

How did the COVID-19 pandemic affect Corporate Cash Holdings Determinants? An Applied Study on Saudi Arabia Firms

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Abstract: - The COVID-19 pandemic has introduced substantial uncertainty and economic disruptions, prompting numerous firms to increase their cash reserves as a significant advantage to enable effective management of exogenous shocks. Using a sample of 120 non-financial firms listed on the Saudi Stock Exchange between 2012 and 2022, we examine the determinants of cash holdings. By dividing the sample into two sub-periods: pre-Covid and under Covid and applying the panel data approach, the results show a significant difference between the determinants of cash holdings of the two groups of firms. During the COVID-19 pandemic, cash holding has increased with firm size, cash flow, Cost of Capital, and net working capital, while it has decreased with dividend payment, and return on invested capital. The research provides support for the pecking order theory, indicating that Saudi firms have maintained relatively stable cash management policies and remained unaffected throughout the pandemic. This study sheds light on the supportive role of the Saudi government in assisting firms facing liquidity challenges, offering a comprehensive understanding of the subject. Furthermore, it contributes to the existing literature on corporate finance by exploring new factors that drive cash management decisions.

Key-Words: - Cash holdings Determinant, COVID-19 pandemic, Saudi listed firms, Firm Size, Dividend Payments, Capital Expenditure, Networking Capital, Cash Flow Ratio, Return on Invested Capital, Cost of Capital.

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1 Introduction

The continuous growth in corporate cash reserves worldwide has generated a growing interest among researchers and scholars, [1], [2], [3], focusing on the need to study and understand the dynamics of corporate cash holdings. This part of financial assets held by the firm as cash or near-cash instruments are easily convertible into cash without incurring significant losses. These holdings are documented as a separate line item on the firm's current assets, reflecting the amount of readily available cash resources.

The existing literature on cash holdings has identified several motives behind firms' decisions to

hold cash, including precautionary [4], speculative, transaction [5], agency [6] and tax motives [7]. However, policymakers and researchers are still exploring the exact reasons for the increase in cash reserves observed globally and particularly in the aftermath of the major crises that have shaped the world like the Global Financial Crisis (2007-2008) and, recently, the unexpected shocks caused by the Covid-19 crisis. This pandemic has exerted a significant influence on firms' cash holdings strategies.

Few studies have attempted to clarify the relationship between Covid-19 and cash holdings. For example, [8], argues that the corporate cash

management was not influenced by the Covid-19 pandemic in Korea. Similarly, [9], reports a negative relationship between firms' Covid exposure and cash holding. Using 3,924 Chinese firms, the authors show that this negative correlation is observed in firms that experience high financial frictions and lack a diversification strategy.

The present study concentrates on Saudi Arabian firms considering the crucial role that cash holdings play in providing financial stability, flexibility, and the ability to meet short-term obligations. Due to the precautionary measures linked to the Covid-19, Saudi-listed firms experienced a decrease in their revenues as well as their investments, [10]. As a result, the Saudi government has undertaken various decisions that are designed to provide a favorable environment for Saudi firms to manage their cash positions effectively. Therefore, it is crucial to examine the determinants that influence firms' decisions regarding cash holdings in response to the specific measures and initiatives implemented during the Pandemic.

This study contributes to the extant literature in two ways. First, we advance our knowledge regarding the motives behind firms' decisions to hold cash during the Pandemic period. Second, we introduce new determinants of corporate cash holding that can better explain the strategies adopted by Saudi firms to prioritize cash management at the boardroom level.

Following this structure, we aim to present a coherent and logical progression of information. In section 2, we review the relevant theory and develop the research hypothesis. Section 3 describes the research methods. Section 4 presents a synthesis of the key findings and their broader implications, while the last Section concludes the paper.

2 Literature Review and Hypotheses

2.1 Background of Corporate Cash Holdings

The level of cash holdings can be influenced by numerous factors such as industry characteristics, financial stability, investment opportunities, risk management strategies, and the overall financial health and objectives of the organization. According to the literature, there are three theories concerned with cash holding determinants. First, the tradeoff theory made by [11], argues that firms perceive the marginal benefits and cost of holding cash to

maximize the shareholder's value. The benefits of cash holding stem from Keynesian Economics Theory which explains the motives for holding liquid assets. These motives are related to the transaction cost, the precautionary, and the speculative. In line with the transaction cost motive, holding cash allows firms to minimize the costs of exchange to liquidate assets. More specifically, firms hold the cash only to surpass the higher opportunity cost in case of a lower cash level. The second motive assumes that holding cash by firms, to cover their financial needs, constitutes a precautionary strategy to safeguard against the inability to raise funds at a lower cost, [12]. Finally, the speculative motives consider that cash holding serves as a financing source for future investment opportunities, [13] and [14].

The Pecking Order Theory implies that firms with higher cash holdings prioritize the financing of their investments and operations using internal funds (such as retained earnings) rather than external financing. According to this theory, external financing, such as issuing new equity or debt, is considered a last resort when internal funds are insufficient. Depending on their cash reserves, such businesses may avoid the expenses and possible problems associated with external borrowing. Therefore, cash reserves may conform to the Pecking Order Theory by supplying companies with internal resources to pay for their operations. Nevertheless, it is crucial to effectively control the ideal amount of cash reserves to strike a balance between the advantages of using internal funds and the possible drawbacks of amassing excessive cash.

The Free Cash Flow Theory suggests that a company's operational cash flows shape its cash reserves, which it uses to cover operating expenses, finance investments, and safeguard against financial risks. Therefore, companies need to guarantee enough liquid assets to meet their operational costs and take advantage of potential investment prospects.

Emerging economies and established markets have lots of characteristics that affect coin holdings. As part of its Vision 2030 purpose to decrease reliance on oil, Saudi Arabia, the largest economic system in the Middle East and heavily dependent on the oil industry, has assigned monetary diversification tasks. In recent years, the non-oil sector has shown signs of growth, driven by sectors such as construction, tourism, and entertainment. However, oil production and prices remain crucial factors influencing the overall economic

performance. Furthermore, cash holdings continue to retain importance for Saudi firms as part of their overall financial management strategy and risk mitigation efforts. Therefore, they continually assess and manage their cash based on their specific circumstances and financial objectives.

Several researchers have studied the determinants of cash holdings in the Saudi context. Using a sample of 70 firms listed on the Saudi Stock Exchange for the period 2006-2014, [15], found that several firm sizes, leverage, capital expenditure, net working capital, and cash flow volatility, play significant roles in determining the level of cash holdings among these firms. Similarly, [16], examined the cash holding decisions of Shariah-compliant firms in six GCC markets during the period 2005 to 2019. The authors provided support that the cash holding decisions can be best explained using the pecking order theory. This result reveals that Shariah-compliant firms rely on liquid assets as their first financing option. Based on a sample of the largest 50 firms listed in the Saudi stock market during the Covid-19 period, [17], demonstrates a positive correlation between corporate cash holdings and factors such as leverage and ownership concentration. Also, the authors report that cash holding is negatively correlated with firm size, cash flow, growth opportunities, working capital, and dividends. Similarly, [18], investigates how corporate cash management practices adapt and respond to the shifts in cash flow uncertainty and financing challenges that have arisen due to the Covid-19 crisis. The authors found that in 2020, firms impacted by the Covid-19 crisis responded to heightened uncertainty by increasing their cash reserves. Additionally, unaffected firms, which had a large size and better access to financial markets and internal capital sources, also exhibited an increase in their cash holdings. This implies that even firms with relatively stable operations recognized the importance of building up cash reserves as a precautionary measure during uncertain times.

2.2 Determinants of Corporate Cash Holdings

2.2.1 Firm Size

Firm size is a widely examined determinant of a firm's cash holdings. According to [19], larger firms typically encounter fewer financial barriers and enjoy enhanced access to external financing sources. As a result, they are less reliant on internal resources to

meet their liquidity needs. Moreover, their considerable size and market presence often generate more consistent and substantial cash flows. Consequently, it is generally expected that, according to the trade-off theory, there is a negative correlation between liquidity and firm size. Oppositely, the pecking order theory asserts that Cash holdings tend to be positively correlated with firm size as larger firms are typically associated with higher historical profitability and, consequently, a greater accumulation of cash. We contend that firm size is a significant factor influencing cash holdings. Hence, such influence can differ both to before and during the Covid-19 pandemic. before the Covid-19 pandemic, larger firms typically maintained higher cash holdings in comparison to smaller firms. This disparity can be attributed to the advantages enjoyed by larger firms. During the COVID-19 pandemic, numerous firms encountered significant disruptions in their cash flows, coupled with increased operational costs and a pressing need to preserve liquidity. Consequently, both large and small firms likely intensified their focus on cash management and liquidity preservation measures. Therefore, we retain the pecking order theory to formulate our first hypothesis:

Hypothesis 1: During COVID-19, there is a positive relationship between firm size and cash holding.

2.2.2 Dividends Payment

Based on the mixed findings from previous research, the association between cash levels and dividend payments is hypothesized to be ambiguous. Some studies confirm the trade-off theory and suggest a negative association between dividend payments and corporate cash levels. Accordingly, firms reduce dividend payments to retain more earnings internally, thereby increasing their cash reserves. This increased availability of cash can enhance the firm's financial flexibility and reduce the need to rely on external sources of funding, such as debt or equity issuance. Other studies have observed a positive relationship, suggesting that shareholders may allow management to retain more cash for future opportunities. Therefore, the overall direction of the relationship between cash levels and dividend payments remains uncertain. However, the effect of dividend payments on cash holdings during the COVID-19 pandemic can be influenced by various factors and may vary across different firms and industries. The firm who's severely affected by the pandemic's economic

disruptions, opted to reduce or suspend dividend payments altogether. This decision was driven by the need to conserve cash and maintain liquidity during a period of heightened uncertainty. Besides, Shareholders may have recognized the importance of cash retention during the pandemic and supported management's decisions to retain cash to ensure the long-term viability and the firm's growth. Therefore, we retain the trade-off theory to formulate our second hypothesis:

Hypothesis 2: During COVID-19, there is a negative relationship between dividend payout and cash holding.

2.2.3 Cash Flow

Cash flow and cash holdings are inherently interconnected. The surplus generated from cash flow plays a crucial role in determining the firm's cash holdings. Besides, positive cash flow allows for the accumulation of cash reserves, which can be used for investments, meeting financial obligations, and supporting various operational and strategic initiatives. Conversely, a negative or insufficient cash flow may impede a firm's ability to maintain adequate cash holdings or require the utilization of existing reserves. Thus, the agency theory of [20], suggests that when cash flow improves, there is an increased risk of agency costs arising from management's inclination to maximize their interests by accumulating more liquid assets instead of utilizing them optimally. Therefore, it is proposed that there exists a positive relationship between cash flow, and cash holdings, [21].

During the Covid-19 pandemic, firms experienced a significant disruption in cash flow, including declines in revenue and increases in expenses. Therefore, holding higher levels of cash can be useful for navigating these uncertainties, mitigating financial risks, and providing a cushion against short-term financial difficulties. In this regard, we formulate the following hypothesis:

Hypothesis 3: During COVID-19, there is a positive relationship between cash flow and cash holding.

2.2.4 Weighted Average Cost of Capital

Academic Finance considers the weighted average cost of capital (WACC) remains as a timely area of interest during a volatile environment and, especially, during the Covid-19 crisis, [22]. This measure of a firm's cost of capital presents a combination between the cost of debt and the cost of equity that firms are

supposed to ensure its alignment with capital structure and create value for stakeholders. When a firm identifies that its cost of capital is high, it prefers to be more demanding in terms of investment choices. Moreover, they can even lead to the abandonment of certain projects. In this case, firms may retain less cash for investments and retain more cash holdings to improve liquidity, [23]. In addition, a higher WACC capital is generally associated with minimal dependence on external sources of finance such as debt or equity issuance. By persevering in a higher level of cash, firms attempt to improve their financial stability by achieving an optimal level of financial structure.

The specialists consider that the increase in WACC during the crisis period can be explained by the elevated expected return on equity. Based on a sample of 30 Danish quoted firms from 2003 to 2010, [24], reports that investors stipulate more risk premium during the pre-crisis period, which increases the WACC. Thus, firms will be compelled to ensure liquidity and address the risks associated with limited access to external financing. Therefore, we expect that, during COVID-19, Saudi firms may choose the precautionary measure by maintaining more cash holdings. Therefore, we formulate the following hypothesis:

Hypothesis 4: During COVID-19, there is a positive relationship between WACC and cash holding.

2.2.5 Return on Invested Capital

The Return on Invested Capital (ROIC) is an indicator of the firm ability to create value. According to [25], this financial measure demonstrates the efficiency in the use of capital by managers. About COVID-19, firms experienced a notable drop in income. The study of [26], supports this idea. By using a sample of 27,944 listed firms in 78 countries, the authors have noted that the cause of the decrease in investment opportunities during the pandemic is primarily related to the reduced sensitivity of investment expenditures to the internally generated cash flows. This decline may affect the internally generated cash flows to finance investment and, in turn, the firm ability to generate returns on invested capital. Based on these considerations, firms that quickly adapted to the Covid-19 pandemic may have minimized the negative impact on their ROIC, while those that faced difficulty in adapting to the circumstances may have faced challenges in maintaining profitability.

In the Saudi Context, [27] and [28], found that the Covid-19 pandemic had a negative influence on the total firm's investments and total revenues. To sum up, we expect that, during the pandemic, Saudi firms that face a decrease in return on invested capital may opt to hold more cash as a precautionary measure. In uncertain times, these firms may increase their cash holdings to ensure they have sufficient liquidity to meet operational needs, fulfill debt obligations, and capitalize on potential investment opportunities. Under such arguments, we assume that:

Hypothesis 5: During COVID-19, there is a positive relationship between Return on Invested Capital and cash holding.

2.2.6 Capital Expenditures

Capital expenditures refer to the funds invested in long-term assets to support a firm's operations and generate future income. Generally, capital investments are made using the available cash or money borrowed. In this case, the firm's cash holdings would decrease as it is being a relatively cheaper source to finance the capital expenditures. Focusing on a sample of 4107 firms in emerging economies for the period 2010-2018, [29], argues that cash accumulation in times of crisis is oriented to capital expenditures. Conversely, some researchers stated that there is no significant relationship between the two variables during the crisis period.

Regarding capital expenditures and cash holdings during the Covid-19 pandemic, firms experienced a decline in cash holdings as they redirected funds toward capital expenditures. The decision to invest in capital projects during the pandemic required firms to allocate cash resources for long-term investments, which could lead to a decrease in their immediate cash reserves. This discussion leads to the following hypothesis:

Hypothesis 6: During COVID-19, there is a negative relationship between capital expenditures and cash holding.

2.2.7 Net Working Capital

Net working capital primarily comprises liquid assets that act as substitutes for cash. It is used in supporting the optimal balance of current liabilities. The interplay between net working capital and cash holdings offers a nuanced perspective on how firms manage their short-term liquidity requirements. Thus, the trade-off theory proposes that there is an inverse relationship between cash and net working

capital. Hence, more the efficient of working capital management, the lesser the requirement for cash holding.

Moreover, recent research has discovered a negative correlation between cash holdings and net working capital. This inverse relationship challenges the traditional trade-off theory. Focusing on a sample of Saudi firms during the period 2006-2014, [30], shows a negative relationship between net working capital and cash holdings, implying that firms can convert their higher liquid assets into cash. Consequently, they have less need to hold cash.

In contrast to these studies, [31], find a positive relationship between these two variables. Using 164 Brazilian listed firms. A higher net working capital leads to higher profitability. Thus, the profit generated will be used for holding cash.

During the COVID-19 pandemic, we argue that the negative relationship between net working capital and cash holdings can be attributed to firms' proactive efforts to streamline their operations, reduce working capital inefficiencies, and maintain financial stability. Further, the economic downturn and disruptions in supply chains may have necessitated a more cautious approach to cash management. About this, we construct the following hypothesis:

Hypothesis 7: During covid-19, there is a negative relationship between a firm's cash holdings and its net working capital.

3 Research Methods

3.1 Data

In our empirical analysis, we have collected data from a sample of 120 companies listed on the Saudi Stock Exchange (Tadawul) from 2012 to 2022. It is worth mentioning that we excluded financial institutions from our sample because they are subject to specific rules and regulations that distinguish them from other industries. The declaration of the COVID-19 outbreaks as a Public Health Emergency of International Concern by the World Health Organization (WHO) on January 30, 2020, led us to divide our sample into two groups: one before COVID-19 (from 2012 to 2019) and one after Covid-19 (from 2020 to 2022). The Table 1 presents showcases the ranking of the sample according to their respective industries.

Table 1. Classification of firms by sectors

Sectors	N°. Firms	%
Materials	37	30.83
Industrials	24	20
Consumer Discretionary	19	15.83
Consumer Staples	16	13.33
Real Estate	8	6.67
Health Care	7	5.84
Energy	5	4.17
Telecommunication Services	4	3.33

indicated a rejection of the homoscedasticity hypothesis. besides, the Wooldridge (2002) test revealed a significant presence of first-order autocorrelation in the error terms. Thus, we recommend utilizing the Generalized Least Squares (GLS) method. Our model is defined as follows:

$$CASH_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 DIV_{i,t} + \beta_3 CF_{i,t} + \beta_4 WACC_{i,t} + \beta_5 ROIC_{i,t} + \beta_6 CAPEX_{i,t} + \beta_6 NWC_{i,t} + \varepsilon_{it} \quad (1)$$

3.2 Variables Measurement and Research Model

We used a panel data approach to estimate the model, incorporating both cross-sectional and time series dimensions. We performed diagnostic tests to review the problems of heteroscedasticity and multicollinearity. The Breusch-Pagan-Godfrey test was employed to detect the presence of heteroskedasticity problems. Thus, the results

Where, i and t refer to firm and time.

Based on several previous empirical works dealing with the determinants of cash holding, our variables are defined as follows (Table 2).

Table 2. Variable definitions and sources

Variable	Acronym	Estimation
Cash holding	CASH	Cash and equivalents/ (Total assets – Cash and equivalents).
Firm size	SIZE	The logarithm of total assets
Dividend Payments	DIV	DIV = (total dividends paid - special dividends) ÷ (shares outstanding)
Cash Flow ratio	CF	cash flow to net assets
Weighted Average Cost of Capital	WACC	Equity/ (Equity + Debt) *Cost of Equity + Debt / (Equity + Debt) *Cost of Debt* (1 - Tax Rate)
Return on Invested Capital	ROIC	EBIT x (1 – tax rate) / Invested Capital
Capital expenditures	CAPEX	Capital expenditures divided by total assets
Net working capital	NWC	((Current assets - Cash and equivalents) – Current liabilities) /Total assets

4 Results

4.1 Summary Statistics

Table 3 presents a comprehensive analysis of the statistical measures. We note that the average cash holding level for the entire period under examination is 12%. However, during the Covid-19 period, there was a specific decline in this variable from 13% to 11%. This indicates that Saudi firms had less available cash during that particular time. Moreover, the size of the firms remained consistent before and after the COVID-19 period, indicating no significant fluctuations in their size. Notably, the average dividend payout for Saudi firms increased from 30% to 32%. This suggests positive financial performance or sufficient cash reserves to distribute higher dividends to shareholders. The research reveals that Saudi firms experienced a decrease in cash flow during the COVID-19 period, with the average declining from 11% to 9%. This result can be linked to the economic disruptions caused by the pandemic. It also can be seen that the average WACC decreased from 8% to 6%. This result proves the effectiveness of measures implemented by the Saudi government to mitigate the epidemic and reduce its Outbreak. Similarly, the results show that the average ROIC remains unchanged during the two periods, implying that Saudi firms have quickly adapted to the Covid-19 pandemic and have minimized the negative impact on their ROIC. The descriptive Analysis demonstrates that Saudi firms experienced a reduction in capital expenditures from 8% to 6%, which proves that Saudi firms had postponed planned capital expenditures during the epidemic. In addition, was a result of increased caution and prioritization of cash preservation, leading to a delay or reduction in long-term asset investments. Finally, the descriptive statistics highlight the stability of NWC throughout the entire study period.

Table 3. Descriptive statistics

Variables	Whole sample		Before COVID-19		Under COVID-19	
	Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev
CASH	0.12	0.14	0.13	0.15	0.11	0.13
SIZE	8.73	0.68	8.69	0.67	8.81	0.69
DIV	0.29	0.32	0.30	0.31	0.32	0.33
CF	0.11	0.10	0.11	0.09	0.09	0.09
WACC	0.08	0.07	0.08	0.08	0.06	0.05
ROIC	0.09	0.12	0.09	0.12	0.09	0.12
Capex	0.07	0.08	0.08	0.09	0.06	0.07
NWC	0.14	0.19	0.14	0.19	0.14	0.18

Table shows that the highest correlation coefficient observed among the variables is 0.52. This correlation is specifically between the WACC and the return on the invested ratio. These findings suggest that the explanatory variables are relatively independent of each other, which strengthens the reliability of the results. By examining the Variance Inflation Factor (VIF) scores associated with the correlation coefficients, Table 4 confirmed that there are no significant issues of multicollinearity. This suggests that the independent variables included in the analysis are not highly correlated with each other.

Table 4. Pearson Correlation matrix and Variance Inflation Factor (VIF)

	SIZE	DIV	CF	WACC	ROIC	Capex	NWC
SIZE	1						
DIV	0.010	1					
CF	-0.027	0.236	1				
WACC	0.004	0.156	0.379	1			
ROIC	-0.062	0.314	0.504	0.527	1		
Capex	0.008	-0.012	0.236	0.095	0.095	1	
NWC	-0.259	0.193	0.110	0.139	0.326	-0.253	1
Variance Inflation Factor							
	SIZE	DIV	CF	WACC	ROIC	Capex	NWC
VIF	1.08	1.14	1.46	1.42	1.86	1.17	1.34
1/VIF	0.92	0.87	0.68	0.70	0.53	0.85	0.74

4.2 Regression Analysis

Table 5 shows the Generalized Least Square (GLS) estimators for our regression models.

Table 5. Results of FGLS Estimates

Variables	Before COVID-19		Under COVID-19	
	Coef	Sig	Coef	Sig
SIZE	0.032	0.000***	0.085	0.005**
DIV	- 0.031	0.000***	- 0.013	0.011**
CF	0.078	0.008***	0.057	0.003***
WACC	- 0.060	0.134	0.090	0.062*
ROIC	0.042	0.232	- 0.055	0.031*
CAPEX	0.108	0.000***	0.019	0.397
NWC	0.399	0.000***	0.358	0.000***
Wald chi2(7)	803.66		801.18	
Prob> chi2	0.0000		0.0000	
No.obs	821		360	
Note: *, ** and *** illustrate a significance level at 1%, 5%, and 10% respectively.				

5 Discussions

The results from Table 5 reveal a noteworthy finding regarding the relationship between firm size and cash holdings level before and during the COVID-19

pandemic. We find a significant and positive correlation, consistent with the findings of [18] and the predictions of the pecking order theory. Therefore, our Hypothesis 1 is accepted. Besides, the coefficient between these variables has increased from 3.2% to 8.5% during the Pandemic. This result confirmed that the considerable size and market presence of Saudi firms enable them to adapt rapidly to economic shocks and generate more consistent and substantial cash flows.

A significant and negative association was found between dividend payment and cash holdings levels before and during the Covid-19 pandemic. Therefore, our Hypothesis 2 is accepted. This finding is consistent with the results of [6] and [21] who observe that firms decrease dividend payments to retain more earnings internally, leading to an increase in cash reserves. Similarly, the coefficient between these variables has decreased from 3.1% to 1.3%. This outcome confirms the trade-off theory, suggesting that Saudi firms have preferred to reduce dividend payments during COVID-19 to hold more cash.

The results indicate that cash flow is significantly and positively correlated with cash holdings in all two sub-periods. Even though the coefficient between the two variables has decreased from 7.8% to 5.7%, the result indicates that Saudi firms have strategically mitigated the risks of the uncertainties of the pandemic by maintaining higher cash holding through cash flow and, as a consequence, protecting themselves against short-term financial challenges. This finding provides support for the pecking order theory and converges with that of [8] and [21].

The Weighted Average Cost of Capital exhibits a positive coefficient during the pandemic. Thus, Hypothesis 4 is proven. This outcome converges with that of [24], who explains that investors stipulate more risk premium during the pre-crisis period, which increases the WACC. Consequently, firms must hold more cash and address the risks associated with limited access to external financing. More specially, Saudi firms have minimized their dependence on external financing during the crisis period. The cost of equity tends to increase due to higher perceived risks and market uncertainties. In turn, investors requested a higher return on their equity to compensate for the increased risk, leading to a higher cost of equity. Additionally, lenders and investors perceive heightened risks and uncertainties during the COVID-19 pandemic, resulting in higher borrowing costs to

compensate for the increased credit risk. Therefore, the higher cost of debt or equity financing can make it more expensive to raise external funds. In such circumstances, Saudi firms have chosen to maintain higher levels of cash holdings to reduce their dependence on external financing and mitigate potential liquidity risks.

As seen in Table 5, the impact of return on invested capital is statistically significant and negatively related to cash holding during the Pandemic, leading to the rejection of Hypothesis 5. This finding is consistent with the results of [10] and [27], who found that the Covid-19 pandemic had a negative influence on firms' total investment and revenue. More specifically, when Saudi firms have achieved a higher return on invested capital before and during the pandemic, it indicates that their investments are generating greater profits and returns. Therefore, they have chosen to allocate their excess cash towards new investment opportunities rather than holding it as cash. This result confirms the free cash flow theory which implies that managers must utilize the cash reserves to create Shareholders' wealth.

When we interact capital expenditures with cash holding, we find that the coefficient on the interaction term is positive (0.108) and significant at the 5% level before the Covid-19 pandemic, but the value is not significant during the pandemic period. This result is consistent with the finding of literature in the context of Omani firms, leading us to reject Hypothesis 6.

Regarding net working capital, the analysis rejects the trade-off theory hypothesis. The coefficient is positively and statistically significantly associated with an increase in cash holdings during the Covid-19 pandemic. Firms with higher liquidity are likelier to hold high cash reserves. This result is consistent with existing empirical research of [10] and [18], which indicates that a higher net working capital leads to higher profitability. Thus, the profit generated will be used for holding cash. Particularly, Saudi firms have recognized strategic investment opportunities resulting from market disruptions or distress in certain sectors. By taking advantage of favorable valuations, they seek to enhance their long-term growth prospects. These investments contribute to the rise in cash holdings by improving revenue generation and facilitating expansion activities.

6 Conclusions

This empirical study examines the factors influencing cash holdings during a pandemic by analyzing a sample of 120 companies listed on the Saudi Stock Exchange from 2012 to 2022. The sample is divided into pre-Covid and Covid phases to investigate the effects of the pandemic. We have selected the most common determinant used in the literature review. Furthermore, we have introduced the weighted average cost of capital and the return on invested capital ratio as new variables that can better explain the motives for holding cash.

The results emphasize significant points based on the summary statistics. During the COVID-19 pandemic, we provide evidence that Saudi firms experienced a decrease in mean values of cash holdings, cash flow, cost of capital, and Capital expenditures. Conversely, firm size and dividend payment recognized an increase in the same period. However, net working capital and return on invested capital remained unchanged.

By conducting our regressions on the sub-samples, the results of the Generalized Least Square regression indicate that the size of Saudi firms enables them to adapt rapidly to economic shocks and generate more consistent and substantial cash flows. In addition, they have decided to reduce dividend payments during COVID-19 to hold more cash. Research results revealed that cash flow is significantly and positively correlated with cash holdings, implying that Saudi firms have mitigated the risks of the uncertainties of the pandemic through cash flow to maintain higher cash holdings.

The coefficient of cost of capital decreased from 8% before the pandemic to 6%, indicating that Saudi firms have chosen to maintain higher levels of cash holdings to reduce their dependence on external financing. Additionally, the empirical evidence shows a significant and negative association between return on invested capital and cash holding during the Pandemic. This result reveals that Saudi firms have chosen to allocate their excess cash towards new investment opportunities rather than holding it as cash. Finally, we find that Saudi firms have recognized strategic investment opportunities during the pandemic which, in turn, contributed to an increase in cash holdings. Overall, our study suggests that Saudi firms have maintained consistent cash management practices and have been relatively unaffected by the outbreak.

The findings contribute to the existing knowledge of corporate finance and provide insights into additional factors influencing cash management decisions. To conclude, the present study will have a substantial impact on the academic accounting literature by advancing our understanding of the determinants and motivations that drive theories about corporate cash holdings. Furthermore, it will make a valuable contribution to the existing body of literature concerning the precautionary measures employed by the Saudi Arabian government to safeguard Saudi firms amidst the COVID-19 pandemic. These contributions will provide researchers and corporations' management with valuable insights, facilitating a deeper comprehension of the factors that shape cash management strategies and aiding in the development of effective crisis management and government intervention strategies.

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