A statistical analysis of the relationship between working capital management and profitability: Evidence from selected manufacturing companies of Bangladesh

Mohammad Emdad Hossain
Department of Business Administration
International Islamic University Chittagong (IIUC), Bangladesh

Abstract

The aim of this study is to measure the relationship between working capital management and profitability. The research is based on secondary data derived from annual reports of companies listed on Bangladeshi stock exchanges. The sample spans nine years, from 2011 to 2019, and includes 52 manufacturing enterprises in Bangladesh, including 20 pharmaceutical companies and 32 textile companies. The cash conversion cycle is significantly positively associated with profitability, the average collection period is significantly negatively associated with profitability, and the inventory conversion period is also significantly negatively associated with profitability, but the average payable period is not significantly associated with profitability. This research adds to the literature by focusing on working capital management and profitability, particularly in the textile and pharmaceutical industries. There have been a few research on this topic, however they are limited in sample size and time period. This research looks at all active businesses in these two industries. As a result, policymakers in these disciplines may utilize these findings to make decisions.

Keywords   Working capital management, Profitability, Listed companies, Bangladesh.

Paper type   Research paper

1.   Introduction

Working capital management measures the efficiency and financial well-being of the organizations. Though the initial targets of the organizations are to optimize profitability, at the same time company needs to maintain adequate asset-liability balances. Does the indicator of working capital management, such as; cash conversion cycle (Panigrahi, 2013); average collection period; inventory turnover (Kasozi, 2017); average payable period (Vural, Sökmen, & Çetenak, 2012) impact on firm's profitability is an intense debate towards the policymakers and researchers. A school of thought believes that managing the firm's short-term assets and liabilities intrinsically augments productivity, "at the risk of possible

insolvency". On the contrary, working capital management ameliorates the capability to handle corporate risks which in turn creates values for the firms (Sharma & Kumar, 2011). Consistent with these two views, to maintain regular and sustainable profit company needs to deal with working capital management (Beaumont-Smith & Fletcher, 2009). Today's business is so complicated; as a result, firms could do with handle assets and liabilities very carefully to maintain profitability.

A lot of studies have been conducted in this field, but mostly based on the developed country's economic setting. Therefore, the studies on the developing economy are important for the investor, policymakers. However, the main target of this study is to examine the association between working capital and profitability in the developing country settings like Bangladesh.

This study specifically focuses on Bangladeshi textile and pharmaceutical firms with markets worth more than BDT 27,000 crore. One of Bangladesh's fastest-growing industries, the pharmaceutical industry meets 98% of the country's demand. In the fiscal year 2020–21, the industry, which grew at an average rate of more than 15% (15.6%) per year, made $169 million by exporting medicines to 150 different nations. In terms of pharmaceutical exports, Bangladesh is now placed 71st in the world (Sultana, 2016). In these conditions, it is essential to do an empirical study on Bangladesh's pharmaceutical industries. Because of current trends in Bangladesh's pharmaceutical industry, investors and decision-makers have a lot of opportunities. However, Bangladesh's textile and garment industries have seen impressive expansion over the past 20 to 30 years, and the majority of its factories are situated near rivers. Recently, Bangladesh has moved up to the second spot in the world for textile production and exports (Ahsan et al., 2019).

In Bangladesh, the dress production industry makes a significant contribution to GDP development, job creation, and foreign exchange influx. Bangladesh garment manufacturers and exporters association (BGMEA) reports demonstrated that garments industry made up over 83 percent of all export revenues in 2017–2018, totaling more than $30.61 billion (Ullah, 2021). Additionally, in 2018, RMG and the connected fabric industry created almost 4.5 million job facilities (Akter, 2019). There is no question that the cloths production sector greatly outperforms other economic sectors in terms of its contribution to the Bangladeshi economy; as a result, greater focus should be placed on guaranteeing the long-term viability of such a crucial industry. Previous studies (Hoque, Mia, & Anwar, 2015) on this issue focused limited sample size, but this study focused all active firms of Pharmaceuticals and textile industries.

Initially, the study measures working capital and then firm's profitability.

Data for the empirical study were collected from yearly reports of recorded pharmaceuticals and textile Organizations of Bangladesh over the periods from 2011 to 2019, and finally the ordinary least square regression model has been to evaluate the relationship. Our study reveals that, the cash conversion cycle is significantly positively associated with profitability, the average collection period is significantly negatively associated with profitability, and the inventory conversion period is also significantly negatively associated with profitability, but the average payable period is not significantly associated with profitability. The above literature review contributes to the existing literature. Firstly, previous studies conducted relationships based on the specific industry of Bangladesh, but this study considers all the active manufacturing organizations of Bangladesh. Secondly, this study applies trade-off theory. Thirdly, this research adds to the literature by focusing on working capital management and profitability, particularly in the textile and pharmaceutical industries. There have been a few research on this topic, however they are limited in sample size and time period. Finally, the study will explain the result based on this theory. The rest of the paper consists of a literature review, research design, and results in discussion.

2. Theoretical framework

The study focuses trade-off theory, which demonstrates that a high performing firm may lessen low profitability problem, therefore, sample firms may incur negative association between productivity and liquidity. Previous studies of Eljelly (2004) found significant negative association between liquidity and profitability.
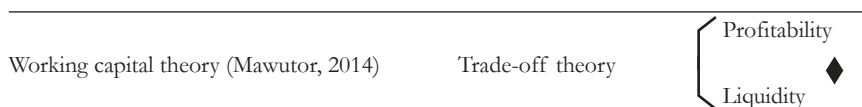
Working capital theory (Mawutor, 2014)	Trade-off theory	Profitability ◆ Liquidity

Figure 1
Summaries of theoretical framework.

3. Literature review

3.1. Cash conversion cycle and profitability.

The cash conversion cycle (Panigrahi, 2013) indicates the conversion of assets like; account receivable, inventory, etc. into cash. Previous research on various economies depicted the outcomes of the cash conversion cycle and profitability. But the finding does not give an inclusive conclusion. Previous study demonstrates mix results (Panigrahi, 2013) based on the economy of India pointed out a negative and significant association between cash

conversion cycle (Panigrahi, 2013) and profitability. On the other hand (Muscettola, 2014) demonstrates a positive relationship based on the Italian economy. Furthermore, Yazdanfar & Öhman, (2014) found significant positive relationship based on data from Sweden's small and medium-sized businesses. According to the African economy, Nigeria Zakari & Saidu, (2016) also found a significant positive relationship. Therefore, these dissimilar findings from diverse economies shed some light on further investigation on another economy. Thus, this study assumes that based on the economy of Bangladesh the relationship would be consistent with the findings of India as it is an Asian economy. As a result, current study has decided to fix up the hypothesis as follows:

H1: There is a significant positive relationship between cash conversion cycle and profitability.

3.2. Average collection period and profitability

The average collection period indicates the time requires collecting the cash from the debtors, lower days of the collection means the good performance of the organizations. Unlike research has been conducted on various economies in this issue. For example, Mawutor (2014); illustrates negative relationship with profitability, but this association is statistically significant. At the same time Mawutor (2014); Iqbal & Zhuquan, (2015); also pointed out the same association. On the other hand, Wafula, Tibbs, & Ondiek, (2019) based on the data of the service company found a significant positive relationship. Based on this dissimilar finding, this study proposes the following hypothesis based on the Bangladeshi economy as follows:

H2: There is a significant negative relationship between Average collection period and profitability.

3.3. Inventory collection period and profitability

Inventory uses for the production of the products. The more the inventory turnover in the organizations indicates the more production. The rate of inventory turnover is also the indicator of a firm's performance. A school of thought depicts that firms which has a higher turnover rate are less likely to stock out and more secure for getting finance from various sources Kasozi (2017). Previous researches show mixed results regarding this issue. Research of Kasozi (2017) shows affirmative relationship between inventory collection period and profitability. But the study of Shah, Gujar, & Sohu (2018) on the economy of Pakistan found an insignificant negative relationship. Based on the above explanation and findings, it has been crystal

clear that inventory collection and profitability are still a big issue of investigation on the diverse economy, therefore this study proposed a hypothesis to find out the answer to the question on this issue the following: *H3: There is a significant positive relationship between Inventory turnover and profitability.*

3.4. Payable period and profitability

The payable period indicates the time needs to settle the payment of creditors. If the company can ensure the effective turnover of account receivable and inventory then it would be conducive for the firms to settle creditors timely. The company's profitability also depends on an accurate settlement with account and notes payable. But many types of research demonstrate mixed results regarding the impacts of payable period and profitability. For instance, diversified outcomes prevail in the literature regarding account payable turnover and profitability. Diversified evidence presented in the literature regarding payable period and ROA, for example Vural, Sökmen, & Çetenak, (2012); Akoto, Awunyo-Vitor, & Angmor, (2013) shows no association, but the study of Falope & Ajilore, (2009); Raheman & Nasr, (2010) demonstrates positive relationship, interestingly, the findings of Deloof, (2003); Raheman & Nasr (2010); Enqvist Graham, & Nikkinen, (2014); Malik & Bukhari, (2014) demonstrates negative and significant relationship. Deloof (2003) explains negative correlation as "the fact that less profitable firms wait longer to pay their bills". According to Jose, Lancaster, and Stevens (1996), "increasing days in payables will cause losses of early payment discounts and flexibility of firm for future debt". On the other hand Mehtap, (2016) support the idea of the positive impact of trade credit as a less costly financing source on the profitability of firms. These dissimilar findings show that further research needs to be conducted on this issue, therefore, this study decided to fix up the hypothesis as follows:
H4: There is a significant negative relationship between average payable period and profitability.

4. Data and methodology

Secondary data have been taken from the websites of pharmaceuticals and textile industries of Bangladesh for the period 2011 to 2019. A total of 52 manufacturing companies include 20 pharmaceuticals and 32 textile companies of Bangladesh. Net sales, cost of goods sold, net income, average accounts receivable, average inventory, average accounts payable, total assets, and total debt are among the financial data of those businesses Mawutor,

(2014). The study used the ordinary least square (OLS) regression model. From the listed manufacturing companies of Bangladesh, we selected some (52) companies from pharmaceuticals (20) and textiles (32) because of information inconsistency and unavailability of annual reports.

4.1. Description of variables

Following previous studies, this study measured return on asset, as a measure of a company's profitability, and consider it as dependent variable. Independent variable consists of the cash conversion cycle Panigrahi, (2013); average collection period; inventory turnover Kasozi, (2017); average payable period Vural, Sökmen, & Çetenak, (2012) as a proxy for a component of working capital. Moreover, Debt ratio and firm size were used as control variables; Panigrahi , (2013); Raheman & Nasr, (2010).

Table 1
Variable definitions

Explanation	Measurement	Variable
"Return on asset (ROA)" (Mawutor, 2014)	(Net income)/ (Total asset)	Dependent
"Average collection period (ACP)"	"(Average Account Receivable)/ (Net sales*365)" (Mkiibi et al., 2014)	Independent
"Inventory Collection period (ICP)" (Shah Gujar, & Sohu, 2018)	"(Average Inventory)/(Cost of Goods sold*365)" (Shah, Gujar, & Sohu, 2018)	"
"Average payable period (APP)" (Falope & Ajilore, 2009)	(Average Account Payable)/ (Cost of Goods sold*365)	"
"Cash Conversion Cycle (CCC)" (Panigrahi, 2013)	"(Average collection period)+(Inventory Collection period)-(Average payable period)" (Panigrahi, 2013)	"
"Debt Ratio (DR)"(Deloof, 2003; Raheman & Nasr, 2010)	(Total Debt)/(Total asset)	Independent (Control)
"Firm Size (SZ)" (Deloof, 2003; Raheman & Nasr, 2010)	Total Asset	"

Table: 01 Proxy variables description with measurement.

4.2. Panel regression model

Consistent with previous studies Shah, Gujar, & Sohu, (2018); Panigrahi, (2013), this study uses OLS regression model to measure the relationship of working capital management with profitability. The study uses following model:

$$ROA_{it}= C+\beta_1 (CCC_{i,t}) + \beta_2 (ACP_{i,t}) +\beta_3 (ICP_{i,t}) + \beta_4 (APP) + \beta_5 (DR_{i,t}) +\beta_6 (FSZ_{i,t}) + \varepsilon_{i,t}$$

Where, C, indicates Constant term

ROA = stands for Return on Assets

CCC = Cash Conversion Cycle
ACP=Average Collection Period
ICP=Inventory Conversion Cycle
APP=Average payable period
DR=Debt Ratio SZ=Firm Size (Total Asset)
ε =Error Term
i,t=stands for firm(i) and year (t)

5. Descriptive statistics

The independent variables cash conversion cycle (Panigrahi, 2013), average collection period, inventory turnover (Kasozi, 2017), average payable period (Vural, Sökmen, & Çetenak, 2012), Debt Ratio (DR), and Firm Size (Total Asset) are all described in Table 02, including the dependent variable Return on Assets (ROA) (SZ). The average return on assets (ROA) is 6% of total assets, implying that the sample companies' overall return rate is 6%, with a standard deviation of 7%. The ROA can reach a maximum of 44 percent and a minimum of -11 percent. Cash conversion cycle (CCC) has been used to calculate liquidity; however, evidence shows that (in Table 2) the average value is 419.50, with a standard deviation of 91.61. Moreover, the highest and lowest possible score is 1570.20 and -32.52 respectively, highest value suggesting that businesses convert their capital into cash in at least 1570 days. The average collection period (ACP), which is used to measure a company's ability to turn receivables into cash, is another proxy variable for measuring liquidity. Results also show the mean value of ACP is 180.50 days and a usual difference of 58.27 days.

Table 2

Descriptive statistics results of selected manufacturing companies of Bangladesh

Variable	Mean	Median	Standard deviation	Minimum	Maximum
ROA	0.06	0.04	0.07	-0.11	0.44
CCC	419.50	207.25	91.61	-32.52	1570.20
ACP	180.50	91.23	58.27	0.00	1642.08
ICP	288.01	138.08	95.29	0.00	1124.99
APP	49.02	15.40	41.75	0.00	1748.75
DR	0.12	0.08	0.15	0.00	2.18
Firm Size	3.20	3.22	0.56	0.00	4.80

Source: Statistical data from listed pharmaceuticals and textile firms of Bangladesh.

The maximum amount of time it takes a company to collect a receivable is 1642.08 days, while the lowest amount is 0.00. Similarly, to determine the company's liquidity level, the inventory conversion period (ICP) is used. Evidence shows the average value and standard deviation of the inventory conversion period is 288.01, and 95.29, respectively. Table 02 further demonstrates that the inventory conversion period (ICP) has a maximum value of 1124.99 and a minimum value of 0.00. Average debt ratio (DR) is 0.06 and its standard deviation is 0.07. A company's maximum debt level is 0.44, while its minimum debt level is -0.11. Furthermore, above table also explains that the mean value of Firm Size (SZ) is 3.20 while the standard deviation is 0.56, but the highest and lowest values are 4.80 and 0.00, respectively.

5.1. Correlation analysis

Present study considered Correlation analysis to determine the relationship between asset liability management and a company's profitability (Shah, Gujar, & Sohu, 2018). The correlation coefficient can be anywhere between -1.00 and +1.00 (e.g., Almasarwah, 2015). Positive correlation occurs when the value of one variable rises at the same time as the value of another linked variable, and vice versa.

Table 3

Correlation coefficient results of selected manufacturing companies of Bangladesh

Variable	ACP	ICP	APP	CCC	FIRM SIZE	Debt ratio	ROA
ACP	1						
ICP	0.41***	1					
APP	0.07	0.12**	1				
CCC	0.65***	0.79***	-0.12**	1			
FIRM SIZE	-0.16***	-0.15***	-0.03	-0.23***	1		
Debt Ratio	-0.03	0.10**	-0.11**	0.05	-0.05	1	
ROA	-0.33***	-0.16***	-0.02	-0.20***	0.22***	-0.19***	1

Note: Table shows the bi-variate results of all the variables. The definitions of variables are given in Table 1. Statistical significance level are marked by star *,**,*** for 10% ,5% and 1% level respectively.

Table 3 above shows the outcomes of the association between dependent and independent variables applied in the examination. Evidence demonstrates negative correlation between ROA with all the variables except the debt ratio. However, results depicted that if those stated proxy variables increase it may harm the firm's profitability. The current study further

investigates the relationship by using regression analysis because correlation result sometimes represents the partial result.

5.2. Panel regression analysis results

The relationship is investigated using the ordinary least square approach in this study. Overall results derived by using STATA Software. However, current study has taken the information from the annual report of listed pharmaceuticals and textile companies. Finally, 468 firm-year observations from 52 publicly traded manufacturing firms spanning a 9-year period from 2011 to 2019 were fixed. ROA is the indicator of profitability which is regressed against CCC, ACP, ICP, APP, DR, and firm size (Total Asset) in the following regression estimation result.

Table 4

The result of ordinary least square (OLS) of selected manufacturing companies of Bangladesh

Variable	Coefficient	Standard error	T-value	P-value
Average collection period(ACP)	-0.039	0.006	-6.940	0.000
Inventory collection period(ICP)	-0.021	0.011	-1.870	0.062
Average Payable period(APP)	0.004	0.005	0.780	0.437
Cash conversion cycle(CCC)	0.028	0.011	2.490	0.013
Firm Size	0.021	0.005	4.120	0.000
Debt ratio	-0.083	0.019	-4.370	0.000
Constant	0.046	0.024	1.970	0.049
Overall probability	0.000			
R-squared	0.187			
Number of observations (Firm-years: 52*9)	468			

[Note: Table shows the regression results of working capital management and profitability. Statistical significance level are marked by star *, **, *** for 10%, 5%, and 1% level respectively. ROA indicates return on asset, CCC indicates cash conversion cycle, ACP indicates average collection period, ICP shows inventory conversion period, and DR is debt ratio.]
Sources: Statistical results from sample firms

Table 04 shows the results of regression analysis; the entire R-square is about 0.19, suggesting that the explanatory variables explained roughly 19% of the variation in return on assets. When all other variables remain steady and unchanged, the slope of the equation is 0.046, meaning that the ROA is anticipated to fall by 0.046. Further evidence illustrates that there is a affirmative association between CCC and ROA, which is significant at a 5% level, indicating that the hypothesis is accepted at a 5% level of significance. As a result, a significant increase in the CCC would result in a profit rise of 0.028 percent. The findings have supported Muscettola (2014), Yazdanfar

and Öhman (2014), Zakari and Saidu (2016), but not Panigrahi (2013). The findings are also not supported by the Trade-off Theory.

Furthermore, there is a considerable negative connection between the ROA and ACP, and it is statistically significant. As a result, the null hypothesis will be accepted at a 1% significance level. This means that a 1% reduction in the average collection period will result in a 0.039 percent drop in profitability. This observation is in line with others Mawutor, (2014); Iqbal & Zhuquan, (2015); Mathuva, (2015). This result, on the other hand, contradicts the findings of Wafula, Tibbs, & Ondiek, (2019). Finally, the trade-off theory is supported by this result.

Furthermore, the results show a negative association between the ICP and ROA, which is statistically meaningful at the 10% level. As a result, this hypothesis is rejected, although it is compatible with the Trade-off theory, which states that liquidity should be inversely connected with company profitability. The conclusions of the study are also supported by the results Shah, Gujar, & Sohu, (2018). It backs up the idea that a 1% reduction in inventory conversion time would result in a 0.021 percent expansion. Additionally, ROA has no significant association with APP, but momentous relationship with firm size and debt ratio.

6. Conclusion

The primary goal of this research is to look into the link between working capital management and a company's profitability. To conduct empirical analysis the study collected data from the annual report of relevant companies listed in the stock exchanges of Bangladesh. The sample consists of 52 firms in the manufacturing sector including 20 pharmaceuticals and 32 textile companies of Bangladesh over nine years spanning from 2011 to 2019. Results show that the cash conversion cycle is significantly positively associated with profitability, the average collection period is significantly negatively connected, and the inventory conversion period is also significantly negatively associated with profitability, but the average payable period is not significantly associated.

Overall, the result illustrates that hypothesis numbers 01 and 02 are accepted and 03 and 04 are rejected. Moreover, the results of hypotheses 02 and 03 support the trade-off theory. This study only considers two industry textile and pharmaceuticals, so future research may be conducted on the full sample of manufacturing of Bangladesh. The policymakers and investors may use these findings to make the corporate governance and other financial standards-related decisions. Further studies may undertake in this field using larger sample sizes and cross-country research.

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Corresponding author
Mohammad Emdad Hossain can be contacted at: emdad@iiuc.ac.bd