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Econometric Study of Working Capital Management and Profitability of Firms

A Case of Auto Industry in India

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Abstract

The working capital is an important factor in determining the profitability of the company. The present study has made an attempt to analyze the relationship between working capital management and profitability of the selected automobile companies which forms the part of NSE Auto index. The impact of working capital management on firms' performance is than investigated using balanced panel data of manufacturing firms listed at the National Stock Exchange. In this study we studied the data from 2011 to 2014 we found a negative relationship between the different factors of Working Capital Management on the corporate profitability. We concluded that profitability can be enhanced if firms manage their working capital in efficient manner.

Keywords: Net operating profitability, working capital management, average collection period, inventory turnover, average payment period, cash conversion cycle, net trading cycle

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1. INTRODUCTION

Working capital is the like a lubricant in the business which ensure the smooth functioning of business. Excess and deficiency of working capital in firm both are problems in business. Seeing the importance of the working capital, we have chosen this topic. Further, the automotive industry plays pivotal role in country's rapid economic and industrial development. The automotive industry comprises of the automobile and the auto component sectors. The auto companies required capital both for long-term purposes and for short-term purposes. Long-term finance is used to buy land, buildings, machinery and so on. Short term finance is required to meet day to day financial needs such as raw material, salary, rent and so on. The short-term finance is known as working capital. The auto industry has a huge demand for the working capital and its management is a difficult task for any company. It starts from estimating working capital of a company and is a continuous process. A firm will be able to meet their short-term financial obligations only when it manages its working capital efficiently otherwise it may not able to meet their short-term financial obligations. It will affect the reputation of the company and profit will go down due to decrease in sales. There is a strong relationship between the profitability of firm and its working capital management. This paper is an attempt to study and analyse relationship between working capital management and profitability of the automobile companies which form the part of NSE Auto index.

2. REVIEW OF LITERATURE

For understanding the earlier studies on the working capital and profitability of firm, we have conducted a brief survey of earlier studies. Some of them are given below:

Smith and Begemann (1997) had evaluated the relationship between traditional and alternative working capital measures and return on investment of a firm and found strong relationship between the two. Shin and Soenen (1998) investigated the trade cycle which is used to measure efficiency of working capital management and profitability of firm. They found negative relationship between lengths of the firm's net trading Cycle and its profitability. Deloof (2003) found significant negative relationship operating cycle and operating income of Belgian firms. He suggested that profitability of firm can be increased by reducing time involve in accounts receivable and inventories. Ghosh and Maji (2003) examined working capital management of the Indian cement companies. Findings of the study indicated that the Indian Cement Industry as a whole did not perform remarkably well during their period of study. Eljelly (2004) explained that efficient liquidity management eliminates the risk of inability to meet short-term obligations and also avoid excessive investment in current assets. He also observed that the cash conversion cycle is an important measure of liquidity than the current ratio. Filbeck G. et al. (2005) found out that firms are able to decrease financing cost of a project by reducing the amount of funds allocated for current assets. He further observed that there is significant difference exist across industries in working capital measures across time. Lazaridis and Tryfonidis (2006) observed a significant relationship between profitability based on the different components of working capital and suggested that profitability can be increased by keeping each component of the conversion cycle at an optimal level. Garcia-Teruel and Martinez-Solano (2007) studied the effects of working capital management on SME profitability using the panel data. The results explained that value of firm can be increased by reducing holding period for inventories and reducing days for outstanding receivables and cash conversion cycle to improve profitability of firm. Raheman and Nasr (2007) investigated the effect of different variables of working capital management and found that there is negative relationship between working capital management and profitability of firm. They also indicated that size of the firm, measured by natural logarithm of sales, and profitability had a positive relationship. Singh and Pandey (2008) studied the impact of working capital management on profitability and found that working capital to total assets ratio had statistically significant impact on the profitability of firm. Falope and Ajilore (2009) found a negative relationship between net operating profitability and also found no significant variations in the effects of working capital management between

large and small firms. Mathuva (2009) examined the impact of different components of working capital management on profitability and found significant negative relationship between accounts collection period and profitability. However he observed a positive relationship between inventory conversion period and average payment period with profitability of firm. This means he is of the opinion that by reducing the cash conversion cycle profitability of firm can be increased. Afza and Nazir (2009) suggested that value of firm can be increased by adopting conservative approach towards working capital investment and its financing policies. Sen. M (2009) found a negative relationship among variables of working capital management and profitability. He uncovered the importance of finance director to increase productivity of firm.

The above literature review indicates that working capital management impacts on the profitability of the firm but there still is ambiguity regarding the appropriate variables that might serve as proxies for working capital management. The present study investigates the relationship between a set of such variables and the profitability of a sample of Indian Automotive firms.

3. RESEARCH METHODOLOGY

The impact of working capital management on profitability of auto sector firm is tested by panel data methodology. The panel data methodology used has certain benefits like using the assumption that firms are heterogeneous, more variability, less collinearity between variables, more informative data, more degree of freedom and more efficiency. The data used is secondary in nature and collected from the published sources such as company websites and reports.

Explained and Explanatory Variables

In order to find out the relationship between different variables, first Pearson Correlation Coefficients are calculated. The impact of working capital management on firms' performance is than investigated using balanced panel data of manufacturing firms listed at the National Stock Exchange. We develop an empirical framework. We specify our model as:

$$\rightarrow NOP_{it} = \beta_0 + \beta_1(WCM_{it}) + \beta_2(GWCTR_{it}) + \beta_3(CATAR_{it}) + \beta_4(CLTAR_{it}) + \beta_5 (CR_{it}) + \varepsilon_{it}$$

$$\rightarrow NOP_{it} = 0.7 - 0.136(53.857) + 0.822(7.932) + 0.78(0.3415) - 0.141(0.4262) - 0.115 (0.8991) + 0.19738$$

$$\rightarrow NOP_{it} = 0.7 - 7.3246 + 6.52 + 0.2664 - 0.0601 - 0.1034 + 0.1974$$

$$\rightarrow NOP_{it} = 0.1957$$

(β = Industrial Risk in the Indian Automotive Sector = 0.7)

The terms used in the models are important components of working capital management and impact the profitability of firms. Where, Net Operating Profitability is used as a measure of firm's performance and Working Capital Management used as a vector of Average Collection Period (ACP), Inventory Turnover in Days (ITID), Average Payment Period (APP), Cash Conversion Cycle (CCC) and Net Trading Cycle (NTC) of the firm. We expected that WCM has negative relationship with profitability of firm and if we reduce number of days in receivables, inventory and Cash Conversion Cycle and Average Payment Period is directly associated with profitability of firms. Other explanatory variables assumed to affect firm performance are Gross Working Capital Turnover Ratio, Current Assets to Total Assets Ratio and Current Liabilities to Total Assets Ratio are used to check the investing and financing policy of working capital management respectively. η_i measures the specific characteristics of each firm called unobservable heterogeneity, whereas λ_t is a parameter for time dummy variables, which is equal for all firms in each year but changes over time and ε is the error term.

4. DATA ANALYSIS AND RESULTS

Table (1) below explained that automotive firms have an average 8 days of Cash Conversion Cycle with standard deviation of 102 days. The firms have an Average Collection Period of 39 days, Inventory Turnover in Days of 78 days and Average Payment Period of 106 days. The sample firms have on average about 50% of the total assets in current form and sales growth of almost 17% annually while on average 62% of the assets are financed with debt.

The performance measure used in the analysis is Net Operating Profitability of the firms, which is on average 14% with a standard deviation of 0.12. The median values for almost all the variables are near to mean values except average collection and average payment periods. The performance measure used in the analysis is Net Operating Profitability of the firms, which is on average 20.5% with a standard deviation of 0.136. The median values for almost all the variables are near to mean values except average collection and average payment periods.

Table 1: Descriptive Statistics

Factors	N	Minimum	Maximum	Mean	Std. Deviation	Variance
NOP	10	.03	.46	.2050	.13476	.018
CR	10	.297	1.810	.89910	.512821	.263
ACP	10	7.55	526.62	106.4260	161.40957	26053.048
APP	10	6.081	429.384	113.69950	144.674343	20930.665
GWCTR	10	2.98	20.47	7.9320	5.59870	31.345
CATAR	10	.128	.747	.34150	.182528	.033
CLTAR	10	.283	.731	.42620	.139928	.020
ITID	10	.590	69.193	15.56110	19.951718	398.071
CCC	10	-210.838	211.174	8.28720	102.082492	10420.835
NTC	10	-185.16	258.00	25.3120	107.77733	11615.952
Valid N (listwise)	10					

CR – *Current Ratio*, **GWCTR** – *Gross Working Capital Turnover Ratio*, **ITID** – *Inventory Turnover in Days* **APP** – *Average Payment Period* **CATAR** – *Current Assets to Total Assets Ratio* **CLTAR** – *Current Liabilities to Total Assets Ratio* **CCC** – *Cash Conversion Cycle* **NTC** – *Net Trading Cycle*

Table 2: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.873[a]	.762	-1.145	.19738

a. Predictors: (Constant), NTC, ITID, CLTAR, APP, CATAR, GWCTR, CR, CCC

b. Dependent Variable: NOP

Table 3: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.124	8	.016	.399	.848[b]
	Residual	.039	1	.039		
	Total	.163	9			

a. Dependent Variable: NOP

b. Predictors: (Constant), NTC, ITID, CLTAR, APP, CATAR, GWCTR, CR, CCC

Table 4 : Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.200	.566		.354	.783		
	CR	-.030	.618	-.115	-.049	.969	.043	23.185
	GWCTR	.020	.074	.822	.268	.833	.025	39.374
	ITID	-.004	.019	-.559	-.195	.877	.029	34.450
	APP	.000	.001	-.176	-.224	.860	.384	2.604
	CATAR	.058	1.756	.078	.033	.979	.042	23.724
	CLTAR	-.136	2.316	-.141	-.059	.963	.041	24.257
	CCC	.001	.016	.750	.063	.960	.002	585.475
	NTC	-.001	.016	-.558	-.044	.972	.001	674.853

Dependent Variable: NOP

CR – *Current Ratio* **GWCTR** – *Gross Working Capital Turnover Ratio* **ITID** – *Inventory Turnover in Days* **APP** – *Average Payment Period* **CATAR** – *Current Assets to Total Assets Ratio* **CLTAR** – *Current Liabilities to Total Assets Ratio* **CCC** – *Cash Conversion Cycle* **NTC** – *Net Trading Cycle*

From the above table, it is evident that none of the variables are significant. The VIF values for all the variables are above 10 (except APP). This suggests a multicollinearity problem. So, we need to make changes in the model. Taking into consideration the Correlation from the Pearson Test (later in the report), changes were made to the model and the following result was obtained:

Table 5: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-.001	.163		-.004	.997		
	CR	.062	.098	.235	.630	.552	.359	2.785
	GWCTR	.022	.008	.924	2.676	.037	.420	2.378
	ITID	-.002	.002	-.251	-.955	.376	.724	1.380

a. Dependent Variable: NOP

The results in table 5 show that the Gross Working Capital Turnover Ratio (GWCTR) is significant i.e. it affects the Net Operating Profitability (NOP) of the firm and the VIF value is also below 10 which does not imply a multi collinearity problem.

Correlation matrix of all variables included in the analysis is presented in the following table, which is calculated based on data of the top 10 NSE firms. The table shows that Operating Profitability is negatively associated with measures of working capital management i.e. Average Collection Period, inventory turnover in days, Average Payment Period,

Cash Conversion Cycle and Net Trade Cycle. The correlation coefficients for all measures of working capital management are significant except for Cash Conversion Cycle. These results are consistent with the view that making payment to suppliers, collecting payments from customers earlier and keeping product or inventory in the stock for lesser time are associated with increase in profitability. A negative relation between Average Payment Period and Net Operating Profitability suggests that less profitable firms wait longer to pay their accounts payables. These three variables jointly form Cash Conversion Cycle and there exists negative relationship between CCC and operating profitability but it is not significant. It might not be a surprise because all the three components of CCC have negative association with the profitability and Average Payment Period is subtracted from sum of ACP and ITID to form Cash Conversion Cycle. Another measure of working capital management is the Net Trade Cycle, which has also a significant negative relationship with profitability. It implies that if a firm is able to reduce the Net Trade Cycle period, it can enhance the profitability for the firm and will ultimately create value for the shareholders.

Table 6: PEARSON'S Correlations Metrix

		NOP	CR	ACP	APP	GWCTR	CATAR	CLTAR	ITID	CCC	NTC
NOP	Pearson Correlation	1	-.325	-.129	-.074	.752*	-.286	.382	-.324	-.163	-.198
	Sig. (2-tailed)		.360	.723	.840	.012	.423	.275	.361	.653	.583
	N	10	10	10	10	10	10	10	10	10	10
CR	Pearson Correlation	-.325	1	.340	-.051	-.710*	.819**	-.509	-.382	.535	.690*
	Sig. (2-tailed)	.360		.337	.889	.021	.004	.133	.275	.111	.027
	N	10	10	10	10	10	10	10	10	10	10
ACP	Pearson Correlation	-.129	.340	1	.788**	-.301	.156	-.361	-.411	.384	.508
	Sig. (2-tailed)	.723	.337		.007	.398	.667	.306	.238	.274	.133
	N	10	10	10	10	10	10	10	10	10	10
APP	Pearson Correlation	-.074	-.051	.788**	1	-.051	-.188	-.244	-.434	-.255	-.122
	Sig. (2-tailed)	.840	.889	.007		.889	.604	.497	.211	.476	.738
	N	10	10	10	10	10	10	10	10	10	10
GWCTR	Pearson Correlation	.752*	-.710*	-.301	-.051	1	-.591	.659*	.019	-.401	-.518
	Sig. (2-tailed)	.012	.021	.398	.889		.072	.038	.959	.251	.125
	N	10	10	10	10	10	10	10	10	10	10

CATAR	Pearson Correlation	-.286	.819**	.156	-.188	-.591	1	-.061	-.289	.456	.590
	Sig. (2-tailed)	.423	.004	.667	.604	.072		.868	.419	.185	.073
	N	10	10	10	10	10	10	10	10	10	10
CLTAR	Pearson Correlation	.382	-.509	-.361	-.244	.659*	-.061	1	.243	-.177	-.275
	Sig. (2-tailed)	.275	.133	.306	.497	.038	.868		.498	.624	.441
	N	10	10	10	10	10	10	10	10	10	10
ITID	Pearson Correlation	-.324	-.382	-.411	-.434	.019	-.289	.243	1	.161	-.064
	Sig. (2-tailed)	.361	.275	.238	.211	.959	.419	.498		.658	.860
	N	10	10	10	10	10	10	10	10	10	10
CCC	Pearson Correlation	-.163	.535	.384	-.255	-.401	.456	-.177	.161	1	.964**
	Sig. (2-tailed)	.653	.111	.274	.476	.251	.185	.624	.658		.000
	N	10	10	10	10	10	10	10	10	10	10
NTC	Pearson Correlation	-.198	.690*	.508	-.122	-.518	.590	-.275	-.064	.964**	1
	Sig. (2-tailed)	.583	.027	.133	.738	.125	.073	.441	.860	.000	
	N	10	10	10	10	10	10	10	10	10	10

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Data reflects high correlations between different measures of working capital management. The correlation between Net Trade Cycle (NTC) and Cash Conversion Cycle (CCC) is (0.964), NTC and ITID is (-0.64), CCC and APP is (-0.255), CCC and ITID is (0.161), CCC and ACP (0.384) and (0.508) between NTC and ACP. This has been taken into account in the regression analysis to avoid multi-co linearity problem. The current liabilities to total assets ratio has a negative relationship with the operating profitability of the firm. One of the relationships between Current Ratio and Net Operating Profitability is contradictory to the traditional belief, which shows a positive association between Current Ratio and profitability.

5. CONCLUSION

Firms could achieve the optimality of working capital management by managing the trade-off between profitability and liquidity. In this study we found a negative relationship between the components of Working Capital Management including the ACP, CCC and NTC with profitability of firms. The negative relationship between NOP and CCC shows that longer the cash conversion cycle is, smaller is the profitability. Previous studies regarding the average days of accounts payable reported negative correlation of this variable and the profitability of the firm. However we have not found any statistically significant relationship between these variables. We found a significant positive relationship between Gross Working Capital Turnover Ratio (GWCTR)

and the Net Operating Profitability (NOP). These findings are in confirmation with (Deloof 2003), (Eljelly 2004), (Shin and Soenan 1998) who found a negative relationship between the measures of working capital management including the average collection period, average payment period and cash conversion cycle with corporate profitability.

Thus, the findings of this paper suggest that value for the shareholders can be increased by reducing the number of days for accounts receivables. In addition, the negative relationship between accounts receivables and firm's profitability suggest that less profitable firms will pursue a decrease of their accounts receivables in an attempt to reduce their cash gap in the cash conversion cycle. On the basis of findings of this paper, we also conclude that profitability can be enhanced if firms manage their working capital in a more efficient way. These results suggest that managers can create value for their shareholders by reducing the number of day's accounts receivable to a reasonable minimum. The negative relationship between accounts payable and profitability is consistent with the view that less profitable firms wait longer to pay their bills.

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Appendix : List of variables affecting working capital

Variable	Measurement	Abbreviation
Net Operating Profitability	(Earnings Before Interest and Taxes + Depreciation)/ Total Assets	NOP
Average Collecting Period	(Accounts Receivable*365)/Net Sales	ACP
Average Payment Period	(Accounts Payable*365)/Net Sales	APP
Inventory Turnover in Days	(Inventory*365)/Cost of Goods Sold	ITID
Cash Conversion Cycle	ACP + ITID – APP	CCC
Gross Working Capital Turnover Ratio	Net Sales/Current Assets	GWCTR
Current Assets to Total Assets Ratio	Current Assets/Total Assets	CATAR
Current Liabilities to Total Assets Ratio	Current Liabilities/Total Assets	CLTAR
Net Trading Cycle	ACP + (Inventory*365)/Net Sales – APP	NTC
Current Ratio	Current Assets/Current Liabilities	CR