Owner: Riset & Jurnal Akuntansi
e –ISSN : 2548-9224 | p–ISSN : 2548-7507
Volume 10 Nomor 1, Januari 2026
DOI : https://doi.org/10.33395/owner.v10i1.2864

Firm Size as a Moderator in the Relationship Between Leverage, Cash Flow, Profitability, and Cash Holding: Evidence from Indonesia's Food and Beverage Sector

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Diajukan : 17 Oktober 2025
Disetujui : 1 Nopember 2025
Dipublikasi : 1 Januari 2026

ABSTRACT

Cash holding plays a crucial role in maintaining corporate liquidity and financial flexibility, especially in capital-intensive industries such as food and beverage manufacturing. This study examines whether firm size moderates the relationship between leverage, cash flow, and profitability on cash holding in companies listed on the Indonesia Stock Exchange (IDX) during 2018–2022. The research employed a purposive sampling method, yielding 18 companies (57 firm-year observations). Data were analyzed using Ordinary Least Squares (OLS) and Moderated Regression Analysis (MRA) with SPSS 26. The results show that leverage ($t = 3.217$; $p < 0.01$) and cash flow ($t = 2.948$; $p < 0.01$) have a significant positive effect on cash holding, while profitability ($t = 0.842$; $p > 0.05$) has no significant impact. The R^2 value of 0.623 indicates that the independent variables explain 62.3% of the variation in cash holding. Furthermore, firm size significantly moderates the effects of leverage and cash flow, but does not moderate the relationship between profitability and cash holding. These findings highlight that larger firms tend to manage cash more effectively when facing leverage pressure or high cash flow, strengthening the understanding of liquidity management behavior in Indonesia's manufacturing sector.

Keywords: Cash Holding, Leverage, Cash Flow, Profitability, Firm Size, Moderation.

INTRODUCTION

Cash is the most liquid asset owned by a company and plays an essential role in ensuring operational continuity and financial flexibility (Azia & Naibaho, 2022). Cash that is available or stored in a company is referred to as cash holdings (Agus Gunawan et al., 2021). Errors in calculating or estimating cash outflows can cause a company to go bankrupt; therefore, companies must implement good cash management and appropriate policies regarding their cash holdings (Hayati, 2020). Firms need to maintain their cash at an optimal level to avoid both shortages and surpluses. Having a large amount of cash allows companies to invest and finance operational activities simultaneously. However, holding excessive cash without proper utilization can reduce the value of money and lead to losses. On the other hand, companies with low cash reserves will find it difficult to survive during economic recessions (Ningrum & Widoretno, 2023). According to the *pecking order theory*, cash decreases in the presence of debt, meaning that the amount of cash held by the company becomes smaller. When investment needs exceed retained earnings, the company's debt will increase (Viriany, 2022). Meanwhile, based on the *trade-off theory*, companies with high leverage tend to hold more cash to minimize potential financial distress (Yanti et al., 2022).

Empirical evidence regarding the determinants of cash holdings shows inconsistent results among researchers. Leverage, cash flow, and profitability have been widely studied as influential

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factors. Leverage, defined as the company's ability to finance assets using debt (Nurwani, 2021), affects cash holdings because companies with high leverage generally face higher risks. One reason for high leverage is when total debt exceeds total assets, resulting in higher leverage ratios (Bensaadi, 2025). When debt is used as a substitute for cash, leverage increases alongside cash holdings (Wijaya & Bandi, 2018). However, high leverage may also indicate that the company's available cash is relatively low because most resources are allocated to meet financing obligations (Rompas et al., 2024). Some studies found that leverage has a positive and significant effect on cash holdings (Wailan' An & Pandia, 2021; Viriany, 2022), while others reported a negative or insignificant effect (Nurainun Bangun, 2019; Sufiyati et al., 2022). Similar inconsistencies appear in research on cash flow and profitability. Cash flow represents the inflow and outflow of cash from operating, investing, and financing activities (Hayati, 2020). According to the *trade-off theory*, firms with stable cash flows tend to hold smaller cash balances because operational needs have already been financed, whereas the *pecking order theory* suggests that firms with high cash flows prefer to maintain larger reserves to fund future investments (Ki & Adhikari, 2022). Studies show mixed results: some find a positive relationship (Rahman, 2021; Rini, 2022; Hayati, 2020; Agnesstyaningsih et al., 2023), while others find no significant effect (Ariana et al., 2018; M. Sari & Zoraya, 2021). Similarly, profitability has also shown varied findings. High profitability indicates high net income and increased cash availability (Rousilita Suhendah, 2021; Sufiyati et al., 2022). According to the *pecking order theory*, greater profitability enhances liquidity and cash holdings (Ridha et al., 2019), supported by studies showing positive relationships (D. M. Sari & Ardian, 2019; Ningrum & Widoretno, 2023; Oktafiana & Hidayat, 2022). However, other evidence reveals a negative effect of profitability on cash holdings (Efrinal & Ernawati, 2022; Sufiyati et al., 2022). These inconsistencies across studies justify the inclusion of moderating factors to better explain the relationship among leverage, cash flow, profitability, and cash holdings.

In Indonesia, the phenomenon of improper cash management remains prevalent, as seen in several cases where companies miscalculated their cash holding levels. One notable case occurred in 2018 when PT Tiga Pilar Sejahtera Food Tbk (AISA), a company in the food and beverage sector, failed to pay interest on its corporate bonds and sukuk ijarah. On June 26, 2018, the company's cash and cash equivalents were insufficient to cover the interest payments due on July 19, 2018 (Yanti et al., 2022). This incident illustrates the importance of maintaining optimal liquidity. The food and beverage manufacturing industry, which has been growing rapidly in Indonesia, demands large working capital and efficient liquidity management. As company operations expand, differences in leverage, profitability, and firm size can significantly influence cash-holding behavior. Larger firms tend to have better access to financing and internal funds, which can affect their cash policies (Nurwani, 2021; Ningrum & Widoretno, 2023). Nevertheless, some large companies may still face liquidity risks when mismanaging their cash balance, emphasizing the need to study this phenomenon within the Indonesian context.

Previous studies have demonstrated inconsistent findings regarding the effects of leverage, cash flow, and profitability on cash holdings, indicating the possibility of other moderating variables. Firm size is considered an essential moderating factor because it reflects a company's scale, measured by total assets, sales, or profits (Azia & Naibaho, 2022). Larger companies generally have greater resources, easier access to external financing, and better management capabilities (Ningrum & Widoretno, 2023). Thus, firm size may strengthen the relationship between leverage, cash flow, profitability, and cash holdings. Research shows that firm size can moderate the relationship between leverage and cash holdings by influencing the firm's ability to manage its assets and obligations effectively (Ningrum & Widoretno, 2023). Similarly, company size can strengthen the relationship between cash flow and cash holdings because larger firms are more capable of converting cash into productive investments (Azia & Naibaho, 2022). Moreover, firm size can also moderate profitability since larger firms with high profitability tend to maintain higher liquidity levels (Ningrum & Widoretno, 2023).

Therefore, this study aims to analyze the effect of leverage, cash flow, and profitability on cash holdings with firm size as a moderating variable, focusing on food and beverage manufacturing firms listed on the Indonesia Stock Exchange from 2018 to 2022. The research replicates and extends the study of Ningrum & Widoretno (2023) by adding the cash-flow variable and using the

food and beverage subsector as the sample, with SPSS employed for statistical analysis instead of Partial Least Square (PLS). This research is expected to provide both theoretical and practical contributions: theoretically, by clarifying the inconsistent findings of previous studies through the introduction of a moderating variable; and practically, by offering insights for investors and managers in making informed decisions regarding liquidity management, capital structure, and firm value. Thus, this study seeks to examine how firm size moderates the relationship between leverage, cash flow, and profitability on cash holdings, particularly within food and beverage manufacturing firms in Indonesia.

LITERATURE REVIEW

Trade-off Theory

Trade-off Theory explains that companies strive to achieve an optimal cash balance by considering the balance between the costs and benefits of holding cash. According to this theory, companies hold cash to obtain benefits in the form of adequate liquidity to finance operational activities, meet short-term obligations, and anticipate uncertainty in future financial conditions. However, on the other hand, holding too much cash also incurs opportunity costs, namely the loss of potential profits from uninvested funds and an increased risk of cash misuse by management (Chireka, 2024).

In the context of capital structure, Trade-off Theory asserts that companies will determine the ideal combination of internal and external financing to minimize overall capital costs. Companies with high leverage tend to hold more cash as reserves to reduce the risk of financial difficulties and maintain their ability to pay obligations (Akhtar & al., 2025). However, if a company's leverage is too high, increased interest costs and bankruptcy risk can reduce the company's ability to hold cash (Yilmaz & al., 2024). Thus, Trade-off Theory emphasizes that a company's decision on the amount of cash holdings is the result of a rational consideration between the benefits of liquidity and the costs of financing, in order to maximize the company's value.

Pecking Order Theory

Pecking Order Theory explains that companies have a hierarchy of preferences in financing, where internal sources of funds are the preferred choice over external financing. This theory was first proposed by Myers and Majluf (1984), who argued that companies tend to use internal funds such as retained earnings and cash because the financing costs are lower and do not pose the risk of asymmetric information between managers and investors. Thus, companies with high profitability and cash flow will prefer to use internal funds to finance their investments, so they tend to have higher cash holdings (Yıldırım, 2021), (Almagribi, 2023).

Furthermore, the Pecking Order Theory implies that companies will use the following funding priority order: first, retained earnings; second, debt; and finally, issuance of new shares. When internal funds are sufficient, companies do not need to seek external funding, but if investment needs exceed retained earnings, companies will turn to external funding through debt (Ercan, 2025). Therefore, companies with high cash flow and profitability tend to hold more cash to maintain financial flexibility and reduce dependence on external financing (Aurelia, 2025). Based on this theory, a company's cash holdings reflect an efficient financing strategy to avoid issuance costs, information risk, and market uncertainty.

Hypothesis Development

The effect of *leverage* on *cash holdings*

Leverage is the proportion of assets financed by debt from external sources. High debt levels require a large cash reserve, so *leverage* affects *cash holdings* because cash is used by the company to pay debts and interest (Ritonga & Harmain, 2023). *Trade-off theory* assumes that a company with a high level of *leverage* can hold more debt, which can reduce the possibility of financial difficulties (Yanti et al., 2022).*Leverage* is said to affect *cash holdings* if a company has a lot of debt, so it can be assumed that a company has a lot of cash because it is risky. Financing assets through corporate bonds is one of the factors that causes high corporate debt. So, if the total debt of a company is greater than its total assets, the debt-to-equity ratio of the company will also be

high (Bensaadi, 2025).A decrease in *cash holdings* relative to debt indicates that the amount of cash held by a company is not large. When a company's investment needs are higher than its retained earnings, the company's debt will be high. If *cash holdings* decrease while debt increases, it indicates that the amount of cash in a company is not large. If investment needs exceed retained earnings, debt will increase. This indicates that the company's investment financing no longer uses internal funding, so it will depend on external funding, namely debt. If debt is considered a substitute for cash in investment financing, it will cause an increase in debt so that cash holdings will be higher (Wijaya & Bandi, 2018).This indicates that *leverage* has a positive impact on *cash holdings,* which is in line with the findings of researchers (Wailan' An & Pandia, 2021),(Viriany, 2022).
H1: *Leverage* affects *cash holdings*

The effect of *cash flow* on *cash holdings*

Cash flow is the amount of cash that flows in and out of a company and is used for various operational activities. A positive net cash flow occurs when cash outflows are less than cash inflows (Agnesstyaningsih et al., 2023). Positive cash flow indicates that the cash inflows in a company are greater than the cash outflows, and vice versa, negative cash flow indicates that the cash outflows in a company are greater than the cash inflows (Azia & Naibaho, 2022).*Cash holdings* are influenced by *cash flow* in conducting operational activities in a company in the application of cash, regardless of the amount of cash, depending on the size of *the cash flow* in the company (Ki & Adhikari, 2022).*Cash holdings* are thought to be influenced by *cash flow* in accordance with the paking order theory, which states that internal finances (*cash flow)* are the main source of funds that will be reinvested in a business to finance investment projects that will benefit the company with more investment opportunities and greater uncertainty in future cash flows, which means that more cash should be held (*cash holdings)* to fund future investments, where *cash holdings* will be influenced by *cash flow.* The amount of cash used in operational activities depends on the size of a company's *cash flow* (D. M. Sari & Ardian, 2019).This shows that *cash flow* has a positive impact on *cash holdings (*Rahman, 2021)and (Hayati, 2020).
H2: *Cash flow* affects *cash holdings*

The effect of profitability on *cash holdings*

Profitability is a company's ability to generate profits in a certain period. Meanwhile, profitability ratio is an important indicator for investors to measure a company's ability to generate net income related to dividends. Therefore, an increase in a company's profitability is interpreted as an increase in the company's net income. This increase is an indication that the company is able to fund its operations using internal company funds, which will make the company more economical in terms of cash (Ridha et al., 2019).In relation to the packing order theory, profitability will cause an increase in *cash holdings* because a company will use its profitability to increase liquidity (Ridha et al., 2019).The results of the study prove that profitability has a positive and significant impact on cash holdings (Ningrum & Widoretno, 2023),(D. M. Sari & Ardian, 2019),(Oktafiana & Hidayat, 2022).
H3: Profitability affects *cash holdings*

The effect *of leverage* on *cash holdings* with company size as a moderating variable (H4)

Leverage is a capability possessed by a company whose assets are financed by debt. Leverage reveals that if an asset owned by a company comes from a credit purchase, it will affect the company's cash holdings (Nurwani, 2021).High *leverage* illustrates how a company has high external funding, so it must set aside cash to pay off maturing debts and interest. The larger the company, the greater the amount of cash that must be provided in anticipation of unexpected costs (Sufiyati et al., 2022).The size of a company will affect the strengthening and moderation of the relationship *between leverage* and *cash holdings* in a company. The larger the size of a company, the greater its ability to manage its assets. Large companies are better able to consider every expense that will be incurred and the benefits that will be obtained by the company, which will be used to maximize the value of a company when compared to small companies. The results of the study

Owner: Riset & Jurnal Akuntansi
e –ISSN : 2548-9224 | p–ISSN : 2548-7507
Volume 10 Nomor 1, Januari 2026
DOI : https://doi.org/10.33395/owner.v10i1.2864

indicate that the size of a company can positively moderate leverage on cash holdings (Ningrum & Widoretno, 2023).
H4: Company size moderates the relationship between *leverage* and *cash holdings*

The effect of *cash flow* on *cash holdings* with company size as a moderating variable

Companies with cash flow will have cash inflows and outflows that will be used in the operational activities of a company. Clean and positive cash flow operations occur when the amount of cash outflow is less than the cash inflow. The size of a company as a moderating variable will affect the relationship between *cash flow and cash holdings* because the amount of money available to a company is used for short-term and emergency funding needs. This measure is an interaction variable regarding the relationship between *cash flow* and *cash holdings*, which has a significant positive influence, indicating that the larger the company (big firm) on a scale, the higher its *cash flow* will be, accompanied by an increase in *cash holdings* in the company (Azia & Naibaho, 2022).The results of the study reveal that company size can moderate significantly in a positive manner (Azia & Naibaho, 2022).
H5: Company size moderates the relationship between *cash flow* and *cash holdings*

The effect of profitability on *cash holdings* with company size as a moderating variable

Small-scale companies or small farms are likely to have higher *cash holdings* due to the high external costs incurred by large-scale companies. However, this contradicts the *pecking order* theory, which states that the larger a company is, the more cash it will have available. Company size can be interpreted as the extent to which a company has diversified its asset liquidity in order to achieve liquidity stability. A stable company cash balance will prevent financial decline, which is difficult for small and medium-sized companies to achieve. If *company size* is a variable that can influence the relationship between profitability and *cash holdings*, then company size will increase the influence on the relationship between profitability and *cash holdings*, which will show that large companies will achieve higher profitability. Therefore, an increase in company size will provide opportunities for companies to generate higher profits and is expected to increase profits for a company and its investors (Rousilita Suhendah, 2021).If profitability has shown that the cash balance is sufficient, then the company will be able to provide its cash balance at an optimal level. Larger companies will have much better access to external funding sources and greater possibilities for increasing capital at a lower cost. In theory, large companies will tend to have less cash (Ridha et al., 2019).
H6: Company size moderates the relationship between profitability and *cash holdings*

Framework Conceptual

As for framework conceptual in study This can depicted as following :

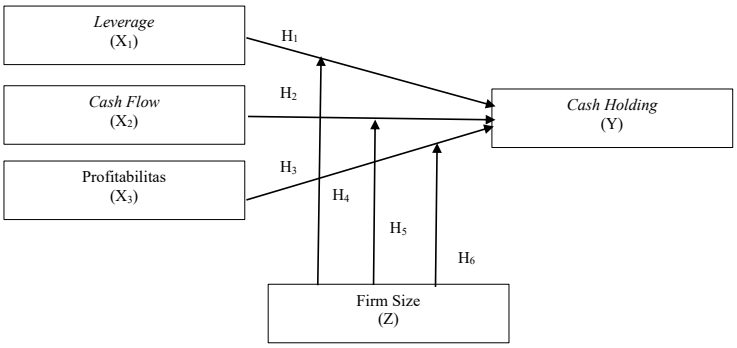

Figure 1. Framework Conceptual

METHODS

Research Object

The type of research used in this study is a quantitative approach. Quantitative research is a research

method that uses numbers to collect and analyze measurable data. The quantitative method is a method commonly used in research. The research object is the main target for researchers. The research object in this study is manufacturing companies in the food and beverage sub-sector listed on the Indonesia Stock Exchange from 2018 to 2022, with data samples taken from the official website of the Indonesia Stock Exchange, namely www.idx.co.id.

Data Sources

The data source used is secondary data collected indirectly from its source in the form of company financial reports. The data collection technique was carried out secondarily in the form of company documentation by obtaining data and financial reports of manufacturing companies in the food and beverage sub-sector listed on the Indonesia Stock Exchange from 2018 to 2022, which can be accessed through the official website, www.idx.co.id.

Population

The population of this study includes food and beverage manufacturing companies listed on the Indonesia Stock Exchange from 2018 to 2022. The sampling method used *purposive sampling*, which is a sampling technique that selects several sample criteria in table 1. The identification of outliers in this study was carried out using the Boxplot method. Data were categorized as outliers if their observed values fell outside the Interquartile Range (IQR). The presence of outliers has the potential to distort data patterns, increase error variance, and disrupt the fulfillment of normality and homoscedasticity assumptions in regression analysis. Therefore, observations identified as outliers were excluded from the dataset to ensure that the regression model produced more stable, unbiased, and representative coefficient estimates of the conditions of food and beverage manufacturing companies included in the study.

Table 1. Sample Selection Criteria

Criteria	Number
Food and beverage manufacturing companies that publish consecutive financial reports on the IDX for 2018-2022	48
1. Food and beverage manufacturing companies that experience profits in 2018-2022	(27)
2. Food and beverage manufacturing companies use the rupiah currency 2018-2022	(3)
Number of samples of manufacturing companies in the food and beverage sector each year	18
Total Number of Sample Observations (18 x 5)	90
Observations excluded due to abnormal data distribution (outliers)	(33)
Total Number of Observations	57

Variable identification and indicators

The dependent variable in this study is cash holdings, while the independent variables are leverage, cash flow, and profitability. The moderating variable used in this study is company size, as presented in Table 2.

Table 2. Operational Variables

Variable	Indicators	Scale
Cash Holdings (Y)	*Cash Holding*: $\frac{\text{Cash and cash equivalents}}{Total\ Assets - Cash\ and\ Cash\ Equivalents}$ Source: (Maulana et al., 2022)& (Rahman, 2021)	Ratio
Leverage (XI)	*Debt to Asset Ratio* (DAR): $\frac{Total\ Debt}{Total\ Assets}$ Source: (Nurwani, 2021)& (Maulana et al., 2022)	Ratio

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e –ISSN : 2548-9224 | p–ISSN : 2548-7507
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Cash Flow (X2)	FCF: $\frac{Free\ Cash\ Flow}{Total\ Assets}$ Source: (Rahman, 2021)	Ratio
Profitability (X3)	ROA: $\frac{Profit\ Clean}{Total\ Assets}$ Source: (Oktafiana & Hidayat, 2022)& (Ridha et al., 2019)	Ratio
Company Size (Z)	Company size = In (Total Assets) Source: (Rahman, 2021)& (Azia & Naibaho, 2022)	Ratio

Source: Summarized by the researcher

Model Specification

To examine the influence of leverage, cash flow, and profitability on cash holdings and the moderating effect of company size, this study applies Moderated Regression Analysis (MRA). The regression model is formulated as follows:

$CH=\beta0+\beta1LEV+\beta2CF+\beta3PROF+\beta4SIZE+\beta5(LEV\times SIZE)+\beta6(CF\times SIZE)+\beta7(PROF\times SIZE)+\epsilon$

where:

CH : Cash holdings
LEV : Leverage
CF : Cash flow
PROF : Profitability
SIZE : Company size (moderator)
$\beta_0 - \beta_7$: Regression coefficients
ϵ : Error term

MRA is used to determine whether company size moderates the relationship between the independent and dependent variables through the inclusion of an interaction term. This method directly tests moderation effects and is more efficient when theoretical interaction relationships are already established (Ghozali, 2019).

Data Analysis Procedure

All analyses in this study were carried out using SPSS 26 through several sequential steps. First, descriptive statistical analysis was performed to identify the mean, standard deviation, minimum, and maximum values of each variable. Next, classical assumption tests were conducted to ensure the validity of the regression model, including the normality test (Kolmogorov–Smirnov), multicollinearity test (VIF < 10 and Tolerance > 0.10), heteroscedasticity test (Glejser test), and autocorrelation test (Durbin–Watson). After confirming that the data met these assumptions, multiple linear regression analysis (OLS) was used to examine the direct effects of leverage, cash flow, and profitability on cash holdings. Subsequently, moderated regression analysis (MRA) was applied to determine whether company size moderated the relationship between the independent variables and cash holdings by including interaction terms (LEV×SIZE, CF×SIZE, and PROF×SIZE). Hypothesis testing was then carried out using both the t-test (to test partial effects) and the F-test (to test simultaneous effects), with a significance level of 0.05 where a p-value below 0.05 indicated that the hypothesis was accepted. Finally, model fit evaluation was performed using the coefficient of determination (R^2 and Adjusted R^2) to measure the explanatory power of the regression model.

Hypothesis Testing

Each hypothesis in this study was tested by comparing the significance value (*p-value*) with the level of significance set at 0.05. If the *p-value* was less than 0.05, the null hypothesis (H_0) was rejected, indicating that the independent variable had a significant effect on the dependent variable. Conversely, if the *p-value* was greater than 0.05, the null hypothesis was accepted, implying that no significant effect was found. This decision rule was applied consistently to both the direct effects analyzed using multiple linear regression (OLS) and the moderating effects tested through the

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e –ISSN : 2548-9224 | p–ISSN : 2548-7507
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DOI : https://doi.org/10.33395/owner.v10i1.2864

interaction terms in the moderated regression analysis (MRA) (Ghozali, 2019).

RESULT

The results of descriptive statistics are *Cash Holding, Leverage, Cash Flow,* Profitability and *Size The company* is presented in the following table:

Table 3. Descriptive Statistics of Cash Holding (Y) and Company Size (Z)

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
DAR	57	1.560	6.380	2.88561	1.290818
FCF	57	0.000	0.280	0.11614	0.072844
ROA	57	0.040	0.230	0.09947	0.043277
CASH HOLDING	57	0.000	0.390	0.13842	0.096618
LN	57	27.440	32.830	30.11807	1.455147
Valid N (listwise)	57				

Source: Secondary data processed with SPSS

Based on Table 3, it can be seen that the number of samples in this study was 57 samples. The average Leverage variable (X1) was 2.88561 and was measured using the DAR formula, which had a minimum result of 1.560 and a maximum value of 6.380, with a standard deviation of 1.290818. Cash Flow (X2) shows an average ratio of 0.11614 and is measured using the FCF formula, which has a minimum result of 0.00 and a maximum value of 0.280, with a standard deviation of 0.072844. Profitability (X3) can be measured using the ROA formula. It has an average value of 0.09947, with a minimum value of 0.040, a maximum value of 0.230, and a standard deviation of 0.043277. Cash holding (Y) shows 0.13842 and can be measured using the formula of cash and cash equivalents divided by total assets minus cash and cash equivalents, which has a minimum value of 0.000 and a maximum value of 0.390 with a standard deviation of 0.096618. Company size (Z) can be measured using the formula Ln Total Assets, which has an average value of 30.11807, a minimum value of 27.440, a maximum value of 32.830, and a standard deviation of 1.455147.

Normality test

The normality test is used to test whether the residual values in the regression model are normally distributed. This study uses the Kolmogorov-Smirnov approach. To determine whether the residual values are normally distributed or not, we can look at the asymptotic probability value Sig > 0.05. The results of the normality measurement can be seen in the table below.

Table 4. Normality Test
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		57
Normal Parameters [a, b]	Mean	-.0005802
	Std. Deviation	.00952755
	Absolute	0.046
	Positive	0.046
	Negative	-0.045
Statistical Tests		0.046
Asymp . Sig. (2-Tailed)		,200 [c,d]

Source: Secondary data processed with SPS

Based on the data in Table 4, it shows that the significance value exceeds 0.05, which indicates that the data is normally distributed. Thus, it meets the normality requirement, making the model valid for use in research.

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Multicollinearity Test

The multicollinearity test aims to determine whether there is a correlation between independent variables. The multicollinearity test can only be performed if the study uses more than one variable. The following are the results of the multicollinearity test.

Table 5. Multicolinear Test Track

	Model	Collinearity Statistics VIF Tolerance
1	(Constant)	
	DAR	.891
	FCF	.863
	ROA	.776
Source : Processed secondary data with SPSS		

Table 5 shows that the tolerance of each variable exceeds 0.10, which means that there is no multicollinearity. Similarly, the VIF (*Variance Inflation Factor*) calculation shows a figure below 10. This means that there is no multicollinearity between the independent variables (X) and the model.

Heteroscedasticity Test

The heteroscedasticity test is used to test whether there are differences in residual variation from one observation to another in the regression model. This study uses the Glejser approach. The following are the results of the heteroscedasticity test

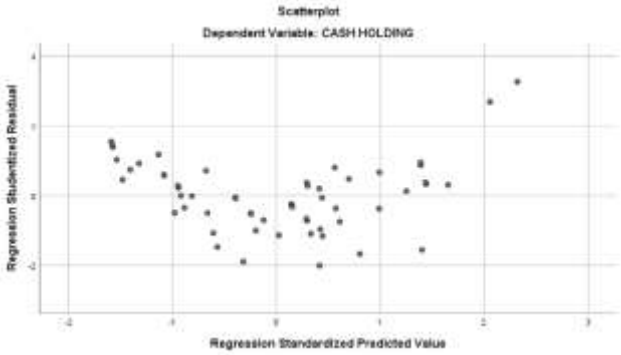

Figure 2. Heteroscedasticity test
Source: Secondary data processed with SPSS

Based on Figure 2, it can be seen that the points are scattered randomly and do not form a specific pattern. This indicates that this study is free from heteroscedasticity.

Autocorrelation Test

Autocorrelation aims to determine whether there is a correlation between the disturbance variable in a certain period and the previous variable. In this study, the DW (Durbin Watson) test was used to examine autocorrelation, with the DW value approaching the free model number under the classical assumption of autocorrelation (Ghozali, 2018). The following are the results of the autocorrelation test:

Table 6. Autocorrelation Test
Model Summary [b]

Model	R	R Square	Justed R Square	Std. Error of the Estimate	Durbin-Watson
1	0.995 [a]	0.991	0.990	0.10	1,298

Source: Secondary data processed with SPSS

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The DW value for the three independent variables is 1.298, which means it is between -2 and +2, so it can be concluded that there is no autocorrelation in the model.

Multiple Linear Regression Test

Multiple linear regression testing is a regression model that involves more than one independent variable used to determine the direction and extent of the influence of independent variables on dependent variables. The table below shows the results of multiple regression calculations.

Table 7. Multiple linear regression test

			Cash Holding		
		Variable Independent	Beta	t	Sig
1		(Constant)	-0.025	-6,194	0,000
		Leverage	0.003	3,130	0.003
		Cash Flow	1,314	69,059	0,000
		Profitability	0.011	0.328	0.744

Source: Secondary data processed with SPSS

Based on the multiple linear regression test in Table 8, it shows that *leverage* affects *cash holdings* and its significance is less than 0.05, namely 0.003 with a beta of 0.003, which means that variable (*leverage*) X1 has a significant positive effect on Y (*cash holdings*), so hypothesis 1 is accepted. Table 8 proves the effect of *cash flow* on *cash holdings* with a significance value of less than 0.05, namely 0.000, which means that variable (*cash flow)* X2 has a positive effect on Y (cash holdings), thus accepting the hypothesis. In Table 8. shows that profitability affects *cash holdings* with a significance value of 0.05, namely 0.744 with a beta of 0.011, which means that variable (profitability) X3 has a significant negative effect on Y (*cash holdings*), so the hypothesis is rejected.

Based on the decision-making criteria used in this test, the following applies:

a. If t calculated > t table or sig value < α (0.05), then there is a significant effect between the independent variable and the dependent variable.
b. If t count > t table or sig value < α (0.05), then there is no significant effect between the independent variable and the dependent variable. It is known that the t table value at a significance level of 5% is as follows:

To determine the critical value for the t-table used as a comparison in hypothesis testing, the following formula is applied:

T table : n−k−1

Where:

n : number of samples
k : number of independent variables
1 : constant

T tabel = n – k – 1; α /2
= 57-3-1:(0.05)/2
= 53 : 0.025
= 2.005

MRA Test (Moderate Regression Analysis)

MRA aims to determine whether company size variables can strengthen or weaken the relationship between *leverage, cash flow*, and profitability with *cash holdings*. The moderating hypothesis is accepted if the moderating variable of company size (Company *Size*Leverage)*, the moderating

Owner: Riset & Jurnal Akuntansi
e –ISSN : 2548-9224 | p–ISSN : 2548-7507
Volume 10 Nomor 1, Januari 2026
DOI : https://doi.org/10.33395/owner.v10i1.2864

variable of company size (*Company Size*Cash Flow)*, and the moderating variable of company size (Company Size*Profitability) have a significant effect on *cash holdings.* The following are the results of the MRA (Moderate Regression Analysis) test:

Table 8. MRA (Moderate Regression Analysis) Test

Model		StandardizedCoefficient Beta	Sig
1	(Constant)	-6.072	0.000
	Moderasi_Leverage	3.439	0.001
	Moderasi_Cash flow	46.721	0.000
	Moderasi_Profitabilitas	1.327	0.190
Source: Secondary data processed with SPSS			

Based on the MRA test shown in Table 9, the first moderator, *Leverage*, obtained a beta regression coefficient of 3.439 with a significance value of 0.001 or less than 0.05. Based on these results, company size is a moderating variable that has a significant influence in moderating the effect of *leverage* on *cash holdings*. The second moderator, *Cash Flow*, obtained a beta regression coefficient of 46.721 and a significance value of 0.00 or less than 0.05. These results indicate that company size is a moderating variable that has a significant value in moderating the effect *of cash flow* on *cash holdings.* The third moderator, Profitability, obtained a beta regression coefficient of 1.327 and a significance value of 0.190, which is greater than 0.05. Therefore, it can be said that company size is not a moderating variable that has a significant effect in moderating the influence of profitability on *cash holdings.*

DISCUSSION

The Effect of Leverage on Cash Holdings

Based on Table 7, it shows a coefficient value of 0.003 and a t-value of 3.130, which is greater than the t-table value of 2.005, as well as a significance value that is less than 0.05, namely 0.003 < 0.05. Therefore, hypothesis 1 in this study is accepted because the significance value of 0.003 is smaller than 0.05. This is shown by high leverage, which means that cash holdings will also be higher, so that if a company's debt is greater, the cash held by the company will also be greater. This is based on the trade-off theory, which states that a company with high debt will also have more cash in order to reduce the possibility of financial problems. This occurs when a company has obtained funding assistance through debt (Yanti et al., 2022).This is because the company has obtained funding from debt, companies with high leverage are generally subject to stricter monitoring by creditors, prompting them to maintain a strong cash position in order to preserve creditor confidence and ensure operational stability. Research results agree that leverage has a positive effect on cash holdings (Yanti et al., 2022),(Wailan' An & Pandia, 2021),(Viriany, 2022).Research results that disagree state that leverage has no effect (Oktafiana & Hidayat, 2022).

The effect of cash flow on cash holdings

Based on Table 7, the coefficient value is 1.314 and the t-value is 69.059, which is greater than the t-table value of 2.005 and less than 0.05, which is 0.00 < 0.05. Therefore, hypothesis 2 in this study is accepted because the significance value of 0.00 is smaller than 0.05. This is demonstrated by companies that have experienced an increase in their cash flow, which will tend to hold back their income and accumulate cash that they can later use as investment funds. This is in line with the pecking order theory, which states that a company will hold a large amount of cash when it has high cash flow. This is due to the tendency of companies to use internal sources of funds rather than external sources (Rahman, 2021). In addition, a high level of cash flow reflects strong liquidity capacity, enabling the company to set aside a portion of its funds as cash reserves. As operating cash flow increases, the company can reduce its reliance on more costly external financing sources, such as debt or the issuance of new shares.The results of the study are in line with the statement that cash flow has a positive effect on cash holdings (Azia & Naibaho, 2022), (Hayati, 2020),and (Agnesstyaningsih et al., 2023).Research that does not agree states that cash flow has no effect on cash holdings (Ariana et al., 2018),(M. Sari & Zoraya, 2021).

The effect of profitability on cash holdings
Based on Table 7, it can be seen that the coefficient value is 0.011 and the t-value is 0.328, which is greater than the t-table value of 2.005, and the significance value is less than 0.05, which is 0.744 > 0.05. Therefore, hypothesis 3 in this study is rejected because the profitability value is too high, namely 0.744 or above 0.005. This may be due to the level of cash holdings, which cannot be seen from how much profit the company earns, but based on how much the company needs. In addition, another responsibility that must be carried out by the company is to provide satisfaction to each shareholder, where the profits owned by the company will be given to each shareholder in the form of dividends. The results of the study do not agree that profitability does not affect cash holdings (Sufiyati et al., 2022).Studies that agree state that profitability affects cash holdings (Sari & Ardian, 2019).

The effect of leverage on cash holdings with company size as a moderating variable
Based on Table 8, leverage obtained a beta regression coefficient of 3.439 with a significance value of 0.001, which is less than 0.05. Thus, hypothesis 4 in this study is accepted because the significance value of 0.001 is less than 0.05. This shows that large companies have a higher debt capacity than small companies. This is because large companies are more trusted to borrow, so they will get more external funding or capital compared to smaller companies. This allows these companies to obtain additional funds, which also has an impact on their cash holdings. The results of the study are in line with the findings that company size can moderate leverage and cash holdings (Ningrum & Widoretno, 2023).Contrary research states that company size cannot moderate leverage on cash holdings (Oktafiana & Hidayat, 2022).

The effect of cash flow on cash holdings with company size as a moderating variable
Based on Table 8, Cash Flow obtained a beta regression coefficient of 46.721 with a significance value of 0.00, which is less than 0.05. Therefore, hypothesis 5 in this study is accepted because the significance value of 0.00 is less than 0.05. This shows that the larger the company, the higher the level of cash availability if the cash flow is also high. Cash availability depends on the amount of cash inflows. Large companies (big firms) will build up high cash reserves from cash flows and can avoid investments that could threaten the company. The larger the company's cash reserves to increase cash flow, the greater the cash reserves in the company (Azia & Naibaho, 2022).The amount of cash owned by a company will depend on the level of cash flow owned by the company. If the incoming cash flow is greater than the outgoing cash flow, the net cash flow owned by the company will be positive. This positive net cash flow will increase the amount of cash available within the company. This is in line with the pecking order theory, which explains financing behavior in companies, where companies tend to prioritize internal funds over external funds (Rahman, 2021).Concurring research findings indicate that a company's size can moderate cash flow and cash holdings within a company (Azia & Naibaho, 2022),(Rahman, 2021).Disagreeing research states that company size cannot moderate cash flow against cash holdings (Agnesstyaningsih et al., 2023).

The effect of profitability on cash holdings with company size as a moderating variable
Based on Table 8, the company's profitability obtained a beta regression coefficient of 1.327 with a significance value of 0.190, which is greater than 0.05. Therefore, hypothesis 6 in this study is rejected because the significance value of 0.190 is greater than 0.05. This indicates that large or small companies do not determine the optimal level of cash availability based on their profit levels. This shows that profitability and cash holdings are not influenced by the size of a company. Large companies, even when they have high levels of profitability, do not necessarily retain large amounts of cash because they have broader access to external financing at relatively lower costs. Conversely, smaller companies that are profitable may choose to hold more cash in order to anticipate potential difficulties in obtaining external funds in the future. Therefore, the effect of profitability on cash holdings operates through internal financial management mechanisms rather than being determined by whether a company is large or small. The results of this study are not in line with the statement

that the size of a company cannot moderate the relationship between profitability and cash holdings (Azia & Naibaho, 2022).A similar study states that company size can moderate profitability against cash holdings (Ridha et al., 2019).

CONCLUSION

Based on the research findings, leverage has a positive effect on cash holdings, indicating that firms with higher leverage levels tend to maintain larger cash reserves. This suggests that as a company's debt increases, the need to hold cash for liquidity and debt servicing also rises. Furthermore, cash flow positively influences cash holdings, as firms that retain earnings and generate strong internal cash flows can accumulate funds for future investment opportunities.

In contrast, profitability does not significantly affect cash holdings, implying that cash accumulation is not solely determined by profit levels but rather by liquidity management strategies. Firm size acts as a moderating variable between leverage and cash holdings, as larger firms generally have greater access to external financing due to higher creditworthiness. Similarly, firm size moderates the relationship between cash flow and cash holdings—larger firms tend to generate stronger cash inflows, thus maintaining higher liquidity reserves. However, firm size fails to moderate the relationship between profitability and cash holdings, suggesting that profitability does not directly influence cash retention regardless of company scale.

The results highlight the importance of maintaining an optimal balance between leverage and liquidity. Managers should monitor debt levels carefully to ensure that cash reserves remain sufficient for operational and investment needs. Large firms are encouraged to leverage their credit reputation to access favorable financing, while smaller firms should focus on improving internal cash flow management to maintain adequate liquidity. Moreover, investors and financial analysts can use these insights to evaluate a firm's liquidity position in relation to its debt policies and size.

This study is limited to manufacturing companies in the food and beverage sub-sector listed on the Indonesia Stock Exchange during 2018–2022. The sample size is relatively small, which may restrict the generalizability of findings. Additionally, the analysis relies on secondary financial data without considering qualitative managerial factors or external macroeconomic variables that may affect cash-holding behavior.

Future research may expand the sample to include other sectors or extend the observation period to capture broader economic conditions. Researchers could also apply advanced modelling techniques such as Structural Equation Modelling (SEM) or panel data regression with dynamic effects to better capture causal relationships. Furthermore, incorporating qualitative insights from managerial interviews or integrating ESG and corporate governance variables may provide a more comprehensive understanding of corporate liquidity management.

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