INTERNATIONAL JOURNAL OF RESEARCH IN COMMERCE, IT & MANAGEMENT

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CASH CONVERSION CYCLE APPROACH TO LIQUIDITY ANALYSIS: CASE OF INDIAN STEEL INDUSTRY

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ABSTRACT

The management of current assets and current liabilities can have significant impact on both the liquidity and profitability of the firm. Basically, corporate liquidity is examined using traditional ratios such as current ratio and quick ratio. These ratios measures liquidity at a given point of time. On the other hand, dynamic view measures ongoing liquidity from the firm's operations. As the firm's ongoing liquidity is a function of its Cash (Conversion) Cycle, it will be more appropriate and evaluate effectiveness of working capital management by Cash Conversion Cycle (CCC), rather than traditional liquidity measures. The purpose of the present study is to investigate the implications of the CCC as an indicator of liquidity on profitability of selected companies in Indian Steel Industry. In Multiple Regression Model, rate of return on assets is used as dependent variable. As independent variables, Accounts Receivables Period (ARP), Inventory Conversion Period (ICP), and Average Payment Period (APP) used as explanatory variables and Size, Growth, Leverage, GDP growth is used as control variables in the model. Empirical results of the study found a significant negative relationship between profitability and ARP, ICP and CCC for a sample of Indian Steel Industry.

KEYWORDS

cash conversion cycle, liquidity, indian steel industry, working capital, accounts receivables period, inventory conversion period and accounts payable period.

INTRODUCTION

Working capital management, which deals with the management of current assets and current liabilities, is very important in corporate finance because it directly affects the liquidity and profitability of the firm (**Deloof, 2003; Raheman and Nasar, 2007).** The current assets of a typical manufacturing firm or even a distributing firm account for more than half of the firm's total assets. **Deloof (2003)** held that same proportion that the accounts receivables and inventories comprise a substantial percentage of the total assets of a firm. Excessive levels of current assets can easily result in a firm realizing a substandard return on investment. However, firms with too few current assets may incur shortages and difficulties in maintaining smooth operations **(Van Horne and Wachowicz, 2005).**

Profitability is the rate of return of firm's investment. An unwarranted high investment in current assets would reduce this rate of return **(Vishnani, 2007)**. The purpose of working capital management is to manage the firm's current accounts so as to attain a desired balance between profitability and risk (**Ricci and Vito, 2000). Shin and Soenen (1998)** found that efficient working capital management is an integral component of the overall corporate strategy towards creating shareholder value. Efficient working capital management involves planning and controlling the current assets and current liabilities in a manner that eliminates the risk of inability of a firm to meet due short term obligations and to avoid excessive investment in these assets on the other hand (**Eljelly, 2004). Smith (1980)** and **Reheman and Nasr (2007)** also observed that working capital management is important because of its effects on the firm's profitability and risk and consequently its value.

The way in which working capital is managed can have a significant impact on both the liquidity and profitability of the firm (**Deloof, 2003)**. The decisions that tend to maximize profitability tend to minimize the chances of adequate liquidity. Conversely, focusing almost entirely on liquidity will tend to reduce the potential profitability of the firm. A firm can have larger sales with a generous credit policy, which extends the cash cycle. In this, the longer cash conversion cycle may result in higher profitability. However, the traditional view of the relationship between cash conversion cycle and corporate profitability is that, ceteris paribus, a longer cash conversion cycle hurts the profitability of a firm (**Deloof, 2003; Smith, 1980).**

CONJECTURAL FRAMEWORK

Liquidity management is necessary for all business, small, medium or large because it means collecting cash from customers in time so that having no difficulty in paying short-term debts. Therefore, when a business does not manage its liquidity well, it will have cash shortages and will results in difficulty in paying obligations. As a result, in addition to profitability, liquidity management is vital for ongoing concerns. Corporate liquidity is examined from two distinct dimensions: static or dynamic view **(Farris and Hutchison, 2002).** The static view is based on commonly used traditional ratios, such as current ratio and quick ratio, calculated from the balance sheet accounts. These traditional measures of liquidity are incompetent measures that cannot provide detailed and accurate about liquidity management effectiveness **(Jose et al., 1996).** These ratios measures liquidity at a given point of time. Liquidity for the ongoing firm is not reliant on the liquidation value of its assets, but rather on the operating cash flow generated by these assets **(Soenen, 1993).**

On the other hand, dynamic view measures ongoing liquidity from the firm's operations. As a dynamic measure of the time takes a firm to go from cash outflow to cash inflow which is measured by Cash Conversion Cycle (CCC) introduced by **Hager (1976)** and has been recommended by **Largy and Stickney (1980), Kamath (1989)** and others. Drawing attention to limitations of traditional liquidity ratio, **Richards and Laughlin (1980), Kamath (1989), Gentry et al., (1990), and Schilling (1996)** have insisted on using ongoing liquidity measures in working capital management. Ongoing liquidity refers to the inflows and outflows of cash through the as the product acquisition, production, sales, payment and collection process takes place overtime. As the firm's ongoing liquidity is a function of its cash (conversion) cycle, it will be more appropriate and evaluate effectiveness of working capital management by cash conversion cycle, rather than traditional liquidity measures.

CASH CONVERSION CYCLE (CCC)

In text books related to finance, CCC is maintained in the context of working capital management **(Keown et al., 2003).** The cash conversion cycle is used as a comprehensive measure of working capital as it shows the time lag between expenditure for the purchase of raw material and the collection of sales of finished goods **(Padachi, 2006, and Eljelly, 2004).**

CCC = RCP + ICP – APP

In the above formula, the three variables to which CCC is dependent are defined as follows;

RCP – Receivables Collection Period (in days) = (Accounts Receivables / Sales) * 365

ICP – Inventory Conversion Period (in days) = (Inventory / Cost of goods sold) * 365

APP – Accounts Payable Period (in days) = (Accounts Payables / Cost of goods sold) * 365

There seems to be strong relation between the cash conversion cycle of a firm and its profitability. The three different components of CCC (accounts receivables, inventory and accounts payables) can be managed in different way in order to maximize profitability. It is an indication of how long a firm can carry on if it was to stop its operations or it indicates the time gap between purchase of goods and collection of sales. The optimum level of inventory will have a direct effect on profitability since it will release working capital resources which in turn will be invested in the business cycle, or will increase inventory levels in order to respond to higher product demand. Similarly, both credit policy from suppliers and credit period granted to customers will have an impact on profitability. In order to understand the way working capital is managed, CCC and its components will be statistically analysed.

Cash Conversion Cycle likely to be negative as well as positive. A positive result indicates the number of days a company must borrow or tie up capital while awaiting payment from a customer. A negative result indicates the number of days a company has received cash from sales before it must pay its suppliers **(Hutchison et al., 2007).** Of course the ultimate goal is having low CCC, if possible negative. Because the shorter the CCC, the more efficient the company in managing its cash flow. The purpose of this part of analysis is to investigate the implications of the CCC as an indicator of liquidity on profitability of selected companies in Indian Steel Industry.

REVIEW OF LITERATURE

In a study by **Kamath (1989),** it has been concluded that there is a reverse relationship between cash conversion cycle and profitability. In another study of **Shin and Soenen (1998),** a sample consisting of American manufacturing firms for the period of 1974-1995 has been analysed and a statistically negative relationship between cash conversion cycle and profitability has been confirmed. To test the relationship between working capital management and corporate profitability, **Deloof (2003)** used a sample of 1009 large Belgian non-financial firms for a period of 1992-1996. He discussed possible relationships between cash conversion cycle and profitability by dividing cash conversion cycle into its components (inventory, account receivables and account payables period). Results of the study have concluded that increase in all of these periods affect profitability negatively. **Lazaridis and Tryfonidis (2006)** conducted a cross sectional study by using a sample of 131 firms listed on the Athens Stock Exchange for the period of 2001-2004 and found cash conversion cycle affects profitability negatively. **Eljelly (2004)** empirically examined the relationship between profitability and liquidity as measured by current ratio and cash conversion cycle on a sample of 929 Joint stock companies in Saudi Arabia. It has been concluded that the effect of cash conversion cycle on profitability is stronger than the effect of current ratio on it and found significant negative relationship between the firm's profitability and its liquidity level. **Raheman and Nasr (2007)** studied the effect of different variables of working capital management including cash conversion cycle on the profitability of 94 Pakistani firm listed on Karachi Stock Exchange for a period between 1999-2004 and found that as cash conversion cycle increases, it leads to decreasing profitability of the firm. **Garcia-Teruel and Martinez-Solano (2007)** collected data for 8872 SMEs from Spain for the period 1996-2002 and tested the effects of working capital management on profitability. The results demonstrated that shortening cash conversion cycle improves the profitability. **Falope and Ajilore (2009)** used a sample of 50 Nigerian quoted non-financial firms for the period 1996-2005. They found a significant negative relationship between net operating profitability and the average collection period, inventory turnover in days, average payment period and cash conversion cycle.

Mathuva (2009) examined the influence of working capital management components on corporate profitability by using a sample of 30 listed on the Nairobi-Stock Exchange (NSE) for the periods 1993 to 2008. He found that there exists a highly significant negative relationship between the time it takes for firms to collect cash from their customers and profitability. **Amarjit Gill, Nahum Biger and Neil Mathur (2010)** studied the relationship between the cash conversion cycle and profitability and found significant relationship between them. However, the study conducted by **Katerina Lyroudi and Lazoridis (2000)** in the Food Industry of Greece found that there was positive relationship between CCC and return on assets. Among the studies conducted in the Indian context showed both the positive and negative association between liquidity and profitability. **Amit K. Mallik, Debdas Rakshit (2005)** studied the relationship between liquidity and profitability in the context of Indian Pharmaceutical industry and concluded that no definite relationship can be established between liquidity and profitability. **Vijayakumar and Venkatachalam (1995)** in their study on Tamil Nadu Sugar Industry with regard to relationship between liquidity and profitability concluded that liquidity was negatively associated with profitability.

On the basis of these researches done in different countries, methodology has been formulated. From the above reviews, the researcher concludes the most of the studies support the general notion that there is a negative relationship between liquidity and profitability. In order to test this general notion, the researcher postulates the following hypothesis

"Firms liquidity negatively affects profitability"

VARIABLES SPECIFICATIONS AND EMPIRICAL MODEL

The primary aim of this part of analysis is to investigate the impact of working capital management (liquidity) on corporate profitability of Indian steel companies. This is achieved by developing a similar empirical framework first used by **Shin and Soenen (1998)** and the subsequent work of **Deloof (2003).** The analysis of data employs the use of correlation and a multiple regression model that consists of both liquidity and profitability. For this purpose, four different models using the various components of liquidity and profitability are considered. This helps analyzing changes in the results due to different measures of liquidity and profitability.

THE EXPLANATORY VARIABLES

This study investigates the effects of accounts receivables period, inventory conversion period, accounts payables period and cash conversion cycle on firms profitability. The dependent variable of the regression model is return on assets (PR). Accounts Receivables Period (ARP) used as proxy for the inventory policy is also an independent variable obtained as account receivables /sales *365. Inventory Conversion Period (ICP) used as proxy for the inventory policy is also an independent variable derived as inventory / cost of sales *365. Average Payment Period (APP) used as proxy for the payment policy is also an independent variable. It is calculated by dividing accounts payable by purchases and multiplying the result by 365. The Cash Conversion Cycle (CCC) used a comprehensive measure of liquidity is another independent variable, and is measured by adding ARP to ICP and then subtracting the APP. All the above variables have relationship that ultimately affects liquidity of the firm. It is expected that there is a negative relationship between profitability on the one hand and the measures of liquidity (number of days accounts receivables, inventory and accounts payables and cash conversion cycle) on the other hand. This is consistent with the view that the time lag between expenditure for the purchase of raw materials and the collection of sales of finished goods can be too long, and that decreasing the time lag increase profitability.

CONTROL VARIABLES

In various literature reviews, various studies have used the control variables along with the main variables of liquidity (working capital) in order to have an opposite analysis of working capital management on the profitability of firms **(Deloof, 2003 and Eljelly, 2004).** On the same lines, along with working capital variables, the present study has taken into considerations some control variables relating to firms such as the size of the firm, the growth in its sales and its financial leverage. The size of the firm (SIZE) has been measured by the natural logarithm of its total sales. The growth of the firm (GROWTH) is measured by variations in its annual sales value with reference to previous year's sales $[(sales_t\text{-}sales_{t-1})/sales_{t-1}]$. Moreover, the financial leverage (LEV) was taken as the debt to equity ratio of each firm for the whole sample evolution of the economic cycle using the GDPGR variable, which measures the real annual GDP growth. Table 1 below summaries the definitions and theoretical predicted signs.

TABLE 1: PROXY VARIABLES DEFINITION AND PREDICTED RELATIONSHIP

Proxy Variables	Definitions	Predicted Sign
ARP	Accounts receivables divided by sales and multiplied by 365 days	+/-
ICP	Inventory divided by cost of goods sold and multiplied by 365 days	+/-
APP	Accounts payables divided by cost of goods sold and multiplied by 365 days	+/-
CCC	No. of days A/R plus No. of days IC minus No. of days A/P	+/-
Size	Natural Logarithm of firm's sales	+/-
Growth	Difference between current year sales and previous year sales divided by previous year sales	+/-
Leverage	Total debt divided by equity	-
GDPGR	Difference between current year GDP and previous year GDP divided by previous year GDP	+

EMPIRICAL MODEL

The study uses panel data regression analysis of cross-sectional and time series data. The pooled regression is one where both intercepts and slops are constant, where the cross-section firm data and times series data are pooled together in a single column assuming that there is no significant cross-section or temporal effects.

The general from of model is

$$PR_{it} = \beta_0 + \sum_{\alpha_{it}}^{n} \beta_i X_{it} + e$$

Where,

PR_{it} –Return on assets of firm i at time t;

i = 1, 2, 3..... 10 firms

β_0 -The intercept of equation

β_I - Co-efficient of X_{it} variables

X_{it} - The different independent variables for working capital management of firms i at time t

t -Time = 1, 2, 3…

e -The error term

To investigate the impact of working capital management (liquidity) on profitability the model used for the regression analysis is expressed in the general form as given above and the variable ARP will be replaced in return by the other explanatory variables: ICP, APP and CCC. Specifically, when convert the above general least squares model into specified variables it becomes:

$$PR_{it} = \beta_0 + \beta_1 ARP_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 LEV_{it} + \beta_5 GDPGR_{it} + e_{it} \quad \textbf{[Model 1]}$$

$$PR_{it} = \beta_0 + \beta_1 ICP_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 LEV_{it} + \beta_5 GDPGR_{it} + e_{it} \quad \textbf{[Model 2]}$$

$$PR_{it} = \beta_0 + \beta_1 APP_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 LEV_{it} + \beta_5 GDPGR_{it} + e_{it} \quad \textbf{[Model 3]}$$

$$PR_{it} = \beta_0 + \beta_1 CCC_{it} + \beta_2 SIZE_{it} + \beta_3 GROWTH_{it} + \beta_4 LEV_{it} + \beta_5 GDPGR_{it} + e_{it} \quad \textbf{[Model 4]}$$

$$PR_{it} = \beta_0 + \beta_1 ARP_{it} + \beta_2 ICP_{it} + \beta_3 APP_{it} + \beta_4 SIZE_{it} + \beta_5 GROWTH_{it} + \beta_5 LEV_{it} + \beta_5 GDPGR_{it+} e_{it} \quad \textbf{[Model 5]}$$

Where,

PR - Measures the firm profitability with gross profit as a percentage of total assets for firm (i) in the year (t)

ARP - Accounts Receivables Period for firm (i) in the year (t)

ICP - Inventory Conversion Period for firm (i) in the year (t)

APP - Accounts Payables Period for firm (i) in the year (t)

CCC - Cash Conversion Cycle for firm (i) in the year (t)

Size - Natural logarithm of firm's sales for firm (i) in the year (t)

Growth - Growth of firm's sales for firm (i) in the year (t)

Leverage - Measures the leverage with debt to equity for firm (i) in the year (t)

GDPGR - Measures the growth of GDP for firm (i) in the year (t)

β_0 - Constant term for firm (i) in the year (t)

β_1, β_2.....Regression Co-efficient.

e - Disturbance term for firm (i) in the year (t)

RESULTS AND DISCUSSION

In Table 2, the summary statistics of the variables included in the models are presented. Descriptive statistics shows the mean and standard deviation of the different variables of interest in the study. It also presents the standard error of mean, median, minimum and maximum values, kurtosis and skewness of the variables. Table 2 presents descriptive statistics for 10 Indian steel companies for the period of 13 years from 2000-2001 to 2012-2013. Overall, the mean profit rate on total assets is 12.38 per cent with the standard deviation of 78 per cent. It means that value of the profitability (profit rate on total assets) can deviate from mean to both sides by 78 per cent. The maximum value for the profit rate on total assets is 28.45 per cent for Indian steel industry in a year while the minimum is -1.74 per cent.

Indian steel industry receive payment against sales after an average of 38 days (approximately more than one month) and standard deviation is 10 days. Minimum time taken by a industry to collect cash from receivables is 26 days and maximum time taken for this purpose is 57 days (approximately two months). On average, Indian steel industry takes 70 days (approximately two and half month) to convert their inventories in to sales with standard deviation of 11 days. Here, minimum time taken by a industry is 55 days and maximum time taken for this purpose is 94 days, which is a very short period to convert inventory in to sales. Industries wait on average 78 days to pay their purchases with standard deviation of 36 days. Here, minimum time taken by a industry is 39 days and maximum time taken for this purpose is 150 days. The mean cash conversion cycle is 30 days (approximately one month) with the standard deviation of 30 days, implying that Indian steel industry turnover their stock on an average of 12 times a year.

The check the size of the industry and its relationship with profitability, natural logarithm of sales is used as a control variable. The mean value of log of sales is 12, while the standard deviation is 0.79 per cent. The maximum value of log of sales for a industry in a year is 12.48 and the minimum is 10.37. In the same way to check the growth of the industry and its relationship with profitability, sales growth is used as a control variable. The average growth of sales for Indian steel industry is 20.98 per cent with the standard deviation of 21.82 per cent. The highest growth of sales for Indian steel industry in a particular year is 77.78 per cent and in the same way the minimum growth of sales for India steel industry in a year is 0.52 per cent.

To check the leverage and its relationship with the profitability, the debt ratio (obtained by dividing the total debt of the company by the equity) is used as a control variable. The results of the descriptive statistics show that the average leverage ratio for the Indian steel industry is 1.62 with a standard deviation of 0.87. The maximum debt financing used by Indian steel industry is 3.54, whereas the minimum level of the debt ratio is 0.86 which is unusual, but may be possible. To check the GDP growth and its relationship with the profitability, GDP growth rate is used as a control variable. The mean value for this ratio is 20.49 per cent with a standard deviation of 52.25 per cent. The maximum GDP growth during the study period is 117.95 per cent and the minimum is -60.20 per cent.

PEARSON'S CORRELATION CO-EFFICIENT ANALYSIS

Consistent with **Shin and Soenen (1998),** Table 3 provides the Pearson correlation for the variables used in the regression model. Pearson's correlation analysis is used for data to see the relationship between variables such as those between liquidity (working capital management) and profitability. If efficient working capital management increases profitability, one should expect a negative relationship between the measures of working capital management and profitability variable. There is a negative relationship between gross profitability on the one hand and the measures of working capital management on the other hand. This is consists with the view that the time lag between expenditure for purchases of raw material and the collection of sales of finished goods can be too long, and that decreasing this time lag increases profitability.

Table 3 shows that the profitability is negatively related to ARP. The negative relationship of profitability and ARP is consistent with the view that the less time taken by the customer to pay their bills, the more cash is available to replenish the inventory hence leading to more sales which results to an increase in profitability. The table also shows that the profitability is negatively related to ICP. The negative relationship between profitability and ICP can be explained by the fact that industry takes more time in selling inventory, it will adversely affect its profitability due high amount of holding cost. The positive relationship between profitability and APP can be explained by the fact that lagging payments to suppliers ensures that the industry has some cash to purchase more inventory for sales thus increasing its sales levels hence boosting its profits. The negative relationship between profitability and CCC is consistent with the view that the time lag between the expenditure for the purchases of raw materials and the collection of sales of finished goods can be too long and that decreasing the time lag increases profitability **(Deloof, 2003).**

Industry size is positively related to profitability. This means that larger industry report higher profits compared to smaller industry. This may be due to larger industry ability to exploit their economies of scale. Growth, which could be an indicator of a industry business opportunities, is an important factor allowing industry to enjoy improved profitability, as can be seen in the positive sign for the variable growth. With reference to other control variables, leverage and GDPGR, profitability is negatively associated with leverage whereas profitability is positively associated with GDPGR. This efficiency will lead to increasing its profitability. The results of correlation analysis indicate that as far as Indian steel industry are concerned, the liquidity management very significantly and strongly affects their profitability.

RELATIONSHIP BETWEEN ACCOUNTS RECEIVABLE PERIOD (ARP) AND PROFITABILITY

The results of the regression (Model 1) of ARP with profitability along with other control variables presented in Table 4. The results of this regression indicate that, consistent with **Deloof (2003) and Raheman and Nasr (2007)** a negative and significant relationship exists between the ARP and profitability in the Indian Steel Industry. This result suggests that industry can improve their profitability by reducing the number of days accounts receivables are outstanding. The result can also be interpreted as the less time takes for customers to pay their bills, the more cash is available to replenish inventory hence the higher the sales realized leading to higher profitability of the industry. The negative coefficient on the ARP suggests that an increase in the number of days accounts receivable by 1 day is associated with a decline in profitability. Consistent with **Lazaridis and Tryfonidis (2006),** this finding implies that managers can improve profitability by reducing the credit period granted to their customers. This finding implies that a more restrictive credit policy giving customers less time to make their payments improves performance. The size of the industry showed a significant negative relationship with profitability. The results of the regression indicate that the coefficient of growth (as measured by growth of sales) on profitability showed significant and positive relationship with profitability. The study used the debt ratio (measured by debt divided by equity) as a proxy for leverage, it shows a negative relationship with the profitability. This means that, when the leverage of the industry increases, it will adversely affect its profitability. Similarly, GDP growth of the country showed a significant positive relationship with profitability. It reflects that if the country's GDP increases, the profitability of Indian Steel Industry will also increases. The model's adjusted R^2 is 0.83 per cent with an F-value of 13.07 which is significant ($p<0.01$). The Durbin Watson statistics is 1.68.

RELATIONSHIP BETWEEN INVENTORY CONVERSION PERIOD (ICP) AND PROFITABILITY

In Model 2, regression is run using Inventory Conversion Period (ICP) in days as an independent variable as a replacement for Accounts Receivables Period (ARP). The other variables are the same as they have been in the first regression. The result of the regression model is presented in Table 4. It is evident from the table that the co-efficient of inventory conversion period in days is negative in Indian steel industry. Consistent with **Reheman and Nasr (2007) and Lezaridis and Tryfonidis (2006)** a negative relationship exist between Inventory Conversion Period (ICP) and profitability. This result suggests that the increase or decrease in the ICP in days affects profitability of the industry. It can be interpreted that if inventory takes more time to sell, it will adversely affect profitability. The co-efficient on the other control variables are significant as in case of first regression model. The size is negatively related to profitability and this is significant at 1 per cent level. The results of the regression also showed that growth of sales is positively related to industry profitability. Similarly, the results showed that use of leverage have negative impact on industry profitability. Further, the GDP growth of country is positively related to industry profitability. The model's adjusted R^2 is 87 per cent with an F-value of 16.46 which is significant ($p<0.01$). The Durbin Watson statistics is 1.80.

RELATIONSHIP BETWEEN AVERAGE PAYMENT PERIOD (APP) AND PROFITABILITY

The third regression is run using the Average Payment Period (APP) as an independent variable as a substitute of Inventory Conversion Period (ICP) in days. The other control variables are same as they have been in first and second regression. The results of the regression model are presented in Table 4. In model 3, the co-efficient on the average payment period is positive and significant. This suggests that an increase in the number of days accounts payable by 1 day is associated with an increase in profitability. The positive relationship can be explained in two ways. First, contrary to **Deloof (2003) and Raheman and Nasr (2007),** this finding holds the more profitable industry waits longer to pay their bills. This implies that they withhold their payment to suppliers so as to take advantage of the cash available for their working capital needs. Second, this result makes economic sense in that the longer a industry delays its payments to its creditors, the higher the level of working capital levels it reserves and uses in order to increase profitability. This finding is in line with the working capital management rule that industry should strive to lag their payments to creditors as much as possible, taking care not to spoil their business relationship with them. Consistent with the other models, the industry size is negatively related to profitability, growth and GDP growth being positively related to profitability. Whereas an increase in the use of debt decreases profitability. The models adjusted R^2 83 per cent with an F- value of 12.86 which is significant ($p<0.01$). The Durbin Watson statistic is 1.89.

RELATIONSHIP BETWEEN CASH CONVERSION CYCLE (CCC) AND PROFITABILITY

In fourth regression model, cash conversion cycle is used as an independent variable instead of ARP, ICP and APP. the other variable are kept the same as they were in first three regressions. The results of the fourth regression model are presented in Table 4. Consistent with **Deloof (2003), Raheman and Nasr (2007) and Shin and Soenen (1998),** a negative relationship exists between the Cash Conversion Cycle (CCC) and profitability. This supports the notion that the CCC is negatively related with profitability. **Shin and Soenen (1998)** argued that the negative relation between profits and the cash conversion cycle could be explained by the market power or the market share, i.e., a shorter CCC because of bargaining power by the suppliers and /or the customers as well as higher profitability due to market dominance. The negative relationship between the industry CCC and profitability can also be explained by the fact minimizing the investment in current assets can help in boosting profits. This ensures the liquid cash is not maintained in the business for long and that it is use to generate profits for the industry. The all other control variables showed similar findings as in the case of first three regression equations and significantly affecting profitability. The model's adjusted R^2 is 72 per cent with an F-value of 10.65 which is significant ($p<0.01$). The Durbin Watson statistics is 10.65.

Model 5 acts as a control model for the variables under study. The model was run so as to provide an indicator as to the most significant variables affecting the study. The model shows that all the variables included are significant. In this model, the ARP, ICP, Size and Leverage are negatively related with industry profitability while APP, Growth and GDPGR variables exhibit a positive relationship. The model's adjusted R^2 is 84 per cent with an F-value of 10.25 which is significant ($p<0.01$). The Durbin Watson statistics is 10.25.

CONCLUSION

The study of empirical relationship between liquidity and profitability is one of the areas of performance of corporate enterprise. This study has shown that Indian steel industry has been able to achieve high scores on the various components of working capital and this has positive impact on its profitability. Empirical results of the study found a significant negative relationship between profitability and Accounts Receivable Period (ARP), Inventory Conversion Period (ICP) and Cash

Conversion Cycle (CCC) for a sample of Indian steel industry. These results suggest that managers can create value for their shareholders by reducing the number of days of accounts receivable and inventories to a reasonable minimum. Further, companies are capable of gaining sustainable competitive advantage by means of effective and efficient utilisation of the resources of the organisation through a careful reduction of the cash conversion cycle to its minimum. In doing so, the profitability of the firm is expected to increase.

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TABLES

TABLE 2: DESCRIPTIVE STATISTICS OF INDEPENDENT, DEPENDENT AND CONTROL VARIABLES (whole industry, 2000-2013)

Variables	Mean ± S.D	Standard Error of mean	Median	Minimum	Maximum	Kurtosis	Skewness
PR	12.38 ± 78	2.17	12.37	-1.74	28.45	0.54	0.15
ARP	38.37 ± 9.55	2.65	40.23	25.83	57.33	-0.49	0.35
ICP	70.11 ± 11.17	3.10	67.93	55.25	93.95	0.14	0.61
APP	78.43 ± 36.33	10.08	66.53	38.53	149.90	0.35	1.07
CCC	30.04 ± 29.73	8.25	15.71	-16.40	6.25	-1.79	-0.04
Size	11.57 ± 0.79	0.22	11.55	10.37	12.48	-1.54	-0.32
Growth	20.98 ± 21.82	6.05	14.25	0.52	77.78	2.98	1.61
Leverage	1.62 ± 0.87	0.24	1.19	0.86	3.54	0.36	1.26
GDPGR	20.49 ± 52.25	14.49	17.72	-60.20	117.95	-0.03	0.56

TABLE 3: CORRELATION MATRIX

	PR	ARP	ICP	APP	CCC	Size	Growth	Leverage	GDPGR
PR	1								
ARP	-0.07	1							
ICP	-0.08	0.15	1						
APP	0.28	0.24	0.30	1					
CCC	-0.15	0.07	-0.13	-0.21	1				
Size	0.29	-0.12	-0.26	-0.24	0.22	1			
Growth	0.23	-0.33	-0.14	-0.20	-0.06	-0.07	1		
Leverage	-0.20	0.35	0.17	0.06	-0.25	-0.15	0.01	1	
GDPGR	-0.03	-0.11	-0.20	0.07	-0.20	-0.23	-0.26	0.42	1

TABLE 4: REGRESSION OF PROFITABILITY ON CASH CONVERSION CYCLE (whole industry, 2001-2013)
(Dependent Variable: Profit Rate on total assets (PR))

Independent Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Intercept	48.37	119.62	235.41	-39.59	154.39
ARP	-0.46 (-3.51)*				-0.10 (3.39)*
ICP		-0.45 (4.10)*			-0.24 (2.92)*
APP			0.31 (3.47)*		0.12 (1.78)**
CCC				-0.22 (2.34)**	
Size	-1.20 (-2.60)**	-5.50 (3.14)*	-16.20 (3.96)*	-5.65 (2.76)**	-8.80 (2.32)**
Growth	0.13 (2.48)**	0.06 (2.13)**	0.05 (1.71)***	0.22 (3.34)*	0.05 (1.72)***
Leverage	-4.72 (-2.09)**	-8.34 (4.99)*	-7.64 (3.99)*	-7.80 (2.65)**	-7.12 (2.57)**
GDPGR	0.03 (2.19)**	0.02 (2.16)**	0.01 (2.50)**	0.07 (2.22)**	0.01 (2.53)**
R^2	**0.90**	**0.92**	**0.90**	**0.79**	**0.94**
Adjusted R^2	**0.83**	**0.87**	**0.83**	**0.72**	**0.84**
F Value	**13.07**	**16.46**	**12.86**	**10.65**	**10.25**
Durbin Watson	**1.68**	**1.80**	**1.79**	**1.89**	**1.94**

Source: Computed

Notes: PR - Profit Rate on total assets: ARP - Accounts Receivables Period;
ICP - Inventory Conversion Period; APP - Accounts Payable Period;
CCC - Cash Conversion Cycle; Size - Natural logarithm of sales (proxy for size);
S.Growth - Sales growth; Leverage – Debt / Equity;
GDPGR - Gross Domestic Product Growth.
*- Significant at 0.01 level; **- Significant at 0.05 level; ***- Significant at 0.10 level.

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