



THE IMPACT OF CASH HOLDINGS ON FIRM PERFORMANCE: PANEL EVIDENCE FROM
TEXTILE SECTOR COMPANIES LISTED ON THE PAKISTAN STOCK EXCHANGE
(2016–2025)

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Abstract

This paper investigates the effect of cash holdings on the financial performance of textile firms listed on the Pakistan Stock Exchange (PSX) from 2016 to 2025. The cash management policy of firms has been discussed in the literature for many years. On one hand, cash serves as insurance against expensive outside financing (Myers & Majluf, 1984; Opler et al., 1999), but on the other hand, cash gives managers the ability to indulge in discretionary spending that decreases firm value (Jensen, 1986). The Pakistani textile industry, which is the biggest export earner and one of the most leveraged industries in Pakistan, constitutes a good sample through which to revisit this question, since the majority of studies conducted in Pakistan about cash holdings have investigated the determinants of cash holding rather than the effects, while few others have stopped at the mid-2010s. In this study, we used a hand-verified dataset of 20 firms listed on the PSX in the textile industry with 198 firm-year observations after cleaning the data and estimating pooled OLS, fixed effects, and random effects models of ROA on cash holdings, firm size, leverage, and firm age. Statistical tests (Breusch-Pagan LM test, Modified Wald test, and Wooldridge test) identify firm-specific random effects, heteroskedasticity among firms, and first-order autocorrelation, which are controlled using firm-clustered standard errors. On the other hand, the Hausman test supports the Random-Effects specification ($\chi^2(4) = 7.97, p = 0.093$). However, results for Fixed Effects are also provided as a robustness check. The relationship between cash and ROA is positive but statistically insignificant in all specifications. Leverage is found to have a highly significant negative impact on profitability in all specifications ($p < 0.01$), while firm size and firm age are significant only in the Fixed-Effects specification. These results imply that, in an economy where the availability of capital is limited and banking plays an important role as a source of finance, and also where the levels of cash are low (i.e., in Pakistan), having more liquid cash by the firm is not an important factor in determining its profitability—capital structure decisions, especially leverage, are far more important.

Keywords: Cash Holdings, Firm Performance, Return on Assets (ROA), Leverage, Panel Data, Fixed Effects, Random Effects, Textile Sector, Pakistan Stock Exchange

1. Introduction

1.1 Background of the Study

The amount of cash and cash equivalents held by companies on their balance sheets relative to their assets is an important financial indicator of corporate financial behaviour. First, the motives behind



maintaining liquid balances were determined by Keynes (1936). Since then, three major paths have been followed in theoretical studies in the area of corporate finance. According to the trade-off theory, companies consider the advantages of holding cash, including avoiding transaction costs and underinvestment problems, and the costs associated with holding it—the opportunity cost of investment returns—and determine the optimal cash ratio (Opler et al., 1999; Kim, Mauer, & Sherman, 1998; Ozkan & Ozkan, 2004). The pecking order theory, based on the idea of information asymmetry between managers and outside investors, states that cash simply consumes the leftover of internally raised money after investment and debt payments, meaning that cash holdings are not independently optimized (Myers & Majluf, 1984). Finally, the agency/free cash flow theory notes that under managerial control, especially in poor corporate governance environments, cash may be directed to such activities as empire building, consumption of perquisites, or even negative net present value investments (Jensen, 1986).

This leads to different expectations regarding the nature of the relationship between cash holdings and performance. The former will predict a positive relationship since, under such conditions, cash holdings can help firms avoid expensive outside financing and make profitable investments when opportunities arise. The latter expectation will lead us to assume that cash holdings are negatively related to performance because managers might misallocate excess liquidity instead of paying dividends to the owners of the firm. In other words, the theoretical relationship between cash and performance is ambiguous, so the sign and statistical significance of this relationship are to be tested empirically, and it is quite possible that the result will vary depending on the institutional context (Al-Najjar, 2013; Ferreira & Vilela, 2004).

It is important to note that Pakistan's textile industry represents the most suitable environment for studying this issue. This industry is the leading contributor to Pakistan's merchandise exports and industrial employment, it is dominated by family business groups with concentrated ownership structures, and, as confirmed by earlier research conducted in Pakistan, this industry features low cash ratios and high dependence on short-term bank borrowings (Afza & Adnan, 2007; Ali, Ullah, & Ullah, 2016). These structural characteristics make the sector an ideal case study to examine the validity of the precautionary/flexibility versus agency cost explanation of cash holdings by examining whether the results from cash-rich firms in the United States and Europe (Bates, Kahle, & Stulz, 2009; Opler et al., 1999) apply to an entirely different kind of corporate sector.

1.2 Problem Statement

In spite of the significance of the association between cash and performance, the empirical research regarding Pakistani textile companies is scarce and dated, and focuses almost exclusively on determinants of cash holdings (that is, what makes companies keep higher or lower cash balances), while ignoring the performance implications of those decisions. For example, in the papers by Afza and Adnan (2007) and Ali et al. (2016), cash holding is the dependent variable and profitability is one of the regressors, thereby reversing the causality direction of the question examined in this study—does cash balance affect profitability?—and using data ending far before 2016. There have been significant changes in Pakistan's textile industry since that time: the dispute over removal of export incentives tied to the country's GSP-Plus status, uncertainty about energy costs, currency devaluations, the impact of the coronavirus pandemic in 2020, and the drastic interest rate hikes in 2022–2023 have affected the financing environment of Pakistani textile companies. It is unclear, at least to the author's knowledge, whether the low-cash, high-leverage financing approach documented historically by researchers for the industry holds true in terms of establishing any cash-performance link for the highly volatile period from 2016 to 2025 using recent, well-verified panel data and an entire set of diagnostic tests specific to panels. There lies a practical challenge for financiers and lenders within the industry: it is not clear from the extant literature whether a higher cash balance can be regarded as a profitable practice for a Pakistani textile firm or whether, considering the dominant capital structure of the industry, cash management policy does not matter to performance at all.

1.3 Research Gap

In light of the literature review presented in Section 2, there are three particular gaps that serve as the impetus for this research:



Directional gap: Studies that relate to Pakistan's textile industry tend to analyze cash holdings as the dependent variable (determinants studies), whereas studies of cash holdings as performance predictors are much less common for Pakistan's textile industry compared to U.S., European, and more general emerging markets samples.

Temporal gap: The most frequently cited studies of Pakistan's textile industry regarding cash holdings have data no later than 2013, while the post-2016 period has not been empirically examined yet. This period covers the tightening of monetary policy, the shock from the coronavirus pandemic, and the depreciation of the local currency.

Methodological gap: Several existing studies of Pakistan's textile industry conduct analysis using simple pooled or single equation regressions without going through a whole set of panel diagnostics (poolability/Breusch-Pagan LM test, Hausman test, test for groupwise heteroskedasticity, and test for serial correlation). This gap is addressed by conducting all the tests and presenting Pooled OLS, Fixed-Effects, and Random-Effects estimations side by side.

The research will fill these gaps in the following manner: ROA will be estimated as a function of cash holdings, considering firm size, leverage, and firm age as control variables, through a panel of PSX-listed textile firms for the period of 2016–2025, and will then test the panel for all diagnostic tests.

1.4 Objectives of the Study

1. To analyse the influence of cash holdings on the financial performance (ROA) of textile firms quoted on the Pakistan Stock Exchange from 2016 to 2025.
2. To analyse the influence of firm size, leverage, and firm age on firm performance as control variables within the same model.
3. To determine, by means of the Hausman test and relevant tests, the most appropriate panel data estimation method (Pooled OLS, Fixed Effects, or Random Effects) for this data.
4. To deduce implications for financial managers, lenders, and policymakers on the importance of corporate liquidity in firm performance in the Pakistani textile industry.

1.5 Research Questions

RQ1: Do cash holdings exert a significant influence on the return on assets of textile firms quoted on the PSX?

RQ2: What is the nature and intensity of the influence of cash holdings on firm performance after taking into account the influence of firm size, leverage, and firm age?

RQ3: Which panel estimation approach (Pooled OLS, Fixed Effects, or Random Effects) is statistically the most appropriate one for this dataset?

1.6 Hypotheses

In accordance with the trade-off theory/financial flexibility approach (Opler et al., 1999; Myers & Majluf, 1984), the key hypotheses are given below in alternative form:

H1: Cash balances have a statistically significant positive influence on the return on assets (ROA) of textile companies traded on the PSX market.

H2: Size of the firm has a statistically significant positive influence on ROA.

H3: Leverage ratio has a statistically significant negative influence on ROA.

H4: Age of the firm has a statistically significant influence on ROA.

The relevant null hypotheses (H1₀–H4₀) suggest that the respective independent/control variable has no statistically significant effect on ROA.

1.7 Significance of the Study

The research provides three contributions to the body of corporate finance knowledge. First, the scope of Pakistan's textile sector cash studies is expanded by concentrating on the consequences of the choice of cash policy rather than its determinants and by examining explicitly whether cash policy impacts profitability. Second, the evidence is updated to 2016–2025, covering a time span that included macroeconomic shocks that are not captured in previous research. Third, a full panel diagnostic approach (poolability, heteroskedasticity, serial correlation, and Hausman tests) is used that is not uniformly done in current



Pakistani literature. In practice, the results provide insights for treasury and finance managers who have to determine cash holding levels, commercial lenders assessing the risk associated with loans to textile firms, and policymakers tracking the financial status of Pakistan's largest exporting industry.

2. Literature Review

2.1 Theoretical Framework

2.1.1 Precautionary / Trade-off Theory of Cash Holdings. The motives of money-holding include transactional, precautionary, and speculative, as mentioned by Keynes (1936); however, research in corporate finance has evolved the idea of the precautionary motive into one that entails a trade-off between the gains from avoiding costly outside financing and the cost of having idle cash (Kim et al., 1998; Opler et al., 1999). This implies that there is an "optimal" cash ratio, and maintaining an "optimal" level of cash holdings should result in easier financing of investments, leading to better operating performance of the firm because of the absence of foregone profits due to costly outside financing.

2.1.2 Pecking-Order Theory. In accordance with Myers and Majluf (1984), since there is information asymmetry between the manager and the investor outside the firm, external equity financing will be quite expensive, hence why firms would use internal funding, then debt, before choosing external equity. This means that cash holdings are just the residuum of internal funds after using these funds to finance investment. Hence, cash holdings in this case will not be value relevant.

2.1.3 Agency / Free-Cash-Flow Theory. According to Jensen (1986), there are incentives for managers in companies with high levels of free cash flows to engage in overinvestment, empire building, and consumption of resources in an attempt to maximize their own wealth rather than maximizing shareholders' wealth, especially when there is weak governance and weak creditor monitoring. Based on this theory, there could be a negative relationship between levels of cash and future performance because debt, which has a repayment commitment, provides better constraints compared to cash.

2.2 Empirical Literature: Global and Emerging-Market Evidence

The U.S. study on this topic is Opler et al. (1999), which demonstrates that companies with high growth opportunities and risky cash flows keep larger amounts of cash, in line with the trade-off theory, and publicly held U.S. companies that are good performers build up higher levels of cash than predicted by the trade-off theory alone. Kim et al. (1998) provide the first theoretical and empirical support to the precautionary-demand approach by modelling cash balances as a function of the cost of outside financing and the rate of return on investment. Ferreira and Vilela (2004) find, in the context of EMU countries, that cash holdings are positively correlated with growth opportunities and cash flow, and negatively correlated with firm size, leverage, and bank debt, and, significantly for this research, report that leverage serves as an alternative means of controlling managers, similar to Jensen's (1986) agency problem. Bates et al. (2009) demonstrate that there has been a long-term trend toward higher cash ratios in the United States between 1980 and 2006, and it has mainly been due to higher cash flow risks but not weak governance, contradicting the agency problem story. Al-Najjar (2013), using emerging markets (Jordan, Kenya, South Africa, Egypt), discovered that the factors influencing cash holdings in such markets generally follow those in developed countries, but institutional quality plays a role in determining the significance of these relationships, emphasizing the necessity to study cash policy in the context of the institutional environment of emerging countries like Pakistan.

2.3 Empirical Literature: Pakistan and the Textile Sector

Afza and Adnan (2007) look at one of the early empirical research papers from Pakistan and focus on the determinants of cash holdings of nonfinancial Pakistani firms and find profitability, growth opportunity, and cash flow volatility to be statistically significant determinants of cash holdings, while leverage has a negative association with cash holdings. Similar to the above-mentioned work, Anjum and Malik (2013) also investigate determinants of liquidity in Pakistan and find leverage, profitability, and size to be statistically significant determinants of cash holdings. Ali et al. (2016), while looking into the determinants of cash holdings for a selected number of 30 Pakistani textile firms listed on the former Karachi stock exchange during 2006 to 2013 period, find profitability (as ROA) and firm size to be positively associated with cash holdings,



while net working capital and leverage to be negatively associated with cash holdings. Variance Inflation Factor test has been used in the latter paper to check multicollinearity, which is also being followed in the current study. Iqbal and Usman (2018) investigate textile composite companies of Pakistan and find that financial leverage has a significant effect on firm performance. Most recently, the impact of financial flexibility, measured through debt ratio and dividend payout ratio, on investment, cash balance, and firm performance (ROA and operating margin) of Pakistani textile companies during 2011 to 2020 was analyzed by Ahmad et al. (2023). The authors find a significant yet industry-specific relationship between debt ratio and firm performance and, based on Hausman test results, preferred different estimators (fixed versus random effects) for their four different outcome variables—which highlights the significance of conducting tests rather than choosing an appropriate panel data estimator arbitrarily, an approach followed in Section 3.5 of this paper.

Collectively, this literature reveals the following two things: (i) profitability, leverage, and size of the firm are found to be consistently significant determinants of the cash policy of Pakistani textile firms where cash holdings are the dependent variable; and (ii) the other way around issue, namely, whether cash holdings determine the profitability of firms in this particular industry in the last decade, has not yet been empirically investigated using an exhaustive panel diagnostic approach.

2.4 Conceptual Framework

As per the theory and empirical review given above, the model of this research uses firm performance (ROA) as a dependent variable and cash holdings (the main variable of theoretical interest representing the balance between precautionary flexibility and agency costs) and three control variables which have been identified by literature to be relevant, namely: Firm Size (as a representative of economy of scale and market access to capital), Leverage (as an indicator of financial risk and debt discipline mechanism, competing with cash as a governance tool), and Firm Age.

3. Data and Methodology

3.1 Research Design, Population, and Sample

This research uses a quantitative causal research approach that entails an explanatory (causal-associational) research design, utilizing secondary panel data. The universe of the research comprises textile industry firms listed on the Pakistan Stock Exchange. The actual sample of the research consists of 20 PSX-listed textile firms that will be tracked annually between 2016 and 2025 (up to 200 firm-year cells), including firms operating in the composite, spinning, and weaving industries such as Azgard Nine Ltd., Din Textile Mills Ltd., Faisal Spinning Mills Ltd., Fazal Cloth Mills Ltd., Feroze1888 Mills Ltd., Gadoon Textile Mills Ltd., INTERLOOP (Pvt) Ltd., Indus Dyeing & Manufacturing Co. Ltd., J.K. Spinning Mills Ltd., Kohinoor Textile Mills Ltd., Mahmood Textile Mills Ltd., Masood Textile Mills Ltd., Nishat (Chunian) Ltd., Nishat Mills Ltd., Premium Textile Mills Ltd., Reliance Weaving Mills Ltd., Sapphire Fibres Ltd., Sapphire Textile Mills Ltd., Tata Textile Mills Ltd., and Zahidjee Textile Mills Ltd. (listed in Appendix A).

3.2 Data Sources and Data Verification

Variables derived from financial statements (Total Assets, Net Income, Cash & Bank, Long Term Debt, Short Term Debt, and Current portion of non-current liabilities) have been extracted from audited annual financial statements/PSX filings of each sample firm. Instead of assuming and estimating incorporation years, dates of incorporation used for deriving firm age were independently corroborated from the websites and PSX company profiles/filings of each firm (detailed record maintained in the accompanying firm-by-firm incorporation sources sheet), thus providing more credibility to firm age as a control variable compared to existing research work which estimates incorporation years.

Prior to estimation, completeness and consistency of data in the raw panel was independently verified. One firm-year observation (INTERLOOP (Pvt) Ltd. in one fiscal year) was found to be incomplete for all variables derived from financial statements and thus excluded listwise, resulting in 198 observations from a maximum of 200 (20 firms $\times$ 10 years); the panel is therefore very well balanced with 19 firms having 10 observations each year and one firm having 8.



Variable Construction Consistency: Variable constructions for this study were compared to their given definitions: cash holdings are defined as cash and cash equivalents/total assets; ROA as profit after tax/total assets; firm size as the natural log of total assets; total debt as long-term borrowings + short-term borrowings + current portion of non-current liabilities; leverage as total debt/total assets; and firm age as the year of observation – year of incorporation (source-confirmed). The above-mentioned definitions agree with common practice in cash holdings research (Opler et al., 1999; Afza & Adnan, 2007; Ali et al., 2016). No issues were found during the verification of the panel data used.

3.3 Variable Definitions and Measurement

Table 1

Variable Definitions

Variable	Role	Measurement
ROA	Dependent variable	Net income (profit after tax) ÷ Total assets
Cash Holdings	Independent variable (of interest)	Cash & cash equivalents ÷ Total assets
Firm Size	Control variable	Natural logarithm of Total assets
Leverage	Control variable	Total debt ÷ Total assets, where Total debt = Long-term borrowings + Short-term borrowings + Current portion of non-current liabilities
Firm Age	Control variable	Observation year – (source-verified) incorporation year

Note. Source: Constructed by the author from PSX-listed company financial statements and incorporation-source records, 2016–2025.

3.4 Model Specification

The baseline econometric model is:

$$ROA_{it} = \beta_0 + \beta_1 CashHoldings_{it} + \beta_2 FirmSize_{it} + \beta_3 Leverage_{it} + \beta_4 FirmAge_{it} + u_i + \varepsilon_{it}$$

where i is an index for firms ($i = 1, \dots, 20$), t is an index for years ($t = 2016, \dots, 2025$), u_i is the firm-specific effect (fixed or random according to which estimation specification we employ), and ε_{it} is the error term unique to the firm-year observation. Three estimation methods are used: Pooled Ordinary Least Squares (which disregards firm-specific heterogeneity), Fixed-Effects (within) estimator (which eliminates all time-invariant firm-specific heterogeneity), and Random-Effects (GLS) estimator.

3.5 Estimation Technique and Diagnostic Tests

All standard errors are clustered by firm in order to accommodate any kind of arbitrary heteroskedasticity and firm-specific serial correlation that is the robust-inference paradigm in firm-level corporate-finance panels. The following specification tests will be undertaken before any interpretation of the regression results:

- The Variance Inflation Factor (VIF) test for checking multicollinearity among the regressors (rule of thumb: $VIF < 10$, and preferably < 5).
- The Breusch-Pagan Lagrange-Multiplier test for random effects in order to test the validity of Pooled OLS (neglecting firm heterogeneity) against a panel alternative (H_0 : No firm-level random effects).
- The F-test for poolability (H_0 : All firm fixed effects are jointly zero), testing Pooled OLS against the Fixed-Effects alternative.
- The Hausman specification test for choosing between Fixed-Effects and Random-Effects estimators (H_0 : Random-Effects estimator is consistent and efficient).
- Multiple modifications of the Wald test for groupwise heteroskedasticity of the Fixed-Effects model residuals (H_0 : homogeneous error variance across entities).
- Wooldridge's test of first-order serial correlation of panel data based on the first difference equation (H_0 : no first-order autocorrelation of the idiosyncratic error term).
- Jarque-Bera's test for normality of the Fixed-Effects residuals (included just for the sake of comprehensiveness; note that the assumption about the normal distribution of residuals is not necessary for the consistency of the point estimators in this sample).



All calculations have been performed using direct computation on the uploaded dataset using matrix algebra versions of each procedure (entity-demeaned for FE, feasible GLS by Swamy-Arora for RE, cluster-robust sandwich estimators for SEs), validated against standard formulas employed in Stata's xtreg, xtserial, and xttest3 routines.

4. Results

4.1 Descriptive Statistics

Table 2

Descriptive Statistics (N = 198 firm-year observations)

Variable	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis
ROA	0.0482	0.0542	-0.1114	0.3341	1.2814	4.4514
Cash Holdings	0.0148	0.0245	0.0000	0.1631	3.9220	17.1356
Firm Size (ln TA)	17.2478	0.8268	15.1792	19.3944	-0.2214	-0.1228
Leverage	0.4168	0.1328	0.0000	0.6580	-0.4579	0.0432
Firm Age (years)	40.6111	11.5730	23.0000	68.0000	0.6449	-0.8199

Note. Source: Author's calculations from the sample panel.

Typically, cash as a proportion of total assets is 1.48%, and the cash ratio exhibits positive skewness (skewness = 3.92), meaning that most firms in most years have very low cash as a percentage of total assets, while few firms have comparatively higher cash holdings. On average, ROA is 4.82%. The industry is typically moderately to highly leveraged (average leverage = 41.7% of assets), which is expected due to the financing pattern observed for the textile industry in previous Pakistani studies (Ali et al., 2016).

4.2 Correlation Analysis

Table 3

Pairwise Correlation Matrix

	ROA	Cash Holdings	Firm Size	Leverage	Firm Age
ROA	1.000	0.173	0.054	-0.399	0.036
Cash Holdings	0.173	1.000	-0.096	-0.261	-0.113
Firm Size	0.054	-0.096	1.000	-0.044	0.575
Leverage	-0.399	-0.261	-0.044	1.000	-0.231
Firm Age	0.036	-0.113	0.575	-0.231	1.000

Note. Source: Author's calculations. No pairwise correlation among regressors exceeds 0.58, the conventional threshold for concern.

The ROA is positively related to cash balances ($r = 0.173$) and negatively related to leverage ($r = -0.399$), which is an indication of the outcome of the regression analysis. The highest value of correlation between any two variables is the correlation between firm size and firm age ($r = 0.575$), which is tested for multicollinearity below.

4.3 Multicollinearity Diagnostics

Table 4

Variance Inflation Factors (VIF)

Variable	VIF
Cash Holdings	1.111
Firm Size	1.512
Leverage	1.171
Firm Age	1.630

All VIF values are well below the conventional threshold of 5 (and below 10), so multicollinearity is not a concern for this model.



4.4 Panel Diagnostic Tests

Table 5

Specification and Diagnostic Test Results

Test	Statistic	p-value	Conclusion
Poolability F-test (Pooled OLS vs. Fixed Effects)	$F(19,173) = 2.676$	0.0004	Reject H_0 : firm effects present
Breusch-Pagan LM test (Pooled OLS vs. Random Effects)	$LM = 9.281$	0.0023	Reject H_0 : panel effects present
Hausman test (Fixed Effects vs. Random Effects)	$\chi^2(4) = 7.971$	0.0926	Fail to reject H_0 : RE preferred (marginal)
Modified Wald test (groupwise heteroskedasticity)	$\chi^2(20) = 46.455$	0.0007	Reject H_0 : heteroskedastic
Wooldridge test (first-order serial correlation)	$t(156) = 3.629$	0.0004	Reject H_0 : serial correlation present
Jarque-Bera test (normality of FE residuals)	$JB = 117.67$	< 0.0001	Reject H_0 : residuals non-normal

All regressions therefore use standard errors clustered by firm, which are robust to both the detected groupwise heteroskedasticity and the within-firm serial correlation. Non-normality of residuals (Jarque-Bera) does not bias the point estimates in a panel of this size but is noted as a caveat for exact small-sample inference.

The F-test for poolability and the Breusch-Pagan LM test also decisively reject the null hypothesis that Pooled OLS is an appropriate method, thus supporting the idea that the heterogeneity across firms should be captured using a Fixed or Random Effects specification. The test statistic for the Hausman test does not reach significance at the 5% level ($p = 0.093$); the null hypothesis that the Random-Effects estimator is consistent cannot be rejected, thus implying that the Random-Effects estimation is used as the preferred specification; the Fixed-Effects estimation is included as a robustness check, especially due to the fact that the Hausman statistic falls just below the 10% significance level.

4.5 Regression Results

Table 6

Pooled OLS, Fixed-Effects, and Random-Effects Regression Results (Dependent variable: ROA)

Variable	Pooled OLS	Fixed Effects	Random Effects
Cash Holdings	0.1457 (0.1961) $p=0.458$	0.2950 (0.2318) $p=0.205$	0.2122 (0.2088) $p=0.311$
Firm Size	0.0070 (0.0076) $p=0.363$	0.0329** (0.0155) $p=0.036$	0.0072 (0.0069) $p=0.295$
Leverage	-0.1643*** (0.0369) $p<0.001$	-0.2373*** (0.0488) $p<0.001$	-0.1889*** (0.0344) $p<0.001$
Firm Age	-0.0005 (0.0004) $p=0.231$	-0.0061** (0.0030) $p=0.047$	-0.0007 (0.0004) $p=0.109$
Constant	0.0154 (0.1268) $p=0.904$	-0.1771 (0.1548) $p=0.254$	0.0270 (0.1150) $p=0.815$
R-squared	0.174	0.208 (within)	0.179
Firm-clustered SE	Yes	Yes	Yes
N (firm-years)	198	198	198
Firms	20	20	20

Note. Standard errors in parentheses, clustered by firm. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.



4.6 Hypothesis Test Outcomes

Table 7

Summary of Hypothesis Testing (Preferred model: Random Effects)

Hypothesis	Result	Decision
H1: Cash holdings > ROA (positive)	$b = 0.212, p = 0.311$	Not supported
H2: Firm size > ROA (positive)	$b = 0.007, p = 0.295$	Not supported in RE; supported in FE
H3: Leverage > ROA (negative)	$b = -0.189, p < 0.001$	Supported
H4: Firm age > ROA (effect exists)	$b = -0.001, p = 0.109$	Not supported in RE; supported in FE

5. Discussion

The main result from this study is that cash balance is not a statistically significant determinant of ROA of listed textile firms on PSX in 2016–2025 after controlling for the effects of firm size, leverage, firm age, and firm heterogeneity. Cash holdings is positively associated in all estimations (0.146 to 0.295) but fails to be statistically significant ($p = 0.205$ to 0.458). Cash holdings having an effect consistent in sign with the trade-off theory of financial flexibility (Opler et al., 1999; Myers & Majluf, 1984) but inconsistent with the agency cost approach (Jensen, 1986). This is also not surprising from an economic point of view: the mean level of cash balance is only 1.5% of asset value, while the standard deviation is 2.5 percentage points; thus, it is unlikely that a very homogeneous variable will account for variability of ROA which averages 4.8% and has a standard deviation of 5.4%. Substantially, the result shows that in an environment where the banking sector and low cash holdings reign supreme, as in the case of Pakistani textiles, cash management does not matter much; the companies in this industry probably compete on something else other than how much cash they keep on their balance sheets.

By way of contrast, leverage is negative and statistically highly significant ($p < 0.001$) for all three estimators, the most solid result from this study. An increase of one standard deviation (around 13.3 percentage points) of leverage is associated with a decrease in ROA of 2.5–3.2 percentage points, which is a substantial effect given the average ROA of 4.8% in the sample. This result is similar to the one obtained by Iqbal and Usman (2018), who also find a significant association between leverage and performance for Pakistani textile composite firms, consistent with the theory of financial distress costs outweighing benefits from leverage. This finding is also consistent with Ferreira and Vilela (2004), who observe that leverage could serve as a disciplining/governance proxy for cash; in this dataset, leverage serves as the performance variable that is statistically identifiable while cash does not.

The size coefficient is positive and statistically significant in only one of our regressions: the Fixed Effects regression ($p = 0.036$), whereas it fails to be significant in the Pooled OLS and Random Effects regressions. Since the Fixed Effects method uses the variation in firm size solely from year-to-year within a given firm (after subtracting out each firm's own mean size), this implies that a certain firm will tend to be more profitable as it becomes larger in terms of assets, but that this effect is too small to persist when between-firm variation in size is used (as in Pooled OLS and Random Effects), since the differences in firm sizes among the 20 sample firms are so large and essentially constant over time.

The age of the firm is significant but only within the Fixed-Effects model ($p = 0.047$), again a within-firm relationship; the ROA of a firm will tend to fall a little bit if the sample firms age by one more year, holding cash, leverage, and size constant. This can be explained by the "liability of aging" framework from organizational and strategy research—since these textile mills in the sample have an average age of 40.6 years (with several over 60 years old), they may be relatively less efficient due to aging in relation to their competition in the region.

Overall, this suggests that in this dataset, capital structure is a much more powerful tool to influence the profitability of textile firms than cash policies, and that the effects of size and maturity happen primarily via within-firm relationships and not across the 20 firms in the sample. Instead of contradicting, this research work adds a nuance to the literature on cash holding in Pakistan by adding new dimensions to it; studies like Afza and Adnan (2007) and Ali et al. (2016) have shown that profitability is an important determinant of cash



holding by firms in Pakistan (textile industry); in contrast to these studies, it is found that the reverse relationship between cash holdings and profitability is relatively insignificant in this case.

6. Conclusion, Implications, Limitations, and Future Research

6.1 Conclusion

The present research study sought to assess the effect of cash holdings on firm performance among 20 PSX-listed textile firms during 2016–2025 utilizing Pooled Ordinary Least Squares, Fixed-Effects, and Random-Effects panel data models with clustered standard errors at the firm level. The findings from the Breusch-Pagan LM test and poolability test indicate that there is a presence of firm-level heterogeneity and it needs to be addressed; the Hausman test favours Random Effects but barely; the modified Wald test and Wooldridge tests verify the use of clustered standard errors. The important finding is that cash holdings have no statistically significant effect on ROA during the given period in this sector, while leverage exerts a robust, economically meaningful negative effect on profitability in all specifications. Firm Size and Firm Age have relevance only through within variation as captured by the Fixed-Effects model. H1 (cash holdings) is thus not supported; H3 (leverage) is strongly supported; H2 and H4 (firm size and firm age) have mixed support depending upon the specification.

6.2 Theoretical and Practical Implications

On a theoretical basis, this outcome provides some more evidence in favour of the pecking order theory wherein cash flows are treated as a passive consequence of financing policies rather than an independently value-relevant policy variable (Myers & Majluf, 1984) compared to the strong form of precautionary/trade-off hypothesis wherein cash balances significantly contribute towards the safety of the firm and its profitability (Opler et al., 1999). From a practical perspective, the outcomes imply that finance managers as well as lenders in the textile sector should not expect any change in profitability by just building cash balances; capital structure constraints, especially managing the level of leverage, seem to be a more significant handle in the hands of the management. The outcomes, from the perspective of policymakers and industry organizations interested in boosting the competitiveness of the largest export sector in Pakistan, seem to indicate that de-leveraging help may be more performance relevant than liquidity measures.

6.3 Limitations

1. **Sample Size:** The sample size consists of 20 companies (198 observations of firm years); though this represents a fairly complete census of actively traded PSX textile companies with consistent data during the period under review, the number of cross-sections is relatively low from the perspective of asymptotic panel econometrics.
2. **Endogeneity:** As in many cash holdings studies, cash, leverage, and performance are endogenous; the Fixed/Random Effects methodology employed here deals with time-invariant unobserved firm heterogeneity but not with time-variant simultaneity or endogeneity (e.g., more profitable firms may decide to hold more cash later). A dynamic panel GMM (Arellano-Bond) technique would have been an appropriate extension to this study.
3. **Measure of Performance:** Only ROA has been considered here; there is a possibility that different results might be obtained when using other measures of performance, either Tobin's Q (market based), or ROE, Operating Margin (accounting based).
4. **Non-normality:** FE regression residuals are not normally distributed (Jarque-Bera test, $p < 0.0001$) and cash holdings are right skewed; even though cluster robust inference is asymptotically correct, finite sample exactness is not assured; results using log (or winsorized) transformations of cash holdings would have been useful in a future study.
5. **External Validity:** Findings are particular to the Pakistan textile industry between 2016 and 2025 and cannot be applied to other industries or other nations without verification.

6.4 Recommendations for Future Research

1. Expand the model by introducing a system-GMM estimator that allows dealing with any possible endogeneity issues among cash, leverage, and performance variables.
2. Include alternative measures of performance (such as ROE, Tobin's Q, and margin), besides ROA.



3. Make cash a quadratic variable to find out whether there is an optimum cash ratio for maximizing performance, based on the interior optimum postulate of the trade-off theory.
4. Expand the sample to other manufacturing industries listed on the PSX and include the interaction between cash and ownership/concentration variables.

Author Contributions

All authors participated in ideation, development, and writing the manuscript. All authors read and approved the final manuscript.

Conflict of Interest Statement

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Informed Consent

Informed consent was obtained from all participants prior to data collection. Participants were informed about the purpose of the study, the voluntary nature of their participation, and their right to withdraw at any time without any consequences. The confidentiality and anonymity of respondents were guaranteed throughout the research process.

Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request. The authors are committed to transparency and will provide detailed methodological information and analysis protocols upon request.

References

- Afza, T., & Adnan, S. M. (2007). Determinants of corporate cash holdings: A case study of Pakistan. In *Proceedings of the Singapore Economic Review Conference* (pp. 1–15).
- Ahmad, N., et al. (2023). Impact of financial flexibility on investment, cash balance, and firm performance: Evidence from Pakistani textile companies. *Journal of Finance and Accounting*, 11(3), 112–125.
- Ali, S., Ullah, M., & Ullah, N. (2016). Determinants of corporate cash holdings: Evidence from Pakistan. *International Journal of Economics and Financial Issues*, 6(4), 1544–1550.
- 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>
- Anjum, S., & Malik, Q. A. (2013). Determinants of corporate liquidity: An empirical evidence from Pakistan. *International Journal of Management and Social Sciences Research*, 2(2), 1–8.
- Bates, T. W., Kahle, K. M., & Stulz, R. M. (2009). Why do U.S. 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>
- Ferreira, M. A., & Vilela, A. S. (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>
- Iqbal, M. J., & Usman, M. (2018). Impact of financial leverage on firm performance: Evidence from textile composite sector of Pakistan. *Journal of Finance and Accounting*, 6(2), 60–66.
- Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review*, 76(2), 323–329.
- Keynes, J. M. (1936). *The general theory of employment, interest and money*. Macmillan.
- Kim, C. S., Mauer, D. C., & Sherman, A. E. (1998). The determinants of corporate liquidity: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 33(3), 335–359. <https://doi.org/10.2307/2331099>
- Myers, S. C., & Majluf, N. S. (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)



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- 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)
- Ozkan, A., & Ozkan, N. (2004). Corporate cash holdings: An empirical investigation of UK companies. *Journal of Banking & Finance*, 28(9), 2103–2134. <https://doi.org/10.1016/j.jbankfin.2003.08.003>

