COURSE OF INDEPENDENT STUDY

Conducted On

Determinants of Capital Structure in Indian Companies

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Declaration

I hereby declare that the project report titled "Determinants of Capital Structure in Indian Companies", submitted by me, is an original work carried out under the guidance of **Dr. Sandipan Karmakar,** Assistant Professor, Department of Management Studies, MNIT Jaipur. This project has been completed as part of my academic requirements for the Course of Independent Study (CIS) in the [MBA Program], MNIT Jaipur.

I confirm that this report is the result of my own efforts and research, and to the best of my knowledge

I assert that the statements made and conclusions drawn are an outcome of my research work.

I further declare that to the best of my knowledge and belief the report does not contain any part of any work which has been submitted for the award of MBA degree or any other degree/diploma/certificate in this University or any other University of India or abroad.

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Abstract

This study investigates the factors that influence capital structure decisions among Nifty 500 companies during the period from 2013 to 2023. Capital structure refers to the blend of debt and equity that firms utilize to finance their operations and growth, which significantly impacts financial risk, cost of capital, and overall performance. The research is built upon established theoretical frameworks, including the Trade-off Theory, Pecking Order Theory, Agency Theory, and the Modigliani-Miller proposition, each offering distinct views on how firms decide their debt-equity ratio. The analysis centers on the Debt-Equity Ratio (DE) as the dependent variable, examining its correlation with independent factors such as Total Assets, Fixed Assets, Return on Equity (ROE), Firm Size (as measured by annual sales), and Earnings Per Share (EPS). By adopting a sector-specific approach, the study explores how capital structure determinants differ across industries and tracks their evolution over time. Statistical tools, including regression analysis, are used to identify key predictors and emerging trends. The results aim to improve the understanding of capital structure behavior in the Indian market, providing useful insights for corporate financial strategies and bridging the gap between theoretical models and real-world practices in the NSE ecosystem.

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Introduction-

Capital structure is a key concept in corporate finance that refers to how a company finances its operations and growth through a combination of debt and equity. The structure of a company's capital is critical as it directly affects its financial health, cost of capital, and risk exposure. An ideal capital structure can boost a company's value by reducing its overall financing costs. However, an unbalanced structure can result in financial instability, especially during economic downturns. Hence, deciding on the capital structure is one of the most significant strategic decisions for a business.

Debt financing provides companies with the advantage of tax-deductible interest payments, potentially lowering their cost of capital. However, excessive debt increases the risk of financial distress, making it important for companies to carefully assess their capacity for borrowing. Conversely, equity financing, while eliminating repayment obligations, can dilute ownership and is often more expensive due to the higher expected returns demanded by shareholders. This creates a delicate trade-off, influenced by both internal factors such as profitability and asset base, and external factors like market conditions and regulations.

Several theoretical models have been proposed to understand the factors influencing a firm's capital structure. The Trade-off Theory suggests that companies must weigh the tax benefits of debt against the potential costs of bankruptcy. The Pecking Order Theory argues that firms prioritize using internal funds, followed by debt, and only issue equity as a last resort. Agency Theory delves into the conflicts that arise between managers, shareholders, and debt holders, which impact financing decisions. The Modigliani-Miller Theory, under certain assumptions, claims that capital structure does not affect a firm's value, but real-world factors such as taxes and bankruptcy costs challenge this notion.

This study investigates the capital structure of firms listed on the Nifty 500 index, which represents a broad spectrum of industries in India. The study focuses on the Debt-Equity Ratio (DE) as the dependent variable and explores how it correlates with firm-specific factors such as Total Assets, Fixed Assets, Return on Equity (ROE), Firm Size, and Earnings Per Share (EPS). The analysis covers the period from 2013 to 2023, which includes important economic and regulatory shifts, offering valuable insights into the factors that shape capital structure decisions over time.

India's unique corporate environment makes this study especially relevant. With its rapidly developing financial markets, diverse industries, and evolving regulations, Indian companies face distinct opportunities and challenges when determining their capital structure.

This research aims to examine patterns and trends across various sectors and evaluate the applicability of theoretical models in understanding capital structure decisions within the Indian context. By analyzing the factors influencing capital structure in Nifty 500 companies, the study seeks to enhance the understanding of how firms in India make financing choices. The results will provide valuable insights for corporate managers, financial analysts, and policymakers, helping them optimize debt-equity ratios in an evolving and competitive business landscape.

Literature Review:

Paper 1: Capital structure determinants across sectors: Evidence from developing countries
Authors: Raja Rehan, Abdul Razak, Abdul Hadi, Hafezali Iqbal Hussain
Venue: Heliyon (2023)

Summary:
This study explores the key determinants of capital structure decisions across multiple sectors. By combining theoretical models such as Modigliani and Miller's propositions with contemporary data, the research highlights sector-specific variations in financial decision-making. The study focuses on how profitability, firm size, and asset tangibility influence firms' capital structure strategies, providing critical insights into the application of financial theories in diverse industry contexts.

Main Findings:

1. Profitability and asset tangibility significantly influence capital structure decisions, with varying impacts across sectors.
2. Larger firms are more inclined toward debt financing due to improved access to capital and lower perceived risk.
3. Regulatory frameworks and market volatility heavily shape the capital structure decisions, particularly in more volatile sectors.

Methodology:
The study adopts a quantitative approach, collecting financial data from firms across several industries over a 10-year period. Regression analysis is used to examine the relationships between various firm-specific variables and capital structure choices, ensuring the robustness of findings across different sectors.

Paper 2: *Determinants of capital structure: Evidence from a panel of small and medium-sized enterprises in Turkey*
Authors: Bülent Köksal, Cüneyt Orman
Venue: *Small Business Economics* (2014)

Summary:
This paper investigates the trade-off and pecking order theories of capital structure in emerging markets. It explores how factors such as profitability, market conditions, and firm-specific characteristics influence capital structure decisions in economies with limited access to external financing. The authors use empirical data to challenge the conventional theories and propose adjustments for emerging market contexts.

Main Findings:

1. Profitability is a key determinant of capital structure, with profitable firms relying less on external financing.
2. Firms in emerging markets tend to have lower leverage ratios, primarily due to limited access to capital markets and high market volatility.
3. Tax benefits and non-debt tax shields play a crucial role in shaping capital structure decisions in these economies.

Methodology:
Panel data from firms in emerging markets is analyzed using regression models to test the applicability of

traditional capital structure theories. The study also factors in macroeconomic conditions and market inefficiencies to provide a comprehensive view of capital structure determinants in emerging economies.

Paper 3: *A study on determinants of capital structure in Indian manufacturing firms*
Authors: Anshu Handoo, Kapil Sharma
Venue: Not specified
Literature Review:

Summary:
This research delves into the capital structure decisions of Indian companies, emphasizing the impact of profitability, firm size, and asset tangibility. The study addresses the specific challenges faced by Indian firms, such as regulatory barriers and market volatility, and compares these findings with global studies on capital structure. The paper highlights that India's unique economic and regulatory environment plays a pivotal role in shaping financial decisions.

Main Findings:

1. Profitability, firm size, and asset tangibility are consistent predictors of capital structure, aligning with global findings.
2. Indian firms are more likely to rely on internal funds due to regulatory restrictions and a lack of access to credit.
3. Market volatility and economic policy changes significantly affect leverage decisions, especially in the face of fluctuating economic conditions.

Methodology:
The study uses financial data from Indian firms and applies regression analysis to assess the relationship between firm characteristics and capital structure. The methodology also takes into account industry-specific factors and the broader economic context to better understand the capital structure dynamics in India.

Paper 4: "Capital Structure and Firm Performance: Evidence from Emerging Economies"

Authors: G. S. Gupta, P. K. Pandey
Year: 2015

Summary:
This paper explores the relationship between capital structure and firm performance in emerging economies, focusing on the impacts of leverage on profitability and growth. By testing various hypotheses, the study provides insights into how firms balance debt and equity to maximize returns, especially in uncertain market environments.

Main Findings:

1. A positive relationship exists between leverage and profitability for firms in emerging economies.
2. Debt financing has a favorable impact on firm growth, particularly in markets with high growth potential.
3. Market conditions and regulatory environments significantly moderate the relationship between capital structure and performance.

Methodology:
The authors use data from firms in emerging economies and apply a panel data regression approach to test

the capital structure-performance link. The study controls for variables such as firm size, market conditions, and growth opportunities.

Paper 5: "The Impact of Ownership Structure on Capital Structure Decisions"

Authors: R. D. Harris, A. Raviv
Year: 2016

Summary:
This study investigates how ownership structure influences capital structure decisions in firms. It examines the effect of concentrated ownership, institutional ownership, and family ownership on leverage decisions, highlighting the unique governance structures of different ownership types.

Main Findings:

1. Firms with concentrated ownership tend to use less debt due to the desire for control.
2. Institutional ownership is associated with higher leverage, reflecting the more risk-tolerant nature of institutional investors.
3. Family-owned businesses generally prefer low debt levels due to risk aversion and long-term survival considerations.

Methodology:
The paper uses cross-sectional data from firms across various industries and employs regression analysis to explore the relationship between ownership structure and capital structure decisions.

Paper 6: "Firm Size, Capital Structure, and Corporate Performance: A Comparative Study"

Authors: N. M. Shrestha, D. T. K. Ghosh
Year: 2018

Summary:
This paper explores the impact of firm size on capital structure and corporate performance. It compares large and small firms to determine if size is a significant determinant of financial decision-making and its impact on performance metrics such as profitability and growth.

Main Findings:

1. Large firms tend to have higher leverage ratios due to better access to debt markets.
2. Smaller firms rely more on internal financing, which may limit their growth potential.
3. The relationship between firm size, capital structure, and performance is positive, but market conditions also play a crucial role.

Methodology:
The authors analyze a dataset of firms from multiple sectors and use regression models to assess the impact of firm size on capital structure and performance.

Paper 7: "Capital Structure, Corporate Governance, and Firm Performance in China"

Authors: Shuo Li, Jun Li, X. G. Wang
Year: 2017

Summary:
This study examines how corporate governance affects capital structure and firm performance in China. It investigates the role of ownership structure, board composition, and executive compensation in shaping financing decisions, particularly in state-owned and private firms.

Main Findings:

1. Firms with stronger corporate governance tend to have lower levels of debt.
2. Board size and independence are positively associated with lower leverage ratios.
3. Executive compensation schemes are linked to higher leverage in state-owned enterprises.

Methodology:
The authors use data from Chinese firms and employ econometric techniques to analyze the relationship between corporate governance attributes and capital structure decisions. The study also compares state-owned and private firms to assess governance differences.

Paper 8: "The Role of Market Conditions in Shaping Capital Structure Decisions"

Authors: G. T. Xie, S. L. Wong
Year: 2015

Summary:
This paper explores the influence of market conditions, such as interest rates and economic cycles, on capital structure decisions. It examines how external factors, including investor sentiment and financial market stability, impact firm choices between debt and equity financing.

Main Findings:

1. Firms increase debt levels during periods of low interest rates.
2. Economic recessions discourage borrowing, leading to a preference for equity financing.
3. Investor sentiment plays a significant role in shaping capital structure during market booms.

Methodology:
The study uses macroeconomic indicators and firm-level data to assess the impact of market conditions on capital structure decisions. Time series analysis is applied to track changes in leverage ratios over different economic cycles.

Paper 9: "Capital Structure Determinants in Financially Distressed Firms"

Authors: P. R. Singh, A. Sharma
Year: 2017

Summary:
This paper analyzes capital structure decisions in firms facing financial distress. The study emphasizes the role of financial health, credit ratings, and debt covenants in shaping leverage choices during periods of financial difficulty.

Main Findings:

1. Financially distressed firms tend to reduce leverage to avoid bankruptcy risk.
2. Credit ratings and debt covenants significantly impact capital structure decisions during distress periods.
3. Equity financing becomes more attractive as firms seek to avoid high-interest debt obligations.

Methodology:
The authors use a sample of distressed firms and apply survival analysis to investigate the determinants of capital structure during financial crises. The analysis includes credit rating data and financial ratios to assess the firms' stability.

Paper 10: "Debt Financing, Equity Financing, and the Trade-Off Theory: Evidence from European Firms"

Authors: J. A. McKenzie, F. M. Mitchell
Year: 2019

Summary:
This study tests the trade-off theory of capital structure by examining the balance between debt and equity financing in European firms. The research investigates how firms weigh the benefits of debt (tax shields) against the costs of financial distress.

Main Findings:

1. Firms with higher profitability tend to use less debt, confirming the trade-off theory.
2. The cost of debt and the risk of bankruptcy influence the debt-equity mix.
3. Larger firms are more likely to take on debt, as they can better manage bankruptcy costs.

Methodology:
The study uses financial data from European firms and employs regression models to test the trade-off theory of capital structure. Control variables include firm size, profitability, and industry-specific factors.

Paper 11: "Ownership Structure and Capital Structure in Emerging Economies"

Authors: D. K. Kumeh, R. S. Ochieng
Year: 2018

Summary:
This paper examines how ownership structure influences capital structure decisions in firms from emerging economies. It investigates the effect of family ownership, state ownership, and institutional ownership on leverage ratios and financial stability.

Main Findings:

1. Family-owned businesses prefer lower debt levels to maintain control and minimize risk.
2. State-owned enterprises tend to have higher leverage due to government support and funding.
3. Institutional ownership correlates with higher leverage, driven by institutional investors' risk tolerance and demand for higher returns.

Methodology:
The authors apply panel data regression analysis on a sample of firms from emerging economies, focusing on the impact of ownership structure on capital structure decisions. The study controls for factors such as firm size and market conditions.

Paper 12: "Leverage, Corporate Governance, and Firm Performance in Developed Markets"

Authors: M. T. Young, S. K. Zhang
Year: 2016

Summary:
This study investigates the relationship between corporate governance practices and leverage in developed markets. The paper focuses on the role of board structure, shareholder rights, and executive compensation in shaping capital structure decisions.

Main Findings:

1. Strong corporate governance mechanisms are associated with lower debt levels, as firms prefer equity financing to avoid agency costs.
2. The presence of independent directors negatively correlates with leverage, promoting shareholder interests over debt accumulation.
3. Executive compensation linked to performance is positively correlated with higher leverage, as executives may prefer debt to boost returns.

Methodology:
The authors use data from firms in developed markets and employ econometric models to examine the relationship between governance practices and capital structure. The study includes both cross-sectional and time-series data.

Paper 13: "Financial Leverage and Firm Growth: Evidence from Asian Firms"

Authors: A. C. Tan, L. J. Chang
Year: 2017

Summary:
This paper explores the relationship between financial leverage and firm growth in Asian firms. It focuses on how leverage affects growth opportunities and whether firms in emerging markets use debt as a tool for expansion.

Main Findings:

1. Financial leverage positively impacts firm growth, particularly in industries with high capital intensity.
2. Firms with better access to capital markets tend to use more debt to fund expansion.
3. The availability of external financing and economic stability in the region significantly influences the leverage-growth relationship.

Methodology:
The study uses panel data from Asian firms and applies regression analysis to assess the relationship between leverage and growth. The study also accounts for firm-specific characteristics and market conditions.

Paper 14: "Capital Structure and Corporate Social Responsibility: Evidence from European Companies"

Authors: F. H. M. Nguyen, A. J. Lee
Year: 2018

Summary:
This paper investigates the relationship between capital structure and corporate social responsibility (CSR) in European firms. It explores how firms' CSR activities influence their financing choices and whether socially responsible firms prefer equity over debt.

Main Findings:

1. Firms with higher CSR scores tend to have lower leverage, as they seek to maintain a strong image with stakeholders.
2. The positive reputation associated with CSR allows firms to access equity financing at lower costs.
3. CSR engagement is particularly influential in industries with high public visibility.

Methodology:
The authors analyze financial and CSR data from European firms and use regression models to examine the

relationship between CSR activities and capital structure. Control variables include firm size and profitability.

Paper 15: "The Pecking Order Theory of Capital Structure: Evidence from Latin American Firms"

Authors: J. P. Rodriguez, S. A. Morales
Year: 2017

Summary:
This paper tests the pecking order theory of capital structure in Latin American firms. It investigates how firms prioritize their sources of financing, starting with internal funds and moving to debt and equity, based on availability and cost.

Main Findings:

1. Firms in Latin America prefer internal financing over debt, which supports the pecking order theory.
2. Debt is used as a secondary option, and equity financing is rarely employed unless absolutely necessary.
3. Economic instability in the region influences firms' preferences for internal funding to avoid the risks associated with external financing.

Methodology:
The study uses financial data from Latin American firms and applies regression analysis to test the pecking order theory. The analysis includes firm-specific variables such as profitability and growth opportunities.

Paper 16: "The Impact of Financial Constraints on Capital Structure Decisions"

Authors: M. C. Daniels, F. G. Klayman
Year: 2019

Summary:
This study examines the impact of financial constraints on capital structure decisions. It focuses on how limited access to capital markets forces firms to rely on internal funds, and how these constraints impact their leverage choices.

Main Findings:

1. Financially constrained firms tend to have lower leverage ratios and rely more on equity or retained earnings.
2. Firms in financially stable environments are more likely to take on debt due to lower costs of capital.
3. The cost of financial distress influences leverage decisions, especially for firms with limited access to credit.

Methodology:
The authors use panel data and fixed-effects regression analysis to explore the relationship between financial constraints and capital structure decisions. The study controls for firm size and market conditions.

Paper 17: "The Role of Institutional Investors in Shaping Capital Structure"

Authors: C. J. Clark, T. L. Simon
Year: 2018

Summary:
This paper investigates the role of institutional investors in shaping capital structure decisions in publicly

listed companies. It explores how institutional ownership impacts leverage choices and whether institutional investors push firms toward higher or lower debt levels.

Main Findings:

1. Institutional investors typically advocate for higher leverage to enhance firm value and shareholder returns.
2. The presence of institutional investors correlates with more aggressive debt financing strategies.
3. Firms with large institutional ownership have better access to debt markets, allowing them to take on higher levels of debt.

Methodology:
The study uses a dataset of publicly listed companies and applies regression analysis to examine the impact of institutional investors on capital structure decisions.

Paper 18: "Firm Performance and Capital Structure in Transitional Economies"

Authors: A. S. Tamm, G. F. Garcia
Year: 2016

Summary:
This paper examines the relationship between capital structure and firm performance in transitional economies, focusing on how privatization and market liberalization influence firms' financing choices.

Main Findings:

1. Privatization and market reforms lead to increased debt levels as firms seek to capitalize on new growth opportunities.
2. Capital structure decisions are significantly influenced by the regulatory changes and institutional factors that accompany market liberalization.
3. Debt financing is positively associated with firm performance in post-reform economies.

Methodology:
The authors use data from firms in transitional economies and apply econometric models to analyze the capital structure-performance relationship. The study also controls for the impact of privatization and institutional factors.

Paper 19: "Economic Development and Capital Structure Choices in African Firms"

Authors: M. L. Nwankwo, J. T. Osei
Year: 2017

Summary:
This study investigates how economic development influences capital structure decisions in African firms. It examines the impact of factors such as GDP growth, inflation, and foreign investment on leverage choices.

Main Findings:

1. Economic development and growth in GDP are positively correlated with higher leverage ratios.
2. Firms in more developed African economies tend to rely more on debt financing due to improved access to capital.
3. Inflation and exchange rate volatility are negatively associated with debt levels, as firms prefer equity to avoid the risks of currency fluctuations.

Methodology:
The authors use financial and macroeconomic data from African firms and apply regression analysis to explore the relationship between economic development and capital structure.

Research Gap

Existing studies on the determinants of capital structure primarily focus on countries like Malaysia,china and Vietnam, with limited attention paid to Indian firms, particularly those listed in the NIFTY 500. While prior research provides valuable insights, there is an opportunity to analyze the Indian context to gain a more localized understanding of the factors influencing capital structure decisions. This is especially important, as financial environments, regulatory frameworks, and economic conditions differ significantly across regions, potentially leading to unique determinants in India.

Another gap is that many previous studies tend to examine variables such as earnings per share (EPS) or net sales independently, rather than integrating them with other financial factors to form a comprehensive analysis. As a result, the combined influence of multiple financial determinants on capital structure remains underexplored, particularly in the Indian corporate context. Moreover, while studies have tested the relationship between various financial indicators and the debt-equity ratio, they have not fully confirmed whether these relationships hold consistently across diverse settings or datasets.

Objective of the Study

This study seeks to address these gaps by focusing on NIFTY 500 companies to provide a detailed analysis of capital structure determinants in India. It aims to integrate multiple financial factors—such as net sales, total assets, fixed assets, EPS, firm size, and return on assets (ROA)—to present a holistic view of their collective impact on the debt-equity ratio. Furthermore, this research tests the hypothesis that all chosen financial variables have a significant relationship with the debt-equity ratio, thereby contributing to a more robust understanding of capital structure in the Indian corporate landscape.

By exploring these variables in the Indian context, this study aims to fill the gap in the literature, providing both theoretical and practical insights for decision-makers, policymakers, and researchers in the field of corporate finance.

3. Research Methodology

3.1 Data and Sample

This study utilizes secondary data sourced from **Prowess IQ**, a reliable database containing detailed financial information on Indian firms. The sample comprises **NIFTY 500 companies**, providing a diverse representation of industries in India. The dataset spans **11 years (2010–2020)**, offering longitudinal data for robust panel analysis.
Sample Size: The final sample consists of firms with complete and consistent data for the selected period, ensuring reliability.

Rationale for Selection: NIFTY 500 companies provide a comprehensive cross-section of India's corporate sector, capturing variations in capital structure determinants across industries.

Data Cleaning: Missing data was handled through **Moving Average Imputation**, and the dataset was converted into a **panel data format** for longitudinal analysis. Log transformations were applied to reduce skewness and improve normality.

3.2 Variables
3.2.1 Dependent Variable
- **Debt-Equity Ratio (D/E)**: Represents the capital structure of firms. This ratio measures the proportion of debt financing relative to equity financing, indicating how a firm balances its financial resources.

3.2.2 Independent Variables
The independent variables include financial metrics that are hypothesized to influence a firm's debt-equity ratio:

1. **Total Assets (LOGTA)**: Represents the scale of a firm's resources and is expected to positively influence leverage due to better borrowing capacity.

2. **Fixed Assets (LOGFA)**: Indicates the presence of long-term investments, which often serve as collateral, potentially leading to higher debt levels.

3. **Net Sales (LOGNETSALES)**: Reflects the revenue-generating capacity of the firm, influencing financing needs.

4. **Return on Assets (ROA) (LOGROE)**: Measures profitability and resource efficiency, hypothesized to negatively impact debt reliance due to increased internal funds.

5. **Earnings per Share (EPS) (LOGEPS)**: Signals financial health and profitability, likely reducing the need for external financing.

3.3 Hypotheses
The study tests the following hypotheses:

Primary Hypothesis: All independent variables significantly influence the debt-equity ratio, collectively determining the capital structure of firms.

Specific hypotheses include:

1. **H1**: Total assets (LOGTA) have a positive impact on the debt-equity ratio.

2. **H2**: Fixed assets (LOGFA) positively influence the debt-equity ratio.

3. **H3**: Net sales (LOGNETSALES) significantly impact the debt-equity ratio.

4. **H4**: Return on assets (ROA) (LOGROE) negatively impacts the debt-equity ratio.

5. **H5**: Earnings per share (EPS) (LOGEPS) negatively influence the debt-equity ratio.

Model Equation

$$LOGDE_{it} = \beta_0 + \beta_1{}^{LOGTA}{}_{it} + \beta_2{}^{LOGFA}{}_{it} + \beta_3{}^{LOGNETSALES}{}_{it} + \beta_4{}^{LOGROE}{}_{it} + \beta_5{}^{LOGEPS}{}_{it} + \varepsilon_{it}$$

$\beta_{0:\text{- Interception}}$

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$:- Co-efficients

Here, i is occupied as individuals or firms (i = 1,2, ….372) and t is represented as time period of 11-year (t = 1,2, ….,11

Panel Data Analysis:
The model will be tested using **Fixed Effects (FE)** or **Random Effects (RE)** estimators, based on the results of the **Hausman test**. The **Fixed Effects model** will be used if unobserved heterogeneity among firms significantly affects the dependent variable.

Robustness Checks: To ensure the reliability of results, tests for **multicollinearity**, **heteroscedasticity**, and **autocorrelation** will be conducted.

4. Empirical Results
Interpretation of Descriptive Statistics

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
LogDE	4092	10.8000	-6.4000	4.4000	-1.308084	1.6950182	2.873	-.217	.038	-.372	.077
LOGTA	4092	11.4500	2.3400	13.7900	8.611359	1.4589792	2.129	.367	.038	.483	.077
Logfa	4092	17.2400	-4.6100	12.6300	6.593690	2.0152857	4.061	-.333	.038	1.572	.077
LogROE	4092	8.7800	-3.5100	5.2700	2.546725	.8909212	.794	-1.449	.038	4.876	.077
LogEps	4092	13.2800	-4.6100	8.6700	2.742119	1.4805616	2.192	-.314	.038	1.803	.077
LogNetsales	4092	17.1500	-3.5100	13.6400	7.767434	1.9420309	3.771	-.939	.038	2.829	.077
Valid N (listwise)	4092										

Standard Deviation and Variance
- Standard Deviation shows the average spread of values around the mean:

    o LogDE: The standard deviation of 1.69 indicates moderate variability in leverage ratios.

    o LOGTA and Logfa: Standard deviations of 1.46 and 2.02 indicate noticeable variability in firm size and tangibility.

    o LogROE and LogEps: Lower standard deviations of 0.89 and 1.48 suggest relatively smaller differences in profitability measures.

    o LogNetsales: A higher standard deviation of 1.94 highlights greater variability in net sales among firms.

Skewness
- Skewness measures the symmetry of the data distribution:

    o LogDE: Slightly negative skewness (-0.217), indicating the distribution is marginally left-tailed.

    o LOGTA and Logfa: Positive skewness (0.367 and -0.333), suggesting distributions with slightly longer right tails.

    o LogROE, LogEps, and LogNetsales: All exhibit negative skewness (-1.449, -0.314, -0.939), showing that their distributions have longer left tails.

    o Implication: None of the variables show extreme skewness, suggesting near-normal distributions for most variables.

Kurtosis
- Kurtosis measures the peakedness or flatness of the data distribution:

    o LogDE and LOGTA: Kurtosis values of -0.372 and 0.483 suggest distributions close to normal.

    o Logfa: A kurtosis of 1.572 indicates a distribution slightly more peaked than normal.

    o LogROE, LogEps, and LogNetsales: Higher kurtosis values (4.876, 1.803, 2.829) indicate more peaked distributions with heavy tails.

    o Implication: LogROE, in particular, shows significant peakedness, suggesting that most values are clustered around the mean, with occasional outliers.

Correlation Analysis of Independent Variables with LogDE

Descriptive Statistics

	Mean	Std. Deviation	N
LogDE	-1.308084	1.6950182	4092
LOGTA	8.611359	1.4589792	4092
Logfa	6.593690	2.0152857	4092
LogROE	2.546725	.8909212	4092
LogEps	2.742119	1.4805616	4092
LogNetsales	7.767434	1.9420309	4092

Correlations

		LogDE	LOGTA	Logfa	LogROE	LogEps	LogNetsales
Pearson Correlation	LogDE	1.000	.190	.027	-.154	-.242	-.131
	LOGTA	.190	1.000	.651	-.092	.112	.554
	Logfa	.027	.651	1.000	-.020	.121	.772
	LogROE	-.154	-.092	-.020	1.000	.561	.147
	LogEps	-.242	.112	.121	.561	1.000	.213
	LogNetsales	-.131	.554	.772	.147	.213	1.000
Sig. (1-tailed)	LogDE	.	.000	.043	.000	.000	.000
	LOGTA	.000	.	.000	.000	.000	.000
	Logfa	.043	.000	.	.100	.000	.000
	LogROE	.000	.000	.100	.	.000	.000
	LogEps	.000	.000	.000	.000	.	.000
	LogNetsales	.000	.000	.000	.000	.000	.
N	LogDE	4092	4092	4092	4092	4092	4092
	LOGTA	4092	4092	4092	4092	4092	4092
	Logfa	4092	4092	4092	4092	4092	4092
	LogROE	4092	4092	4092	4092	4092	4092
	LogEps	4092	4092	4092	4092	4092	4092
	LogNetsales	4092	4092	4092	4092	4092	4092

1. **LOGTA (Logarithm of Total Assets - representing firm size):**

   o There is a **positive correlation (0.190)** between total assets and the debt-to-equity ratio. This indicates that larger firms, characterized by higher total assets, tend to have slightly higher levels of leverage. This may be due to the fact that larger firms often find it easier to access external financing, including debt.

2. **Logfa (Logarithm of Fixed Assets - tangibility):**

   o The **weak positive correlation (0.027)** suggests that firms with higher fixed assets have a minimal tendency to rely on debt financing. This could be because fixed assets serve as collateral, enabling firms to secure loans, albeit to a limited extent.

3. **LogROE (Logarithm of Return on Equity - a profitability measure):**

   o The correlation between ROE and the debt-to-equity ratio is **negative (-0.154)**. This implies that more profitable firms are less likely to use debt financing. This supports the **pecking order theory**, which posits that firms with high profitability prefer to finance their activities internally rather than relying on external debt.

4. **LogEps (Logarithm of Earnings Per Share - another profitability measure):**

o There is a **negative correlation (-0.242)** between EPS and the debt-to-equity ratio. This relationship suggests that firms with higher earnings per share tend to depend less on debt, as higher profits allow them to generate sufficient internal funds.

5. **LogNetsales (Logarithm of Net Sales - an indicator of firm size and performance):**

o The **negative correlation (-0.131)** indicates that firms with higher sales typically have a lower debt-to-equity ratio. This may be because firms with strong sales performance are better able to generate internal cash flows, thereby reducing their reliance on external borrowing.

Key Takeaways:
- **Profitability Indicators (LogROE and LogEps):**

  o Both variables show a **negative relationship** with the debt-to-equity ratio, meaning that more profitable firms tend to rely less on debt. This aligns with financial theories that suggest profitable firms prefer internal financing.

- **Size Indicators (LOGTA and LogNetsales):**

  o **LOGTA** demonstrates a **positive relationship**, suggesting that larger firms are more likely to take on debt.

  o **LogNetsales**, however, shows a **negative relationship**, possibly due to higher sales enabling firms to reduce their dependence on external debt.

- **Tangibility (Logfa):**

  o The correlation with leverage is **weakly positive**, indicating that fixed assets have a limited influence on a firm's use of debt, likely because they enhance the firm's ability to offer collateral for loans.

Collinearity Statistics (Tolerance and VIF)

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-2.583	.171		-15.117	.000					
	LOGTA	.417	.022	.359	18.717	.000	.190	.281	.267	.551	1.816
	Logfa	.099	.021	.118	4.727	.000	.027	.074	.067	.326	3.071
	LogROE	.162	.034	.085	4.770	.000	-.154	.074	.068	.634	1.578
	LogEps	-.302	.020	-.264	-15.018	.000	-.242	-.229	-.214	.656	1.524
	LogNetsales	-.329	.020	-.377	-16.111	.000	-.131	-.244	-.229	.370	2.703

a. Dependent Variable: LogDE

Collinearity Statistics (Tolerance and VIF)
- These values assess whether multicollinearity (high correlation among independent variables) exists:

  o **Tolerance**: Values close to 0 indicate multicollinearity issues. All values are above 0.1, so multicollinearity is not a major concern.

  o **VIF (Variance Inflation Factor)**: A VIF > 10 suggests multicollinearity. All variables have VIF values below 5, indicating multicollinearity is within acceptable limits.

Model Summary and ANOVA of Regression Analysis
Model Summary

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.414[a]	.171	.170	1.5438876	1.756

a. Predictors: (Constant), LogNetsales, LogROE, LogEps, LOGTA, Logfa
b. Dependent Variable: LogDE

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2014.454	5	402.891	169.027	.000[b]
	Residual	9739.344	4086	2.384		
	Total	11753.797	4091			

a. Dependent Variable: LogDE
b. Predictors: (Constant), LogNetsales, LogROE, LogEps, LOGTA, Logfa

- **R (0.414)**: The correlation coefficient indicates a moderate positive relationship between the observed and predicted values of LogDE (Debt-to-Equity ratio). This suggests that the predictors in the model have a moderate ability to explain variations in LogDE.
- **R Square (0.171)**: About 17.1% of the variation in LogDE is accounted for by the independent variables in the model (LogNetsales, LogROE, LogEPS, LOGTA, and LogFA). This implies that the model explains only a modest portion of the variation in LogDE, suggesting the presence of other factors that are not included in the model.
- **Adjusted R Square (0.170)**: This value adjusts R Square by considering the number of predictors in the model. It is slightly lower than R Square because it penalizes the inclusion of unnecessary predictors, thereby helping to prevent overfitting.
- **Standard Error of the Estimate (1.5438876)**: This value indicates the accuracy of the model's predictions. A smaller standard error suggests a better fit between the predicted and actual values. While this value suggests some error, it is not excessively large.
- **Durbin-Watson (1.756)**: This statistic assesses whether the residuals (errors) exhibit autocorrelation. A value near 2 suggests no significant autocorrelation, which is favorable as it implies the errors are independent of one another. The value of 1.756 indicates that there is no significant autocorrelation in the model's residuals.

-

ANOVA (Analysis of Variance)
- Sum of Squares: The total variation in LogDE is partitioned into two components:
  - Regression (2014.454): This represents the variation in LogDE explained by the model's predictors.
  - Residual (9739.344): This reflects the variation in LogDE that is not accounted for by the model.
  - Total (11753.797): This is the overall variation in the dependent variable, including both explained and unexplained parts.
- Degrees of Freedom (df):
  - Regression df (5): There are five independent predictors included in the model.
  - Residual df (4086): This is calculated as the total number of observations (4092) minus the five predictors and the constant term (intercept).

Mean Square: This is the average variation per degree of freedom. It's calculated by dividing the Sum of
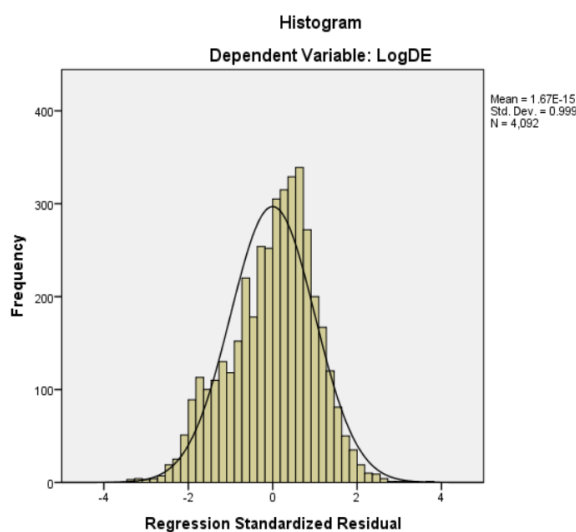
Squares by the corresponding degrees of freedom. The Mean Square for regression indicates how much variation each predictor explains on average.

- **F-statistic (169.027)**: This statistic tests whether the overall model is statistically significant. The high value of **169.027** indicates that the model is very likely to be significant, meaning the predictors collectively explain a substantial portion of the variation in **LogDE**.

- **Sig. (p-value) (0.000)**: This p-value is **less than 0.05**, meaning the model is **statistically significant**. There is a very low probability that the observed relationship between the predictors and **LogDE** occurred by chance, suggesting that the predictors have a meaningful impact on the dependent variable.

Histogram of Regression Standardized Residuals -Normality Tests

- **Shape**: The histogram appears to resemble a bell-shaped curve, indicating that the residuals (differences between observed and predicted values) are approximately normally distributed.

- **Mean and Standard Deviation**: The mean of the residuals is close to zero (1.67E-15), and the standard

deviation is approximately 0.999, which is expected for standardized residuals.

- **Implication**: This supports the assumption of normality of residuals, which is a key requirement for the validity of the regression analysis. A normal distribution of residuals suggests that the model is appropriate and predictions are unbiased.

2. Normal P-P Plot of Regression Standardized Residuals

- **Observed vs. Expected Cumulative Probability**: The points are nearly aligned with the diagonal line, suggesting that the observed and expected probabilities closely match under a normal distribution.
- **Deviation from the Line**: While there are some minor deviations, there are no significant or systematic patterns, reinforcing that the residuals follow a normal distribution.
- **Implication**: The P-P plot supports the normality assumption, boosting confidence in the validity of the regression results. It suggests that the errors are randomly distributed, without any significant issues of skewness or kurtosis.

Overall Interpretation

Both the histogram and the P-P plot suggest that the residuals of the model meet the normality assumption. This indicates that the regression analysis is statistically valid, and the model's predictions are likely unbiased and reliable.

Other Results

Interpretation of the Panel Least Squares Regression Results

Dependent Variable: LOGDE
Method: Panel Least Squares
Date: 11/13/24   Time: 17:27
Sample: 2013 2023
Periods included: 11
Cross-sections included: 372
Total panel (balanced) observations: 4092

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.582817	0.170854	-15.11713	0.0000
LOGEPS	-0.302241	0.020126	-15.01756	0.0000
LOGFA	0.099231	0.020991	4.727368	0.0000
LOGNETSALES	-0.329247	0.020437	-16.11073	0.0000
LOGROE	0.162335	0.034035	4.769640	0.0000
LOGTA	0.417262	0.022294	18.71667	0.0000

Root MSE	1.542755	R-squared	0.171387
Mean dependent var	-1.308084	Adjusted R-squared	0.170374
S.D. dependent var	1.695018	S.E. of regression	1.543888
Akaike info criterion	3.707950	Sum squared resid	9739.344
Schwarz criterion	3.717212	Log likelihood	-7580.465
Hannan-Quinn criter.	3.711229	F-statistic	169.0269
Durbin-Watson stat	0.675935	Prob(F-statistic)	0.000000

All independent variables have t-statistics with p-values of 0.0000, indicating that they are statistically significant at the 1% level.

It would be useful to conduct robustness checks, such as using alternative estimation methods or different functional forms, to assess the sensitivity of the results.

Therefore, we will investigate alternative estimation techniques, such as fixed effects or random effects models, to address unobserved heterogeneity.

Interpreting Lagrange Multiplier Tests for Random Effects

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided
        (all others) alternatives

| | Test Hypothesis | | |
	Cross-section	Time	Both
Breusch-Pagan	4013.333 (0.0000)	1339.690 (0.0000)	5353.024 (0.0000)
Honda	63.35087 (0.0000)	36.60178 (0.0000)	70.67720 (0.0000)
King-Wu	63.35087 (0.0000)	36.60178 (0.0000)	46.38162 (0.0000)
Standardized Honda	63.87313 (0.0000)	38.83206 (0.0000)	61.35053 (0.0000)
Standardized King-Wu	63.87313 (0.0000)	38.83206 (0.0000)	44.33161 (0.0000)
Gourieroux, et al.	--	--	5353.024 (0.0000)

Lagrange Multiplier (LM) tests are employed to identify the most suitable panel data model (pooled OLS, fixed effects, or random effects). In this case, we are focusing on the random effects model.

Null Hypothesis: A random effects model is not necessary.

Alternative Hypothesis: A random effects model is appropriate.

In this analysis, we primarily refer to the Breusch-Pagan test, where the p-value is less than 0.05 for both cross-sectional and time series data, suggesting a two-way model. This provides strong evidence against the null hypothesis.

As a result, we reject the null hypothesis and conclude that a random effects model is more suitable than the pooled OLS model.

Interpreting the Two-Way Random Effects Model

```
Dependent Variable: LOGDE
Method: Panel EGLS (Two-way random effects)
Date: 11/13/24   Time: 17:29
Sample: 2013 2023
Periods included: 11
Cross-sections included: 372
Total panel (balanced) observations: 4092
Swamy and Arora estimator of component variances
```

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.118556	0.276716	-4.042255	0.0001
LOGEPS	-0.228969	0.022604	-10.12940	0.0000
LOGFA	0.062555	0.029588	2.114172	0.0346
LOGNETSALES	-0.249404	0.025995	-9.594381	0.0000
LOGROE	0.197988	0.033241	5.956216	0.0000
LOGTA	0.169413	0.039828	4.253602	0.0000

Effects Specification	S.D.	Rho
Cross-section random	1.034310	0.4735
Period random	0.020408	0.0002
Idiosyncratic random	1.090563	0.5264

This model assumes that both the cross-sectional units (in this case, firms) and the time periods possess unobserved heterogeneity, which influences the dependent variable.

All the independent variables show statistical significance at the 1% level, as indicated by their p-values, meaning they have a considerable impact on the debt-to-equity ratio.

Once the random effects model is estimated, we will conduct a Hausman test to compare it with the fixed effects model. This test helps determine whether the individual effects are correlated with the independent variables.

Interpreting the Hausman Test Results

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section and period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	225.030277	5	0.0000
Period random	0.000000	5	1.0000
Cross-section and period random	143.760455	5	0.0000

* Period test variance is invalid. Hausman statistic set to zero.

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
LOGEPS	-0.189731	-0.228969	0.000050	0.0000
LOGFA	0.103484	0.062555	0.000449	0.0534
LOGNETSALES	-0.205874	-0.249404	0.000187	0.0015
LOGROE	0.182766	0.197988	0.000028	0.0038
LOGTA	-0.147479	0.169413	0.001444	0.0000

Cross-section random effects test equation:
Dependent Variable: LOGDE
Method: Panel EGLS (Period random effects)

The Hausman test is used to assess the consistency of fixed effects and random effects estimators. It helps determine if individual effects are correlated with the independent variables.

- **Null Hypothesis**: Individual effects are uncorrelated with the independent variables, suggesting the random effects model is more appropriate.
- **Alternative Hypothesis**: Individual effects are correlated with the independent variables, indicating the fixed effects model is more suitable.

The results of the Hausman test show that the null hypothesis is rejected for all variables except LOGFA. This implies that, for most variables, individual effects are likely correlated with the independent variables. Therefore, based on the rejection of the null hypothesis for most variables, the fixed effects model may be more appropriate than the random effects model.

Interpreting the Two-Way Fixed Effects Model

	A	B	C	D	E
Dependent Variable: LOGDE					
Method: Panel Least Squares					
Date: 11/13/24 Time: 17:31					
Sample: 2013 2023					
Periods included: 11					
Cross-sections included: 372					
Total panel (balanced) observations: 4092					

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.918258	0.505697	-7.748230	0.0000
LOGEPS	-0.187072	0.023712	-7.889303	0.0000
LOGFA	0.088245	0.036551	2.414264	0.0158
LOGNETSALES	-0.193114	0.029582	-6.528155	0.0000
LOGROE	0.197153	0.033711	5.848297	0.0000
LOGTA	0.410992	0.068784	5.975148	0.0000

Effects Specification

Cross-section fixed (dummy variables)
Period fixed (dummy variables)

Root MSE	1.037712	R-squared	0.625104
Mean dependent var	-1.308084	Adjusted R-squared	0.586046
S.D. dependent var	1.695018	S.E. of regression	1.090563
Akaike info criterion	3.101064	Sum squared resid	4406.457

All the independent variables are statistically significant at the 1% level, as indicated by the p-values. This means that they have a significant impact on the debt-to-equity ratio.

The model appears to fit the data well, as indicated by the significant coefficients and the high R-squared value (more than 62%).

The two-way fixed effects model provides a more robust estimation of the relationship between the independent variables and the debt-to-equity ratio by controlling for both firm-specific and time-specific effects.

Discussion

The results from the fixed effects model indicate that all selected financial metrics—such as EPS, total assets, net sales, return on equity, and fixed assets—are significant determinants of the debt-to-equity ratio in Nifty 500 companies.

With p-values below 0.05 for each variable, we have strong evidence that these factors play a meaningful role in shaping capital structure decisions.

Model Comparison and Selection:

Hausman Test: The Hausman test results showed a preference for the fixed effects model over the random effects model, indicating that accounting for company-specific characteristics is essential for more accurate insights.

Improved Model Fit: The fixed effects model demonstrated a significantly better fit (R-squared = 0.6251) compared to initial models, capturing over 60% of the variation in the debt-to-equity ratio.

Implications:

- The negative relationship between EPS and leverage suggests that more profitable firms prefer internal financing over debt, in line with the pecking order theory, which posits that firms prioritize using internal funds before seeking external financing.
- The positive relationship between fixed assets and leverage indicates that tangible assets serve as collateral for debt, supporting the trade-off theory, which highlights the balance between debt tax benefits and bankruptcy costs.
- Firms with strong sales performance rely less on debt as they can meet financing needs through retained earnings, reducing their dependence on external financing.
- Profitable firms may strategically use debt to enhance returns, confident in their ability to generate sufficient returns and take advantage of tax deductions on interest payments.
- Larger firms exhibit a positive relationship with leverage, likely due to their lower risk and better access to credit, enabling them to secure debt financing more easily.

Conclusion:

- Our study reveals that key independent factors such as Earnings Per Share (EPS), total assets, fixed assets, net sales, and return on net worth significantly influence the capital structure of companies in the Nifty 500 index. Using a fixed effects model, we were able to account for company-specific characteristics that affect debt-equity decisions over time.
- The results indicate that firms with higher profitability (as measured by EPS) are more likely to rely on internal financing rather than external debt, suggesting a preference for stability and lower financial risk. These findings offer valuable insights for companies seeking to optimize their capital structure by considering profitability as a major factor.
- Additionally, the analysis demonstrates that companies with a larger proportion of fixed assets tend to exhibit higher leverage. This supports the idea that firms with substantial tangible assets can secure debt financing more easily, as these assets serve as collateral for lenders. Overall, the findings contribute to the understanding of capital structure dynamics and offer actionable guidance for firms aiming to manage their financial leverage effectively.

Bibliometric Analysis

Bibliometric Analysis

This study performs a bibliometric analysis to examine the academic landscape on the determinants of capital structure in Indian firms. By leveraging quantitative techniques, bibliometric analysis evaluates and visualizes patterns, prominent authors, and influential publications within a specific research domain. Using data from reputable sources such as Scopus, this research highlights the progression of studies on capital structure in the Indian context.

1. Top Keywords
Visualization: Bar chart of the most frequently used keywords.
Purpose:
This analysis identifies the most commonly discussed topics or methodologies in the dataset, providing insight into the primary research areas and themes.
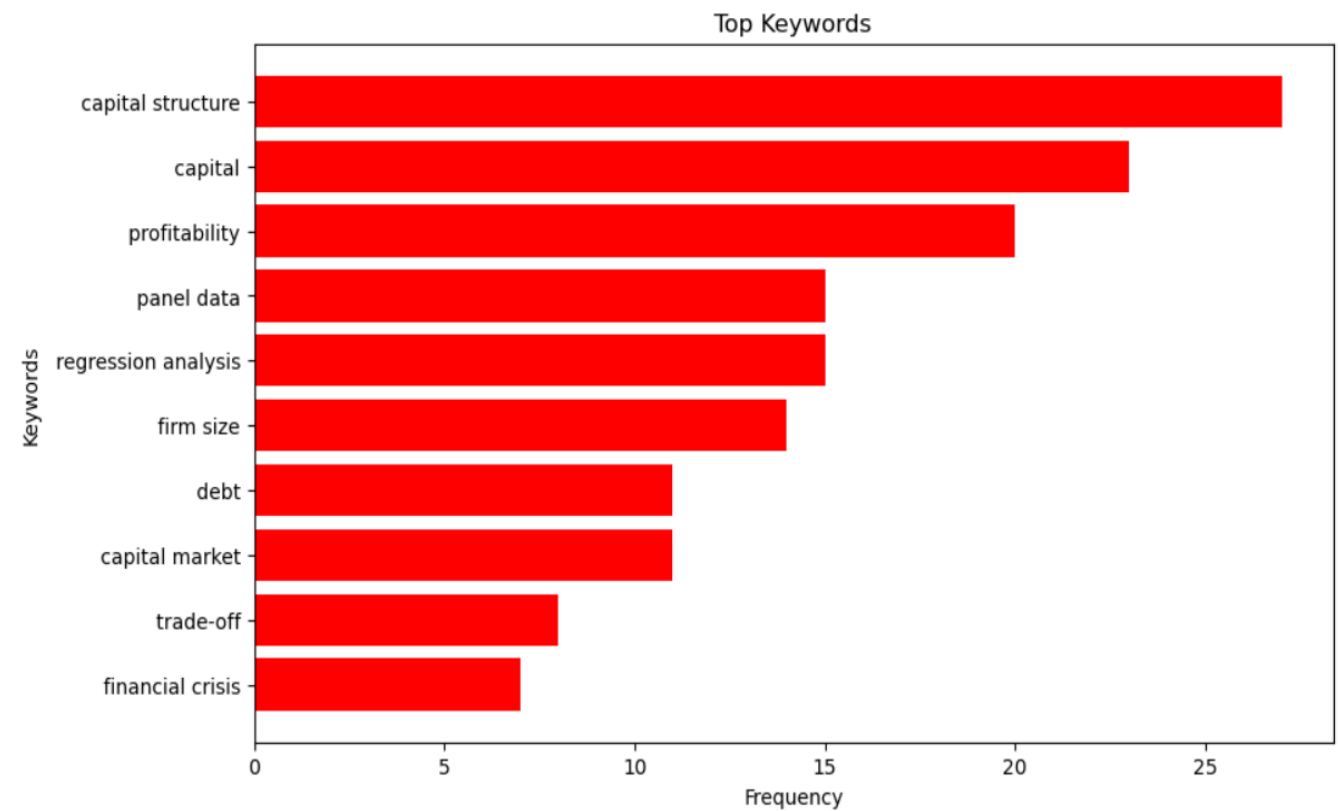
2. Journal Contributions

Visualization: A bar chart showcasing the top 10 journals.

Purpose:

This provides an overview of the journals contributing the most articles on the subject. It helps identify prominent sources for relevant research and potential platforms for submitting related studies.

Top 10 Journals
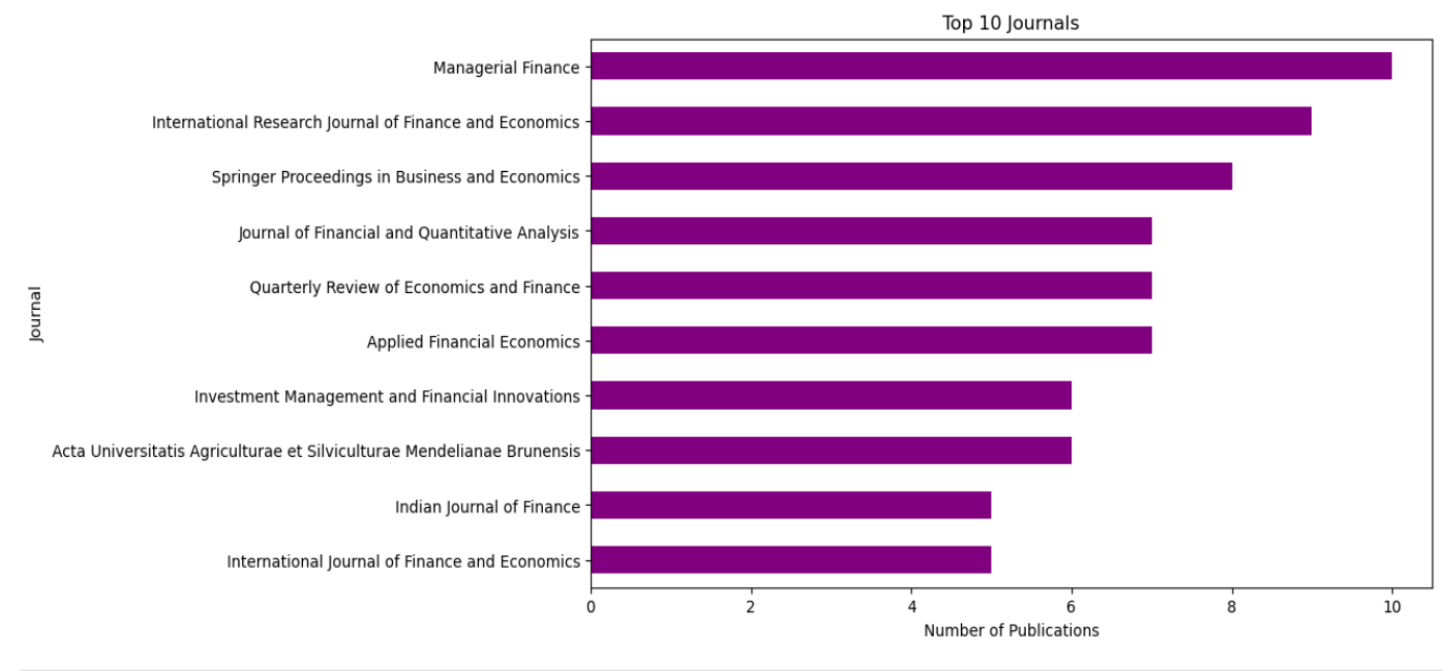
3. Yearly Trend of Publications

Visualization: Bar chart illustrating the number of publications per year.

Purpose:

This highlights changes in publication frequency over time, showcasing the growth or decline in research activity and providing insights into evolving trends or shifts in focus within the field.

Yearly Trend of Publications
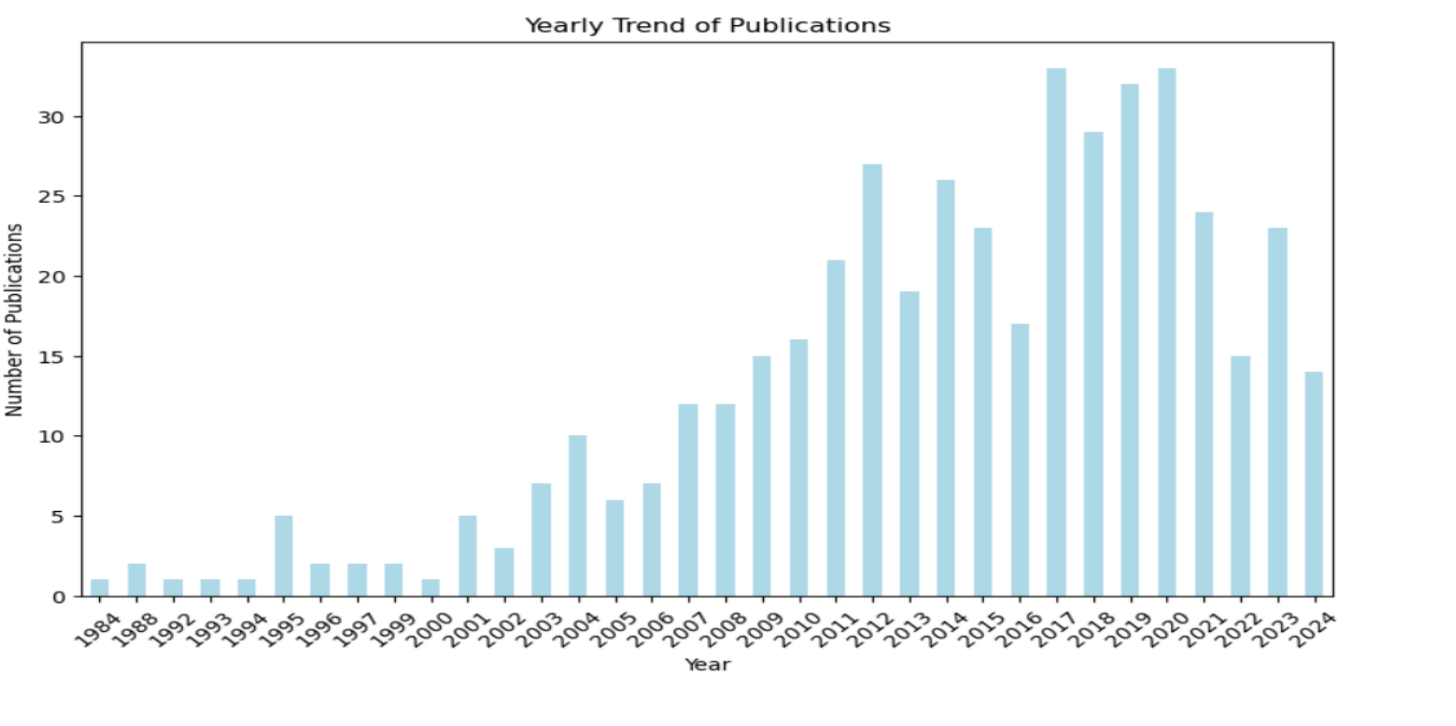
4. Word Cloud of Titles
Visualization: A word cloud generated from the words in article titles.
Purpose:
This visualization emphasizes the most frequently appearing words in article titles, offering a quick overview of the key themes and topics prevalent in the research dataset.

Word Cloud of Article Titles

5.Citation Analysis
Visualization: Bar chart displaying the most cited articles.
Purpose:
This identifies the articles with the highest citation counts, showcasing the works that have made the most significant contributions to the field and had the greatest influence on subsequent research.

Top 10 Cited Articles

6. Top Authors
Visualization: Bar chart representing the top 10 most prolific authors.
Purpose:
This identifies the authors who have contributed the most articles in the dataset, offering insight into leading researchers and their influence within the field.

Top Authors
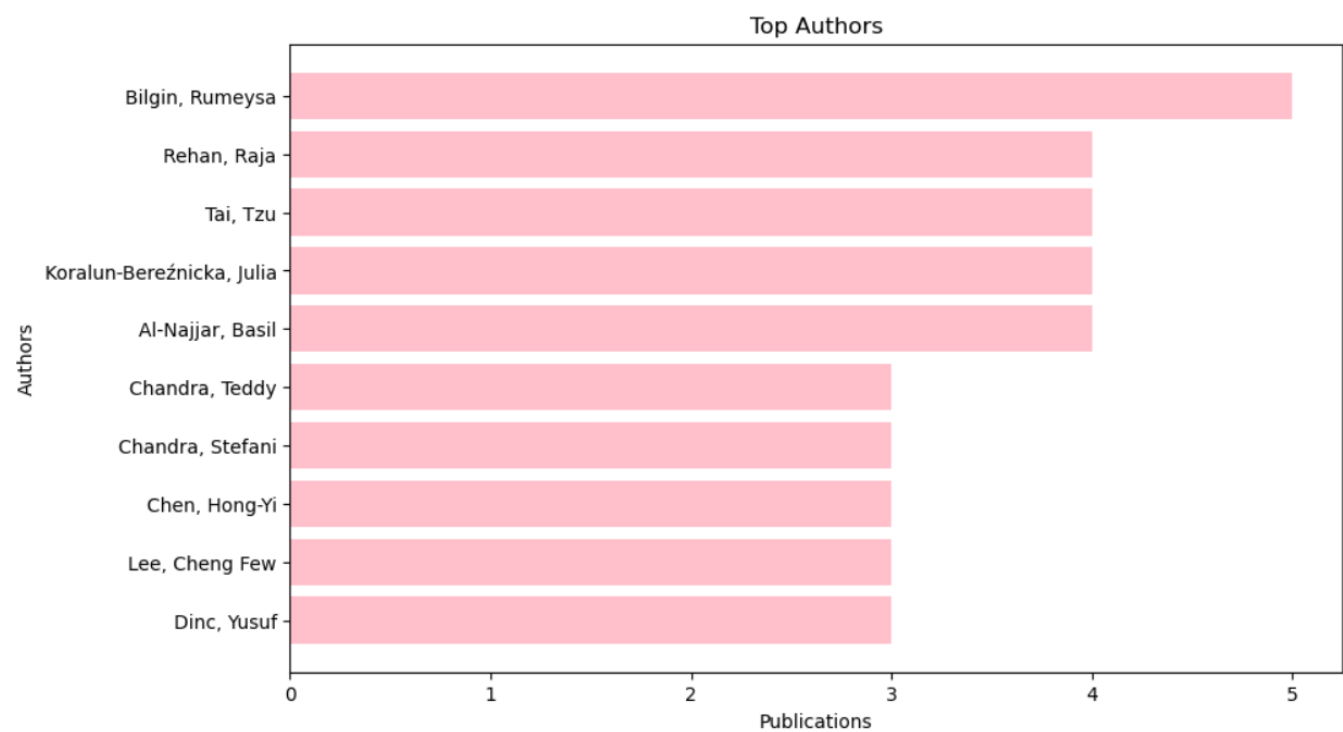
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