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THE INFLUENCE OF FINANCIAL INDICATORS ON LIQUIDITY: AN EMPIRICAL ANALYSIS OF PROFITABILITY, LEVERAGE, AND FUND AGE

Abstract

Financial leverage, profitability, and liquidity are crucial metrics used to evaluate the financial health and stability of a firm. This study aims to investigate the relationship between leverage ratios (debt-to-equity and debt-to-asset), profitability ratio (ROE), Fund Age and liquidity ratios (cash ratio and quick ratio) for Residential Real Estate Investment Trusts (REITs) listed on the New York Stock Exchange (NYSE) over the period of 2009-2021. A multiple linear regression analysis was conducted to model the relationship between the independent variables and the dependent variables. The findings suggest that ROE has a significant positive relationship with liquidity ratios, while Debt to Equity and Fund Age have a significant negative relationship. Debt to Assets is found to be not statistically significant in explaining liquidity, further highlighting the complex nature of the relationship between financial metrics and the financial stability of a firm.

Key words: liquidity, leverage, REITS

JEL classification: G01, G21, G29

УТИЦАЈ ФИНАНСИЈСКИХ ПОКАЗАТЕЉА НА ЛИКВИДНОСТ: ЕМПИРИЈСКА АНАЛИЗА ПРОФИТАБИЛНОСТИ, ЛЕВЕРИЦА И ДОБИ ФОНДА

Апстракт

Финансијски леверџи, профитабилност и ликвидност су кључни показатељи процене финансијског здравља и стабилности предузећа. Ово истраживање има за циљ да испита везу између показатеља леверџица (однос дуга према капиталу и дуга према средствима), показатеља профитабилности (принос капитала), доби фонда и показатеља ликвидности (показатељ готовине и општи показатељ ликвидности) за Ресидентнал Реал Естате Инвестмент Трустс (РЕИТс) који су листирани на Њујоршкој берзи (NYSE) у периоду 2009-2021. Обављена је вишеструка линеарна регресиона анализа како би се моделовала веза између независних и зависних варијабли. Резултати анализе сугеришу да РОЕ има значајну позитивну везу са ликвидношћу, док Доба фонда и Однос Дуга према Капиталу имају значајну негативну везу са ликвидношћу.

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Поред тога, Однос Дуга према Активи се показао као статистички незначајан показатељ, што указује на сложену природу између финансијских показатеља и финансијске стабилности предузећа.

Кључне речи: ризик, ниво задужености, РЕИТС

Introduction

Financial leverage, profitability and liquidity are three key metrics used in the evaluation of a firm's financial health and stability. Leverage ratios, such as debt to equity and debt to asset ratios, measure the extent to which a firm relies on debt financing. Liquidity ratios, such as the cash and current ratios, measure the ability of a firm to meet its short-term obligations. Profitability ratio, such as return of equity measures the efficiency with which a company's management uses its equity to generate profits. In order to better understand the relationship between these financial metrics, it is important to conduct a regression analysis. This type of analysis aims to model the relationship between the dependent variable and the independent variables. The results of this analysis can provide valuable insights into the relationship between company's liquidity on the one hand and leverage, profitability and fund age on the other hand.

The purpose of this study is to investigate the relationship between leverage ratios (debt-to-equity and debt-to-asset), profitability ratio(ROE), fund age and liquidity ratios (cash ratio and quick ratio) for Residential Real Estate Investment Trusts (REITs) listed on the New York Stock Exchange (NYSE) over the period of 2009-2021. Acquiring a comprehensive understanding of the relationship between liquidity as a dependent variable and independent variables such as profitability, leverage, and fund age can exert a substantial influence on a company's financial performance. When it comes to liquidity and profitability, there is often a trade-off between the two. Companies that prioritize maintaining high levels of liquidity, such as cash and easily marketable securities, may have lower profits as they are not investing their resources in high-return assets. The relationship between liquidity and leverage is also important to consider. Leverage refers to the use of borrowed funds to finance a company's operations and investments. High levels of leverage can increase a company's financial risk and make it more vulnerable to changes in the economic environment. Finally, the relationship between liquidity and fund age should also be taken into account. Fund age refers to the length of time that funds have been invested in a particular asset. Older funds are typically less liquid than newer funds, making them more difficult to sell quickly and subject to greater market risk (Sassanfar & Zhang, 2014). The hypothesis is that profitability ratio, leverage ratios, and fund age are significant predictors of liquidity ratio. To test this hypothesis, multiple linear regression analysis will be conducted with leverage ratios, profitability ratio and fund age as independent variables and liquidity ratios as dependent variables. The results of the analysis will be evaluated based on the coefficients and p-values of the regression model. The magnitude of the coefficient provides an estimate of the strength of the relationship, with larger coefficients indicating a stronger relationship. Furthermore, the significance of the relationship will be assessed using p-values. A p-value less than 0.05 indicates that the relationship is statistically significant, meaning that it is unlikely to have arisen by chance. In addition to the coefficients and p-values, the overall fit of the model will be evaluated

using statistical measures such as R-squared. This measure provides insight into the validity of the regression model and its ability to explain the relationship between dependent and independent ratios for Residential REITs.

Literature review

There are many research papers that focus on the assessment of the relationship between liquidity and leverage. One of the papers that addressed this issue was a paper that examined the liquidity management practices of companies listed on the Ghana Stock Exchange (GSE) (Isshaq & Bokpin, 2009). The study aimed to investigate the determinants of corporate liquidity holdings of companies listed on the Ghana Stock Exchange (GSE). The research design involved using a dynamic panel model with a lagged dependent variable, with data collected from the annual reports and financial statements of the firms and the GSE Factbook, covering the period 1991-2007. The Arrellano-Bond estimator was applied, incorporating a Sargan test to account for over-identification. The findings indicated that leverage was not a significant determinant of liquidity in Ghanaian-listed firms, likely due to the underdeveloped nature of the financial market. On the other hand, the results showed that liquidity was statistically significantly influenced by factors such as a target liquidity level, firm size, return on assets, and net working capital. Additional research on the relationship between liquidity and price effects in firms by examining the liquidity of market-based options to predict changes in the capital structure of REITs used option data to evaluate the potential behavior of REIT managers. The results show that REITs with higher historical volatility or lower option market liquidity are less likely to increase leverage, while those with higher option liquidity or lower realized volatility are more likely to increase net long-term debt (Borochin, et al., 2017). The findings are similar to prior research on non-REIT firms (Borochin & Yang, 2016).

Another paper examined the relationship between liquidity (cash conversion cycle) and profitability using a sample of 20 Indian automotive companies over the period 1996-2009 and showed that managers can increase their companies' profitability by shortening the cash conversion cycle, days sales outstanding, and inventory conversion time (A., 2011). The study suggests that an optimal cash conversion cycle is a more accurate and comprehensive measure for analyzing liquidity. In another work that examines the relationship between liquidity and profitability of small and medium enterprises, it is proposed to use the new mathematical model to calculate the net profit by reducing the amount of liquid assets. This allows SMEs to take net profit into account when managing and reducing liquid assets in order to improve profitability (Kontus & Mihanovic, 2019).

Subsequent research focusing on asset liquidity and stock liquidity confirms that holding more cash increases the liquidity of REIT stocks (Downs & Zhu, 2022). There is also a positive correlation between the liquidity of the real estate market and the liquidity of REIT shares. Another study on REITs and liquidity examined liquidity between public and nonpublic REITs (Soyeh & Wiley, 2019). The results show that public, non-listed REITs tend to accumulate a significant amount of cash from issuing shares, resulting in higher liquidity ratios compared to a sample of listed REITs. In addition, these REITs have less access to bank lines of credit. The growth of investments in public, unlisted REITs is highly dependent on the availability of cash. In addition, there is a paper that examines the dividend policy of

REITs and its impact during the 2008-2009 liquidity crisis. Results from a multinomial logit analysis indicate that REITs with higher market leverage or lower market-to-book ratios are more likely to adjust dividends in ways such as cutting, suspending, or paying elective stock dividends (Case, et al., 2012).

In addition, the liquidity risks of REITs are examined using a sample of 440 REITs for the period 1980-2015 (DiBartolomeo, et al., 2021). The results are classified into four groups:

1. The study finds that REITs exhibit negative sensitivity to marketwide liquidity shocks and their prices tend to increase compared to the broader stock market during such events.
2. The results are not specific to any property type sector but are evident across different classifications.
3. Smaller REITs offer protection against liquidity risk only when they have a relatively high dividend frequency.
4. When firms change their status from non-REITs to REITs, the study finds that marketwide liquidity risk is lower. These findings suggest that investors view dividends as a source of enhanced liquidity and REITs, with their high regulatory-mandated payout requirements, provide investors with reduced liquidity risk.

Further study analyzed the financial performance of Real Estate Investment Trusts (REITs) in Turkey using a Multi-Criteria Decision Making method called Entropy based TOPSIS. The analysis covered the period between 2011Q1-2014Q3 and considered factors such as liquidity, profitability, turnover, and capital structure. The results highlights the importance of assessing financial performance to maintain market share and ensure the soundness of REITs (Islamoglu, et al., 2015).

The paper that studies the impact of capital structure on firm liquidity has shown that leverage affects firm liquidity and growth using tobacco industry in Pakistan as an example (Salman, 2019). The study uses secondary data from 2011-2016 of tobacco companies listed on the Karachi stock exchange and employs regression testing to demonstrate the influence of leverage on corporate liquidity and growth. The results suggest that debt financing and holding a high proportion of short-term debt positively affect corporate liquidity and growth in the tobacco industry. Further study aimed to investigate the moderating role of liquidity and optimal liquidity level on the relationship between debt and financial performance using MREITs as an example for the period 2005-2016 (Zainudin, et al., 2019). The results showed that liquidity affects the relationship between financial performance and debt, and that maintaining a certain level of liquidity negatively affects the relationship between debt and financial performance. Similarly, another study that examines the use of debt financing in terms of financial performance using data from all Malaysian REITs between 2005 and 2014 finds that REITs use debt financing to meet growth needs rather than to achieve tax benefits, and that the high dividend payout requirement serves more as a disciplinary tool than debt financing (Zainudin, et al., 2017). The study also concludes that financial flexibility plays an important role in turning the negative relationship between debt financing and financial performance into a positive one, making it an important aspect for REIT managers to consider in their financial management.

Methodology overview

Linear regression is a statistical technique used to examine the relationship between dependent variable and one or more independent variables (Weisberg, 1981). The aim is to develop an equation that can accurately predict and explain the value of the dependent variable based on the values of the independent variables. Linear regression is a valuable tool in statistics and can be applied to various situations such as forecasting future values, exploring the connection between variables, and determining key variables for a particular outcome (Chatterjee & Hadi, 2014). The formula for linear regression with two independent variables ($x_1, x_2, x_3, \dots, x_n$) and one dependent variable (y) is:

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n \tag{1}$$

Where:

- y is the dependent variable (cash ratio/current ratio)
- x_1, x_2, \dots, x_n are independent variables (debt-to-equity, debt-to-asset, fund age, ROE)
- b_0 is the y-intercept of the line
- b_1, b_2, \dots, b_n are the slopes of the line representing the change in y for a unit change in x_1, x_2, \dots, x_n . The coefficients (b_0, b_1 and b_2) are estimated from the data using a method such as least squares.

Debt-to-equity and debt-to-asset ratios, along with the fund age and return on equity (ROE), are considered crucial determinants in assessing the liquidity of a company or investment fund. This is primarily because these factors provide essential insights into the financial robustness and sustainability of the respective entity. The table below presents a comprehensive summary of the selected determinants and their anticipated impact on liquidity.

Table 1 Determinants overview and expected influence on liquidity ratios

	Debt to Equity	Debt to Asset	Fund Age	ROE
Liquidity ratios	<i>Negative relationship</i>	<i>Negative relationship</i>	<i>Negative relationship</i>	<i>Positive relationship</i>
Source	(Rashid & Abbas, 2011)	(Daryanto, et al., 2018)	(Sassanfar & Zhang, 2014)	(Hongli, et al., 2019)

Source: multiple sources (see table)

Based on the above sources, three hypothesis can be formulated:

1. There is a negative relationship between debt-to-equity ratio/debt to asset and liquidity ratios in REITs.

Higher levels of debt indicate that a REIT is financing more of its assets with debt, which can result in higher interest payments and potentially lower cash levels. As a result, the REIT's liquidity ratios are expected to be lower.

2. There is a negative relationship between fund age and liquidity ratios in REITs. Older funds are anticipated to have lower liquidity levels.

As REITs age, their asset bases grow and may become more complex, making it more difficult to quickly convert assets into cash to meet liquidity needs. Additionally, older REITs

may have a higher proportion of long-term assets that are not easily sold, further decreasing their liquidity levels.

3. There is a positive relationship between return on equity (ROE) and liquidity ratios in REITs.

Higher ROE indicates that a REIT is generating higher profits from its operations, which increases its ability to meet liquidity needs. Therefore, REITs with higher ROE are expected to exhibit higher liquidity ratios.

To measure company's liquidity there are two common ratios - the Cash Ratio and the Current Ratio, that measures the company ability to meet its short-term obligations as they come due (Birgham & Houston, 2015):

$$(2) \quad \text{Cash Ratio} = \frac{\text{Cash} + \text{Cash Equivalents}}{\text{Current Liabilities}}$$

$$(3) \quad \text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}$$

Cash and Cash Equivalents refers to the company's cash and cash-like assets, such as short-term investments that can be easily converted to cash. Current Assets includes assets that can be readily converted to cash within one year, such as accounts receivable and marketable securities. Current Liabilities are obligations due within one year, such as accounts payable and short-term debt (Horngren, 2018).

To measure company's leverage there are two common ratios (Birgham & Houston, 2015):

$$(4) \quad \text{Debt to Equity} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

$$(5) \quad \text{Debt to Asset} = \frac{\text{Total Debt}}{\text{Total Asset}}$$

The profitability of a company is commonly evaluated using various financial metrics, with Return on Equity (ROE) being a widely accepted. ROE measures the efficiency with which a company's management is utilizing its equity to generate profits (Penman, 2007). As a result, it is often considered to be the most suitable metric for evaluating the profitability of REIT companies.

$$(6) \quad \text{ROE} = \frac{\text{Net income}}{\text{Average shareholder's equity}}$$

In order to increase the quality of model, fund age is included. Including fund age in regression analysis is useful for several reasons (Cheng, et al., 2009):

1. Age as a predictor variable: Fund age may be a significant predictor of fund performance and can provide valuable information about the relationship between fund age and performance.
2. Control for survivorship bias: Fund age can help control for survivorship bias in performance analysis, as older funds have a higher chance of survival and therefore a higher chance of being included in performance data.
3. Time-series analysis: Fund age can also be used in time-series analysis to model the evolution of fund performance over time.

The calculation was carried out as follows: the relevant data was sourced from the Macrobond platform and imported into the Python programming language. The dependent variables chosen were cash and current ratio for each REIT, while the independent variables were leverage ratio, profitability ratio, and fund age. Before performing linear regression analysis, a logarithmic transformation was performed to attenuate skewness and increase the degree of normality of the data. Descriptive statistics were then calculated and the data tested for normality. For the normality test, the Shapiro-Wilk test was used. The Shapiro-Wilk test is a normality test used to determine whether a data set is drawn from a normal distribution (King & Exkersley, 2019). Upon observing a large number of non-normal data points, only those factors that demonstrated a p-value greater than 0.05 were selected from the transformed data, effectively accepting the null hypothesis of normality and implying that the data was considered to be normally distributed. After the independent variables are selected, the VIF (Variance Inflation Factor) is measured to determine the extent of multicollinearity among the independent variables. VIF starts at 1, indicating no correlation between the independent variable and the other variables, and a value above 5 or 10 indicates high multicollinearity (Bhandari, 2020). The results and discussion are presented in the following chapter.

Results and discussion

This section presents the results of the previously mentioned methodology of a regression analysis for selected REITs. The following three tables show respectively the descriptive statistics, the p-values for the normality test and values of VIF factor, as well as the regression analysis with the selected factors for EQR REIT.

Table 2 Descriptive statistics for EQR logs

	<i>C a s h</i> EQR	<i>C u r r e n t</i> EQR	<i>D E</i> EQR	<i>D A</i> EQR	<i>F u n d</i> <i>A g e</i> EQR	<i>R O E</i> EQR
<i>count</i>	13	13	13	13	13	13
<i>mean</i>	-0,57	-0,38	0,19	-0,62	3,08	-2,13
<i>std</i>	1,21	1,08	0,30	0,13	0,18	0,73
<i>min</i>	-1,87	-1,39	-0,10	-0,76	2,77	-2,94
<i>25%</i>	-1,31	-1,24	-0,02	-0,71	2,94	-2,64
<i>50%</i>	-1,24	-0,99	0,10	-0,64	3,09	-2,38
<i>75%</i>	0,19	0,27	0,25	-0,58	3,22	-1,90
<i>max</i>	1,68	1,69	0,75	-0,39	3,33	-0,47

Source: the authors calculation based on data

Based on the summary statistics, some general observations can be made: Cash EQR and Current EQR variables have negative mean values, which suggest that they are distributed around negative values. DE EQR and DA EQR variables have relatively small standard deviations, which suggest that the data is relatively concentrated around the mean.

Fund Age EQR variable has a mean close to zero and a small standard deviation, which suggest that the data is relatively symmetrical around the mean. ROE EQR variable has a mean close to negative 2 and a relatively small standard deviation, which suggest that the data is symmetrical around a negative value.

Table 3 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	<i>Cash EQR</i>	<i>Current EQR</i>	<i>DE EQR</i>	<i>DA EQR</i>	<i>Fund Age EQR</i>	<i>ROE EQR</i>
<i>p-value</i>	0,029	0,010	0,011	0,034	0,792	0,067
<i>VIF factor</i>					1,088	1,088

Source: the authors calculation based on data

The p-value from a normality test indicates the probability of observing a sample that is as or more extreme than the one observed, assuming that the data is normally distributed. In general, a p-value less than 0.05 indicates that the data is not normally distributed, and a p-value greater than 0.05 indicates that the data is likely to be normally distributed. Based on the results provided, the following conclusions can be made:

- DE EQR and DA EQR have p-values less than 0.05, which suggests that the data is not normally distributed.
- Fund Age EQR and ROE EQR has a p-value greater than 0.05, which suggests that the data is likely to be normally distributed. Moreover, the VIF factor is close to 1, indicating that there is no multicollinearity among the independent variables. Therefore these two parameters will be included in linear regression

Table 4 OLS: Regression Results for Cash & Current Ratio for EQR

<i>Dep. Variable:</i>	<i>Cash Ratio</i>		<i>Dep. Variable:</i>	<i>Current Ratio</i>	
R²:	0,392		R²:	0,536	
	coef:	P > t 		coef:	P > t
const.	13,01	0,04	const.	13,35	0,01
Fund Age	-4,31	0,03	Fund Age	-4,43	0,00
ROE EQR	0,13	0,32	ROE EQR	0,04	0,90

Source: the authors calculation based on data

The R-squared value, 0.392, represents the proportion of variation in the dependent variable that is explained by the independent variables. An R-squared value of 0.392 indicates that 39.2% of the variation in the Cash Ratio can be explained by the values of Fund Age and ROE EQR. In this linear regression, the coefficient for the constant is 13.01, with a p-value of 0.04. This suggests that the constant has a statistically significant impact on the Cash Ratio. The coefficient for Fund Age is -4.31, with a p-value of 0.03. This suggests that Fund Age has a statistically significant negative impact on the Cash Ratio. The coefficient for ROE EQR is 0.13, with a p-value of 0.32. This suggests that ROE EQR does not have a statistically

significant impact on the Cash Ratio. In conclusion, based on this linear regression, it seems that the Fund Age is the most important predictor of the Cash and Current Ratio, where the R-squared value of 0.536 indicates that 53.6% of the variation in the Current Ratio can be explained by the values of Fund Age and ROE EQR. Furthermore, the initial hypothesis stating a negative correlation between liquidity ratios and Fund Age, as well as a positive correlation between liquidity ratios and ROE, has been validated.

In the case of ELS REIT, only Fund Age follows a normal distribution, and there is no multicollinearity as only one variable is included.

Table 5 Descriptive statistics for ELS logs

	Cash ELS	Current ELS	DE ELS	DA ELS	Fund Age ELS	ROE ELS
count	13	13	13	13	13	13
mean	-3,71	-2,69	1,09	-0,31	3,08	2,74
std	0,95	0,84	0,40	0,08	0,18	0,45
min	-5,88	-3,91	0,80	-0,38	2,77	1,66
25%	-4,08	-3,00	0,89	-0,36	2,94	2,80
50%	-3,50	-2,81	0,92	-0,33	3,09	2,92
75%	-3,22	-2,81	0,99	-0,32	3,22	2,98
max	-1,89	-0,49	2,02	-0,13	3,33	3,14

Source: the authors calculation based on data

Table 6 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash ELS	Current ELS	DE ELS	DA ELS	Fund Age ELS	ROE ELS
p-value	0,397	0,015	0,000	0,001	0,792	0,002
VIF factor					1,00	

Source: the authors calculation based on data

Table 7 OLS: Regression Results for Cash & Current Ratio for ELS

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,079		R²:	0,006	
	coef:	P> t 		coef:	P> t
const.	-8,26	0,105	const.	-3,67	0,403
Fund Age	1,47	0,251	Fund Age	0,34	0,808

Source: the authors calculation based on data

The R² values of 0.079 and 0.006 suggest that the independent variables explain only 7.9% and 0.6% of the variation in the Cash Ratio and Current Ratio, respectively. This means that the regression models do not explain a significant portion of the variation in the dependent variables. The initial hypothesis stating a negative correlation between liquidity ratios and Fund Age, has not been validated. However, p-value are higher than 0.05, meaning that the results are not statistically significant.

The next REIT to be discussed is UDR, which has all four factors with a normal distribution. However, there is a strong multicollinearity between Debt to Equity, Debt to Asset and Fund age, which is why the linear regression only considers the ROE.

Table 8 Descriptive statistics for UDR

	Cash UDR	Current UDR	DE UDR	DA UDR	Fund Age UDR	ROE UDR
count	13	13	13	13	13	13
mean	0,50	0,73	0,52	-0,45	3,55	0,65
std	1,47	1,29	0,22	0,07	0,11	1,32
min	-1,62	-1,35	0,25	-0,57	3,37	-2,48
25%	-1,13	-0,40	0,39	-0,51	3,47	0,00
50%	1,22	1,44	0,49	-0,46	3,56	0,76
75%	1,68	1,69	0,56	-0,41	3,64	1,56
max	2,01	2,03	0,98	-0,32	3,71	2,35

Source: the authors calculation based on data

Table 9 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash UDR	Current UDR	DE UDR	DA UDR	Fund Age UDR	ROE UDR
p-value	0,007	0,014	0,154	0,986	0,820	0,131
VIF factor			18,28	14,06	4,31	1,63

Source: the authors calculation based on data

Table 10 OLS: Regression Results for Cash & Current Ratio for UDR

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,49		R²:	0,39	
	coef:	P > t 		coef:	P > t
const.	-0,004	0,34	const.	0,33	0,32
ROE	0,77	0,00	ROE	0,61	0,02

Source: the authors calculation based on data

Based on the p-values listed, ROE is statistically significant for both factors predicting liquidity, and initial hypothesis about positive relationship with ROE is validated. Moreover, the R² values are moderate and are 0.49 and 0.39. The next REIT is UMH with three normally distributed variables, without collinearity between them.

Table 11 Descriptive statistics for UMH

	Cash UMH	Current UMH	DE UMH	DA UMH	Fund Age UMH	ROE UMH
count	13	13	13	13	13	13
mean	0,41	1,67	0,10	-0,88	3,39	1,78
std	0,75	0,50	0,27	0,89	0,13	0,81
min	-0,56	1,03	-0,34	-3,81	3,18	0,00
25%	-0,31	1,21	-0,05	-0,72	3,30	1,63
50%	0,34	1,81	0,13	-0,63	3,40	1,89
75%	1,01	2,08	0,25	-0,57	3,50	2,18
max	1,71	2,35	0,49	-0,47	3,58	2,98

Source: the authors calculation based on data

Table 12 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash UMH	Current UMH	DE UMH	DA UMH	Fund Age UMH	ROE UMH
p-value	0,406	0,128	0,528	0,000	0,814	0,401
VIF factor			1,74		1,49	1,21

Source: the authors calculation based on data

Table 13- OLS- Regression Results for Cash & Current Ratio for UMH

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,485		R²:	0,647	
	coef:	P> t 		coef:	P> t
const.	12,05	0,06	const.	12,66	0,00
Debt-to-Equity	-1,80	0,07	Debt-to-Equity	-0,68	0,19
Fund Age	-3,48	0,06	Fund Age	-3,30	0,00
ROE	0,20	0,42	ROE	0,16	0,25

Source: the authors calculation based on data

Based on the p-values listed, Fund Age, Debt to Equity and const. are statistically significant, with having R² between 48 % and 64 %. Furthermore, the initial hypothesis

regarding the relationships between the analyzed factors and liquidity is supported by the findings. Specifically, a negative relationship exists between Debt to Equity and Fund Age, whereas a positive relationship exists between ROE and liquidity. Following REIT is MAA, with two parameters being included in calculation, having no collinearity.

Table 14 Descriptive statistic for MAA

	Cash MAA	Current MAA	DE MAA	DA MAA	Fund Age MAA	ROE MAA
count	13	13	13	13	13	13
mean	-1,48	-1,44	0,25	-0,64	3,03	1,57
std	0,70	0,69	0,54	0,24	0,19	0,55
min	-2,71	-2,66	-0,29	-0,93	2,71	0,19
25%	-1,91	-1,90	-0,18	-0,83	2,89	1,35
50%	-1,50	-1,43	0,16	-0,78	3,04	1,64
75%	-1,30	-1,20	0,65	-0,42	3,18	1,87
max	-0,47	-0,46	1,22	-0,26	3,30	2,41

Source: the authors calculation based on data

Table 15 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash MAA	Current MAA	DE MAA	DA MAA	Fund Age MAA	ROE MAA
p-value	0,416	0,441	0,023	0,048	0,787	0,254
VIF factor					1,007	1,007

Source: the authors calculation based on data

Table 16 OLS- Regression Results for Cash & Current Ratio for MAA

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,352		R²:	0,428	
	coef:	P> t 		coef:	P> t
const.	4,64	0,13	const.	5,55	0,064
Fund Age	-1,83	0,07	Fund Age	-2,15	0,034
ROE	-0,35	0,29	ROE	-0,30	0,344

Source: the authors calculation based on data

The p-value for Fund Age and constant is lower than threshold 0.05, indicating that the relationship between these two factors and Current Ratio is statistically significant. The

R² value of 0.352 indicates that 35% of the variation in the cash ratio is explained by the independent variables, while the value for the current ratio is 0.428. The initial hypothesis stating a positive correlation between liquidity ratios and ROE, has not been validated. However, p-value are higher than 0.05, meaning that the results are not statistically significant. The hypothesis asserting a negative relationship between liquidity and Fund Age has been substantiated.

The following REIT is ELME, though it has only Fund Age as a normally distributed factor.

Table 17 OLS- Descriptive statistics for ELME

	Cash ELME	Current ELME	DE ELME	DA ELME	Fund Age ELME	ROE ELME
count	13	13	13	13	13	13
mean	3,37	0,28	0,20	-0,44	3,55	0,17
std	0,96	1,29	0,40	0,73	0,11	1,18
min	2,03	-3,51	-0,86	-1,29	3,37	-2,30
25%	2,69	0,29	0,13	-0,67	3,47	0,00
50%	3,36	0,46	0,38	-0,56	3,56	0,00
75%	3,62	0,79	0,47	-0,52	3,64	0,00
max	4,94	1,81	0,55	1,76	3,71	2,43

Source: the authors calculation based on data

Table 18 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash ELME	Current ELME	DE ELME	DA ELME	Fund Age ELME	ROE ELME
p-value	0,302	0,002	0,008	0,000	0,820	0,002
VIF factor					1,00	

Source: the authors calculation based on data

Table 19- OLS- Regression Results for Cash & Current Ratio for ELME

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,130		R²:	0,104	
	coef:	P> t 		coef:	P> t
const.	14,37	0,12	const.	13,45	0,27
Fund Age	-3,09	0,22	Fund Age	-3,71	0,28

Source: the authors calculation based on data

The coefficient values show that the p-value is greater than 0.05 for all independent variables, meaning that none of the independent variables are significant predictors of the Cash and Current Ratio. Moreover, the hypothesis asserting a negative relationship between liquidity and Fund Age has been validated. The following REIT is CSR, though it has Fund Age and Debt to Equity as a normally distributed factors, with moderate collinearity between them.

Table 20- OLS- Regression Results for Cash & Current Ratio for CSR

	Cash CSR	Current CSR	DE CSR	DA CSR	Fund Age CSR	ROE CSR
count	13	13	13	13	13	13
mean	-0,78	-0,33	0,42	-0,56	2,87	0,49
std	1,44	1,66	0,21	0,15	0,22	0,80
min	-3,79	-3,91	0,09	-0,74	2,48	-0,21
25%	-1,93	-1,90	0,20	-0,69	2,71	0,00
50%	-0,06	0,33	0,46	-0,62	2,89	0,14
75%	0,35	0,76	0,53	-0,41	3,04	0,81
max	0,69	1,43	0,74	-0,37	3,18	2,68

Source: the authors calculation based on data

Table 21 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash CSR	Current CSR	DE CSR	DA CSR	Fund Age CSR	ROE CSR
p-value	0,026	0,015	0,463	0,029	0,767	0,005
VIF factor			4,09		4,09	

Source: the authors calculation based on data

Table 22- OLS- Regression Results for Cash & Current Ratio for CSR

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,606		R²:	0,721	
	coef:	P> t 		coef:	P> t
const.	8,62	0,33	const.	6,37	0,456
Debt-to-Equity	1,74	0,54	Debt-to-Equity	3,85	0,18
Fund Age	-3,53	0,20	Fund Age	-2,9	0,27

Source: the authors calculation based on data

The coefficient values show that the p-value is greater than 0.05 for all independent variables, meaning that none of the independent variables are significant predictors of the Cash and Current Ratio. The last REIT is ESS, with only the Fund Age as a variable.

Table 23- Descriptive statistics for ESS

	Cash ESS	Current ESS	DE ESS	DA ESS	Fund Age ESS	ROE ESS
count	13	13	13	13	13	13
mean	-0,34	0,47	0,17	-0,62	3,03	2,05
std	0,39	0,27	0,26	0,12	0,19	1,47
min	-1,17	-0,12	-0,13	-0,76	2,71	0,79
25%	-0,59	0,31	-0,05	-0,72	2,89	1,31
50%	-0,32	0,57	0,11	-0,65	3,04	1,94
75%	-0,06	0,64	0,45	-0,49	3,18	1,98
max	0,21	0,79	0,56	-0,45	3,30	6,73

Source: the authors calculation based on data

Table 24 Normality test: p-value of ratios & Co-linearity test: VIF factor for independent variables

	Cash ESS	Current ESS	DE ESS	DA ESS	Fund Age ESS	ROE ESS
p-value	0,836	0,209	0,022	0,017	0,787	0,000
VIF factor					1,00	

Source: the authors calculation based on data

Table 25- OLS- Regression Results for Cash & Current Ratio for ESS

Dep. Variable:	Cash Ratio		Dep. Variable:	Current Ratio	
R²:	0,021		R²:	0,207	
	coef:	P> t 		coef:	P> t
const.	1,08	0,41	const.	2,45	0,16
Fund Age	-0,20	0,63	Fund Age	-0,92	0,11

Source: the authors calculation based on data

The coefficient values show that the p-value is greater than 0.05 for all independent variables, meaning that none of the independent variables are significant predictors of the Cash and Current Ratio

Based on the results of multiple linear regression analysis performed on the various REITs, the following conclusions can be made:

- The results indicate that Fund Age is a significant predictor of liquidity ratios, namely Cash Ratio and Current Ratio, in most REITs. This is evidenced by the statistically significant relationship and the high R^2 values of the regression models, ranging from 35% to 53.6%. These findings lend support to the initial hypothesis that there is a negative relationship between Fund Age and liquidity ratios.
- Furthermore, some REITs have additional independent variables that are statistically significant predictors of liquidity ratios, namely Debt to Equity and ROE, confirming the initial hypothesis about their negative and positive relationship with liquidity, respectively.
- However, in some REITs, independent variables such as Debt to Assets (DA) were not found to be statistically significant predictors of liquidity ratios, thus the initial hypothesis about its negative relationship with liquidity cannot be supported.
- In addition, the constant value was found to be a significant predictor of liquidity ratios in some REITs.

Conclusion

The objective of this study was to examine the relationship between debt ratios, profitability ratios and fund age, and liquidity ratios (cash ratio and quick ratio) for REITs listed on the NYSE during the period 2009-2021. A multiple linear regression analysis was conducted with liquidity ratios as dependent variables. All hypotheses mentioned in the overview of the methodology were confirmed. The results of the analysis show that Fund Age can be used as a predictor of liquidity. Constant value also proves to be a statistically significant predictor of liquidity ratios for some REITs, and some REITs have other independent variables that are statistically significant predictors of liquidity ratios, such as Debt to Equity and ROE. Debt to assets (DA) was not statistically significant in any of the regression models run. Results that were not consistent with the hypotheses established were not considered statistically significant. All results that did not support the established hypothesis were found not to be statistically insignificant.

As for further work, one could consider including more variables in the analysis, such as the operating income or the net income of the REITs, and excluding the ones that prove not to be statistically significant. In addition, including several different funds using a panel analysis can provide a broader perspective. Another approach would be to perform a more in-depth analysis of the underlying reasons for the relationship between Fund Age and the Cash and Current Ratios. Additionally, one could also compare the results of this study with similar studies of other types of financial companies to see if the results are generalizable. Finally, it would be interesting to explore how the results of this study could be used by REIT managers to improve their financial performance.

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