

**Working Capital Management: A Comparative Study between Public and Private Sector Crude Oil and
Natural Gas Companies in India**

Palash Bandyopadhyay
Assistant Professor, Department of Commerce
Azad Hind Fouz Mahavidyalaya, Howrah, India
&
Amalendu Bhunia
Professor, Department of Commerce
University of Kalyani, Bengal, India

Abstract

This study investigates the working capital management of public sector and private sector crude oil and natural gas companies in India based on ratio data for the period from 1994-2013 using descriptive statistics, correlations and linear regression methods. Working capital position in terms of liquidity is unsatisfactory in case of both the public and private sector companies under study. Again, inventory management and payable management of private companies are more satisfactory than public sector companies under study but receivables management of public sector companies are satisfactory than private sector companies in India. Linear regression test results show that cash position ratio, debt-equity ratio, stock turnover ratio, debtors' turnover ratio and creditors' turnover ratio have been positively significantly influenced the profitability of public sector companies but cash position ratio, debt-equity ratio and stock turnover ratio have been significantly influenced the profitability of private sector companies under study.

Keywords: working capital management, oil and gas companies, India, public sector, private sector, descriptive statistics, linear regression.

1. Introduction

Crude oil and natural gas plays an important role on the performance of Indian economy. Civilization and urbanisation has a positive relationship with the consumption of crude oil and natural gas. India has rapid growth in terms of civilisation and urbanisation which resulted in increase in demand of crude oil and natural gas. The production of crude oil and natural gas is not capable of meeting the demand in India over the years. As a result India has to depend much on import of crude oil and natural gas which negatively affect the foreign exchequer. Crude oil and natural gas price is fixed by the government mainly on the basis of international market price. The performance of crude oil and natural gas companies in India is not up to the mark. The one of the reason of poor performance is under utilisation of production capacity, which has been observed during the last twenty years for both public and private sector crude oil and natural gas companies in India. The working capital is accountable for under utilisation of production capacity. Working capital plays an important role in the triumphant performance of a business firm. A firm should make sure that it does not undergo from insufficiency of working capital or surplus liquidity to meet up its short-run needs (Bhunia, 2007; Bhunia et al. 2011). Keeping in view of this, the present study compares the working capital management public and private sector crude oil and natural gas companies in India.

2. Literature Review

This section deals with literature review of the different work done by different authors in the field of working capital management. Rafuse (1996) suggested that companies should focus on inventory management strategies based on "lean supply-chain" techniques. Ghosh and Maji (2003) examined the efficiency of working capital management of Indian cement companies for twelve years from 1993 to 2002 using working capital management ratios. They found that some of the sample firms successfully improved efficiency during these years. Sur (2006) examined the efficiency of the working capital management in the National Thermal Power Corporation, and exhibited that the company achieved a higher level of efficiency in managing its working capital during the post-liberalization era by adapting itself to the new environment which had emanated from liberalization, globalization and competitiveness. Garcia-Teruel et al. (2007) tested the effects of working capital management on SME profitability using the panel data of 8872 small to medium-sized enterprises for a period of seven years from 1996 to 2002. They concluded that managers could create value by reducing their inventories and the number of days for which their accounts are outstanding. Moreover, shortening the cash conversion cycle also improves the firms' profitability. Singh (2008) found that the size of inventory directly has an impact on working capital and its management. He pointed out that inventory was the major component of working capital and needed to be carefully controlled. Singh and Pandey (2008) suggested that the management of working capital is essential as it has a direct impact on profitability and liquidity. They stated that there was significant impact of working capital management on profitability for Hindalco Industries Limited. Wolf (2009) investigated the effects of ownership in terms of performance and efficiency on 1001 national oil companies and privately owned international oil companies for a period from 1987 to 2006, taking secondary data using panel data regression analysis. He concluded that national oil companies significantly underperform the private sector in terms of efficiency and profitability. Bhunia (2010) examined the overall efficiency of the management of the working capital of selected four private sector steel companies, using secondary data obtained from the audited balance sheet and profit and loss accounts for a period of nine years from 1997-98 to 2005-06 using different statistical tools. He concluded that inventory management of all companies under study was unsatisfactory, receivable management was also unsatisfactory for all except Lloyds Steel Industries Ltd. and Kalyani Steel and JSW Steel Ltd. Payable management is unsatisfactory for all except one company; cash management performance is week in case of Kalyani Steel Ltd. and JSW Steel Ltd. At the same time there existed a relationship between liquidity and profitability indicators. Mittal et al. (2010) studied the examined the trends in working capital management of the cement industry in India. He studied a sample of two companies namely Gujarat Ambuja Cements Ltd and Associated Cement

Companies Limited considered the market leaders and principal competitors for the period from 2006 to 2009 using secondary data that was collected from the company balance sheets to understand the size of the working capital in the cement industry in India and find trends in the working capital management in the industry. They concluded that there was an insignificant relation between the sizes of the working capital of the firms. Singh and Bansal (2010) examined the working capital management based on secondary data of the IFFCO and KRIBHCO using financial ratio analysis, t-test and working capital cycle analysis etc. They concluded that all the sectors should ponder on their liquidity and proper utilization of working capital and contemplate working capital management, achievements, profitability appraised. Manjhi and Kulkarni (2012) investigated the working capital position of five selected textile companies of Gujarat for a period of eleven years with the help of ratio analysis, descriptive statistics etc. The study demonstrated that all the companies under the study working capital position and company's financial performance are good as well as efficient. Tayyaba and Khushbakht (2013) analyzed the impact of leverage on profitability on selected 25 oil and gas companies using secondary panel data taken from different websites for a period of six years from 2007 to 2012 using different statistical tools. It is concluded that degree of financial leverage and return on asset have positive relationship while degree of operating leverage and return on asset have inverse relationship. Arora (2013) made an attempt to show the impact of negative working capital on profitability of Hindustan Unilever Ltd. from 2007 to 2012. He concluded that even with the negative working capital the company's sales, net profit and operating profit had shown positive growth which indicate that company had done well and profitability was not adversely affected by the negative capital. From the above literatures it was observed that no such had been done to compare the working capital position of public and private sector crude oil and natural gas companies in India.

2.1 Objectives of the study

This study examines the following issues:

- (i) To compare the liquidity position between public and private crude oil and natural gas companies;
- (ii) To compare the liquidity-profitability relationship between public and private crude oil and natural gas companies.

2.2 Hypotheses taken

The present study considers the following research hypotheses:

H₁: liquidity position and its management are very much satisfactory for public sector and private sector crude oil and natural gas companies in India.

H₂: liquidity and profitability are associated more significantly for public companies.

3. Data and Methodology

This study purposively selects three public and three private crude oil and natural gas companies in India. These are Hindustan Oil Exploration Company Ltd (HOECL), Oil and Natural Gas Corporation Videsh Ltd (ONGCVL), Oil and Natural Gas Corporation Limited (ONGCL), Oil India Limited (OIL), Selan Ltd (SETL) and Tata Petrodyne Ltd. (TPL). This study is conducted by considering eight financial ratios using secondary data collected from Centre for Monitoring Indian Economy prowess database. These ratios are current ratio (CR), quick ratio (QR), cash position ratio (CPR), debt-equity ratio (DER), stock turnover ratio (STR), debtors turnover ratio (DTR), creditor turnover ratio (CTR) and return on capital employed (ROCE). Out of these, return on capital employed has been used as profitability ratio, which is a dependent variable and other seven financial ratios have been used as liquidity ratios which are independent variables. The study has been considered for 20 years between 1994 and 2013. Twenty years has been taken with the intention that this research work is significant in highlighting the awareness on the constitutional changes in crude oil and gas price. The study used descriptive statistics to judge the liquidity position. To test the hypotheses, t-test has been utilised in this study. Correlation statistics and multiple regressions have been used to observe the relationship between liquidity and profitability.

4. Empirical Results and Analysis

4.1 Descriptive Statistics based on Current Ratio

Current ratio is an assessment of overall liquidity and is basically used to make the interpretation of liquidity of firm in the short-run. A relatively high current ratio is a pointer that the firm has huge liquidity and has the ability to pay the matured obligation in time. Table 1 shows the comparative descriptive statistics of current ratio of public and private sector crude oil and natural gas companies in India.

Table - 1: Descriptive Statistics based on Current Ratio

	Public Sector	Private Sector	Industry Average
Mean	1.96	2.08	2.10
Maximum	4.57	3.66	3.38
Minimum	1.11	1.05	1.17
Std. Dev.	1.05	0.76	0.70
C. V. (%)	53.57	36.54	33.33

Mean of public sector companies as whole under study is not satisfactory as its average are 1.96 which is lower than grand industry average (2.10) that is taken as benchmark. On the other hand almost satisfactory current ratio is seen in case of selected private sector companies as the mean of current ratio of those companies are near about to (2.08) the grand industry average under study. It means private companies are in a position to meet their current obligation in time rather than public sector companies. Coefficient of variation of current ratio of industry as a whole is 33.33%. Coefficient of variation of current ratio is 36.54% in case of private companies and it is 53.57% in case of public companies under the study and both are higher than grand industry average.

4.2 Descriptive Statistics based on Quick Ratio

Quick ratio is more specific test of liquidity than current ratio. A high Quick ratio is an indication that the company has liquidity and ability to meet its current liabilities in time. But a low quick ratio represents that liquidity position of the company is not good. Comparative descriptive statistics based on quick ratio of selected public and private sector crude oil and natural gas companies under the study is portrayed in table 2.

Table - 2: Descriptive Statistics based on Quick Ratio

	Public Sector	Private Sector	Industry Average
Mean	1.66	1.84	2.00
Maximum	3.44	3.41	3.59
Minimum	1.03	0.84	1.07
Std. Dev.	0.75	0.75	0.79
C. V. (%)	45.18	40.76	39.50

Mean of both public and private sector companies are unsatisfactory as their averages are 1.66 and 1.84 respectively, which are lower than grand industry average (2.00), taken as yardstick. It confirms that the general liquidity position is poor and they have not capable to meet up their liquidity obligations in time under study. Coefficient of variation of quick ratios of public (45.18%) and private companies (40.76%) are more than grand industry average (39.50%), which exhibits less reliability in the matter of working capital management.

4.3 Descriptive Statistics based on Cash Position Ratio

Cash and cash equivalent is the most liquid asset. Cash position ratio is further perfect analysis of liquidity than current and quick ratio. It is meticulous as most useful indicator to test the unconditional liquidity position of any organisation. In determining the cash, inventories and accounts receivable are deducted from current assets. This ratio of selected public and private sector crude oil and natural gas

companies is shown in table 3.

Table - 3: Descriptive Statistics based on Cash Position Ratio

	Public Sector	Private Sector	Industry Average
Mean	0.98	1.23	1.33
Maximum	2.89	2.86	3.17
Minimum	0.22	0.36	0.48
Std. Dev.	0.61	0.64	0.78
C. V. (%)	62.24	52.03	58.65

Mean of cash position ratios of public and private companies are 0.98 and 1.23 respectively, which is lower than grand industry average (1.33), taken as standard. It confirms that the liquidity position is poor and they have not capable to meet up their liquid obligations in time under study. Coefficient of variation of cash position ratio of industry as a whole is 58.65%. Coefficient of variation of cash position ratio is 52.03% in case of private companies that is less than grand industry average. It means private companies are more reliable in terms of working capital management. It indicates that liquidity management of private companies are efficient. But coefficient of variation of cash position ratio is more than grand industry average of for public companies under study, that is, 62.24%, which exhibits less reliability in the matter of liquidity management.

4.4 Descriptive Statistics based on Debt-Equity Ratios

Short-term debt-equity ratio is an indicator of liquidity position and also important for reliability of financial position as well as financial policies in a short period of the firm. It is measures the direct proportion of debt capital to equity capital. It is a proportion of outside liabilities and tangible net worth relating to short period of the company. It also indicates the proportion of owners' stake in the business. Debt-equity ratios of selected public and private sector crude oil and natural gas companies are shown in table 4.

Table - 4: Descriptive Statistics based on Debt-Equity Ratio

	Public Sector	Private Sector	Industry Average
Mean	3.13	0.21	1.01
Maximum	12.26	0.44	3.59
Minimum	0.03	0.12	0.01
Std. Dev.	3.80	1.00	1.16
C. V. (%)	121.41	476.19	114.85

Table 4 shows that debt-equity ratio of public companies is 3.13, which is much higher than the 1.01 grand industry average, which is taken as benchmark. This indicates the company is able to meet its matured current obligations in every year under the study period. Again, a very lower debt-equity ratio is found in case of private companies (0.21) under the study than industry average throughout the study period. This shows an unfavourable condition to pay their matured obligations in time. Coefficient of variation of debt-equity ratio of public and private companies under study is 121.41% and 476.19% respectively, which is higher than Industry average (114.85). It indicates that these companies depend not only upon short-term sources but also very much dependent on the long-term sources.

4.5 Descriptive Statistics based on Stock Turnover Ratio

Stock turnover ratio establishes the relationship between the costs of goods sold and average stock. This ratio indicates the velocity of conversion of stock into sales. Usually, a high inventory turnover indicates efficient management of inventory because more frequently the stock is sold, the less amount of money is needed to finance inventory. A low inventory turnover ratio shows inefficient management of inventory, over investment in inventories, slow business, and poor quality of goods that lead to lower profit as compared to total investment. The stock turnover ratio of selected crude oil and natural gas

companies is shown in table 5.

Table - 5: Descriptive Statistics based on Stock Turnover Ratio

	Public Sector	Private Sector	Industry Average
Mean	204.58	24.64	105.78
Maximum	777.38	39.33	407.03
Minimum	63.91	12.10	35.4
Std. Dev.	241.26	8.49	116.18
C. V. (%)	117.93	34.46	109.83

Table 5 shows a satisfactory result for public companies as mean value (204.58) which is much higher than grand industry average (105.78) taken as standard. It signifies that public companies are in a position to convert stock into sales much quicker than other companies in the industry. But the mean value of private companies is 24.64, which is much lower than the grand industry average. It signifies that conversion of stock into sales is not satisfactory for these companies. So public companies' conversion of stock into sales are much satisfactory than private companies. But on the other hand the co-efficient of variation for private companies (34.46%) is much lowering than grand industry average (109.83%) taken as benchmark. It means the lower variation and higher consistency in inventory management. Whereas in case of public companies it is little higher than industry average, it means higher variability and lower consistency in inventory management. So it can be said that inventory management is better in case of private companies than public companies.

4.6 Descriptive Statistics based on Debtors' Turnover Ratios

Trade debtors are expected to be converted into cash within a short period time. Hence, the liquidity position of concern to pay its short term liabilities in time depends upon the quality of its trade debtors. It indicates the rate at which debtors are converted to cash, helps in formulating the credit policy by indicating whether investment in debtors is within limits, and indicates if capital is blocked in slow paying debtors. A high DTR indicates a moderate credit policy, over investment in debtors or slow paying debtors. However it may also result in higher sales. The higher the value of debtors' turnover the more efficient is the management of debtors or more liquid the debtors are. Similarly, low debtors' turnover ratio implies inefficient management of debtors or less liquid debtors. It is the reliable measure of the time of cash flow from credit sales. Debtors' turnover ratio of the selected public and private companies under the study is shown in the following table 6.

Table - 6: Descriptive Statistics based on Debtors Turnover Ratio

	Public Sector	Private Sector	Industry Average
Mean	8.00	8.52	7.6
Maximum	14.93	53.01	28.99
Minimum	2.78	2.1	2.47
Std. Dev.	3.87	10.76	5.53
C. V. (%)	48.38	126.29	72.76

Table 6 illustrates that DTR is satisfactory for both public (8.00) and private companies (8.52) taken together as the mean value is higher than the grand industry average (7.6). It means debtors are converted into cash quicker than other companies in the industry. But private companies are more efficient than public companies in terms of conversion of debtors into cash. On the other hand co-efficient variation of private companies (126.29%) is higher than industry average (72.73). It illustrates less variability and inefficient management of debtors. But in case of public companies (48.38%) it is lower than industry average; it means lower variability and efficient management of debtors. That illustrates, public companies are more efficient in managing debtors.

6.1.7 Descriptive Statistics based on Creditors’ Turnover Ratios

Creditors’ turnover ratio is an indication of efficiency of the credit and payment policy of the company and liquidity position directly depends on this period. Higher the credit payment period the longer is the age of creditors as well as better is the management of liquidity whereas shorter the age of creditors shows inefficient and poor payment policy that is accountable to decrease current liabilities (credit) burden and suffering condition of liquidity position. Creditors’ turnover ratio of selected public and private crude oil and natural gas companies in India under the study is furnished in table 7.

Table - 7: Descriptive Statistics based on Creditors Turnover Ratio

	Public Sector	Private Sector	Industry Average
Mean	5.75	2.48	4.56
Maximum	16.66	5.50	12.28
Minimum	2.47	0.55	1.5
Std. Dev.	3.42	1.09	2.33
C. V. (%)	59.48	43.95	51.10

Table 7 illustrates that CTR is satisfactory for public companies (5.75) under study as the mean value is higher than the grand industry average (4.56). It means creditors are paid slower than other companies under the study. But in case of private companies (2.48) under study it is lower than industry average. It signifies an unsatisfactory creditors’ turnover. So public companies are better than private companies in terms of creditors’ turnover. On the other hand co-efficient variation of public companies (59.48%) under study is higher than industry average (51.10%). It illustrates less high variability and inefficient management of creditors. But only in case of private companies under study (43.95%) it is lower than industry average, it means lower variability and efficient management of creditors. So it can be said that private companies are more efficient in managing their creditors than public companies.

4.2 Relationship between working capital management indicators and profitability based on correlation statistics

Generally, correlation analysis attempts to determine the degree and direction of relationship between two variables under study. The co-efficient of correlation is denoted by ‘r’.

The correlation is studied using Karl Pearson’s correlation formula. $r = \frac{N \sum xy - (\sum x)(\sum y)}{\sqrt{(N \sum x^2 - (\sum x)^2)(N \sum y^2 - (\sum y)^2)}}$ (Karl Pearson’s correlation formula)

Correlation analysis is exercised to observe the association between working capital management and profitability. If resourceful management of working capital increases earning ability, this should anticipate a pessimistic connection between the measures of working capital management and earning ability or profitability indicator. Tables 8 and 9 demonstrate correlation coefficients result and p-values are listed in parenthesis.

4.2.1 Correlation statistics of public sector companies

Table 8 discloses that CR is meagrely positively (0.009) related with ROCE and quick ratio is also merely negatively (0.061) related with ROCE, both are statistically insignificant. However, CPR is meagrely positively connected (0.145) with probability that is also insignificant statistically. This indicates that three ratios are insufficiently influence the profitability. Over again, DER (0.326) is furthermore connected of lower positive correlation coefficient with profitability. This means that correlation statistics is hold up the expectancy that debt is linked with probability. In addition, correlation test results corroborate a low positive relationship among two efficiency ratios, that is, STR and CTR and profitability ratio (ROCE), which is statistically insignificant. But other efficiency ratio that is DTR is moderately related with profitability ratio (ROCE) and that is statistically significant at five percent level.

Table - 8: Correlations Test Result of Public Sector Companies

	CR	QR	CPR	DER	STR	DTR	CTR	ROCE
CR	1							
QR	.967(**)	1						
	.000							
CPR	.440	.565(**)	1					
	.052	.009						
DER	-.207	-.363	-.300	1				
	.381	.116	.198					
STR	-.352	-.295	.034	-.167	1			
	.128	.206	.888	.482				
DTR	-.493(*)	-.452(*)	.075	.009	.565(**)	1		
	.027	.045	.752	.970	.009			
CTR	.770(**)	.658(**)	-.043	.114	-.425	-.660(**)	1	
	.000	.002	.857	.633	.062	.002		
ROCE	.009	-.061	.145	.326	.182	.452(*)	.011	1
	.970	.798	.542	.161	.443	.046	.964	

4.2.2 Correlation statistics of private sector companies

Table 9 discloses that current ratio (0.099) and quick ratio (0.12) are meagrely negatively related with ROCE, which is statistically insignificant. At the same time CPR is also very meagrely negatively connected (0.029) with probability that is also insignificant statistically. This means the correlation statistics has hold up the belief that conventional liquidity ratios are insufficiently influence the profitability. Over again, DER (0.280) is furthermore connected of lower negative correlation coefficient with profitability. This means that correlation statistics is hold up the expectancy that debt is linked with probability. In addition, correlation test results corroborate a low negative relationship between STR (0.287) and profitability ratio (ROCE), which is statistically insignificant. But other two efficiency ratios that is DTR and CTR are very meagrely related with profitability ratio (ROCE) and they are statistically insignificant.

Table – 9: Correlations Test Results of Private Sector Companies

	CR	QR	CPR	DER	STR	DTR	CTR	ROCE
CR	1							
QR	.987(**)	1						
	.000							
CPR	.936(**)	.917(**)	1					
	.000	.000						
DER	.164	.182	.196	1				
	.489	.442	.408					
STR	-.208	-.189	-.376	-.159	1			
	.379	.424	.102	.502				
DTR	-.072	-.045	-.110	.456(*)	-.181	1		
	.764	.849	.645	.043	.445			
CTR	-.173	-.146	-.314	-.402	.459(*)	.055	1	
	.467	.540	.177	.079	.042	.818		
ROCE	-.099	-.120	-.029	-.280	-.287	.090	.021	1
	.678	.616	.904	.233	.220	.705	.929	

4.3 Linear regression analysis

Linear regression method has been applied to study the joint influence between working capital management and profitability. In this research work, working capital management indicators, that is, current ratio, quick ratio, cash position ratio, short-term debt-equity ratio, stock turnover ratio, debtors' turnover ratio and creditors' turnover ratio have been taken as independent variables and ROCE has been used as a dependent variable.

The linear regression model utilized in this investigation is: $ROCE = \epsilon + \beta_1 CR + \beta_2 QR + \beta_3 CPR + \beta_4 DER + \beta_5 STR + \beta_6 DTR + \beta_7 CTR + \epsilon_t$ (unexplained variables or error terms) Where ϵ , β_1 , β_2 , β_3 , β_4 , β_5 , β_6 and β_7 are the parameters of the ROCE line.

4.3.1 Linear regression test results of public sector companies

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 of public companies are given in tables 10 and 11.

Table - 10: Linear Regressions of Public Sector Companies

Model	Unstandardized Coefficients		t	Prob.	Collinearity Statistics
	B	Std. Error			VIF
(Constant)	-34.32	24.66	-1.39	0.19	
CR	16.61	23.60	.70	0.50	41.89
QR	-29.28	35.29	-0.83	0.42	47.66
CPR	12.85	11.48	1.12	0.29	3.30
DER	0.78	1.54	.50	0.62	2.33
STR	0.01	0.02	.03	0.97	1.60
DTR	3.37	1.53	2.20	0.05	2.40
CTR	2.89	2.79	1.04	0.32	6.21
R = 0.71	R ² = 0.51		Adjusted R ² = 0.22		F = 1.77
Std. Error of the Estimate = 16.69			Durbin-Watson = 2.35		p of F = 0.18

It was observed from the above that an increase in CR by one unit; the ROCE increased by 16.61 units that were statistically insignificant. When QR was increased by one unit, ROCE was decreased by 29.28 units that were also statistically insignificant. However, when CPR increased by one unit, the ROCE of the public companies are increased by 12.85 units, which was not statistically significant. When DER is increased by one unit, the ROCE of the company is also increased by 0.78 units, which was insignificant statistically. Again, three important indicators of efficiency, STR, DTR and CTR, increased by one unit, ROCE increased by 0.01, 3.37 and 2.89 units respectively DTR is statistically significant at 5 per cent level but STR and CTR are statistically insignificant. The multiple correlations among the dependent variable ROCE and the independent variables taken together were 0.71. It indicates that the profitability was strongly responded by its independent variables. It is also evident from the value of R² that 0.51 per cent of variation in ROCE was accounted by the joint variation in independent variables. Adjusted 'R'square (R²) signifies that 22 per cent of the positive variations in the ROCE are explained by the independent variable. Standard Error of regression coefficients (16.69) being high, demonstrates that there exists poor line of estimates among the variables. F value (1.77) indicates that the model is not perfectly fit and also the probability is more than 0.05. The VIF is too high in case of two independent variables CR and QR, which is an indication of multicollinearity problems. An insignificant variability in profitability could be the result of the composite effect adopted in the analysis as well as many other working capital management variables. But Durbin-Watson statistics (2.35) indicates that residuals are not serially

correlated. Table 10 reveals that multiple regression results between the dependent and independent variables has been unauthenticated because the result of tolerance and variance inflation factor cannot satisfy the model (even rule of thumb of statistics), that is, VIF value exceeds 5 (rule of thumb in statistics) or tolerance level of 0.20. However, first of all, we have removed CR and QR from the regression model and set a new model of linear regression. The new regression model used in this analysis is: $ROCE = \alpha + \beta_1 CPR + \beta_2 DER + \beta_3 STR + \beta_4 DTR + \beta_5 CTR + \epsilon_t$ Table 11 discloses that linear regression test results between the dependent and independent variables has been authenticated because the result of tolerance and variance inflation factor satisfy the model, that is, VIF value does not exceed 5 after excluding the variable CR and QR.

Table - 11: Linear Regressions of Public Sector Companies

Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics
	B	Std. Error			VIF
(Constant)	-47.42	17.92	-2.65	0.02	
CPR	6.50	6.36	1.02	0.02	1.12
DER	1.64	1.05	1.57	0.04	1.19
STR	0.01	0.02	.06	0.05	1.55
DTR	3.61	1.42	2.55	0.02	2.26
CTR	2.63	1.44	1.83	0.03	1.83
R = 0.69	R ² = 0.48		Adjusted R ² = 0.29		F = 2.58
Std. Error of the Estimate = 15.91			Durbin-Watson = 2.48		p of F = 0.03

The strength of the relationship between the dependent variable, ROCE and the independent variables taken together and the impact of these independent variables on the profitability are given in table 11. It was observed that an increase in CPR increased by one unit, the ROCE of the company increased by 6.5 units that were statistically insignificant. When DER is increased by one unit, the ROCE of the company is also increased by 1.64 units and statistically insignificant. Again, three important indicators of efficiency, STR, DTR and CTR, increased by one unit, ROCE increased by 0.01, 3.61 and 2.63 units respectively though STR and CTR were statistically insignificant but DTR was statistically significant at five percent level. The multiple correlations among the dependent variable ROCE and the independent variables taken together were 0.69. It indicates that the profitability was highly responded by its independent variables. It was also evident from the value of R² that 0.48 per cent of variation in ROCE was accounted by the joint variation in independent variables. Adjusted 'R'square (R²) signifies that 29 per cent variations in the ROCE are explained by the independent variables. Standard Error of regression coefficients being high (15.91), demonstrates that there does not exist really line of estimates among the variables. F value (2.58) indicates that the model is perfectly fit even the probability is more than 0.05. The VIF is below thumb rule in case all the variables, these indicate that there are no multicollinearity problems. An insignificant variability in profitability could be the result of the composite effect adopted in the analysis as well as many other liquidity management related unexplained variables. Also Durbin-Watson statistics (2.48) indicates that residuals are not serially correlated.

4.3.2 Linear regression test results of private sector companies

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 of private companies are given in tables 12 and 13.

Table - 12: Multiple Regressions of Private Sector Companies

Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics
	B	Std. Error			VIF
(Constant)	21.99	13.05	1.69	0.12	
CR	1.36	19.97	0.07	0.95	53.80
QR	-5.96	17.94	-0.33	0.75	42.61
CPR	4.86	11.69	0.42	0.69	13.05
DER	-36.99	28.57	-1.30	0.22	1.83
STR	-0.24	0.33	-0.72	0.48	1.86
DTR	0.21	0.25	0.83	0.42	1.70
CTR	0.03	2.56	0.01	0.99	1.83
R = 0.51	R ² = 0.26		Adjusted R ² = -0.18		F = 0.60
Std. Error of the Estimate = 9.01			Durbin-Watson = 1.39		p of F = 0.75

It was observed from the above that an increase in CR by one unit; the ROCE increased by 1.36 units that were statistically insignificant. When QR was increased by one unit, ROCE was decreased by 5.96 units that were also statistically insignificant. However, when CPR increased by one unit, the ROCE of the private companies are increased by 4.86 units, which was not statistically significant. When DER is increased by one unit, the ROCE of the company is decreased by 36.99 units, which was insignificant statistically. Again, three important indicators of efficiency, STR, DTR and CTR, increased by one unit, ROCE decreased by 0.24 and increased by 0.21 and 0.03 units respectively and all are statistically insignificant. The multiple correlations among the dependent variable ROCE and the independent variables taken together were 0.51. It indicates that the profitability was strongly responded by its independent variables. It is also evident from the value of R² that 0.26 per cent of variation in ROCE was accounted by the joint variation in independent variables. Adjusted 'R'square (R²) signifies that 18 per cent of the positive variations in the ROCE are explained by the independent variable. Standard Error of regression coefficients (9.01) being low, demonstrates that there exists strong line of estimates among the variables. F value (0.60) indicates that the model is not perfectly fit and also the probability is more than 0.05. The VIF is too high in case of two independent variables CR and QR, and slightly high for CPR, that is an indication of multicollinearity problems. An insignificant variability in profitability could be the result of the composite effect adopted in the analysis as well as many other liquidity management related unexplained variables. But Durbin-Watson statistics (2.35) indicates that residuals are not serially correlated. Table 12 reveals that multiple regression results between the dependent and independent variables has been unauthenticated because the result of tolerance and variance inflation factor cannot satisfy the model (even rule of thumb of statistics), that is, VIF value exceeds 5 (rule of thumb in statistics) or tolerance level of 0.20. However, first of all, we have removed CR and QR from the regression model and set a new model of linear regression. The new regression model used in this analysis is: $ROCE = \epsilon + \beta_1 CPR + \beta_2 DER + \beta_3 STR + \beta_4 DTR + \beta_5 CTR + \epsilon_t$ Table 13 discloses that multiple regression results between the dependent and independent variables has been authenticated because the result of tolerance and variance inflation factor satisfy the model, that is, VIF value does not exceed 3 after excluding the variable CR and QR.

Table - 13: Multiple Regressions of Private Sector Companies

Model	Unstandardized Coefficients		t	Sig.	Collinearity Statistics
	B	Std. Error			VIF
(Constant)	23.53	10.90	2.16	0.05	
CPR	-0.62	3.42	-0.18	0.01	1.30
DER	-37.56	26.56	-1.41	0.04	1.79
STR	-0.31	0.29	-1.08	0.03	1.58
DTR	0.18	0.23	0.78	0.45	1.63
CTR	-0.30	2.34	-0.13	0.90	1.74
R = 0.49	R ² = 0.24		Adjusted R ² = -0.04		F = 2.86
Std. Error of the Estimate = 8.47			Durbin-Watson = 1.56		p of F = 0.03

The strength of the relationship between the dependent variable, ROCE and the independent variables taken together and the impact of these independent variables on the profitability are given in table 13. It was observed that an increase in CPR increased by one unit, the ROCE of the company decreased by 0.62 units that were statistically insignificant. When DER is increased by one unit, the ROCE of the private company is also decreased by 37.56 units and statistically insignificant. Again, three important indicators of efficiency DTR, STR and CTR, increased by one unit, ROCE increased by 0.18 and decreased by 0.31 and 0.30 units respectively and all were statistically insignificant. The multiple correlations among the dependent variable ROCE and the independent variables taken together were 0.49. It indicates that the profitability was moderately responded by its independent variables. It was also evident from the value of R² that 0.24 per cent of variation in ROCE was accounted by the joint variation in independent variables. Adjusted 'R'square (R²) signifies that 4 percent negative variations in the ROCE are explained by the independent variables. Standard Error of regression coefficients being low (8.47), demonstrates that there exists really line of estimates among the variables. F value (0.86) indicates that the model is perfectly fit even the probability is more than 0.05. The VIF is below thumb rule in case all the variables, these indicate that there are no multicollinearity problems. An insignificant variability in profitability could be the result of the composite effect adopted in the analysis as well as many other liquidity management related unexplained variables. Also Durbin-Watson statistics (1.56) indicates that residuals are not serially correlated.

5. Conclusion

This study investigates the working capital management of public sector and private sector crude oil and natural gas companies in India. The primary findings of the study are that working capital position in terms of liquidity is unsatisfactory in case of both the public and private sector companies under study but liquidity management is slightly satisfactory in case of private sector companies under study. However, financial leverage position of private sector is satisfactory than public sector crude oil and natural gas companies in India. Again, inventory management and payable management of private companies are more satisfactory than public sector companies under study but receivables management of public sector companies are satisfactory than private sector companies in India. Correlation statistics illustrates that only debtors are significantly positively associated with profitability of public sector companies but working capital management indicators are not significantly associated with profitability of private sector companies under study. Linear regression test results show that cash position ratio, debt-equity ratio, stock turnover ratio, debtors' turnover ratio and creditors' turnover ratio have been positively significantly influenced the profitability of public sector companies but cash position ratio, debt-equity ratio and stock turnover ratio have been significantly influenced the profitability of private sector companies under study.

References

- Arora, A. K. (2013). Negative Working capital and its impact on profitability- A case study of Hindustan Unilever. *The Management Accountant*, 48(3), 308-312.
- Bhandari, A. K. and Maiti, P. (2007). Efficiency of Indian Manufacturing Firms: Oil and Petroleum Industry as a Case Study. *International Journal of Business and Economics*, 6(1), 71-88.
- Bhunia, A. (2007). Working Capital and Liquidity Management of Iron and Steel Enterprises in India: A Comparative Study between SAIL and TISCO. Unpublished UGC-Minor Research Project, Eastern Region, Kolkata, 3.
- Bhunia, A. (2010). Financial Performance of Indian Pharmaceutical Industry- A Case study; *Asian Journal of Management Research*, Review Article, 427-451.
- Bhunia, A., Khan, I.U. and Mukhuti, S. (2011). A Study of Managing Liquidity. *Journal of Management Research*, 3(2), 1-22.
- Bhunia, A. and Khan, I. U. (2011). Liquidity management efficiency of Indian Steel Companies (a Case Study). *Far East Journal of Psychology and Business*, 3(1), 3-13.
- Garcia-Teruel, P. J., & Martínez-Solano, P. (2007). Effects of working capital management on SME profitability, *International Journal of Managerial Finance*, 3(2), 164-177.
- Govindarajan, A and Thamilselvan, R. (2013). A Study on Financial Performance of A Public Sector Undertaking with Special reference to Neyveli Lignite Corporation Ltd.- Neyveli, Tamilnadu; *Indian Journal of Research*, 2(11), 211-213.
- Ibe, S. O. (2013). The Impact of Liquidity Management on the Profitability of Banks in Nigeria; *Journal of Finance and Bank Management*, 1(1), 37-48.
- Karpagam, V., Selvam, M. and Babu, M. (2013). Impact of Ownership Structure on Corporate Performance with Special Reference to BSE Listed Companies. *International Journal of Accounting and Financial Management*, 3(1), 133-140.
- Kumara, M. and Abhilasha, N. (2015). A Critical Analysis of Financial Performance Evaluation of An Indian Automobile Companies. *International Journal of Research in Finance and Marketing*, 5(8), 96-106.
- Lazaridis, I., & Tryfonidis, D. (2006). Relationship between working capital management and profitability of listed companies in the Athens stock exchange. *Journal of Financial Management and Analysis*, 19(1), 26-35.
- Mathuva, D. (2009). The influence of working capital management components on corporate profitability: a survey on Kenyan listed firms. *Research Journal of Business Management*, 3, 1-11.
- Megaladevi, P. (2015). A study on financial performance analysis of the select Paper Company with special reference to Tamil Nadu Newsprint and papers limited. *International Journal of Recent Research Aspects*, 2(4), 22-24.
- Ongore, Vincent Okoth and Kusa, Gemechu Berhanu (2013). Determinants of Financial Performance of Commercial Banks in Kenya; *International Journal of Economics and Financial Issues*, 3(1), 237-252.
- Pimplapure, K. (2011). Working Capital Management: Impact of Profitability. *SCMS Journal of Indian Management*, 53-59.
- Rafuse, M.E. (1996). Working capital management: an urgent need to refocus, *Management Decision*, 34(2), 31-42.
- Salem, Q and Rehman, R.U. (2011). Impact of liquidity ratios on profitability (case of oil and gas compqnies of Pakistan). *Interdisciplinary Journal of research in business*, 1(7), 95-98.
- Singh, P. (2008). Inventory and Working Capital Management: An Empirical Analysis. *The ICAI University Journal of Accounting Research*, 35.
- Singh, J.P. and Pandey, S. (2008). Impact of Working Capital Management in the Profitability of Hindalco Industries Limited, *The ICAI University Journal of Financial Economics*, 36, 102-115.
- Srivastava, A. (2011). Ownership structure and Corporate Performance: Evidence from India. *International Journal of Humanities and Social Science*, 1(1), 23-29.
- Sur, D. (2006). Efficiency of Working Capital Management in Indian Public Enterprises during the Post-

liberalization Era: A Case Study of NTPC, The ICFAI Journal of Management Research, 34, 37-48.

Vijayakumar, A. and Jayachitra, S, (2014). An Empirical Study on Profitability Performance of Disinvested Central Public Sector Enterprises of Indian Manufacturing Sector. Zenith International Journal of Multidisciplinary Research, 4(12), 7-29.

Tayyaba, K. (2013). Leverage- Analysis and Its Impact on Profitability with Reference to Selected Oil and Gas Companies; International Journal of Business and Management Invention, 2(7), 50-59.

Wolf, C. (2009). Does ownership matter? The performance and Efficiency of State Oil Vs. Private Oil (1987-2006). Elsevier, Energy Policy, 37, 2642-2652.