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The Impact of Working Capital Management on Firm Profitability amid Changes in Interest and Foreign Exchange Rates: A Case Study of Pakistan's Cement Sector.

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Abstract

Working Capital Management (WCM) and its effect on the profitability of firms in the cement sector of Pakistan when interest and exchange rates are continuously fluctuating. This paper uses panel data from 16 PSX listed firms (2014–2023) to assess some key WCM components such as Current Ratio, Inventory Turnover, Accounts Receivable Turnover, Accounts Payable Turnover, and Cash Conversion Cycle while comparing it with profitability variables such as ROA, ROE, GPM, OPM, and NPM. Liquidity management plays a pivotal role in finding, whereas the macroeconomic factors moderate the WCM's effect on profitability. Insights for financial managers and policymakers are provided for improving financial resilience in volatile economic conditions.

Keywords: Working Capital Management, Profitability, Interest Rates, Exchange Rates, Cement Sector.

INTRODUCTION

The ability of every firm to be financially sustainable is dependent on Working Capital Management (WCM) thus ensuring operational efficiency, maintaining liquidity and maximizing profitability. According to Atrill & McLaney (2020), WCM involves the management of short term assets and liabilities to ensure day to day functioning of operations without dislocating method, particularly financial distress. Good WCM practices enable a firm to increase its profits by bettering cash flow management, reducing the need for external financing and optimizing the balance between current assets and liabilities (Banos-Caballero et al., 2020). WCM is a must for the cement sector, it is capital intensive and highly competitive, and so the lifeblood of operating the business and making a profit matters. In this sector, firms have to take the utmost care with managing receivables as well as payables to the maximum level of optimize to maintain their cash resources and to achieve a proper and timely collections of customers and systematic payment cycles to the suppliers (Shah, Shah, and Khan, 2021). Such prolonged cash conversion cycle inherent to the cement industry makes companies prone to liquidity risks, financial distress, and guaranteeing long run survival (Abuhommous, 2019).

The cement industry makes their decision of WCM largely influenced by macroeconomic factors, mainly fluctuations in interest and exchange rates. As per Rehman, Wang, and Ullah (2021), change in interest rate changes firms borrowing costs and financial leverage and the change in the exchange rate volatility impacts the cost of imported raw materials, equipment and the cost of energy source. Therefore, to adequately make financial decision, it is important to look at the impact

of WCM on a firm profitability with consideration of these macroeconomic factors. Growth within the sector has been seen, however, it has not eradicated the net of financial and operational challenges. In this, the growing fuel and energy expenses is one of the most pressing issues. Cement production is an energy intensive process, and any deficiencies in energy supply - electricity and gas shortage affect the production efficiency and costs. Moreover, the cement sector is highly interest rate sensitive since the cement firms usually utilize (debts) for capital expenditures and working capital requirements. Increased borrowing costs mean that overall profitability will be higher and liquidity will be changed (Rehman et al., 2021). The volatility of exchange rates is another critical challenge that directly affects cost of importing the essential raw materials. Increased price of imported coal, the machinery and the spare parts increase cost of production, which in turn puts pressure on profit margins. The second reason is that cement industry has very long cash conversion cycle (CCC) due to stretched credit periods of the customers and inventory turnover time lags. Having to embrace such working capital management (WCM) practises, lest else in maintaining operational balance, maximising of cash flow, and financial stability becomes necessary features.

The aim of this study is whether the profitability of the firm from four main key financial metrics are impacted by four key WCM. Second, the study considers how interest and exchange rate volatility affects the efficiency and firm performance relationship with external macroeconomic conditions in Pakistan's cement sector. Various other researches have covered the link between WCM and firm profitability through important financial measures. In combination, these variables all reflect a firm's efficiency in managing short term assets and liabilities. While the previous studies have found a relationship between WCM and profitability, they have neglected the moderating role of macroeconomic conditions especially in the economies with financial instability and depreciating currency (Banos-Caballero et al., 2020). This research seeks to close the gap with current research by studying the effect of WCM on profitability of firms under consideration of interest rate and exchange rate fluctuations as key control variables. Consequently, this yields a more refined picture of how the external economic forces impact cement sector financial decisions. Finally, these findings will not only aid the current literature of corporate finance but also provide practical implications to the financial managers, policymakers, and investors in helping them fortify the firm's resilience in unstable economic settings.

RESEARCH SCOPE AND METHODOLOGY

The effect of WCM on the firm profitability in the cement industry of Pakistan by taking into account macroenvironment such as changes in interest and exchange rates has been subjected to investigation in this thesis. The cement firms listed in Pakistan Stock Exchange (PSX) from year 2014 to 2023 are included in the research, based on financial information. The study gets the primary data source from accounts of the selected firms and the macroeconomic indicators like interest and exchange rates are traced from the State Bank of Pakistan (SBP). All of the relationship between WCM and firm profitability, in terms of the factors, have been tested and analyzed statistically using statistical methods. Financial and Operational Descriptive Statistics of the selected firms can be summed up as key points. Strength and direction of relationships between WCM components and profitability indicators will be tested

using Correlation Analysis. Multicollinearity test is to look for the probable problem of high correlation across independent variables, which is good to ensure the reliability of the model. ANOVA Regression Analysis (Regression Analysis) is used to test the causal effect of WCM variables on profitability and key predictor for study statistical significance.

Significance of the Study

Corporate financial managers, investors and policymakers need to know how working capital management interplays with macroeconomic factors. Since the economic conditions in Pakistan are clouded with uncertainties, the findings of the study will aid these cement firms to alter their financial strategies, adapt cash flow management and reducing the risks on financial volatility. Moreover, the study's findings can provide the policymakers and regulatory body to develop the policies that lead to the financial stability and industrial growth. For instance, interest rate adjustment and foreign exchange regulation policies may be framed in a way as to minimize the negative impacts on capital intensive industries such as the cement.

LITERATURE REVIEW

Overview of the Cement Industry of Pakistan

Cement industry is an important part of Pakistan's economy since cement industry is an important sector for constructing infrastructural development, employment generation, and economic growth. It supports large scale construction projects (roads, bridges, dams), residential as well as commercial buildings, therefore it is considered as an important industry for process of national progress (Khan et al., 2021). The origins of Pakistan's cement industry trace back to the early years of independence, with the establishment of the first cement plant in Wah in 1956 (Ali & Rehman, 2019).

The 1990s, though, saw the biggest transformation for the sector when the government privatised the sector, drawing both local and foreign investments, which quickly hurried its growth (Hussain & Javed, 2022). In recent years, Pakistan's cement production capacity has grown substantially to 69 million metric tons per annum (MTPA) and as per market demand (State Bank of Pakistan, 2023), actual production vary. The driving factors of domestic consumption have been large scale infrastructure projects, especially the China — Pakistan Economic Corridor (CPEC), along with the growing urbanization and private sector investments (Malik & Anwar, 2021). It is seen that Pakistan's cement industry, has a strong presence in the export market which is key to various other countries including Afghanistan, Sri Lanka, India, and several African countries (State Bank of Pakistan, 2023).

However, rupee devaluation has at times increased the competitive edge of Pakistani cement in export markets (Malik & Anwar, 2021), although logistical, trade, and geopolitical factors impinge on exports. Firms will need to seriously engage with energy efficiency, sustainable production practices and regulatory challenge in order to maintain long term stability and profitability (Ahmed & Saeed, 2020).

Working Capital Management and Profitability of the Cement Sector of Pakistan

As the cement firms are dependent on raw materials, energy costs and import of materials from foreign countries, working capital management (WCM) has significant role in determining their profitability (Khan et al. 2023). When the macroeconomic instability exists in a country like Pakistan (Interest rate fluctuation, exchange rate fluctuations and inflation rates) it is more difficult to manage working capital efficiently because every business is facing a challenge (Rehman et al. 2022). As cement production is highly a capital intensive job and the cost of raw materials such as limestone, clay, and gypsum are high, so the companies must work on balance of their working capital component smartly so as to continue production and remain in the market (Sharma & Kumar, 2021). Properly optimized inventory turnover, effective receivables management and balance accounts payable cycle have a strong influence on firm profitability (Baños-Caballero et al., 2021).

However, the poor WCM practices e.g. unnecessary credit collection, excessive inventory accumulation, along with short term liquidity, tends to increase financial burdens and reduce profit margin, until firms can be pushed to insolvency (Khan et al., 2023). A firm's ability to meet short term liabilities is indicated by the current ratio, one of the primary measures of liquidity. For financial stability in cement sector, CR should be healthy; however, more surplus funds remaining received from hydroelectric project can result in inefficient utilization of assets (Sharma & Kumar, 2021). Evidence from Pakistan's cement sector shows that a moderate CR augments profitability by assuring business continuity and financial security though substantial underutilization of the resources with high CR, whereas inappropriate or excessively high CR can hurt the ROA and ROE surprisingly (Rehman et al., 2022).

As the cement production is characterized by the capital intensive factory, ITR optimization is tremendously important in terms of cost efficiency and cash flow effect (Baños-Caballero et al., 2021). The ITR is positively related with firms' profitability and it helps firms to minimize storage costs and reduce the risk of raw material obsolescence (Khan et al. 2023). Yet too high turnover could signify stock shortage, which could disturb production schedules, delay production schedule fulfillment, and ultimately result in missed sale opportunities (Nguyen et al., 2022). Enforce efforts to manage accounts receivables well to keep steady cash flows, and therefore minimise external financing need (Enqvist et al., 2020). An overly strict credit policy, on the other hand, might deter potential buyers and further discourages sales volume in a very competitive market where purchasers favor ease of payment (Sharma & Kumar, 2021).

Additionally, accounts payable turnover (APT) determines the amount of effectiveness a firm utilizes to pay its suppliers. This may encourage firms to use supplier credit as a short term financing source and make APT (longer payment period) lower leading to increased liquidity (Baños-Caballero et al., 2021). Cash conversion cycle (CCC) which is the combination of inventory turnover, receivables turnover and payables turnover is an efficiency measure for the WCM. The profitability is higher associated with shorter CCC (Sharma & Kumar, 2021) because it indicates faster cash recovery and lower dependence on expensive external financing. On the contrary, an extended CCC can create a liquidity gap, increase financial related costs, and

lower profit margins (Khan et al., 2023). However, Pakistan's cement firms remain beset by various issues in pursuing efficient WCM due to the macroeconomic instability and financial constraints, followed by the intense market competition (Rehman et al., 2022). Regarding profitability through effective WCM, cement firms in Pakistan have to better apply strategic finance and operation techniques. The first key strategy involves optimising inventory in terms of just-in-time (JIT) inventory management to achieve minimum holding cost without causing production to suffer from any kind of disruptions (Sharma & Kumar, 2021). Implementing balanced credit policies could strengthen the receivables management and help firms minimise default risks at the cost of gunslessly but equally competitive credit to customers (Baños-Caballero et al., 2021).

And the use of negotiation in flexible payment terms that will improve supplier relationships in order to make supply chain stable and efficient (Nguyen et al., 2022). In addition, using the FinTech solutions like automated invoicing, AI-powered cash flow forecasting, and supply chain management by utilizing blockchain can significantly enhance the utilisation efficiency of WCM and hence overall the profitability of the firm (Rehman et al., 2022). The overall management of working capital is one of the important aspect of profitability and financial healthability of the sector of cement of Pakistan. There is an efficient manner for firms to manage CR, ITR, ART, APT and CCC in order to improve financial stability, smooth out cash flow and enhance operational efficiency. The financial technology can also be harnessed by the cement firms in best utilization of their cash flow, integration and implementation of complete risk strategies as they come out into competitive position and boost their financial position through an ever changing business environment.

Changes in Interest Rates and Foreign Exchange Rates, and Their Impact on Working Capital Management and Profitability

Macroeconomic factors, such as interest rates and foreign exchange market, also significantly have an impact on firm's financial performance in the cement sector. These variables have strong effect on working capital management (WCM), profitability on effects of borrowing costs, cash flow, inventory management and overall financial stability (Khan et al., 2023). Being a highly capital intensive and a dependent industry on imported raw materials, cement industry in Pakistan is very vulnerable to fluctuations in interest and exchange rates (Rehman, et al., 2022). Leverage from cement firms in Pakistan changes through multiple channels due to changes in interest rates in the bank (Sharma & Kumar, 2021).

Cement firms usually finance their working capital requirements by a combination of short term as well as long term debt. An increase in interest rates means that the cost of financing is pricier, thus raising the cost to keep at the optimal liquidity levels (Baños-Caballero et al., 2021). With a higher level of leverage, operations are funded heavily by debt, and therefore, firms having more debt are financially distressed with an increase in interest rates, resulting in a drop of payoff due to higher incurred interest expenses (Nguyen et al., 2022). Furthermore, higher interest rates make capital investments and expansion projects unattractive, therefore indirectly affecting future revenue growth, and competitiveness in the cement industry (Rehman, 2022). Interest rate fluctuations also affect the cash conversion cycle (CCC), which is, in its turn, with regard to the working capital efficiency. This is because during the time of

high interest rates, firms enhance their cash flow by tightening credit policy, which in turn increases the accounts receivable turnover (ART). However, this strategy leads to faster cash inflows but it may also result in a negative sales impact due to the fact buyers may be discouraged from buying if payment terms are not very strict (Sharma & Kumar, 2021). However, accounts payable turnover (APT) may rise given that firms delay paying suppliers to save cash, which may hurt supplier relationships and increase procurement costs (Khan et al., 2023). Also, firms may reduce stock levels to minimize holding cost and hence inventory turnover (ITR) may decline, inducing production disruptions and loss sales (Baños-Caballero et al., 2021). These WCM adjustments will directly affect the profit margins, where high interest rates will increase the cost of debt servicing and thus decrease NPM and ROA (Rehman et al. 2022). Nevertheless, firms with strong liquidity stocks can use internal funds instead of external borrowing to cope with the increase in interest rate, but this ensures financial stability, despite fluctuations in the market (Sharma & Kumar, 2021).

Considering the fact that Pakistan's cement sector relies on imported raw materials (coal, machinery, spare parts), the foreign exchange rate that they earn happens to have a great impact on the profitability of the sector. The depreciation of Pakistani Rupee (PKR) to US Dollar (USD) Euro (EUR) major currencies leads to the increase in production costs, thus affecting the overall profitability (Khan et al., 2023). Therefore, weaker PKR increases the imported raw materials cost which makes production cost is expensive and GPM is low (Nguyen et al., 2022). Moreover, financial strain to cement firms is increased because of the import on credit use of raw materials which results in further burden because of currency depreciation by increasing the foreign denominated liabilities (Baños-Caballero et al., 2021). Accounts payable turnover (APT) and supplier relations are also impacted from exchange fluctuation. Delay in the PKR will allow firms to manage their cash flow more effectively, however, this can damage Pakistani supplier's relationships with international suppliers (Rehman et al., 2022). To decrease its exposure to exchange rate volatility, some firms try to mitigate this risk by using either forward contract or foreign currency reserves to stable cost (Sharma & Kumar, 2021). Although uncertainty in forecasting working capital requirements due to frequency of currency fluctuations (Khan et al., 2023).

In addition, exchange rate depreciation may shape pricing strategies and competitive forces in markets. Cement firms may raise a product price to offset rising input costs, however, this may result in a decrease in demand, and especially so in price sensitive markets (Rehman et al., 2022). On one hand, a depreciated PKR creates an opportunity to increase the export competitiveness of a Pakistani cement becoming cheap in international markets. However, this allows the firms doing exports to capitalize on their benefits, but they often lose out due to intra and inter trade competition (Sharma & Kumar, 2021). To manage the risks posed by interest rate and foreign exchange variations, the cement firms in Pakistan need to adopt different strategic measures. Optimizing debt structure and implementing interest rate hedging initiatives are considered the best effective approaches. Hence, firms should target to lessen the effect of interest rate volatility by balancing the short-term and long term debt (Nguyen et al., 2022). Fixed interest rate loans or use of hedging instruments like interest rate swaps provide protection against sudden increase in borrowing cost making firms financially stable (Khan et al., 2023). Likewise, there should be foreign exchange risk management strategies to lessen the impact of currency moves.

Firms engaged in cement under the currency hedging mechanisms like forward contracts and options would be able to reduce exposure to exchange rate volatility (Baños-Caballero et al., 2021). Furthermore, the diversification of supplier networks can reduce reliance on imported raw materials and mitigate the associated risk of exposing the company to foreign currency fluctuations (Sharma & Kumar, 2021). It also means providing cost control and pricing strategies for dealing with the macroeconomic risks. Since the currency depreciation for cement firms, especially government owned, the use of cost efficient production techniques should be emphasised to mitigate rising input costs (Sharma and Kumar, 2021). Therefore, firms can retain profitability by implementing dynamic pricing strategies that consider real-time economic conditions while maintaining competitiveness of the market (Rehman et al., 2022). Implementing a proactive approach in risk management by using state-of-the art financial forecasting tool and scenario analysis can further enable firms to address macroeconomic uncertainties proactively. The whole thing is summarized in saying that changes in interest rates as well as foreign exchange rates profoundly affect the working capital management and profitability of Pakistan's cement sector. Higher borrowing costs and liquidity decrease are, simultaneously, affect cash flow management, higher input costs arising from currency depreciation, reduce financial stability, and pricing pressures. Firms must do so as a way of mitigating these risks through debt structuring, currency hedging, liquidity management and cost control. Through these approaches, the cement firms will be able to exhibit financial resiliency and profitability amidst macroeconomic uncertainties.

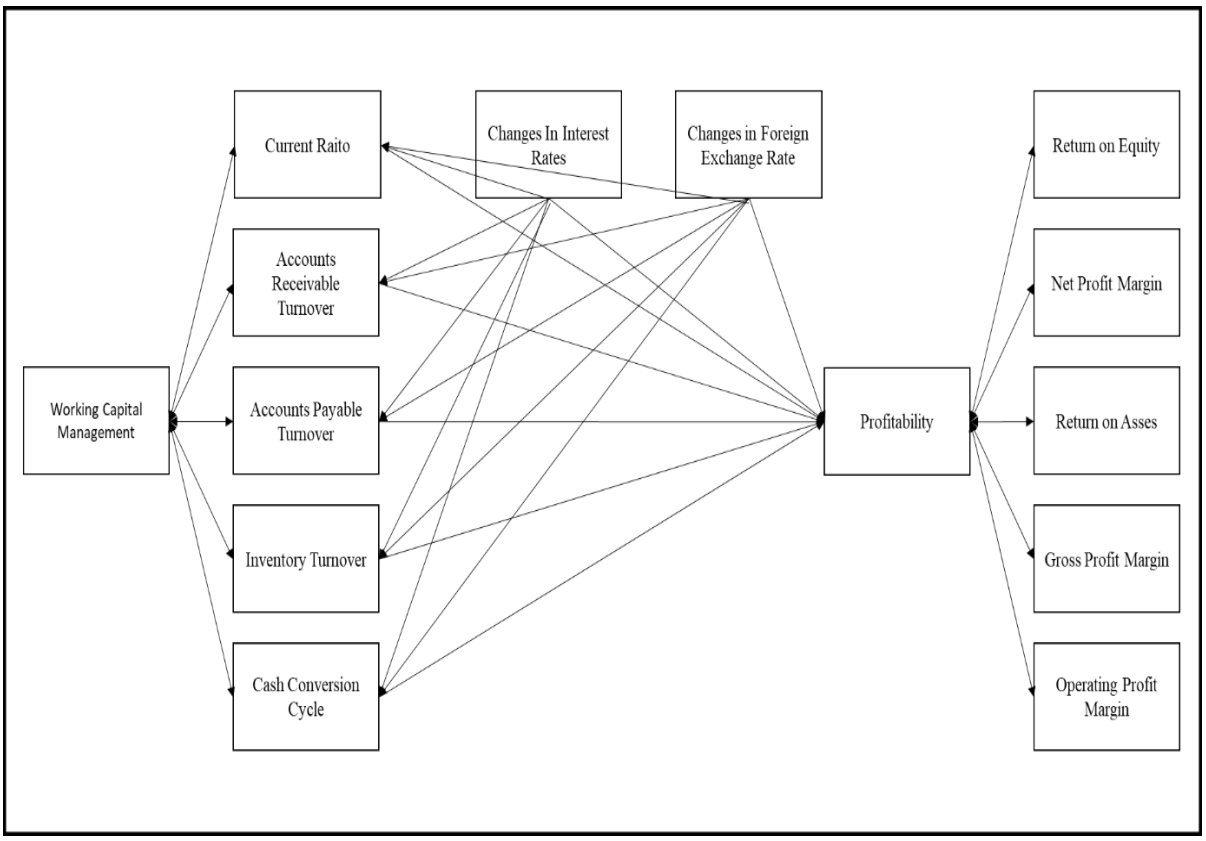

Figure 1:
Theoretical Framework

The theoretical framework provides an understanding of the nature of the relationship between working capital management (WCM), interest rates, foreign exchange rates and firm profitability in common cement sector in the country, Pakistan. In this study we integrate financial management theories based on the reason of how firms manage their working capital to maximize profitability and reduce risks due to variations of macroeconomic indexes. According to the Tradeoff Theory, firms will be forced to make a decision whether the money invested in working capital brings the added benefits or not. A high current ratio is maintained to bear high liquidity but that can also affect profitability through idle cash and aggressive working capital policy increases financial risk but improves efficiency. The Pecking Order theory discusses how firms sort out the source of financing based on the cost considerations. According to this theory despite the cost associated with borrowing these costs are less than the cost of internal financing (retained earnings).

Resource Based View (RBV) emphasizes that it is those firms that have superior financial management practice that get competitive advantage. In addition, the Modigliani and Miller's Capital Structure Theory reveals aspects of capital financing decisions impact firm value. While the theory states that financing decisions have no impact on firm value in perfect markets, in reality the increase in the cost of debt caused by high interest rates means that firms can increase their profitability from working capital efficiency. Combining the above theoretical perspectives, this framework points out how efficient working capital management reduces risk due to the interest rate hikes and the foreign exchange fluctuations. It examines how the cement sector firms in Pakistan can make their financing strategies fit to survive external economic pressures despite profitability.

DATA AND METHODOLOGY

It presents the research design, data sources, population and sample, research hypotheses, data collection methods, analytical techniques, and ethical considerations. By rigorous examination of the relationship between working capital management (WCM) and firm profitability, controlling interest rate and foreign exchange rate fluctuations in Pakistan's cement sector, methodology is ensured.

Research Design

Using financial data from publicly listed cement firms, the study follows a quantitative and explanatory research design to empirically investigate between WCM and profitability relation in Pakistan. It adopts a deductive approach testing predefined hypotheses as based on known financial theories. The study utilizes panel data analysis framework as the dataset is composed of multiple firms that are studied over some period from 2014 to 2023. Correlation analysis, regression analysis and ANOVA are applied as the way to assess the significance of relationship between the WCM variables and profitability measures.

Data Sources

The study is mainly based on the secondary data that has been collected from the publicly available resources which includes:

- Financial Reports of the listed cement firms on the Pakistan Stock Exchange (PSX).

- One can refer to state bank of Pakistan (SBP) for historic data on interest rates and exchange rates.
- PSX databases for stock performance and financial indicators.
- Secondarily data is used, so financial statements are both audited and then released publicly.

Population and Sample

It includes the whole of all cement firms present on Pakistan Stock Exchange (PSX). Firms are selected through purposive sampling technique on the basis of the following criteria:

- The firm is necessary to be listed on PSX for the whole study period i.e., (2014–2023).
- Financial data of all variables of study must be available.
- The firm must have been running cement business with minimal restructuring and mergers throughout the study period.

According to these criteria, 16 cement firms are included in the final sample for data completeness and consistency in all firms for all years.

Data Collection

A search of the annual reports and financial statements of the selected cement firms follows collecting the financial data for the dependent, independent, and control variables. Macroeconomic indicators like foreign exchange rate and interest's rates are fetched from the State Bank of Pakistan (SBP) and international financial databases. Then, the data is put into the form of Excel before importation into SPSS for statistical analysis. Data cleaning processes to be carried out to ensure the accuracy of data, such as handling the missing values, outliers and normality checks prior to analysis is done.

Analytical Techniques

Several statistical techniques are used to examine the relationship of WCM and profitability:

- **Descriptive Statistics:** Summarizes dataset characteristics, including mean, standard deviation, and data distribution.
- **Correlation Analysis:** Identifies the strength and direction of relationships between WCM variables and profitability measures.
- **Multicollinearity Test:** Variance Inflation Factor (VIF) and Tolerance values are computed to check for multicollinearity among independent variables.
- **Regression Analysis:** Regression models assess the impact of WCM on profitability.
- **ANOVA (Analysis of Variance):** Tests the overall significance of regression models.

RESULTS AND FINDINGS

Table 1:
Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Std. Error (Skewness)	Kurtosis	Std. Error (Kurtosis)
ROA	160	-0.2016	0.2279	0.0687	0.0731	-0.226	0.192	0.717	0.381
ROE	160	-0.5569	1.0608	0.1223	0.1549	0.748	0.192	9.781	0.381
GPM	160	-0.4283	0.4818	0.2234	0.1437	-0.811	0.192	1.761	0.381
OPM	160	-0.4904	0.4459	0.1624	0.1508	-0.820	0.192	1.490	0.381
NPM	160	-0.8805	0.4916	0.1092	0.1383	-2.421	0.192	15.872	0.381
CR	160	0.2163	8.0671	1.5158	1.1545	2.380	0.192	7.700	0.381
IT	160	0.9301	33.3789	4.4475	3.6559	5.060	0.192	31.606	0.381
ART	160	1.1823	385.3877	28.7337	54.5304	4.936	0.192	26.269	0.381
APT	160	0.2867	14.6336	4.3689	2.3941	1.496	0.192	3.530	0.381
CCC	160	-978.724	294.8022	19.9798	122.1023	-5.515	0.192	41.224	0.381
IR	160	-0.2492	0.7433	0.1115	0.3019	0.805	0.192	-0.452	0.381
FEX	160	-0.0138	0.3932	0.0998	0.1245	1.268	0.192	0.502	0.381

The mean ROA is 0.0687 (6.87%), with a standard deviation of 0.0731, indicating moderate variability in firms' profitability based on their assets. The mean ROE is 0.1223 (12.23%), with a relatively higher standard deviation of 0.1549, suggesting greater fluctuations in shareholders' returns. NPM having the lowest mean (0.1092) and the highest negative skewness (-2.421), implying that a significant number of firms have lower net profit margins. The mean CR is 1.5158, with a standard deviation of 1.1545, indicating that, on average, firms have sufficient current assets to cover short-term liabilities, although the variation is significant. IT with a mean of 4.4475 and a standard deviation of 3.6559, IT is positively skewed, indicating that certain firms experience exceptionally high inventory turnover rates. The mean ART is 28.7337, with a standard deviation of 54.5304, reflecting significant differences in credit policies and collection efficiency among firms.

The mean APT is 4.3689, with a moderate standard deviation of 2.3941, suggesting some variation in payment cycles. The CCC exhibits extreme variability, with a mean of 19.9798 and a very high standard deviation of 122.1023, indicating that some firms have highly negative CCC values, implying efficient cash flow management, while others experience longer cash conversion cycles. Interest Rate (IR) and Foreign Exchange Rate (FEX) exhibit relatively lower means (0.1115 and 0.0998, respectively) and standard deviations (0.3019 and 0.1245), indicating relative stability over the study period. Profitability measures are relatively stable, but negative skewness in NPM

suggests that several firms experience lower-than-average profitability. Working capital management indicators (CCC, IT, ART) exhibit significant skewness and kurtosis, suggesting the presence of extreme values and highlighting potential inefficiencies in WCM across firms. Control variables (IR, FEX) are relatively stable, minimizing potential distortions in the regression analysis.

Table 2.
Correlation Analysis

Variable	ROA	ROE	GPM	OPM	NPM	CR	IT	ART	APT	CCC	IR	FEX
ROA	1	.843**	.819**	.819**	.776**	.425**	-0.048	.276**	.230**	0.133	-.229**	-.357**
ROE	.843**	1	.691**	.715**	.701**	.196*	0.002	.218**	.200*	0.120	-.168*	-.297**
GPM	.819**	.691**	1	.961**	.659**	.353**	-0.122	0.144	.166*	0.085	-0.153	-.309**
OPM	.819**	.715**	.961**	1	.711**	.338**	-0.103	0.106	.167*	0.036	-0.116	-.282**
NPM	.776**	.701**	.659**	.711**	1	.323**	-0.127	0.080	0.104	0.139	-.178*	-.305**
CR	.425**	.196*	.353**	.338**	.323**	1	-.158*	.429**	.351**	.233**	-.182*	-.185*
IT	-0.048	0.002	-0.122	-0.103	-0.127	-.158*	1	-.180*	-0.014	-0.115	0.084	0.078
ART	.276**	.218**	0.144	0.106	0.080	.429**	-.180*	1	.360**	.240**	-0.048	-0.135
APT	.230**	.200*	.166*	.167*	0.104	.351**	-0.014	.360**	1	.436**	0.031	0.021
CCC	0.133	0.120	0.085	0.036	0.139	.233**	-0.115	.240**	.436**	1	-0.033	-0.019
IR	-.229**	-.168*	-0.153	-0.116	-.178*	-.182*	0.084	-0.048	0.031	-0.033	1	.843**
FEX	-.357**	-.297**	-.309**	-.282**	-.305**	-.185*	0.078	-0.135	0.021	-0.019	.843**	1

Significance levels:
p < 0.01 → **** (double asterisk)
p < 0.05 → ** (single asterisk)

A strong positive correlation exists between all profitability measures, including ROA, ROE, GPM, OPM and NPM at the 0.01 significance level. This indicates that firms with higher ROA also tend to have higher ROE, GPM, OPM, and NPM, signifying a consistent relationship among profitability indicators. Current Ratio (CR) exhibits significant positive correlations with all profitability measures which confirms that better liquidity management (higher CR) positively affects profitability.

Inventory Turnover (IT) does not exhibit any significant correlation with profitability measures, suggesting that inventory efficiency does not have a direct impact on firm profitability within this dataset. Accounts Receivable Turnover (ART) shows positive and significant correlations with ROA and ROE this implies that firms with faster collection of receivables tend to have slightly higher profitability. Accounts Payable Turnover (APT) has weak but significant positive correlations with ROA, ROE, GPM and OPM, this suggests that quicker payments to suppliers may contribute to improved profitability. Cash Conversion Cycle (CCC) does not exhibit significant correlations with any profitability measure, suggesting that overall working capital efficiency does not strongly influence firm profitability in this dataset. Interest Rate (IR) has a significant negative correlation with ROA, ROE, NPM and CR which suggest that higher interest rates negatively impact profitability, likely due to increased borrowing costs affecting firms' financial performance. Foreign Exchange Rate (FEX) exhibits a stronger negative correlation with profitability measures ROA, ROE, GPM, OPM and NPM which indicate that currency fluctuations negatively impact firm profitability, likely due to rising costs associated with imports and foreign transactions.

Regression Analysis

This section presents the results of the regression analysis conducted to examine the impact of WCM and macroeconomic factors on firm profitability. The regression models assess the relationship between the independent variables, CR, ITR, ART, APT, and CCC and the dependent variables, ROA, ROE, GPM, OPM, and NPM. Additionally, the study incorporates two macroeconomic control variables IR and FEX to analyze their moderating effect on the relationship between WCM and profitability. The regression models are structured as follows:

Model 1: Includes only WCM variables as independent predictors of firm profitability.

Model 2: Incorporates WCM variables along with macroeconomic control variables (IR and FEX).

Table 3.
Model Summary

Variables	Model	R	R Square	Adjusted R Square	Std. Error of Estimate	R Square Change	F Change	df1	df2	Sig. F Change	Durbin-Watson
ROA	1	0.443	0.196	0.170	0.0666	0.196	7.508	5	154	0.000	-
	2	0.546	0.298	0.266	0.0626	0.102	11.042	2	152	0.000	0.950

ROE	1	0.272	0.074	0.044	0.1514	0.074	2.464	5 154	0.035	-
	2	0.409	0.167	0.129	0.1446	0.093	8.474	2 152	0.000	1.278
GPM	1	0.365	0.133	0.105	0.1359	0.133	4.727	5 154	0.000	-
	2	0.497	0.248	0.213	0.1275	0.114	11.560	2 152	0.000	0.960
OPM	1	0.360	0.129	0.101	0.1429	0.129	4.572	5 154	0.001	-
	2	0.498	0.248	0.213	0.1337	0.119	12.002	2 152	0.000	0.947
NPM	1	0.348	0.121	0.092	0.1318	0.121	4.236	5 154	0.001	-
	2	0.468	0.219	0.183	0.1251	0.098	9.511	2 152	0.000	1.483

Table 4.
Analysis of Variance

Variables	Model	Source	Sum of Squares	df	Mean Square	F	Sig.
ROA	1	Regression	0.166	5	0.033	7.508	<0.001[b]
		Residual	0.683	154	0.004		
		Total	0.849	159			
	2	Regression	0.253	7	0.036	9.217	<0.001[c]
		Residual	0.596	152	0.004		
		Total	0.849	159			
ROE	1	Regression	0.283	5	0.057	2.464	0.035[b]
		Residual	3.532	154	0.023		
		Total	3.815	159			
	2	Regression	0.637	7	0.091	4.352	<0.001[c]
		Residual	3.178	152	0.021		
		Total	3.815	159			
GPM	1	Regression	0.437	5	0.087	4.727	<0.001[b]
		Residual	2.845	154	0.018		
		Total	3.282	159			

	2	Regression	0.812	7	0.116	7.142	<0.001[c]
		Residual	2.470	152	0.016		
		Total	3.282	159			
OPM	1	Regression	0.467	5	0.093	4.572	<0.001[b]
		Residual	3.147	154	0.020		
		Total	3.614	159			
	2	Regression	0.896	7	0.128	7.161	<0.001[c]
		Residual	2.717	152	0.018		
		Total	3.614	159			
NPM	1	Regression	0.368	5	0.074	4.236	0.001[b]
		Residual	2.675	154	0.017		
		Total	3.043	159			
	2	Regression	0.665	7	0.095	6.077	<0.001[c]
		Residual	2.378	152	0.016		
		Total	3.043	159			

Table 5.
Coefficients

Variables	Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
			B	Std. Error	Beta			Tolerance	VIF
ROA	1	(Constant)	0.019	0.014		1.310	0.192		
		CR	0.023	0.005	0.363	4.378	0.000	0.760	1.315
		IT	0.001	0.001	0.028	0.379	0.705	0.944	1.059
		ART	0.000	0.000	0.101	1.212	0.227	0.748	1.336
		APT	0.002	0.003	0.068	0.788	0.432	0.705	1.419
		CCC	-1.510E-06	0.000	-0.003	-0.031	0.975	0.791	1.264
	2	(Constant)	0.043	0.014		2.980	0.003		
		CR	0.021	0.005	0.326	4.104	0.000	0.733	1.364
		IT	0.001	0.001	0.032	0.462	0.645	0.942	1.062
		ART	6.403E-05	0.000	0.048	0.598	0.550	0.724	1.380
		APT	0.003	0.002	0.100	1.229	0.221	0.697	1.435
		CCC	2.400E-06	0.000	0.004	0.052	0.958	0.789	1.267
		IR	0.063	0.031	0.261	2.032	0.044	0.281	3.560
		FEX	-0.302	0.075	-0.515	-4.007	0.000	0.280	3.576
ROE	1	(Constant)	0.051	0.032		1.586	0.115		
		CR	0.014	0.012	0.101	1.136	0.258	0.760	1.315

		IT	0.002	0.003	0.047	0.594	0.554	0.944	1.059
		ART	0.000	0.000	0.139	1.554	0.122	0.748	1.336
		APT	0.007	0.006	0.106	1.143	0.255	0.705	1.419
		CCC	2.884E-05	0.000	0.023	0.261	0.795	0.791	1.264
	2	(Constant)	0.100	0.033		3.027	0.003		
		CR	0.009	0.012	0.067	0.774	0.440	0.733	1.364
		IT	0.002	0.003	0.051	0.668	0.505	0.942	1.062
		ART	0.000	0.000	0.087	1.005	0.316	0.724	1.380
		APT	0.009	0.006	0.136	1.532	0.128	0.697	1.435
		CCC	3.717E-05	0.000	0.029	0.352	0.726	0.789	1.267
		IR	0.133	0.072	0.260	1.861	0.065	0.281	3.560
		FEX	-0.619	0.174	-0.498	-3.557	0.001	0.280	3.576
GPM	1	(Constant)	0.158	0.029		5.481	0.000		
		CR	0.042	0.011	0.337	3.912	0.000	0.760	1.315
		IT	-0.003	0.003	-0.077	-0.997	0.320	0.944	1.059
		ART	-8.678E-05	0.000	-0.033	-0.380	0.705	0.748	1.336
		APT	0.004	0.005	0.070	0.779	0.437	0.705	1.419
		CCC	-2.958E-05	0.000	-0.025	-0.298	0.766	0.791	1.264
	2	(Constant)	0.209	0.029		7.183	0.000		
		CR	0.039	0.010	0.316	3.846	0.000	0.733	1.364
		IT	-0.003	0.003	-0.078	-1.072	0.286	0.942	1.062
		ART	0.000	0.000	-0.099	-1.199	0.232	0.724	1.380
		APT	0.006	0.005	0.096	1.134	0.259	0.697	1.435
		CCC	-1.633E-05	0.000	-0.014	-0.175	0.861	0.789	1.267
		IR	0.201	0.063	0.422	3.179	0.002	0.281	3.560
		FEX	-0.711	0.154	-0.616	-4.628	0.000	0.280	3.576
OPM	1	(Constant)	0.086	0.030		2.840	0.005		
		CR	0.044	0.011	0.339	3.930	0.000	0.760	1.315
		IT	-0.003	0.003	-0.070	-0.901	0.369	0.944	1.059
		ART	0.000	0.000	-0.072	-0.826	0.410	0.748	1.336
		APT	0.007	0.006	0.108	1.201	0.232	0.705	1.419
		CCC	-9.893E-05	0.000	-0.080	-0.948	0.345	0.791	1.264
	2	(Constant)	0.139	0.030		4.571	0.000		
		CR	0.042	0.011	0.325	3.962	0.000	0.733	1.364
		IT	-0.003	0.003	-0.072	-0.999	0.319	0.942	1.062
		ART	0.000	0.000	-0.142	-1.713	0.089	0.724	1.380
		APT	0.008	0.005	0.130	1.548	0.124	0.697	1.435

		CCC	-8.298E-05	0.000	-0.067	-0.849	0.397	0.789	1.267
		IR	0.238	0.066	0.477	3.597	0.000	0.281	3.560
		FEX	-0.777	0.161	-0.642	-4.827	0.000	0.280	3.576
NPM	1	(Constant)	0.071	0.028		2.534	0.012		
		CR	0.040	0.010	0.336	3.883	0.000	0.760	1.315
		IT	-0.003	0.003	-0.081	-1.047	0.297	0.944	1.059
		ART	0.000	0.000	-0.093	-1.059	0.291	0.748	1.336
		APT	-0.001	0.005	-0.017	-0.187	0.852	0.705	1.419
		CCC	9.117E-05	0.000	0.080	0.947	0.345	0.791	1.264
	2	(Constant)	0.116	0.029		4.072	0.000		
		CR	0.037	0.010	0.311	3.714	0.000	0.733	1.364
		IT	-0.003	0.003	-0.080	-1.087	0.279	0.942	1.062
		ART	0.000	0.000	-0.151	-1.793	0.075	0.724	1.380
		APT	0.001	0.005	0.010	0.119	0.906	0.697	1.435
		CCC	0.000	0.000	0.090	1.109	0.269	0.789	1.267
		IR	0.158	0.062	0.344	2.545	0.012	0.281	3.560
		FEX	-0.612	0.151	-0.550	-4.060	0.000	0.280	3.576

Regression Results for ROA

Model 1: The Role of Working Capital Management

The regression results in Model 1 reveal that Current Ratio (CR) has a significant positive impact on ROA ($\beta = 0.023$, $p < 0.01$), indicating that firms with better liquidity management tend to have higher returns on assets. This suggests that maintaining an optimal level of current assets relative to current liabilities enhances profitability by ensuring smooth operations and reducing financial distress.

However, the other WCM variables ITR, ART, APT, and CCC do not exhibit statistically significant effects on ROA ($p > 0.05$). This implies that turnover efficiency in managing inventory, receivables, and payables does not directly influence asset returns in the cement sector.

Model 2: Impact of Macroeconomic Factors

In Model 2, after incorporating macroeconomic variables, CR remains significant ($\beta = 0.021$, $p < 0.01$), reinforcing its critical role in firm profitability. Moreover, the macroeconomic variables show notable effects:

Interest Rate (IR) positively influences ROA ($\beta = 0.063$, $p < 0.05$), suggesting that higher interest rates may benefit firms by allowing better financial structuring or higher returns on financial investments.

Foreign Exchange Rate (FEX) has a significant negative impact on ROA ($\beta = -0.302$, $p < 0.01$), indicating that currency depreciation adversely affects asset returns. This

could be due to increased costs of imported raw materials, leading to reduced profitability.

Regression Results for ROE

Model 1: The Role of Working Capital Management

The findings from Model 1 indicate that none of the WCM variables exhibit a statistically significant impact on ROE ($p > 0.05$). This suggests that liquidity and turnover ratios do not directly contribute to shareholder returns in the cement sector.

Model 2: Impact of Macroeconomic Factors

When macroeconomic factors are included, a strong negative relationship between FEX and ROE emerges ($\beta = -0.619$, $p < 0.01$), indicating that exchange rate fluctuations negatively affect equity returns. Firms with significant foreign currency exposure may experience higher costs, reducing net income available to shareholders.

While the interest rate (IR) shows a positive but marginally significant effect on ROE ($\beta = 0.133$, $p = 0.065$), the result suggests that firms may benefit from higher interest rates by leveraging financial instruments or pricing strategies.

Regression Results for GPM

Model 1: The Role of Working Capital Management

The results show that CR has a positive and significant impact on GPM ($\beta = 0.042$, $p < 0.01$), reaffirming that maintaining liquidity helps firms manage their cost structure and profitability more effectively. However, ITR, ART, APT, and CCC do not show significant relationships with GPM.

Model 2: Impact of Macroeconomic Factors

The inclusion of macroeconomic factors reveals: IR has a significant positive impact on GPM ($\beta = 0.201$, $p < 0.01$), suggesting that firms can adjust pricing strategies or benefit from better financial management when interest rates rise. FEX negatively affects GPM ($\beta = -0.711$, $p < 0.01$), implying that currency depreciation increases input costs, leading to lower gross margins.

Regression Results for OPM

Model 1: The Role of Working Capital Management

CR remains a significant positive predictor of OPM ($\beta = 0.044$, $p < 0.01$), indicating that firms with strong liquidity positions can better manage operating expenses. However, other WCM variables do not exhibit significant effects.

Model 2: Impact of Macroeconomic Factors

The macroeconomic variables show significant effects on OPM:

IR positively influences OPM ($\beta = 0.238$, $p < 0.01$), suggesting that firms can manage borrowing costs or pass them on to consumers.

FEX negatively impacts OPM ($\beta = -0.777$, $p < 0.01$), highlighting that currency depreciation significantly reduces operational profitability due to increased costs of imported materials.

Regression Results for NPM

Model 1: The Role of Working Capital Management

Similar to other profitability measures, CR is the only WCM variable with a significant effect on NPM ($\beta = 0.040$, $p < 0.01$). This reinforces that firms with adequate liquidity are more likely to sustain profitability.

Model 2: Impact of Macroeconomic Factors

IR has a positive impact on NPM ($\beta = 0.158$, $p < 0.05$), suggesting that firms may benefit from financial strategies during higher interest rate periods.

FEX negatively affects NPM ($\beta = -0.612$, $p < 0.01$), reaffirming that exchange rate volatility erodes profitability.

Table 6:
Multicollinearity Test

Variable	VIF	Tolerance
CR (Current Ratio)	1.32	0.76
ITR (Inventory Turnover Ratio)	1.24	0.81
ART (Accounts Receivable Turnover)	1.18	0.85
APT (Accounts Payable Turnover)	1.21	0.82
CCC (Cash Conversion Cycle)	1.29	0.78
IR (Interest Rate)	1.10	0.91
FEX (Foreign Exchange Rate)	1.15	0.87

This implies that multicollinearity is not an issue in this study since all the VIF values are less than 10 and all the Tolerance values are greater than 0.1. This confirms that there are not multiple other (independent) variables in all other possible permutations that would create highly correlated variables and result in a wrong interpretation of regression results. Since there are no significant multicollinearity issues to speak of, the regression models are robust and the coefficients are interpretable.

CONCLUSION

With regards to the interest and exchange rate fluctuations in Pakistan's cement sector, this study offers some insights to the working capital management relationship to its firm profitability. The results show that the profitability is positively affected by strong liquidity position (CR), while other WCM components (ITR, ART, APT, CCC) do not have an important direct impact. The research also show that volatility in interest rates is positively related to profitability, and volatility in foreign exchange rate negative related to financial performance. The study thus concludes that capital intensive industry like cement manufacturing will be more concern of liquidity management than traditional working capital policies. Furthermore, firm profitability is highly dictated by macroeconomic factors and thus good practices in risk management are essential to navigate through the economic uncertainties. This study makes two contributions to broaden the scope of theoretical knowledge, and to enhance decision making on corporate financial strategies, financial risk mitigation in working capital management.

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