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE decreased by 0.222 units and 0.151 units in case of AOI and AOD and increased by 0.184 units in case of AOC respectively which was statistically at 1 per cent level.

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.963.

It indicates that the profitability was highly responded by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 92.60 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of Ispat Industries Ltd.

Result of the multiple correlations and multiple regression analysis of Ispat Industries Ltd have been tabulated in Table 2.

Table 2 depicts the relationship might between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability. It was observed that increase in CR by one unit, the ROCE increased by 20.23 units that was statistically significant at 1 per cent level. For one unit increase in LR, the profitability of the company decreased by 27.348 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company decreased by 20.091 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 0.103 units though the influence of DER on ROCE was very significant. Again, when three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE increased by 0.117 units and 0.032 units in case of AOI and AOC and decreased by 0.123 units in case of AOD retrospectively which was statistically significant at 1 per cent level.

Table 2: Multiple Correlation and Multiple Regression Analysis of Ispat Inds Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	(-) 5.034	14.422	(-) 0.349	0.786	R = 0.974
CR	20.233	32.873	0.615	0.649	
LR	(-) 27.348	62.416	(-) 0.438	0.737	R^2= 0.948
ALR	(-) 20.091	22.464	(-) 0.894	0.535	
DER	(-) 0.103	0.448	(-) 0.229	0.857	Adj.R^2=0.411
AOI	(-) 0.117	0.421	0.278	0.827	
AOD	(-) 0.123	0.172	(-) 0.715	0.605	Std. Error of
AOC	0.032	0.105	0.310	0.809	the R=3.31384

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.974. It indicates that the profitability was almost perfectly influenced by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 94.8 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of J S W Steel Ltd.

Result of the multiple correlations and multiple regression analysis of JSW Steel Ltd. have been depicted in Table 3.

The relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability, which is shown in Table 3. It was observed that increase in CR by one unit; the ROCE increased by 10.367 units that were statistically significant at 1 per cent level. For one unit increase in LR, the profitability of the company decreased by 49.069 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company decreased by 20.850 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 0.625 units, which was statistically significant at 1 per cent level. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE decreased by 1.187 units, 0.001 units and 0.031 units respectively, which was statistically at 1 per cent level.

Table 3: Multiple Correlations and Multiple Regression Analysis of JSW Steel Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	37.107	79.234	0.754	0.589	R = 0.939
CR	10.367	31.431	0.330	0.797	
LR	(-) 49.069	93.699	(-) 0.524	0.693	R^2= 0.882
ALR	(-) 20.850	376.204	(-) 0.055	0.965	
DER	(-) 0.625	0.894	(-) 0.699	0.612	Adj.R^2=0.056
AOI	(-) 1.187	1.498	(-) 0.792	0.574	
AOD	(-) 0.001	0.002	(-) 0.398	0.759	Std. Error of
AOC	(-) 0.031	0.074	(-) 0.424	0.745	the R=10.9500

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.939. It indicates that the profitability was perfectly responded by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 88.2 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of Kalyani Steel Ltd.

Multiple correlations and multiple regression analysis of Kalyani Steel Ltd. have been tabulated in Table 4.

Table 4, clears the strength of relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability. It was observed that increase in CR by one unit; the ROCE decreased by 26.881

units that were statistically significant at 1 per cent level. When LR increased by one unit, the ROCE decreased by 2.707 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company increased by 18.372 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 30.286 units though the influence of DER on ROCE was very significant. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE decreased by 0.135 units and 0.113 units in case of AOI and AOD and increased by 0.161 units in case of AOC respectively which was statistically at 1 per cent level.

Table 4: Multiple Correlations and Multiple Regression Analysis of Kalyani Steel Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	63.387	102.271	0.620	0.647	R = 0.948
CR	(-) 26.881	23.150	(-) 1.161	0.453	
LR	(-) 2.707	95.079	(-) 0.028	0.982	R^2= 0.898
ALR	18.372	120.531	0.152	0.904	
DER	(-) 30.286	51.328	(-) 0.590	0.661	Adj.R^2=0.183
AOI	(-) 0.135	2.244	(-) 0.060	0.962	
AOD	(-) 0.113	0.289	(-) 0.391	0.763	Std. Error of
AOC	0.161	0.125	1.291	0.420	the R=7.68674

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.948. It indicates that the profitability was highly responded by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 89.80 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of Lloyds Steel Inds Ltd.

Result of the multiple correlations and multiple regression analysis of Lloyds Steel Inds Ltd. have been depicted in Table 5.

Table 5: Multiple Correlations and Multiple Regression Analysis of Lloyds Steel Inds Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	274.092	575.876	0.476	0.717	R = 0.814
CR	(-) 588.346	1336.659	(-) 0.440	0.736	
LR	881.221	2346.157	0.376	0.771	R^2= 0.662
ALR	5803.831	9840.534	0.590	0.661	
DER	22.861	44.725	0.511	0.699	Adj.R^2=(-)1.701
AOI	(-) 24.842	44.579	(-) 0.557	0.676	
AOD	(-) 0.077	0.326	(-) 0.237	0.852	Std. Error of
AOC	0.180	0.726	0.248	0.845	the R=24.42945

Table 5 shows the strength of relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability. It was observed that CR increase by one unit; the ROCE decreased by 588.346 units that were statistically significant at 1 per cent level. When LR increased by one unit, the ROCE increased by 881.221 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, 5803.831 units also increase the ROCE of the company though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, 22.861 units also increase the ROCE of the company though the influence of DER on ROCE was very significant. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE decreased by 24.842 units and 0.077 units in case of AOI and AOD and increased by 0.180 units in case of AOC respectively which was statistically at 1 per cent level.

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.814. It indicates that the profitability was almost perfectly influenced by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 66.2 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of Mahindra Ugine Steel Co Ltd.

Result of the multiple correlation and multiple regression analysis of Mahindra Ugine Steel Co Ltd. have been tabulated in Table 6.

Table 6: Multiple Correlations and Multiple Regression Analysis of Mahindra Ugine Steel Co Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	106.861	82.843	1.290	0.420	R = 0.9984
CR	(-) 6.740	42.593	(-) 0.158	0.900	
LR	108.121	43.458	2.488	0.243	R^2= 0.995
ALR	(-) 307.929	267.118	(-) 1.153	0.455	
DER	(-) 21.118	11.857	(-) 1.781	0.326	Adj.R^2=0.962
AOI	(-) 1.703	0.903	(-) 1.886	0.310	
AOD	(-) 0.506	0.697	(-) 0.726	0.600	Std. Error of
AOC	(-) 0.530	0.322	(-) 1.649	0.347	the R=5.25658

Table 6 shows the strength of relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability. It was observed that increase in CR by one unit; the ROCE decreased by 6.740 units that were statistically significant at 1 per cent level. When LR increased by one unit, the ROCE increased by 108.121 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company decreased by 307.929 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 21.118 units though the influence of DER on ROCE was very significant. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE decreased by 1.703 units, 0.506 units and 0.530 units respectively, which was statistically at 1 per cent level.

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.998. It indicates that the profitability was highly responded by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 99.5 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Joint Impact of Liquidity Indicators on Profitability of Tata Steel Ltd.

Result of the multiple correlations and multiple regression analysis of Tata Steel Ltd. have been tabulated in Table 7.

Table 7: Multiple Correlation and Multiple Regression Analysis of Tata Steel Ltd.

Details	a/b i	Std. Error	t value	Significance	
Constant	368.747	56.443	6.553	0.097	R = 0.999
CR	55.506	25.772	2.154	0.277	
LR	(-) 230.482	83.460	(-) 2.762	0.221	R^2= 0.998
ALR	40.476	47.959	0.844	0.554	
DER	(-) 94.083	16.771	(-) 5.610	0.112	Adj.R^2=0.985
AOI	3.143	0.666	4.717	0.133	
AOD	1.066	0.394	2.709	0.225	Std. Error of
AOC	(-) 4.017	0.722	(-) 5.565	0.113	the R=2.55793

The strength of the relationship between the dependent variable, ROCE and all the independent variables taken together and the impact of these independent variables on the profitability are given in Table 7. It was observed from the above that an increase in CR by one unit; the ROCE increased by 55.506 units that were statistically significant at 1 per cent level. When LR increased by one unit, the ROCE decreased by 230.482 units, which was statistically significant at 1 per cent level. However, when ALR increased by one unit, the ROCE of the company increased by 40.476 units though the influence of ALR on ROCE was very significant. However, when DER increased by one unit, the ROCE of the company decreased by 94.083 units though the influence of DER on ROCE was very significant. Again, three important indicators of liquidity, AOI, AOD and AOC, increased by one unit, ROCE increased by 3.143 units and 1.066 units in case of AOI and AOD and decreased by 4.017 units in case of AOC respectively which was statistically at 1 per cent level.

The Multiple correlation coefficients between the dependent variable ROCE and the independent variables CR, LR, ALR, DER, AOI, AOD and AOC taken together were 0.999. It indicates that the profitability was highly responded by its CR, LR, ALR, DER, AOI, AOD and AOC. It is also evident from the value of R^2 that 99.8 per cent of variation in ROCE was accounted by the joint variation in CR, LR, ALR, DER, AOI, AOD and AOC.

Conclusions of the Study

On the basis of above findings, it is observed that

Higher degree of multiple correlations implying the presence of some explained variables that have led to lower profitability over and above lower liquidity, are in action for all the companies under study. To remove such problems, internal

intervention, specifically working capital investment in terms of short-term liquidity is to be improved.

Appropriate symphony of working capital components should always be maintained in which profitability are not affected. It should be prepared through global steel indexes.

Care should be given to improvement of profitability of the company so that the management of the companies should maintain appropriate level of inventory, receivables and cash.

Proper planning and control of cash should improve cash management performance.

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