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Uncertainty in Working Capital Management and Firm Performance: A COVID-19 Perspective

MOHAMMAD REYAD HOSSAIN[a] AND M. A.ZARIYAWATI[a*]

[a]*School of Business and Economics, Universiti Putra Malaysia, Malaysia*

ABSTRACT

This study examines the impact of the COVID-19 pandemic on firms' working capital management (WCM) and, eventually, firms' performance of 4513 China and 1049 United Kingdom (UK) publicly listed firms. Static panel data analysis was used to achieve the objective of this study. By using the cash conversion cycle (CCC) as a proxy for WCM, we discover that COVID-19 has a negative effect on the WCM of Chinese firms. We also found a statistically significant negative relationship between WCM and Chinese firms' performance. This suggests that when firms are affected by COVID-19 uncertainty, Chinese firms will be compelled to reduce their account receivables, inventory levels, and seek increased credit terms from suppliers. Contrary to Chinese firms, we discover the positive relationship between COVID-19 and WCM for UK firms. Further, the relationship between WCM and UK firms' performance is positively associated. The greater investment in WCM by UK firms during the COVID-19 period generated a higher firm performance.

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[*] Corresponding author: Email: zariyawati@upm.edu.my
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INTRODUCTION

The COVID-19 pandemic wreaked unprecedented levels of havoc and uncertainty in the economy (Hu and Zhang, 2021) when most countries implemented movement order control (MCO). Businesses need to shut down their operations during MCO and make the firm's cash positions severely impacted. With the recent COVID-19 outbreak, many businesses have been dealing with supply-side and demand-side disruptions that have halted the flow of goods and finances (Utit et al., 2021). Notably, credit constraints, such as those occurring in the current context shaped by the COVID-19 crisis, make working capital management (WCM) a critical factor in firm performance. Firms with volatile cash flows and insufficient cash holdings have appeared to be particularly vulnerable in the short term. Businesses should focus on the cash conversion cycle (CCC) to free up cash from their working capital to deal with sudden liquidity pressures (Banerjee et al., 2021; Fernández-López et al., 2020).

The working capital is the money that firms require to operate on a day-to-day basis (Chauhan, 2019). A well-managed working capital entails the management of its constituents, such as inventory, accounts receivables, and accounts payable. Receivables and supplier payments are routine transactions for a business operation to execute with continuous cash flow. Simultaneously, the ability to continuously refill inventory to keep up with sales makes efficient working capital management (WCM) essential for firms. Therefore, a firm with efficient working capital management can possibly be less affected and more resilient during difficult times, such as during the COVID-19 pandemic (Seth et al., 2020). Countries like China and the United Kingdom (UK), involved in international trade heavily, are more prone to the COVID-19 pandemic. This is commensurate with Figure 1, which explicitly demonstrates that the COVID-19 pandemic significantly affected firms' working capital management in both China and the UK.

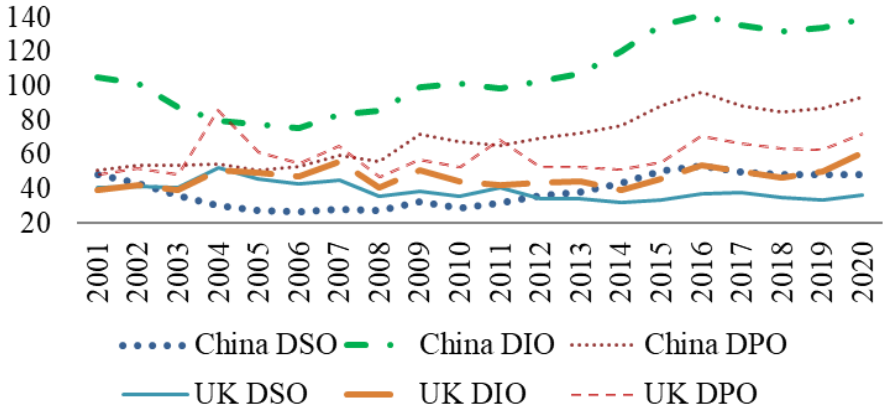

Figure 1 WCM in UK & China, Source: DataStream

Figure 1 clearly indicates that during the COVID-19 pandemic, working capital management components such as days sales outstanding (DSO), days inventory outstanding (DIO), and days payable outstanding (DPO) were higher in China and the UK. Hence, it proves that firms' working capital management is influenced by COVID-19. Even though a higher working capital level may boost a firm's sales and profits (Ukaegbu, 2014), it can also be an indicator of inefficient management of the firm's working capital in the long run. This is because there may be a deficiency in available funds, increasing the likelihood that the firm may have to resort to more expensive external funding options (Altaf and Ahmad, 2019). The higher cost of external financing, meaning the higher cost of capital, further affects firm performance due to lower profits.

In addition, during COVID-19 periods, firms may have limited ability to pay off their account payables due to insufficient cash flows. In this circumstance, account payable levels are expected to be higher for firms with volatile sales in this period. Insufficient cash flow also resulted from the difficulties encountered while attempting to collect outstanding receivables and an accumulation of inventories. The accumulated inventories were due to poor inventory forecasting (Dbouk et al., 2020), which further resulted in an increment of a firm's daily inventory outstanding due to higher inventory holding costs.

As a result, if firms take a longer time to convert their investment in working capital into cash from sales, it ultimately affects the firms' profitability. Hence, it is suggested that firms with lower inventories and receivables will increase profitability, even though profitability is smaller for firms that delay in paying suppliers (Deloof, 2003). Therefore, this study aims to examine how the COVID-19 pandemic affects firms' WCM and, eventually, firm performance in China and the United Kingdom. This paper is organized into five sections. Section 2 conducts a review of the current field's literature. Section 3 develops the methodology and models. Section 4 summarizes the major findings from the statistical analysis, and the concluding remarks are contained in section 5.

LITERATURE REVIEW

WCM is related to the short-term capital required to support operational demands, which constitute a significant portion of a firm's balance sheet (Le, 2019). It helps firms to optimize their current assets and retain enough cash flow to fulfill their short-term goals and obligations (Lyngstadaas, 2020; Wichitsathian and Pestonji, 2019; Zariyawati et al., 2016). Existing studies reveal that WCM may have a substantial influence on the profitability of a firm during a financial crisis, as it impacts current assets, short-term obligations, revenues, and cost of operations (Akgün and Karatas 2020; Baveld 2012; Zimon and Dankiewicz 2020). Managers need to pay attention to the amount of working capital their firms must hold to be competitive throughout an economic crisis like COVID-19.

COVID-19 and Working Capital Management

The effect of COVID-19 was so severe that it wreaked havoc on global supply chains, threw financial markets into disarray, and hampered the day-to-day operations of businesses (Rey-Ares et al., 2021). As a result of disruptions to economic activity brought on by the COVID-19 pandemic, firms' assets have seen a decrease in value (Hoong et al., 2022; Almaghrabi, 2021; Hassan et al., 2020). This has influenced the firm's short-term capital demand, which has rendered them ineffective in their WCM. Businesses catered to consumers had to close or operate at reduced capacity because of government measures taken to stem the spread of the pandemic, which in turn caused a drop in demand for goods and services (Ke, 2021). This, in turn, led to an increase in inventory and a lag in the collection of receivables. The result is that companies' financial flow is restricted to supporting activities with a shorter time horizon.

According to Hu and Zhang (2021), COVID-19's impact on economic policy uncertainty leads to less investment, higher costs of capital, and eventually monetary restraints for businesses. This is congruent with the research conducted by Hu and Zhang (2021). They use COVID-19 cases as a measure of economic uncertainty and return on assets (ROA) as a measure of company performance. The authors demonstrate that firms' return on assets is negatively connected with COVID-19 cumulative cases using quarterly data from 16,148 enterprises across 107 countries between 2020Q1 and 2020Q3. In addition, they demonstrate that economic uncertainty caused by COVID-19 erodes investments, raises businesses' cost of capital, and ultimately reduces company value.

Consistently, the financial accelerator theory states that macroeconomic shocks raise interest rates, restrict external financing, degrade cash flows, and thus influence the investment behavior of firms (Gertler and Bernanke, 1989; Bernanke et al., 1996, 1999). This theory is supported by the fact that when economic uncertainty affects a company's investments, it may also have an effect on its working capital management. Tarkom (2022) discovered that COVID-19-exposed businesses had greater CCC levels. They also demonstrate that firms with more investment prospects and those that get government incentives have lower CCC levels. Overall, they give evidence of the severe negative impact of COVID-19 on WCM and demonstrate that the effect may be minimized by expanding investment possibilities and government incentives.

The study by Shen et al. (2020) report that the COVID-19 pandemic has a major detrimental influence on the performance of publicly traded Chinese firms by lowering investment sizes and overall revenue. The negative return rate ultimately reflects the detrimental effect of the pandemic on the production, operation, and sales of these businesses. Along the geographical dimension, the negative effect is even more obvious in highly impacted regions, where tight quarantine measures restrict consumption and output, sending a negative

signal to managers and their stakeholders. Financial restrictions may exacerbate the COVID-19 crisis. Furthermore, the COVID-19 pandemic slowed business activity by lengthening the time it took to acquire inventory, sell inventory, and collect cash from inventory sales (Zimon and Tarighi, 2021). Therefore, the primary focus of this study is to find out the impact of COVID-19 on firms' WCM.

H_1: COVID-19 and working capital management are positively associated.

Working Capital Management and Firm Performance

Chowdhury et al. (2020) claim that owing to COVID-19, firms are suffering from a lack of working capital since their operational expenses are higher than their sales income. The after-effects will linger for quite some time, and that return on investment will suffer in the medium and long terms. In this context, firms must effectively manage working capital to enhance their financial and operational performance, which has a beneficial impact on the firm's absolute and relative market value (Boisjoly et al., 2020). In contrast, a firm's financial performance would suffer if its working capital is poorly managed. As such, Fernández-López et al. (2020) discover that between 2010 and 2016, the profitability of Spanish cheese-manufacturing enterprises is negatively correlated with the DIO, DPO, and CCC. Braimah et al. (2021) and Sawarni et al. (2020) establish the relationship between DSO and business profitability. They claim that the receivables collection time adversely impacts the profitability of firms. When companies wait longer to collect their receivables, this signals a worsening financial state. Hence, better working capital management requires optimum levels of inventories, accounts receivable, and accounts payable. Any interruptions in the WCM components have a negative impact on the company's performance (Magni and Marchioni, 2020).

Dhole et al. (2019) consider that firms retain a shorter cash conversion time to alleviate their financial constraints. The results demonstrate unequivocally that efficient management of working capital mitigates the detrimental impact of financial restrictions on corporate performance. In addition, Afrifa and Tingbani (2018) find a significant positive relationship between working capital management and company performance when cash flow is available. The research reveals a negative correlation between WCM and business performance in the absence of accessible cash flow. However, the present research also suggests that a higher CCC is detrimental to a firm's ROA. As a result, the following hypothesis will be the focus of our investigation.

H_2: Working capital management and firm performance are negatively associated.

METHODOLOGY

Sample and Data Collection

The sample of the study consists of 4513 Chinese and 1049 UK-listed firms from 2011 to 2020. The reason for choosing China and the UK is that they were more susceptible to the COVID-19 pandemic, and businesses in both nations suffered greatly owing to the uncertainty brought on by the pandemic. The earliest reports of COVID-19 were discovered in China (Song et al., 2021). The UK is third in Europe and fourth globally in terms of the overall number of COVID-19 cases (Jeris and Nath, 2020). The present study started its data collection by obtaining COVID-19 data from the websites of the World Health Organization. We obtained daily COVID-19 case data for 2019 and 2020 and then converted it to cumulative cases for each year. Thomson Reuters Refinitiv Eikon is used to gather financial data of the firms. We chose firms that are listed on stock exchanges in China and the UK, and the firms' headquarters are likewise located in China and the United Kingdom.

Estimation Technique and Models

This study examines the impact of the COVID-19 pandemic on firms' working capital management (WCM) and, eventually, firm performance. To accomplish this objective, this research makes use of static panel data regression utilizing the Stata 15 software. Panel data is more relevant since it accounts for both intertemporal dynamic behavior and firm-level individuality by including the necessary mechanisms. For instance, it allows for the adjustment of heterogeneity bias due to the hidden influence of time-invariant variables in a regression

model. In addition, a large number of data points increases degrees of freedom and decreases collinearity across explanatory factors. Therefore, it improves the performance of econometric estimators. However, in practice, several variables, such as COVID-19, may have various degrees of effect on a firm's management of its working capital.

Model 1

In this model, we use COVID-19 with the interaction of firm's sales to examine their impact on working capital management. There are specific reasons for employing the interaction between COVID-19 and sales. Firstly, the level of working capital a business has is influenced by its cash flow. Secondly, expenditures will exceed income if the company's sales fall, forcing it to use up its working capital. Meanwhile, CCC, as a working capital management indicator represents the number of days required for a business to convert cash into inventory and subsequently back into cash through the sales process. However, to examine the study's first hypothesis, this study estimates the following panel data regression model.

$$WCM_{i,t} = \beta_0 + \beta_1 \text{Sales*COVID-19} + \beta_2 \text{LEV} + \beta_3 \text{SIZE} + \varepsilon_{i,t} \quad (1)$$

where i and t denote firm and year, respectively; $WCM_{i,t}$ is the dependent variable for firm i at the time t; B_0 indicates intercept; β_1 indicates the estimated coefficient of the independent variable; β_2, β_3 indicate the estimated coefficient of control variables (leverage, and firm size); $\varepsilon_{i,t}$ represents idiosyncratic error.

Model 2

This model aims to investigate the impact of WCM on firm performance, which represents the study's second hypothesis. Thus, it will be feasible to assess if COVID-19 has an influence on the WCM and then what effect the WCM has on the firms' performance. We use return on asset (ROA) as an indicator of firm performance. The rationale behind using ROA is that it is a commonly used profitability measure. Further, the ROA provides investors with a measure of a firm's ability to turn its investments into net profits. If a firm has a high ROA, it means that it is profitable while making relatively fewer investments.

$$ROA_{i,t} = \beta_0 + \beta_1 \text{WCM} + \beta_2 \text{SG} + \beta_3 \text{LEV} + \beta_4 \text{SIZE} + \varepsilon_{i,t} \quad (2)$$

where i and t denote firm and year, respectively; $ROA_{i,t}$ is the dependent variable for firm i at the time t; B_0 indicates intercept; β_1 indicates the estimated coefficient of the independent variable; β_2, β_3, β_4 indicate the estimated coefficient of control variables (sales growth, leverage, and firm size); $\varepsilon_{i,t}$ represents idiosyncratic error.

Table 1 Summary of the Variables

Variables	Symbols	Measurements	Reference Authors
Firm Performance:			
-Return on Asset	ROA	$\frac{\text{Net Income}}{\text{Total Assets}}$	(Altaf and Ahmad, 2019; Lee and Hyun, 2019; Pirttilä et al., 2020)
Working Capital Management:			
-Cash Conversion Cycle	CCC	$(\frac{\text{Account Receivables}}{\text{Sales}} \times 365)+ (\frac{\text{Inventory}}{\text{Sales}} \times 365)– (\frac{\text{Account Payables}}{\text{Sales}} \times 365)$	(Rey-Ares et al., 2021; Wetzel and Hofmann, 2019)
COVID-19	COVID-19	Cumulative Daily Cases	(Rahman et al., 2021)
Control Variables:			
- Sales Growth	SG	$100 \times \frac{(Sale_{it} - Sale_{it-1})}{Sale_{it-1}}$	(Alam et al., 2020; Cheng, 2019; D'Mello and Toscano, 2020)
- Leverage	LEV	100 × (Short-Term Debt + Long-Term Debt) / (Total Assets)	(Dhole et al., 2019; Mirza and Ahsan, 2020; Nguyen et al., 2018a)
- Firm Size	SIZE	Natural logarithm of the firms' total assets.	(Attig et al., 2021; Dhole et al., 2019; Nguyen et al., 2018a)

RESULTS AND DISCUSSIONS

Descriptive Statistics

Descriptive statistics of the study variables are shown in Table 2. A total of 4513 China and 1049 UK publicly traded firms are included in this analysis. The total number of observations varies due to missing data in some years; however, the maximum number of observations for Chinese data is 37,192, whereas 10,490 for UK data. Table 2 further highlights that the average CCC period for China is 4.7217 days, and 4.6129 days for the UK. While the numbers are close, Chinese firms move quickly to recoup their working capital investments. Additionally, the fact that the minimum value of CCC is negative for a few businesses in both nations suggests that their working capital is not tied up for an extended period of time, resulting in better liquidity. Negative minimum values for ROA, a measure of a firm's profitability, suggest that the companies holding such values are not making optimal use of their resources. Furthermore, we find that the average value of the interaction variable Sales*COVID-19 for Chinese firms is 3.2505, whereas the average value for UK firms is 3.2638. Nevertheless, the standard deviation for all the variables is below the mean value, indicating that data is clustered around the mean.

Table 2 Descriptive Statistics

Variable	Observation	Mean	Std. Dev.	Minimum	Maximum
		China			
CCC	35,291	4.7217	0.9355	-5.6550	6.1821
ROA	36,877	3.5645	0.4469	-0.2233	4.0878
Sales*COVID-19	37,192	3.2505	0.8044	2.2783	5.7149
LEV	36,877	2.8041	1.1479	0.6932	5.0193
SG	34,466	3.6798	1.1594	-0.4494	5.0217
SIZE	36,877	19.8947	1.4801	12.6476	26.6961
		UK			
CCC	9,993	4.6129	1.1480	-0.3506	6.0685
ROA	10,182	2.8518	0.7526	-0.3971	3.4843
Sales*COVID-19	9,063	3.2638	0.8413	-1.5516	5.9430
LEV	6,619	0.2114	0.1793	0.0036	0.6583
SG	7,817	0.0969	0.3540	-0.5336	1.1088
SIZE	10,490	18.5586	2.3950	4.8695	26.4458

Correlation Matrix

According to the correlation matrix in Table 3, most variables exhibit weak correlations. This suggests that multicollinearity problems are less likely to arise. It turns out that whereas ROA and Sales*COVID-19 are positively correlated with CCC for UK firms, they are inversely correlated for Chinese ones. The use of leverage and sales growth is also shown to positively correlate with CCC.

Table 3 Correlation Matrix

			China			
Variable	CCC	ROA	Sales*COVID-19	LEV	SG	SIZE
CCC	1					
ROA	-0.0586	1				
Sales*COVID-19	-0.0293	0.0314	1			
LEV	0.0045	-0.1842	0.0124	1		
SG	0.1097	0.2027	0.0981	-0.0712	1	
SIZE	-0.039	0.0115	0.1884	0.0412	-0.0017	1
			UK			
Variable	CCC	ROA	Sales*COVID-19	LEV	SG	SIZE
CCC	1					
ROA	0.1719	1				
Sales*COVID-19	0.0205	0.0245	1			
LEV	0.0026	0.0227	-0.0753	1		
SG	0.0116	-0.0127	-0.0415	-0.0125	1	
SIZE	0.1208	0.28	0.0027	0.0497	-0.0205	1

Breusch and Pagan Lagrange Multiplier Test

This research examines the applicability of the OLS estimation model for working capital management and firm performance indicators using the Breusch-Pagan Langrage Multiplier (LM) test. The multiplier test is employed to assess homogeneity. The LM test result, however, shows that the null hypothesis of both Chinese and UK firms having equivalent slopes and intercepts is rejected with a p-value of 0.000. Since the slopes and intercepts differ among businesses, random effects offer more precise estimates of the factors that influence WCM and firm performance than OLS analysis. Due to the inclusion of a non-constant error term that would reduce the effectiveness of the Pooled Model, the random effect model is preferable.

Hausman Test

The Hausman test is used to establish whether fixed-effects or random-effects panel data is more appropriate (Hsiao, 2007). If the P value of the Hausman test is less than 0.05, it is likely that fixed effects estimation is more accurate than random effects estimation. Accordingly, the P value of the Hausman test for Models 1 and 2 of Chinese data is less than 0.05. This means the Chinese firms' models will be interpreted using the fixed effects model. In contrast, for UK data, we get P values of more than 0.05 for Model 1 but less than 0.05 for Model 2. Consequently, Model 1 of UK data will use a random effect approach, whilst Model 2 will be analyzed utilizing fixed effect.

Heteroscedasticity

The principal assumption of a regression model is the absence of heteroscedasticity. According to Moradi et al. (2020), when heteroscedasticity is present and homoscedastic disturbances are present, consistent estimates of inadequate coefficients will be obtained. We infer that there are heteroscedasticity issues with the study models since the level of p-value in the heteroscedasticity test across our diverse models is less than five per cent.

In this regard, to fit a model with heteroskedastic residuals, it is necessary to utilise robust standard errors that are compatible with the presence of heteroscedasticity (Ashraf and Shen, 2019). Heteroscedasticity can be managed by robust standard errors (Nagar et al., 2019). Hence, robust standard errors are used for chosen models to evaluate the hypotheses of the present research.

Multicollinearity Tests

After running the regression, we use the variance inflation factors (VIFs) test to look for multicollinearity. The VIF test evaluates the degree to which collinearity increases the variance of an estimated regression coefficient. Regarding the VIF value, if the VIF of the calculated model coefficients is less than 10, there is no linearity issue (Salehi et al., 2018; Thompson et al., 2017). In general, it may be worthwhile to dig further into a variable with VIF scores of 10 or above. The variance inflation factors (VIFs) for the models in this research are less than 5, indicating no multicollinearity issues (Shen et al., 2021).

Regression Analysis

Model 1

The regression results for the influence of COVID-19 on WCM are shown in Tables 4 and 5. In this research, we use COVID-19 with the interaction of sales, which has a major impact on working capital management. The level of working capital a business has is influenced by its cash flow. Expenditures will exceed income if the firm's sales fall, forcing it to use up its working capital. In this regard, CCC, as a working capital management indicator represents the number of days required for a business to convert cash into inventory and subsequently back into cash through the sales process.

Nevertheless, for China's firm level data, the fixed effect regression analysis in Table 4 shows that the interaction variable Sales*COVID-19 is negatively related to CCC at a 1% significance level. Although we anticipate that COVID-19 will result in an increase in CCC, Chinese firms manage their working capital levels well and keep CCC levels low. This suggests that when sales are affected by COVID-19 uncertainty, firms will be compelled to reduce their account receivables, inventory levels and seek increased credit terms from

suppliers. This is due to the fact that Chinese firms have had their performance negatively impacted by the COVID-19 pandemic as a result of lower investment and lower sales (Shen et al., 2020). As a result of the pandemic's detrimental effects on production, operation, and sales, Chinese firms were forced to decrease their investment in working capital. During the pandemic, WCM becomes more challenging due to possible funding shortages. In this scenario, we observe a positive correlation between leverage and CCC, showing that debt financing may assist firms in meeting their working capital requirements for improved performance. In contrast, we see a negative association between firm SIZE and CCC. During COVID-19, smaller businesses have a reduced competitive edge when obtaining working capital financing. On the other side, bigger companies have stronger market control and more favourable trade credit conditions.

Table 4 Regression Analysis for Model 1, China

Variable	OLS	Random Effect	Fixed Effect
	CCC	CCC	CCC
Sales*COVID-19	-0.0299***	-0.0193***	-0.0179***
	(0.0084)	(0.0043)	(0.0047)
LEV	0.0049	0.0205***	0.0230***
	(0.0049)	(0.0046)	(0.0075)
SIZE	-0.0219***	-0.0244***	-0.0252***
	(0.0039)	(0.0048)	(0.0095)
Constant	5.2343***	5.1330***	5.2100***
	(0.0776)	(0.0941)	(0.1880)
Observations	27933	27933	27933
LM Test	0.0000		
Hausman Test		0.0000	

Note: The results are estimated with a fixed effect estimator employing heteroscedasticity robust standard errors. Standard errors are presented in parentheses * p<0.10, ** p<0.05, *** p<0.01.

In contrast to Chinese firms, the results of random effect regression in Table 5 for UK data indicate a significantly positive connection between Sales*COVID-19 and CCC. As a result of the COVID-19 pandemic's disruptions to economic operations, the value of the firm's assets has decreased (Almaghrabi, 2021; Hassan et al., 2020), which has had a negative influence on the firms' short-term capital need and rendered them ineffective in their WCM. Firms providing goods and services to consumers either stopped down or functioned at lower capacities because of the pandemic response. This leads to a rise in inventory and a delay in collecting receivables. The result is that firm's financial flow is restricted to supporting activities with a shorter time horizon. Therefore, uncertainty in COVID-19 led UK firms to maintain a higher CCC level due to effective management of their working capital. We also find a negative relationship between leverage and CCC, suggesting that a one-unit increase in leverage results in a decrease in CCC. However, we find firm size is positively related to UK firms' CCC. It proves that the CCC of UK firms increases with increasing firm size.

Table 5 Regression Analysis for Model 1, UK

Variable	OLS	Random Effect	Fixed Effect
	CCC	CCC	CCC
Sales*COVID-19	0.0283*	0.0277**	0.0264**
	(0.0147)	(0.0106)	(0.0118)
LEV	-0.0272*	-0.0084	-0.0061
	(0.014)	(0.0219)	(0.0158)
SIZE	0.0671***	0.0617***	0.0587***
	(0.0051)	(0.0132)	(0.0111)
Constant	3.3487***	3.3893***	3.4537***
	(0.1084)	(0.2531)	(0.2162)
Observations	8630	8630	8630
LM Test	0.0000		
Hausman Test		0.7137	

Note: The results are estimated with a random effect estimator employing heteroscedasticity robust standard errors. Standard errors are presented in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Model 2

Model 2 analyses the effect of working capital management on firm performance from 2011 to 2020. In the prior model, we discovered that COVID-19 uncertainty had a large effect on WCM. Consequently, we hypothesize that WCM may similarly impact business performance. For the Chinese firm, the fixed effect regression analysis in Table 6 reveals a negative relationship between CCC and ROA at the 1% level of

significance. As shown by the previous model, Chinese firms were able to effectively manage their working capital and maintain a low CCC level and increase ROA. When a firm's CCC is low, it indicates that its working capital management is effective. Consequently, they may provide a greater firm performance (Braimah et al., 2021; Fernández-López et al., 2020; Sawarni et al., 2020). Hence, using the CCC, firms can determine how fast they may recoup their working capital investment.

For the control variable results, there is a negative correlation between leverage and ROA in Model 2 for Chinese firms. The risks of using too much debt to finance a business are at their highest when the return on their assets is less than the cost of their debt service. However, we find that sales growth is positively correlated with ROA, suggesting that a rise in sales activity is positively correlated with an increase in ROA of Chinese firms. The positive correlation between SIZE and ROA in model 2 suggests that as firm size increases so does return on assets.

Table 6 Regression Analysis for Model 2, China

Variable	OLS	Random Effect	Fixed Effect
	ROA	ROA	ROA
CCC	-0.0304***	-0.0292***	-0.0306***
	(0.0025)	(0.0028)	(0.0103)
LEV	-0.0631***	-0.0647***	-0.0626***
	(0.0021)	(0.0023)	(0.0059)
SG	0.0704***	0.0662***	0.0541***
	(0.0022)	(0.0022)	(0.0049)
SIZE	0.0039**	0.0060***	0.0637***
	(0.0016)	(0.0018)	(0.0058)
Constant	3.5510***	3.5289***	2.4216***
	(0.0357)	(0.0394)	(0.1294)
Observations	25770	25770	25770
LM Test	0.0000		
Hausman Test		0.0000	

Note: The results are estimated with a fixed effect estimator employing heteroscedasticity robust standard errors. Standard errors are presented in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Contrarily, Table 7 indicates a positive correlation between CCC and ROA for the UK. A higher CCC is indicative of a more substantial investment in working capital management, which in turn generates better firm performance in the UK. Sales for firms improve because of an increase in inventory and trade receivables brought on by the more conservative approach (Tauringana and Afrifa, 2013). Investing in inventory may reduce the likelihood of production delays, the cost of purchasing raw materials, and the volatility of prices (Deloof, 2003). Simultaneously, investing in accounts receivable may boost firms' performance since it extends customers' payment terms and closes the information gap between purchasers and vendors (Smith, 1987). Finally, we find that leverage and sales growth are positively associated with ROA, but the firm size is negatively associated with ROA.

Table 7 Regression Analysis for Model 2, UK

Variable	OLS	Random Effect	Fixed Effect
	ROA	ROA	ROA
CCC	0.0805***	0.0386***	0.0202**
	(0.0071)	(0.0073)	(0.0157)
LEV	0.0295***	0.0287***	0.0200*
	(0.0094)	(0.0102)	(0.0173)
SG	0.0786***	0.0576***	0.0151*
	(0.0035)	(0.0052)	(0.0117)
SIZE	-0.0158	-0.0077	-0.0078
	(0.0233)	(0.0209)	(0.0215)
Constant	0.9632***	1.5407***	2.4416***
	(0.0700)	(0.1028)	(0.2025)
Observations	7432	7432	7432
LM Test	0.0000		
Hausman Test		0.0000	

Note: The results are estimated with a fixed effect estimator employing heteroscedasticity robust standard errors. Standard errors are presented in parentheses * p<0.10, ** p<0.05, *** p<0.01.

Overall, the preceding regression analyses demonstrate that COVID-19 have both positive and negative effects on WCM. When COVID-19 has a negative influence on Chinese firm-level data, this contradicts the first hypothesis of the research. By demonstrating a positive relationship between Sales*COVID-19 and CCC, the model 1 findings for UK firm-level data supports the first hypothesis. Thus, the current study has

developed a new empirical connection related to COVID-19 by demonstrating its effect on WCM. Nonetheless, the second hypothesis of the research proposes a negative association between WCM and firm performance. We find a negative correlation between CCC and ROA for data on Chinese firms but a positive correlation for data on UK firms. Therefore, it is apparent from the findings that UK firms were more prone to COVID-19 as they could not manage their CCC level lower. Despite this, UK firms transform their higher investment in working capital into higher profitability by ensuring uninterrupted production and sales.

CONCLUSION

The COVID-19 pandemic has wreaked havoc on the global economy, increasing economic uncertainty. When there is a lot of unpredictability in the economy, it has a major effect on how a business operates. Consequently, it may be challenging for firms to maintain adequate levels of working capital. A firm's survival may be threatened if its working capital is poorly managed. In this regard, this study intends to examine the effect of the COVID-19 pandemic on firms working capital management and, eventually, on firm performance. We discover that the interaction between sales and COVID-19 has a negative effect on the CCC of Chinese firms. This suggests that when sales are affected by COVID-19 uncertainty, businesses will be compelled to reduce their account receivables, inventory levels and seek increased credit terms from suppliers. As a result of managing the working capital well, they increase firms' performance, as the negative relationship between WCM and ROA of Chinese firms proves. For UK firms, however, we discover the positive impact of COVID-19 on firms' CCC and a positive relationship between WCM and ROA. COVID-19 induces a greater investment in the working capital of UK firms; however, it generates a higher return for the firms.

Moreover, current study's results provide insight into how business leaders should handle working capital management and financial decision-making in the face of economic volatility. This research also illustrates how working capital management influences a firm's performance in the face of external shocks like COVID-19. This allows for better working capital choices to be made by the firms' financial managers. In turn, it may result in increased profits. This research will assist foreign investors in deciding whether to invest in Chinese or British firms based on the degree of risk the firms pose during periods of turbulence. At last, this study will provide policymakers with the information they need to determine the best ways to handle working capital in a volatile market.

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