Working Capital Optimization and Firm's Performance: Evidence from Indian Cement Industry

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Posted Date: 6 December 2023

doi: 10.20944/preprints202312.0403.v1

Keywords: Working Capital Management, Profitability, Cement Industry, Bombay Stock Exchange, Panel Data, India.; Working Capital Management

 doi:10.20944/preprints202312.0403.v1

Article

Working Capital Optimization and Firm's Performance: Evidence from Indian Cement Industry

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Simple summary: The study shows that the inventory turnover period (ITP) and cash conversion cycle (CCC) have a negative impact on returns on assets (ROA) whereas the accounts receivable period (ARP) does not significantly predict the return on assets of cement companies. The current ratio (CR) is negatively related to ROA whereas the quick ratio (QR) favourably predicts ROA of the cement companies. It was observed that only ITP and CCC are significantly related to return on equity (ROE) where the direction of the relationship is negative.

ABSTRACT: Optimum usage of working capital is always considered the key to the success of an enterprise. There is much evidence in the financial literature that an efficient management of working capital has a positive impact on the performance of the organisation. Results of empirical analysis show that there is a strong relationship between the firm's profitability and its working capital management efficiency i.e., optimization of working capital. Present research work is an endeavour in this direction of establishing the factual importance of efficient management of working capital to any organization, particularly to Indian cement companies. The research work is backed by a research design of methodology including objectives, scope, significance, hypotheses, tools, techniques, etc. To make it more comprehensive in its approach, it is designed with both descriptive and econometric tools. The study employs a quantitative approach to examine whether the Indian cement companies optimally use their working capital, which is analysed by establishing the relationship between the working capital management and profitability using 11-year (2010-2021) financial data of 31 cement companies listed in Bombay Stock Exchange (BSE).

Keywords: working capital management; profitability; cement industry; bombay stock exchange; panel data; India

INTRODUCTION

The word optimum usage of working capital implies the best use of the components of working capital i.e., Inventory Turnover Period (ITP), Cash Conversion Cycle (CCC), Accounts Receivable Period (ARP), Accounts Payable Period (APP) as well as Current Ratio (CR) and Quick Ratio (QR) most efficiently so as to improve the firm's performance. Optimization of working capital, otherwise known as efficient management of working capital, increases firms' free cash flow, which in turn increases the firms' growth opportunities and returns to shareholders. In this study, we will examine the policy and practices of cash management, and evaluate the principles, procedures, and techniques of Inventory Management, Receivable and Payable Management to understand the efficiency of the working capital management (WCM) system of the Indian Cement Industry. Because working capital management has been one of the most crucial components of effective financial management, the present research aims to investigate the working capital management practices in the cement manufacturing sector. As a result, it provides an opportunity to investigate the financial perspectives of the BSE-listed

 doi:10.20944/preprints202312.0403.v1

cement companies. It is undeniably true that the estimates of relevant working capital measures vary greatly from industry to industry and from business to business.

The study is intended to analyse working capital management practices in the Indian cement industry. In this process, the research analysed various ratios on the working capital policy and practices in the selected industries and their impact on the performance to provide useful suggestions to improve the components of working capital for better performance. Its significance includes providing empirically-based guidance to businesses, especially the cement industry, to improve their financial performance, including increased profitability only through adopting suitable working capital management strategies, relating to the maintenance of optimal levels of inventories, cash, and receivables. The target population for this research is made up of all the Bombay Stock Exchange (BSE) listed cement manufacturing companies located in the Indian sub-continent. The sample cement companies were selected based on a few criteria. First of all, it has been ensured that the selected company should be a legal entity, filing their annual return to the register of companies, Govt. of India and should be listed in BSE. It has since been confirmed that the selected company should have 11 years of financial data starting from 2010 to 2020. Those companies not having the last 11 years of data were purposefully excluded from the sample. Thus, the sampling technique adopted in this research is purposive sampling. As the population is limited and countable, the study tried to include as many industries as possible provided they are satisfying the selection criteria. The final sample contains 31 cement companies with 11 years of financial data resulting in 341 Company-year panel data.

REVIEW OF EXISTING LITERATURE

Earlier studies on this aspect have looked at the relevance of working capital from a range of various viewpoints. For example, some studies have looked into the influence of optimum inventory management while others have looked into the best approach to manage accounts receivable in order to maximise profits. Many studies were conducted on the relationship between working capital management and the financial performance of manufacturing industries in different countries. Research on the impact of working capital management on firms' profitability in the Indian context is very limited and hardly any study has extensively been carried out to analyse the importance of optimum utilization of working capital and its impact on a firm's profitability particularly with respect to Indian cement companies. The data collected from the previous studies on this area by various researchers are presented in the form of a table as given below which provides a concise view of the prior studies exclusively dealing with the relationship between the determinants of working capital and financial profitability in the cement industries. It is observed that most of the available studies are being conducted in countries like Pakistan, India, Bangladesh, Nigeria, Kenya, Indonesia and Saudi Arabia. If we look at the prior findings there are conflicting outcomes concerning the relationship between CR and QR where Pandey and Sabamaithiy (2016) indicated a positive association whereas, Rehman and Anjum (2013) found a negative relation with ROA. Again, the other variables like APP, ARP, ITP and CCC are insignificant in predicting ROA. As such, the majority of studies are claiming an insignificant impact of CCC on profitability, yet some studies have also observed a negative relationship.

Table I. Summary of Prior studies on the Relationship between Working Capital and Profitability in the Cement industry.

Author	Country	No of Companies	Financial year	CR	QR	ARP	APP	ITP	CCC	DV
Almazari (2014)	Saudi Arab	8	2008-2012					+		ROA

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Angahar and Alematu (2014)	Nigeria	4	2002-2009		-		-	+	ROA
Dhar (2018),	Bangladesh	7	2007-2015		-	+	-	-	GPR
Hoque et al., (2015)	Bangladesh	6	2010-2012		-				NPR ROA
Kawakibi & Hadiwidjojo (2019)	Indonesia	6	2012-2017		-	-	+		ROA
Nwude et al., (2020)	Nigeria	3	2007-2018		+	-	-		ROA
Pandey and Sabamaithiy (2016)	India	24	2003-2013	+	+				ROI
Panigrahy, (2020)	India	30	2006-2015		+	-	-	-	ROA
Quayyum, (2011)	Bangladesh	6	2005-2009	+	+	+	-	-	NPR, ROA
Rehman and Anjum (2013)	India	10	2003-2008	-	-	+			ROA
Sarwat et al., (2017)	Pakistan	18	2007-2011	+					ROA
Shahzad et al., (2015)	Pakistan	7	2007-2013	+	-				ROA
Wanguu and Kipkirui (2015)	Kenya	3	2000-2014			-	+		ROA
Yasir et al., (2014)	Pakistan	16	2007-2012		-	-	-	-	ROA

Source: Author's preparation.

RESEARCH METHODOLOGY

The methodology for the present research work consists of six major steps namely: (i) review of the literature, (ii) construction of hypothesis, (iii) design of theory or model, (iv) data collection, (v) estimation and testing, and above all (vi) interpretation of findings to reach the logical conclusions and to relate them to existing literature and theory. Therefore, the present research work is comparatively extensive and unique of its kind as well making it more meaningful and purposeful. The main aim of the present research work is to examine the effect of working capital on the profitability of selected Indian cement companies. The research employed both descriptive and quantitative analysis. The descriptive and inferential analysis was made easier with the use of graphs and tables indicating growth trends. Statistical analyses have been performed using E-views 10.0 software to perform correlation and panel regression analysis of the data. The Least Squared Dummy Variable (LSDV) estimator was used to estimate the fixed-effect model, while the Generalized Least Squares estimator was used to estimate the random effect model (GLS). Because of the nature of the variables utilized and their suitability for robust estimations, these estimators were used. The descriptive analysis includes statistical techniques like Mean, Median, Maximum and minimum, Standard Deviation, Correlation, etc., which are carried out on all the variables (dependent, independent,

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and control) included in the research. Besides this, different other analysis tools like Durbin Watson (D-W) and Variance Inflation Factor (VIF) tests have also been carried out to examine the existence of auto-correlation or multicollinearity issues in the variables.

Variables used in the study and the methods of estimations have been provided in Table II. The selection and measurement of the dependent and independent variables were done according to some prior studies on this particular subject. The majority of the prior studies used ROA as a measure of profitability, however, some researchers also used NP, GP, ROE, ROCE and Tobin Q. For this study, we used only ROA and ROE as the measure of profitability.

Table II: List of Variables and Estimation Formulae

Variables	Definition	Estimation
Dependent Variables		
ROA	Return on Assets	EBIT/Average Assets
ROE	Return on Equity	EBIT/Equity
Independent Variables		
ITP	Inventory Turnover Period	(Inventory/COGS) x 365 Days
ARP	Accounts Receivables Period	(Accounts Receivable/Sales) x 365 Days
APP	Accounts Payable Period	(Accounts Payable/Purchases) x 365 Days
CCC	Cash Conversion Cycle	ITP+ ARP-APP
CR	Current Ratio or WCR	Current Asset/Current Liability
QR	Quick Ratio	Liquid Asset/Current Liability
Control Variables		
LCS	Firm Size	Log (Total Assets)
LCA	Firms Age	Log (Age in Years)
LEV	Leverage	Total Financial Debt / Total Assets
LOC	Location of the firm	1=East, 2= North, 3=West, 4=South

Source: Author's creation.

HYPOTHESIS OF THE STUDY

Since the objective of this study is to examine the relationship between profitability and working capital management, the study makes a set of testable hypotheses. In due course of data analysis, the following hypotheses are proposed to test the objectives of the study.

H**01**: No significant relationship exists between the indicators (proxies) of working capital management and the Return on Assets (ROA) of the firms.

H**02**: No significant relationship exists between the indicators (proxies) of working capital management and the Return on Equity (ROE) of the firms.

ANALYSIS AND INTERPRETATION OF DATA

The panel data models have been an improvised model adopted from some prior studies (e.g., Prempeh and Peprah-Amankonah 2018; Sahar and Yalali 2014; Akoto et al. 2013; Agyemang and Asiedu 2013; Tufail & Khan2013; Mohamad and Saad 2010). These models are used in this study to show the importance of the differences between businesses and the particular impacts of the specified variables within the industry over time.

Fixed effects models:

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$$Y_{it} = \alpha_i + \beta_0 + \beta_j X_{it} + \gamma_k C_{it} + \varepsilon_{it}$$

$$ROA_{it} = \alpha_i + \beta_0 + \beta_1 ICP_{it} + \beta_2 ACP_{it} + \beta_3 APP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 WCR_{it} + \beta_8 CLR_{it} + \beta_9 WTR_{it} + \gamma_1 Gr_{it} + \gamma_2 FS_{it} + \gamma_3 AGE_{it} + \gamma_4 LEV_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \alpha_i + \beta_0 + \beta_1 ICP_{it} + \beta_2 ACP_{it} + \beta_3 APP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 WCR_{it} + \beta_8 CLR_{it} + \beta_9 WTR_{it} + \gamma_1 Gr_{it} + \gamma_2 FS_{it} + \gamma_3 AGE_{it} + \gamma_4 LEV_{it} + \varepsilon_{it} \quad (2)$$

Random Effects Models:

$$Y_{it} = \beta_0 + \beta_j X_{it} + \gamma_k C_{it} + \mu_{it} + \varepsilon_{it}$$

$$ROA_{it} = \beta_0 + \beta_1 ICP_{it} + \beta_2 ACP_{it} + \beta_3 APP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 WCR_{it} + \beta_8 CLR_{it} + \beta_9 WTR_{it} + \gamma_1 Gr_{it} + \gamma_2 FS_{it} + \gamma_3 AGE_{it} + \gamma_4 LEV_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \beta_0 + \beta_1 ICP_{it} + \beta_2 ACP_{it} + \beta_3 APP_{it} + \beta_4 CCC_{it} + \beta_5 CR_{it} + \beta_6 QR_{it} + \beta_7 WCR_{it} + \beta_8 CLR_{it} + \beta_9 WTR_{it} + \gamma_1 Gr_{it} + \gamma_2 FS_{it} + \gamma_3 AGE_{it} + \gamma_4 LEV_{it} + \mu_{it} + \varepsilon_{it} \quad (2)$$

where,

$\varepsilon_{it} \sim iid(0; \sigma^2_{\varepsilon})$ and

$\mu_{it} \sim iid(0; \sigma^2_{\mu})$

where,

α = Constant (the intercept, or point where the line cuts the Y axis when X = 0)

α_i = Firm-specific effect variable

$\beta 0$ = Constant (the intercept, or point where the line cuts the Y axis when X = 0)

βj = Regression coefficient (the slope, or the change in dependent variable Y for any corresponding change in one unit of independent variable X)

γk= Regression coefficient of the control variables represented as C. coefficient

μit = Between-firm error (due to the belief that there are differences across firms that may influence the dependent variable)

εit = With in-firm error

i = Firm (Cross Section Dimensions) ranging from 1– 31

t = Time (Time Series Dimensions) ranging from 2010– 2020

DESCRIPTIVE STATISTICS

Descriptive statistics of the variables included in the study have been presented in Table-IV. The descriptive analysis includes information relating to the measures of central tendency including standard deviation, skewness, kurtosis, and minimum and maximum values in the variables. The research analysis includes two dependent variables viz: ROA and ROE, nine independent variables which measure the working capital management and liquidity position of the selected companies, and four control variables that are industry-specific and need to be controlled while verifying the impact of independent variables on the dependent variables. The other two variables include the year of establishment of the companies and the financial years for which data has been collected for the analysis.

It can be observed that the establishment year of the selected cement companies lies between 1910 to 2001 with a mode of 1979 and, mean 1972. This indicates that most of the companies were established during the late 1900s century. Based on the financial year data, it

 doi:10.20944/preprints202312.0403.v1

is evident that the study included 11 years of data for the financial year starting from 2010 to 2020. The ROA of the cement companies shows a mean value of 0.051, a standard deviation of 0.079 which is slightly different from the average ROA of individual companies given in Table-IV. As such, the ROA of the companies ranges between -0.2 to 0.5. whereas, on the other hand, the ROE of the companies ranges between -3.25 to 3.15 with a mean value of 0.087 and a standard deviation of 0.375.

Table IV: Descriptive Statistics of the Variables.

Variables	Mean	Median	Mode	SD	Skewness	Kurtosis	Min	Max
EST	1972	1979	1979	21.051	-1.06	0.593	1910	2001
FY	2015	2015	2010[a]	3.167	0.00	-1.22	2010	2020
ROA	0.051	0.04	0.02	0.079	1.340	7.289	-0.20	0.50
ROE	0.087	0.08	0.03	0.375	-0.796	38.736	-3.25	3.15
ITP	43.596	37.44	0.00	32.249	2.368	8.233	0.00	238.25
ACP	40.466	18.67	4.31[a]	69.958	4.226	22.871	0.00	641.13
APP	35.693	27.74	0.00	43.769	9.256	125.954	0.00	664.22
CCC	48.369	30.64	-0.99[a]	75.274	0.937	15.417	-498.69	523.54
CR	1.367	1.14	0.68[a]	0.919	2.289	7.462	0.07	6.54
QR	0.605	0.46	0.40	0.565	2.926	11.417	0.00	4.05
CAR	0.349	0.29	0.26[a]	0.200	1.552	1.863	0.05	0.99
CLR	0.300	0.26	0.20	0.156	2.273	8.419	0.05	1.33
WTR	10.551	1.54	-7.87[a]	204.699	16.926	303.995	-438.15	3673.32
SG	0.142	0.070	0.040	0.690	10.300	137.378	-0.890	10.150
LCS	2.967	2.830	2.770[a]	0.829	-0.231	0.156	0.440	4.860
LCA	1.588	1.570	1.570	0.209	-0.040	-0.204	1.000	2.040
LEV	0.162	0.150	0.000	0.141	0.661	-0.167	0.000	0.610

Source: Interpretation of Secondary Data.

Measurement of working capital ratios like; inventory turnover period (ITP) shows a mean value of 43.59 days with a standard deviation of 32.25 days. The ITP of the selected companies ranges from 0 to 238.25 days. Similarly, the Average Collection Period (ACP) shows a mean value of 40.47 days with a standard deviation of 69.95 days. ACP for selected companies ranges between 0 to 641.13 days. The Average Payments period (APP) shows a mean value of 35.69 days with a standard deviation of 43.77 days. ACP of the selected companies ranges from 0 to 664.22 days. Further, the mean Cash conversion cycle for selected companies is 48.37 days with a standard deviation of 75.27 days. The CCC ranges from -498.7 to 523.5 days and the majority of the companies have a negative cash conversion cycle because of a liberal accounts collection period.

Similarly, the liquidity ratios i.e., the quick ratio (QR) show a mean value of 0.605 with a standard deviation of 0.565. R of the selected companies ranges between 0 to 4.05 and the majority of the companies have a quick ratio of 0.40. The mean of the Current Ratio (CR) of the selected companies is given by 1.367 with a standard deviation of 0.919. Most firms have a current ratio of 0.68 with a median value of 1.14. The current ratio ranges from 0.07 to 6.54.

The current asset ratio (CAR) shows a mean value of 0.349 and a standard deviation of 0.2 with a range of 0.05 to 0.99. The current liability ratio shows a mean value of 0.3 with a standard deviation of 0.156 with a range of 0.05 to 1.33. Control variables such as the log of the size of the firm (LCS) show a mean value of 2.967 and a standard deviation of 0.829 with a range of 0.44 to 4.86. Logs from Firm Age (LCA) show a mean value of 1.588 and a standard deviation of 0.209 with a range of 1.00 to 2.04. The mean value of growth in sales of the cement companies year-wise from 2010 to 2020 is 14.2% with a standard deviation of 0.690 (69%). The growth

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potential in the companies hovers between -0.89 (-89%) to 10.15 (1015%). The majority of the companies witnessed around a 4% growth rate. The leverage data obtained for the companies indicates that the majority of the companies have no leverage in their capital structure. The mean value of the leverage is given by 0.162 with a standard deviation of 0.141.

The correlation matrix given in Table-V not only presents the inter-variable correlation but also provides evidence regarding the multicollinearity issues among the variables. It can be observed that the dependent variable ROA has a positive strong correlation with CR, QR, and CAR, whereas a negative correlation is observed with ITP, ACP, APP, CCC, and CLR. However, no strong correlation was observed between ROA, WTR, ROE and WTR. Contrarily, ROE exhibits a strong negative relation with the ITP and CCC of the cement companies. It is also observed that the independent variable CCC is strongly correlated with ACP leading to the existence of multicollinearity issues. Therefore, in order to remove the multicollinearity issue, one variable has to be removed. In this particular study, CCC has been used as a predictor variable separately in a different model, and the other variables such as ITP, ACP, and APP are used in another model.

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Table-V: Correlation Matrix of the variables under study and Multicollinearity identification

	ROA	ROE	ITP	ACP	APP	CCC	CR	QR	CAR	CLR	WTR	SG	LCS	LCA	LEV
ROA	1														
ROE	0.554**	1													
ITP	-0.248**	-0.168**	1												
ACP	-0.153**	-0.099	0.027	1											
APP	-0.183**	0.024	0.052	0.352**	1										
CCC	-0.141**	-0.178**	0.423**	**0.736****	-.232**	1									
CR	0.205**	0.072	0.078	0.289**	-0.098	.359**	1								
QR	0.281**	0.093	0.434**	-0.138*	-.147**	.143**	.633**	1							
CAR	0.167**	0.102	-0.029	0.374**	.163**	.240**	.601**	.262**	1						
CLR	-0.269**	-0.038	0.088	0.007	.363**	-.166**	-.421**	-.364**	.195**	1					
WTR	0.058	0.014	-0.012	-0.022	-0.019	-0.014	0.013	0.032	0.019	-0.012	1				
SG	0.111*	0.145**	-0.131*	-0.085	.248**	-.279**	-0.058	-0.036	0.020	0.051	0.013	1			
LCS	0.093	0.012	-0.101	-0.337**	-.203**	-.239**	-.162**	-0.003	-.434**	-.354**	0.064	-0.072	1		
LCA	0.062	0.007	0.064	-0.146**	-0.054	-0.077	-0.094	.128*	-.207**	-.186**	0.075	-0.099	.448**	1	
LEV	-0.204**	-0.075	-0.001	-0.071	-0.077	-0.021	-.235**	-.218**	-.443**	-.199**	-0.047	0.089	.157**	0.018	1

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed).*

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Effect of Working Capital Management on Return of Assets (ROA)

The effect of working capital management in cement companies measured in terms of different ratios on the return on the asset has been presented in this section. It presents three different regression models viz; the general panel OLS model followed by the Random effect model with Hausman's test and then the fixed effects model. A similar pattern has been followed for the regression models for the prediction of ROE.

a. OLS Model-1 WCM prediction ROA

As per the correlation matrix, the multicollinearity issue detected between ACP and CCC has been sorted out by not including these two variables in a single model rather than two different models presented to analyse the relationships. Model-1 given in Table-VI indicates ITP, CR, and CLR are negatively related to the ROA whereas, QR and CAR are favourably predicting the ROA of the cement companies. Whereas, APP and ACP do not significantly predict ROA. Moreover, the sales growth (SG) is positively related which is quite obvious but the leverage (LEV) of the cement companies has a negative impact on the profitability measure ROA. The value of R-square, which is the coefficient of determination is 0.329 which is quite impressive.

Table VI: Pulled OLS Model-1 Predicting ROA.

Dependent Variable: ROA
Method: Panel Least Squares
Sample: 2010 - 2020
Periods included: 11
Cross-sections included: 31
Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	T-Statistics	Prob.
ACP	-5.77E-05	7.15E-05	-0.806916	0.420
APP	-0.000171	0.000100	-1.703011	0.089
ITP	-0.000861	0.000144	-5.998633	**0.000**
CR	-0.029297	0.008101	-3.616470	**0.000**
QR	0.060063	0.011619	5.169169	**0.000**
CAR	0.111547	0.031555	3.534969	**0.000**
CLR	-0.139493	0.037656	-3.704454	**0.000**
WTR	8.13E-06	1.75E-05	0.464558	0.642
LCA	-0.001454	0.019779	-0.073506	0.941
LCS	0.001898	0.005667	0.335004	0.737
LEV	-0.079322	0.029789	-2.662804	**0.008**
SG	0.011738	0.005611	2.092011	**0.037**
C	0.110996	0.037868	2.931166	0.003

R-squared	0.328949	Mean dependent var	0.050759
Adjusted R-squared	0.304398	S.D. dependent var	0.078687
S.E. of regression	0.065627	Akaike info criteria	-2.572272
Sum squared residual	1.412677	Schwarz criteria	-2.426189
Log-likelihood	451.5725	Hannan-Quinn criteria	-2.514071
FX Statistics	13.39877	Durbin-Watson stat	1.398136
Prob(F-statistic)	0.000000		

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Table VII: Pulled OLS Model-2 Predicting ROA.

Dependent Variable: ROA

Method: Panel Least Squares

Sample: 2010-2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	T-Statistics	Prob.
CCC	-0.000217	5.80E-05	-3.735051	**0.000**
CR	-0.024118	0.008306	-2.903537	**0.003**
QR	0.028141	0.009103	3.091331	**0.002**
CAR	0.139891	0.032108	4.356871	**0.000**
CLR	-0.228701	0.036110	-6.333430	**0.000**
WTR	1.07E-05	1.83E-05	0.582499	0.560
LCA	-0.007476	0.020634	-0.362331	0.717
LCS	0.002848	0.005898	0.482796	0.629
LEV	-0.096590	0.031046	-3.111209	**0.002**
SG	0.008745	0.005779	1.513223	0.131
C	0.114494	0.039712	2.883138	0.004

R-squared	0.257113	Mean dependent var	0.050759
Adjusted R-squared	0.234601	S.D. dependent var	0.078687
S.E. of regression	0.068841	Akaike info criteria	-2.482304
Sum squared residual	1.563904	Schwarz criteria	-2.358695
Log-likelihood	434.2328	Hannan-Quinn criteria.	-2.433056
F-statistic	11.42127	Durbin-Watson stat	1.412035
Prob(F-statistic)	0.000000		

Likewise, model-2 includes only CCC and removes all the determinants of CCC i.e., ITP, ACP, and APP. This model also gives similar results for the variables QR and CAR which are positively related and CR and CLR which are negatively related. Further, there is a strong negative relationship found between CCC and ROA. However, Sales Growth (SG) in this model is not related to ROA.

It is quite obvious that in the case of panel data where there is a high level of differences found across industry and time (financial years), therefore, the simple panel OLS results are not promising as there may exist any fixed or random effect of the panel characteristics of the data. Thus, the random effect model has been run for both the set of variables as shown in the previous model.

The first model of the random effect includes independent variables ACP, APP, ITP, CR, QR, WTR, CAR, and CLR along with the four control variables which are common in all the models. In the random effect model, it can be observed that ITP, CR, and CLR are negatively related to ROA with t-statistics -5.603, -3.130, and -3.554 respectively. On the other hand, QR and CAR are positively predicting ROA with a t-value of 4.678 and 3.713 respectively. This observation is quite identical to the results obtained from the panel OLS model. This leads to the inference that an increase in inventory turnover period has a negative impact on the ROA thus the cement companies need to reduce the ITP as low as possible to ensure profitability. Similarly, the current ratio which is a proportion of current assets to current liabilities is also negatively related to ROA indicating a higher current ratio is unfavourable for profitability. Therefore, the companies need to maintain a lower current ratio. At the same time, it is also observed that CLR i.e., the current liabilities to the total asset ratios need to be decreased to ensure good profitability measures in terms of ROA.

 doi:10.20944/preprints202312.0403.v1

Again, a quick ratio, which is the proportion of liquid assets to the current liabilities, is positively predicting ROA. Thus, maintaining a good liquidity position has a favourable impact on profitability but at the same time, it should be ensured that the current ratio should not increase. Similarly, the current asset to total assets ratio i.e., CAR should be increased as it has a positive impact on profitability which can be done just by reducing the fixed asset or by increasing the liquid assets and reducing the current assets other than liquid assets. Further, the value of R-square is 0.30 indicating that the profitability measure ROA is explained by the independent variables as only 30%.

Table VIII: Random Effect Model-1 Predicting ROA.

Dependent Variable: ROA

Method: Panel EGLS (Cross-section random effects)

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ACP	-8.61E-05	8.11E-05	-1.061490	0.289
APP	-0.000156	9.91E-05	-1.573016	0.116
ITP	-0.000943	0.000168	-5.603029	**0.000**
CR	-0.025843	0.008256	-3.130196	**0.001**
QR	0.061447	0.013135	4.678213	**0.000**
CAR	0.130705	0.035195	3.713748	**0.000**
CLR	-0.134674	0.037893	-3.554083	**0.000**
WTR	6.51E-06	1.66E-05	0.392016	0.695
LCA	-0.007725	0.032221	-0.239746	0.810
LCS	0.000595	0.008781	0.067788	0.946
LEV	-0.091536	0.032823	-2.788740	**0.005**
SG	0.011438	0.005406	2.115835	**0.035**
C	0.117366	0.053516	2.193099	0.029

Effects Specification

	S.D.	Rho
Cross-section random	0.028433	0.1802
Idiosyncratic random	0.060650	0.8198

Weighted Statistics

R-squared	0.300928	Mean dependent var	0.027457
Adj. R-squared	0.275352	S.D. dependent var	0.071675
S.E. of regression	0.061014	Sum squared residual	1.221055
F-statistic	11.76613	Durbin-Watson stat	1.594934
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.318263	Mean dependent var	0.050759
Sum squared residual	1.435172	Durbin-Watson stat	1.356981

 doi:10.20944/preprints202312.0403.v1

The effect of the control variables included in the random effect model-1 shows that the leverage of the firm is negatively related to ROA. Contrarily, the size and age of the cement industry have no significant relationship with its profitability. Therefore, it can be inferred that those companies maintaining a lower level of leverage can benefit more in terms of ROA. The working capital turnover ratio (WTR) was found to be insignificant in predicting the return on assets of cement companies.

The acceptability of the above random effect model has been ascertained by conducting the Hausman's Test which is given in Table-IX. Hausman's Test is based on the acceptance or rejection of a null hypothesis which says that "the random effect model is appropriate". The results of the Hausman's Test show a p-value of 0.193 which is greater than 0.05 level of significance leading to the acceptance of the null hypothesis with the conclusion of accepting the random effect model which is an appropriate model. However, the fixed-effect model is not appropriate but still, it is presented in Table- X for reference as it is a part of Hausman's Test results.

Table-IX: Hausman's test for Model-1.

Correlated Random Effects - Hausman Test

Test cross-section random effects

Test Summary	Chi Sq. Statistics	Chi Sq. d.f.	Prob.
Cross-section random	15.953	12	0.193

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var (Diff.)	Prob.
ACP	-0.000061	-0.000086	0.000000	0.650
APP	-0.000125	-0.000156	0.000000	0.332
ITP	-0.001031	-0.000943	0.000000	0.500
CR	-0.027253	-0.025843	0.000012	0.686
QR	0.062520	0.061447	0.000088	0.909
CAR	0.193812	0.130705	0.000634	0.012
CLR	-0.119269	-0.134674	0.000151	0.210
WTR	0.000005	0.000007	0.000000	0.594
LCA	-0.017358	-0.007725	0.012775	0.932
LCS	-0.052094	0.000595	0.001165	0.122
LEV	-0.096746	-0.091536	0.000415	0.798
SG	0.010628	0.011438	0.000003	0.618

Table- X: Fixed Regression Model-1 Predicting ROA

Cross-section random effects test equation:

Dependent Variable: ROA

Method: Panel Least Squares

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	T-Statistics	Prob.
C	0.266310	0.135262	1.968846	0.049
ACP	-6.09E-05	9.83E-05	-0.619027	0.536
APP	-0.000125	0.000104	-1.199413	0.231

 doi:10.20944/preprints202312.0403.v1

ITP	-0.001031	0.000213	-4.837410	**0.000**
CR	-0.027253	0.008963	-3.040699	**0.002**
QR	0.062520	0.016150	3.871130	**0.000**
CAR	0.193812	0.043275	4.478624	**0.000**
CLR	-0.119269	0.039839	-2.993802	**0.003**
WTR	5.06E-06	1.68E-05	0.300786	0.763
LCA	-0.017358	0.117530	-0.147693	0.882
LCS	-0.052094	0.035247	-1.477962	0.140
LEV	-0.096746	0.038631	-2.504384	**0.012**
SG	0.010628	0.005645	1.882660	0.060

Effects Specification			
Cross-section fixes (dummy variables)			
R-squared	0.479300	Mean dependent var	0.050759
Adjusted R-squared	0.405913	S.D. dependent var	0.078687
S.E. of regression	0.060650	Akaike info criteria	-2.649992
Sum squared residual	1.096161	Schwarz criteria	-2.166793
Log-likelihood	494.8236	Hannan-Quinn criterion	-2.457478
F-statistic	6.531119	Durbin-Watson stat	1.773356
Prob(F-statistic)	0.000000		

The second model in this section includes the variables CCC, QR, CR CAR, CLR, and WTR as the predicting variables. The model-2 given in Table- XI shows the dependency of ROA on the selected working capital measures. Before proceeding to further interpretation of the model, it is essential to ascertain the appropriateness among the Fixed and Random effect models.

 doi:10.20944/preprints202312.0403.v1

Table- XI: Random Effect Model-2 Predicting ROA.

Dependent Variable: ROA

Method: Panel EGLS (Cross-section random effects)

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CCC	-0.000188	6.53E-05	-2.884242	**0.004**
CR	-0.020028	0.008372	-2.392210	**0.017**
QR	0.032701	0.011666	2.803141	**0.005**
CAR	0.147316	0.035987	4.093595	**0.000**
CLR	-0.215911	0.036676	-5.886914	**0.000**
WTR	8.78E-06	1.73E-05	0.507235	0.612
LCA	-0.017346	0.032333	-0.536492	0.592
LCS	0.003193	0.008784	0.363539	0.716
LEV	-0.115582	0.033649	-3.434946	**0.000**
SG	0.009566	0.005588	1.711996	0.087
C	0.115980	0.054295	2.136131	0.033

Effects Specification

	S.D.	Rho
Cross-section random	0.027994	0.1639
Idiosyncratic random	0.063237	0.8361

Weighted Statistics

R-squared	0.228774	Mean dependent var	0.028574
Adjusted R-squared	0.205404	S.D. dependent var	0.071927
S.E. of regression	0.064116	Sum squared residual	1.356576
F-statistic	9.789021	Durbin-Watson stat	1.594247
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.244686	Mean dependent var	0.050759
Sum squared resid	1.590064	Durbin-Watson stat	1.360144

 doi:10.20944/preprints202312.0403.v1

The Hausman's test result given in Table- XII shows a chi-square value of 19.234 with 10 degrees of freedom is significant at a p-value less than 0.05. This leads to the rejection of the null hypothesis "The random effect model is appropriate". In other words, it can be claimed that the fixed effect model is appropriate. The fixed effect model given in Table-XIII shows very contradictory results compared to the random effect model. However, the direction of the relationship between dependent and independent variables is intact but the magnitude of the relationship has been changed. The fixed-effect model shows that the cash conversation cycle, though negatively related to ROA, is not affected significantly. However, CR and CLR are significantly negatively predicting ROA. Further, QR and CAR are positively predicting the ROA of the cement companies. This finding is quite similar to the earlier results obtained in the pooled OLS and the first model of the random effect. The value of R-square in this model is 0.43 which is quite good.

Table- XII: Hausman Test for model-2.

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi Sq. Statistics	Chi Sq. d.f.	Prob.
Cross-section random	19.234	10	0.037

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var (Diff.)	Prob.
CCC	-0.000127	-0.000188	0.000000	0.113
CR	-0.021006	-0.020028	0.000015	0.801
QR	0.045467	0.032701	0.000136	0.273
CAR	0.196313	0.147316	0.000719	0.067
CLR	-0.182469	-0.215911	0.000224	0.025
WTR	0.000007	0.000009	0.000000	0.460
LCA	-0.052716	-0.017346	0.013890	0.764
LCS	-0.050790	0.003193	0.001268	0.129
LEV	-0.127628	-0.115582	0.000453	0.571
SG	0.010125	0.009566	0.000003	0.762

Table- XIII: Fixed effects model-2 Predicting ROA.

Dependent Variable: ROA

Method: Panel Least Squares

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	T-Statistics	Prob.
C	0.297716	0.140887	2.113147	0.035
CCC	-0.000127	7.60E-05	-1.664695	0.097
CR	-0.021006	0.009235	-2.274688	**0.023**
QR	0.045467	0.016500	2.755533	**0.006**
CAR	0.196313	0.044883	4.373894	**0.000**

 doi:10.20944/preprints202312.0403.v1

CLR	-0.182469	0.039610	-4.606624	**0.000**
WTR	6.60E-06	1.76E-05	0.375853	0.707
LCA	-0.052716	0.122209	-0.431360	0.666
LCS	-0.050790	0.036671	-1.385043	0.167
LEV	-0.127628	0.039817	-3.205331	**0.001**
SG	0.010125	0.005885	1.720442	0.086

Effects Specification			
Cross-section fixes (dummy variables)			
R-squared	0.430127	Mean dependent var	0.050759
Adjusted R-squared	0.354143	S.D. dependent var	0.078687
S.E. of regression	0.063237	Akaike info criteria	-2.571481
Sum squared residual	1.199681	Schwarz criteria	-2.110756
Log-likelihood	479.4375	Hannan-Quinn criterion	-2.387921
F-statistic	5.660816	Durbin-Watson stat	1.768049
Prob(F-statistic)	0.000000		

The following inferences can be noted for the formulated hypotheses relating to the dependency of ROA on working capital management.

Table- XIV: Hypotheses Summary for Equation-1.

Independent Variable	Relationship with ROA	Significance
ACP	Negative	Not Significant
APP	Negative	Not Significant
ITP	Negative	Significant
CCC	Negative	Significant
CR	Negative	Significant
QR	Positive	Significant
CAR	Positive	Significant
CLR	Negative	Significant
WTR	Positive	Not Significant

Effect of Working Capital Management on Return on Equity (ROE)

The second part of the regression model deals with the relationship between the working capital management and the return on equity of the selected cement companies. Return on equity unlike return on assets, is a very robust measure of profitability as it only includes the return on equity capital invested in companies. Therefore, the results obtained for this profitability ratio may be quite different from the relationship observed for working capital management and ROA. Table- XV and Table - XVI given below show two different Pooled OLS models for predicting the ROE of the cement companies.

Table-XV: Pooled OLS Model-1 Predicting ROE.

Dependent Variable: ROE

Method: Panel Least Squares

Sample: 2010- 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	T-Statistics	Prob.

 doi:10.20944/preprints202312.0403.v1

ACP	-0.000543	0.000396	-1.369219	0.171
APP	0.000517	0.000556	0.930447	0.352
ITP	-0.002642	0.000796	-3.318804	**0.001**
CR	-0.034585	0.044931	-0.769741	0.442
QR	0.128314	0.064446	1.991030	**0.047**
CAR	0.234780	0.175018	1.341462	0.180
CLR	-0.088297	0.208853	-0.422768	0.672
WTR	-3.54E-07	9.70E-05	-0.003646	0.997
LCA	0.008506	0.109703	0.077540	0.938
LCS	0.001000	0.031431	0.031832	0.974
LEV	-0.038776	0.165221	-0.234689	0.814
SG	0.051794	0.031121	1.664271	0.097
C	0.102073	0.210030	0.485993	0.627

R-squared	0.090754	Mean dependent var	0.086880
Adjusted R-squared	0.057489	S.D. dependent var	0.374933
S.E. of regression	0.363996	Akaike info criteria	0.854029
Sum squared residual	43.45768	Schwarz criteria	1.000112
Log-likelihood	-132.6119	Hannan-Quinn criteria	0.912230
F-statistic	2.728208	Durbin-Watson stat	1.897024
Prob(F-statistic)	0.001552		

 doi:10.20944/preprints202312.0403.v1

Table- XVI: Pooled OLS Model-2 Predicting ROE.

Dependent Variable: ROE
Method: Panel Least Squares
Sample: 2010 - 2020
Periods included: 11
Cross-sections included: 31
Total panel (balanced) observations: 341

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CCC	-0.001026	0.000308	-3.331211	**0.001**
CR	-0.017516	0.044124	-0.396969	0.691
QR	0.039770	0.048356	0.822430	0.411
CAR	0.318498	0.170561	1.867351	0.062
CLR	-0.274271	0.191820	-1.429841	0.153
WTR	4.03E-06	9.75E-05	0.041386	0.967
LCA	0.005296	0.109608	0.048322	0.961
LCS	-0.000403	0.031331	-0.012867	0.989
LEV	-0.080600	0.164917	-0.488729	0.625
SG	0.050388	0.030699	1.641363	0.101
C	0.105882	0.210951	0.501928	0.616
R-squared	0.076679	Mean dependent var		0.086880
Adjusted R-squared	0.048699	S.D. dependent var		0.374933
S.E. of regression	0.365689	Akaike info criteria		0.857660
Sum squared residual	44.13043	Schwarz criteria		0.981269
Log-likelihood	-135.2311	Hannan-Quinn criterion.		0.906908
F-statistic	2.740533	Durbin-Watson stat		1.892583
Prob(F-statistic)	0.002965			

The pooled OLS model given in the above table gives a preliminary indication regarding the relationship between dependent and independent variables. It is clear from the above models that ROE of the cement companies is significantly predicted by ITP and CCC negatively whereas QR is favourable predicting ROE. Other determinants do not significantly predict the financial performance measure ROE of the cement companies. However, it is worth finding out how variables behave in the fixed and random effect models given in the following sections.

Table- XVII presents the random effect model presenting the impact of APP, ACP, ITP, QR, CR, WTR, CAR, and CLR on the Return on Equity of the cement companies. The Hausman Test outcome presented in Table-XVIII shows a chi-square value of 14.60 at 12 degrees of freedom with a p-value greater than 0.05. This leads to the acceptance of Hausman's Test hypothesis "Random effect model is appropriate". Thus, the random effect model results need to be interpreted here. It can be confirmed from the regression model that only ITP and QR are the two measures of working capital management in the cement industry that predict ROE significantly. As in the case of ROA, the direction of impact of these two variables is identical. This means ITP is negatively related to ROE indicating a decrease in inventory turnover period leads to an improvement in return on equity. Similarly, the quick ratio is positively related to ROE and is significant at a p-value less than 0.05.

 doi:10.20944/preprints202312.0403.v1

Table-XVII: Random Effect Model-1 Predicting ROE.

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	T-Statistics	Prob.
ACP	-0.000543	0.000400	-1.356073	0.176
APP	0.000517	0.000561	0.921514	0.357
ITP	-0.002642	0.000804	-3.286940	**0.001**
CR	-0.034585	0.045367	-0.762351	0.446
QR	0.128314	0.065071	1.971914	**0.049**
CAR	0.234780	0.176715	1.328582	0.184
CLR	-0.088297	0.210878	-0.418709	0.675
WTR	-3.54E-07	9.80E-05	-0.003611	0.997
LCA	0.008506	0.110766	0.076796	0.938
LCS	0.001000	0.031735	0.031526	0.974
LEV	-0.038776	0.166823	-0.232436	0.816
SG	0.051794	0.031423	1.648292	0.100
C	0.102073	0.212066	0.481327	0.630

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	0.367524	1.0000

Weighted Statistics

R-squared	0.090754	Mean dependent var	0.086880
Adjusted R-squared	0.057489	S.D. dependent var	0.374933
S.E. of regression	0.363996	Sum squared residual	43.45768
F-statistic	2.728208	Durbin-Watson stat	1.897024
Prob(F-statistic)	0.001552		

Unweighted Statistics

R-squared	0.090754	Mean dependent var	0.086880
Sum squared residual	43.45768	Durbin-Watson stat	1.897024

 doi:10.20944/preprints202312.0403.v1

Table- XVIII: Hausman's Test for model-1.

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi Sq. Statistics	Chi Sq. d.f.	Prob.
Cross-section random	14.603	12	0.263

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var. - Diff	Prob.
ACP	-0.001504	-0.000543	0.000000	0.0295
APP	0.000340	0.000517	0.000000	0.5388
ITP	-0.002239	-0.002642	0.000001	0.6901
CR	-0.082705	-0.034585	0.000892	0.1071
QR	0.208430	0.128314	0.005344	0.2731
CAR	0.377486	0.234780	0.037540	0.4614
CLR	-0.058837	-0.088297	0.013811	0.8021
WTR	0.000005	-0.000000	0.000000	0.8631
LCA	0.270396	0.008506	0.494973	0.7097
LCS	-0.455312	0.001000	0.044614	0.0307
LEV	0.053409	-0.038776	0.026970	0.5746
SG	0.023259	0.051794	0.000183	0.0349

Table- XIX: Fixed Effect Model-1 Predicting ROE.

Dependent Variable: ROE

Method: Panel Least Squares

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Variable	**Coefficient**	**Std. Error**	**T-Statistics**	**Prob.**
C	1.015598	0.819659	1.239049	0.216
ACP	-0.001504	0.000596	-2.523584	**0.012**
APP	0.000340	0.000631	0.538125	0.590
ITP	-0.002239	0.001292	-1.733394	0.084
CR	-0.082705	0.054313	-1.522764	0.128
QR	0.208430	0.097868	2.129698	**0.034**
CAR	0.377486	0.262237	1.439483	0.151
CLR	-0.058837	0.241414	-0.243720	0.807
WTR	4.55E-06	0.000102	0.044626	0.964
LCA	0.270396	0.712209	0.379658	0.704
LCS	-0.455312	0.213591	-2.131702	**0.033**
LEV	0.053409	0.234094	0.228153	0.819
SG	0.023259	0.034210	0.679881	0.497

Effects Specification

 doi:10.20944/preprints202312.0403.v1

Cross-section fixes (dummy variables)			
R-squared	0.157823	Mean dependent var	0.086880
Adjusted R-squared	0.039127	S.D. dependent var	0.374933
S.E. of regression	0.367524	Akaike info criteria	0.953356
Sum squared residual	40.25210	Schwarz criteria	1.436556
Log-likelihood	-119.5472	Hannan-Quinn criterion.	1.145870
F-statistic	1.329639	Durbin-Watson stat	2.055830
Prob(F-statistic)	0.093046		

The fixed-effect model also provides similar evidence regarding the independent variable QR as in the case of the random-effect model; however, ITP is not significant in the fixed-effect model at a 0.05 level of significance. Here, ACP was found to have a negative impact on the return on equity of cement firms. Another difference that can be observed in the fixed and random effect model is the value of the coefficient of determination R-square. The R-square in the random effect model is very low i.e., 0.09 whereas, in the fixed model it is 0.157.

The second random effect model includes a cash conversion cycle replacing its composition variables i.e. ACP, APP, and ITP. The random effect model-2 given in Table-XX is found appropriate as per the results of the Hausman's Test given in Table-XXI. Now, the random effect model-2 gives clear evidence regarding a strong negative relationship between the cash conversion cycle and return on equity of the cement companies. The behaviour of CCC is identical in the case of ROA as well. So it can be concluded that the cement companies need to reduce their cash conversion cycle in order to maximize their profitability ratio. However, other measures of working capital management are not at all significant in explaining the return on equity of the selected cement companies in India.

Table- XX: Random Effects model-2 predicting ROE.

Dependent Variable: ROE

Method: Panel EGLS (Cross-section random effects)

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	T-Statistics	Prob.
CCC	-0.001026	0.000311	-3.303536	**0.001**
CR	-0.017516	0.044493	-0.393671	0.694
QR	0.039770	0.048761	0.815598	0.415
CAR	0.318498	0.171990	1.851838	0.064
CLR	-0.274271	0.193426	-1.417962	0.157
WTR	4.03E-06	9.83E-05	0.041043	0.967
LCA	0.005296	0.110526	0.047921	0.961
LCS	-0.000403	0.031594	-0.012760	0.989
LEV	-0.080600	0.166299	-0.484669	0.628
SG	0.050388	0.030956	1.627727	0.104
C	0.105882	0.212718	0.497758	0.619
Effects Specification				
			S.D.	Rho

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Cross-section random		0.000000	0.0000
Idiosyncratic random		0.368753	1.0000
Weighted Statistics			
R-squared	0.076679	Mean dependent var	0.086880
Adjusted R-squared	0.048699	S.D. dependent var	0.374933
S.E. of regression	0.365689	Sum squared residual	44.13043
F-statistic	2.740533	Durbin-Watson stat	1.892583
Prob(F-statistic)	0.002965		
Unweighted Statistics			
R-squared	0.076679	Mean dependent var	0.086880
Sum squared residual	44.13043	Durbin-Watson stat	1.892583

Table-XXI: Hausman Test for Model-2.

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi Sq. Statistics	Chi Sq. d.f.	Prob.
Cross-section random	11.767	10	0.300

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var (Diff.)	Prob.
CCC	-0.001201	-0.001026	0.000000	0.5804
CR	-0.075406	-0.017516	0.000920	0.0564
QR	0.177407	0.039770	0.006880	0.0970
CAR	0.411513	0.318498	0.038919	0.6373
CLR	-0.189310	-0.274271	0.015937	0.5009
WTR	0.000009	0.000004	0.000000	0.8702
LCA	0.165770	0.005296	0.495634	0.8197
LCS	-0.437466	-0.000403	0.044727	0.0388
LEV	-0.007986	-0.080600	0.026255	0.6541
SG	0.022513	0.050388	0.000219	0.0599

The value of R-square is very low i.e. 0.07, which means only 7% variance in the ROE is being explained by the working capital measures. The low value of R-square also makes the regression model a bit poor as the majority of the independent variables included in the model do not significantly predict the dependent variable. Thus, in the final conclusion, it is better to prefer the model where ROA is taken as the profitability measure instead of ROE. However, both measures exhibit an identical relationship with working capital management practices in cement companies.

Table- XXII: Fixed Effect Model-2 Predicting ROE.

Dependent Variable: ROE

Method: Panel Least Squares

Sample: 2010 - 2020

Periods included: 11

Cross-sections included: 31

Total panel (balanced) observations: 341

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Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.086483	0.821551	1.322478	0.187
CCC	-0.001201	0.000443	-2.708271	**0.007**
CR	-0.075406	0.053851	-1.400268	0.162
QR	0.177407	0.096218	1.843795	0.066
CAR	0.411513	0.261724	1.572317	0.116
CLR	-0.189310	0.230978	-0.819603	0.413
WTR	8.70E-06	0.000102	0.085057	0.932
LCA	0.165770	0.712636	0.232615	0.816
LCS	-0.437466	0.213836	-2.045806	**0.041**
LEV	-0.007986	0.232185	-0.034396	0.972
SG	0.022513	0.034319	0.655998	0.512

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.146494	Mean dependent var	0.086880
Adjusted R-squared	0.032694	S.D. dependent var	0.374933
S.E. of regression	0.368753	Akaike info criterion	0.954988
Sum squared resid	40.79356	Schwarz criterion	1.415713
Log-likelihood	-121.8254	Hannan-Quinn criteria.	1.138548
F-statistic	1.287289	Durbin-Watson stat	2.058171
Prob(F-statistic)	0.124325		

The following inferences can be noted for the formulated hypotheses relating to the dependency of ROA on working capital management.

Table- XXIII: Hypotheses Summary for Equation-2.

Independent Variable	Relationship with ROA	Significance
ACP	Negative	Not Significant
APP	Negative	Not Significant
ITP	Negative	Significant
CCC	Negative	Significant
CR	Negative	Not Significant
QR	Positive	Significant
CAR	Positive	Not Significant
CLR	Negative	Not Significant
WTR	Positive	Not Significant

RESULTS OF THE STUDY AND HYPOTHESIS TESTING

- ***Effect of Working Capital Management on Return of Assets (ROA)***

Hausman test statistics confirmed the appropriateness of the random effect model for interpreting the role of working capital management on the return on assets of cement companies. It has been observed that the coefficient of inventory turnover period (ITP) is negative and statistically significant at 0.001 level significance. This means an increase in the inventory turnover period days has a significantly negative impact on the ROA of the selected companies. On the same note, many prior studies also provided evidence regarding the favourable impact of proper inventory management on firms' financial performance (Quayyum 2011; Haresh 2012; Nyabwanga et al. 2012;

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Amponsah-Kwatiah & Asiamah, 2020). Similarly, the cash conversion cycle of the cement companies has a significant negative impact on ROA leading to the conclusion that a reduction in the cash conversion cycle will certainly help in improving the return on the asset which contradicts the findings of Angahar and Alematu (2014) claiming a positive association between CCC and ROA. To substantiate this finding, Agyemang and Asiedu (2013) also explored the association between working capital management and firm profitability (ROA) in the light cash conversion cycle theory.

Further, the account collection period or accounts receivable period does not significantly predict the return on assets of cement companies. Thus, any change in the account collection period does not have any significant impact on financial profitability. The result is in contradiction to the pecking order theory and several other prior studies that claimed a positive association between account receivable management on financial performance (Quayyum 2011; Haresh 2012; Azam 2016; Prempeh and Peprah-Amankona 2018; Amponsah-Kwatiah & Asiamah, 2020). Yet, the result partially supports the findings of Akey (2019) who reported a negative impact of the average collection period on profitability. Similarly, the account payable period though negatively related to ROA but not significantly predict it. Therefore, any alterations to the accounts payable period will have no significant impact on the financial performance measures such as ROA. This contradicts some prior studies that claim a suitable payment period would affect the firm's profitability favourably (Quayyum 2011; Haresh 2012; Azam 2016; Prempeh and Peprah-Amankona 2018; Amponsah-Kwatiah & Asiamah, 2020) which is found to be not true in the case of Indian cement companies. However, the present findings of this research partially support the studies which reported a negative relationship between the accounts payable period and financial performance (Bagchi and Khamrui 2012).

Concerning the other variables like the liquidity measures, the current ratio is negatively related to ROA whereas the quick ratio is favourably predicting ROA of the cement companies. Thus, it can be concluded that the cement companies need to keep a check on the current ratio to improve ROA whereas, they need to improve their liquidity position by maintaining a higher quick ratio to ensure an increase in ROA. This is in contradiction with the prior findings claiming a positive and significant role of the current ratio in improving ROA (Quayyum 2011; Haresh 2012; Azam 2016; Amponsah-Kwatiah & Asiamah, 2020).

Current asset ratio (CAR), was found to have a significantly positive impact on the ROA confirming the agency theory of working capital management and also supporting a few earlier research findings (Mohamad &Saad 2010; Quayyum 2011; Haresh 2012; Ebenezer and Asiedu 2013; Ahmed 2013; Azam 2016). However, the current liabilities ratio has a significantly negative impact on ROA. Thus, it can be concluded that the increase in CAR and a decrease in CLR improve the ROA of the cement companies. Finally, the working capital turnover ratio (WTR) does not at all significantly predict the ROA of cement companies which was also supported by the findings of Shahzad et al., (2015).

- ***Effect of Working Capital Management on Return on Equity***

The dependency of the ROE of cement companies on the working capital management practices is very narrow. It was observed that only ITP and CCC are significantly related to ROE where the direction of the relationship is negative. In other words. A decrease in ITP or CCC increases the ROE of the cement firms. This confirms the earlier findings which claim that a well-managed inventory leads to improved financial performance (Azam 2016; Prempeh and Peprah-Amankona 2018). Further, a negative relationship between CCC and ROE has also been observed by Abassi and Bosra (2012) and Bagchi and Khamrui (2012). As such, an overall reduction in the cash conversion period improves the ROE of the cement companies. On the other hand, accounts payable period, accounts receivable period, current ratio, current asset ratio, and current liability ratio are not at all strongly related to the return on equity of cement companies. These findings pertaining to the creditor, debtor management fail to follow the pecking order theory as well as many studies claiming a significant dependency of ROE on working capital management (Samiloglu & Demirgunes 2008; Mohamad & Saad 2010; Ebenezer and Asiedu 2013; Ahmed 2013). However, a quick ratio positively predicts ROE,

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implying an increasing level of liquidity can ensure improved returns on equity. The current assets ratio and current liability ratio are not related significantly to ROE is a contradicting outcome for the cement industry (Mohamad and Saad, 2010; Akoto et al. 2013). Likewise, the working capital turnover ratio is also insignificant in predicting the ROE of the Indian cement companies.

SUMMARY OF THE HYPOTHESIS

The following table presents a brief overview of the results obtained from the regression models while establishing a relationship between working capital management and the financial performance of the selected cement companies.

Independent Variables	Relation with ROA (H_{01})	Decision on Null Hypothesis WCM predicting ROA	Relation with ROE (H_{02})	Decision on Null Hypothesis WCM Prediction ROA
ACP	-	Accept	-	Accept
APP	-	Accept	+	Accept
ITP	(- -)	Reject	(- -)	Reject
CCC	(- -)	Reject	(- -)	Reject
CR	(- -)	Reject	-	Accept
QR	(++)	Reject	(++)	Reject
CAR	(++)	Reject	+	Accept
CLR	(- -)	Reject	-	Accept
WTR	+	Accept	-	Accept
LCA	-	Accept	+	Accept
LCS	+	Accept	+	Accept
LEV	(- -)	Reject	-	Reject

NB: The double "Plus" or "Minus" sign represents a significant relationship between the dependent and independent variables.

LIMITATIONS OF THE STUDY

This study has the following limitations:

- The study is limited to the Indian cement companies listed on the Bombay Stock Exchange only. It does not consider other manufacturing industries.
- It is restricted to secondary data obtained over 11 financial years from 2010 to 2020 from 31 randomly selected cement companies in India.
- The effect of inflation is not taken into consideration while analysing the financial data in this research.
- Since the research is exclusively based on secondary data, direct observation of the internal management practices is not a part of this research and the limitations associated with secondary data are unavoidable.
- The researcher has to eliminate the companies with insufficient financial data pertaining to the period selected period of the study. Therefore, the exclusion of some companies limited the focus of the study only to those where the financial data is available.
- Imperative financial explanatory factors are considered, which are gathered from the most trustworthy and genuine data sources in order to get an inevitable conclusion.
- Despite their significance, several other important influencing factors of working capital management and financial performance such as; management style, labour issues, location of the business, market competition, market coverage, and so on have been left out of the scope of this study. These explanatory variables were indeed omitted in the current study due to the lack of data.
- The study also did not mention the terms of the product or brand perception in the market because the market potential of a product is determined by a variety of factors such

 doi:10.20944/preprints202312.0403.v1

as; government policy, economic feasibility, customer preferences, quality and range of products, and so on. As a result, despite their relevance, these parameters were not taken into consideration. Even so, extreme caution has been exercised in obtaining conclusions in the presence of various limitations.

OVERALL IMPLICATIONS OF THE STUDY

The study is intended to analyze working capital management practices in the Indian cement industry. In this process, the research analyzed various ratios pertaining to the working capital policy and practices in the selected companies and their impact on the performance to provide useful suggestions to improve the components of working capital for better performance. Its significance includes providing empirically-based guidance to businesses, especially cement industries, to improve their financial performance, including increased profitability only through adopting suitable working capital management strategies, relating to the maintenance of optimal levels of inventories, cash, and receivables.

The study's findings will assist the management of the selected industry by providing better insight into how they may successfully manage their working capital to improve their financial performance. The findings will also contribute to the existing body of knowledge by validating different theories of working capital management for the cement industry. The findings of this study may be beneficial to financial managers and investors in the Indian stock markets while making investment decisions. The study's findings will also aid policymakers and regulators in enacting new working capital management rules and regulations in the industrial sector. The study will also assist the investing community, including security analysts, investment managers, stockbrokers, and other institutional and retail investors, whose understanding of the link between working capital management and financial success is critical for investment analysis.

CONCLUSION

Finally, the results of the research on working capital management and its impact on the financial performance of the BSE-listed cement companies reveal three important findings. First of all, working capital management, especially inventory management, and cash conversion cycle, negatively affects profitability whereas quick ratio and current ratio have a favourable impact on ROA. As such, the working capital turnover ratio was also found to be insignificant in explaining the financial performance of the selected companies. Moreover, the accounts collection period and accounts payable period exhibit a negative relationship with ROA but are not significant. Thus, instead of concentrating more on receivables and payables, cement companies should concentrate on reducing their inventory turnover period and cash conversion cycle on a priority basis. The outcomes of this study of the Indian cement manufacturing sector have been able to substantiate the existing theories and literature on the impact of working capital management on financial performance. These research findings highlight the importance of the inventory turnover period, cash conversion cycle theory, pecking order theory, and agency theory in evaluating the link between WCM and firm performance. The research also built a foundation for future research, allowing academicians to comprehend the connection between working capital management practices and financial performance. To some extent, the findings of the research help governments in their development strategies for enhancing the performance of this particular sector by infusing more liquidity and more infrastructural projects. Since the development of this particular industry is linked with infrastructure development and economic development, effective and favourable investment and developmental strategies need to be framed based on the dependency of profitability on WCM. Further, the data show that effective and efficient WCM especially, the inventory turnover period needs to be looked after for better financial results. Quicker inventory turnover will in turn reduce the cash conversion cycle, which in turn improves liquidity position and financial profitability.

SCOPE FOR FUTURE RESEARCH

The conclusions of this particular research are based on samples from the Indian cement manufacturing sector. Since business operations and management styles differ greatly across companies, firms as well and countries, the present study provides ample scope for extended research on firms in different economies after taking into account the degree of similarity among these businesses and the sample companies. Further studies might be conducted by categorizing businesses into different group-based company-specific characteristics and examining how these variables impact the relationship between WCM and firm performance. Further, working capital policies are influenced by internal management and control, competition, and technological advancements. Therefore, future studies may investigate the link between WCM and company performance by assessing market competitiveness, internal management control, and the degree of adoption of relevant technologies in the firm in consideration.

REFERENCES

Abuzayed, B. Working capital management and firms' performance in emerging markets: the case of Jordan. *International Journal of Managerial Finance* **2012**, *8*, 155–179. https://doi.org/10.1108/17439131211216620.

Akoto, R.K.; Awunyo-Vitor, D.; Angmor, P.L. Work capital management and profitability: Evidence from Ghanaian listed manufacturing firms. *Journal of economics and international finance* **2013**, *5*, 373–379. https://doi.org/10.5897/jeif2013.0539.

Almazari, A.A. The relationship between working capital management and profitability: Evidence from Saudi cement companies. *Journal of Economics, Management and Trade* **2014**, 146-157. https://doi.org/10.9734/bjemt/2014/5427.

ALShubiri, F.N. The effects of working capital practices on risk management: Evidence from Jordan. *Global Journal of business research* **2011**, *5*, 39–54.

Angahar, P.A.; Alematu, A. Impact of working capital on the profitability of the Nigerian cement industry. *European journal of accounting auditing and Finance Research* **2014**, *2*, 17–30.

Appuhami, B.R. The impact of firms' capital expenditure on working capital management: An empirical study across industries in Thailand. *International management review* **2008**, *4*, 8.

Berk, J.; Marzo, P.D.; Harford, J. *Fundamentals of Corporate Finance*, 1st ed.; Pearson Education Inc.: Boston, MA, USA, 2009.

Brigham, E.F.; Gapenski, L.C.; Daves, P.R. *Intermediate Financial Management*, 8th ed.; Thomson South-Western: Mason, OH, USA, 2004.

Dash, M.; Hanuman, R. A liquidity-profitability trade-off model for working capital management [SSRN working paper series]. 2008.

Deloof, M. Does working capital management affect profitability of Belgian firms? *Journal of business finance & Accounting* **2003**, *30*, 573–588.

Dhar, S. Analysing the impact of working capital management on profitability: A study on DSE listed cement companies in Bangladesh. *Global Journal of Management and Business Research* **2018**, *26*, 3222–3235

Eljelly, A.M. Liquidity-profitability trade-off: An empirical investigation in an emerging market. *International journal of commerce and management*. **2004**, *14*, 48–61.

Filbeck, G.; Krueger, T.M. An analysis of working capital management results across industries. *American journal of business* **2005**, *20*, 11–20. https://doi.org/10.1108/19355181200500007

Garcia-Teruel, P.J.; Martinez-Solano, P. Effects of working capital management on SME profitability. *International Journal of Managerial Finance* **2007**, *3*, 164. https://doi.org/10.1108/17439130710738718.

Ghosh, S.K.; Maji, S.G. Working capital management efficiency: a study on the Indian cement industry. Management Accountant **2004**, *3*, 363–372.

Grablowsky, B.J. Financial Management of Inventory. *Journal of Small Business Management* **1984**, *22*, 59–65.

Hall, C. Total working capital management. *AFP Exchange* **2002**, *22*, 26–32.

Haq, ul I.; Sohail, M.; Zaman, K.; Alam, Z. The relationship between working capital management and profitability: a case study of cement industry in Pakistan. *Mediterranean Journal of Social Sciences* **2011**, *2*, 365–365.

Havoutis, N. *Optimising Working Capital: The Latest Solutions*; JP Morgan: New York, NY, USA, 2003.

Hawawini, G.; Viallet, C.; Vora, A. Industry influence on corporate working capital decisions. 1986.

Hoque, A.; Mia, A.; Anwar, R. Working capital management and profitability: A study on cement industry in Bangladesh. *Research Journal of Finance and Accounting* **2015**, *6*, 18–28.

Kabuye, F.; Kato, J.; Akugizibwe, I.; Bugambiro, N. Internal control systems, working capital management and financial performance of supermarkets. *Cogent Business & Management* 2019, 6, https://doi.org/10.1080/23311975.2019.1573524.

Kanga, O.S.; Achoki, G. Liquidity and financial performance in agricultural firms listed in the Nairobi securities exchange in Kenya. *International Journal of Business and Social Science* **2017**, *7*, 57–65.

 doi:10.20944/preprints202312.0403.v1

Kawakibi, A.A.; Hadiwidjojo, D. The effect of working capital management on company profits and values (study of cement companies listed on the Indonesia stock exchange). *International Journal of Business Economics and Law* **2019**, *20*, 30–37.

Khan, S.U.; Hijazi, S.T.; Kamal, Y. Impact of working capital management on the profitability of firms: Case of listed Pakistani companies. 2005. Retrieved from SSRN.com (accessed on 7 April 2012).

Kimondo, C.N.; Irungu, M.; Obanda, M. The impact of liquidity on the financial performance of the nonfinancial firms quoted on the Nairobi Securities Exchange. *Researchjournali's Journal of Accounting* **2016**, *4*, 1–12.

Lazaridis, I.; Tryfonidis, D. Relationship between working capital management and profitability of listed companies in the Athens stock exchange. *Journal of financial management and analysis* **2006**, *19*, 26–35.

Li, K.; Musah, M.; Kong, Y.; Mensah, I.A.; Antwi, S.K.; Bawuah, J.; Donkor, M.; Coffie, C.P.K.; Osei, A.A. Liquidity and firms' financial performance nexus: panel evidence from non-financial firms listed on the Ghana Stock Exchange. *SAGE Open* **2020**, *10*, 2158244020950363.

Matar, A.; Eneizan, B.M. Determinants of financial performance in the industrial firms: Evidence from Jordan. *Asian Journal of Agricultural Extension, Economics & Sociology* **2018**, *22*, 1–10. https://doi.org/10.9734/ajaees/2018/37476.

Muhammad, H.; Rehman, A.U.; Waqas, M. The relationship between working capital management and profitability: A case study of tobacco industry of Pakistan. *The Journal of Asian Finance, Economics, and Business* **2016**, *3*, 13–20. https://doi.org/10.13106/jafeb.2016.vol3.no2.13.

Nwankwo, O.; Osho, G.S. An empirical analysis of corporate survival and growth: Evidence from efficient working capital management. *International journal of scholarly academic intellectual diversity* **2010**, *12*, 1–13.

Nwude, E.C.; Allison, P.U.; Nwude, C.A. The relationship between working capital management and corporate returns of cement industry of emerging market. *International Journal of Finance & Economics* **2020**, *26*, 3222–3235. https://doi.org/10.1002/ijfe.1959.

Orshi, T.S. Impact of liquidity management on the financial performance of listed food and beverages companies in Nigeria. *Published Thesis, Federal University Dutsin-Ma*. 2016.

Owolabi, S.A.; Obida, S.S. Liquidity management and corporate profitability: Case study of selected manufacturing companies listed on the Nigerian stock exchange. *Business Management Dynamics* **2012**, *2*, 10–25.

Padachi, K. Trends in working capital management and its impact on firms' performance: an analysis of Mauritian small manufacturing firms. *International Review of business research papers* **2006**, *2*, 45–58.

Pandey, N.S.; Sabamaithily, S. Working capital management on profitability: Cement industry in India. *SCMS Journal of Indian Management* **2016**, *13*, 81–95.

Panigrahi, C.M.A. Working Capital Management and Corporate Profitability: A Panel Data Regression Model Analysis of Indian Cement Companies. *Wutan Huatan Jisuan Jishu* **2020**, *16*, 245–267.

Petersen, M.A.; Rajan, R.G. Trade credit: theories and evidence. *The review of financial studies* **1997**, *10*, 661–691. https://doi.org/10.1093/rfs/10.3.661.

Prasad, P.; Sivasankaran, N.; Shukla, A. Impact of deviation from target working capital on firm profitability: evidence from India, *International Journal of Productivity and Performance Management* **2019**, *68*, 1510–1527, doi: 10.1108/IJPPM-11-2018-0407.

Prasad, P.; Sivasankaran, N.; Paul, S.; Kannadhasan, M. Measuring impact of working capital efficiency on financial performance of a firm: An alternative approach. *Journal of Indian Business Research* **2019**, *11*, 75–94.

Quayyum, S.T. Effects of working capital management and liquidity: evidence from the cement Industry of Bangladesh. *Journal of Business and Technology* **2011**, *6*, 37–47.

Rehman, M.U.; Anjum, N. Determination of the impact of working capital management on profitability: an empirical study from the cement sector in Pakistan. *Asian economic and financial review* **2013**, *3*, 319.

Richards, V.D.; Laughlin, E.J. A cash conversion cycle approach to liquidity analysis. *Financial Management* **1980**, *9*, 32. https://doi.org/10.2307/3665310.

Ross, S.A.; Westerfield, R.W.; Jaffe, J.; Jordan, B.D. *Modern Financial Management*, 8th ed.; McGraw-Hill: New York, NY, USA, 2009.

Saluja, P.; Kumar, P. Liquidity and profitability trade off. *International Journal of Advanced Research in Management and Social Sciences* **2012**, *1*, 77–84.

Samiloglu, F.; Demirgunes, K. The effect of working capital management on firm profitability: Evidence from Turkey. *The International journal of applied Economics and Finance* **2008**, *2*, 44–50. https://doi.org/10.3923/ijaef.2008.44.50.

Sarwat, S.; Iqbal, D.; Durrani, B.A.; Shaikh, K.H.; Liaquat, F. Impact of working capital management on the profitability of firms: Case of Pakistan's cement sector. *Journal of Advanced Management Science* **2017**, *5*, 238–244. https://doi.org/10.18178/joams.5.3.238-244.

Sawarni, K.S.; Narayanasamy, S.; Ayyalusamy, K. Working capital management, firm performance and nature of business: An empirical evidence from India. *International Journal of Productivity and Performance Management* **2020**, *70*, 179–200.

Schulz, T. The Impact of Capital Structure on Firm Performance: An Investigation of Dutch Unlisted SMEs. In Ninth IBA Bachelor Thesis Conference (pp. 1–12). 2017. https://essay.utwente.nl/72690/1/Schulz_BA_BMS.pdf

Shahzad, F.; Fareed, Z.; Zulfiqar, B. Impact of working capital management on firm's profitability: A case study of cement industry of Pakistan. *European researcher. Series A* **2015**, *91*, 86–93, https://doi.org/10.13187/er.2015.91.86.

 doi:10.20944/preprints202312.0403.v1

Sharma, A.K.; Kumar, S. Effect of working capital management on firm profitability: Empirical evidence from India. *Global business review* **2011**, *12*, 159–173.

Shrivastava, A.; Kumar, N.; Kumar, P. Bayesian analysis of working capital management on corporate profitability: evidence from India. *Journal of Economic Studies* **2017**, *44*, 568–584, https://doi.org/10.1108/jes-11-2015-0207.

Ukaegbu, B. The significance of working capital management in determining firm profitability: Evidence from developing economies in Africa. *Research in International Business and Finance* **2014**, *31*, 1–16, https://doi.org/10.1016/j.ribaf.2013.11.005.

Van Horne, J.C.; Wachowicz, J.M. *Fundamentals of Financial Management*; Prentice Hall Publishers: New York, NY, USA, 2004.

Vishnani, S.; Shah, B.K. Impact of working capital management policies on corporate performance—An empirical study. *Global business review* **2007**, *8*, 267–281. https://doi.org/10.1177/097215090700800206.

Wanguu, K.C.; Kipkirui, S.E. The effect of working capital management on profitability of cement manufacturing companies in Kenya. *IOSR Journal of Economics and Finance* **2015**, *6*, 53–61.

Wasiuzzaman, S.; Arumugam, V.C. Determinants of working capital investment: a study of Malaysian Public Listed firms. *Australasian Accounting, Business and Finance Journal* **2013**, *7*, 63–83. https://doi.org/10.14453/aabfj.v7i2.5.