The Effect of Working Capital and Cash Holding Level on Firm Performance: Evidence from the Covid-19 Pandemic

Dilruba Afroze[1], Ashraful Islam Faysal[2]

Abstract

Short-term financing decisions on liquidity management have significant implication on firm's financial profitability. The importance of having proper liquidity is proven to be even more prevalent in the times of the Covid-19 pandemic. The purpose of this paper is to examine how liquidity can influence the financial performance of a company before and after the pandemic. This study used 29 listed Bangladeshi banks and financial institutions. 5 years from 2016 to 2020 are taken as samples. Correlation matrix, multivariate OLS regression analysis, panel data random-effect regression statistical measures are used to evaluate the data. Additionally, the interaction effect of explanatory variables and lagged variables of dependent variables has been used to increase the reliability of the findings. Our results portray that both current ratio and cash holding level have positive relationship with firms' profitability. However, as dictated by trade-off theory, there is an inverted U-shaped relationship as the values of current ratio and cash holding levels increase. Another major finding of the study is the negative impact of the covid-19 pandemic on both ROA and ROE. Among the control variables, growth of operating profit shows positive relationship and the other variables – firm size, debt to equity ratio and loan to deposit ratio show negative relationships.

Keywords: Liquidity, Current ratio, Cash holding level, ROA, ROE

1. Introduction

Both short-term and long-term financing decisions are equally important for a company's growth and sustainability (Akgun & Karatas, 2020). The financial health of a company cannot be wholly determined without evaluating such vital decisions. This is even more true in the desperate times of the Covid-19 pandemic. Prudent liquidity planning gives firms the flexibility to effectively respond to sudden contingencies. Therefore, firms around the world are focusing on having large cash reserve to utilize the growth opportunities. For this

[1] Assistant Professor, Department of Accounting & Information Systems Bangladesh University of Professionals (BUP), Email: dilruba.afroze@bup.edu.bd

[2] Graduate Student, Department of Accounting & Information Systems, Bangladesh University of Professionals (BUP), Email: ashrafulfaysal01@gmail.com

particular study, liquidity management will be looked at from 2 relevant perspectives – cash holding level and working capital management suggested by (Yun et al., 2020) and (Anton and Nucu, 2021). Deloitte (2021) observed that companies' survival in this Covid-19 times will largely depend on how they would manage their working capital**.** PWC (2021) stated in its working capital report that working capital is going to be the next value driver of the businesses. Another important indicator of financial resilience is liquidity (Yun et al., 2020). Having an optimum level of liquidity is vital rather both high or low liquidity levels have their respective problems of higher cost (Panda & Nanda, 2018). Firms with sufficient liquid assets gain greater flexibility to respond to sudden economic turmoil. To understand liquidity, we have to look at the most liquid asset a business will have – cash. The primary reason companies want to have cash holding is to deal with the immediate expenditure, (Islam, 2012). This study, however, does not examine the cash or inventory conversion cycle which are mainly focused on the length of time. Rather, it emphasizes on cash and current assets which are needed to address the immediate payments and the contingencies in this pandemic.

Understanding how a company uses its cash flows will help us determine its liquidity. The figures of revenue or even net profit have the inherent limitations of using accrual basis of accounting in which revenue is recorded just as it is earned and expense is recorded just as it is incurred. Nangih et al. (2020) stated that cash flow statement is useful in assessing or predicting how an entity will be producing cash and cash equivalents. Without having an in-depth look at the cash flow statements of a company, investors cannot be confident about the security of their investments. In fact, one of the primary responsibilities of management is to make sure there is sufficient cash reserve as a shock absorber to contingencies. Nwanyanwu (2015) found that users of financial statements depend more on cash flow parameters instead of accounting ones because management had more freedom to manipulate the accounting figures.

The significance of cash flow is being even more valued in this COVID-19 pandemic as (Forbes, 2021) having low cash reserve is one of the biggest reasons for business failure. High cash flow reserve enables the companies to have more actual control in which they can quickly respond to a desperate situation like that of the current pandemic.

Despite the significance of working capital management and liquidity levels especially in this pandemic, there has not been a sufficient amount of research conducted in understanding the relationship between these variables and firm performance. Many researchers are trying to make a comparison of this pandemic with the 2008 financial crisis as they both had a detrimental impact on the businesses across the world (Barua & Barua, 2020). Almost all the countries around the world have felt the adverse impact of the covid-19 pandemic. Massive layoffs, adverse exchange rates, increased price, fluctuating supply and demand, and a lot of other macroeconomic uncertainties have created disastrous situations across countries (World Bank, 2020).

The situation is no better when it comes to a developing country like Bangladesh. For example, Ghosh and Saima (2021) found the evidence of cash shortages when Bangladesh Bank extends the loan moratorium. Bangladesh, being a developing country was already struggling with its rising non-performing loans. To make matter worse, this pandemic will only increase the loan defaulters. Without proper and wise policy support of the central Banks, the cash flow crisis of these institutions can be increased. However, several stimulus packages by the Bangladeshi government have been announced for the banks due to the liquidity crisis (The financial express, 2021). As a result, these packages were named as Liquidity Support packages.

This paper examines how the increasingly important working capital management and cash holding levels affect the firm performance, ROA and ROE and how this relationship changes over this Covid-19 pandemic. The model development of this study followed some of recent papers such as Akgun and Karatas (2020), Yun et al. 2020), Mohd-Asshari and Faizal (2018). Fiscal year 2020 is the only period of time, we can assess the impact of the pandemic. Though we have seen many businesses collapse or are struggling in the pandemic, it is very early to judge how things turn out. Given the fluctuating covid-19 cases, there are still a lot of uncertainties. Our findings provide the first empirical evidence of how the liquidity of listed banks and financial institutions of Bangladesh are influencing the firm performance, by encompassing data from the post-pandemic era. The findings of the study should be of great interest to the management of the financial institutions by providing the scope of gauging themselves against the current scenario in the market.

This paper starts with explaining the motivation behind the study which is then followed by exploring the literature. Then it talks about the methodology and the theoretical framework on which the hypotheses are built. Next, it moves to analysis of the data collected from the samples and concludes with relevant recommendations.

2. Literature Review

Working capital which works as the buffer of liquidity is essential during economic collapse (Baños-Caballero et al., 2020). There are several ways to determine working capital ratio. Some compare current assets to total assets; some compare current assets to current liabilities. In this paper, the latter has been selected as the determination of the working capital ratio which is also known as the current ratio. The same proxy has also been used by Akgun and Karatas, 2020 and Yun at al., 2020. Yun et al. (2020) found mixed results on how working capital influences ROA, ROE and EBIT, in research conducted on more than 700 Polish firms. The study stated that working capital will have significant positive effect on the firm performance up to a certain level after which the maintenance and supplementary cost of working capital will decrease the firm performance. This finding is also consistent with Altafand Ahmad(2019), who found an inverted U-shaped relationship, meaning the working capital increased the firm performance up to a level and then it started to decrease the firm performance.

While most of the studies found positive relationship between working capital and firm performance, it is not conclusive. For instance, many studies found negative association as well, as in the case of Fernandez-Lopez et al. (2020) and Duru et al. (2014). The effect of working capital on firm performance can be influenced by many other variables as well. For example, Ren et al. (2019), found negative relationship between cash conversion cycle and profitability when controlling for ownership structures. Hussainet al. (2021) also found negative relationship between cash conversion cycle and firm profitability when controlling for macroeconomic variables like exchange rate and interest rate.

Almost in all areas of business - starting from making effective decisions to having insights into operating and financing activities, liquidity plays a vital role (Rahman, 2020). Cash is known as the most liquid assets of all.

Cash holding level is determined by dividing the cash and cash equivalents over total assets of a firm. The same proxy is used in most of the literature as in the case with (Akgun & Kartas, 2020; Doan, 2020; Yun et al.,2020).

Asante-Darkoet al. (2018) found positive relationship between cash holding and firm value but the relationship was not significant. Aslam et al. (2019) found positive relationship between cash holding and Tobin's Q but the relationship with accounting performances of ROA was found to be negative. Doan (2020) also found positive relationship between cash holding and firm performance, ROA and ROE when conducting research on 186 firms in Vietnam stock market over a period from 2008 to 2018.

Jabbouri and Almustafa (2020) conducted an extensive study on the emerging markets of Middle East and North Africa region over a period of 15 years. He came up with significant positive relationship between cash holding level and firm performance. He also showed how strong national governance has the scope of strengthening the value of cash holding by protecting the investors' rights. Khatib et al. (2021) stated that whenever the economy undergoes crises like that of the 2008 economic crisis or the current pandemic, firms around the globe shift their focus on the cash holding level. It becomes the most popular means of maintaining liquidity. It becomes a pivotal component of corporate financial policy. In another study by Ghosh and Saima (2021) mentioned how the sustainable development of an economy can be dependent on the stability of its financial institutions.

As we have seen from the literature, firms regardless of the industry, size, ownership structure or board characteristics can increase their profitability by having a proper liquidity management system in place. Many studies have been conducted in addressing the impact of the covid-19 pandemic on the firm performance of the banking industry of Bangladesh. However, no studies have yet been conducted on the relationship between liquidity level and firm profitability in the post-pandemic era. Furthermore, the breakdown of liquidity components into current ratio and cash holding level adds another dimension to understand the impact of liquidity. This study incorporates all the listed banks and financial institutions that have published their 2020 annual reports thereby bridge the gaps in the literature.

3. Theoretical Framework

After the study of economies made liquidity preference theory a part of its discipline, researchers seemed to have a vested interest in understanding the relationship between liquidity and firm performance. Popular theories that are discussed within the dominant literature include agency theory, free cash flow theory, trade-off theory.

Trade-off theory states that there would be a balance between marginal cost and benefit of cash holding level so that it can absorb financial shock. Holding more cash indicates more opportunity cost but at the same time this amount of cash will lead to less transactional cost. Anton and Nucu (2021) found an inverted U-shaped relationship between liquidity and firm profitability which means the liquidity level will be positively influencing the firm performance up to the optimum level after which it will start having a negative impact.

In times of financial crisis like the Covid-19 pandemic, firms tend to hold a little more than optimal level of cash which can save them from looking for external financing which becomes even more difficult in such desperate times. This is known as the precautionary motive (Alves & Morais, 2018).

Agency theory describes the conflict between shareholders and managers because of their inherent motivation and expectation. Managers usually tend to avoid risk so that they want to hold a cash level higher than their optimal level. On the other hand, shareholders are usually risk-neutral and are happy as long as their investments are safe and secure (Chen, 2021). Another relevant theory discussed in the literature is the free cash flow theory which specifies the idea of holding more cash in managers' hands. This action of the managers has both advantages and disadvantages. The advantage is the obvious protection from sudden economic crisis and the disadvantage is that managers might try to manipulate the cash holding level in order to pursue personal gain. (Dittmar & Mahrt-Smith, 2007).

Having more current assets in comparison to the current liabilities can also indicate that there are idle resources. On the other hand, having low current working capital will lead to problematic situations in which firms might miss out on responding to immediate orders or buying supplies. The ample empirical evidence on efficient working capital on firm performance should motivate the managers to choose between aggressive, moderate and conservative approaches.

Conceptual research conducted by Ling et al. (2018) on working capital management stressed the importance of this particular short-term financing decision. Among many theories, relationship has been drawn between working capital management and trade-off theory. The theory states that the level of working capital needs to be optimum because a large amount of such capital would require higher inventory maintenance cost.

This paper particularly focuses on the trade-off theory by examining whether liquidity level - working capital and cash holding level always have the same relationship with firm profitability. Liquidity level should be kept at an optimum level – lower liquidity can lead to inability of carrying out day-to-day activities and higher liquidity can lead to increased cost of maintaining that. Therefore, firms have to find a balanced approach of how much to trade-off between liquidity and profitability. Since trade-off theory is relevant to both current ratio and cash holding level, this paper attempted to test how this theory applies to our findings.

4. Data and Methodology

4.1 Data Collection and Sample Size

A period of 5 years – from 2016 to 2020- has been chosen and 145 samples are collected from 24 listed banks and 5 financial institutions (Appendix Table 1). Among them, many of them have not yet published their 2020 annual reports and many of them are listed after year 2016. Banks and financial institutions are playing an important role to a country's economy as all companies deposit their money and take out loans whenever they require from these institutions. The growth of these institutions is a strong indicator of the overall economy as mentioned by Ghosh and Saima (2021). For this reason, we used banks and financial institutions as samples in our study.

This particular time frame is selected because this period is the most recent in terms of availability of the data and a period of 5-year is quite sufficient to validate the findings of a research which was also followed previously by Islam (2020). Yearly data is used in this study (Achim et al. 2021). Year 2020 is included to study the effect of the Covid-19 pandemic. However, many studies by Shen et al. (2020) and Qin et al. (2020) used quarterly data as well to study the impact of Covid-19 pandemic on firm performance. Data is collected from the annual reports of these institutions.

The data that has been collected from the 145 samples is analysed with statistical measures using STATA software.

4.2 Determination of the Variables

Table 1: Determination of the Variables

Dependent variables	**Determination of the variables**
ROA	Net profit after tax divided by the total assets
ROE	Net profit after tax divided by the total shareholder's equity
Independent variables	
Current Ratio	Current assets divided by the current liabilities
Cash Holding Level	Cash and cash equivalents divided by the total assists
Control variables	
Firm size	Natural logarithm of total assets
Financial leverage	Total liabilities divided by the total shareholders' equity
Loan to deposit ratio (LDR ratio)	Total loans divided by the total deposit
Growth rate of operating profit	(Current year operating profit-previous year operating profit)/current year operating profit
Covid-19 dummy	Set to 0 for the period of 2016 to 2019 and set to 1 for year 2020

4.3 Research Model

Model 1: ROA = β0+β1 Current ratio + β2 Cash holding level + β3 Firm Size + β4 Debt to equity ratio + β5 profit growth + loan to deposit ratio + Covid-19 dummy+ ε

Model 2: ROE = β0+β1 Current ratio + β2 Cash holding level + β3 Firm Size + β4 Debt to equity ratio + β5 profit growth + loan to deposit ratio + Covid-19 dummy+ ε

ROA and ROE are taken as dependent variables, motivated by Yun et al. (2020) and Akgun and Karatas (2020) to study the relationship between liquidity and firm performance. However, many studies have taken only ROA as the dependent variable like Ramazani et al. (2018) whereas some have taken Profit

After Tax like Appah et al. (2021). Other studies take Tobin's Q as a financial performance indicator as well (Aslam, 2019). Cash holding level and current ratio are used as independent variables to determine how they affect ROA and ROE of firms. However, many studies considered cash conversion cycle and inventory conversion cycle which are related to the length of time to measure the liquidity (Vural et al., 2012). Durrah et al. (2016) took quick ratio besides the cash and current ratio as measures of liquidity.

Besides current ratio and cash holding level, there can be other relevant variables that can influence ROA and ROE as well. For example, firm size calculated as the natural logarithm of total assets, used as control variable which have a significant impact on the firm's financial performance as Shen et al., (2020) found negative relationship between these two variables previously. Beside this, leverage ratio, calculated as the total liabilities to total shareholders' equity also added as control variable which was also used by Hapsari (2018) and Sari et al. (2020) in their studies where they found significant positive relationship between leverage ratio and firm's profitability. Moreover, growth rate of operating profit, calculated as the percentage increase, is another control variable in this study. More growth means there is more scope of enhancing the firm's profitability (Shen et al., 2020).

The relationship between liquidity and firm performance is measured by using firm size and leverage ratio as control variables (Hossain & Saif, 2019; Hung et al. 2021; Omenyo & Muturi 2019). Moreover, total loan to deposit ratio is added as another control variable because of its impact in determining the financial performance as have been found by Das (2020).

Covid-19 dummy is also taken to measure the impact of the current pandemic on the financial performance which was previously used by Akgun and karatas (2020) when studying the effect of the economic crisis of 2008. 2020 is scored as 1 and 2016 to 2019 is given the score of 0, as the assumption is that the pandemic will affect year 2020 only (Zimon et al. ,2020).

4.5 Hypothesis Development

Hypothesis 1

Null hypothesis = There is no relationship between current ratio and ROA

Alternate hypothesis = There is a significant relationship between current ratio and ROA

Hypothesis 2

Null hypothesis = There is no relationship between current ratio and ROE

Alternate hypothesis = There is a significant relationship between current ratio and ROE

Hypothesis 3

Null hypothesis = There is no relationship between cash holding level and ROA

Alternate hypothesis = There is a significant relationship between cash holding level and ROA

Hypothesis 4

Null hypothesis = There is no relationship between cash holding level and ROE

Alternate hypothesis = There is a significant relationship between cash holding level and ROE

Hypothesis 5

Null hypothesis = There is no relationship between the Covid-19 pandemic and ROA

Alternate hypothesis = There is a significant relationship between Covid-19 pandemic and ROA

Hypothesis 6

Null hypothesis = There is no relationship between the Covid-19 pandemic and ROE

Alternate hypothesis = There is a significant relationship between Covid-19 pandemic and ROE

5. Findings and Discussion

First of all, we have tried to look at the overall nature of data by looking at the descriptive statistics and the correlation matrix. Then, we moved towards the regression analysis to determine the strength of the relationship among the variables of the study. The type of regression to be used- pooled OLS or Panel fixed/random regression - is determined based on nature of the data and Hausman test (Hausman, 1978).

In addition, lagged regression model, interaction effect of the independent variables and squared values of independent variables have been used – in consistence with the existing literature - to further validate the findings and test the trade-off theory.

Table 2 : Descriptive Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
ROA	145	0.960	0.453	0.01	2.1
ROE	145	11.80	4.594	0.08	24
Current Ratio	145	1.092	0.181	0.76	2.29
Cash Holding	145	0.061	0.0318	0	0.15
Firm Size in BDT million	145	252666.4	116341.4	15809	529053
Debt to equity ratio	145	12.418	4.701	0.33	28.51
Operating profit growth	145	0.028	0.211	-0.76	0.6
Loan to deposit ratio	145	89.608	15.629	62	154

In Table 2, mean, standard deviation, minimum and maximum values of all the variables analysed in this study help us get an overall idea of how the variables are scattered throughout. The mean value of ROA is 0.96 which is close to 1. Any value of ROA above 1 is deemed to be a good indication of financial performance. On the other hand, the mean value of ROE is above 10 which is a healthy value for ROE.

Among the explanatory variables, the mean value of current ratio is above 1 which means there are more current assets than current liabilities. The mean value of cash holding is 0.06 meaning the amount of cash and cash equivalents is 6 percent of the total assets. The mean value of firm size is BDT 252666.4 million. All of the banks and financial institutions analysed in this study have 6-digit figure in millions. Debt-to-equity ratio, known as the leverage ratio has a mean of 12.4, meaning the amount of debt is 12 times more than that of equity. Operating profit is growing at the rate of 28 percent which is a very good indication of the firms' profitability. Loan to deposit ratio's mean is almost 90%, which is again a healthy ratio.

Table 3 : Correlation Matrix

Variables	ROA	ROE	Current Ratio	Cash Holding	Firm Size	Debt to equity ratio	Operating profit growth	Loan to deposit ratio	Covid-19 dummy
ROA	1.000								
ROE	0.752	1.000							
Current Ratio	0.291	0.160	1.000						
Cash Holding	-0.151	0.013	0.052	1.000					
Firm Size	-0.463	-0.264	-0.084	0.622	1.000				
Dent to equity ratio	-0.530	-0.148	-0.349	0.409	0.506	1.000			
Operating profit growth	0.215	0.321	-0.008	-0.007	-0.228	0.003	1.000		
Loan to deposit ratio	0.295	0.034	0.017	-0.629	-0.647	-0.372	-0.036	1.000	
Covid- 19 dummy	-0.166	-0.166	0.007	-0.063	0.139	0.032	-0.463	-0.038	1.000

Table 3 shows how the variables are correlated with one another. As we can see, current ratio is positively correlated with both ROA (0.291) and ROE (.160) whereas cash holding is positively correlated with ROE (0.013) but has negative correlation with ROA (-0.151). The correlation coefficient values are quite small (less than 1) which is an indication that the variables do not have the multicollinearity problem.

Table 4: Effect of Liquidity on Firm Performance Using Pooled OLS Regression

Variables	ROA		ROE	
	Coef.	P>t	Coef.	P>t
Current Ratio	0.2723	0.129	2.745	0.199
Cash Holding	3.9266	0.004	28.135	0.080
Firm Size	-0.167	0.004	-1.951	0.005
Dent to equity ratio	-0.039	0	-0.042	0.663
Operating profit growth	0.3069	0.068	5.276	0.009
Loan to deposit ratio	0.0035	0.194	-0.023	0.483
Covid- 19 dummy	-0.026	0.751	0.061	0.952
_cons	2.6371	0.002	33.464	0.001
No. of Observations	145		145	
R-squared	41.69		19.28	
Prob> F	0.000		0.000	

Table 5: Effect of Liquidity on Firm Performance Using Panel Data Regression - Random Effects

Variables	ROA		ROE	
	Coef.	P>t	Coef.	P>t
Current Ratio	0.162	0.327	0.425	0.819
Cash Holding	2.566	0.078	21.494	0.193
Firm Size	-0.194	0.002	-2.207	0.002
Dent to equity ratio	-0.053	0.000	-0.106	0.465
Operating profit growth	0.272	0.032	4.161	0.003
Loan to deposit ratio	-0.004	0.228	-0.091	0.032
Covid- 19 dummy	-0.04	0.512	-0.241	0.726
Constant	4.070	0.000	46.538	0.000
No. of Observations	145		145	
R-squared	6.51		15.90	
Prob> F	0.000		0.000	

Panel data regression analysis has been conducted on the data to control the individual heterogeneity problem of the OLS pooled data model.

After conducting the Hausman test, the p value was found to be 0.521 which is higher than 0.05. Therefore, we should look at the random effects of the panel regression instead of the fixed effects.

The following discussion will be based on the results of panel data random-effects.

Model 1: ROA= 4.070 + 0.162*Current ratio + 2.566*Cash holding level - 0.194*Firm Size - 0.053*Debt to equity ratio + 0.272*Operating profit growth - 0.004*Loan to deposit ratio - 0.04*Covid-19 dummy+ ε

Model 2: ROE= 46.538 + 0.425*Current ratio + 21.494*Cash holding level - 2.207*Firm Size - 0.106*Debt to equity ratio + 4.161*Operating profit growth - 0.091*Loan to deposit ratio - 0.241*Covid-19 dummy+ ε

R-squared values for the panel data fixed-effect regression models are quite low; 6.51 for the first model and 15.90 for the second model.

R-squared values for the OLS regression models are much higher; 41.69 for the first model and 19.28 for the second model.

Hypothesis 1: There is a positive relationship between current ratio and ROA but the relationship is not significant at 5% level. We cannot reject the null hypothesis. Given that all the other variables are constant; 1 unit change in current ratio will cause a change of 0.162 unit in ROA. This outcome is consistent with Durrah et al. (2016) and Akgun and Karats (2020).

Hypothesis 2: There is a positive relationship between current ratio and ROE but the relationship is not significant at 5% level. We cannot reject the null hypothesis. Given that all the other variables are constant; 1 unit change in current ratio will cause a change of 0.425 unit in ROE. This outcome is consistent with Hermanto et al. (2018).

Hypothesis 3: There is a positive relationship between cash holding and ROA, significant at 10% level. We can reject the null hypothesis Given that all the other variables are constant; 1 unit change in cash holding will cause a change of 2.566 unit in ROA. This outcome is consistent with Yun et al. (2020) but inconsistent with Akgun and karatas (2020).

Hypothesis 4: There is a positive relationship between cash holding and ROE but the relationship is not significant at 5% level. We cannot reject the null hypothesis. Given that all the other variables are constant; 1 unit change in cash holding will cause a change of 0.193 unit in ROE. The positive relationship of liquidity (current ratio and cash holding) with ROA and ROE is due to the liquidity factor which enables the firms to fulfill customer immediate demands without having to go for external financing.

Hypothesis 5: There is a negative relationship between covid-19 dummy and ROA but the relationship is not significant at 5% level. We cannot reject the null hypothesis.

Hypothesis 6: There is a negative relationship between covid-19 dummy and ROE but the relationship is not significant at 5% level. We cannot reject the null hypothesis. This result is consistent with Akgun and Karatas (2020) who concluded with similar result on the 2008 economic crisis. It is also consistent with Qin et al. (2020) showing the effect of Covid-19 pandemic on firm profitability.

The negative relationship is strictly consistent in the literature that has developed in the post-pandemic era. It is evident that the financial performances of listed banks and financial institutions in Bangladesh have been highly disrupted by the covid-19 pandemic. However, the relationship is not significant because of the lack of data we have access to.

There is a negative relationship between firm size and ROA, significant at 5% level. This outcome is consistent with Mawshekhi et al. (2019) and Qin et al. (2020). There is a negative relationship between firm size and ROE as well, significant at 5% level. Though the dominant literature shows a positive relationship between firm size and firm performance, the reason for our negative relationship might be because of large firm size leads to idler assets that are not being utilized efficiently.

There is a negative relationship between debt-to-equity ratio and ROA, significant at 1% level. We can reject the null hypothesis. This outcome is consistent with Antol et al. (2021). There is a negative relationship between debt-to-equity ratio and ROE, but the relationship is not significant at 5% level. In a developing country like Bangladesh the market for external financing especially the bond market is not very well developed. Therefore, according to pecking order theory, more debt means more expense which leads to decreased profitability.

There is a positive relationship between operating profit growth and ROA, significant at 5% level. This outcome is consistent with Shen et al. (2020). There is a positive relationship between operating profit growth and ROE, significant at 5% level. Growth of operating income is reflected in the net profit after tax which is then reflected on the higher firm performance.

There is a negative relationship between loan to deposit ratio and ROA but the relationship is not significant at 5% level. There is a negative relationship between loan to deposit ratio and ROE, significant at 5% level. The results between loan to deposit ratio and firm performance are contrary to the dominant literature which shows a positive relationship. The excessive amount of loan defaults by customers, a prevalent scenario in the banking sector of Bangladesh, might be a logical explanation for this negative relationship.

5.1 Multicollinearity Test

Table 6: Multicollinearity Test Using the Variance Inflation Factor

Variable	VIF	1/VIF
Firm Size	2.53	0.395
Loan to deposit ratio	2.11	0.473
Cash Holding	2.07	0.483
Dent to equity ratio	1.63	0.614
Operating profit growth	1.42	0.703
Covid- 19 dummy	1.31	0.761
Current Ratio	1.2	0.831
Mean	VIF	1.75

In table 6, a mean value of 1.75, which is below 5, indicates that there is no multicollinearity problem in the relationship of the variables.

Table 7: Effect of Liquidity on Firm Performance Using Lag Model

Variables	ROA		ROE	
	Coef.	P>t	Coef.	P>t
One lag (ROA, ROE)	0.411	0.000	0.450	0.000
Current Ratio	0.206	0.188	1.861	0.315
Cash Holding	3.127	0.008	23.486	0.090
Firm Size	-0.112	0.028	-1.113	0.065
Dent to equity ratio	-0.028	0.000	-0.048	0.568
Operating profit growth	0.374	0.011	6.010	0.001
Loan to deposit ratio	0.002	0.340	-0.008	0.774
Covid- 19 dummy	-0.001	0.997	0.141	0.872
Constant	1.654	0.027	17.869	0.046
No. of Observations	145		145	
R-squared	55.39		39.34	
Prob> F	0.000		0.000	

Table 7 shows the outcome of the random-effect regression after using lag model in which it is explained how the previous year's ROA and ROE influence the current year's results, in addition to the effect of the other explanatory variables. Turrent (2018) has used such lagged independent variables to evaluate the endogeneity nature of the data in the analysis of institutional factors of corporate governance.

As we can see, the coefficient directions do not change for the explanatory variables and the significance levels remain almost same suggesting robustness of the results and no problem of endogeneity.

Table 8: Effect of Liquidity on Firm Performance Using Interaction Effect of Current Ratio and Cash Holding Level

Variables	ROA		ROE	
	Coef.	P>t	Coef.	P>t
Current Ratio*Cash Holding	1.841	0.109	11.082	0.396
Firm Size	-0.193	0.002	-2.172	0.002
Dent to equity ratio	-0.053	0.000	-0.087	0.525
Growth rate of Operating profit	0.272	0.033	4.185	0.003
Loan to deposit ratio	-0.005	0.188	-0.096	0.022
Covid- 19 dummy	-0.046	0.460	-0.317	0.644
Constant	4.292	0.000	47.385	0.000
No. of Observations	145		145	
R-squared	37.04		15.56	
Prob> F	0.000		0.000	

We have already examined the effect of current ratio and cash holding on the firm performance. There is another dimension we can test this relationship using the joint effect of the explanatory variables. Shen et al. (2020) used such interaction effect to find the effect of the covid-19 pandemic on firm performance. Lavrakas (2008) and Grace-Martin (2014) also explained the significance of using interaction effect.

In Table 8, when we use both current ratio and cash holding as one explanatory variable, we find that the new joint variable has a positive relationship with both ROA and ROE but the relationship is not significant at 5% level.

Control variables also show the same coefficient direction and significance levels.

Table 9: Effect of Liquidity on Firm Performance Using Squared Values of Explanatory Variables to Test the Trade-off Theory

Variables	ROA		ROE	
	Coef.	P>t	Coef.	P>t
Current Ratio	3.714	0.000	38.723	0.000
Current Ratio Squared	-1.180	0.000	-12.639	0.000
Cash Holding	0.232	0.957	-48.858	0.309
Cash Holding Squared	4.445	0.849	303.579	0.247
Firm Size	-0.153	0.013	-1.700	0.015
Dent to equity ratio	-0.042	0.001	0.036	0.809
Growth rate of operating profit	0.285	0.019	4.271	0.001
Loan to deposit ratio	-0.004	0.260	-0.109	0.015
Covid- 19 dummy	-0.022	0.713	-0.147	0.825
Constant	1.105	0.360	16.669	0.227
No. of Observations	145		145	
R-squared	39.77		22.2	
Prob> F	0.000		0.000	

As discussed in the literature, the liquidity level shows an inverted U-shaped relationship with profitability, increasing firstly and then decreasing. Financing cost, opportunity cost and refinancing uncertainties all add up to the negative relationship. Anton, (2020) has also found similar relationship between working capital and firm performance.

Table 9 verifies this trade-off theory because the relationship between current ratio and ROA and the relationship between current ratio squared and ROE change the coefficient direction. And the relationship is significant at 1% level. The same is also true when we take the squared values of cash holding to examine the effect on ROE. However, the relationship with ROE is not significant at 5% level.

This change in coefficient direction essentially means that initially when liquidity levels increase, firm profitability increases as well. But as the liquidity values extend a certain optimal level, this association becomes inverse because firm's profitability starts decreasing. If we plot the values of firm's profitability against

those of current ratio and cash holding level on a x by y axis, it will show an inverted U-shaped relationship.

Despite the implication of trade-off theory, firms need to have extra cash holding to be able to carry the increased expenditure during the covid-19 pandemic as suggested in the recent literature (Deloitte, 2021; Josepth et al., 2020).

5.2 Evaluation of Hypothesis

Table 10: Evaluation of Hypothesis

Hypothesis	Decision
Hypothesis 1	Cannot reject null hypothesis at 5% significance level
Hypothesis 2	Cannot reject null hypothesis at 5% significance level
Hypothesis 3	Can reject null hypothesis at 10% significance level
Hypothesis 4	Cannot reject null hypothesis at 5% significance level
Hypothesis 5	Cannot reject null hypothesis at 5% significance level
Hypothesis 6	Cannot reject null hypothesis at 5% significance level

6. Conclusion and Recommendations

This study aimed to examine the relationship between liquidity management and firm's performance. After collecting data from 29 listed banks and financial institutions and conducting various regression analysis, we found the relationship to be positive. Firstly, it looks at the financial scenarios of the listed banks and financial institutions of Bangladesh and how they are affected by different determinants. Secondly, it enriches the current literature by breaking down liquidity management into two important elements – cash holding level and working capital ratio. Moreover, it also addresses the fact many relevant control variables which might influence the relationship studies in this paper. Thirdly, it re-evaluates and re-examines the effect of liquidity and working capital on firm performance in this covid-19 pandemic.

There are many macroeconomic, country and firm-specific variables which can significantly influence the relationships examined in this study. Incorporating these relevant variables will surely enhance the validity and reliability of the findings. Moreover, due to the sheer uncertainties regarding the pandemic situation, we need to wait for a long time to determine the aggregate impact on the firm performance. Findings based only on one-year post-pandemic period is not sufficient. And lastly, increasing the sample size and incorporating more

industrial sectors, are as always, proven methods of increasing the acceptance and the implications of the findings.

Based on the outcome of the research, we recommend that the management adopt a strict liquidity strategy by bringing the liquidity discussion at the centre of their financial planning. Solid contingency plans should also be set in place so that firms can absorb any sudden economic shock by using their cash holding level. Appropriate expansion of financing sources and an attempt to reduce default loans will also be areas to focus, since the prevention cost during the pandemic creates cash flow crisis. The findings of the study will be helpful to policymakers, regulatory bodies and management of firms to take decisions during an economic crisis like the current covid-19 pandemic.

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Appendix:

Observation	Name	Type
1	AB Bank	Bank
2	BRAC Bank	Bank
3	Al-ArafahIslami Bank Limited	Bank
4	IDLC	Financial Institution
5	IPDC	Financial Institution
6	IFIC Bank	Bank
7	City Bank	Bank
8	Dhaka Bank	Bank
9	Dutch Bangla Bank	Bank
10	Eastern Bank Ltd	Bank
11	Jamuna Bank	Bank
12	Mercantile Bank	Bank
13	Mutual Trust Bank Limited	Bank
14	National Bank Limited	Bank
15	NCC Bank	Bank
16	One Bank	Bank
17	Premier Bank	Bank
18	Prime Bank	Bank
19	ShahjalalIslami Bank Limited	Bank
20	Social Islami Bank Limited	Bank
21	South East Bank	Bank
22	Standard Bank	Bank
23	Trust Bank	Bank
24	United Commercial Bank	Bank
25	Uttara Bank	Bank
26	Bangladesh Finance and Investment	Financial Institution
27	Delta BracHousing Finance Corporation Ltd	Financial Institution
28	First Security Islami Bank Limited	Bank
29	Lanka Bangla Finance Limited	Financial Institution

Table 1: 24 Banks and 5 Financial Institutions