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GENERAL & APPLIED ECONOMICS | RESEARCH ARTICLE

Working capital management and firm performance: are their effects same in covid 19 compared to financial crisis 2008?

Muhammad Ahmad¹, Rabia Bashir¹ and Hamid Waqas²*

Abstract: The recent covid 19 has increased the challenges for worldwide businesses to manage working capital. Compared to the studies on the financial crisis of 2008, management of working capital and firm performance relation during the covid 19 is less studied, particularly in developing countries. Therefore, this study examined the working capital management and firm performance relation in 577 firms from three Asian developing countries from 2004 to 2020. The working capital measurement includes working capital investment policy, working capital financing policy, cash conversion cycle (CCC), and net working capital (NWC). Firm performance is measured by return on assets (ROA) and Tobin's Q (TQ). To examine the working capital management and firm performance during the crisis 2008 and covid 19, Kruskal-Wallis test is used. Results revealed that working capital management and firm performance were more affected during covid 19 than crisis 2008 period. In addition, this study compared the working capital management and firm performance relation for covid 19 and crisis 2008 using the dynamic panel system generalized method of moments (GMM). Results showed the difference in the effect of working capital management on firm performance during the covid 19 period as compared to the crisis 2008 period. CATAR significantly and negatively influenced ROA but significantly and positively influenced TQ. In contrast, CLTAR and CCC significantly and positively influenced ROA but significantly and negatively influenced TQ. NWC significantly and positively influenced ROA only. To the best of our knowledge, this study is the first empirical research study to extend cross-country analysis in respect of non-financial firms to the developing countries' context. The results of this study provide important managerial implications for firms. The different results for different firm performance proxies imply that firm managers must adopt the working capital policies which are profitable for firms and shareholders. Thus, firms in developing countries would be able to optimize their working capital according to the economic conditions.

Subjects: Corporate Finance; Credit & Credit Institutions; Investment & Securities

Keywords: working capital management; firm performance; covid 19; financial crisis 2008; working capital policies; accounting-based performance; market-based performance

1. Introduction

Working capital management is the most important and challenging task for financial managers since they are among the decision-makers who improve the financial position of firms. This can be





difficult for managers, but it is crucial because a business needs to make sure that it is running in an organized and advantageous way. If a firm has too little current assets compared to its current liabilities, this will affect the company's growth and profitability. Thus, the importance of working capital policies cannot be overemphasized in corporate finance since it directly affects the firm's performance.

Studies have stressed that economic downturns have increased the awareness and changed the firms' attitude towards the management of working capital in order to increase firm performance (Akgün & Karataş, 2021; Simon et al., 2017; Zimon & Tarighi, 2021). In late 2019, one of the major infectious diseases known as covid 19 outbreak in China and widespread to all countries. As a result, many economies experienced financial disruption (Gormsen & Koijen, 2020). Covid 19 outbreak impacted economies through numerous channels. These include the decline of financial markets, sharp declines in domestic consumption, spillovers of weaker demand to other sectors and economies through trade and production linkages, severe declines in business sales (Liu et al., 2020), and a decline in firm performance (Shen, Fu, Pan, Yu, Chen et al., 2020). Businesses around the globe experienced significant deterioration in working capital performance. Customers delayed payments, which resulted in a 7% rise for both accounts receivable and payable days. Consequently, companies' net working capital management becomes more important for businesses as mismanagement can lead to a loss of liquidity (Chang et al., 2019; Salehi et al., 2019). Thus, it is necessary to investigate the working capital management in the covid 19 period.

Researchers around the world have started to examine the financial effects of covid 19. Extant studies often focused on the impact of covid 19 on the macro level, such as impact of oil prices (Narayan, 2020), exchange rates (Iyke, 2020), and tourism (Sigala, 2020). Very less attention has been given to firms' financial challenges, particularly working capital management. Honda and Uesuai (2021) investigated the relation between covid 19 and cash holdings in Japanese firms. Shen, Fu, Pan, Yu, Chen et al. (2020) explored the relation between covid 19 and the financial performance of Chinese firms. We found only Zimon and Tarighi (2021), who explored the relationship between working capital management policies and firm performance during the covid 19 for Polish SMEs. However, their study failed to find any significant influence of the covid 19 on working capital components, i.e, average collection period, inventory turnover, average payment period, CCC, operating cycle, and firm performance measured by return on sales. There were a few limitations. First, they employed only accounting-based measure of firm performance, i.e., return on sales. Marketing-based measure of firm performance captures the information which is readily available to investors; thus, it is also important to be applied in the studies (Deeds et al., 1998; Ullmann, 1985). Second, their data period is limited till June 2020, and results are based on traditional ordinary least square (OLS) estimation method which does not provide the clear picture for the impact of covid 19 on firm-specific effects.

The recent studies on covid 19 suggested that the effect of covid 19 is completely different from the previous financial crisis in terms of severity (He et al., 2022). For example, interest rates touched their lows historically, and supply chains in all economies were affected because global financial markets are interconnected (Ozili & Arun, 2020). This leads us to investigate the comparison of covid 19 with crisis 2008 in our context. Such evidence will help the firm managers highlight policies to avoid profit deterioration and liquidity issues during the crises.

Thus, our study covers all the above limitations and contributes to the literature of working capital in these ways. First, this study explores how working capital management and firm performance were affected during crisis 2008 and covid periods. For this purpose, we used Kruskal-Wallis test to compare the working capital management and firm performance precrisis, crisis, pre-covid and covid periods. Second, this study investigates the relation of working capital policies, cash conversion cycle (CCC), and net working capital (NWC) with firm performance which is measured by return on assets (ROA) and Tobin's q (TQ). Third, this study compares the

effect of covid 19 with the effect of crisis 2008 on working capital management and firm performance relation. Fourth, unlike Zimon and Tarighi (2021), by taking the whole 2020 year data, this study employed dynamic panel system generalized method of moments (GMM) panel data technique to handle the issue of endogeneity. Effect of financial crisis 2008 on relation between working capital management and firm performance is previously discussed (Akbar et al., 2021; Akgün & Karataş, 2021; Chang et al., 2019). Our findings showed the effect of covid 19 on working capital management and firm performance was stronger and worse than the effect of financial crisis 2008. Firms adopted conservative approach in managing working capital investment policies in the covid 19 compared to the crisis 2008. In addition, the effect of covid 19 was different for ROA and TQ. Covid 19 and crisis negatively influenced firms' ROA while positively influenced TQ.

Further, this study is structured in the following sections. In section 2, the literature review is presented and hypotheses are developed. In section 3, research methodology and data collection are discussed. In section 4, all the empirical results are discussed. Finally, in section 5, conclusion of the study is provided.

2. Literature review and hypothesis development

For sustainable firm performance, the right choice of working capital is most important since it optimises the operating costs and maintains financial liquidity (; Zimon & Tarighi, 2021). The working capital literature provides two types of policies: working capital investment policy and working capital financing policy. The investment policy is related to the determination of levels of current assets. The level of current assets can be measured by relating the current assets to total assets (Nazir & Afza, 2009). Low ratio indicates the low investment in current assets relative to total assets. The working capital investment policy is sub-categorized into aggressive investment policy and conservative investment policy. The trade-off theory suggests that firms optimize their working capital policies by considering costs and benefits. If firms adopt aggressive working capital investment policy--that encourages low investments in current assets, they will be at greater risk of working capital inadequacy. Lower investments in the receivables and inventories may provide sufficient liquidity to the firm to operate effectively and efficiently but at the cost of low sales. In contrast, if firms adopt conservative working capital investment policy, that is, policies that encourage high investments in current assets, they will experience a high cost of liquidity. Increased investment in receivables and inventory balances may prevent interruption in the production process and build good relationship with customers, thus increasing sales, but firms may potentially face high interest expenses, which may negatively affect shareholders' value (Aktas et al., 2015; Baños-Caballero et al., 2014; Nabi et al., 2016; Nazir & Afza, 2009).

Working capital financing policy is related to use of current liabilities to finance the current assets and is measured by total current liabilities to total assets ratio (; Koh et al., (2014). This policy is also sub-categorized into aggressive financing policy and conservative financing policy. Aggressive working capital financing policy is the use of short-term debt to finance current assets, while conservative working capital financing policy is the use of long-term debt to finance current assets (Nabi et al., 2016; Nazir & Afza, 2009). The use of less current liabilities is less costly and high risky since firms are forced to settle this short-term debt early. In contrast, long-term liabilities are less risky and allow firms sufficient time to settle, however, on the cost of high interest expenses (Alrahamneh et al., 2020). To manage working capital effectively, financial managers should consider the policy appropriate to the company in order to increase its profitability and market value.

Studies argued that firms' working capital practices depend on the economic conditions (Mervill & Tavis, 1973; Filbeck & Krueger, 2005). In the study of Enqvist et al. (2014), working capital management was found more pronounced in the economic downturns than the economic booms. Their findings concluded that working capital management is always vital for firm managers, regardless of the economic co2005nditions because w1973orking capital management directly

deals with current assets, cost of operations, short-term liabilities and revenues (Zimon & Tarighi, 2021).

Zimon and Tarighi (2021) argued that firms must use the right working capital strategy to achieve sustainable growth since it optimizes the operating cost and maintains financial liquidity. It could be argued that during the covid 19 period, managers were more concerned to maintain sufficient working capital levels in order to stay competitive. However, there is limited research in this area, particularly less empirically known about what working capital policies firms adopted during the period of covid 19. Therefore, the current study determines what kind of working capital management policies were adopted during the covid 19. Specifically, unlike in the previous studies, our study analyses the working capital management policies in developing countries. This study also intends to observe if the firms adopted conservative or aggressive policies of working capital during the covid 19 period.

In the following, the recent studies that investigated the effect of working capital management including working capital policies in normal business periods and in crises periods are synthesized to suggest the research hypotheses.

Rasyid (2017) investigated the effect of working capital investment and financing policies on performance of 393 Indonesian firms for the year 2014. They employed ROA and TQ as measures of firm performance. Findings revealed that working capital investment policy has significant and positive while working capital financing policy has significant and negative relation with ROA and TQ. Nanda and Panda 2018 investigated the relation between working capital financing policies and firm performance for 1,211 Indian manufacturing firms for the period 2000–2016. Application of GMM estimation revealed that working capital financing policies significantly and negatively influenced firm performance. In another Indian state-wise study, Farhan et al. (2021) not only found similar results to Nanda and Panda 2018, but they also explored the significant positive relation between working capital investment policies and firm performance. Results of both studies indicate that Indian firms generally adopted conservative approach for both working capital investing and financing policies.

Pestonji and Wichitsathian (2019) investigated the relation between working capital policies and firm performance of 68 Thai firms for the period 2012–2016. Results revealed the significant positive influence of working capital investment policy and the significant negative influence of working capital financing policy on firm performance. Basyith et al. (2021) investigated the relation between working capital policies and firm performance for 135 Indonesian firms from 2008 to 2019 from eight non-financial sectors. Findings revealed that working capital investment policy significantly and positively influences firm performance measured by ROA while negatively influences firm performance measured by gross profit margin (GPM). In contrast, a significant negative relation was reported between working capital financing policies and both measures of firm performance. Their findings were consistent with the previous study on Indonesian firms by Firmansyah et al. (2018). These studies conclude that firms generally invest more in current assets and less use the current liabilities to finance current assets to increase performance.

Prior research widely used comprehensive measures of working capital such as cash conversion cycle and net working capital (Akgün & Karataş, 2021; Bashir & Regupathi, 2021; Prasad et al., 2019; Yousaf et al., 2021). CCC was also referred as net trade cycle (Akbar et al., 2021; Laghari & Chengang, 2019; Prasad et al., 2019). CCC captures the average time a firm takes from payment of materials to collection of cash after sale of finished goods (Deloof, 2003). Or in other words, CCC measures the average length of time firms' funds are tied up in the cycle of raw material purchase, sale of inventories and collection of sales. Theoretically, the shorter CCC is better because it does not block the funds in working capital such as less days to collect receivables and more days to pay suppliers which positively increases performance (Amponsah-Kwatiah & Asiamah, 2020; Enqvist et al., 2014). In contrast, holding lower inventories and collecting earlier from customers can harm the firm performance. However, there is no best strategy to implement regarding length of CCC.

NWC is the output of current assets minus current liabilities over the total assets and discovers whether a firm's current assets are sufficient to cover the current liabilities when converted into cash.

The extant literature has provided mixed evidence for the influence of working capital management on firm performance. Sharma and Kumar 2011 studied the working capital management and firm performance relation for Indian firms. Considering the sample of 263 listed firms for the period 2000–2008, they found CCC positively influences ROA. Similarly, in 52 listed Jordanian firms for the period 2000–2008 Abuzayed (2012) found the positive influence of CCC on gross operating profit and TQ. Similar findings are reported for firms in China (Laghari & Chengang, 2019), Czech (Yousaf et al., 2021), Ghana (Amponsah-Kwatiah & Asiamah, 2020), Indonesia (Basyith et al., 2021), Spain (Rey-Ares et al., 2021), and Visegrad Group countries (Mazanec, 2022). In contrast, few studies reported negative relation between CCC and firm performance in India (Bhatia & Srivastava, 2016), Malaysia (Bashir & Regupathi, 2021) and Vietnam (Nguyen et al., 2020). The negative relation suggests that higher CCC leads to lower firm performance. A study by Afrifa et al. (2014) did not find any significant relation between CCC and firm performance. The findings for NWC and firm performance relation is not much different from the CCC. The positive relation is reported for firms in European countries (Akgün & Karataş, 2021) and UK (Afrifa, 2016), and negative relation is reported for firms in Poland (Anton et al., 2021).

There is limited evidence for working capital policies during the crisis 2008 and covid 19. In 104 Indonesian firms, Rozari et al. (2015) found that the significant positive relation between working capital investment policy and firm performance (measured by ROA and TQ) became weaker during the crisis 2008 period. This is because firms adopted aggressive approach for working capital investment policy. On the other hand, firms adopted a conservative working capital financing policy, which resulted in a significant negative relation with TQ. In a recent study on 61 Polish firms, Zimon and Tarighi (2021) found that covid 19 did not significantly affect either working capital policies. Based on the limited evidence, we developed below hypotheses:

H1: The positive relationship between working capital investment policy and firm performance is stronger during covid 19 than the crisis 2008.

H2: The negative relation between working capital financing policies and firm performance is stronger in covid 19 than the crisis 2008.

Studies produced mixed results to find the effect of financial crisis on other working capital management variables. Sunday et al. (2017) investigated Nigerian firms' working capital management practices. Findings revealed that all working capital components collectively reduced the potency of working capital management during the financial crisis in the form of shorter CCC. In contrast, for 75 South African firms, study by Oseifuah (2018) did not find any significant effect of financial crisis on CCC and market-based firm performance (measured as market capitalization). For Pakistani firms, Akbar et al. (2021) found mixed effect. The relation between CCC and ROE was positive and negative with TQ. These studies produced results for CCC and less is known about NWC. Thus, the below hypotheses are developed.

H3: The negative relationship between CCC and firm performance is stronger during the covid 19 than the crisis 2008.

H4: The positive relationship between NWC and firm performance is stronger during the covid 19 than the crisis 2008.

3. Methodology

3.1. Data source

To construct our sample, we used secondary data and retrieved it from Thomson Reuters Datastream. Datastream is also widely used by empirical studies such as Dang et al. (2019) and Alkhataybeh (2021). Past empirical studies in developing countries indicated the need for efficient working capital management in crisis or normal business periods (Akbar et al., 2021; Altaf & Shah, 2018; Ramiah et al., 2014). However, the covid 19 study by Zimon and Tarighi (2021) is concentrated on the Polish firms. This knowledge gap in developing countries suggests us to conduct this study. We examine the firms from three Asian developing countries, Malaysia, Thailand and Pakistan, for the period 2004–2020. At the initial level, data for the financial sector was removed. Datastream shows 32 non-financial sectors (1094 firms) in these countries. To standardize the currency, we retrieved the data in US dollar.¹ We filtered the extracted data for analysis purpose. Firms with incomplete observations for period 2004–2020 were also removed. Finally, we were left with 577 firms (9809 firm-year observations) from five sectors, which are as follows: (i) Automobile and Parts, (ii) Chemicals, (iii) Food Products, (iv) General Industrials, and (v) Pharmaceuticals and Biotechnology.

3.2. Variables measurement

There are two frequently used measures of firm performance, accounting-based and market-based. Prior studies have shown that investors are more concerned about the market-based information of the firm, and this measure is more appropriate to be applied (Deeds et al., 1998; Ullmann, 1985). Market-based performance measures consider the time value of money and opportunity cost (Fisher & McGowan, 1983). Unlike accounting-based measures, market-based measures are not much influenced by firm-specific accounting rules (Johnson & Kaplan, 1987; McGuire et al., 1988). Moreover, these reflect the firms' future performance. (Dubofsky & Varadarajan, 1987; Wisner & Eakins, 1994). On the other hand, despite the criticism, accounting measures of firm performance are still applied in many contexts (Akbar et al., 2021) and in users' decision-making process (Afrifa et al., 2014; Akbar et al., 2021). The results of studies that focus on accounting-based measures are often different from those that focus on market-based firm performance measures of firm performance. There are a number of previous studies that described the effect of working capital management on firm performance by employing different proxies of firm performance such as, return on asset, return on equity, net profit margin and Tobin's q as a proxy of performance (Farhan et al., 2021; Mandipa & Sibindi, 2022; Pestonji & Wichitsathian, 2019; Tahir & Anuar, 2015). Based on the frequent usage, we used return on assets (ROA) as accounting-based and Tobin's Q (TQ) as market-based measure of firm performance.

Tan (2016) argued that ROA is the measure of firms' earning as per unit of total assets. TQ is the ratio of market value of equity minus book value of debt divided by book value of assets (Laghari & Chengang, 2019; Shin & Soenen, 1998). To measure the working capital policies, we used the two ratios: (i) CATAR for working capital investment policies and (ii) CLTAR for working capital financing policies. Following the literature, we also included two composite measures for working capital management, CCC and NWC. Other than these working capital variables, we included three firm-specific control variables namely, firm size (SIZE), sales growth (SG), and leverage (LEV), and two country-specific control variables: inflation and GDP. As the current study aims to analyse if influence of covid 19 on working capital management and firm performance relation is stronger than the financial crisis 2008, CRISIS and COVID dummies and interactions were introduced in the empirical models. CRISIS is defined as 1 if a firm year is 2008-2009 or zero otherwise, and COVID is defined as 1 if a firm year is 2020 or zero otherwise. These dummies are then used with working capital variables to form interaction term. The variables measurement is summarised in Table 1.

We estimate four equations in this study. Equation 1 and equation 2 determines the relation between working capital management and firm performance, while equation 3 and equation 4

Table 1. Summary of variables and measurements							
Variables	Abbreviation	Measurement					
Return on Assets	ROA	Net profit Total assets					
Tobin's Q	TQ	<u>Market value of equity – book value of debt</u> Book value of total assets					
Current Asset to Total Assets Ratio	CATAR	Current assets Total assets					
Current Liabilities to Total Assets Ratio	CLTAR	<u>Current liabilities</u> Total assets					
Cash Conversion Cycle	ссс	Accounts receivable period + inventory converion period - accounts payable period					
Net Working Capital	NWC	<u>Current assets – current liabilities</u> Total assets					
Dummy variable 1	Crisis	Crisis = 1, if the firm year is 2008 and 2009, otherwise Crisis = 0					
Dummy variable 2	Covid	Covid = 1, if the firm year is 2020, otherwise Covid = 0					
Control Variables							
Firm Size	FS	Natural log of sales					
Sales Growth	SG	Current year sales – previous year sales previous year sales					
Leverage	LEV	<u>Total debt</u> Total equity					
Inflation	INF	Consumer price index					
Gross Domestic Product	GDP	log (real GDP per capita)					

examines the effect of crisis 2008 and covid 19 on the working capital and firm performance relation.

$$\begin{aligned} \mathsf{ROA}_{i,t} &= \beta_0 + \delta \mathsf{ROA}_{i,t-1} + \beta_1 \mathsf{CATAR}_{i,t} + \beta_2 \mathsf{CLTAR}_{i,t} + \beta_3 \mathsf{CCC}_{i,t} + \beta_4 \mathsf{NWC}_{i,t} + \beta_5 \mathsf{CNTL} \\ &+ \varepsilon_{i,t} \end{aligned} \tag{Equation 1}$$

$$\begin{aligned} \mathsf{TQ}_{i,t} &= \beta_0 + \delta \mathsf{TQ}_{i,t-1} + \beta_1 \mathsf{CATAR}_{i,t} + \beta_2 \mathsf{CLTAR}_{i,t} + \beta_3 \mathsf{CCC}_{i,t} + \beta_4 \mathsf{NWC}_{i,t} + \beta_5 \mathsf{CNTL} \\ &+ \varepsilon_{i,t} \end{aligned}$$

(Equation 2)

$$\begin{aligned} \mathsf{ROA}_{i,t} &= \beta_0 + \delta \mathsf{ROA}_{i,t-1} + \beta_1 \mathsf{CATAR}_{i,t} + \beta_2 \mathsf{CLTAR}_{i,t} + \beta_3 \mathsf{CCC}_{i,t} + \beta_4 \mathsf{NWC}_{i,t} + \\ & \beta_5 \mathsf{CRISIS} + \beta_6 \mathsf{CRISIS} * \mathsf{CATAR}_{i,t} * + \beta_7 \mathsf{CRISIS} * \mathsf{CLTAR}_{i,t} + \beta_8 \mathsf{CRISIS} * \mathsf{CCC}_{i,t} + \\ & \beta_9 \mathsf{CRISIS} * \mathsf{NWC}_{i,t} + \beta_{10} \mathsf{COVID} + \beta_{11} \mathsf{COVID} * \mathsf{CATAR}_{i,t} + \beta_{12} \mathsf{COVID} * \mathsf{CLTAR}_{i,t} + \\ & \beta_{13} \mathsf{COVID} * \mathsf{CCC}_{i,t} + \beta_{14} \mathsf{COVID} * \mathsf{NWC}_{i,t} + \beta_{15} \mathsf{CNTL} + \varepsilon_{i,t} \end{aligned}$$

(Equation 3)

$$\begin{aligned} \operatorname{arrayrlTQ}_{i,t} &= \beta_0 + \delta TQ_{i,t-1} + \beta_1 CATAR_{i,t} + \beta_2 CLTAR_{i,t} + \beta_3 CCC_{i,t} + \beta_4 NWC_{i,t} \\ &+ \beta_5 CRISIS + \beta_6 CRISIS *CATAR_{i,t} * + \beta_7 CRISIS *CLTAR_{i,t} \\ &+ \beta_8 CRISIS *CCC_{i,t} + \beta_9 CRISIS *NWC_{i,t} + \beta_{10} COVID \\ &+ \beta_{11} COVID *CATAR_{i,t} + \beta_{12} COVID *CLTAR_{i,t} + \beta_{13} COVID *CCC_{i,t} \\ &+ \beta_{14} COVID *NWC_{i,t} + \beta_{15} CNTL + \varepsilon_{i,t} array \end{aligned}$$
(Equation 4)

where ROA and TQ are proxies of firm performance. Subscripts *i* is the firm while *t* is the time, i.e. from 2004 to 2020. θ is the regression slope coefficient. *CNTL* denotes control variables: firm size,

sales growth, leverage, inflation, and GDP. ε is the error term. All other independent variables, dummies and interactions are same as defined in Table 1.

Data analysis was carried out in five stages. At the first stage, we explored the descriptive statistics for all variables, including mean, minimum, maximum, standard deviation, skewness, and kurtosis. At the second stage, Pearson's correlation coefficients for all variables were produced. At third stage, we investigated the firms' working capital management practices during normal business and crises periods. For this purpose, we compared the mean ranks for independent and dependent variables for pre-crisis, crisis, pre-covid and covid periods using Kruskal-Wallis non-parametric test. At fourth stage, using dynamic panel system generalized method of moments (GMM), we estimated the equation 1 and equation 2 for the crisis 2008 and covid 19 periods.

The corporate finance literature suggests that the most important problem in financial literature is related to the problems of endogeneity. Firm performance can be affected by certain unobserved characteristics in the equation. This leads to the heterogeneity. Moreover, the presence of endogenous variables in the equation is also expected to produce biased results. Consequently, the ordinary least square (OLS) method does not produces reliable results (Andres and Vallelado 2008). To deal with the endogeneity problem, dynamic panel generalized method of moments (GMM) has been suggested as the appropriate method by the econometric literature. GMM estimator deals with the problem of endogeneity, serial correlation, and unobserved heterogeneity (Arellano & Bond, 1991). GMM estimator includes lagged dependent variable on the right-hand side of equation and allows to include the instruments for independent variables. The Hansen-J statistics confirm the validity of instruments, and AR-1 and AR-2 address the problems of first-order and second-order serial correlation (Arellano & Bond, 1991; Roodman, 2009). Blundell and Bond (1998) addressed that difference GMM poorly uses instruments that yield biased and inefficient estimates. They suggested the use of system GMM estimation. System GMM allows to perform onestep or two-step estimations. To select the appropriate estimator, we checked diagnostics (Hansen-J statistics, AR-1 and Ar-2) for each. We found that one-step system GMM estimation does not meet the basic model assumptions. Instruments validity was not confirmed in any of the models; therefore, we moved to two-step system GMM estimation. Following Essel and Brobbey (2021), Moussa (2019), Obeng et al. (2021), and Rev-Ares et al. (2021), this study applied two-step system GMM estimation technique for working capital management and firm performance.

3.3. Empirical results

Table 2 presents the descriptive statistics for sampled firms. According to Simon et al. (2017), for the data normality, Skewness and Kurtosis values should be within range ± 3 and ± 10 , respectively.

Table 2. Descriptive statistics							
	N	Mean	SD	Min	Max	Skewness	Kurtosis
ROA	8078	0.905	0.575	0.004	7.280	1.832	8.215
TQ	8078	1.101	1.032	0.018	16.454	4.987	37.982
CATAR	8078	0.491	0.234	0.010	9.116	7.181	242.322
CLTAR	8078	0.316	0.230	0.003	6.896	5.844	117.583
CCC	8078	150.173	149.502	-639.066	2650.588	4.105	36.003
NWC	8078	0.230	0.233	-8.125	5.953	-3.876	264.330
FS	8078	11.414	1.419	0.693	16.787	0.401	1.431
SG	8078	0.233	0.944	-1.000	47.673	27.563	1069.219
LEV	8078	0.707	1.175	-6.975	63.087	20.465	993.938
INF	8078	3.230	3.635	-1.139	20.286	2.197	5.917
GDP	8078	26.467	0.310	25.750	27.023	-1.765	3.444

Source: Authors' calculations using stata statistical software

Except ROA, none of the variables are normally distributed based on the actual values. Greene (2012) stated that normality is unnecessary to get many results in multivariate regression analysis, although it will permit getting numerous exact statistical findings. Moreover, it helps in the construction of confidence intervals and t-statistics, apart from the cases where some alternative distribution is explicitly presumed. Moreover, it is noted that the data outliers are original and extracted from reliable sources (e.g., Thomson Reuters Database and Annual Reports). Therefore, the approach to outlier deletion is not appropriate except if researchers have a strong justification based on their assessment (Hair et al., 2010). Therefore, non-normal distribution of data was not expected to be problematic due to large sample size, and we proceeded with non-normal data. During the period 2004-2020, the mean value of TQ and ROA are 1.101 and 0.905, respectively. Working capital policy variables, CATAR and CLTAR show different mean values 0.491 and 0.316, respectively. According to Adam et al. (2017), the CATAR ratio more than 50% and CLTAR ratio less than 50% indicate that firms follow conservative working capital investment and financing policies. Thus, it can be said that Asian firms could have faced the constraints in accessing the short-term financing for operations. Moreover, Asian firms invested more in current assets than fixed assets. It indicates that firms are not risk takers. The mean value of CCC shows that firms take 150.173 days, on average, for raw material purchase to the collection of sale proceeds. The mean and standard deviation of NWC are 0.230 and 0.233, respectively. Mean firm size is 11.414. Mean SG indicates 23 percent sales growth. Mean of LEV indicates that firms used 70 percent debt.

In Table 3, Pearson's correlation coefficients are presented for all variables. ROA and TQ are positively related to CATAR, CLTAR, and NWC. This positive relation indicates that the more firms adopt aggressive approach in working capital investment and financing policies, the more the investor's value given to the firm (Afza & Adnan, 2007). Moreover, ROA and TQ negatively relates to CCC. The negative relation between performance and CCC indicates that the average time between the purchases of raw materials and the collection for sales of finished goods is long, and decreasing this time lag increases performance (Deloof, 2003; Soukhakian & Khodakarami, 2019). ROA and TQ have different relations with FS and SG. Large firm size can increase long-term performance while high sales growth firms can increase short-term performance. LEV, GDP and INF show positive relation with TQ and ROA. These results provided initial insights on the effect of working capital management on firm performance. To draw conclusions on the hypotheses and provide robust results, regression analysis using GMM estimation is provided further.

Table 4 compares the working capital management and firm performance pre-crisis, crisis, precovid and covid periods using Kruskal-Wallis non-parametric test. The period between 2008 and 2009 is considered as the financial crisis period and the 2020 is considered as covid 19 period. Kruskal-Wallis statistics p-value indicates the significance of change in the mean ranks among the groups. For market-based firm performance, the TQ mean rank reduced in both recession periods but more pronounced during the crisis 2008, we say that the effect of crisis is stronger than covid on firms' market-based performance. On the other hand, ROA slightly increased during crisis and highly reduced during covid, indicating that accounting-based performance is adversely influenced during covid 19 compared to the crisis 2008. We can say that performance of non-financial firms during crisis and covid were somewhat worse. During the crisis 2008 and covid 19 periods, CLTAR has decreased compared to their values pre-crisis and pre-covid, implying that firms adopted more conservative working capital financing policies during the covid 19 period than the crisis 2008 period. NWC shows the decline in covid period. It seems that effect of crisis 2008 was much stronger on CLTAR. Pre-crisis to the covid 19 period, firms reduced the use of current liabilities to finance their assets. We did not find any significant evidence for change in CATAR and CCC due to crisis 2008 and covid 19. Taking together, the above-mentioned points indicated the effect of covid 19 on working capital management and firm performance was statistically stronger than the crisis 2008.

Next, we estimated our empirical models using two-step System-GMM (generalized method of moments) with robust errors, which is consistent in the presence of any pattern of

	FS SG LEV GDP INF							1	0.028 1	0.121 0.063 1 1	-0.020 0.191 -0.008 1	-0.062 0.097 0.179 0.121 1	-
	NWC						1	-0.176	0.018	-0.284	0.027	-0.083	
	CCC CCC					7	0.172	-0.103	0.011	-0.011	0.015	-0.074	
	CLTAR				1	-0.045	-0.329	0.014	0.077	0.486	0.004	0.125	
ents	CATAR			1	0.301	0.232	0.545	-0.130	600.0	-0.076	0.029	-0.034	and software
ution coefficie	Δ		1	0.449	0.363	-0.369	0.062	-0.016	0.011	0.002	0.023	0.150	ing stata statistic
irson's correld	ROA	1	0.198	0.079	0.049	-0.080	0.053	0.003	-0.004	0.008	0.006	0.093	coloulations usi
Table 3. Pea		ROA	TQ	CATAR	CLTAR	CCC	NWC	FS	SG	LEV	GDP	INF	Source: Authors

working capital management and firm performance							
Variables	Pre-crisis	Crisis	Pre-covid	Covid	K-Wallis Stat. (P-value)		
ROA	4342.65	4378.77	4011.35	3339.28	87.034 (0.000)*		
TQ	4354.22	3935.72	4033.72	3990.09	13.088 (0.004)*		
CATAR	4169.90	3997.67	4044.85	3939.29	2.371 (0.352)		
CLTAR	4297.89	4207.76	3997.71	3862.46	18.269 (0.000)*		
CCC	4230.24	4086.68	4005.72	4092.19	5.837 (0.120)		
NWC	3902.16	3907.21	4106.48	3771.63	18.087 (0.000)*		

Table 4. Kruskal-Wallis non-parametric test for the effect of crisis 2008 and covid 19 on working capital management and firm performance

Source: Authors' calculations using statistical package for the social sciences (SPSS)

Note: Mean ranks for each variable are given in respective rows. Periods in columns are defined as Pre-crisis: 2004–2007, Crisis: 2008–2009, Pre-Covid: 2010–2019, Covid: 2020. In last column, values in parenthesis are p-values for Kruskal-Wallis statistics, which are defined as * <1%, ** <5%, *** <10%.

heteroscedasticity and autocorrelation. This method allows endogeneity problems to be controlled and delivers consistent and unbiased estimates by using lagged independent variables as instruments (Arellano & Bond, 1991). We lagged our dependent variables with t-1. For independent variables, we use their lags from t-1 to t-2 as instruments. Table 5 presents results for estimation of equation 1 and equation 2 using GMM estimation. GMM performance indicators in all models, meeting the assumptions, indicates that there is no second order serial correlation (AR-2) and instruments are valid. The significant positive lagged values of dependent variables show that firm performance in last year positively influence firm performance in next year. Model 1 and model 2 show that CATAR is significantly positive while CLTAR has a significantly negative influence on firms' accounting-based and market-based performance. The coefficient of CATAR is statistically significant with ROA and TQ (β = 0.229 and β = 0.248). It shows that the higher total current assets to total assets ratio leads to higher performance. This can be done by increasing the current assets levels that follows the conservative approach of working capital investment policy. This is because manufacturing sector need more working capital to expand inventories and trade credit to customers. In contrast, the service sector holds fewer inventories and account receivables (Adam et al., 2017). This finding is consistent with the previous studies such as Awopetu et al. (2017), Basyith et al. (2021), Farhan et al. (2021), Nazir and Afza (2009), and Pestonji and Wichitsathian (2019), who concluded that conservative working capital investment policy increases firm performance. The CLTAR significantly and negatively influences both measures of firm performance ($\beta = -0.081$ and $\beta = -0.227$). It means that firms can increase performance if use less current liabilities to finance their operational activities. Therefore, using high conservative working capital financing policy can help the firm to increase its accounting-based performance and market-based performance. This finding is consistent with the studies of Basyith et al. (2021), Farhan et al. (2021), and Pestonji and Wichitsathian (2019).

In addition, the results show strong evidence of negative relation between CCC and both measures of firm performance where the coefficient is negative and significant ($\beta = -0.002$ and $\beta = -0.001$). It implies that decreasing the CCC will generate more profits for the firm. The negative CCC implies the shorter account receivable period, shorter inventory conversion period and longer accounts payable period. This all leads to the lesser funds block in the working capital and thus reduces the needs for external capital to finance operations. Moreover, the less external finance results in the less cash outflow in terms of the interest cost. Thus, working capital maintenance cost is reduced and in outputs provides better margins and increased performance. So, a firm manager can enhance the performance by shortening the CCC. It further entails that firms can create shareholder value by reducing the CCC to minimum. This result is consistent with the studies by Simon et al. (2017), Soukhakian and Khodakarami (2019), Basyith et al. (2021), Yousaf et al.

Table 5. GMM estimation results for the relation between working capital policies and firm performance					
	Model 1	Model 2			
	ROA	TQ			
Variables	Coef.	Coef.			
Lag	0.539*** (0.000)	0.121*** (0.000)			
CATAR	0.229*** (0.000)	0.248*** (0.000)			
CLTAR	-0.081*** (0.000)	-0.227*** (0.000)			
ССС	-0.002*** (0.000)	-0.001*** (0.000)			
NWC	0.024** (0.019)	0.312*** (0.000)			
FS	-0.016*** (0.000)	-0.031*** (0.000)			
SG	0.201*** (0.000)	-0.036*** (0.000)			
LEV	-0.026*** (0.000)	0.242*** (0.000)			
GDP	0.000 (0.315)	-0.001** (0.048)			
INF	0.007*** (0.000)	0.008*** (0.000)			
Constant.	0.738*** (0.000)	1.176*** (0.000)			
No. of Obs.	8655	8655			
No. of instruments	283	285			
AR (2) (P-value)	0.530	0.055			
Hansen Test (P-value)	0.197	0.745			

Note: P-values in parenthesis are * <0.1, ** <0.05%, *** <0.01

Source: Authors' calculations using Stata statistical software

(2021), and Bashir and Regupathi (2021). However, the result contradicts Amponsah-Kwatiah and Asiamah (2020) and Ebenezer and Asiedu (2013). In contrast to CCC, NWC shows positive relation with both measures of firm performance. The coefficient is significantly positive (β = 0.024 and β = 0.312). This result implies that the greater the proportion of current assets over the total assets, the higher the firm performance. This finding is similar to the studies by Akgün and Karataş (2021) and Sheikh et al. (2016). In firm-specific control variables, FS is negatively associated with firm performance measures. SG is positively associated with ROA and negatively associated with TQ. In contrast, LEV is negatively associated with ROA and positively associate with TQ. In contry-specific control variables, GDP is negatively associated with TQ only and INF is positively associate with both ROA and TQ.

Table 6 presents results for estimation of equation 3 and equation 4 using GMM estimation. Model 3 to Model 6 present further analysis to examine the effect of crisis 2008 and covid 19 on relation between working capital and firm performance. In Model 3 to Model 6, crisis 2008 and covid 19 dummies shows the significant negative coefficients with ROA ($\beta = -0.050$ and $\beta = -0.339$) and significant positive coefficients with TQ ($\beta = 0.658$ and $\beta = 1.603$). This result indicates that crisis 2008 and covid 19 have positive influence on the shareholder value. This result is somewhat consistent with Akgün and Karataş (2021) who found the negative influence of the crisis on ROA for European countries. The coefficients of covid interactions in comparison to the coefficients of crisis interactions

	Model 3	Model 4	Model 5	Model 6
	ROA	TQ	ROA	TQ
Variables	Coef.	Coef.	Coef.	Coef.
Lag	0.701*** (0.000)	0.117*** (0.000)	0.872*** (0.000)	0.119*** (0.000)
Crisis 2008	-0.050** (0.032)	0.658*** (0.000)		
Crisis* CATAR	0.819*** (0.000)	1.224*** (0.000)		
Crisis* CLTAR	-0.271*** (0.000)	-0.966*** (0.000)		
Crisis* CCC	-0.001*** (0.000)	-0.007*** (0.000)		
Crisis* NWC	-0.272*** (0.000)	-0.131 (0.579)		
Covid 19			-0.339** (0.022)	1.603*** (0.000)
Covid*CATAR			-3.003*** (0.000)	3.567*** (0.000)
Covid*CLTAR			3.660*** (0.000)	-2.474** (0.000)
Covid*CCC			0.001** (0.018)	-0.016*** (0.000)
Covid*NWC			2.791*** (0.000)	-0.626 (0.229)
FS	-0.007** (0.020)	-0.033*** (0.001)	-0.013*** (0.001)	-0.031** (0.009)
SG	0.287*** (0.000)	-0.043* (0.081)	0.096*** (0.000)	-0.036 (0.254)
DR	0.062*** (0.000)	0.199*** (0.000)	0.084*** (0.000)	0.281*** (0.000)
GDP	0.001** (0.116)	0.004*** (0.000)	0.004*** (0.000)	0.007*** (0.000)
INF	0.005** (0.000)	0.003 (0.470)	-0.015*** (0.002)	0.002 (0.887)
Constant.	0.218*** (0.000)	1.105*** (0.000)	0.155*** (0.001)	0.984*** (0.000)
No. of Obs.	8655	8655	8655	8655
No. of instruments	136	138	161	115
AR (2)	0.167	0.703	0.773	0.119
Hansen Test	0.554	0.424	0.281	0.836

Note: P-values in parenthesis are * <0.1, ** <0.05%, *** <0.01

Source: Authors' calculations using stata statistical software

indicate that the effect of covid 19 is more pronounced than crisis 2008. This result is in contrast with Zimon and Tarighi (2021) who did not find effect of covid 19 on firm performance. All variables' coefficient sizes in Model 4 and Model 6 are higher than those in Model 3 and 4. Notably, covid 19 significantly changed the relation between working capital and firm performance. This finding is in contrast to those of Akgün and Karataş (2021), Afrifa and Padachi (2016), and Simon et al. (2017) who did not find significant influence of financial crisis on working capital and firm performance relation. CATAR has significant and negative relation with ROA. With TQ, the relation is significantly positive and stronger than crisis 2008. In contrast, CLTAR has significantly positive relation with ROA and

significantly negative relation with TQ. These findings indicate working capital investment policies of firms, although negatively influenced accounting-based performance but positively increased the market-based performance. Similarly, the working capital financing policies positively influenced accounting-based performance but negatively influenced the market-based performance. Based on different results due to the different measures of firm performance, we can say that *H1* and *H2* are partially supported. These findings indicate that firms' working capital policies during covid 19 are different from the crisis 2008. There have been no comparable past studies to support our results.

The results for CCC and NWC are also different in covid 19 period than the crisis 2008 period, with ROA, CCC and NWC having significant positive relation in the covid 19 period. Higher length of CCC during the covid 19 positively influences ROA but negatively influence TQ. It could imply that during covid 19 period, firms experienced slow sales and faced difficulty in collecting the receivables from their customers (because they were also adversely affected); therefore, to stay liquid firms delayed payments to their own suppliers. This positively influenced the firms' asset based returns. However, this policy is not in the interest of shareholders because all funds are tied up in working capital cycle. So, we can say that effect of covid 19 on CCC and firm performance was adverse for shareholders. On the other hand, the relation between NWC and TQ is still negative and insignificant. In addition, comparison of the coefficient size shows that magnitude of relation between CCC and TQ and relation between NWC and ROA is high compared to the crisis 2008 period. Thus, H3 and H4 are partially supported.

In control variables, FS negatively, but DR and GDP, positively influence the performance in all models. During the crisis 2008 period, SG is positively associated with ROA at 1% level but negatively associated with TQ at 10% level. During covid 19 period, SG and ROA relation remains positive but turns to insignificant negative with TQ. INF is significant positive with ROA during the crisis period but significant negative during the covid period. With TQ, relation is not significant in either model. Overall, study findings revealed that working capital and firm performance relation changes due to the economic conditions.

4. Conclusion

The current study aims three objectives. First, it explores the working capital practices during crisis 2008 with covid 19. Second, it investigates the direct relationship between working capital management and firm performance for the whole period 2004–2020. Third, for comparison, this study investigates the working capital management and firm performance relationship for crisis 2008 and covid 19 periods separately, which is not studied before, to the best of our knowledge. Several studies explored that during the financial crisis 2008, firms changed working capital practices, so the firm performance also changed in the firms around the world (Akbar et al., 2021; Akgün & Karataş, 2021; Simon et al., 2017). Covid 19 became another reason to adversely affect the global working capital management practices (PwC., 2021). By taking 577 firms from three Asian countries, Malaysia, Pakistan and Thailand, this study is a first attempt to show how firms responded to the covid 19.

To measure working capital management, we considered two measures of working capital policies namely, working capital investment policies and working capital financing policies, and two common and comprehensive indicators of working capital management known as CCC and NWC. For firm performance, we used ROA and TQ. Descriptive analysis results showed that Asian firms adopted conservative working capital investment and financing policies. Kruskal-Wallis non-parametric test is used to examine the differences for working capital management and firm performance pre-crisis, crisis, pre-covid and covid periods. These results confirm that effect of covid 19 was severe on working capital management and firm performance than the crisis 2008. In covid 19, ROA and TQ showed significant decline. To mitigate the adverse effect of covid 19, firms decreased the use of current liabilities to finance assets. NWC also showed a decline in the covid period relative to the pre-crisis, crisis and pre-covid period.

For the whole study period, results showed that CATAR and NWC positively while CCC and CLTAR negatively influence firm performance. Our results are consistent with previous studies (Bashir & Regupathi, 2021; Basyith et al., 2021; Simon et al., 2017; Soukhakian & Khodakarami, 2019; Yousaf et al., 2021). Lastly, we compared the effect of crisis 2008 and covid 19 on working capital management and firm performance relation. The findings showed that covid 19 changed the relation between working capital management and firm performance. Both working capital policies and both working capital components showed different coefficient signs and sizes than the crisis 2008 period. However, the results were mixed based on proxies of performance. Although these findings are not comparable to past studies because of less work for covid 19, firm managers would be able to mitigate the effect of crises by adopting a suitable working capital management policy which eventually increases returns for both firms and shareholders. This study, however, is not without limitations. The two proxies of firm performance namely ROA and TQ are used. Other measures can also be included to provide strategic implications and more useful insights. This study used secondary data for analysis. Future researchers can also use survey data to understand the behavior of firms' managers in managing the working capital in response to economic conditions.

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Correction

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Note

1. Datastream provides option to standardize the currency. Other cross-country studies in corporate finance literature have adopted this approach (Nimtrakoon, 2015).

References

- Abuzayed, B. (2012). Working capital management and firms' performance in emerging markets: The case of Jordan. International Journal of Managerial Finance, 8 (2), 155–179. https://doi.org/10.1108/ 17439131211216620
- Adam, A. M., Quansah, E., & Kawor, S. (2017). Working capital management policies and returns of listed manufacturing firms in Ghana. Scientific Annals of Economics and Business, 64(2), 255–269. https://doi. org/10.1515/saeb-2017-0017
- Afrifa, G. A., Tauringana, V., & Tingbani, I. (2014). Working capital management and performance of listed SMEs. Journal of Small Business & Entrepreneurship,

27(6), 557–578. https://doi.org/10.1080/08276331. 2015.1114351

- Afrifa, G. A. (2016). Net working capital, cash flow and performance of UK SMEs. Review of Accounting and Finance, 15(1), 21–44. https://doi.org/10.1108/RAF-02-2015-0031
- Afrifa, G. A., & Padachi, K. (2016). Working capital level influence on SME profitability. *Journal of Small Business and Enterprise Development*, 23(1), 44–63. https://doi.org/10.1108/JSBED-01-2014-0014
- Afza, T., & Adnan, S. (2007). Determinants of corporate cash holdings: A case study of Pakistan.
 Proceedings of Singapore Economic Review Conference (SERC), 2-4 August, Singapore, (Asian Research News) pp. 1–17.
- Akbar, M., Akbar, A., & Draz, M. U. (2021). Global financial crisis, working capital management, and firm performance: Evidence from an Islamic market index. SAGE Open, 11(2), 1–14. https://doi.org/10.1177/ 21582440211015705
- Akgün, A. I., & Karataş, A. M. (2021). Investigating the relationship between working capital management and business performance: Evidence from the 2008 financial crisis of EU-28. International Journal of Managerial Finance, 17(4), 545–567. https://doi.org/ 10.1108/IJMF-08-2019-0294
- Aktas, N., Croci, E., & Petmezas, D. (2015). Is working capital management value-enhancing? Evidence from firm performance and investments. *Journal of Corporate Finance*, 30, 98–113. https://doi.org/10.1016/j.jcorpfin. 2014.12.008
- Alkhataybeh, A. (2021). Working capital and R&D smoothing: Evidence from the Tel Aviv stock exchange. *Journal of Applied Economics*, 24(1), 91–102. https://doi.org/10.1080/15140326.2021. 1877599
- Alrahamneh, L., Chu, E. Y., & Hong, M. (2020). The implications of debt financing on working capital management efficiency: Evidence from MENA emerging markets. International Journal of Industrial Management, 8(1), 62–67. https://doi.org/10.15282/ ijim.8.0.2020.5764
- Altaf, N., & Shah, F. A. (2018). How does working capital management affect the profitability of Indian companies? *Journal of Advances in Management Research*, 15(3), 347–366. https://doi.org/10.1108/ JAMR-06-2017-0076
- Amponsah-Kwatiah, K., & Asiamah, M. (2020). Working capital management and profitability of listed

manufacturing firms in Ghana. International Journal of and Productivity and Performance Management, 70 (7), 1751–1771 https://doi.org/10.1108/IJPPM-02-2020-0043.

- Anton, S. G., Afloarei Nucu, A. E. J. J. O. R., & Management, F. (2021). The impact of working capital management on firm profitability: Empirical evidence from the Polish listed firms *Journal of Risk and Financial Management*. 9(1), 1–14https://doi.org/10. 3390/jrfm14010009.
- Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297. https://doi.org/10. 2307/2297968
- Awopetu, L., Wui, P., & Park, J. (2017). Working capital investing policy under economic recession: Focusing on small-medium size companies *International Review of Business Research Papers*, 13(1), 17–30 https://doi.org/10.21102/irbrp.2017.03.131.02.
- Baños-Caballero, S., García-Teruel, P. J., & Martínez-Solano, P. (2014). Working capital management, corporate performance, and financial constraints. *Journal of Business Research*, 67(3), 332–338. https:// doi.org/10.1016/j.jbusres.2013.01.016
- Bashir, R., & Regupathi, A. (2021). Aggregate and disaggregate measures of operating and non-operating working capital influence on firm performance:
 Evidence from Malaysia. International Journal of Banking and Finance, 17(2), 1–26. https://doi.org/10. 32890/ijbf2022.17.1.1
- Basyith, A., Djazuli, A., Fauzi, F. J. A. E., & Review, F. (2021).
 Does working capital management affect profitability? Empirical evidence from Indonesia listed firms. Asian Economic and Financial Review, 11 (3), 236–251 https://doi.org/10.18488/journal.aefr. 2021.113.236.251.
- Bhatia, S., & Srivastava, A. (2016). Working capital management and firm performance in emerging economies: Evidence from India. *Management and Labour Studies*, 41(2), 71–87. https://doi.org/10.1177/ 0258042X16658733
- Chang, -C.-C., Kam, T.-Y., Chang, Y.-C., & Liu, -C.-C. (2019). Effects of the 2008 financial crisis on the working capital management policy of US enterprises. International Journal of Business, 18(2), 121–139.
- Dang, T. L., Ly Ho, H., Dzung Lam, C., Thao Tran, T., & Vo, X. V., . (2019). Stock liquidity and capital structure: International evidence, *Cogent Economics & Finance*, 7 (1), -1–20 https://doi.org/10.1080/23322039.2019. 1587804.
- Deeds, D. L., DeCarolis, D., & Coombs, J. E. (1998). Firmspecific resources and wealth creation in high-technology ventures: Evidence from newly public biotechnology firms. *Entrepreneurship Theory and Practice*, 22(3), 55–73. https://doi.org/10.1177/ 104225879802200303
- Deloof, M. (2003). Does working capital management affect profitability of Belgian firms? *Journal of Business Finance & Accounting*, 30(3-4), 573–588. https://doi.org/10.1111/1468-5957.00008
- Dubofsky, P., & Varadarajan, P. R. (1987). Diversification and measures of performance: Additional empirical evidence. Academy of Management Journal, 30(3), 597– 608https://doi.org/10.2307/256018.
- Ebenezer, A. B., & Asiedu, M. K. (2013). The relationship between working capital management and profitability of listed manufacturing companies in Ghana. *International Journal of Business and Social Research*, 3(2), 25–34 https://doi.org/10.18533/ijbsr. v3i2.71.

- Enqvist, J., Graham, M., & Nikkinen, J. (2014). The impact of working capital management on firm profitability in different business cycles: Evidence from Finland. *Research in International Business and Finance*, 32, 36–49. https://doi.org/10.1016/j. ribaf.2014.03.005
- Essel, R., & Brobbey, J. (2021). The impact of working capital management on the performance of listed firms: evidence of an emerging economy. *International Journal of Industrial Management*, 12(1), 389–407. https://doi. org/10.15282/ijim.12.1.2021.6994
- Farhan, N. H., Almaqtari, F. A., Al-Matari, E. M., Senan, N. A. M., Alahdal, W. M., & Hazaea, S. A. (2021). Working capital management policies in Indian listed firms: A state-wise analysis. *Sustainability*, 13(8), 1–25. https://doi.org/10.3390/ su13084516
- Filbeck, G. & Krueger, T. M. (2005). An Analysis of Working Capital Management Results Across Industries. *American Journal of Business*, 20(2), 11–20. 10.1108/ 19355181200500007
- Firmansyah, J., Siregar, H., & Syarifuddin, F. (2018). Does working capital management affect the profitability of property and real estate firms in Indonesia? *Jurnal Keuangan Dan Perbankan*, 22(4), 694–706. https:// doi.org/10.26905/jkdp.v22i4.2438
- Fisher, F. M., & McGowan, J. J. (1983). On the misuse of accounting rates of return to infer monopoly profits. *The American Economic Review*, 73(1), 82–97.
- Gormsen, N. J., & Koijen, R. S. (2020). Coronavirus: Impact on stock prices and growth expectations. *The Review* of Asset Pricing Studies, 10(4), 574–597. https://doi. org/10.1093/rapstu/raaa013
- Greene, W. H. (2012). *Econometric analysis* (7th ed.). Pearson.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). Multivariate data analysis: A global perspective (7 ed.). Pearson Prentice Hall.
- He, Z., Nagel, S., & Song, Z. (2022). Treasury inconvenience yields during the COVID-19 crisis. Journal of Financial Economics, 143(1), 57–79. https://doi.org/ 10.1016/j.jfineco.2021.05.044
- Honda, T., & Uesugi, I. COVID-19 and Precautionary Corporate Cash Holdings: Evidence from Japan (2021). RCESR Discussion Paper Series DP21-2, Research Center for Economic and Social Risks, Institute of Economic Research, Hitotsubashi University.
- Iyke, B. N. (2020). The disease outbreak channel of exchange rate return predictability: Evidence from COVID-19. Emerging Markets Finance Trade Finance, 56(10), 2277–2297. https://doi.org/10.1080/ 1540496X.2020.1784718
- Johnson, T. H., & Kaplan, R. S. (1987). Relevance lost: The rise and fall of management accounting. Harvard Business School Press.
- Koh, A, Ang, S. K., Brigham, E. F., & Ehrhardt, M. C. (2014). Financial Management: Theory and Practice. Singapore: Cengage Learning Asia Pty Ltd.
- Laghari, F., & Chengang, Y. (2019). Investment in working capital and financial constraints: Empirical evidence on corporate performance. *International Journal of Managerial Finance*, 15(2), 164–190. https://doi.org/ 10.1108/IJMF-10-2017-0236
- Liu, L., Wang, E.-Z., & Lee, -C.-C. (2020). Impact of the COVID-19 pandemic on the crude oil and stock markets in the US: A time-varying analysis. *Energy Research Letters*, 1(1), 13154. https://doi.org/10. 46557/001c.13154
- Mandipa, G., & Sibindi, A. B. (2022). Financial performance and working capital management practices in the

retail sector: Empirical evidence from South Africa. Risks, 10(3), 1–17. https://doi.org/10.3390/ risks10030063

- Mazanec, J. (2022). The impact of working capital management on corporate performance in small-medium enterprises in the visegrad group. *Mathematics*, 10(6), 2–19. https://doi.org/10.3390/math10060951
- McGuire, J. B., Sundgren, A., & Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. Academy of Management Journal, 31 (4), 854–872 https://doi.org/10.2307/256342.
- Merville, L. J., & Tavis, L. A. (1973). A generalized model for capital investment. *The Journal of Finance*, 28(1), 109–118. 10.1111/j.1540-6261.1973.tb01349.x
- Moussa, A. A. (2019). Determinants of working capital behavior: Evidence from Egypt. International Journal of Managerial Finance, 5(1), 39–61. https://doi.org/10. 1108/IJMF-09-2017-0219
- Nabi, G., Yousaf, M. S., Ali, I., & Najaf, R. (2016). Impact of working capital management approaches (aggressive/conservative) on the profitability and shareholder's worth: Comparative analysis of cement and sugar industry. Research Journal of Finance Accounting, 7(5), 60–65.
- Nanda, S., & Panda, A. K. (2018). The determinants of corporate profitability: An investigation of Indian manufacturing firms. *International Journal of Emerging Markets*, 13(1), 66–86. 10.1108/IJoEM-01-2017-0013
- Narayan, P. K. (2020). Oil price news and COVID-19—Is there any connection? *Energy Research Letters*, 1(1), 13176. https://doi.org/10.46557/001c.13176
- Nazir, M. S., & Afza, T. (2009). Impact of aggressive working capital management policy on firms' profitability. IUP Journal of Applied Finance, 15(8), 19–30.
- Nguyen, A. H., Pham, H. T., & Nguyen, H. T. (2020). Impact of working capital management on firm's profitability: Empirical evidence from Vietnam. The Journal of Asian Finance, Economics and Business, 7(3), 115–125. https://doi.org/10.13106/jafeb.2020.vol7. no3.115
- Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance: Empirical evidence from the ASEAN. International Journal of Productivity and Performance Management, 16(3), 587–618. https://doi.org/10. 1108/JIC-09-2014-0104
- Obeng, H., Enos, B.K., and Yensu, J. . (2021). Working capital management, working capital policy, and firm performance in Ghana: Empirical evidence using a dynamic system GMM. African Journal of Business and Economic Research. 16(1), 249–271 https://doi. orq/10.31920/1750-4562/2021/v16n1a11.
- Oseifuah, E. K., & Gyekye, A. B. (2018). Global financial crisis, working capital management and firm value: Evidence from JSE listed non-financial firms. *Journal* of Accounting and Management, 8(1), 5–22.
- Ozili, P. K., & Arun, T. Spillover of COVID-19: Impact on the global economy. Available at SSRN: https://ssrn.com/ abstract=3562570 2020, 10.2139/ssrn.3562570
- Pestonji, C., & Wichitsathian, S. (2019). "The impacts of working capital policy on firms' performances: An empirical study on Thai listed companies in production sector". Asia-Pacific contemporary finance and development (International Symposia in Economic Theory and Econometrics, Vol. 26), Emerald Publishing Limited, pp. 39–51.
- Prasad, P., Sivasankaran, N., & Shukla, A. (2019). Impact of deviation from target working capital on firm profitability: Evidence from India. *International Journal of Productivity and Performance*

Management, 68(8), 1510–1527. https://doi.org/10. 1108/IJPPM-11-2018-0407

- PwC. (2021). Working Capital Study 21/22. https://www. pwc.com/gx/en/services/deals/business-recoveryrestructuring/working-capital-study.html
- Ramiah, V., Zhao, Y., & Moosa, I. (2014). Working capital management during the global financial crisis: The Australian experience. *Qualitative Research in Financial Markets*, 6(3), 332–351. https://doi.org/10. 1108/QRFM-09-2012-0026
- Rasyid, R. (2017). Impact of the aggressive working capital management policy on firm's profitability and value: Study on non-financial listed firms in Indonesia stock exchange Proceedings of the International Conference on Business and Management Research (ICBMR 2017), Padang-Indonesia, (Atlantis Press), pp. 207–217https://doi. org/10.2991/icbmr-17.2017.20.
- Rey-Ares, L., Fernández-López, S., & Rodeiro-Pazos, D. (2021). Impact of working capital management on profitability for Spanish fish canning companies. *Marine Policy*, 130, 104583. https://doi.org/10.1016/j. marpol.2021.104583
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, 9(1), 86–136. https://doi.org/10.1177/ 1536867X0900900106
- Rozari, P. E. D., Sudarma, Y. S., Indiastuti, R., & Febrian, E. (2015). The integrated measuring of working capital management efficiency on financial performance in Indonesia stock exchange. *Information Management* and Business Review, 7(3), 26–33. https://doi.org/10. 22610/imbr.v7i3.1150
- Salehi, M., Mahdavi, N., Dari, S. Z. A., & Tarighi, H. (2019). Association between the availability of financial resources and working capital management with stock surplus returns in Iran. International Journal of Emerging Markets, 14(2), 343–361. https://doi.org/10. 1108/IJoEM-11-2017-0439
- Sharma, A., & Kumar, S. (2011). Effect of working capital management on firm profitability. Global Business Review, 12(1), 159–173. 10.1177/ 097215091001200110
- Sheikh, N. A., Rafique, A., & Abbasi, M. N. (2016). Impact of working capital on performance of textile firms listed on PSX. Pakistan Journal of Social Sciences, 36(1), 409–419.
- Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y., . (2020). The impact of the COVID-19 pandemic on firm performance *Emerging Markets Finance and Trade* . 56(10), 2213–2230 https://doi.org/10.1080/ 1540496X.2020.1785863.
- Shen, H., Fu, M., Pan, H., Yu, Z., & Chen, Y. (2020). The impact of the COVID-19 pandemic on firm performance. *Emerging Markets Finance Trade Finance*, 56(10), 2213–2230. https://doi.org/10.1080/ 1540496X.2020.1785863
- Shin, H.H., & Soenen, L. (1998). Efficiency of working capital management and corporate profitability. *Financial Practice and Education*, 8(2), 37–45.
- Sigala, M. (2020). Tourism and COVID-19: Impacts and implications for advancing and resetting industry and research. *Journal of Business Research*, 117, 312–321. https://doi.org/10.1016/j.jbusres.2020.06.015
- Simon, S., Sawandi, N., & Abdul-Hamid, M. A. (2017). The quadratic relationship between working capital management and firm performance: Evidence from the Nigerian economy. *Journal of Business Retail Management Research*, 12(1), 94–108. https://doi.org/ 10.24052/JBRMR/V12IS01/TQRBWCMAFPEFTNE
- Soukhakian, I., & Khodakarami, M. (2019). Working capital management, firm performance and macroeconomic

factors: Evidence from Iran. Cogent Business Management and Labour Studies, 6(1), 1–24 https:// doi.org/10.1080/23311975.2019.1684227.

- Tahir, M., & Anuar, M. B. A. (2015). The determinants of working capital management and firms performance of textile sector in Pakistan. *Quality & Quantity*, 50(2), 605–618. https://doi.org/10.1007/s11135-015-0166-4
- Tan, Y. (2016). The impacts of risk and competition on bank profitability in China. Journal of International Financial Markets, Institutions Money, 40, 85–110. https://doi.org/10.1016/j.intfin.2015.09.003
- Ullmann, A. A. (1985). Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of US firms. Academy of Management Review, 10(3), 540–557https://doi.org/10.2307/258135.
- Wisner, J. D., & Eakins, S. G. (1994). A performance assessment of the US Baldrige quality award winners. International Journal of Quality & Reliability Management, 11(2), 8–25. https://doi.org/10.1108/ 02656719410051643
- Yousaf, M., Bris, P., & Haider, I. (2021). Working capital management and firm's profitability: Evidence from Czech certified firms from the EFQM excellence model. *Cogent Economics & Finance*, 9(1), 1–16 https://doi.org/10.1080/23322039.2021. 1954318.
- Zimon, G., & Tarighi, H. (2021). Effects of the COVID-19 global crisis on the working capital management policy: Evidence from Poland. *Journal of Risk Financial Management*, 14(4), 169. https://doi.org/10.3390/ jrfm14040169



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