

## DOES OPTIMAL CASH HOLDING MATTER IN MAINTAINING AND IMPROVING PROFITABILITY?

**Nimra Riaz**

*Lyallpur Business School, Government College University Faisalabad, Pakistan*

**Ahsan Riaz**

*Lyallpur Business School, Government College University, Faisalabad, Pakistan*

**Syed Hamad Raza**

*Lyallpur Business School, Government College University, Faisalabad, Pakistan*

**Syed Muhammad Ahmad Hassan Gillani**

*Lyallpur Business School, Government College University, Faisalabad, Pakistan*

**Faiz Rasool**

*Institute of Business Management Sciences, University of Agriculture,  
Faisalabad, Pakistan*

Received: 15 May 2022

Revised: 19 Aug 2022

Accepted: 22 Aug 2022

### ABSTRACT

**Purpose:** This study was aimed to identify optimal cash holding factors and how they impacted the profitability of Pakistani-listed enterprises.

**Design/Methods:** The trade-off and pecking order theories are investigated to develop hypotheses for testing the cash holding threshold influence on a firm's profitability on 201 selected firms extracted from the Osiris database between 2009 and 2018.

**Results/ Findings:** The findings of the present study indicate that cash holdings, liquidity, financial flexibility, and operating cash flow significantly impact profitability. There is a two-threshold effect between the cash holding ratio and business profitability. The coefficient value is positive but decreases as the cash holdings ratio falls below 5.3%, thus indicating a non-linear relationship.

**Originality:** The elements affecting the ideal cash holding ratio which Pakistani listed companies must maintain to ensure cash sustainability are examined in this study. Previous studies have focused on the determinants and motivations for cash holding. Still, research has not addressed how much cash a company should keep to achieve long-term profitability or cash independence.

**Keywords:** *Cash Holding; Firm's Profitability; Threshold Regression; Panel Data*

**Paper type:** Research Paper

**NBR**

NUST Business Review

ID: NBR22051501

Vol. 04 (01)

08, 2022

pp. 28-49

DOI:

[https://doi.org/10.37435/  
NBR22051501](https://doi.org/10.37435/NBR22051501)

This work is licensed  
under a Creative  
Commons Attribution  
4.0 International  
License.



## INTRODUCTION

Recently, countries across the globe have been facing a severe financial crisis which has impacted ongoing financial operations of businesses across different sectors (Zhang, Zhang, Zhou & He, 2019). As a result, most companies have experienced fluctuations in profitability, a decline in stock prices, business closures, and bankruptcy (Nguyen Thi, Tran, and Doan, 2021). Subsequently, managers prefer to raise firms' cash levels through equity or debt financing to alleviate cash flow pressures, handle the operative risks of the financial crisis, and guarantee that businesses can overcome the GFC (Joseph, Kneer, and van Horen, 2021). Companies must hold a reasonable amount of cash and focus on liquidity and profitability to manage risks and increase performance.

Since the global financial crisis (GFC) impacts short-term risks in their activities, managers must maintain their businesses at appropriate liquidity levels to cover fixed costs and expenditures. On the other hand, cash holding can help companies maintain liquidity by eliminating external sources (Opler, Pinkowitz, Stulz, and Williamson, 1999). The most popular strategy for organizations to retain sufficient liquidity is holding cash (Almeida, Campello, Cunha, and Weisbach, 2014). Cash flow is the difference between cash outflows and cash inflows and is considered the most liquid asset in a company's statement of financial position. Cash is needed for operational needs to fulfill all business obligations. A cash shortage occurs when cash outflow (payments) exceeds cash inflow (receipts). Therefore, cash holdings are essential to a company's financial policies. Cash holding is the most common way for businesses to have enough cash (Almeida, Campello, Cunha, and Weisbach, 2014).

If companies manage cash levels, they are not likely to suffer cash shortages, and it may not be necessary to increase the cash from an external market for investment (Le, Tran, Ta, and Vu, 2018). Firms have numerous purposes for holding a certain amount of cash. There are several motives for holding cash, and it has advantages, as described by (Keynes and Waeger, 1936). First, the transaction motive proposes that businesses keep cash to reduce the costs of accumulating funds and evade making current and less liquid assets in other ways (Ali and Yousaf, 2013). Second, there is a precautionary motive for holding cash, in which a company holds an amount of cash to offset financial difficulties in the future. Cash holding is an asset when other funding sources are inadequate for meeting the firm's need for cash. This problem worsens when companies cannot finance their investments due to a lack of external funding (Azmat & Iqbal, 2017). Third, the speculative motive primarily demonstrates that businesses hold more cash during everyday business to take advantage of good investment opportunities (Ye, 2018).

Large corporations held cash reserves in tax motive and it was discovered that tax laws allow multi-national corporations to retain more cash (Fritz Foley, Hartzell, Titman, and Twite, 2007). Daher (2010) also claims that multinational corporations are concerned about tax returns and double dividend taxes due to corporate profits, and

that shareholder dividends are taxable. Consequently, companies hold onto cash rather than distributing dividends to shareholders in order to avoid paying dividend taxes (Kariuki, 2015). The agency motive focuses on managers' preference to choose whether the company can hold cash or pay dividends and bonuses to stockholders. Cash holding is considered from the client's viewpoint, depending on the business's commitment motive, which suggests that the business maintains a higher cash balance to demonstrate that the company is not in financial distress. The organization's decision to hold an amount of cash is affected by several factors (Nguyen Thanh, 2019).

Cash and cash equivalents are a large portion of total assets by country and industry. Cash accounts for 10% of total assets in the US, 8% in the UK, 5% in Russia, 3% in India, 9.1% of total assets in Turkish firms, 3.5% in China, 2% in Brazil, and 10% of total assets in Italian private firms (Bigelli and Sánchez-Vidal, 2012; Uyar and Kuzey, 2014; Al-Najjar, 2013). Several international studies show that the average cash ratio of US companies in 2016 was 23.2%, compared with 10.5% in 1980 (Bates, Kahile, and Stulz, 2009), 12.33% in Australia from 1990-2015 (Cava and Windsor, 2016), and 12% in India from 2005-2015 (Arora, 2019).

Despite the vast literature on corporate cash holdings, few studies have emphasized the correlation between profitability and the optimal cash holding ratio. The corporate cash holding ratio has both benefits and costs for the company. As a result, an optimum amount of cash is available to maximize the firm's profitability. Martínez-Sola et al. (2013) found an optimal cash holding ratio for US manufacturing companies. This result is also in line with a study by Azmat (2014) which found that an optimal cash sum exists for a sample of listed Pakistani firms. Firms may alter their cash reserves for value maximization if they follow this optimal level. This study suggests that firms maintain at least 5.3% of their cash.

After the GFC of 2007-08, top corporate management began to emphasize cash holdings. The financial crisis reaffirmed the value of a company's cash holding ratio. Cash is a highly liquid asset that assists businesses in covering operational expenses. Furthermore, when a business is not operating due to a strike or lockdown, it helps make payments to short-term creditors. Moreover, no firm will survive in the market without cash, so an entity keeps a certain cash reserve or marketable securities to meet operational needs, respond to unexpected occurrences, or encounter vital prospects (Shar, Mirani, and Gilal, 2020).

This research is essential for companies to identify the importance of cash holdings, liquidity, & profitability after the GFC of 2007/2008. The study also looks at balancing the costs and benefits of cash holding. The study explores the elements determining Pakistani enterprises' optimal cash holding ratio for cash sustainability. Previous research has focused only on the motives of cash holding. It has not addressed how much cash a company should keep for long-term profitability or cash freedom.

Therefore, little consideration has been given to improving the cash holding ratio to enhance operative effectiveness and increase the firm's profitability in emerging economies such as Pakistan. This research prompted the absence of an analogy among

Pakistani researchers on the optimal cash holding ratio and profitability. Thus, this research aims to investigate whether the significant aspects of optimal cash holding ratio and threshold affect the profitability of Pakistani listed firms.

In the next section, the theory and hypotheses are presented. Section 3 includes the definitions of the variables, methodology, and techniques. Section 4 discusses the analysis and discussion to achieve the research objective. Finally, the paper presents the policy implications, conclusions, recommendations, and limitations related to cash holdings.

## **THEORY AND HYPOTHESES**

Trade-off theory, pecking order theory, and the free cash flow theory of corporate finance is all cited as supporting cash holding in the literature (Jensen, 1986); (Myers and Majluf, 1984). Companies find their "sweet spot" in cash on hand by striking a balance between the benefits and costs of holding onto that kind of cash. The trade-off theory recommends an ideal cash level to enhance a firm's value, including marginal costs and benefits. Firms focus on this trade-off model to choose the percentage of the financing mix used to grow their business. Cash holding is directly linked to operational cash flow, and the benefit of cash holdings is to save the business cost from the external funding source.

As cited by (Keynes and Waeger, 1936), the transaction motive evades the cost of underinvestment. Thus, firms access the capital market specified by firm size, profitability, and the prospect of financial suffering as the basis of cash holdings. The trade-off concept advocates that the most acceptable level of cash holdings is based on the optimal cash level. Thus, managers can determine shareholder wealth, balancing marginal benefits and costs per theory. Mihai et al. (2018) suggested that cash holding is beneficial for reducing financial distress costs and minimizing the price of raising external funding. Moreover, the risk level is minimized because it is associated with selling out assets to sustain investment.

Myers and Majluf (1984) suggested the pecking order theory to prioritize financing decisions. First, it relies on retained earnings from internal financing. Then, if it is not enough to make investment opportunities, firms go to external financing, preferably debt, because it is the cheapest source of financing and would benefit firms to pay tax entitled tax shield benefits; the third and last resort is equity financing. According to this theory, firms with a high operating cash flow can repay debt and dividends to shareholders. Thus, firms used this funding to make more profitable projects. Thus, in the pecking order concept, the cash level communicates investment and financing decisions.

On the other hand, retained earnings prevent outside investors from knowing debt and equity capital. Therefore, firms must consider internal financing as a better funding source than an external source of finance. However, modern investors think firms should issue equity because this is a riskier source than debt. In this theory, managers must contain private information about the value of assets and investment opportunities that cannot be readily available in the market. In this case, firms provide

information on debt and equity levels to reduce information asymmetry. Outsiders do not know precisely their current positions because they do not provide all their financial information. This theory helps to overcome or avoid the cost of asymmetric information and other financing costs. Frank and Goyal (2007) highlight that the pecking order theory reveals some problems between firms, managers, and outside investors, resulting in agency problems. Hamilton and Fox (1998) argue that managers are not likely to accept new shareholders because they do not want to lose control. This is why managers prefer internal financing to invest in business projects. Cash holding is a term for cash and other liquid assets that will not be spent for more than three months (Gill and Shah, 2011). A company's cash and cash equivalents to its total assets is called its cash holding ratio (Vijayakumaran and Atchyuthan, 2017). The purpose of cash holdings is to ensure that production impacts investment decisions that affect company performance and value. Different theories propose why companies hold money, such as the theory of trade-off and pecking order.

Literary evidence supports the trade-off theory's negative relationship between asset returns and cash holdings (Bates, Kahle, and Stulz, 2009). Pecking order anticipates a positive relationship (Almeida, Campello, and Weisbach, 2004). Trade-off and pecking order theories suggested a negative/positive link between cash holdings and profitability. Recent empirical studies show a link between cash and profitability (Vijayakumaran and Atchyuthan, 2017); (La Rocca and Cambrea, 2019).

*H1: There is a positive relationship between cash holding and profitability.*

Liquidity and profitability are assumed to have a positive relationship, depending on how a small number of liquid assets can decrease due to higher credit demand. Therefore, low profitability may not generate sufficient cash (Samo and Murad, 2019). The trade-off and pecking order theory results are widely accepted and tested by scholars in Pakistan. Liquidity negatively impacts the ratio of cash holdings of listed manufacturing companies in Pakistan, which is supported by previous findings (Gill and Shah, 2012). Since liquid assets can be used as replacement and quickly transformed into cash, the negative impact of liquidity on companies with excess liquid assets prefers to reduce their cash holdings (Shabbir, Haider Hashmi, and Mujtaba Chaudhary, 2016).

*H2: There is a positive relationship between liquidity and profitability.*

Financially flexible businesses can better access foreign stock markets to address liquidity needs resulting from unexpected earnings deficits or emerging growth prospects and prevent conditions that lead to poor investment. As a result, financially flexible firms' output can be more robust and superior to other firms, showing a positive relationship with profitability (Ma and Jin, 2016). However, according to (Vithessonthi and Tongurai, 2015), there is a negative relationship between firm profitability and financial flexibility. As an outcome, it is unclear whether flexible companies benefit from improved performance.

*H3: There is a negative relationship between financial flexibility and profitability.*

Networking capital management may negatively and positively impact firms' profitability. Networking capital management is critical to a firm's profitability and must pay dividends to shareholders. Therefore, effective networking capital management is vital for a profitable company to contribute to shareholder equity growth. Similarly, one of the most common causes of business performance is strong networking capital management (Şamiloğlu and Akgün, 2016). On the other hand, trade-off theory expects NWC to negatively affect cash holdings because additional CH can replace liquid assets. Thus, the network capital is used as a liquid asset proxy (Chauhan, Pathak, and Kumar, 2018). In contrast, the pecking order theory supports the concept that companies with fewer cash periods turn working capital into cash more rapidly, resulting in higher cash reserves and companies holding a large share of their networking capital in highly liquid assets (Sethi and Swain, 2019).

*H4: There is a positive relationship between net working capital and profitability.*

The cash derived from a day-to-day business or cash flow made available by the company's core business is renowned as cash flow. The net cash or cash equivalent gain or decrease resulting from the transactions to achieve operating profit is known as net cash flow arising from operations, as cash flow is a more precise measure of how a company produces than traditional profitability measures such as net income, given the account for receivable, depreciation, and liabilities. Business books of account often include several fixed assets, such as buildings and machinery, to charge depreciation (Fabozzi and Markowitz, 2006); (Ghanbari, Yaghobi and Derakhsh, 2015; Turcas, 2011). Therefore, cash flow is suggested as an alternate source of liquidity in financial distress or bankruptcy as per the trade-off principle (Hardin, Highfield, Hill, and Kelly, 2009). Most businesses pay a high asymmetry cost, and cash flow companies often incur high costs to raise capital; thus, low cash holdings are given (Myers and Majluf, 1984). However, (Kim, Mauer, and Sherman, 1998) found that high cash flow companies use internal cash based on the pecking order principle. In this situation, firms use cash to fund an external liability, resulting in low cash reserves and a negative relationship.

In contrast, firms with higher cash flows prefer to retain cash to prevent bankruptcy or investment company losses. The more significant fluctuation in cash flow leads to more extraordinary fluctuations in earnings, as explained by (Bigelli and Sánchez-Vidal, 2012). As a result, businesses tend to have more cash on hand to avoid future risks from volatility.

*H5: There is a positive relationship between operating cash flow and profitability.*

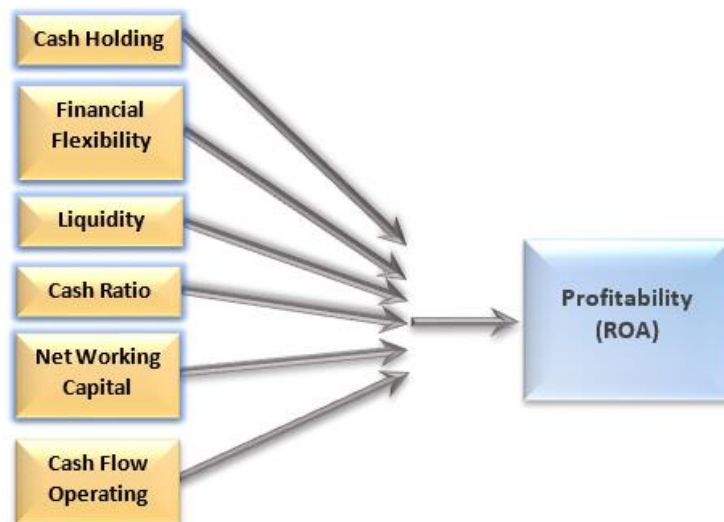
The study suggested a positive association between cash ratio and profitability, indicating lower risk and better performance for companies with high liquidity ratios. On the other hand, profitability (ROA) and cash ratio (CR) have a negative but

insignificant association. The trade-off theory predicts a negative relationship between the cash ratio and ROA to determine whether a company can fulfill its current liabilities. The liquidity shortfall will make an organization fight to meet its corporate liabilities and pursue debt financing to fund its operations. Zygmunt (2013) noted that the importance of liquidity could be used to determine profitability. This means that liquidity is substantial and can affect the profitability of a company's performance.

In contrast, pecking order theory helps understand the significance of internal liquid assets and predicts a positive relationship (Dadepo and Afolabi, 2020). The study showed that liquidity and profitability are closely linked; as one increases, the other decreases. The liquidity ratio significantly influences the return on assets (Rehman, Khan, and Khokhar, 2015).

*H6: There is a positive relationship between cash ratio and profitability.*

The literature supports the explanatory factors used in this study. The theoretical predictions and expected relationship of cash holding determinants with profitability are presented in table 1. Similarly, the research framework of the study where the dependent variable is represented is a return on asset (profitability), and independent variables are cash holdings, liquidity, financial flexibility, net working capital, cash ratio, and operating cash flow, as shown in figure 1.



*Figure 1: A research framework*

## **METHODS**

Based on positivism, the research design is quantitative in nature and elaborates on the association between optimal cash holding ratio and firm profitability. The panel data illustrate the association between return on assets (profitability), cash holdings,

liquidity, financial flexibility, net working capital, operating cash flow, and cash ratio of selected firms from 2009 to 2018. The rationale for choosing-financial firms is that they follow international accounting standards to maintain records. Therefore, the data collection is based on the variables linked to the listed companies financial statements extracted from the Osiris database. All of the companies chosen were listed in selected non-financial sectors. The Osiris database used sectoral segregation and included 393 companies in textiles, cement/steel, electrical engineering, energy, information technology, electronic equipment, oil, pharmaceuticals, and sugar; 201 were chosen for our study, accounting for 51% of the total population. Scholars suggest different methods to measure a company's profitability, but the return on assets is widely used in literature. A useful definition of profitability is Net income to total assets, given that it widens the scope of profitability by including net income (statement of comprehensive income) and total assets (statement of financial position). The measurement of the factors included in this research is presented in Table 1.

*Table 1 Measurement of the variables*

Dependent variable		
Variable	Proxy/ Definition	Citation
Return on Assets	Net income to total assets	(Khuong, Ha, Minh and Thu, 2019)
Independent Variables		
Cash/ Cash Holding	Equivalent cash and cash over total assets	(Le, Tran, Ta and Vu, 2018); (Khuong, Ha, Minh and Thu, 2019); (Orlova and Sun, 2018); (Naumoski, 2018); (Rukh and Rehman, 2019).
Financial Flexibility	Cash and cash equivalents over current assets.	(Chen and Jiang, 2001)
Liquidity	Current assets divided by current liabilities	(Safdar, Lin, Tanchangya and Amin, 2019)
Cash ratio	Cash and cash equivalents over current liabilities	(Dadepo and Afolabi, 2020)
NWC	Networking capital over total assets	(Orlova and Sun, 2018); (Naumoski, 2018)
CFO	Cash flows divided by total assets	(Khuong, Ha, Minh and Thu, 2019)

This study used three estimation models to estimate the effect of explanatory variables on profitability, including ordinary least squares (OLS), random effects, and



fixed effects since panel data confined observations on the same cross-section. The ordinary least squares (OLS) model pool totals all the observations and estimates a panel regression, ignoring our data's cross-section and time-series nature. The Hausman test is usually applied to fixed and random effects to determine the best test. The test compares the random effect estimator directly  $\hat{\beta}_{RE}$  to the fixed effect estimator  $\hat{\beta}_{FE}$  in the presence of an association between an individual effect and the regressors. If there is no association between the fixed effect and factors, both estimates are reliable, but the ordinary least squares fixed effect estimator is ineffective. Thus, the null hypothesis is that the random effect is chosen, and the alternative hypothesis prefers a fixed effect.

Using E-Views software to test the hypotheses, a regressing threshold was used to demonstrate the correlation between the outcome and predicted variables. The panel threshold is a nonlinear time-series model in economic and financial research. The findings of the traditional structural sound method may be responsive to the threshold level. The findings of the standard method correlate with structural soundness with the threshold level. Econometric estimation derived from exogenous sample division poses considerable challenges (Hansen, 1999); (Hansen, 2000). Hansen (1999) developed a threshold regression technique for panel data. The panel threshold model is separated by the panel model, allowing for fixed individual impacts depending on whether the observation passes the threshold level in two or more regimes.

One of the "Fixed number" specification options can be used if the number of thresholds is known. Before going over the other methods, it is worth noting that EViews determines the number of thresholds using (Bai and Perron, 1998) methodologies rather than (Hansen, 1999) fixed regressor bootstrap testing. Because the lagged endogenous regressors in the model are subject to structural breaks, the approaches based on testing should be viewed as informal in the TAR setting. This violates the assumptions of the Sup-F statistics (Hansen, 2000); (Hansen, 1999). If the number of thresholds is known, it can be specified as one of the "Fixed number" options integer or integer pairs or a list of variables. The simple panel regression model and panel threshold regression model are described in Equations 1 and 2, respectively.

$$ROA_{i,t} = \alpha_0 + \beta_1(CH)_{i,t} + \beta_2(LIQ)_{i,t} + \beta_3(FF)_{i,t} + \beta_4(NWC)_{i,t} + \beta_5(CFO)_{i,t} + \beta_6(CR)_{i,t} + \varepsilon_{i,t} \dots \dots \dots (1)$$

$$ROA_{i,t} = \alpha_0 + \beta_1(CH)_{i,t} + \beta_2(CH)_{i,t \leq \gamma} + \beta_3(LIQ)_{i,t > \gamma} + \beta_4(FF)_{i,t} + \beta_5(NWC)_{i,t} + \beta_6(CFO)_{i,t} + \beta_7(CR)_{i,t} + \varepsilon_{i,t} \dots \dots \dots (2)$$

## DATA ANALYSIS AND DISCUSSION

### *Descriptive statistics*

The descriptive statistics of the Pakistani companies' factors used in this study are shown in Table 4.1. The mean value of ROA (Net income to total assets) is 0.0672, ranging from a minimum value of 0.00017 to a maximum value of 0.6280. The profitability means value shows that non-financial companies report a 6.7% profit of total assets. The average cash holding ratio (CH) was 6.7%. The firm's liquidity shows that the current assets over current liabilities would be 151%. The average financial flexibility is 0.1426, from 1.6885 to 0.1971. The mean net working capital is 23%, and the operating cash flow is defined as cash flow over total assets, with an average of 9.9%. The cash ratio, measured as the cash and cash equivalents to current liabilities, ranges from 12.6100 to 0.66204 and has a mean value of 30%. The observation, mean, median, confidence intervals, and minimum and maximum component values are listed in Table 2.

*Table 2 Descriptive Statistics*

Variables	Observation	Mean	Median	SDEV	Min	Max
Profitability (ROA)	2010	0.0651	0.0438	0.5624	-0.9823	24.8160
C	2010	1.0000	1.0000	0.0000	1.00000	1.00000
Cash Holding	2010	0.0672	0.0208	0.1045	0.00017	0.62800
Liquidity	2010	1.5177	1.1313	0.0068	21.2110	1.36920
Financial Flexibility	2010	0.1426	0.0538	0.0003	1.68850	0.19710
Net Working Capital	2010	0.2324	0.2380	-2.5964	3.6536	0.2154
Operating Cash Flow	2010	0.0990	0.0780	-0.9104	24.8171	0.56193
Cash Ratio	2010	0.30807	0.05680	0.00018	12.6100	0.66204

### *Levin Li Chu test for data series*

The LLC test results were presented with an intercept at the level plus intercept and trend, as shown in Table 4. According to the results, all series are stationary at level 1(0), with constant trends. CH, LIQ, FF, NWC, CFO, and CR have less than 1% probability values, and the sequence is essential for both the constant and trend effects. As a result, the null hypothesis was rejected with a confidence level of 99 percent. As a result of the heterogeneous LLC test, it can be concluded that the data series does not have a unit root problem and is stationary at this level.

Table 3. LLC Panel unit root test for data series

Variables	Constant	P-value	Constant and trend	P-value
Profitability ROA	-11.3532	0.0000	-21.3927	0.0000
Cash Holding	-49.4160	0.0000	-23.4811	0.0000
Liquidity	-44.0412	0.0000	-43.4524	0.0000
Financial Flexibility	-16.2595	0.0000	-15.4393	0.0000
Net Working Capital	-12.4541	0.0000	-22.3564	0.0000
Operating Cash Flow	-11.3310	0.0000	-24.1213	0.0000
Cash Ratio	-96.6985	0.0000s	-68.7154	0.0000

### Variance Inflation Factors

Variance inflation factors (VIF) of the predicted regression coefficients are calculated to describe the level of Multicollinearity in the regression or the correlation between predictors. Multicollinearity is a severe problem because it raises the variance of regression coefficients, making them unstable and difficult to understand. As shown in Table 4, the values of all the given variables were less than 10. As a result, all variables are less correlated, and the model has no major Multicollinearity problem.

Table 4: Variance Inflation Factors

Variables	Coefficient Variance	Uncentered VIF
Cash Holding	0.0002	7.4149
Liquidity	7.4196	6.7449
Financial Flexibility	6.6343	8.5476
NWC	1.3146	2.8737
Operating Cash Flow	1.4673	1.0391
Cash Ratio	5.3501	6.2055

### Regression results

The research was conducted on datasets from Pakistani non-financial companies and entailed identifying the cash holding of firm-related factors. A set of hypotheses was proposed to determine the relationship between these explanatory variables and profitability. The panel regression results for non-financial firms from (2009-to 2018) are presented in Table 6. It displays the models' measured coefficients, standard deviations, and parameters per Akaike information, Hannan Quinn criteria, Schwarz criteria, and Durbin-Watson criteria. Table 4.3 includes the results of the ordinary least square, fixed effect, and random effect model regression. In this paper, the regression results of the random effects model are reported as per Hausman's test results. The Value of R<sup>2</sup> is 0.6975, which specifies a 69.75% variation in profitability,

and is explained by cash holding, liquidity, financial flexibility, net working capital, operating cash flow, and cash ratio. Cash holdings are hypothesized to have a positive relationship with ROA. The coefficient value of cash holding appears positive, as predicted ( $y = 0.0377$ ;  $p = 0.0415$ ), indicating that cash holdings impact profitability significantly at 5%, consistent with (Abushammala and Sulaiman, 2014).

This study predicts a positive relationship between liquidity and ROA. The coefficient value of liquidity is positive, as expected ( $y = 0.0007$ ;  $p = 0.0435$ ), indicating that liquidity influences profitability (ROA) significantly at 5%, and the results are consistent with (Ismail, 2016). This study proposes a negative relationship between financial flexibility and profitability (ROA). The coefficient value of financial flexibility is negative ( $y = -0.0030$ ;  $p = 0.0757$ ) as predicted, indicating that financial flexibility has an impact on profitability (ROA) significant at 10 percent, and the work is in line with (Vithessonthi and Tongurai, 2015).

This study assumes a positive relationship between net working capital and profitability (ROA). The coefficient value is positive ( $y = 0.0020$ ;  $p = 0.6150$ ), indicating that networking capital influences profitability (ROA) insignificantly, and the result is in line with (Fattah Al-Slehat and Al-Sharif, 2019). Furthermore, this study predicts a positive association between operating cash flow and profitability (ROA). The coefficient value of operating cash flow is positive ( $y=0.9999$ ;  $p=0.0000$ ), indicating that operating cash flow influences ROA significantly at 1% in association (Liman and Mohammed, 2018). Finally, this study proposes a negative relationship between cash ratio and profitability (ROA). The coefficient value of the cash ratio is negative ( $y = -0.0023$ ;  $p = 0.3372$ ), indicating that the cash ratio has an insignificant impact on profitability (ROA) at all levels, consistent with (Rehman, Khan, and Khokhar, 2015)

Table 5: Panel data regressions of data series

Independent Variables	OLS	Fixed Effect	Random Effect
Cash Holding	0.0474(0.0014)	0.0261(0.2621)	0.0377(0.0415)
Liquidity	0.0011(0.1811)	0.0003(0.7178)	0.0007(0.0435)
Financial Flexibility	-0.011(0.1442)	0.0062(0.6223)	-0.0030(0.0757)
Net Working Capital	-4.899(0.9892)	0.0034(0.4730)	0.0020(0.6150)
Operating Cash Flow	0.9990(0.0000)	1.0003(0.0000)	0.9999(0.0000)
Cash Ratio	-0.0017(0.4439)	-0.0025(0.3264)	-0.0023(0.3372)
No. of observations	2010	2010	2010
R <sup>2</sup>	0.6870	0.7179	0.6975
Hausman test (FEM vs REM)			6.7217 (0.3474)
F-test (FEM vs. OLS)		3.7862 (0.000) ***	

Note: The significance levels of 10%, 5%, and 1% are indicated by \*, \*\*, and \*\*\*.

### *Threshold Regression*

Tables 7, 8, and 9 show calculated coefficient values, and standard deviations by parameters for Akaike info, Hannan Quinn's criteria, Schwarz's criteria, and Durbin Watson's criteria for the above models. As per table 7, the ratio of holding cash is less than 0.54%; then the approximate coefficient is -3.822, and the probability is 0.0003 and is significant at 5%. As per table 8, the approximate coefficient is -0.0957, and the probability is 0.2364, while the cash holding ratio (CH) is more significant than 0.54% and lower than 5.3%; it is a statistically insignificant level. As per table 9, once the holding ratio of cash is more significant than 5.3%, the approximate coefficient is 0.0657, and the probability value is 0.0000, then statistically significant at all levels. When cash is more significant than 5.3%, the results have shown that cash's ROA coefficient regression is not a fixed valuation but depends on each cash holding ratio's threshold. The association between the cash holding and profitability ratio varies due to changes in the cash holding ratio. This study found a positive correlation between cash holding and profitability, consistent with previous literature (Abushammala and Sulaiman, 2014).

As per Table 7, the amount of cash holding is smaller than 0.54%; then, the coefficient is 0.0043, and the probability of 0.0788 is significant at 10%. As per Table 8, the approximate coefficient is 0.0005, and the probability is 0.6970, while the liquidity ratio is more significant than 0.54% and less than 5.3% and is statistically insignificant at all levels. Finally, as per Table 9, when the approximate coefficient is 0.0001, and the probability value is 0.9522, it is more significant than 5.3% and statistically insignificant. Thus, there is a positive relationship between liquidity and profitability (Kimondo, 2014). This study also found a positive and insignificant relationship between liquid assets and profitability, consistent with previous studies (Nguyen Thanh, 2019).

As per Table 7, the amount of cash holding is lower than 0.54%; the coefficient is -0.3430, and the probability is 0.0496 significant at 5%. As per Table 8, the approximate coefficient is 0.0246, where the FF is more significant than 0.54% and less than 5.3%, and the probability is 0.2454, which is statistically insignificant at all levels. As per Table 9, if the calculated coefficient is -0.0252 while FF is more significant than 5.3%, the probability value is 0.0148 and statistically significant at the 1% level. This study finds that financial flexibility has a significant negative effect on profitability. There is mixed evidence of the FF and profitability relationship reported in the literature (Embaye and Haile, 2019). Ma and Jin (2016) show that financial flexibility positively affects firm profitability. The underlying study result is consistent with previous studies and asserts a negative but significant correlation between financial flexibility and profitability. The findings reveal that the ROA regression coefficient for all variables is not constant, although it depends on each cash-holding ratio threshold.

As per Table 7, the cash holding ratio decreases by 0.54%; the coefficient is 0.0301, and the probability is 0.0001 significant at 1%. As per Table 8, the calculated coefficient is 0.0011, and the probability is 0.8336, while the networking capital ratio is more significant than 0.54% and less than 5.3%, and statistically insignificant at all levels.

Finally, as shown in Table 9, the NWC is more significant than 5.3% when the approximate coefficient is 0.0173, and the probability value is 0.0052 and statistically significant for all significance levels. Thus, Le (2019) reported a positive link between NWC and profitability. The results are consistent with our study, in which networking capital positively correlates with profitability, as measured by ROA.

As per Table 7, the percentage of holding cash decreases by 0.7590, and the probability is 0.0000 is significant at the 1% level. As per Table 8, the calculated coefficient is 1.0010, and the probability is 0.0000, where the operating cash flow is more significant than 0.54% and smaller than 5.3%, and it is statistically significant at the 1% level. As per Table 9, CFO is more significant than 5.3%, and the calculated coefficient is 0.9452, the probability value is 0.0000, and statistically significant at a 1% level of significance. According to Ghanbari et al. (2015), operating cash flow and financial performance (ROA) have a significant positive relationship. This study also recommends a positive relationship between operating cash flows and profitability.

As per Table 6, the cash holding fraction is less than 0.54%; the coefficient is 0.9303, the probability is 0.0000, and it is significant at the 1% significance level. As per Table 7, the approximate coefficient is -0.0044, and the probability is 0.6749, while the cash ratio is higher than 0.54% and less than 5.3%, which is statistically insignificant at all levels. Finally, as per Table 8, when the cash ratio is more significant than 5.3%, the calculated coefficient is 0.0007, and the probability value is 0.8194 and statistically insignificant at all significance levels. Thus, a negative but insignificant association between the Return on Assets (ROA) and Cash Ratio (Rehman, Khan, and Khokhar, 2015). On the other hand, Ismail (2016) revealed a positive relationship between cash ratio and profitability (Ismail, 2016). Thus, this study shows mixed outcomes concerning the connection between the cash ratio and profitability.

*Table 6. Threshold regression results of data series*

Variables	Coefficient	Std. error	t- statistics	Prob
C	-0.0280	0.0039	-7.0347	0.0000
CH	-3.8225	1.0562	-3.6188	0.0003
LIQ	0.0043	0.0025	1.7587	0.0788
FF	-0.3430	0.1746	-1.9645	0.0496
NWC	0.0301	0.0077	3.8895	0.0001
OCF	0.7590	0.0144	52.597	0.0000
CR	0.9303	0.2167	4.2921	0.0000

*The significance levels of 10%, 5%, and 1% are indicated by \*, \*\*, and \*\*\*.*

Table 7. Threshold regression results of data series

Variables	Coefficient	Std. error	t- statistics	Prob
C	-0.0334	0.0031	-10.572	0.0000
CH	-0.0957	0.0808	-1.1842	0.2364
LIQ	0.0005	0.0013	0.3894	0.6970
FF	0.0246	0.0212	1.1618	0.2454
NWC	0.0011	0.0053	0.2100	0.8336
<b>OCF</b>	1.0010	0.0011	883.93	0.0000
CR	-0.0044	0.0106	-0.4194	0.6749

The significance levels of 10%, 5%, and 1% are indicated by \*, \*\*, and \*\*\*.

Table 8 Threshold regression results of data series

Variables	Coefficient	Std. error	t- statistics	Prob
C	-0.0282	0.0043	-6.5112	0.0000
CH	0.0657	0.0160	4.0934	0.0000
LIQ	0.0001	0.0016	0.0599	0.9522
FF	-0.0252	0.0103	-2.4385	0.0148
NWC	0.0173	0.0062	2.7983	0.0052
OCF	0.9452	0.0121	77.488	0.0000
CR	0.0007	0.0034	0.2283	0.8194

The significance levels of 10%, 5%, and 1% are indicated by \*, \*\*, and \*\*\*.

### Threshold Test Results

This study investigated the presence of a single-threshold effect. The F1 statistics and p-value obtained are 44.645 and 0.05, respectively, suggesting that the null hypothesis is accepted at 5%. Subsequently, this research revealed a double-threshold effect, and the F2 statistics and p-value obtained were 5.3499 and 0.05, accepting the null hypothesis. Moreover, the F3 statistics obtained are 2.6723; the results suggest that the triple threshold regression rejected the theory.

Because of the threshold effect test, it was discovered that cash holdings and profitability have both single- and double-threshold effects. Table 10 displays the estimated values for the single and double thresholds at 0.053. The first-step estimation of the threshold is the point at which LR1 ( $\gamma$ ) is equal to zero, which occurs at  $\gamma_1 = 0.053$ . The findings of this study are split into two sections regarding the cash holding threshold vector (above and below the threshold value of  $\gamma = 0.053$ ). Therefore, this study described three modes created by the 0–1, 1–2, and 2–3 threshold values below.

Table 10 Threshold regression test results of data series

Threshold Tests	F-statistics	Scaled F-statistics	Critical value **
0 Vs. 1*	44.645	312.5157	21.87
1 Vs. 2*	5.3499	37.44977	24.17
2 Vs. 3	2.6723	18.70663	25.13

## IMPLICATION & RECOMMENDATIONS

This study highlights the importance of cash holdings and profitability after the GFC. The influence of cash holdings, liquidity, financial flexibility, networking capital, operating cash flow, and cash ratio on profitability was investigated by testing 201 manufacturing companies registered at the PSX. The analysis is conducted by testing the panel threshold regression model of (Hansen 2000) and the Caner and Hansen threshold model with multiple variables and regimes conducted by a threshold variable to analyze the importance and profitability of cash holdings.

Using Hansen's (1999) threshold regression model, ROA measures the business's profitability, and cash holdings are derived by dividing cash and equivalents by total assets. In this study, two threshold effects occur between cash holdings and firms' profitability. Furthermore, if the cash ratio is less than 0.54%, the coefficient is negative; this percentage would significantly impact the business's value below. The coefficient is negative if the cash holding ratio is more significant than 0.54%, implying an insignificant cash holding volume. On the other hand, if cash holdings are more significant than 5.3%, the coefficient is positive, enhancing firm profitability. A further improvement in the cash holding ratio above this amount increases its profitability. This finding suggests a non-linear relationship between the cash holding ratio and its profitability, and findings are associated with some earlier empirical studies (Azmat, 2014); (Nguyen, Nguyen, and Le, 2016); (Nguyen Thanh, 2019).

The policy implications of this study provide fresh insights and guidelines for financial managers. The findings of this study provide a new perspective to help the firm's top management as an input or basis for improving their cash reserves and accounting for the cash flow of their business. The firm's primary objective is to increase shareholder wealth (price and profitability), and this study serves as a guiding platform for financial managers not to ignore the importance of cash holdings, operating cash flow, and profitability while making decisions. The financial managers of Pakistani listed companies must maintain a cash holding ratio of at least 5.3% to avoid unavoidable circumstances and cash hurdles.

This study had some limitations. First, this study used Hansen's (1999) panel threshold regression, whereas future studies might use extended threshold panels for non-dynamic panels (for dynamic panels and considering endogeneity) for more rigorous results. Second, this study focuses on only listed non-financial firms in



Pakistan. Therefore, future studies should also focus on financial firms to determine whether the results can be generalized. Third, the frequency of accounting data collected in this study was yearly. Therefore, the data are unavailable on a semi-annual, quarterly, and monthly basis, from which more robust results could be derived. Lastly, the current study neglects the industry effect on Pakistani corporations' corporate cash holding ratio. The data are collected from eight industries, and each industry's size impacts the cash holding ratio. Large-sized firms typically have more cash than small-sized firms do.

The study recommends that further research should add more explanatory variables and observation periods to examine the impact of cash holdings on profitability. Comparative research with other countries in the same period with the same research methodology would benefit international investors in suggesting an optimum cash holding level. The current study is likely to help the researchers to discover financial companies' cash holdings as banks and financial organizations have a professional regulated system in the non-financial sector. Future studies may include macroeconomic determinants such as GDP, inflation rate, the size of the banking sector, stock market index, and interest rate to provide new evidence of the effects of the optimal cash holding ratio on profitability in developing countries. Finally, top management authorities should consider the significance of optimal cash holdings, profitability, and liquidity.

## REFERENCES

- Abushammala, S., & Sulaiman, J. (2014). Cash holdings and corporate profitability: Some evidence from Jordan. *International Journal Of Innovation And Applied Studies*, 8(3), 898.
- Ali, A., & Yousaf, S. (2013). Determinants of Cash holding in the German Market. *IOSR Journal Of Business And Management*, 12(6), 28-34. <https://doi.org/10.9790/487x-1262834>
- Almeida, H., Campello, M., & Weisbach, M. (2004). The Cash Flow Sensitivity of Cash. *The Journal Of Finance*, 59(4), 1777-1804. <https://doi.org/10.1111/j.1540-6261.2004.00679.x>
- Almeida, H., Campello, M., Cunha, I., & Weisbach, M. (2014). Corporate Liquidity Management: A Conceptual Framework and Survey. *Annual Review Of Financial Economics*, 6(1), 135-162. <https://doi.org/10.1146/annurev-financial-110613-034502>
- Al-Najjar, B. (2013). The financial determinants of corporate cash holdings: Evidence from some emerging markets. *International Business Review*, 22(1), 77-88. <https://doi.org/10.1016/j.ibusrev.2012.02.004>
- Arora, R. (2019). Corporate Cash Holdings: An Empirical Investigation of Indian Companies. *Global Business Review*, 20(4), 1088-1106. <https://doi.org/10.1177/0972150919844911>

- Azmat, Q. (2014). Firm value and optimal cash level: evidence from Pakistan. *International Journal Of Emerging Markets*, 9(4), 488-504. <https://doi.org/10.1108/ij OEM-11-2011-0104>
- Azmat, Q., & Iqbal, A. (2017). The role of financial constraints on precautionary cash holdings: evidence from Pakistan. *Economic Research-Ekonomska Istraživanja*, 30(1), 596-610. <https://doi.org/10.1080/1331677x.2017.1305770>
- Bai, J., & Perron, P. (1998). Estimating and Testing Linear Models with Multiple Structural Changes. *Econometrica*, 66(1), 47. <https://doi.org/10.2307/2998540>
- Bates, T., Kahle, K., & Stulz, R. (2009). Why Do US Firms Hold So Much More Cash than They Used To? *The Journal Of Finance*, 64(5), 1985-2021. <https://doi.org/10.1111/j.1540-6261.2009.01492.x>
- Bigelli, M., & Sánchez-Vidal, J. (2012). Cash holdings in private firms. *Journal Of Banking & Finance*, 36(1), 26-35. <https://doi.org/10.1016/j.jbankfin.2011.06.004>
- Chauhan, Y., Pathak, R., & Kumar, S. (2018). Do bank-appointed directors affect corporate cash holding? *International Review of Economics & Finance*, 53(C), 39-56.
- Chen, L., & Jiang, G.J. (2001). The determinants of Dutch capital structure choice. *The annual research report, Research School Systems, Organisation, and Management*, 1-25.
- Dadepo, A., & Afolabi, O. (2020). Impact of Liquidity Management on Profitability of Selected Manufacturing Firms in Nigeria. *European Journal Of Business And Management*, 12(27), 93-99. <https://doi.org/10.7176/ejbm/12-27-11>
- Daher, M. (2010). The Determinants of Cash Holdings in UK Public and Private Firms. Doctoral dissertation, *Department of Accounting and Finance*, Lancaster University.
- Embaye, S.S., & Haile, F. (2019). The effect of financial flexibility on firm performance: Evidence from North African countries. *Eur. J. Res*, 5, 56-67.
- Fabozzi, F. J., & Markowitz, H. M. (2006). The Theory and Practice of Investment. *Library Wiley: London*, UK.
- Fattah Al-Slehat, Z., & Al-Sharif, B. (2019). Net Working Capital and the Profitability: Empirical Evidence from Amman Stock Exchange. *International Business Research*, 12(4), 12. <https://doi.org/10.5539/ibr.v12n4p12>
- Ferreira, M., & Vilela, A. (2004). Why Do Firms Hold Cash? Evidence from EMU Countries. *European Financial Management*, 10(2), 295-319. <https://doi.org/10.1111/j.1354-7798.2004.00251.x>
- Frank, M., & Goyal, V. K. (2007). Corporate Leverage: How Much Do Managers Really Matter? *SSRN Electronic Journal*. 971082. <https://doi.org/10.2139/ssrn.971082>
- Fritz-Foley, C., Hartzell, J., Titman, S., & Twite, G. (2007). Why do firms hold so much cash? A tax-based explanation. *Journal Of Financial Economics*, 86(3), 579-607. <https://doi.org/10.1016/j.jfineco.2006.11.006>

- Ghanbari, M., Yaghobi, M., & Derakhsh, M. D. (2015). The Effect of Corporate Governance Mechanisms on Conditional and Unconditional Conservatism of Listed Companies on the Stock Exchange of Tehran. *International Research Journal of Applied and Basic Sciences*, 9(8), 1295-1304.
- Gill, A., & Shah, C. (2012). Determinants of Corporate Cash Holdings: Evidence from Canada. *International Journal Of Economics And Finance*, 4(1), 70-79. <https://doi.org/10.5539/ijef.v4n1p70>
- Hamilton, R., & Fox, M. (1998). The financing preferences of small firm owners. *International Journal Of Entrepreneurial Behavior & Research*, 4(3), 239-248. <https://doi.org/10.1108/13552559810235529>
- Hansen, B. (1999). Threshold effects in non-dynamic panels: Estimation, testing, and inference. *Journal Of Econometrics*, 93(2), 345-368. [https://doi.org/10.1016/s0304-4076\(99\)00025-1](https://doi.org/10.1016/s0304-4076(99)00025-1)
- Hansen, B. (2000). Sample Splitting and Threshold Estimation. *Econometrica*, 68(3), 575-603. <https://doi.org/10.1111/1468-0262.00124>
- Hardin, W., Highfield, M., Hill, M., & Kelly, G. (2009). The Determinants of REIT Cash Holdings. *The Journal Of Real Estate Finance And Economics*, 39(1), 39-57. <https://doi.org/10.1007/s11146-007-9103-1>
- Ismail, R. (2016). Impact of liquidity management on profitability of Pakistani firms: A case of KSE-100 Index. *International Journal of Innovation and Applied Studies*, 14(2), 304-314.
- Jensen, M. (1986). Agency Cost Of Free Cash Flow, Corporate Finance, and Takeovers. *SSRN Electronic Journal*, 76(2), 323-329. <https://doi.org/10.2139/ssrn.99580>
- Joseph, A., Kneer, C., & van Horen, N. (2021). All You Need is Cash: Corporate Cash Holdings and Investment after the Global Financial Crisis. *SSRN Electronic Journal*, 1-52. <https://doi.org/10.2139/ssrn.3839926>
- Kariuki, C. (2015). The Determinants of Foreign Direct Investment in the African Union. *Journal Of Economics, Business, And Management*, 3(3), 346-351. <https://doi.org/10.7763/joebm.2015.v3.207>
- Keynes, J. M. (1937). The general theory of employment. *The quarterly journal of economics*, 51(2), 209-223.
- Khuong, N., Ha, N., Minh, M., & Thu, P. (2019). Does corporate tax avoidance explain cash holdings? The case of Vietnam. *Economics & Sociology*, 12(2), 79-93. <https://doi.org/10.14254/2071-789x.2019/12-2/5>
- Kim, C., Mauer, D., & Sherman, A. (1998). The Determinants of Corporate Liquidity: Theory and Evidence. *The Journal Of Financial And Quantitative Analysis*, 33(3), 335-359. <https://doi.org/10.2307/2331099>
- Kimondo, C. N., Irungu, M., & Obanda, M. (2016). The impact of liquidity on the financial performance of the nonfinancial firms quoted on the Nairobi Securities Exchange. *Researchjournali's Journal of Accounting*, 4(2), 1-12.

- La Rocca, M., & Cambrea, D. (2018). The effect of cash holdings on firm performance in large Italian companies. *Journal Of International Financial Management & Accounting*, 30(1), 30-59. <https://doi.org/10.1111/jifm.12090>
- Le, B. (2019). Working capital management and firm's valuation, profitability, and risk. *International Journal Of Managerial Finance*, 15(2), 191-204. <https://doi.org/10.1108/ijmf-01-2018-0012>
- Le, D., Tran, P., Ta, T., & Vu, D. (2018). Determinants of corporate cash holding: evidence from UK listed firms. *Business And Economic Horizons*, 14(3), 561-569. <https://doi.org/10.15208/beh.2018.40>
- Liman, M., & Mohammed, A. (2018). Operating cash flow and corporate financial performance of listed conglomerate companies in Nigeria. *Journal of Humanities and Social Science*, 23(2), 1-11.
- La Cava, G., & Windsor, C. (2016). Introduction | RDP 2016-03: Why Do Companies Hold Cash? *Reserve Bank of Australia Research Discussion Papers (May)*
- Ma, C., & Jin, Y. (2016). What Drives the Relationship Between Financial Flexibility and Firm Performance: Investment Scale or Investment Efficiency? Evidence from China. *Emerging Markets Finance And Trade*, 52(9), 2043-2055. <https://doi.org/10.1080/1540496x.2015.1098036>
- Martínez-Sola, C., García-Teruel, P., & Martínez-Solano, P. (2013). Trade credit and SME profitability. *Small Business Economics*, 42(3), 561-577. <https://doi.org/10.1007/s11187-013-9491-y>
- Mihai, I. O., Radu, R. I., & Dragan, B. G. (2018). Determining the factors of cash holdings—the case of Romanian nonfinancial companies. *In Forum Scientiae Oeconomia*, 6(3), 53-65.
- Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal Of Financial Economics*, 13(2), 187-221. [https://doi.org/10.1016/0304-405x\(84\)90023-0](https://doi.org/10.1016/0304-405x(84)90023-0)
- Naumoski, A. (2018). Corporate cash holdings: An empirical investigation of South-East European companies. *Economic and Social Development: Book of Proceedings*, 339-349.
- Nguyen Thi, Q., Tran, Q., & Doan, H. (2021). Foreign ownership, state ownership and cash holdings under the global financial crisis: evidence from the emerging market of Vietnam. *International Journal Of Emerging Markets*. <https://doi.org/10.1108/ij OEM-03-2020-0303>
- Nguyen, T., Nguyen, L., & Le, T. (2016). Firm Value, Corporate Cash Holdings, and Financial Constraints: A Study from a Developing Market. *Australian Economic Papers*, 55(4), 368-385. <https://doi.org/10.1111/1467-8454.12082>
- Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal Of Financial Economics*, 52(1), 3-46. [https://doi.org/10.1016/s0304-405x\(99\)00003-3](https://doi.org/10.1016/s0304-405x(99)00003-3)

- Orlova, S., & Sun, L. (2018). Institutional determinants of cash holdings speed of adjustment. *Global Finance Journal*, 37, 123-137. <https://doi.org/10.1016/j.gfj.2018.05.002>
- Rehman, M. Z., Khan, M. N., & Khokhar, I. (2015). Investigating liquidity-profitability relationship: Evidence from companies listed in the Saudi stock exchange (Tadawul). *Journal of Applied Finance and Banking*, 5(3), 159-173.
- Rukh, L., & Rehman, S. (2019). Factors Affecting Cash Holdings: The Empirical Evidence of Nonfinancial Firms. *Journal of Managerial Sciences*, 13(4), 28-37.
- Safdar, M., Lin, T., Tanchangya, P., & Amin, S. (2019). Ownership Hierarchy and Cash Holding: A Study From Pakistan. *International Journal Of Financial Research*, 10(6), 67. <https://doi.org/10.5430/ijfr.v10n6p67>
- Şamiloğlu, F., & Akgün, A. (2016). The Relationship between Working Capital Management and Profitability: Evidence from Turkey. *Business And Economics Research Journal*, 7(2), 1-1. <https://doi.org/10.20409/berj.2016217492>
- Samo, A., & Murad, H. (2019). Impact of liquidity and financial leverage on firm's profitability – an empirical analysis of the textile industry of Pakistan. *Research Journal Of Textile And Apparel*, 23(4), 291-305. <https://doi.org/10.1108/rjta-09-2018-0055>
- Sethi, M., & Swain, R. (2019). Determinants of Cash Holdings: A Study of Manufacturing Firms in India. *International Journal Of Management Studies*, VI(2), 11. [https://doi.org/10.18843/ijms/v6i2\(2\)/02](https://doi.org/10.18843/ijms/v6i2(2)/02)
- Shabbir, M., Haider, H., S., & Mujtaba, C., G. (2016). Determinants of corporate cash holdings in Pakistan. *International Journal Of Organizational Leadership*, 5(1), 50-62. <https://doi.org/10.33844/ijol.2016.60263>
- Shar, A. K., Mirani, I. A., & Gilal, R. G. (2020). Determinants of Cash Holdings of Subsidiaries of Multi-National Corporations (MNCs) Operating in Pakistan. *International Journal of Advanced Research in Engineering and Technology (IJARET)*, 11(12), 2122-2138.
- Turcas, M. (2011). The cash flow–Instrument for the company's analysis and forecast. *International Journal of Economics and Finance*, 5(5), 148-158.
- Uyar, A., & Kuzey, C. (2014). Determinants of corporate cash holdings: evidence from the emerging market of Turkey. *Applied Economics*, 46(9), 1035-1048. <https://doi.org/10.1080/00036846.2013.866203>
- Vijayakumaran, R., & Atchyuthan, N. (2017). Cash holdings and corporate performance: Evidence from Sri Lanka. *International Journal of Accounting & Business Finance*, 1.
- Vithessonthi, C., & Tongurai, J. (2015). The effect of leverage on performance: Domestically-oriented versus internationally-oriented firms. *Research In International Business And Finance*, 34, 265-280. <https://doi.org/10.1016/j.ribaf.2015.02.016>

- Ye, Y. (2018). A Literature Review on the Cash Holding Issues. *Modern Economy*, 09(06), 1054-1064. <https://doi.org/10.4236/me.2018.96068>
- Zhang, H., Zhang, Y., Zhou, S., & He, Y. (2019). Corporate Cash Holdings and Financial Constraints –An Analysis Based on Data on China at Company Level after the Global Financial Crisis. *Emerging Markets Finance And Trade*, 56(7), 1490-1503. <https://doi.org/10.1080/1540496x.2019.1603105>
- Zygmunt, J. (2013). Does liquidity impact on profitability? *In Conference of informatics and management sciences*, 38-49.