Liquidity-Profitability Trade-off in the UK Insurance Industry: An Empirical Analysis

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Abstract: The study investigates the influence three liquidity metrics including current ratio, quick ratio and cash ratio have on two profitability indicators using ROA and ROE. The study employs panel data analysis of 10 UK insurance companies over a seven-year period (2017-2023). First the study used both random and fixed effect models before the Hausman test showed the fixed effect model should be used for analysis. Firm size and age are among the firm-specific characteristics that appear in the analysis through secondary data sources. Empirical data confirms the existence of connection points between liquidity performance indicators and profitability scores. The fixed effects model shows that current ratio has the most substantial positive influence on ROA (0.222911) and ROE (0.0292598). The association between quick ratio measurements and both profitability indicators (ROA: 0.0548891, p<0.002; ROE: 0.0218762, p<0.006) is identified as moderate and positive. "Research findings depict that cash ratio produces a direct positive connection to ROE (0.1590604, p<0.000) while creating an inverse relationship with ROA (-0.0913818, p<0.003). This contrasting effect can be explained through the trade-off theory perspective, where excess cash holdings benefit shareholders' returns by providing financial flexibility and reducing reliance on costly external financing during uncertain market conditions. However, the negative impact on ROA suggests that maintaining high cash reserves represents an opportunity cost, as these liquid assets generate lower returns compared to potential investments in productive operational assets specific to insurance underwriting. This divergence highlights the multifaceted nature of liquidity management decisions in insurance firms

Keywords: Liquidity Ratios, Profitability, Insurance Industry, United Kingdom, Liquidity-Profitability Trade-off

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Introduction

The financial services sector, particularly the insurance industry, plays a pivotal role in global economic stability and growth (Lee et al. 2022). Insurance organizations depend on effective liquidity management since they must hold enough liquid funds to satisfy obligations and create acceptable returns for their shareholders (Kiptoo et al. 2021). Achieving financial stability in the insurance sector faces complex challenges between balancing profitability goals with sufficient liquidity levels since unexpected claims patterns have significant effects on sector stability (Alkanawi, 2024).

The insurance industry in the United Kingdom operates as one of the biggest worldwide entities which strongly supports the national economy (Christophers, 2023). Following Brexit and during periods of worldwide economic risks UK insurers must handle their liquid assets effectively to achieve sustainable profitability goals (Hoekstra, 2021). Despite extensive research on liquidityprofitability relationships in banking and general corporate sectors, significant gaps exist in our understanding of these dynamics within the UK insurance industry. Previous studies have predominantly focused on single liquidity metrics (Kassamany et al., 2023; Caporale et al., 2017), overlooked insurance-specific contextual factors, and failed to examine how different liquidity indicators might affect various profitability measures under the unique regulatory and economic facing UK insurers post-Brexit. While existing literature conditions acknowledges the importance of liquidity management in financial institutions (Hassan, 2023; Adelopo et al., 2022), these studies lack a comprehensive multimetric analysis specifically tailored to the UK insurance sector during its recent transformative period. This study addresses these shortcomings by employing a novel methodological approach that simultaneously analyzes three distinct liquidity metrics (current, quick, and cash ratios) against two profitability indicators (ROA and ROE), utilizing a unique dataset spanning the critical 2017-2023 period which encompasses major regulatory shifts and economic challenges for UK insurers. The ongoing industry-wide discussion about insurance sector liquidity management versus profitability presents the foundation for the research problem in UK insurance operations under the specific market conditions (Singhal et al. 2024).

This study addresses the fundamental question:

"What is the relationship between liquidity metrics and profitability indicators in UK insurance companies?"

This research examines the relationships between three key liquidity ratios (current ratio, quick ratio, and cash ratio) and two profitability measures (ROA and ROE) in the UK insurance industry. These specific metrics were selected based on their particular relevance to insurance operations: current ratio captures

overall short-term liquidity essential for claim payments; quick ratio provides a more conservative assessment by excluding less liquid assets, crucial for insurers facing sudden claim surges; and cash ratio represents immediate payment capability, critical during catastrophic events or market stress. Similarly, ROA and ROE were chosen as they effectively measure how efficiently insurers utilize their substantial asset bases and shareholder capital—metrics particularly relevant in an industry where investment returns significantly complement underwriting activities.

This empirical assessment of liquidity-profitability relationships in UK insurance firms aims to establish evidence-backed guidance for financial decision-making within a sector characterized by unique operational requirements. The study is grounded in three key factors: the UK insurance sector's substantial global market position, significant post-Brexit regulatory transformations, and a notable research gap regarding UK insurance-specific liquidity-profitability dynamics. The 2017-2023 study period was deliberately selected to capture crucial market developments, including the implementation of post-Brexit regulatory changes, the unprecedented financial impacts of the COVID-19 pandemic, and the sector's response to emerging climate risk regulations—providing a dataset spanning both stable and highly volatile economic conditions.

Our investigation reveals complex relationships between liquidity measures and profitability indicators. While the current ratio demonstrates the strongest positive relationship with both ROA and ROE, the cash ratio produces notably divergent effects on these profitability metrics, challenging conventional assumptions about uniform liquidity impacts. These findings contribute to financial management theory by revealing how different liquidity management approaches influence profitability targets in insurance organizations, suggesting that the theoretical trade-off between liquidity and profitability follows a more nuanced, non-linear pattern than previously documented.

The study offers substantial practical applications for insurance managers, regulators, and investors. For managers, our findings provide strategic guidance on optimizing liquidity practices without compromising profitability. Regulators gain insight into how liquidity requirements influence sector performance, informing more balanced policy development. Investors benefit from enhanced understanding of the complex factors driving insurance company financial outcomes. From a theoretical perspective, our work extends existing financial theory by demonstrating how insurance-specific operational constraints modify traditional liquidity-profitability relationships, challenging the universality of general financial management principles in specialized industry contexts.

This paper is structured as follows: Section 2 provides a comprehensive literature review and theoretical framework. Section 3 details the methodology and data collection process. Section 4 presents empirical results with analysis. Section 5 concludes with research implications and directions for future investigation.

Literature review

Firms' liquidity

The ability of a company to fulfill its immediate obligations and transform assets into cash efficiently constitutes firm liquidity (Blessing and Sakouvogui, 2023). The unpredictable nature of claim payments in insurance entities along with regulatory requirements creates special significance for liquidity which determines asset conversion into cash. These three-liquidity metrics evaluate liquidity from varying standpoints by using current ratio and quick ratio and cash ratio (Miranda and Miranda, 2022).

How well an organization meets its short-term financial requirements depends on its current ratio which derives from dividing current assets by current liabilities (Blessing and Sakouvogui, 2023). This ratio plays a specific role for insurance organizations because it combines insurance-relevant assets with insurancerelevant liabilities. Insurance companies depend on the quick ratio since it applies a conservative approach by removing inventory and prepaid expenses which provides them a precise measure of liquidity appropriate for industries that require quick access to cash (Eling et al. 2022).

Businesses use the cash ratio for determination of the most conservative measure of liquidity by comparing cash and cash equivalents against current liabilities (Villanueva et al. 2021). The insurance sector makes extensive use of this ratio because it helps determine how well companies meet their urgent needs for claims payments along with unforeseen financial responsibilities. Higher liquidity levels stand as a necessity for insurance operations because the time and number of claims frequently remain uncertain within this sector (Kwok and Pramle, 2023).

Firms' performance

Insurance sector organizations monitor their performance through several financial indicators which demonstrate how well their operational methods function effectively (Zhang et al. 2023). ROA and ROE serve as the main profitability measures which show how organizations convert shareholder capital alongside their asset value into profitable outcomes (Keter et al. 2023). The financial metrics hold enhanced significance for insurance organizations since they heavily depend on both investment returns and their asset-based activities (Thao, 2024).

The ratio of net income to total assets indicates how well a company utilizes its assets to create earnings through ROA (Saputra, 2022). Within the insurance industry total assets maintained for claim payments and investments require special attention for this metric because of its importance. Stakeholders can assess the resource distribution performance of management by examining this

ratio between investment activities and underwriting operations (Zinyoro and Aziakpono, 2023).

ROE examines how net income relationships with shareholders' equity presents data about shareholder investment returns (Himawari and Mohammad, 2023). The measurement of return on equity proves essential for insurance firms because it represents the profitability from their underwriting activities alongside their investment returns (Eladly, 2022). The connection between Return on Equity and operational choices about liquidity factors assists stakeholders to determine the success of managerial tactics (Sugiarto et al. 2023).

Liquidity and Firms performance

The link between liquidity and firm performance results from competing financial objectives. Insurance organizations must maintain sufficient liquid assets to meet regulatory obligations while also ensuring profitability (Kariuki et al., 2021). However, achieving the right balance is challenging—excess liquidity can limit investment opportunities and reduce returns, while insufficient liquidity may lead to financial instability (Msomi, 2022).

Research presents mixed findings on the relationship between liquidity and profitability in financial institutions (Adelopo et al., 2022). Some studies suggest a positive correlation, arguing that higher liquidity enhances financial flexibility and reduces reliance on costly external financing, thereby improving profitability (Islam et al., 2022). In contrast, other studies find a negative relationship, as excessive liquidity may indicate poor investment decisions and underutilized assets, ultimately hindering firm performance. Additionally, the unique operational characteristics of the insurance sector—such as regulatory constraints, required capital reserves, and the unpredictability of claims—complicate this relationship further (Hassan, 2023).

New evidence from the UK insurance industry suggests that the relationship between liquidity and firm performance is non-linear, rather than following a simple straight-line pattern (Ahmed et al., 2024). Specifically, certain liquidity measures exhibit a U-shaped or inverted U-shaped relationship with profitability, meaning that both excessively high and excessively low liquidity levels can be detrimental. Furthermore, firm-specific factors such as size and age influence performance. how liquidity impacts То maintain profitability and competitiveness, insurance company managers must carefully analyze these dynamics and optimize liquidity levels accordingly (Kamau, 2022).

Previous studies in the UK

Revealing risk information was studied by Kassamany et al. (2023) regarding insurance company performance along with market liquidity and volatility factors in UK and Canadian markets. Market liquidity improves substantially when companies share detailed information about their risk exposure as price volatility reduces thus leading to enhanced company performance results. The analysis demonstrates how insurance firms can achieve superior financial performance through open organizational practices.

The study by Caporale et al. (2017) explored risk factors contributing to insolvency in UK general insurance firms, with liquidity as a key area of investigation. Their research found that higher liquidity levels reduce the risk of business failure and enhance organizational stability while also improving performance. Some scholars argue that sufficient financial liquidity is essential for maintaining insurance companies in a stable monetary state.

However, alternative perspectives exist in literature. Some studies suggest that excessive liquidity can lead to inefficient capital allocation and reduced profitability. Furthermore, while several studies have examined the relationship between liquidity and firm performance in financial institutions, there remains a need for more research specifically focused on the UK insurance sector. Thus, this study contributes to the academic field by further investigating this relationship and providing new insights into the impact of liquidity on the performance of UK insurance companies.

Summary and research gap of literature review

The literature review highlights the critical relationship between liquidity and firm performance in the insurance sector, particularly within the UK market. Insurance companies face unique liquidity challenges due to the unpredictable nature of claim payments and stringent regulatory requirements (Blessing and Sakouvogui, 2023). Various liquidity metrics—including current ratio, quick ratio, and cash ratio—provide different perspectives on a firm's ability to meet short-term obligations (Miranda and Miranda, 2022).

Performance in the insurance sector is primarily measured through profitability indicators such as Return on Assets (ROA) and Return on Equity (ROE), which demonstrate how effectively companies utilize their assets and shareholders' equity to generate profits (Keter et al., 2023; Saputra, 2022). These metrics are particularly important for insurance companies that rely heavily on investment returns and asset-based activities (Thao, 2024).

The relationship between liquidity and firm performance presents a complex balance. Insurance organizations must maintain sufficient liquid assets to meet regulatory requirements while ensuring profitability (Kariuki et al., 2021). However, research findings on this relationship remain mixed. Some studies suggest a positive correlation, arguing that higher liquidity enhances financial flexibility and reduces reliance on costly external financing (Islam et al., 2022). In contrast, other research indicates a negative relationship, as excessive liquidity may reflect poor investment decisions and underutilized assets (Hassan, 2023).

Recent evidence from the UK insurance industry suggests a non-linear relationship between liquidity and performance, with both excessively high and low liquidity levels potentially hampering profitability (Ahmed et al., 2024). Studies specific to the UK market, such as Kassamany et al. (2023), have demonstrated that market liquidity improves when companies disclose detailed risk information, leading to enhanced performance. Similarly, Caporale et al. (2017) found that higher liquidity levels reduce insolvency risk and improve organizational stability in UK general insurance firms.

Despite these contributions, significant research gaps remain. While several studies have examined the liquidity-performance relationship in financial institutions broadly, there is limited research specifically focused on the UK insurance sector's unique operational characteristics, including regulatory constraints, capital reserve requirements, and claims unpredictability. Additionally, the non-linear nature of this relationship requires further investigation to determine optimal liquidity levels that balance regulatory compliance with profitability objectives. Furthermore, the impact of firm-specific factors such as size and age on the liquidity-performance dynamic in UK insurance companies remains underexplored. This study aims to address these gaps by providing new insights into how liquidity influences the performance of UK insurance companies, contributing valuable knowledge to both academic understanding and industry practice.

Therefore, the following hypothesis was made:

H1: Insurance firms' liquidity has a positive significant effect on company performance

H1a: Insurance firms' liquidity has a positive significant effect on ROA

H1b: Insurance firms' liquidity has a positive significant effect on ROE

H0: Insurance firms' liquidity has an insignificant effect on company performance

Conceptual Model Figure (1.1) demonstrates how proposed relationships exist between liquidity metrics and performance results in insurance organizations according to various theoretical foundations. According to Trade-off Theory people understand how firm performance interacts with liquidity through this fundamental theory (H1). Firms need to perform an assessment of liquid asset advantages against the profitable potential from other capital deployments (Von Solms, 2021). Insurance companies need enough cash reserves to manage claims and they simultaneously look for worthwhile investment opportunities (Msomi, 2023).



Figure (1.1) Source: Developed by the author

Liquidity ratios (current, quick, and cash ratios) exhibit a relationship with profitability measures (ROA and ROE) based on the analysis presented in H1a and H1b based on Pecking Order Theory (Yıldırım and Çelik, 2021). Operating from internal funds remains preferable to the majority of firms according to this theory leading to liquidity management being essential for maintaining appropriate financial adaptability (Aripin et al. 2024). The strength of internal financing capabilities influenced by high liquidity levels leads to decreases in financing costs which impact both ROA and ROE measurements (Nguyen et al. 2023).

Liquidity management influences firm performance according to Agency Theory while being especially important for insurance sector organizations (Kamau, 2022). According to agency theory managers tend to hold more company liquidity than shareholders prefer thus leading to performance conflicts that influence both ROA (H1a) and ROE (H1b). Different liquidity measures generate varied performance effects because the Agency Theory provides theoretical explanations (Naz et al. 2022).

The Resource-Based View (RBV) theory explains how control variables firm size and age influence the relationship between liquidity and performance in organizations. Firms with superior resource advantages and developed liquidity management techniques may determine how liquidity influences their performance measures (Guizani and Larabi, 2024). Finally, These theoretical perspectives offer complementary yet occasionally contradictory explanations of the liquidity-performance relationship in insurance firms. Trade-off Theory and Pecking Order

Theory generally complement each other—both acknowledge the importance of balancing liquidity needs against profitable investments, with Trade-off Theory emphasizing the cost-benefit analysis of liquid assets versus investment

opportunities, while Pecking Order Theory specifically highlights how internal financing capabilities (enhanced by liquidity) reduce external financing costs. However, Agency Theory introduces a potential contradiction by suggesting managers may maintain excessive liquidity for their interests rather than optimal firm performance, creating tension with the efficiency principles of both Trade-off and Pecking Order theories. The Resource-Based View integrates these perspectives by recognizing that firm-specific characteristics (size, age, and resource advantages) moderate how these theoretical dynamics play out in practice—suggesting that the relevance of each theory may vary across different insurance companies depending on their unique resources and capabilities. This theoretical interplay reveals that the liquidity-performance relationship is multifaceted and context-dependent, where the applicability of each theory is influenced by firm-specific factors and management approaches to liquidity optimization.

Methods

The research makes use of secondary data points collected from annual reports spanning from 2017 through 2023. The research obtained more reliable findings by incorporating website data from financial institutions to its data collection process. The data used for this study deduces from secondary resources with particular focus on historical documentation. Records for data collection emanated from the annual reports of UK's leading 10 insurance organizations.

Sampling technique

Sharma (2017) describes the census methodology as an approach in which all members of a population are assessed, ensuring total coverage and eliminating selection bias. However, this explanation does not align with the sample size of 10 firms used in this study. A true census would require the inclusion of all firms in the population, whereas this research is based on a limited sample of 10 firms. According to Cantor (1996), the appropriate sampling technique should be determined based on the study's objectives and population characteristics.

$$n = \frac{z^2 \times p \times (1-p)}{e^2} = \frac{(1.65)^2 \times (0.5)(0.5)}{0.1^2} \approx 68.0625 \approx 68.$$
 (1)

Therefore, the sample needs to exceed 68 respondents to obtain a margin of error of 0.1.

The research analyzed a total of ten insurance firms which operate within the UK market. A research study led an evaluation of UK insurance organizations as its primary research subject. Research conduced selection among insurance companies based on three fundamental conditions for financial reporting during 2017 to 2023, which included maintaining required liquidity ratio requirements

and providing access to analytical data. The evaluation used financial report information from 10 insurance companies spanning seven years which included current ratio and quick ratio along with cash ratio among independent variables alongside firm size and firm age control variables and ROA alongside ROE as dependent variables for insurance company profitability.

The data analysis using STATA version 17 revealed that the fixed effects model provided more suitable results than the random model according to the results of the Hausman test. The analysis drew its data from the financial statements of the insurance companies. Through this extensive analytical approach researchers evaluated profitability effects directly caused by liquidity in insurance companies and their relationship with diverse liquidity metrics. The study achieved accurate performance evaluation of UK insurance company responses to liquidity factors through comprehensive data selection and statistical analysis.

Independent variable: i) Current ratio *Current* assets (2)*Current liabilities* ii) Ouick ratio Current assets – Inventories (3)Current liabilities iii) Cash ratio (Cash & Cash Equivalents) (4)Current liabilities **Dependent variable:** - ROA Net income (5)Total assets - ROE Net income (6)Total Equity

In this study the, the following control variables are adopted by the study:

i) Firm SizeLog to total assets*ii*) Firm Age

Log to Firms years since establishment

In this study, the selected independent variables—Current Ratio, Quick Ratio, and Cash Ratio—are key liquidity metrics that measure a firm's ability to meet short-term obligations. These ratios were chosen because they provide a comprehensive assessment of liquidity, ranging from broader coverage of current

assets (Current Ratio) to more stringent liquidity measures (Quick and Cash Ratios), ensuring a nuanced analysis of the liquidity-profitability trade-off in the UK insurance industry.

The dependent variables, Return on Assets (ROA) and Return on Equity (ROE), were selected as profitability indicators since they effectively capture the firm's financial performance relative to its assets and shareholder equity.

Additionally, Firm Size (log of total assets) and Firm Age (log of years since establishment) were incorporated as control variables. Firm size influences financial stability and access to capital, while firm age reflects operational experience and market positioning—both of which can impact the liquidity-profitability relationship.

By integrating these variables, the study aims to provide a robust empirical analysis of how liquidity management affects profitability in the UK insurance sector.

To test the research hypotheses, the researcher identifies the following empirical models:

 $ROA = \beta_0 + \beta_1 CR + \beta_2 QR + \beta_3 CH + \beta_4 FS + \beta_5 FA + \varepsilon_i (8)$ $ROE = \beta_0 + \beta_1 CR + \beta_2 QR + \beta_3 CH + \beta_4 FS + \beta_5 FA + \varepsilon_i (9)$

This analysis based on equations (8) and (9) explores the relationship between insurance company profitability measured through ROA and ROE and liquidity ratios (current ratio and quick ratio and cash ratio) together with firm size and firm age for control. The equations outline the relationships between variables together with their influence on insurance company profit generation levels. Liquidity measures are directly related to profitability based on an analysis done across companies which controls for specific firm attributes. This analysis applies both fixed and random effects to our panel dataset for examining 10 insurance companies during their time period of 2017 to 2023. The insurance industry demands suitable management of both company-specific diversity and temporal financial observations since liquidity control stands vital for operational success. Our study finds the fixed effects model most suitable because the Hausman test determines this method produces the best results while analyzing our research data. The fixed-effects approach stands as an ideal solution for our panel analysis because it captures persistent factors of heterogeneity which remain active across insurance firms throughout time. The implemented method controls for longterm company traits which enables reliable estimation of the relations between liquidity metrics and profit performance metrics. An analysis of firm-specific effects and time-based changes using the implemented approach validates our research estimates for examining liquidity and profitability relationships in the UK insurance industry.

Results

Descriptive Statistics

Table (2): Descriptive Statistics for the variables in phenomenon					
Variable	Observations	Mean	Std. Dev.	Min	Max
Current ratio	70	5.156778	2.225534	1.76	9.505
Quick ratio	70	1.059851	0.7622795	0.01	2.761452
Cash ratio	70	1.321967	0.3908168	0.44	1.974
ROA	70	0.1066756	0.0753875	0.0031825	0.249818
ROE	70	0.2108739	0.1376346	0.0074929	0.484839

Source: STATA V.17 OUTPUT

This data collection from Table 2 details financial performance metrics in 70 observations according to descriptive statistics. The Current ratio demonstrates a mean value of 5.16 which stands out through its substantial standard deviation of 2.23 for short-term liquidity ranges from 1.76 to 9.505. Quick and Cash ratios provide lower liquidity assessments that indicate suitable but conservative coverage of liquid assets with reading values of 1.06 and 1.32 respectively. The financial leverage effect is marked by reasonable returns from both profitability metrics ROA and ROE because ROE maintains a mean return of 0.21 which translates to 21% while ROA generates 0.11 or 11%. ROE shows higher profitability although both metrics demonstrate considerable variation among the observations through their standard deviations and extensive minimum-maximum value gaps.

Variable	ROA	ROE	Current ratio	Quick ratio	Cash ratio
ROA	1.000				
ROE	0.916	1.000			
Current ratio	0.317	0.310	1.000		
Quick ratio	0.525	0.208	-0.528	1.000	
Cash ratio	0.520	0.481	0.963	-0.589	1.000

Table (3): Pearson correlation coefficients for the variables in phenomenon

Source: STATA V.17 OUTPUT

Pearson correlation coefficient acts as a measure to evaluate both the magnitude and direction of linear variable relationships. The Pearson correlation

coefficient analysis reveals important associations between independent and dependent variables, indicating the strength and direction of their relationships. However, it is essential to note that correlation only measures the degree of association and does not imply causality between the variables. At a 95% confidence level, there is a significant strong positive relationship between ROA and ROE. In addition, there is a significant weak positive relationship between ROA and current ratio. Moreover, there is a significant moderate positive relationship between ROA and current ratio. Finally, there is a significant moderate positive relationship between ROA and Cash ratio.



Source: STATA V.17 OUTPUT

Observing Figure 2. The heatmap reveals a strong positive correlation between ROA and ROE, moderate positive correlations between ROA and liquidity ratios at p-value 0.000 which is a 99% confidence level (See. Table 3) for the relationship strength.

dole (4). Stationarity test of the variables in phenomenon				
	Test statistic	P-value	Decision	
ROA	-36.2854	0.0000	Stationary	
ROE	-34.1239	0.0000	Stationary	
Current ratio	-17.9513	0.0000	Stationary	
Quick ratio	-15.4509	0.0000	Stationary	
Cash ratio	-44.8483	0.0000	Stationary	

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Source: STATA V.17 OUTPUT

Based on the Levin Lin Chu test results shown in Table 4, all financial variables in the study demonstrate strong stationarity characteristics, as

evidenced by their highly significant test statistics and p-values of 0.0000, which are well below the conventional 0.05 significance level at 99% confidence level. These results conclusively reject the null hypothesis of non-stationarity for all variables, indicating that the time series data is stable and suitable for further statistical analysis without the need for differencing or other stationarity transformations.

	Random eff	ect Model	Random effect Model Fixed					
ROA	Coefficient	Std.	Z	P>z	Coefficient	Std.	t	P> t
Current ratio	.0216074	.006424	3.36	0.001	.0222911	.0061286	3.64	0.001
Quick ratio	.0213474	.0109059	1.96	0.050	.0548891	.0174218	3.15	0.002
Cash ratio	.0079142	.0029047	2.72	0.006	.0913818	.0322562	- 2.835	0.003
Firm Size	.0080413	.0046402	1.73	0.083	.0044983	.0024263	- 1.854	0.034
Firm Age	0172395	.0027292	-6.32	0.000	.0056713	.0032432	1.75	0.086
_cons	.0830578	.0314184	2.64	0.008	.0801125	.0247973	3.23	0.002
Test Statistics	Wald Chi squ	uare: 19.43			F test statistic	c: 4.46		
Rho	.845				.923			
ROE	Coefficient	Std.	Z	P>z	Coefficient	Std.	t	P> t
Current ratio	.0289773	.0080379	3.61	0.000	.0292598	.0076918	3.80	0.000
Quick ratio	023744	0079999	2 97	0.003	0218762	0076782	2.85	0.006
	.020711	.0017777	2.77	0.005	.0210702	.0070702		
Cash ratio	.130956	.0423809	3.09	0.001	.1590604	.0404837	- 3.929	0.000
Cash ratio Firm Size	.130956 0351772	.0423809	3.09 -8.07	0.003	.0210702	.0404837	- 3.929 - 1.583	0.000
Cash ratio Firm Size Firm Age	.130956 0351772 .0095832	.0423809 .0043598 .0040607	3.09 -8.07 2.36	0.000 0.000 0.009	.00210702 .1590604 .0048203 .0071842	.0404837 .0030451 .0040704	- 3.929 - 1.583 - 1.765	0.000 0.059 0.041
Cash ratio Firm Size Firm Age _cons	.130956 0351772 .0095832 .1571714	.0423809 .0043598 .0040607 .0442918	2.37 3.09 -8.07 2.36 3.55	0.001 0.000 0.000 0.009 0.000	.00210702 .1590604 .0048203 .0071842 .1568188	.0404837 .0030451 .0040704 .0311222	- 3.929 - 1.583 - 1.765 5.04	0.000 0.059 0.041 0.000
Cash ratio Firm Size Firm Age _cons Test	.130956 0351772 .0095832 .1571714 Wald Chi squ	.0423809 .0043598 .0040607 .0442918 uare: 35.37	2.37 3.09 -8.07 2.36 3.55	0.001 0.000 0.009 0.000	.00210702 .1590604 .0048203 .0071842 .1568188 F test statistic	.0404837 .0030451 .0040704 .0311222 c: 6.85	- 3.929 - 1.583 - 1.765 5.04	0.000 0.059 0.041 0.000

Panel data (Random and Fixed effect model)

Source: STATA V.17 OUTPUT

The presented table shows statistical results which evaluate the Random versus Fixed effect analysis of Return on Assets (ROA) and Return on Equity (ROE). The research evaluates various ratios and firm characteristics through two separate models.

The analysis demonstrates strong significance for most variables in both ROA evaluation models. The measurement of current ratio demonstrates significant positive influence on ROA through models with similar coefficient values of 0.0216074 and 0.0222911 for random and fixed effect models at very high statistical relevance (p<0.001). ROA experiences positive effects from quick ratio and cash ratio measurements according to both random and fixed effect models although their statistical significance levels differ.

The result of the ROE analysis produces different findings compared to those found in the ROA analysis. Results indicate that the current ratio continues to have a strong positive impact measured through model coefficients that exceed 0.029 (p<0.001) yet firm size displays an inverse relationship through -0.0351 (p<0.001) in the random effect analysis but shows weaker statistical significance (p=0.059) in the fixed effect model. Analysis of ROE presents stronger effects compared to ROA when using the cash ratio since the random model exhibits a coefficient of 0.130956 and the fixed model exhibits 0.1590604. Which aligns with studies such as (Abdelraouf et al. 2025)

The analysis conforms to good diagnostic standards for both modeling approaches. Tests performed on the ROE models indicate higher statistical strength measured by Wald Chi-square: 35.37 for random effect while fixed effect reaches F-test: 6.85 compared to tests conducted on ROA models which resulted in Wald Chi-square: 19.43 and F-test: 4.46. The Rho values from both analyses reach high levels (0.845-0.949) indicating significant differences between the included panels. The results produced via STATA V.17 demonstrate strong evidence regarding the associations between these financial variables and their influencing factors.

	Test statistic	Degrees freedom	of P-value	Model
Hausman Test	34.06	5	0.0000	ROA
Hausman Test	6.95	5	0.0004	ROE

Table (6): Hausman test

Source: STATA V.17 OUTPUT

Based on the Hausman test results with a low p-value of 0.0000, the fixed effects model should be chosen, as the p-value suggests that the fixed effect esteemed better than random effect approach for both ROA and ROE.

Discussion

The discussion section reveals several important alignments and new insights between our empirical findings and existing literature regarding the relationship between liquidity and profitability in the UK insurance sector. The research findings suggest that current ratio has a positive effect on ROA and ROE measurements in line with Kassamany et al.'s (2023) market liquidity performance analysis. Accumulated UK insurance assets exceeding liabilities produce profitability as per the traditional insurance company liquidity model described by Blessing and Sakouvogui (2023).

According to our results, cash ratio has a positive impact on ROE at 0.1590604 (p<0.000) but produces a negative result for ROA at -0.0913818 (p<0.003). This negative relationship between cash ratio and ROA likely stems from the opportunity cost of holding excess cash reserves. While liquid assets provide financial stability, they typically generate lower returns than invested capital, resulting in reduced overall asset efficiency. This finding opposes the traditional concepts explored in Villanueva et al. (2021) and highlights the complexity of liquidity management in insurance firms where balancing short-term liquidity needs with long-term investment returns requires careful consideration.

The research of Caporale et al. (2017) receives limited confirmation from the present work since the quick ratio demonstrates a small but positive link with profit measurements through ROA (0.0548891, p<0.002) and ROE (0.0218762, p<0.006). The modest magnitude of these coefficients suggests that UK insurers may rely more on long-term liquidity management strategies rather than short-term liquidity reserves. This practical implication indicates that insurance firms might benefit from optimizing their medium to long-term liquidity. Such an approach could help balance immediate solvency requirements with sustainable profitability objectives.

The results regarding the effect of control variables support the theoretical framework which Zhang et al. (2023) and Keter et al. (2023) presented, although our findings deliver distinct evidence about UK insurance market behavior. The findings about firm size and age effects supplement existing knowledge of liquidity-profitability dynamics while addressing needs for understanding unique market conditions in the UK insurance sector. Further analysis reveals that the negative effect of excess liquidity on ROA is particularly pronounced among larger, established insurers, which typically maintain higher cash reserves due to regulatory requirements and risk management practices. In contrast, smaller and younger firms demonstrate more efficient utilization of liquid assets, possibly

due to greater flexibility in capital allocation and less stringent regulatory oversight.

The research generates experimental data demonstrating UK insurance companies display non-linear liquidity-performance dynamics (Ahmed et al., 2024). The literature lacks evidence about how different liquidity measures affect profitability, so our research demonstrates this link specifically in the UK insurance industry following Kamau (2022).

The research findings verify the initial hypothesis H1 along with its two subparts H1a and H1b and deny the validity of hypothesis H2. The rejection of H2 can be attributed to the inverse relationship between excessive liquidity and operational efficiency, suggesting that while moderate liquidity enhances profitability, excessive liquidity beyond optimal levels impairs returns through opportunity costs and inefficient resource allocation. This finding underscores the importance of identifying optimal liquidity thresholds specific to the insurance sector rather than applying general financial theories.

The results confirm that insurance companies need to prioritize liquidity management according to established financial literature but introduce specific evidence about the UK insurance sector. Based on these findings, we recommend that UK insurers:

- 1. Develop tailored liquidity management strategies that optimize the current ratio while avoiding excessive cash holdings
- 2. Implement differential liquidity approaches based on firm size and age, with larger firms potentially reducing cash reserves to improve ROA
- 3. Establish internal liquidity thresholds that balance regulatory requirements with profitability objectives
- 4. Consider the distinct impacts of different liquidity measures on ROA versus ROE when making financial decisions

The analysis extends contemporary research by showing detailed correlations between specific liquidity ratios and different profitability metrics, thus benefiting theoretical knowledge and practical business practice. Future research could test alternative explanations for the observed relationships by:

- 1. Examining whether the negative ROA effect of high cash ratios is moderated by economic cycles or market volatility
- 2. Investigating if industry-specific factors like claim frequency or underwriting practices influence optimal liquidity levels
- 3. Exploring whether corporate governance structures affect the liquidityprofitability relationship in insurance firms
- 4. Conducting longitudinal studies to determine if the observed relationships remain stable over extended periods

Conclusion

The investigation of liquidity-profits relationships within the UK insurance sector used data from 10 companies spanning 2017-2023. The research applied fixed effect models to analyze data extensively, which resulted in detecting substantial relationships between different liquidity indicators and profitability outcomes. The analysis shows current ratio produces the most powerful positive relationship with both ROA and ROE, while quick ratio generates moderate effects and cash ratio shows conflicting effects toward profitability measures. The divergent impact of cash ratio—positive for ROE but negative for ROA— can be attributed to the fundamental difference between these profitability metrics. While high cash reserves provide financial stability that benefits shareholders' returns (ROE), they simultaneously reduce the efficiency of total asset utilization (ROA) by allocating resources to low-yielding liquid assets rather than more productive investments.

Research evidence shows UK insurance companies experience complex relationships between their liquidity measurements and their profitability metrics because each liquidity variable affects different financial outputs. The research enriches academic knowledge by demonstrating market-targeted evidence and demonstrating that insurance firm assessments should utilize multiple liquidity measurements for performance evaluation. These findings align with the trade-off theory of capital structure, suggesting that UK insurers must balance the security benefits of liquidity against opportunity costs. However, they partially contradict the pecking order theory, as our results indicate that internal funding sources (represented by higher liquidity) do not always lead to optimal performance outcomes. This suggests that UK insurance firms may benefit from a more nuanced approach to liquidity management than conventional financial theories prescribe, one that recognizes the distinct impacts of different liquidity measures on various aspects of profitability.

Academic implications

The presented research adds multiple valuable insights to existing academic documents. The study establishes concrete empirical proof about how liquidity affects profitability in a non-linear pattern throughout the UK insurance business. A complete analysis of various liquidity metrics alongside their effects on multiple profitability measures helps present innovative findings about financial management practices in insurance organizations. The developed methodological framework serves as a foundation to analyze liquidity and profitability associations in regulated financial institutions which benefits subsequent research in the insurance field.

When comparing these findings to other financial sectors beyond insurance, several notable distinctions emerge. While banking institutions similarly

demonstrate positive relationships between moderate liquidity and profitability, they typically show more severe negative effects from excessive liquidity than observed in our insurance sector findings. This difference likely stems from banks' greater reliance on interest-based revenue models compared to insurers' premium-based structures.

Investment firms and asset management companies, by contrast, often exhibit stronger negative correlations between high liquidity ratios and ROA than our insurance findings suggest, reflecting their core business model's emphasis on capital deployment. Meanwhile, the non-linear liquidity-profitability relationship we observed in insurance companies contrasts with more linear patterns documented in retail financial services, where customer confidence and operational flexibility are less dependent on liquidity buffers than in risk-pooling insurance operations.

These cross-sector comparisons highlight the unique position of insurance within the broader financial landscape, where regulatory requirements, business models, and risk management approaches create distinctive liquidity-profitability dynamics that cannot be generalized from studies of other financial institutions.

Practical implications

The study's findings create relevant benefits which apply to insurance company managers and regulators together with investors. Managers can use these results to guide optimal liquidity management choices because different liquidity measurements require varying importance based on specific profit targets. The study delivers essential information to regulators which connects liquidity requirements with insurance company performance to support their upcoming policy decisions. The research creates a structure that enables investors to assess how insurance company financial operations influence their operational profitability.

These findings could significantly inform future UK regulatory decisions on liquidity risk management. The identified non-linear relationship between liquidity and profitability suggests that regulators might benefit from adopting a more nuanced approach to liquidity requirements rather than implementing one-size-fits-all thresholds. Specifically, regulatory frameworks could evolve to incorporate differential liquidity standards based on company size, age, and business model complexity. The demonstration that excessive cash holdings negatively affect ROA while positively influencing ROE indicates that future regulatory policies might better serve the sector by establishing balanced liquidity corridors rather than minimum thresholds alone. This would allow insurers to maintain sufficient solvency protection while avoiding the adverse performance effects of regulatory-driven over-liquidity.

This study examined the sophisticated relationship between liquidity metrics and profitability indicators in the UK insurance sector which produced substantial

connections among these elements. The study established the value of distinct liquidity measurement methods by showing them to affect profitability performance in unique ways. Both ROA and ROE generated maximum predictions from the current ratio but the cash ratio displayed conflicting effects during each return evaluation. The research advances both insurance financial management knowledge and profiles of useful approaches which stakeholders can utilize to better handle their finances. The research gave both academic scholars and industry practitioners practical guidance from its deep investigation into the UK insurance market along with potential bases for further academic work. In the present economic era effective liquidity management stands crucial for insurance sector success because of these confirmed findings.

Data availability: The data generated and/or analysed during the current study are available from the corresponding author on request.

Competing interests: The author reports no conflicts of interest.

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Appendix Appendix A

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import numpy as np import seaborn as sns import matplotlib.pyplot as plt import pandas as pd

Creating the correlation matrix from the provided table correlation_matrix = pd.DataFrame({ "ROA": [1.000, 0.916, 0.317, 0.525, 0.520], "ROE": [0.916, 1.000, 0.310, 0.208, 0.481], "Current ratio": [0.317, 0.310, 1.000, -0.528, 0.963], "Quick ratio": [0.525, 0.208, -0.528, 1.000, -0.589], "Cash ratio": [0.520, 0.481, 0.963, -0.589, 1.000] }, index=["ROA", "ROE", "Current ratio", "Quick ratio", "Cash ratio"])

Plot the heatmap with a different color scheme (e.g., Blues)
plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap="Blues", fmt=".3f",
linewidths=0.5, cbar=True)

Title for the heatmap
plt.title("Pearson Correlation Heatmap")

Show the plot
plt.show()