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Effect of Working Capital Management on the Profitability of Indian Firms

Agrim Aggarwal[1], Rahul Chaudhary[2]
[1](Department of Electrical Engineering, Indian Institute of Technology, Delhi, India)
[2](Department of Electrical Engineering, Indian Institute of Technology, Delhi, India)

Abstract : *Working capital is an important component of the capital of a firm that helps to carry out the day-to-day activities. A well-managed working capital can help a firm to optimize itself. This study attempts to examine the effect of working capital on the profitability of Indian firms. A panel data of 364 companies listed on the Bombay Stock Exchange over a period of five years is obtained. The dependence of gross operating profit ratio on average inventory period, cash conversion cycle, debtors collection period and the creditors payment period is examined through linear regression model. The results suggest that quick cash conversion cycle, quick collection of accounts receivables and small inventory periods are favorable for earning higher profits. Also the type of industry affects the gross operating profits.*

Keywords: *Working capital management, cash conversion cycle, BSE 500*

I. Introduction

Corporate finance deals with mainly three aspects of financial decision making – capital budgeting, capital structure and working capital management. While the former two focus on financing and managing long-term investment decisions, the latter deals with the management of short-term capital requirements of the firm. Apart from the fixed assets such as land, machinery and other infrastructural requirements, a firm requires some current assets to carry out the day-to-day activities for proper functioning of the firm. The firm may also have some short-term external obligations to be met, known as the current liabilities. The surplus of current assets over current liabilities is called the working capital of the firm. Efficient working capital management is important for increased cash flows, and thus, reduce the dependence on external financing.

The working capital policies can depend on the size of the firm. Richard Burns and Joe Walker (1991)[14] analyzed the working capital policies and management of working capital components for small manufacturing firms in the US by collecting information from them through surveys and financial statements. Their research suggested that small firms differ from large firms in having a large component of the total assets as current assets. Secondly small firms depend more on the promoters for capital and managerial decision making and not depending much on formal financial theories. Grablowsky (1976)[24] has shown a positive significant relationship between various success measures and the employment of formal working capital policies.

The firms, depending on their size and nature may have varying requirements of working capital and accordingly different policies. A firm that produces goods may have to store the raw materials, the work-in-process goods and the finished goods temporarily before they can be moved to the next level of the operation cycle. If the production cycle is slow and the storage requirements of the firm are large, then it may require a large working capital for efficient functioning and vice versa. Having too high or too low a working capital may decrease the efficiency of the firm. If the firms invests too much in working capital than is necessary, then it may be left with little money to carry on the manufacturing activity resulting in low profits. This is a case of excessive liquidity. On the other hand if the company has very little working capital, then it may be unable to meet its short-term external obligations. It may have to liquidate its assets leading to insolvency. Thus, to both these undesirable situations, it is important to have a balance of current assets and current liabilities. There is a trade-off between liquidity and solvency (Gryglewicz and Sebastian (2010))[16] and (Eljelly, Abuzar (2004))[6].

The working capital of a firm depends upon several factors such as the average inventory period, the average debtors, the average creditors and the cash conversion cycle. Capkun, Vedran and Weiss (2009)[18] performed a detailed analysis of the relationship between the various types of inventory and financial performance for a wide range of firms. Smaller value of average inventory means that the product spends less time in the inventory before being sold and hence there are more number of investment cycles in a financial year. This would lead to higher profitability. But some researchers argue that maintaining high levels of inventory would facilitate availability of raw materials all times, protection against price fluctuations (Blinder and Maccini (1991))[13] and reduced supply costs, leading to higher sales. The concept of just-in-time inventory has revolutionized the role of supply chain management in the manufacturing industry. Fullerton, Rosemary and

Fawson (2003)[19] have provided empirical evidence to show that JIT manufacturing systems improve the financial performance of a firm.

The raw materials bought at credit and the bills payable serve as a source of finance for the firm. So longer the average payback period of the firm, the greater is the short term finance available to the firm. This reduces the requirement of working capital and the hence, the firm can invest more money in the manufacturing process. This is expected to increase the profitability of the firm. However there is a counter-argument that the firms that have low profits are expected to make delays in payments to the creditors (Charitou, Elfani and Lois (2010))[17], so there is a negative correlation between creditors and profitability of the company.

Goods sold to the consumers at a credit decrease the net current assets of the firm. If the firm receives these payments after a long time, it needs to divert funds from the manufacturing process and maintain a higher level of working capital. This may reduce its profitability as also shown by Mathuva (2009)[20]. However, as claimed by some researchers, a higher debtor's collection period may increase the popularity of the firm among the customers and increase the sales of the company, leading to higher profits.

Similarly cash conversion cycle is another parameter of the efficiency of the working capital of a firm. It is the time delay between expenses for the purchases of raw materials and the receipt of payment for the goods sold. Shorter the cash conversion cycle, higher is the inventory turnover ratio of the company and hence, higher is the profitability of the firm. The criteria for deciding the inventory, debtor and the creditor policy is subjective and depends on a number of factors. Several researchers have attempted to examine the relationship between profitability and working capital by finding the correlation between these variables through statistical analysis. Some important works in this field are illustrated as follows.

II. Literature Review

Working capital management involves managing proper balance between short term assets and liabilities so as to minimize working capital requirement and to maximize revenue. Various studies on listed firms in many countries have been performed to study impact of firm's working capital management on its profitability. These studies employ different variables and techniques to study this impact.

Shin and Soenen (1998)[1] studied the effect of working capital management on corporate profitability using sample of 58,985 firm years covering the period 1975-1994. They examined the relationship between firm's net trade cycle and its profitability and found a strong negative relationship. They also found that shorter net trade cycles are associated with higher risk adjusted stock returns.

Deloof (2003)[2] studied effect of working capital management on Belgian firms' profitability. He used gross operating income as a measure of profitability and found significant negative relation between gross operating income and the number of days accounts receivable, inventories, accounts payable. He also suggested that less profitable firms wait longer to pay their bills hence negative relationship between accounts payable and profitability.

Raheman and Nasr (2007)[3], Lazaridis and Tryfonidis (2006)[5], Padachi (2006)[4], among others also found similar results as those of Shin and Soenen (1998)[1], Deloof (2003)[2] by applying regression models on financial data of different firms and sectors in different countries.

Raheman and Nasr (2007)[3] analysed different variables of working capital management on firms listed on Karachi Stock Exchange. They used net operating profit as a measure of profitability. Along with measures of working capital management including average collection period, inventory turnover ratio, average payment period and cash conversion cycle they includes current ratio as a measure of liquidity and found it to be most important liquidity measure that affects profitability.

Eljelly (2004)[6] examined the liquidity-profitability tradeoff on sample of firms in Saudi Arabia. He found significant negative relationship between liquidity, measured by current ratio, and profitability. He also found negative relationship being more evident in case of firms having longer cash conversion cycles and higher current ratios.

A. Ajanthan (2013)[7] studied the relationship between liquidity and profitability of trading companies in Sri Lanka using current and quick ratio for liquidity and return on equity and return on asset for profitability. He found significant impact of liquidity on profitability.

Al-Shubiri and Aburumman (2013)[8] analysed the relationship between cash conversion cycle and financial characteristics on industrial sector of Jordan. Their study indicated a positive relationship between cash conversion cycle and independent variables of debt, market, productivity, liquidity and dividends.

Various other studies have also been done to analyse relationship between working capital management and profitability in developed markets like Gill, Amarjit, Biger and Mathur (2010)[23] on New York Stock Exchange as well as in emerging markets like Abuzayed, Bana (2012)[22] on Jordan firms, Charitou, Stephanou, Elfani and Lois (2010)[17] on Cyprus market, Teruel and Solano (2007)[15] on a sample of small and medium-sized Spanish firms. Generally all of them suggest that policies of working capital management

that are aggressive enhance firm's profitability. Our study aims to extend this study in the context of Indian markets.etc.

III. Data And Methodology

1.1 Sampling and Design

This study consists of a sample of 364 firms listed on Indian stock exchange, all part of BSE 500 index. The study comprises a period of 5 years, from April 2010 to March 2014. The selection of companies was based on following criterion. First, firm must be listed on Indian Stock Exchange before April 2010. Second, the stocks of the company must be listed all throughout the time period of study. Third, firms belonging to finance, banking and insurance sector were removed because of their specific nature. Fourth, firms having missing data for above mentioned time period were also excluded from the sample. Fifth, data points of certain firms of some years having any extreme year end values income statements were omitted. The sample data (from income statements) of required firms for the study was taken from Ace Equity database. Data thus obtained was a panel data set having 1763 firm year observations. Table 1 describes how sample data was selected.

Table 1: Sample selection process

Number of firms listed in BSE500	500
(-) Financial, Banking and Insurance firms	(85)
Remaining non-financial firms	415
(-) Firms with missing data	(51)
Firms included in the sample	364

364 firms under study can be categorized into 5 industries: energy and resources, materials and construction, industrials, consumer products, technology. Table 2 shows number of firms in each industry.

Table 2: Classification of firms

Industry	**Number of Firms**
Energy and resources	35
Materials and construction	98
Industrials	47
Consumer products	116
Technology	68

1.2 Explanatory and Control Variables

To analyze the impact of working capital on profitability, the profitability ratio used is the gross operating profit ratio and the efficiency variables used are average inventory days, creditors payment period, debtor collection period and the cash conversion cycle. These ratios have been calculated from the financial statements of the given firms obtained from the database.

The Gross Operating Profit Ratio which has been taken as the dependent variable was calculated by subtracting the cost of goods sold (COGS) from the net sales revenue and dividing the result by total assets minus financial assets. As also taken by Lazaridis and Tryfonidis (2006)[5], this ratio has been taken in place of operating ratio because it is more related to the cash conversion cycle and the various measures of working capital. Alternatively we can take Interest before Interest, Taxes, Depreciation and Amortization (EBITDA), N. Venkata Ramana (2013)[12], or the Return on Total Assets (ROA), Nor Edi Azhar Binti Mohamad (2010)[9] and Mian Sajid Nazir (2009)[11]. Other such measures are the ratio of closing price of the market stock in the current year to the closing price in the previous year as taken by S. Kheradyar, I. Ibrahim, and F. Mat Nor (2011)[10]. The weakness in this ratio is that the market price does not depend only on the profitability of the company.

Table 3: Variables and Abbreviations

Variable / Ratio	**Formula**	**Abbreviation**
Gross operating profit ratio	(Sales – COGS)/(Total assets – financial assets)	GOPR
Cash conversion cycle	ICP + DCP – CPP	CCC
Inventory conversion period	365 * (Inventory / COGS)	ICP
Debtors collection period	365 * (Accounts receivables / Sales)	DCP
Creditors payment period	365 * (Accounts payables / COGS)	CPP
Firm size	*ln* (net sales)	SIZE
Fixed financial asset ratio	Fixed financial assets / total assets	FFAR
Debt ratio	Total debt / total assets	DEBTR

Apart from the efficiency ratios, the other variables that have been taken are the firm size calculated by taking the natural log of the net sales (in crores of rupees). This has been taken to account for any dependence of profitability on firm size. Larger firms are often said to have better working capital management and more profitability due to reduced average cost of goods manufactured.

The fixed financial asset ratio has been used as a proxy variable to account for the impact of non-operating financial assets investments. This includes any intangible asset whose monetary value, the firm is entitle to receive under any contractual claim such as bonds, stocks or any bank deposits. For this study, it has been calculated from the balance sheet by adding the long-term and short-term loans and advances lent, any current investments, cash and bank, sundry debtors, bills receivables, interest accrued on loan and investments and any deposits with government.

Another control variable that has been taken is the debt ratio. As debt is the cheapest source of finance, the more leveraged companies are expected to have higher profitability than the companies financed by equity. The variable DEBTR would capture any increasing or decreasing trend in the profitability of differently leveraged but otherwise similar firms. The regression model would now reflect a true picture of the relationship between the profitability and the working capital management. The regression models to demonstrate empirical evidence of the above findings has been presented in the next section.

1.3 Descriptive Statistics

Table 4 shows descriptive statistics of the variables used in the study. The total number of observations is 1763. Mean value of fixed financial assets ratio is 0.422 with standard deviation of 0.198. Included firms have an average of 0.643 gross operating profit ratio. Firms takes an average of 225.33 days (median: 76.12) to pay to creditors with standard deviation of 1142.09 while they collect from debtors in 68.68 days (median: 51.06) on an average. This shows that data regarding creditors payment period is quite volatile. Average time for inventory to be sold is 212.25 days on average (median: 72.83). Cash conversion cycle of firms is 55.702 days (median: 48.39).

Table 4: Descriptive Statistics of the Variables

	Count	Mean	Median	Standard Deviation	Minimum	Maximum
CPP	1763	225.3387403	76.12440479	1142.090442	-9157.91	19985.26
DCP	1763	68.6875594	51.06249128	85.37126696	0	1406.608
ICP	1763	212.3544932	71.82844863	1670.306024	-15656	45447.28
SIZE	1763	7.498645846	7.518851487	1.71787088	-2.40795	13.06824
DEBTR	1763	0.21359126	0.194127748	0.190323648	0	1.151727
FFAR	1763	0.422378625	0.391379671	0.198773469	0.015496	0.976744
GOPR	1763	0.642674308	0.452149849	0.793634803	-1.97554	12.05098
CCC	1763	55.70331234	48.39441296	1933.492147	-19985.3	44495.24

1.4 Correlation Analysis

Table 5 shows Pearson correlation matrix of the variables used in the regression model. The table shows that the correlation coefficient between the independent variables though significant but is small suggesting that the regression variables do not suffer from multi-collinearity. Therefore the regression results are more reliable. Table also depicts that gross operating profit ratio is positively correlated with fixed financial assets ratio. High correlation exists between cash conversion cycle and creditors payment period and cash conversion cycle and inventory conversion period but it is immaterial as they are never used simultaneously in a single regression model. Gross operating profit is negatively correlated with creditors payment period, inventory conversion period, debt ratio and cash conversion cycle. Negative correlation implies that holding inventory for too long and having high cash conversion cycle period are related to decrease in firm's profitability. This supports the intuitive idea that shorter the time period between production and selling of goods more is the profitability of the firm.

Table 5: Pearson correlation matrix of the variables

	GOPR	CPP	DCP	ICP	SIZE	DEBTR	FFAR	CCC
GOPR	1							
CPP	-0.0142	1						
DCP	0.0092	0.0378	1					
ICP	-0.0658***	0.0947***	0.0195	1				
SIZE	0.0047	-0.0938***	-0.2603***	-0.0897***	1			
DEBTR	-0.3394***	0.0712***	0.0668***	0.0194	0.1132***	1		
FFAR	0.5478***	-0.0042	0.2470***	-0.0377	-0.1107***	-0.4711***	1	
CCC	-0.0481**	-0.5072***	0.03874	0.8088***	-0.0335	-0.0222	-.0191	1

IV. Regression Analysis

The method of Ordinary Least Squares (OLS) regression was employed to study the relationship between profitability and working capital. The gross operating profit was taken as the dependent variable. For the independent variables, only one of average inventory, debtors' collection period, creditors' payment period and the cash conversion cycle was taken at a time. The control variables – natural logarithm of sales as a proxy for firm size, fixed financial asset ratio and the debt ratio were taken in all the regressions. To account for the effect of industries, some industry dummy variables were also taken. To provide the minimum degree of freedom necessary, industry dummy variables were taken instead of the sectors. The gamut of industries in the sample has been divided into five categories – energy and resources, materials and construction, industrials, consumers and the technological industry. The technological industry was taken as the comparison industry and all other industries were assigned a dummy variable- ENRGY, MATRL, INDSTRL and CONSMR for the order specified above. The regression analysis has been done to study the collective impact of all the industries as well as to analyze any differences between different types of industries identical in all other respects. The regression models without the dummy variable and including the dummy variable have been presented alongside. The test for the significance of the included dummy variable has also been presented in each case.

1.5 Cash Conversion Cycle

Equation (1) represents the regression results when the gross operating profit ratio is regressed on cash conversion cycle and the control variables. The results are tabulated in table 6. The F-test shows that the results are significant at the 1% level. As seen in the results, the profitability is negatively correlated with the cash conversion cycle and the coefficient is significant at the 5% level. This is as expected in reality because small cycles lead to higher turnover ratio and hence higher profitability. The regression results also demonstrate a significant positive relationship between the size of the firm and the profitability. The gross operating profit significantly declines in case of more leveraged firms because their risk of default is high (Charitou, Elfani and Lois (2010))[17]. The fixed financial assets ratio is positively correlated with the profitability of the firm.

$$GOPR = -0.353 - 0.000016\,CCC + 0.0331\,SIZE - 0.466\,DEBTR + 2.005\,FFAR \quad (1)$$

Table 6: Effect of cash conversion cycle on operating profit (without dummy variables)

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.35257	0.087766	-4.0172	6.14E-05
CCC**	-1.6E-05	8.11E-06	-1.95023	0.048707
SIZE***	0.033123	0.009201	3.599855	0.000327
DEBTR***	-0.46581	0.093574	-4.97797	7.05E-07
FFAR***	2.005888	0.089579	22.39241	6.51E-98

R Square	0.315328
Adjusted R Square	0.31377
F	202.4128
Significance F	6.8E-143
Observations	1763

If the effect of industries is also taken into account by including the dummy variables, the regression equation changes to (2). The results are tabulated in table 7. The regression model is significant at the 1% level, as seen in the F test. The sign of coefficients of the cash conversion cycle and the control variables is still unchanged. The correlation between profitability and consumer industry is positive but highly insignificant while it is negative and significant for the rest of the industries at the 1% level. This suggests that for a given inventory, leverage and a size of the firm, the consumer industry earns higher profits than the technological industry.

To verify the combined statistical significance of the dummy variables, the F-test is conducted which suggests that these variables are significant at the 1% level. The p-value is 2.52E-12.

$$GOPR = -0.292 - 0.000018\,CCC + 0.0415\,SIZE - 0.442\,DEBTR + 1.952\,FFAR - 0.368\,ENRGY - 0.175\,MATRL - 0.179\,INDSTRL + 0.0101\,CONSMR \quad (2)$$

Table 7: Effect of cash conversion cycle on operating profit (with dummy variables)

	Coefficients	Standard Error	t-Stat	P-value
Intercept	-0.29241	0.09417	-3.10513	0.001932
CCC**	-1.8E-05	8.07E-06	-2.21867	0.026637
SIZE***	0.041506	0.009145	4.538713	6.04E-06
DEBTR***	-0.44199	0.092196	-4.79396	1.77E-06
FFAR***	1.951948	0.090331	21.60875	5.24E-92
ENRGY	-0.36754	0.064769	-5.67467	1.62E-08
MATRL	-0.17503	0.049343	-3.54727	0.000399
INDSTRL	-0.1797	0.058195	-3.08799	0.002047
CONSMR	0.010121	0.047993	0.21088	0.833005

R Square	0.33845
Adjusted R Square	0.335433
F	112.1688
Significance F	1.9E-151
Observations	1763

1.6 Inventory Conversion period

Equation (3) presents the regression results when the gross operating profit ratio is regressed on average inventory and the control variables. The results are tabulated in table 8. Here the inventory days includes the inventory period of the raw material, work-in-process and the finished goods. The F-test shows that the results are significant at the 1% level. As seen in the results, when the number of days in the inventory increases by one, the profitability of the firm decreases and this result is statistically significant at a level of 10%. This is as expected in reality because longer periods of storage means higher storage costs and lower inventory turnover ratio. The regression results also demonstrate a significant positive relationship between profitability and both the size and fixed assets of the firm. The gross operating profit significantly declines in case of more leveraged firms.

$$GOPR = -0.34273 - 0.000018\,ICP + 0.032\,SIZE - 0.4582\,DEBTR + 2\,FFAR \quad (3)$$

Table 8: Effect of inventory period on operating profit (without dummy variables)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.342727741	0.088189624	-3.886259	0.000105579
ICP*	-1.83165E-05	9.42609E-06	-1.943166	0.052155554
SIZE***	0.032021551	0.00923774	3.4663837	0.000540194
DEBTR***	-0.458209768	0.093527225	-4.899213	1.05058E-06
FFAR***	2.005411528	0.089589197	22.384524	7.47201E-98

R Square	0.315316838	
Adjusted R Square	0.31375897	
F	1.9161E-138	
Significance F	6.9135E-143	
Observations	1763	

If the effect of industries is also taken into account by including the dummy variables, the regression equation changes to (4). The results are tabulated in Table 9. The test results are significant at the 1% level. The sign of coefficients of the inventory period and the control variables is still unchanged. The relationship between profitability and consumer industry is positive but insignificant while it is negative and significant for the rest of the industries at the 1% level. This suggests that for a given inventory, leverage and a size of the firm, the technological industry earns higher than all the given industries except the consumer industry.

To verify the combined statistical significance of the dummy variables, the F-test is conducted which suggests that these variables are significant at the 1% level. The p-value for the F test of the dummy variables is 7.32E-12.

$$GOPR = -0.287 - 1.535E-05\,ICP + 0.0406\,SIZE - 0.434\,DEBTR + 1.954\,FFAR - 0.35ENRGY - 0.175MATRL - 0.179\,INDSTRL + 0.01\,CONSMR \quad (4)$$

Table 9: Effect of inventory period on operating profit (with dummy variables)

	Coefficients	Standard Error	t-Stat	P-value
Intercept	-0.287037756	0.094492992	-3.03766	0.002419
ICP	-1.53563E-05	9.37272E-06	-1.63841	0.101516
SIZE* **	0.04055941	0.009187777	4.414497	1.07E-05
DEBTR* **	-0.434232229	0.09220956	-4.70919	2.68E-06
FFAR* **	1.954756888	0.090370535	21.63047	3.61E-92
ENRGY	-0.357672456	0.064626497	-5.53446	3.59E-08
MATRL	-0.174640444	0.049500845	-3.52803	0.000429
INDSTRL	-0.178953856	0.058237239	-3.07284	0.002153
CONSMR	0.010030276	0.048023849	0.20886	0.834582

R Square	0.337608
Adjusted R Square	0.334586
F	111.7471
Significance F	5.8E-151
Observations	1763

1.7 Creditor Payment period

Equation (5) presents the regression results when creditor payment period is used as the independent variable. The test results are significant at the 1% level. Here the industry dummy variables have not been taken. The results, tabulated in table 10 suggest that there is a positive correlation between the creditors payment period and the profitability of the firm. This is as expected in reality. However the coefficient is not statistically significant. The trend of firm size, debt ratio and the fixed financial assets is the same as in the previous case.

$$GOPR = -0.363 + 1.85E-06\ CPP + 0.0339 - 0.461\ DEBTR + 2.012\ FFAR \quad (5)$$

Table 10: Effect of creditors payment period on operating profit (without dummy variables)

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.36288	0.088041	-4.12175	3.94E-05
CPP	1.85E-06	1.38E-05	0.134012	0.893409
SIZE* **	0.033849	0.009253	3.658118	0.000262
DEBTR* **	-0.46085	0.093969	-4.90428	1.02E-06
FFAR* **	2.011817	0.08965	22.44076	2.8E-98

R Square	0.313853
Adjusted R Square	0.312292
F	201.0335
Significance F	4.5E-142
Observations	1763

When the effect of industries is also taken into account by including the dummy variables, the results are as shown in table 11. The test results are significant at the 1% level. The sign of coefficients of the creditors payment period and the control variables is still unchanged. The relationship between profitability and consumer industry is positive but insignificant while it is negative and highly significant for the rest of the industries. The energy industry has the lowest profitability among all industries because its coefficient is the lowest and statistically significant.

To verify the combined statistical significance of the dummy variables, the F-test is conducted which suggests that these variables are significant at the 1% level. It gives a p-value of 2.59E-12.

$$GOPR = -0.307 + 1.43E-05\ CPP + 0.043\ SIZE - 0.443 DEBTR + 1.956 FFAR - 0.364 ENRGY - 0.184 MATRL - 0.181\ INDSTRL + 0.00979\ CONSMR \quad (6)$$

Table 11: Effect of creditors payment period on operating profit (with dummy variables)

	Coefficients	*Standard Error*	*t Stat*	*P-value*
Intercept	-0.30715	0.094478	-3.25107	0.001172
CPP	1.43E-05	1.38E-05	1.040451	0.298274
SIZE* **	0.04307	0.009216	4.67351	3.19E-06
DEBTR* **	-0.44337	0.092569	-4.78965	1.81E-06
FFAR* **	1.955654	0.090437	21.62457	4E-92
ENRGY	-0.36428	0.065068	-5.59845	2.51E-08
MATRL	-0.18395	0.049285	-3.73232	0.000196
INDSTRL	-0.18096	0.058261	-3.106	0.001927
CONSMR	0.009785	0.048046	0.203657	0.838645

R Square	0.337608
Adjusted R Square	0.334586
F	111.7471
Significance F	5.8E-151
Observations	1763

1.8 Debtor Payment period

Equation (7) presents the regression results when debtors collection period is used as the independent variable. Here the industry dummy variables have not been taken. The results, tabulated in table 12 suggest that there is a negative correlation between the debtors period and the coefficient is statistically significant at the 1% level. The trend as expected. The firm size and the fixed financial assets ratio are positively correlated while the debt ratio is negatively correlated. These three coefficients are significant at the 3% level.

$$GOPR = -0.286 - 0.00099\,DCP + 0.0213\,SIZE - 0.346\,DEBTR + 2.157\,FFAR \quad (7)$$

Table 12: Effect of debtor collection period on operating profit (without dummy variables)

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.28604	0.08845	-3.23397	0.001243
DCP* **	-0.00099	0.0002	-4.96634	7.48E-07
SIZE**	0.021317	0.009477	2.249261	0.024619
DEBTR* **	-0.34622	0.095744	-3.61612	0.000307
FFAR* **	2.156748	0.093639	23.03269	8.3E-103

R Square	0.32334
Adjusted R Square	0.3218
F	210.0135
Significance F	2.2E-147
Observations	1763

When the effect of industries is also taken into account by including the dummy variables, the results are as shown in table 13. The test results are significant at the 1% level, as seen in the F test. The sign of coefficients of the debtors collection period and the control variables is still unchanged. The relationship between profitability and all the industries is negative and significant except the consumer industry. This suggests that for a given debtors collection period, leverage and a size of the firm, the technological industry earns the highest profits and the energy industry earns the lowest.

To verify the combined statistical significance of the dummy variables, the F-test is conducted which suggests that these variables are significant at the 1% level. It gives a p-value of 9.39E-12.

$$GOPR = -0.210 - 0.00095DCP + 0.0301\,SIZE - 0.3259\,DEBTR + 2.09FFAR - 0.364\,ENRGY - 0.198\,MATRL - 0.192\,INDSTRL - 0.0147\,CONSMR \quad (8)$$

Table 11: Effect of debtor collection period on operating profit (with dummy variables)

	Coefficients	Standard Error	t Stat	P-value
Intercept	-0.20985	0.095492	-2.19759	0.028109
DCP* **	-0.00095	0.000198	-4.79476	1.77E-06
SIZE* **	0.03008	0.009427	3.190848	0.001444
DEBTR* **	-0.32586	0.094481	-3.44892	0.000576
FFAR* **	2.090465	0.093886	22.26593	6.25E-97
ENRGY	-0.3642	0.064272	-5.66644	1.7E-08
MATRL	-0.19843	0.049077	-4.0433	5.5E-05
INDSTRL	-0.19162	0.057945	-3.30696	0.000962
CONSMR	-0.01471	0.048012	-0.30631	0.759402

R Square	0.345177
Adjusted R Square	0.34219
F	115.5731
Significance F	2.6E-155
Observations	1763

1.9 Results

On the basis of the above study conducted on the BSE 500 companies, the dependence of profitability on working capital can be summarized in the following table.

Table 12: Results

	Correlation with profitability	Significance
Cash conversion cycle	negative	high
Average inventory	negative	high
Creditors payment period	positive	low
Debtors collection period	negative	high

V. Conclusion

Working capital management is an important aspect of financial decision making. The companies need to allocate an appropriate proportion of the total capital to the working capital. It can help them to enhance their profitability and reduce the risk of solvency. The analyses presented above can help the companies identify the areas where there is a scope of improvement for better performance.

From our analysis on the panel data of 364 companies listed on BSE 500 we conclude that the average inventory, creditor payment period and the debtor collection period are the main determinants of working capital. A smaller cash conversion cycle, smaller inventory period and a smaller debtors collection period help the firm to earn higher profits. A large creditors payment period on the other hand may not always help to increase its profits.

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