LEVERAGE, FIRM SIZE, AND PROFITABILITY: EMPIRICAL EVIDENCE OF PT BANK CENTRAL ASIA TBK 2021–2024 WITH MULTIPLE REGRESSION (ORANGE DATA MINING)

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ABSTRACT
This study analyzes the influence of leverage and firm size on profitability at PT Bank Central Asia Tbk (BCA), a bank listed on the Indonesia Stock Exchange, during the 2021–2024 period. The research applies a quantitative approach using secondary data obtained from the company's annual financial statements. Leverage is proxied by the Debt-to-Equity Ratio (DER), firm size is measured using the natural logarithm of total assets [Ln(Total Assets)], and profitability is represented by Return on Assets (ROA). The relationship among variables is examined through multiple linear regression, processed using Orange Data Mining (v3.39.0) to support data processing, visualization, and model estimation. The results indicate that leverage tends to relate negatively to profitability, while firm size tends to relate positively to profitability. These findings suggest that an increase in debt-based funding may be associated with lower asset-based returns, whereas a larger asset base may support improved profit generation. The study provides managerial implications for optimizing funding structure and managing asset growth to maintain bank profitability.
Keywords: leverage; firm size; profitability; return on assets; debt-to-equity ratio.

INTRODUCTION

Banking sector is bone back intermediation finance that mobilizes public funds and distributes them return to sector productive through credit . In phase recovery post-pandemic , industry Indonesian banking does not only face adjustment request credit and quality assets , but also dynamics interest rates , global market volatility , and acceleration digital transformation that changes structure costs and service models . In the context of said , the authority emphasize importance guard stability system finance as well as resilience institution finances so that the function intermediation still walk in a way Healthy .

Bank profitability becomes indicator key For evaluate sustainability business and the bank's ability to absorb risk . Profitability (e.g. ROA/ROE) reflects bank effectiveness in manage asset productive , efficient costs , and funding strategies . From the perspective of supervision industry , reports official authorities also use indicator profitability as one of the size main performance banking , side by side with capital and quality assets . Therefore , understanding internal factors that influence profitability important No only for bank management , but also for investors and regulators.

Two internal factors that often reviewed related with profitability is leverage and size company (firm size). Leverage in banks is basically reflect structure funding — to what extent is growth

asset financed by obligations (party funds third /debt) relative towards own capital . By In theory , leverage can " leverage " returns. holder stock (ROE) when the income margin more big from cost of funds. However , leverage also increases risk , so that can pressing profitability when cost of funds increases or quality credit worsened . A number of findings empirical in the sector Indonesian banking shows that change structure funding and efficiency capital related with fluctuations indicator bank profitability .

Besides leverage, the size of the bank describes capacity assets , scale operations , and potential efficiency . Bank size big generally own opportunities for economies of scale, diversification portfolio , as well as access more funding wide . However , the size big can also cause challenge coordination , complexity operational and costs greater compliance high . Therefore , the relationship size company with profitability Can varies depending on business strategy , market structure , and conditions macro . Empirical studies on Indonesian banking show that bank size and other internal variables can relate with indicator performance , although direction and strength No always consistent between period and sample .

Study This focusing on PT Bank Central Asia Tbk (BCA) for the 2021–2024 period , namely phase when banking adapt to recovery economy and normalization policy . Election period This important Because change environment interest rates and dynamics intermediation can influence cost of funds, expansion credit and returns results asset productive ——which ultimately influence profitability . With Thus , testing empirical the influence of leverage and size company to profitability at BCA becomes relevant For give proof based on data at the individual bank level.

In a way methodological , research use multiple linear regression with Orange Data Mining assistance for test the influence of leverage and size company to profitability . Research results expected give contribution practical for management in formulate policy structure funding and management scale assets , as well as enrich literature empirical Indonesian banking in the period latest .

LITERATURE REVIEW
Financial management
According to James C. van Horne in (Kasmir, 2019) defines financial management as all activities related to the acquisition, funding, and management of assets with overall objectives. According to Riyanto (2008) in (Hakim, 2024) defines financial management as all activities in obtaining funding or capital at minimal costs, the most profitable terms of obtaining funds and using these funds as efficiently as possible.

So, according to these theories, it can be concluded that financial management is a science that is used in activities to regulate the inflow and outflow of funds, whether it is done to manage individual funds, businesses or institutions by considering the calculation of risks that will be experienced so that the decisions chosen are appropriate so that they can achieve the predetermined goals or the desired results.

Concept of Understanding Banks

Banks are business entities that collect funds from the public in the form of savings and distribute them to the public in the form of credit and/or other forms in order to improve the standard of living of many people.

Banking is a financial system consisting of institutions that accept deposits, extend loans, and provide various other financial services. Simply put, banking encompasses all activities undertaken by banks to support the financial needs of individuals and businesses.

Bank Financial Report

A bank's financial report shows the bank's overall financial condition, including its assets, liabilities, revenues, and expenses. The report includes information on the amount of assets and the types of assets held (on the asset side). It also shows short-term and long-term liabilities, as well as equity (own capital).

The above information is reflected in the financial report, which we call the balance sheet. Financial reports also provide information on the bank's operating results over a specific period and the costs or expenses incurred to achieve those results. This information is included in the income statement.

Bank Financial Ratios

To determine a bank's financial condition, you can view and study its periodic financial reports. These reports also illustrate the bank's performance over that period. These reports are particularly useful for owners, management, the government, and the public as customers, as they provide insight into the bank's condition at any given time.

The bank's financial ratios that will be presented are as follows:

1. Bank Liquidity Ratio: This ratio measures a bank's ability to meet its short-term obligations when they are due.
2. Bank Solvency/Leverage Ratio This ratio measures a bank's effectiveness in achieving its objectives. The bank's Solvency Ratio measures a bank's ability to source funds to finance its activities.
3. Bank Profitability Ratio Bank profitability ratio is a ratio used to measure the level of business efficiency and profitability achieved by a bank in a certain period.

Leverage

Leverage is a solvency ratio used to assess the extent to which a company's assets are financed with debt. Harahap (2013) explains that leverage describes the relationship between debt and equity and reflects a company's level of dependence on external funding. In general, the use of debt can increase potential returns, but it can also increase financial risk if not managed carefully (Brigham & Houston, 2019). In this study, leverage is measured using the Debt to Equity Ratio (DER).

In this study, leverage is measured using *Debt to Equity (DER)* , using the formula:

$$\text{DER} = \frac{\text{Total Debt}}{\text{Total Equity}}$$

Company Size

Company Size, According to Hartono (2008:14) in (Setiowati et al., 2023) company size is the size of the company which can be calculated by the total assets/size of the company's assets by

using the calculation of the logarithm value of total assets. In this study, company size is measured using *the Natural Logarithm LN (Total Assets)* , using the formula:

$$Ukuran\ Perusahaan = Logaritma\ Natural\ LN\ (Total\ Assets)$$

Profitability

Profitability ratios describe a company's ability to generate profit within a specific period and demonstrate management's effectiveness in managing its resources. Kasmir (2021) emphasized that profitability is an important indicator of operational efficiency and financial performance. In financial studies, ROA is commonly used to assess an asset's ability to generate profit (Gitman & Zutter, 2015). In this study, profitability is measured using Return on *Assets (ROA)* , using the formula:

$$Return\ On\ Assets\ (ROA) = \frac{Laba\ Bersih}{Total\ Asset} \times 100\ \%$$

METHOD

Research Design

This study uses a quantitative approach with a descriptive method to obtain empirical evidence from financial reports related to the leverage ratio and company size at PT Bank Central Asia Tbk in 2021-2024. The descriptive analysis method is used to analyze available data and process it to obtain a clear picture of the facts and relationships between phenomena. being researched.

Data and Data Collection Methods

The type of data used is secondary data. The research data was obtained from the annual financial report of PT Bank Central Asia Tbk for the 2021–2024 period, published on the Indonesia Stock Exchange and the company's official website (IDX, nd; PT Bank Central Asia Tbk, nd).

Data Analysis Techniques

The data analysis technique in this study used multiple linear regression. The data was processed using the *Orange Data Mining application program version 3.39.0 for Windows* . This analysis was used to measure the magnitude of the influence between the independent and dependent variables.

1. **Descriptive Statistics**

   Descriptive statistics are used to analyze data by describing the collected data directly, without aiming to draw general conclusions.

2. **Multiple Linear Regression**

   Multiple linear regression analysis was performed using *the Linear Regression widget* in the *Orange Data Mining application version 3.39.0 (Windows)* , by entering *profitability* as the dependent variable and leverage and company size as independent variables. The multiple regression analysis equation is as follows:

$$Y = -\alpha - \beta 1 X 1 + \beta 2 X 2$$

Where :
Y = *Dependent* Variable
α = Constant (*intercept*)
β= Regression coefficient of independent variable
X = *Independent* Variable

3. **Classical Assumption Test**

   Normality Test

   Normality testing is performed visually using histograms and box plots, depicted through distribution plots *in* the *Orange Data Mining application* . Data is said to be normally distributed if it forms a symmetrical pattern and approaches a bell curve **.**

   Multicollinearity Test

   The multicollinearity test was carried out by looking at the correlation values between independent variables using the Correlations widget in the Orange Data Mining application **.**

   Heteroscedasticity Test

   The heteroscedasticity test is performed visually by observing the distribution of residuals against predicted values using *a scatterplot* . A model is said to be free of heteroscedasticity if the residuals are randomly distributed and do not form a specific pattern.

4. **Hypothesis Testing**

   Hypothesis testing in this study was conducted indirectly using the *coefficient of determination (R^2)* as the basis for drawing conclusions. The R^2 value indicates the ability of the independent variable to explain the dependent variable, so the research hypothesis is based on the strength of the relationship generated by the model.

RESULTS

Data analysis using application data processing, namely *Orange Data Mining version 3.39.0 Windows* , where *Orange Data Mining* is device soft *open-* source used For data analysis , data visualization , and modeling statistics in a way interactive . Application This based *visual programming* with widget *system* . Use Orange Data Mining application is expected can increase reliability and accuracy results research conducted

1. **Descriptive Statistics**

   Analysis results descriptive statistics show that the research data own stable characteristics with level low variation , so worthy For used in analysis advanced

(Source : Data processed 2026)

2. **Multiple Linear Regression Analysis**

Analysis conducted with use method multiple linear regression use application *software Orange Data Mining version 3.39.0 Windows* obtained regression model equation like following :

$$Y = -107.561 - 0{,}578589\, X1 + 5.40197\, X2$$
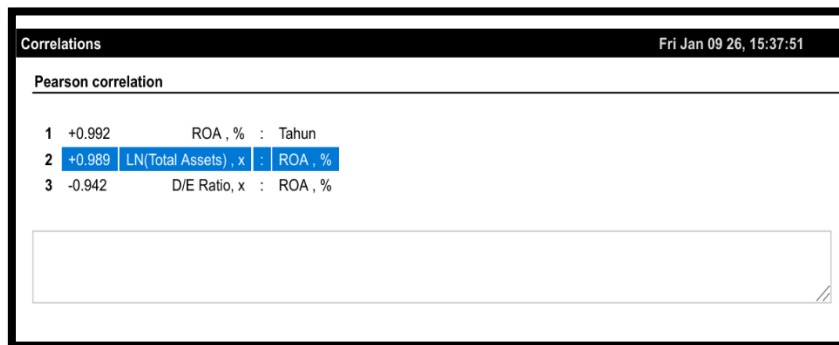

(Source : Data processed 2025)

3. **Classical Assumption Test**
   a. **Normality Test**
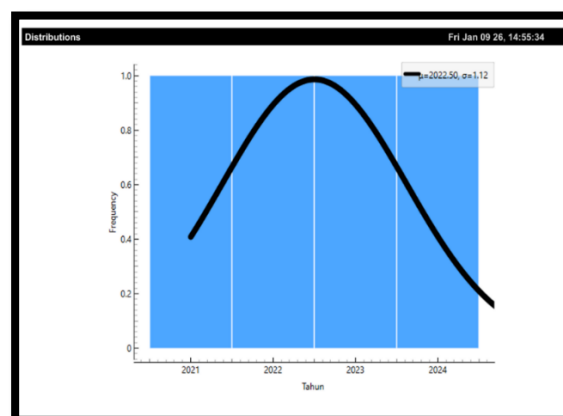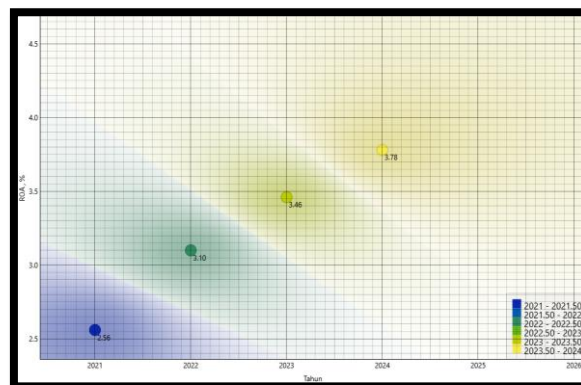

(Source: Processed Data 2026)

b.   **Multicollinearity Test**

(Source: Processed Data 2026)

-    LN(Total Assets) (X) with ROA (%) (Y), Correlation value of +0.989.
-    D/E Ratio (X) with ROA (%) (Y), Correlation value of -0.942.
-    Correlation between variables independent, No there is very high correlation (≥ 0.90) between fellow independent variables .
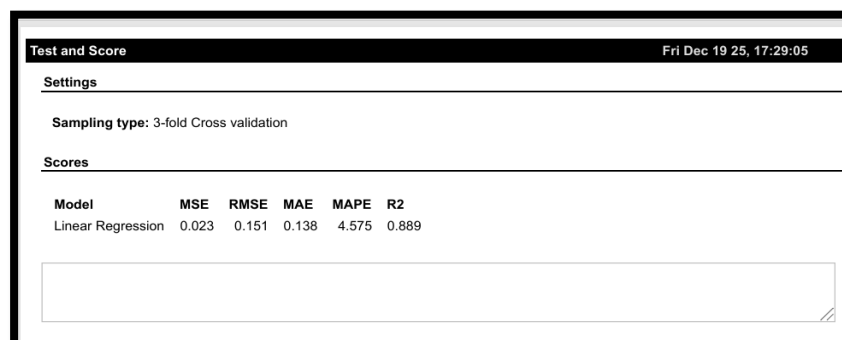
c.   **Heteroscedasticity Test**

(Source : Data processed 2025)

Regression model No experience heteroscedasticity or fulfil assumptions homoscedasticity ,

4.   **Hypothesis Testing**

(Source : Data processed 2025)

Coefficient value *determination (R²)* of 0.889 shows that amounting to 88.9% of the variation in the variable dependent can explained by variables independent used in the model. While that , the rest 11.1 % is influenced by other factors outside the model.

DISCUSSION

Study This aim For analyze The Influence of Leverage and Company Size on Profitability at PT Bank Central Asia Tbk during 2021-2024 period . Research results show that Leverage has a negative value and the size company has a positive value against profitability . This shows that improvement use of debt against equity precisely lower level profitability company , temporary the more big size company so ability company in produce profit the more increased . In the context of banking , high leverage reflects height dependence on third party funds thirdly , if No managed can optimally pressing profitability . Therefore that , the result study This disclose that PT Bank Central Asia Tbk more effective in guard profitability with control leverage level so as not to cause burden risk big finances . Next , the results study show that size company influential positive to profitability That means that PT Bank Central Asia Tbk as a bank with large assets capable optimize source power possessed For produce more profit high . results study This expected can become material consideration for management in determine policy optimal finances to improve profitability company .

CONCLUSION

Based on results research and data analysis that has been done about the influence of leverage and size company to profitability at PT Bank Central Asia Tbk , then can withdrawn a number of conclusion as following :

1. BCA's leverage level is in a relatively controlled condition. Leverage has a negative effect on profitability. The higher the debt, the lower the profit tends to be due to increasing expenses and risks.
2. Bank BCA has a large and stable company size. Company size has a positive effect on profitability. Large assets increase the ability to generate profits.
3. BCA's profitability during the 2021–2024 period is classified as good. Profit performance is influenced by debt and asset management.
4. Leverage and company size simultaneously have a significant impact. Leverage has a negative impact, while company size has a positive impact. Capital and asset structure management is key to profitability.

LIMITATIONS

This study has several limitations. First, the research object focused only on PT Bank Central Asia Tbk, so the results cannot be generalized to other banking companies or different industrial sectors. Second, the research period was limited to 2021–2024, so the results do not fully reflect the company's long-term condition. Third, the research variables only included *leverage (DER)* and company size (*Ln Total Assets*) on *profitability. (ROA),* while other financial variables that could potentially influence profitability were not analyzed. Furthermore, external factors such as government policy, inflation, interest rates, and

macroeconomic conditions were not included in this study, so their impact on profitability cannot be fully explained.

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