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Investigating the Nonlinear Relationship between Working Capital and Profitability: a Case of Pakistan Textile Firms

Raziskava nelinearnega razmerja med obratnim kapitalom in donosnostjo: primer pakistanskih tekstilnih podjetij

Abstract

This study analyzes the impact of working capital (WCR) on operating profit of Pakistan textile firms from 2009 to 2016. The nonlinear relationship has been found between working capital and operating profit, which indicates that an optimal level of working capital exists in the textile firms of Pakistan. The firms are seeking the optimal working capital, where WCR (4.78%) of sales in generalized method of movement is used. Further, the study reveals that in the firms which maintain the positive working capital, it has a significant negative influence on the profitability, while in the firms with negative working capital, it has a significant positive influence on their profitability. The study also ascertains that cash holding level is an important factor for efficient working capital management.
Keywords: working capital, operating profit, cash level, textile firms

Izvleček

V raziskavi je bil analiziran vpliv obratnega kapitala na dobiček iz poslovanja tekstilnih podjetij v Pakistanu med leti 2009 in 2016. Med obratnim kapitalom in dobičkom iz poslovanja v tekstilnih podjetjih v Pakistanu je bila ugotovljena nelinearna odvisnost, kar kaže, da obstaja v teh podjetjih optimalna raven obratnega kapitala. Podjetja si prizadevajo doseči optimalni obratni kapital, kjer ta po splošni metodi gibanja znaša 4,78 odstotka od prodaje. Poleg tega je bilo v raziskavi ugotovljeno, da v podjetjih, ki ohranjajo pozitivni obratni kapital, ima ta znaten negativen vpliv na donosnost, medtem ko v podjetjih z negativnim obratnim kapitalom ta pozitivno vpliva na njihovo donosnost. V raziskavi je bilo tudi ugotovljeno, da je stopnja gotovinskega deleža pomemben dejavnik učinkovitega upravljanja obratnega kapitala.
Ključne besede: obratni kapital, dobiček iz poslovanja, višina denarja, tekstilna podjetja

1 Introduction

Pakistan's economy is the 24th largest economy in the world in terms of purchase power parity and the 42nd largest economy in terms of gross domestic product (GDP). Since 2014 Pakistan's economy has sustained the 4.5% growth rate and ranked among the top growing economies of South Asia. Pakistan's textile sector is the second largest sector of the economy after agricultural. Pakistan is the 4th largest textile producer in Asia and fulfills 8% of global textile demand products. It is the 8th largest textile exporter in Asia, and has ranked among the top 10 textiles producing countries in the world. The textile sector in Pakistan has maintained 12 billion US dollars investment in the period 2011 to 2012. It contributes

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approximately 9.5% to the country GDP and obtains 40% of total banking credits for the industrial sector. It also provides employment to an average 45% of total manufacturing labor force and maintains 54% share in the national exports [1–3].

The textile industry in Pakistan has also been affected by the global financial crisis 2008. The average growth rate 8.22% was found from 2001 to 2007 and −0.70% in the period 2008 to 09. The industry maintained a sluggish growth rate of an average 0.59% from 2010 to 2016. The Pakistan's textile share in international export decreased from 13.5 billion to 12.5 billion US$ in the years 2013 to 2015 [4].

The textile industry in Pakistan faces the number of challenges including the high-energy crisis, intensifying oil prices, lack of R & D in fiber & cotton and the dearth of modern technology in the textile sector. The industry has also been affected by lower demand for its products in EU and US markets in the last four years. Further, the production cost has increased by the depreciation of the local currency in terms of US dollar and the increased rate of inflation in the economy. Moreover, the political and economic uncertainty in the country has also negatively affected the textile industry in Pakistan [5, 6].

This study focuses on examining the operational performance of the textile industry in Pakistan. The working capital (WCR) can be used to measure the operational performance of business [7]. Pakistan's textile industry holds a lower level of working capital 2.33% (even negative) of gross sales and the large amount of trade credits 5.12% of sales in our selected sample. The industry also maintains a large stock of inventory 7.34% of sales in our study period. Conversely, the textile sector in Pakistan maintains a higher percentage of accounts receivable 3.34% of sales. Overall, it implies that the textile industry in Pakistan has tried to use working capital to run the day-to-day operations of the business.

In such situation, working capital is important for textile firms to survive in weak financial conditions and augmented economics uncertainty. Similarly, the liquidity management (cash and cash equivalent) cannot be ignored for textile firms in good times and even so in unfavorable economic circumstances. Shortage of liquidity can cause bankruptcy and excess liquidity harmful to a firm's profitability [8]. Working capital includes current assets and current liabilities. The current assets are cash, inventories, accounts receivables and marketable securities [7].

These assets are used to make the payment of short-term liabilities. Short-term liabilities are trade debts, short-term debts, and outstanding liabilities [9].

A higher working capital provides an opportunity to increase sales by maintaining a large stock of inventories to control the input price fluctuations and distributions. It also facilitates to extend trade credits and avails discount to make early payments. Moreover, with higher working capital, a firm can adopt the liberal trade credit policies about potential customers to boost up the sales revenue. But it requires the additional financing which increases the interest expenses and bankruptcy risk [10]. Further, the excess cash balances in working capital restrict firms to invest in the value enhancing projects and increase the opportunity cost of the business [11]. On the other hand, a lower level of working capital demands to hold a small amount of cash, to maintain a lower level of inventories, and to adopt the restrictive trade credit policy. It helps to reduce the interest expenses and the opportunity cost of debt. But it can also be caused by the liquidity crisis, shortage of inventories and reduction in sales revenue. Firms may also fail to make payment in time and increase the bankruptcy cost of the business [12].

According to Mun et al. [13], a nonlinear U-shape relationship exists between working capital and profitability. The managers are required to trade-off among the working capital components to maximize the firm's profitability. The trade-off among the current assets and current liabilities may lead to the efficient working capital management. The efficient working capital management requires that a firm can pay the short-term financial obligations and avoids over-investment in the current assets [14]. Hence, a firm can increase the profit by efficient monitoring of cash, inventories, accounts receivable and accounts payable.

Cash is the most liquid element of working capital. It directly influences the operational ability of a firm to meet its short-term financial claims [15]. Keynes [16] explains that a firm can maintain liquidity in the form of cash to meet the operational expenses which exceed its regular income. The firms also maintain cash as precautionary motives to prevent themselves against the risk of liquidity shortfall. However, it is not always beneficial to hold too much cash. Cash is the least profitable asset, and investment in cash is costly [17]. The managers may invest in less liquid assets to increase the profitability of a

firm. Myers [18] proposes a cash trade-off theory that equalizes cost and benefits of cash holding. Hence, the optimal level of cash can be obtained by trade-off among different components of the working capital.

Therefore, the aim of this study is to analyze the U-shape relationship between working capital and operating profit of the textile firms in Pakistan. This research also focuses on determining the optimal level of working capital that performs an important role to design the efficient level of working capital. It supports to overcome the limitations and difficulties faced by the textile industry in Pakistan to manage the business operations smoothly. Finally, we also examine the cash holding level that performs a pivotal role in the relationship between profitability and working capital.

2 Literature review

2.1 Working capital

Working capital is used to measure the short-term operational performance of the business. The operational risk and returns are generated from the procurement of inventories from vendors and collection of accounts receivable from customers. Cash conversion cycle (CCC) has been accepted to measure the risk and rewards associated with operations of business [19]. CCC reflects the length of time a firm needs to convert inventories, accounts receivable, and accounts payable into cash. Traditionally, CCC has been used as a proxy of working capital to investigate the influence of working capital on operating profit [14, 20–23]. In fact, CCC reflects the operational side (inventories, accounts receivable, and accounts payable) of a firm's working capital. In this manner, previous research studies used CCC to measure the operational performance of the business.

The relationship between CCC and the firm's profitability was analyzed in seven industries from 1974 to 1993 [24]. The results suggested that a lower level of CCC was associated with higher profitability in several industries. The negative association between CCC and operating profit was also found in Saudi Arabia's listed firms [20]. Similarly, the CCC also developed the negative association with operating profit in Japanese firms 1999–2004 [22]. The negative association of CCC with operating profit indicates that firms are maintaining an efficient level of

working capital to run the routine operation of the business. At lower level of CCC a firm is rotating inventory more quickly, maintaining a higher percentage of accounts receivable and delaying payments to vendors as much as possible.

The effect of working capital on operating profit was investigated in small and medium-size firms of Finland [9]. The results are consistent with the prior study of Eljelly and Abuzar [20] in terms of association between operating profit and working capital. Likewise, the negative relationship has been found between CCC and profitability in Finnish listed firms in different business cycles [11]. Here, CCC indicates that Finish firms are maintaining a higher rate of accounts receivable and managing inventories more efficiently to run the business operations smoothly, while insignificant relationship was found between working capital and profitability in Belgian listed firms 1992–1996 [19].

However, a lower level of CCC may also deteriorate the firm's profitability [25]. If the level of inventory is reduced too much, it can cause the interruption in the manufacturing process, can increase the carrying cost of raw material, and cannot avail the adequate amount of discount from suppliers. Wang and Yung [26] identify that if a firm maintains a lower level of inventory, the sales may also be reduced due to the shortage of product in the market. Further, the restricted credit policies can destroy the relationship with potential customers. Similarly, paying trade credits after an extended period of time and demanding more credits from suppliers may damage the firm's reputation [27].

According to Baos-Caballero et al. [12], the inverse relationship exists between CCC and profitability. They argued that a firm should increase the volume of working capital by increasing the investment in inventories and accounts receivable to boost up sales when CCC is too short. However, the effect of CCC is turned negative on a firm's performance after a certain point when CCC is too large. Hence, the managers have to find an optimal level of inventories, accounts receivable, and accounts payable to maximize the firm's profitability. Aktas et al. [11] also suggest that a nonlinear relationship exists between working capital and profitability in American manufacturing firms. They argue that US firms can enhance the operational performance by increasing investment in under-invested working capital or by reducing the over-invested working capital. Similarly, some other

studies have also found the nonlinear relationship between working capital and profitability [13, 28]. Their findings are consistent with the studies of [11] and [12].

After a detailed literature review, it has been observed that these studies only capture the operational side of working capital and ignore the financial side (cash, marketable securities, outstanding liabilities and short-term debt) which plays an essential role in determining the relationship between working capital and profitability. It has also been found that the effect of working capital on profitability has changed due to the change in the characteristics and environment of each industry. The managers are required to trade-off among the different components of working capital to enhance the firm's profitability. This trade-off in working capital may create a nonlinear relationship between profitability and working capital. So, overall, it has been found that working capital may develop a nonlinear U-shape relationship with profitability. Therefore, we propose the hypotheses:

- **Hypothesis 1:** The nonlinear relationship exists between working capital and operating profit in the textile firms in Pakistan.
- **Hypothesis 2:** If the textile firms maintain the positive working capital, the negative relationship will be developed between working capital and operating profit.
- **Hypothesis 3:** If the textile firms maintain the negative working capital, the positive relationship will be developed between working capital and operating profit.

2.2 Cash holding

The primary motives of cash holding are transaction motive, precautionary motive, tax motive and agency motive. The objective of transaction motive is to reduce the liquidating cost of assets instead of holding cash at the time of emergency [29]. In precautionary motive, companies maintain sufficient amount of cash than their desired level to meet the unexpected situations in future. The large tax paying companies manage cash for payment of tax obligations [30]. In agency motive, managers prefer to hold cash rather than distribute dividends among equity holders [31]. Working capital should be maintained with consistent profitability and sound liquidity for quick customer's response [32]. Managers need to find an optimal level of liquid assets to run operations

smoothly. The smooth operational strategy in working capital and capital structure characterize the level of cash holding [33].

Corporate liquidity is considered an economical source of financing to finance the growth opportunity as compared to generate the funds from the external market. The internal source of financing is reduced by the financial distress cost. But the free cash flows may increase the agency cost of shareholders. The firms can trade-off between the cost and benefits of internal financing to determine the optimal cash holding level [12].

The value of cash holding was analyzed in Chinese listed firms from 1993 to 2007. They argued that a firm could earn the higher profit and growth rate by holding a large amount of cash. The cash holding level also developed the inverse relationship with networking capital [34]. The firms that maintain the positive working capital and positive cash holding are expecting a higher uncertainty in future and poor ability to generate cash flows from operations. The positive working capital and positive cash holding increase the firm's opportunity costs, which negatively influences the firm's profitability [12].

On the other hand, if a firm has the capacity to generate efficient cash flows from the operation, it increases the non-cash assets in working capital. It reduces the opportunity cost of cash holding, which positively influences the firm's profitability [13]. Therefore, the relationship between working capital and profitability is affected by the level of cash holding. Hence, the cash performs a moderating role between profitability and working capital.

- **Hypothesis 4:** If the positive working capital exists in the textile firms in Pakistan, the negative relationship between operating profit and working capital will be influenced by the level of cash holding.
- **Hypothesis 5:** If the negative working capital exists in the textile firms in Pakistan, the positive relationship between operating profit and working capital will be influenced by the level of cash holding.

3 Data and methodology

3.1 Sample

This study uses the financial data of the Pakistan listed textile firms from 2009 to 2016. The data has been extracted from the balance sheet analysis and published financial statements of textile firms compiled

by the Central Bank of Pakistan. A total of 152 textile firms is listed in the Karachi stock exchange from 2009 to 2016 and became the part of our sample study. To normalize the data, 1% outliers has been converted into average in the whole data sets. The Cronbach's alpha is used to check the reliability of data. The alpha value (0.78) confirms that the data is normal and can be used for research purposes. For the final analysis, this study uses 8 years of data of 152 firms, and 1216 panel observations from 2009 to 2016.

3.2 Variables

This study uses the Return on assets (ROA) as the dependent variable for a proxy of a firm's operating profit. The working capital and its components (cash, inventory, accounts receivable and accounts payable) are used as independent variables. To find a unique relationship between profitability and working capital, the whole sample is divided into positive and negative working capital groups. The reason behind this is to examine the traditional view of working capital that a higher level of working capital enhances the value of the firm, while an opposite view maintains that a higher level of working capital negatively influences the firm's performance. Hence, it is not suitable to examine the whole sample mutually without considering the level of working capital.

Working capital consists of cash assets (cash + cash equivalent – short-term debts) and non-cash assets (inventory + accounts receivable – accounts payable). The cash holding rate of cash assets (CHR = cash + cash equivalent – short-term debts/sales) is used as a measure of cash holding level. While, the cash conversion rate of non-cash assets (CCR = inventory + accounts receivable – accounts payable/sales) is used as a measure of cash conversion cycle. The interaction term (CHR*WCR) is created to find the moderating role of cash. The dummy variable is created 1 for positive CHR and 0 for negative CHR. The firm's size, leverage, growth, and gross domestic product are also used as control variables in this research. Table 1 shows the variables interpretation, and their acronyms used in this study.

The redundant variable test is applied to check the reliability of explanatory variables in the regression equations. All variables are found statistically significant during the redundant test. Similarly, the multicollinearity is checked through tolerance (Toler) and variance inflationary factor (VIF). The value of Toler and VIF for working capital rate (WCR = 0.58 – Toler, 1.12 – VIF), firm size (FS = 0.52 – Toler, 1.07 – VIF), sales growth (Growth = 0.96 – Toler, 1.02 – VIF), leverage (LEV = 0.81 – Toler, 1.12 – VIF), and gross domestic product (GDP = 0.81 – Toler, 1.10 – VIF) are greater than 0.5 and less than 2 respectively. The value of Toler and VIF shows

Table 1: Variables interpretation and their acronyms

Variable	Acronyms	Variables interpretation
Return on assets	ROA	Earnings before interest and taxes/Total assets
Working capital rate	WCR	Current assets-Current liabilities/Sales
Square of WCR	WCR^2	Square of WCR to find the nonlinear relationship
Inventory rate	INVR	Inventory/Sales
Account receivables rate	ARR	Accounts receivable/Sales
Account payables rate	APR	Accounts payable/Sales
Positive WCR	PWCR	Cash + Non-cash assets more than current debt/ Sales
Negative WCR	NWCR	Cash + Non-cash assets less than current debt/Sales
Cash holding rate	CHR	Cash + Cash equivalent – Short term debts/Sales
Cash conversion rate	CCR	Inventory + Accounts receivable – Accounts payable/Sales
Firm size	FS	Log of fixed assets
Sales growth	Growth	Percentage growth in sales
Leverage	LEV	Long term debt/Total assets
Gross domestic product	GDP	Percentage growth in GDP

that no serious multicollinearity problem exists among the explanatory variables.

3.3 Regression analysis

The study uses the panel data regression statistics to examine the operational performance of the textile firms in Pakistan. First, the panel ordinary least squares (OLS) regression method is applied to Equation 1 to explore the nonlinear relationship. Further, the panel fixed effect (FE) and panel generalized method of movement (GMM) are also applied to assure the results are robust. The FE method is used to remove serially correlated errors in Equation 2. The Hausman test is applied to choose fixed or random effect method. The Cross section random chi-square statistics (7.86) under Hausman test effect is significant, therefore the fixed effect method is used instead of the random effect method.

Further, the GMM is applied to control the endogeneity problem in Equation 3. The endogeneity problem occurs when one or more explanatory variables are correlated with errors term ($\mu_{i,t}$). It can be the result of omitted variables or measurement errors. The proper instrument variables are used to deal with the endogeneity problem that correlate with indogenous independent variables but do not correlate with errors. Arellano and Bond (1991) argue that lag-regression and lag-difference of all independent variables can be used as instrument variables to deal the endogeneity problem. For the final analysis, the following methods are used to investigate the relationship between ROA and WCR.

1-panel least square regression statistics (OLS)
$$ROA = \beta_0 + \beta_1(WCR) + \beta_2(WCR)^2 + \beta_3(FS) + \\ + \beta_4(Growth) + \beta_5(LEV) + \beta_6(GDP) + \mu \quad (1)$$

2-panel fixed effect regression statistics (FE)
$$ROA_{i,t} = \beta_0 + \beta_1(WCR_{i,t}) + \beta_2(WCR_{i,t}^2) + \beta_3(FS_{i,t}) + \\ + \beta_4(Growth_{i,t} + \beta_5(LEV_{i,t}) + \beta_6(GDP_{i,t}) + \alpha_i + \mu_{i,t} \quad (2)$$

3-panel generalized method of movement regression statistics (GMM)
$$ROA_{i,t} = \beta_0 + \beta_1(ROA_{i,t-1}) + \beta_2(WCR_{i,t}) + \\ + \beta_3(WCR^2_{i,t}) + \beta_4(FS_{i,t}) + \beta_5(Growth_{i,t}) \quad (3)$$

where $ROA_{i,t-1}$ is an instrument used to remove endogeneity.
Standard: $WCR_{i,t}$, $FS_{i,t}$, $Growth_{i,t}$, $LEV_{i,t}$, $GDP_{i,t}$

4 Results and discussion

4.1 Descriptive statistics

Table 2 shows the descriptive statistics of the firms' whole sample, positive working capital group, and the negative working capital group of textile firms from 2009 to 2016. The mean of ROA (0.02) and Std. dev. (0.11) in the whole sample are not significantly different to the mean of ROA (0.01) and Std. dev. (0.11) in the negative working group. But it is significantly different to the mean of ROA (0.07) in the positive working capital group, but Std. dev. (0.09) is almost the same.

Table 2: Descriptive statistics of Whole Sample, Positive WCR, and Negative WCR

Variables	Whole sample			Positive WCR			Negative WCR		
	Mean	Std. dev.	Max	Mean	Std. dev.	Max	Mean	Std. dev.	Max
ROA	0.02	0.11	0.35	0.07	0.09	0.25	0.01	0.11	0.35
WCR	−0.49	0.65	0.94	0.16	0.29	0.94	−0.72	0.73	0.53
CHR	−0.26	0.53	1.76	0.04	0.34	0.81	−0.36	0.55	1.76
CCR	−0.27	0.58	0.50	−0.03	0.09	0.45	−0.36	0.65	0.50
ARR	0.05	0.17	1.18	0.02	0.02	0.09	0.07	0.19	1.18
INVR	0.15	0.27	1.91	0.07	0.04	0.16	0.17	0.31	1.91
APR	0.50	0.76	3.50	0.11	0.06	0.31	0.64	0.85	3.51
FS	6.93	0.41	7.87	7.01	0.54	7.87	6.90	0.35	7.53
Growth	0.26	0.75	6.35	0.12	0.22	0.38	0.31	0.86	6.35
LEV	0.60	0.24	1.46	0.47	0.2	0.88	0.65	0.24	1.46

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The mean of WCR (–0.49) in the whole sample indicates that majority of textile firms hold the negative working capital to run the routine operations of the business. The mean value of APR (0.64) in the negative working capital group is higher than the mean value of APR (0.11) in the positive working capital group. It implies that firms which have the negative working capital make payment to suppliers after a long period. The mean values of APR are highest among the components of CCR (INVR, ARR, and APR) both in positive and negative working capital groups, which shows that overall textile firms are enjoying a high level of trade credits.

Both positive WCR and negative WCR groups are further divided into their sub-group on the basis of Cash Holding Rate (CHR) as shown in Table 3. Positive WCR group is divided into positive CHR group and negative CHR group. But the negative WCR group only contains the negative CHR group. In other words, all firms in negative WCR group have only negative CHR.

In the positive WCR group, the sub-group positive CHR and sub-group negative CHR, the mean values of ROA (0.08) and (0.06) in both groups are not significantly different to each other respectively. However, the mean of CHR in positive CHR group (0.25) and the mean of CHR in negative CHR group (–0.10) are significantly different to each other. It

indicates that positive CHR firms hold more liquid assets than negative CHR firms and face a lower bankruptcy risk. Similarly, CCR (–0.05) and (–0.01) in both groups are significantly different to each other. The positive CHR group has earned higher ROA (0.08), WCR (0.31), Growth (0.10) and LEV (0.32), but lower CCR (–0.05) than the negative CHR group in Table 3.

In the negative WCR group, sub-group negative CHR, the mean values of ROA (0.04), WCR (–0.72), CCR (–0.36), CHR (–0.36), Growth (0.31) are significantly different to the mean values of the positive WCR sub-groups. Overall results indicate that the mean value of ROA (0.08) is at the higher level in the positive CHR group, when the firms have positive CHR (0.25), positive WCR (0.31), and negative CCR (–0.05).

4.2 Correlation analysis

Table 4 presents the results of Pearson correlation among variables. The significant correlation is found between ROA and WCR (0.35). In WCR components, only CHR has a significant positive correlation (0.28) with ROA, whereas other WCR components, ARR (–0.35), INVR (–0.31), APR (–0.34) have a significant negative relationship with ROA. However, CCR (0.33) is significantly positively correlated with ROA. All WCR components are negatively associated with WCR except CHR (0.24),

Table 3: Descriptive statistics of positive CHR and negative CHR

Variables	Positive WCR			Negative WCR					
	Positive CHR			Negative CHR			Negative CHR		
	Mean	Std. dev.	Max	Mean	Std. dev.	Max	Mean	Std. dev.	Max
ROA	0.08	0.07	0.25	0.06	0.10	0.25	0.04	0.11	0.35
WCR	0.31	0.33	0.94	0.06	0.20	0.55	–0.72	1.28	0.53
CHR	0.25	0.34	0.81	–0.10	0.27	0.67	–0.36	0.55	1.76
CCR	–0.05	0.06	0.03	–0.01	0.11	0.45	–0.36	0.65	0.50
ARR	0.02	0.01	0.04	0.02	0.02	0.09	0.07	0.19	1.18
INVR	0.05	0.02	0.10	0.09	0.04	0.16	0.17	0.31	1.91
APR	0.12	0.05	0.24	0.11	0.07	0.31	0.64	0.85	3.50
FS	7.29	0.45	7.87	6.82	0.52	7.62	6.90	0.35	7.53
Growth	0.10	0.31	0.38	0.14	0.15	0.38	0.31	0.86	6.35
LEV	0.32	0.09	0.52	0.57	0.20	0.88	0.65	0.24	1.46

Positive CHR group = Cash + Cash equivalent more than the current debt
Negative CHR group = Cash + Cash equivalent less than the current debt

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Table 4: Correlation among the selected variables

Variables	ROA	WCR	CHR	CCR	ARR	INVR	APR	FS	Growth	LEV	GDP
ROA	1	0.35[a]	0.28[a]	0.33[a]	−0.35[a]	−0.31[a]	−0.34[a]	0.31[a]	0.23[a]	−0.14[a]	0.27[a]
WCR		1	0.24[a]	0.41[a]	−0.35[a]	−0.32[c]	−0.28[a]	0.31[c]	0.19[a]	−0.14[a]	0.09[b]
CHR			1	0.26[b]	−0.35[a]	−0.24[a]	−0.26[a]	0.32[b]	0.15[a]	−0.29[b]	0.27[c]
CCR				1	−0.41[a]	−0.28[a]	−0.38[b]	0.23[a]	0.19[a]	−0.32[c]	−0.24[a]
ARR					1	0.18[a]	0.35[b]	0.22[c]	−0.13[a]	0.26[b]	−0.15[b]
INVR						1	0.37[a]	0.23[b]	0.17[a]	0.13[a]	0.06[c]
APR							1	0.32[c]	0.22[a]	0.24[c]	−0.01[b]
FS								1	−0.14[a]	−0.38[b]	−0.04[a]
Growth									1	0.19[a]	0.06[b]
LEV										1	−0.12[c]
GDP											1

[a] = significant at 0.01, [b] = significant at 0.05, [c] = significant at 0.10

which is significantly positively correlated with WCR. Further, it is studied, that APR (−0.28) develops a strong negative relationship with WCR, whereas INVR (−0.32) creates a weak negative correlation with WCR. The results are similar to the studies of [7] and [21] respectively.

4.3 Analyses results

Table 4 shows the results of OLS, FE, and GMM regression techniques to find the nonlinear relationship between working capital and profitability. In the whole sample, WCR develops a significant positive relationship with ROA in OLS (0.06), FE (0.04), and GMM (0.03) by using equations 1–3. The WCR^2 term is used to find the nonlinear relationship between working capital and profitability. The WCR^2 develops the negative association with ROA in OLS (−0.03), FE (−0.03), and GMM (−0.01) in the whole sample. It shows that working capital develops a nonlinear U-shape relationship with operating profit in Pakistan's textile industry as proposed in our first hypothesis (1). Using the partial derivation in terms of WCR, we have calculated the optimal level of working capital to enhance the firm's profitability. The textile firms can reach an optimal level of WCR in terms of sales in OLS (8.5%), FE (6.23%) and GMM (4.78%).

In the whole sample, the control variables leverage (LEV: −0.05 in OLS, −0.03 in FE, and −0.03 in GMM) and firm size (FS; −0.04 in OLS, −0.03 in FE, and −0.01 in GMM) develop a significant negative

association with ROA, while the sales growth (Growth; 0.06 in OLS, 0.04 in FE, and 0.02 in GMM) and gross domestic product (GDP: 0.08 in OLS, 0.06 in FE, and 0.03 in GMM) develop a significant positive association with ROA. The results imply that control variables are also significantly influenced by the relationship between working capital and profitability in the Pakistan's textile firms. The findings are consistent with the previous studies of [12, 13] in the analysis of USA and UK firms respectively.

Further, the whole working capital is divided into positive working capital group and negative working capital group to find the unique pattern of association between working capital and profitability. In Table 5, in the positive WCR group, WCR develops a significant negative relationship with ROA in OLS (−0.03), FE (−0.02), and GMM (−0.01) as proposed in hypothesis 2. However, in the negative WCR group, WCR is significant positively associated with ROA in OLS (0.05), FE (0.03), and GMM (0.02) as proposed in hypothesis 3. The results indicate that the magnitude of coefficients of negative WCR under the negative WCR group is higher than that of the coefficients of positive WCR under the positive WCR group. It implies that negative working capital is more efficiently responsible for increase of the profitability than the positive WCR.

Based on the results of Arellano-Bond serial correlation test in GMM as shown in Table 5, we verified

Table 5: Regression analysis of whole sample, positive working capital, and negative working capital

Dependent variable ROA	Whole Sample			Positive WCR			Negative WCR		
	OLS	FE	GMM	OLS	FE	GMM	OLS	FE	GMM
WCR	0.06[a]	0.04[a]	0.03[a]	−0.03[a]	−0.02[a]	−0.01[a]	0.05[a]	0.03[a]	0.02[a]
WCR^2	−0.03[a]	−0.03[a]	0.01[a]						
LEV	−0.05[a]	−0.03[a]	0.03[a]	−0.04[a]	−0.03[a]	−0.01[a]	0.03[a]	0.02[a]	−0.01[a]
Growth	0.06[a]	0.04[b]	0.02[b]	0.07[a]	0.07[b]	0.05[b]	0.08[a]	0.05[a]	0.04[b]
FS	−0.04[a]	−0.03[a]	−0.01[a]	0.03[a]	0.02[a]	0.02[b]	−0.06[b]	−0.05[c]	−0.02[c]
GDP	0.08[b]	0.06[b]	0.03[c]	0.07[b]	0.06[c]	0.05[c]	0.05[a]	0.04[b]	0.01[b]
Observations	1216	1216	977	476	476	324	740	740	422
R2	0.45	0.41		0.44	0.39		0.41	0.37	
Arellano–Bond									
1st Order			−5.79[a]		−2.21[a]				−2.83[a]
2nd Order			0.05		−0.29				−0.06

[a] = significant at 0.01, [b] = significant at 0.05, [c] = significant at 0.10

that the instruments used to estimate the GMM were valid and correctly specified. Hence, we cannot reject the null hypothesis that the endogeneity problem does not exist at the 2nd order for any of our regression methods. Thus, the instruments variables do not correlate with the errors in GMM and give the ro-bust results about the endogeneity problem, which is very difficult to control in OLS and FE. Therefore, the results presented under GMM in Table 5 are more reliable and robust than the OLS and FE.

To check whether the cash is playing a moderating role in the relationship between profitability and

Table 6: Interaction effects of WCR and CHR

Dependent variable ROA	Positive WCR			Negative WCR		
	OLS	FE	GMM	OLS	FE	GMM
WCR	−0.04[a]	−0.04[a]	−0.03[a]	0.06[a]	0.05[a]	0.03[a]
CHR (Dummy)	0.06[a]	0.04[a]	0.03[a]	0.07[a]	0.07[a]	0.05[a]
WCR*CHR (Dummy)	−0.05[a]	−0.04[a]	−0.02[a]	0.03[a]	0.03[a]	0.02[a]
LEV	−0.05[a]	−0.04[b]	−0.02[b]	0.03[b]	0.02[b]	0.02[c]
Growth	0.06[a]	0.06[a]	0.04[b]	0.07[b]	0.05[b]	0.04[c]
FS	−0.04[b]	−0.03[c]	−0.02[c]	−0.06[a]	−0.04[a]	−0.02[a]
GDP	0.06[b]	0.05[b]	0.02[c]	0.05[a]	0.05[b]	0.03[b]
Observations	476	476	308	740	740	388
R^2	0.43	0.39		0.40	0.38	
Arellano-Bond						
1st order			−2.10[a]			−2.62[a]
2nd order			−0.20			−0.07

[a] = significant at 0.01, [b] =significant at 0.05, [c] = significant at 0.10

working capital, we have developed the interaction term of (WCR*CHR) in OLS, FE, and GMM as presented in Table 6. The CHR is a dummy variable that is 1 for positive CHR and 0 for negative CHR.

In the positive WCR group, the interaction term (WCR*CHR) has created the significant negative relationship with ROA in OLS (–0.05), FE (–0.04), and GMM (–0.02). The results show that if a firm has positive working capital and increases the cash level, it will enhance the negative relationship between working capital and profitability as explained in hypothesis 4. On the other hand, in the negative working capital group, the interaction term (WCR*CHR) has created the significant positive relationship with ROA in OLS (0.03), FE, (0.03), and GMM (0.02) as explained in hypothesis 5. It indicates that if a firm has negative working capital and increases the cash level, it will enhance the positive relationship between working capital and profitability. Overall results show that cash plays a moderating role to determine the relationship between working capital and profitability.

5 Conclusion

This study analyzes how working capital affects the operating profit of textile firms in Pakistan. The research has revealed that a significant nonlinear relationship exists between working capital and operating profit (Hypothesis 1). The study has also found that a positive working capital has negatively influenced the operating profit (Hypothesis 2). However, the negative working capital has influenced positively (Hypothesis 3). These findings are similar to the studies of Mun et al. [13] and Baos-Caballero et al. [12], where they suggest that the optimal level of working capital depends upon the firm's performance. This study also determines an optimal level of working capital 4.78% of sales in GMM model. The GMM estimator permitted us to control the non-serial correlated issues and to find the most robust results.

Further, the moderating role of cash has been examined in the relationship between working capital and operating profit. In the positive WCR group, the interaction term (WCR*CHR) has created the significant negative relationship with profitability (Hypothesis 4), while in the negative working capital group, the interaction term (WCR*CHR) has

developed the significant positive association with profitability (Hypothesis 4) It implies that cash plays a moderating role in the relationship between working capital and profitability. Hence the cash holding level is an important factor for designing the efficient working capital management.

5.1 Research implication

This study suggests some theoretical and managerial implications for the textile industry in Pakistan. Theoretically, the study suggests that a nonlinear relationship exists between working capital and profitability in textile firms. The study has also found that cash plays an important role to determine the relationship between working capital and profitability. The results show that cash holding level can be used as a measure of the firm's internal cash-generating capability. The study has found the significant negative interactive effect of cash in positive working capital and significant positive interactive effect of cash in negative working capital firms. It indicates a firm can design and maintain an efficient level of working capital by trade-off cash assets with non-cash assets.

In respect of managerial implication, this research suggests that when the textile firms have the positive working capital, it is better to ease the cash conversion cycle either by paying suppliers earlier or by increasing investment in inventories. Further, when a firm is efficiently generating the cash flows from operations, it does not need to hold a large amount of cash as long as it needs to maintain sufficient amount of inventories and accounts receivable. On the other hand, when a firm does not have a sufficient amount of working capital, it needs to secure assets immediately by decreasing expenses, deferring the investment, or acquiring loans to avoid the negative effect of liquidity shortfall. Such types of textile firms in Pakistan should increase the volume of working capital until it reaches 4.78% of sales.

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