



Does Working Capital Management Affect the Profitability? A Case of Pakistani Manufacturing Firms

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1. Introduction

Working capital management (henceforth WCM) is an important area of corporate finance. Its management directly affects the liquidity and profitability of firms (Raheman and Nasr, 2007; Zariyawati, *et al.* 2009). Moreover, it is the management of current assets and current liabilities (Raheman and Nasr, 2007). The WCM mainly focus on the decision about how much funds will be invested in each element of current assets and the sources that will be used to finance these assets (Mathuva, 2009).

Preceding studies of corporate finance have been accentuated on WCM due to its significance. According to Chandra (2007) manufacturing firm's current assets represent almost 50 percent of their total assets and while in case of trading and

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distribution firms, more than fifty percent of total funds are invested in current assets. However, excessive investment in current assets causes reduction in profitability (Gitman, 2009).

Nevertheless, WCM is a very sensitive area, as the decisions taken about different components of working capital are recurring and time consuming (Joshi, 1994). Further, these decisions have short term effect on firms' profitability and liquidity so any adverse effect of these decisions can be corrected without incurring a major loss. The managers usually take these decisions during investment in current assets and also at the time of choosing sources of short term funds for financing current assets (Samiloglu and Demirgunes, 2008). During business recession, firms can overcome crises by managing their working capital efficiently. Even in expansionary business environment, where every organization strives to excel others in the market. Firms can get competitive advantage over their rivals by managing their working capital efficiently (Padachi, 2006).

The above discussion reveals that firms can improve their profitability by giving due consideration to working capital management. Therefore, the current study aimed to analyze WCM efficiency; working capital policies and strategies impact on profitability of Pakistani listed manufacturing firms on Karachi Stock Exchange. There is dearth of research on WCM particularly in emerging capital markets (Zariyawati, *et al.* 2009) like Pakistan. Hence, this study would be an addition into the working capital management literature in general and particularly for Pakistan.

Rest of the paper is organized as follows: After explaining the working capital management and rationale of the study in introduction, a brief review of previous studies along with their findings is given in section 2. Data sources, sampling, variables and methodology used in the study are discussed in section 3. Data analysis and explanation of results are reported in section 4. Section 5 concludes this study by highlighting its empirical findings along with policy suggestions and by proposing further research direction.

2. Literature Review

In this section we briefly explain findings of previous studies on working capital management and its likely effect on profitability. For instance Shin and Soenen (1998) found that WCM significantly affects the profitability of firms. Raheman and Nasr (2007) found significant relationship between variables of the working capital management and profitability of the firm. Similar results were found by Padachi (2006). Sayaduzzaman (2006) concluded that any improvement in the efficiency of working capital management has positive effect on profitability, and growth of a firm. Similarly Chowdhury and Amin (2007) found significant relationship between working capital policies and firms' profitability.

Zariyawatiet *al.* (2009) recommended that in order to increase the value of a firm, managers should pay due attention on the reduction of cash conversion cycle. Uyar (2009) examined that larger firms have shorter cash conversion cycle and are more profitable. On the contrary, studies of Lyrودي and Lazaridis (2000) and Gill, *et al.* (2010) found that cash conversion cycle is positively related with profitability.

Asselbergh (1999) stated that the management of debtors' accounts has strategic value for the firm, and there is need to create flexibility and control in managing debtors. Deloof (2003) suggested that managers could create value for their shareholders by curtailing the number of days' accounts receivable and inventories to a reasonable minimum limit. The study shows negative relationship between the number of days accounts payable and profitability, with the view that payment of bills normally delayed by less profitable firms.

Teruel and Solano (2007) established significant positive correlation between trade and other payables turnover in days and profitability. Moreover, firms' profitability can be improved by reducing the trade receivable turnover in days, inventory turnover in days and by lowering the cash conversion cycle.

Mathuva (2009) by analyzing Nairobi non-financial firms, suggest that firms can increase profits by reducing their bad debts and opportunity costs via speeding up the collection from customers. Nazir and Afza (2008) found that Pakistani listed manufacturing firms can increase profitability through short term investment in assts.

However, the degree of aggressiveness in working capital financing and investment policies negatively affect the profitability of firms.

Nwankwo and Osho (2010) concluded that efficient working capital management is inevitable for the growth and existence of a firm. Because it positively affects profitability of firms, hence enable firms to continue their operations indefinitely. Raheman *et al.* (2010) highlighted the significance working capital management for the firms belonging to manufacturing sector of Pakistan. They pointed out that manufacturing firms are facing problems regarding their collection and payment policies. Lack of empirical studies about the impact of working capital management policies and strategies on manufacturing firms' performance particularly in the context of Pakistan (Raheman *et al.* 2010) is the main driving force to conduct this study. Therefore, present study will contribute to the existing literature on working capital management from the perspective working capital management policies and working capital management goals regarding efficiency which seemed not covered by previous studies. After the brief review of literature, we now focus on methodology of the study in the next section.

3. Data and Methodology

As we explained earlier, this study investigates the effect of working capital management policies and efficiency on profitability of firms. In this section we extend the methodology of Padachi (2006) and Raheman, *et al.* (2010) by taking quarterly observations and apply panel regression analysis – fixed and random effect models.

3.1 Data Description

The study uses quarterly financial reports of 148 manufacturing firms listed on KSE, for the period of 2006-2011. The total number of observations used in the study is 2368. These quarterly reports have obtained from KSE and/or respective firms. The study explicitly excludes financial, trading and service sectors due to specific nature of their operating activities. Nevertheless, for balance panel consideration the study only take those manufacturing firms which provide quarterly financial reports for 20 quarters.

Furthermore, in order to keep reasonable representation of each manufacturing sector in the sample, manufacturing sectors with less than four are also excluded. Finally we included 18 engineering firms, 25 chemical firms, 54 textile firms, 20 cement firms, 16 sugar firms and 15 firms from fuel and energy sector, that make 148 in total.

3.2 Panel Estimation Techniques

We pool the data because it has both the cross section and time effects. Moreover, the used data is short and wide (Griffiths *et. al.*, 2008) indicating that there are many firms observed over a relatively short period of time. Hence it gives rise to presence of heterogeneity cross sections and over time (Asteriou, 2006). We applied fixed and random effect models to investigate the effects of cross section's specific factors on the dependent variable. In fixed effect (cross section) model, it is assumed that slope coefficients are constant over time for all firms but coefficient of intercept is allowed to vary across firms. We use the following model with two distinct disturbance terms ε_i and ω_{it} .

$$RATA_{it} = \alpha_0 + \sum_{i=1}^N \sum_{t=1}^T \beta_i X_{it} + \varepsilon_i + \nu_{it}$$

Where $RATA_{it}$ is used for dependent variable i.e. Profitability and X_{it} is vector of explanatory variables. The α_0 is a common intercept which is constant across firms and time. ε_i describes the cross section specific effects and is assumed fixed for individual firm. ν_{it} stand for residuals term. It describes the effects of all other factors on $RATA_{it}$ which could not be attributed to X_{it} . It was allowed to vary across time and firms.

On the other hand, in random effect model ε_i is a random variable that describes the firm's specific characteristics which varies across firms but remained constant over time. It measures the random deviation of each firm's intercept term from the common intercept term α_0 . It is assumed that ε_i has zero mean and constant variation. Furthermore, it is independent of individual observation error term ν_{it} and explanatory variables X_{it} .

Redundant fixed effect test is used to check whether the effect of firm's specific characteristics exist or not in the model. Furthermore, we use Hausman test to decide whether fixed effect or random effect models are the choice to investigate the relationship between working capital management and profitability.

3.3 Description of Variables

After reviewing prior studies on working capital management and firm performance, we selected the following variables to investigate the impact of working capital management on firm's profitability. The following tables describe the measurement and expected sign of variables used in the study.

Table – 1: Variables along with Expected Signs

Variables and their Measurement	Expected Sign
Dependent Variable	
Return on Average total Assets (RATA) is used as a proxy for profitability of a firm. = Quarterly net profit/ average total assets	
Independent Variables	
Average Trade Debtors turnover in Days (ATDTD) is used as a proxy for firm's credit policy. = Average trade debtors / Average per day sales during the quarter	+ / (-)
Average Stock in trade turnover in Days (ASTTD) is used as a proxy for firm's efficiency in managing stock in trade. = Average stock-in-trade / Average per day cost of goods sold during the quarter	+ / (-)

Average Payables turnover in Days (APTD) is used as a proxy for firm's payment policy. = Average trade and other payables/ Average per day cost of goods sold during the quarter.	+ / (-)
Average Cash Conversion Cycle (ACCC) is used as proxy for overall efficiency of working capital management. = (Average trade turnover in days + average stock turnover in days) – average payment turnover in days	+ / (-)
Average Current Assets to Average Total Assets (ACATA) is used as a proxy for firm's strategy of investment in current assets. = Average current assets during quarter / Average total assets during quarter	+ / (-)
Average Current Liabilities Average Total Capital (ACLATC) is used as a proxy for firm's strategy of short term financing. =Average current liabilities remained outstanding during quarter / Average total capital remained outstanding during quarter	+ /(-)
Average Debt Ratio (ADR) is used as a proxy for degree of financial leverage. = Average total liabilities remained outstanding during quarter / average total assets	(-)
Average Operating Assets to Average Total Assets (AOATO) is used as a proxy for overall operating efficiency of a firm in utilizing its operating assets. = Net Sales for a quarter / Average operating assets	+
Natural Log of Total Assets (NLTA) is used as proxy for firm's size.	+/(-)

3.3.1 Profitability

Firms' profitability is used as dependent variable in this study and it is defined as the relationship between revenues and costs which arise due to utilization of firms' assets (both current assets and fixed assets) in productive activities (Gitman, 2009). Chen and Shimerda (1981) found that return on total assets ratio has been used in fourteen various studies as a proxy variable to describe profitability of firms and thirteen times it was found useful. Like Sen and Oruc (2009, Ganesan (2007) and Padachi (2006) return on total assets (RATA) is used in the study as a proxy variable for profitability of firms.

3.3.2 Working Capital Management and Derivation of Hypotheses

Managers can increase profitability of a firm by controlling various costs associated with the various components of working capital. To control these costs they make policies and strategies regarding working capital and try to manage efficiently the components of working capital.

Working capital management can be described best in terms of a certain set of decisions variables such as credit policy, payment policy, stock-in-trade management efficiency, and strategy for investment in current assets, strategy for short term financing and overall efficiency of WCM. These decision variables of working capital management are used as explanatory variables in the study. The brief description of these decision variables is given in following paragraphs.

3.3.2.1 Firms Credit Policy

This policy is used to manage the trade receivables. The goal of this policy is to increase the profitability and to maintain stronger liquidity position of firms. Like Previous studies conducted by Padachi (2006); Mathuva (2009) and Gill, *et al.* (2010), trade receivable turnover in days is used in the study as a proxy variable for firm's credit policy. Lower value of this ratio means tight credit policy and higher value of this ratio indicates liberal credit policy.

Effect of credit policy on profitability depends on its expected benefits and expected cost. In case expected benefits are more than expected cost, profitability of a firm will increase otherwise vice versa. To investigate the effect of credit policy on firm's profitability a hypothesis is developed, that firm's credit policy has significant impact on its profitability. Following regression model is developed to investigate the effect of firm's credit policy on its profitability.

Model-

$$RATA_{it} = \beta_0 + \beta_1 ATDTD_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + \varepsilon_i + \nu_{it} \quad 2.2$$

3.3.2.2 Stock-in-Trade Management Efficiency

In this study we used average stock-in-trade turnover in days (ASTTD) ratio as a proxy variable [as used by Sen and Oruc (2009), Ganessan (2007), Padachi (2006)] for the efficiency of stock-in-trade management because it affects the profitability of firms (Raheman and Nasr, 2007). Through the improvement in efficiency, the ordering and carrying costs of stock-in-trade can be controlled. Hence ensures the increase in profitability of firms. On the contrary, too much efficiency may cause increase in costs and reduction in sales, and eventually the reduction in profitability. Owing to this we hypothesize that firm's efficiency in managing stock-in-trade has significant effect on its profitability. The aforementioned hypothesis has been tested with the following regression model.

$$RATA_{it} = \beta_0 + \beta_1 ASTTD_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + \varepsilon_i + v_{it} \dots\dots\dots (2)$$

3.3.2.3 Firm's Payment Policy

In this study we use trade and other payable turnover in days as a proxy variable for firm's payment policy in keeping with previous studies of Padachi (2006), Mathuva (2009) and Gill, *et al.* (2010). Higher value of this accounting ratio indicates that firm is using delayed payment policy. Firm using this policy avoids the early payment of cash to creditors and in lieu invest this cash in marketable securities or stock-in-trade and earn profit.

The lower value of this accounting ratio implied that firm is using early payment policy. If trade discount and early payment incentive are more than return on short term investment then early policy may cause increase in profitability and creditworthiness of firms. Hence, we hypothesize that firm's payment policy has significant impact on its profitability. The following regression model is used to test it.

$$RATA_{it} = \beta_0 + \beta_1 APTD_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + v_{it} \dots\dots\dots (3)$$

3.3.2.4 Overall Efficiency of Working capital Management

This study uses cash conversion cycle (CCC) as a proxy variable for the efficiency of working capital management in line with previous studies [Padachi (2006),

Mathuva (2009), Gill, *et al.* (2010) and Raheman, *et al.* (2010)]. The small value of CCC indicates higher level of WCM efficiency. The relationship between profitability and efficiency of working capital management depends on the cost and saving/profits. Profitability of a firm will increase if benefits supersede the cost of improving the overall efficiency of working capital management or vice versa. Therefore we hypothesize that overall efficiency of working capital management has significant effect on firm's profitability. Following model is developed to test this hypothesis.

$$RATA_{it} = \beta_0 + \beta_1 ACCC_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + v_{it} \dots\dots\dots(4)$$

3.3.2.5 Firms' Strategy of Investment in Current Assets

In this study we use average current assets to average total assets ratio (CA/TA Ratio) as a proxy variable for firm's strategy of investment in current assets in accordance with prior studies of Padachi (2006), Chowdhury and Amin (2007) and Afza and Nazir (2008). The higher value of this ratio indicates that firm has invested relatively more in current assets. Hence it based on conservative strategy of investment. On the other hand, lower value of this ratio indicates that firm has invested comparatively less in current assets. Hence firm following an aggressive strategy of investment (Chandra, 2007). The hypothesis is that firm's strategy of investment in current assets has significant impact on its profitability. Following regression model is developed to test this hypothesis.

$$RATA_{it} = \beta_0 + \beta_1 ACATA_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + \varepsilon_i + v_{it} \dots\dots\dots(5)$$

3.3.2.1 Firms' Strategy of Short Term Financing

This study also uses current liabilities to total assets ratio (CL/TA Ratio) as a proxy variable for short term financing strategy as used by Padachi (2006), Ganesan(2007), Chowdhury & Amin (2007) and Afza & Nazir (2008). The higher value of this ratio indicates that firm is using a relatively more aggressive strategy of financing to support its operating activities. Nevertheless, this strategy positively affects profitability and negatively influences the short term liquidity position of firms' (Van Horne and Wachowicz 2008). Therefore we hypothesize that firm's

strategy of short term financing has significant impact on its profitability. The following regression model is used to test it.

$$RATA_{it} = \beta_0 + \beta_1 ACLATC_{it} + \beta_2 AOATO_{it} + \beta_3 NLTA_{it} + \beta_4 ADR_{it} + \nu_{it} \dots\dots (6)$$

In addition to above stated explanatory variables, we also used financial leverage (Padachi, 2006; Raheman and Nasr, 2007; and Mathuva 2009), firm size (Samiloglu and Demirgunes 2008; Martin, *et al.* 2009), and efficiency in operating assets utilization (Martani, *et al.* 2009) as control variables. Following hypotheses are developed to investigate their effect on the profitability of firms.

- Degree of financial leverage has significant impact on firm's profitability.
- Size of a firm has significant impact on its profitability.
- Firm's efficiency in utilizing its operating assets has significant impact on its profitability.

4 Data Analysis and Explanation of Results

After explaining data and methodology, results of data analysis are reported in this section.

4.1 Descriptive Analysis

In this section we elaborate the attributes of data through descriptive statistics along with brief explanation. The Table – 2 depicts descriptive statistics for totals 2960 quarterly observations. Return on average total assets (RATA) ratio has mean and standard deviation values 0.012903, 0.059014 respectively. This indicates that on average firm are earning profit. The difference between maximum value and minimum value (a movement from profit to loss) shows that return on average total assets vary over a relatively small range. Similarly, the lower value of standard deviation indicates that profitability of the firms is not much sensitive, however, it varies either side of the mean i.e. profits vis-à-vis losses.

Table–2Descriptive Analyses of Variables

Variable	Descriptive Statistics					
	Mean	Median	Maximum	Minimum	Std. Dev	Observation
RATA	0.01290	0.01240	0.426387	-0.92513	0.059014	2960
ATDTD	52.9990	24.1758	1965.753	0	107.1225	2960
ASTTD	93.1836	63.8478	1731.459	0	1116.311	2960
APTD	138.918	65.5852	3415.581	0	272.726	2960
ACCC	-10.5883	24.0972	1781.514	-2982.82	260.1595	2960
ACATA	0.50781	0.50573	0.957571	0.072618	0.212416	2960
ACLATC	0.44357	0.42568	1.366716	0.04915	0.209656	2960
ADR	0.61522	0.61051	2.086512	0.184658	0.230344	2960
NLTA	17.3596	16.1354	24.74733	10.7596	3.634702	2960
AOATO	0.99219	0.28146	24.82023	-0.56175	2.546384	2960

ATDTD ratio is used as a proxy variable for credit policy of firms. It has mean value 52.99; it means on average firms lend credit to customers for 53 days. The high value of standard deviation is 107.12 days, it indicates that firms' credit policy is subject to change both across firms and over time. Hence management of firms continuously reviews credit policy and making marginal adjustments accordingly.

The average value ASTTD is 93.18 days, indicates that firms on average are able to sell their stock within 93 days. However, the standard deviation of this ratio is quite large 126.36 days and subject to cause greater variation in inventory management decision of firms.

The mean value of APTD, a proxy variable for firm's policy payment to trade payables, is 138.91 along with standard deviation of 272.72 days. According to these statistics, on average, firms are making payments to their creditors after 138 days but their payment policies are not stable due to high value of SD.

Average cash conversion cycle (ACCC) is used as a comprehensive measure of overall efficiency of working capital management. Firms with shorter cash conversion cycle are more efficient than the firms with longer cash conversion cycle. Average value of cash conversion cycle is 10 days which shows firms on average are efficient. Large standard deviation of 272 days indicates that level of efficiency attained by firms in managing their working capital is not stable.

ACATA ratio is used as a proxy variable for firms' strategy of investment in current assets. Higher value of this ratio indicates that firm is using conservative policy and lower value indicates that firm is using relatively less conservative policy of investment in current assets. Mean value 0.50 indicates that on average firms' investment in current assets is 50 percent of total value of assets owned by firms. But this investment in current assets is varying as shown by standard deviation which is 0.21. It means firms' investment policy can be more or less conservative.

ACLATC ratio is used to describe short term financing strategy of firms. Lower value of this ratio indicates that firms are using conservative financing strategy and

higher value indicates that firm is using aggressive financing strategy. The mean (0.4435) shows that firms are using relatively less aggressive strategy. The standard deviation (0.20) shows that firm' financing strategy can be relatively more or less aggressive.

Average debt ratio explains the degree of financial leverage, higher value of it indicates that on average firms are employing more funds with fixed financial charges. It also shows the level of financial risk. This ratio has mean 0.61 and standard deviation 0.23. These statistics show that on average firms are using more funds with fixed financial charges but their financing structure is varying over a relatively large spectrum as indicated by standard deviation and range. Natural log of average total assets is used as a proxy variable for firm's size.

On average firms' size is 17.35 which can vary across time and firms, the standard deviation is 3.63 and varies over range 13.98. Average operating assets turnover ratio is used to describe the efficiency of firms in utilizing operating assets. This ratio has mean value 0.99 with standard deviation 2.54.

4.2 Correlation Analysis

In this section we analyze the association among the selected variables based on the results of Pearson's correlation reported in Table – 3. First the association is of firms' credit policy with firms' profitability (RATA). The result indicates a positive association between ATDTD and RATA with coefficient 0.07137, which is significant at 5 percent. The coefficient value shows that firms using liberal credit policy hence earn more profit than the firms using tight credit policy.

The ASTTD has negative correlation with RATA of -0.17525 which is highly significant at 1 percent. It means firms managing their stock-in-trade efficiently have higher profitability. Similarly APTD explain the effect of firms' payment policy. Its coefficient of correlation with RATA is -0.14851 which is significant at 5 percent. It means that profitable firms are following earlier payment policy. The ACCC has coefficient of correlation with RATA is -0.07207, which is significant at 5 percent and

indicates that there is negative relationship between working capital management efficiency and firm's profitability. The ACATA ratio is used for firms' strategy of investment in current assets. This ratio has 0.0505 coefficient of association with RATA. This coefficient is significant at 10 percent. It means firms following the conservative strategy of investment in current assets, earn more profit.

Table – 3 Pearson's Correlation Matrix

	RATA	ATDT D	ASTTD	APTD	ACCC	ACAT A	ACLAT C	ADR	NLTA	AOAT O
RATA	1 (----)									
ATDTD	0.071 (0.043)*	1 (----)								
ASTTD	-0.175 (0.002)*	0.6701 (0.0104)*	1 (----)							
APTD	-0.148 (0.050)*	0.1111 (0.0020)*	0.8857 (0.0000)*	1 (----)						
ACCC	-0.072 (0.050)*	0.0251 (0.0863)	0.6597 (0.0000)*	-0.7226 (0.0000)*	1 (----)					
ACATA	0.0502 (0.064)**	0.0983 (0.0064)	0.0413 (0.0522)*	0.0272 (0.0451)*	0.0470 (0.1924)	1 (----)				
ACLAT A	-0.333 (0.000)*	0.1148 (0.0014)*	0.0294 (0.4145)	0.0164 (0.6484)	0.0509 (0.1585)	0.4791 (0.0000)*	1 (----)			
ADR	-0.396 (0.000)*	0.1135 (0.0016)*	0.0167 (0.6429)	0.0134 (0.7099)	0.0108 (0.7635)	0.0859 (0.0172)**	0.8088 (0.0000)*	1 (----)		
NLTA	0.136 (0.081)*	-0.1326 (0.0002)*	0.0657 (0.0687)*	-0.0614 (0.0886)**	0.0008 (0.0815)*	-0.0515 (0.0000)*	-0.4430 (0.0000)*	-0.2432 (0.0000)*	1 (----)	

AOAT	0.022 (0.002)*	0.2414 (0.0000) *	0.0306 (0.3963)	0.0613 (0.0894)* **	-0.1906 (0.000)*	-0.1021 (0.0046) *	-0.0297 (0.4099)	0.0447 (0.2157))	-0.1211 (0.0008))*	1 (----)
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Level Of Significance:

*Significant at 1%, ** Significant at 5%, *** Significant at 10 %

Firms' strategy of short term financing (ACLATC) has -0.3337 coefficients of correlation with profitability which is significant at 1 percent. It indicates that firms using aggressive strategy of financing earn less profit. The coefficient of ADR with RATA is -0.39654 and is significant at 1 percent. The Table – 3 also depicts the significant negative association between financial leverage and profitability. It means that firms using more long term debt funds with fixed financial charges have poor profitability. Natural log of average total asset (NLTA) has positive connection with firm's profitability. Average operating assets turnover (AOATO) has coefficients of correlation 0.0228 significant at 1 percent for RATA. It means that firms utilizing their operating assets more efficiently are likely to have more profitability.

4.3 Panel Estimation Outcomes

In this section we apply the results of fixed and random effect models, along with *Redundant* fixed effect test – to determining whether the fixed effects are necessary or not and *Hausman* test – to check for any correlation between the residuals and the regressors in a random effect model.

The panel estimation techniques consider the effect of both explained and unobservable firm specific factors on profitability. The *Redundant* fixed effects test showed in Tables – 4 and 5, it is evident that we can reject the null hypothesis of firms' specific characteristics have insignificant effect on firms' profitability as per the p-value which is less than the 1 percent level of significance.

Table – 4 Redundant Fixed Effects Test

Model –1 Credit Policy	Model – 2 Efficiency of Stock-in-Trade Management	Model – 3 Payment Policy
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Effects Test	Statistics	Degree of Freedom	P – value	Statistics	Degree of Freedom	P – value	Statistics	Degree of Freedom	P – value
Cross-section F	2.2194	(47,716)	0.0000	2.242751	(47,716)	0.0000	2.2488	(47,716)	0.0000
Cross-section χ^2	104.4532	47	0.0000	105.478173	47	0.0000	105.7458	47	0.0000

Table – 5 Redundant Fixed Effects F–Test Result

	Model – 4 Overall Efficiency of Working Capital Management			Model – 5 Strategy of Investment In Current Assets			Model – 6 Strategy of Short Term Financing		
Effects Test	Statistics	Degree of Freedom	P – value	Statistics	Degree of Freedom	P – value	Statistics	Degree of Freedom	P – value
Cross-section F	2.2515	(47,716)	0.0000	2.2212	(47,716)	0.0000	2.3127	(47,716)	0.0000
Cross-section χ^2	105.8629	47	0.0000	104.5299	47	0.0000	108.5471	47	0.0000

Now we apply the *Hausman* test to compare the coefficient estimates from the random effects model to those from fixed effect model. Both estimators are consistent if there is no correlation between unobservable firm specific factors and the explanatory variables. On the other hand, if residuals correlated with the explanatory variables, the random effects estimator will become inconsistent. The test also viewed as a distance measure between the fixed effect and the random effect estimators (Ahn and Moon, 2001).

Table – 6 Hausman Test

Test Summary	Model –1 Credit Policy			Model – 2 Efficiency of Stock-in-Trade Management			Model – 3 Payment Policy		
	χ^2 Statistic	χ^2 Degree of Freedom	P – value	χ^2 Statistic	χ^2 Degree of Freedom	P – value	χ^2 Statistic	χ^2 Degree of Freedom	P – value
Cross-section random	32.7448	4	0.0000	20.7568	4	0.0000	39.5393	4	0.0000

Table – 7 Hausman Test

Test Summary	Model – 4 Overall Efficiency of Working Capital Management			Model – 5 Strategy of Investment in Current Assets			Model – 6 Strategy of Short Term Financing		
	χ^2 Statistic	χ^2 Degree of Freedom	P – value	χ^2 Statistic	χ^2 Degree of Freedom	P – value	χ^2 Statistic	χ^2 Degree of Freedom	P – value
Cross-section random	43.0785	4	0.0000	0.0000	4	1.0000	19.0483	4	0.0008

On the basis of *p*-value (see Table – 6 and 7) of test we reject the null hypothesis of appropriateness of the random effects model even at 1% level of significance. It implies that we should use the fixed effect estimator in all the models.

Now we sequentially add each decision variables⁴ along with other control variables⁵ in all six models. The estimated results of fixed and random effects models are reported in Tables 8 and 9. In model 1, firm's profitability is regressed on firm's credit policy (ATDTD) and the coefficient turns out to be negative but insignificant [ensuing Raheman *et al.* (2010)]. It shows that profitability of a firm can be increased by implementing tight credit policy.

Table – 8 Fixed and Random Effect Results

Independent Variables	Model – 1			Model – 2			Model – 3		
	Fixed Effect			Random Effect			Fixed Effect		
	Coefficient	t-Statistic	P-Value	Coefficient	t-Statistic	P-Value	Coefficient	t-Statistic	P-Value
Intercept	0.4059	3.972	0.000	0.0864	2.814	0.005	0.4066	4.007	0.000
ATDTD	-3.67E-07	-0.018	0.985						
ASTTD				-1.13E-06	-4.539	0.000			
APTD							-8.61E-07	-3.870	0.000
AOATO	0.00055	0.433	0.665	0.00077	1.771	0.0917	0.000577	0.543	0.587
NLTA	-0.01991	-3.502	0.000	-0.000836	-0.918	0.358	-0.01996	-3.535	0.000
ADR	-0.08059	-2.206	0.027	-0.09826	-4.400	0.000	-0.08011	-2.193	0.028
Adjusted R²	0.208			0.083			0.209		

⁴These are firm's credit policy, efficiency of stock-in-trade management, firm's payment policy, overall efficiency of working capital management, firm's strategy of investment in current assets and firm's strategy of short term financing.

⁵ These are firm's efficiency in utilization of its operating assets, firm's size and financial leverage ratio.

DW Statistic	1.600	1.510	1.604
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Table 9 Fixed and Random Effect Results

Independent Variables	Model – 4			Model – 5			Model – 6		
	Fixed Effect			Random Effect			Fixed Effect		
	Coefficient	t-Statistic	P-Value	Coefficient	t-Statistic	P-Value	Coefficient	t-Statistic	P-Value
Intercept	0.402703	3.917	0.000	0.0607	1.536	0.124	0.3475	3.048	0.002
ACCC	2.58E-06	2.568	0.010						
ACATA				0.0227	1.654	0.098			
ACLATC							-0.0681	-1.007	0.314
AOATO	0.0006	0.577	0.564	0.0011	2.036	0.042	0.0005	0.498	0.618
NLTA	-0.0197	-3.457	0.000	-7.06E-05	-0.062	0.950	-0.0165	-2.753	0.006
ADR	-0.0798	-2.187	0.029	-0.0974	-4.335	0.000	-0.0306	-0.407	0.683
Adjusted R²	0.2093			0.0875			0.2144		
DW statistic	1.6032			1.5138			1.5989		

On the other hand, two out of three control variables are highly significant except firm's efficiency variable AOATO; nevertheless it has positive impact on firm's profitability. The size of the firm variable (NLTA) has negatively related with profitability [not owing to Samiloglu and Demirgunes(2008) and Martin, *et al.* (2009)]. It implies that firms are not optimally utilizing their investment in total assets, hence producing less profit per unit of their investment.

The Financial leverage (ADR) has significant negative effect on profitability of firms. It means increase in financial leverage will cause decrease in profitability of firms. This finding is consistent with Gill, *et al.* (2010) and Raheman, *et al.* (2010).

The model 2 contains all the explanatory variables, however credit policy is now replaced with efficiency of stock-in-trade management (ASTTD). The included variable has positive impact on the profitability of firms. It indicates that high profitability in Pakistan is subject to efficient management of stock-in-trade. This finding also strengthens the earlier studies [Samiloglu and Demirgunes (2008); Sen and Oruc (2009); Mathuva (2009) and Raheman, *et al.* (2010)] that efficient stock-in-trade management affects firms' profitability. The variables show right sign but one of them is insignificant.

Now in model 3 we add third sequential variable that is firm's payment policy (APTD). The coefficient of firms' payment policy is negative and significant which implies that by making earlier payment to trade creditors, firms can improve their profitability. It also suggests that firms have the opportunity to earn discount by making earlier payment to their trade creditors. This finding contradicts with Raheman, *et al.* (2010) and Gill, *et al.* (2010). It may be due diverse nature of firms and time period covered by these studies.

The model 4 contains average cash conversion cycle (a measure of overall efficiency of working capital management) along with other control variables on the right side of equation 4. The average lower value of cash conversion cycle indicates that overall working capital is being managed efficiently and vice versa. The positive sign indicates that firms can improve their profitability by lengthening their cash conversion cycle; however it has more cost than savings and thus leads to decrease in profitability. This result confirms the findings of Gill, *et al.* (2010) and Lyroudi and Lazaridis (2000).

The results of model 5 showed that firm's conservative strategy of investment (ACATA) in current assets has significant positive effect on profitability of firms. It means firms can generate more profits by increasing their investment in current assets particularly in trade receivables and stock-in-trade. This finding is in support of Rehman, *et al.* (2010) and Nazir and Afza (2008).

In model 6, profitability of firms is regressed on firms' strategy for short term financing (ACLATC). Like Raheman, *et al.* (2010), it is found that Firms' strategy of short term financing has negative impact on firms' profitability. It suggest that those firms which follow aggressive strategy of short term financing are generating less profitability due to high financial charges. Therefore it would be better for firms to meet their working capital financing requirement by medium and long term borrowing rather than short term borrowing.

5 Conclusions

This study investigates the effect of working capital management on profitability of manufacturing firms listed on KSE Pakistan. The fixed effect model results revealed that firms' aggressive strategy of financing negatively affect the profitability. Moreover, tight credit policy, efficiency of stock-in-trade management, early payment policy and conservative strategy of investment in current assets are found to have significant positive effect on profitability of firms. It is concluded that working capital management significantly affects profitability of manufacturing firms. It means that profitability of firms can be improved by choosing and implementing appropriate working capital strategies and policies. In addition to that, managers should use such techniques and procedures which are cost effective and are helpful in improving the efficiency of stock-in-trade management and overall efficiency of working capital management. In order to generalize the effect of working capital management policies on profitability of firms there is need of more extensive study with sample size covering more time span and more firms across various countries.

While managing stock-in-trade efficiently and effectively, managers should consider the expected rise in prices, expected shortage of materials, future demand for finished goods and processing capacity. Furthermore, there is need to focus on supply chain management. Similarly for developing appropriate credit policy, management should consider the industry structure, trade practices, business cycle, economic and political conditions, past relationship with customers and suppliers and etc.

Overall findings of this study strengthen the earlier studies [Samiloglu and Demirgunes (2008); Sen and Oruc (2009); Mathuva (2009) and Raheman, *et al.* (2010)] etc. Hence, the study can be extended to investigate the factors which must be considered by management while developing firms' working capital management policies and strategies.

References

- Afza, T and Nazir, M.S. (2008). Working capital approaches and firm's returns in Pakistan. *Pakistan Journal of Commerce and Social Sciences*, 1, 25-36.
- Asselbergh, G. (1999). A strategic approach on organizing accounts receivable management: Some empirical evidence. *Journal of Management and Governance*, 3, 1-29.
- Asteriou, D. (2006). *Applied econometrics* (1sted.). United States of America, Palgrave: Macmillan Publishers.
- Brooks, C. (2008). *Introductory econometrics for finance*, (2nded.). U.K. Cambridge University Press.
- Chandra, P. (2007). *Fundamentals of financial management* (7thed.). Tata McGraw-Hill publishing company.
- Chen, K. H. and T.A Shimerda, T.A. (1981). An Empirical analysis of useful financial ratios. *Financial Management*, 10(1), 51-60.
- Chowdhury, A. and Amin, Md. M. (2007). Working capital management practiced in pharmaceutical companies listed in Dhaka Stock Exchange. *BRAC University Journal*, 2, 75-86.
- Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of Business Finance & Accounting*, 30 (3)&(4), 573 - 587
- Ganesan V (2007). Analysis of working capital management efficiency in telecommunication equipment industry. *Rivier Academic Journal*, 3(2), Fall.
- Gill, A., Nahume, B. and Mathur, N. (2010). Relationship between working capital management and profitability: Evidence from the United States. *Business and Economic Journal*, 2-9 BEJ-10. <http://astonjournals.com/bej>
- Gilmer R.H. (1985). The optimal level of liquid assets: An empirical test. *Financial Management*, 14(4), 39-43.
- Gitman, L.A (2009). *Principles of managerial finance* (12thed.). New York: Addison Wesley Publishers.

- Gugarati, D.N. (2004). *Basic econometrics* (4thed.) USA, McGraw-Hill Co.
- John, A. T.(1993).Accounting Measures of Liquidity, Leverage, and Cost of Financial Distress.*Financial Management*,22 (3), 91-100.
- Joshi, P. V. (1995). *Working capital management under inflation* (1sted.). Anmol publishers.
- Lyroutdi, K.and Lazaridis, J. (2000).The cash conversion cycle and liquidity analysis of the food industry in Greece.http://papers.ssrn.com/paper.taf?abstract_id=236175.
- Martani, D., Mulyono, Khairurizka, R. (2009). The effect of financial ratios, firm size and cash flow from operating activities in the interim report to the stock return.*Chinese Business Review*, 8 (6), 44-55.
- Mathuva, D. M. (2009). The influence of working capital management components on corporate profitability: A survey on Kenyan listed firms.*Research Journal of Business Management*, 1-11.
- Nwankwo, O. and Osho,G.S. (2010). An empirical analysis of corporate survival and growth: Evidence from efficient working capital management. *International Journal of Scholarly Academic Intellectual Diversity*, 12,1-13.
- Padachi.K. (2006).Trends in working capital management and its impact on Firms' performance: An analysis of Mauritian small manufacturing firms.*International Review of Business Research Papers*, 2 (2), 45-58.
- Raheman, A. and Nasr, M. (2007).Working capital management and profitability – Case of Pakistani firms.*International Review of Business Research Papers*,3(1), 279-300.
- Raheman, A., Talat, A., Abdul, Q. and Mahmood, A. B. (2010).Working Capital Management and Corporate Performance of Manufacturing Sector in Pakistan.*International Research Journal of Finance and Economics*,47, 151-163.
- Samiloglu, F. andDemirgunes, K. (2008).The effect of working capital management on firm profitability: Evidence from Turkey.*The International Journal of Applied Economics and Finance*, 2(1), 44-50.
- SayaduzzamanMd (2006). Working capital management: A study on British American Tobacco Bangladesh Company Ltd.*The Journal of Nepalese Business Studies*,3(1), 78-84.
- Sen, M. andOruc, E. (2009).Relationship between efficiency level of working capital management and return on total assets in ISE.*International Journal of Business and Management*, 4(10), 109-114.
- Shin, H.H and Soenen, L. (1998).Efficiency of working capital management and corporate profitability.*Financial Practice and Education*, 8(2), 37-45.

- Smith K. V. and Sell B. S. (1980). *Working capital management in practice: In the readings on management of working capital* (51-84),.Edited by Smith K. V. West Publishing Company.
- Uyar, A. (2009). The relationship of cash conversion cycle with firm size and profitability: An empirical investigation in Turkey.*International Research Journal of Finance and Economics*, 24, 187-193, from<http://www.eurojournals.com/finance.htm>
- Van Horne J. C., and Wachowicz J. M., (2008), *Fundamentals of Financial Management* (13th ed),New Delhi,Pearson Education.
- Zariyawati, M. A., Anwar, M.N.,Taufiq, H. and Rahim, A.S.A. (2009).Working capital management and corporate performance: Case of Malaysia. *Journal of Modern Accounting and Auditing*, 5(54), 47-54.