IMPACT OF FIRMS' PERFORMANCE ON RETURNS: LARGE-CAP vs SMALL-CAP STOCKS

by

Tetiana Kompaniiets

A thesis submitted in partial fulfillment of the requirements
for the degree of

MA in Business and Financial Economics

Kyiv School of Economics

2023

Thesis Supervisor: _____ Professor Olesia Verchenko

Approved by _____

Head of the KSE Defense Committee, Professor [Type surname, name]

_____

_____

_____

Date _____

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

NPM Net Profit Margin

ROA Return on Assets

ROE Return on Equity

EPS Earnings per Share

PE Price to Earnings

PBV Price Book Value

CHAPTER1. INTRODUCTION

It is crucial for investors, financial analysts and policymakers to have an understanding of what influences stock returns. This knowledge helps them make informed decisions and effectively allocate resources. The performance of stock market investments has implications on the economy and affects various aspects of it.

Beyond just individual investors, this understanding holds significant economic importance for various stakeholders, including pension funds and institutional investors, and even affects the overall health of the financial system. The critical role of stock market is deeply intertwined with modern economies. It has a direct impact on the financial security of countless retirees through pension funds, shaping their financial well-being and the stability of pension systems. Institutional investors, who manage substantial sums of money, depend on stock returns to fulfill their financial commitments and generate profits for their diverse clientele, which includes individuals, businesses, and other entities. Furthermore, stock market performance reflects the broader economic sentiment and strength. Positive returns can boost consumer confidence, driving increased spending and, consequently, promoting economic growth. Conversely, market declines can signal economic uncertainty, potentially influencing investment decisions, job opportunities, and overall economic stability.

This study explores the connection between a companys performance and the returns on its stocks specifically looking at both large-cap and small-cap stocks. While earlier studies mainly focused on large-cap stocks there is a growing interest among analysts in investigating smaller-cap stocks because of their characteristics and greater potential for growth. Motivation for this research stems from an increased interest and recognition of small-cap stocks' opportunities, especially their unique dynamics, and factors that drive stock returns in this segment. Knowing these dynamics and factors becomes crucial for capitalizing on potential high-growth opportunities while optimizing portfolios. This study aims to bridge the existing research gap by examining the connection between performance indicators and returns specifically focusing on the small-cap shares. It seeks to provide insights, for investors and financial practitioners to make decisions and improve their decision-making processes.

Small-cap stocks are essentially companies with market capitalizations falling within the range of $250 million to $1 billion, distinguishing them from larger, more sizable corporations. Such stocks tend to display unique market dynamics characterized by increased volatility as well as the potential

for significant growth opportunities. Large-cap, often referred to as "big cap", describes companies that have a market capitalization value of over $10 billion. Large-cap stocks are typically viewed as offering investors a more stable investment choice due to their lower risk profile and reduced susceptibility to sharp fluctuations in stock prices compared to smaller stocks.

Over the last three decades, data provided by S&P Dow Jones Indices reveals that the S&P600 index has consistently delivered stronger average annualized returns when compared to its counterparts tracking larger-cap and mid-cap stocks. The previous trend has been changing in the last few years, though. The S&P's monthly return averaged at remarkable 155 % over the last decade ending ten years ago while the S&P SmallCap 600 recorded a comparative low of 118.47%. In comparison 10-year period from 2004 through 2014, S&P 600 delivered almost twice as high return as S&P 500: 134% and 76% respectively. This evolutionary dynamic emerges for several reasons. The first is that historical evidence reveal that when the concentration within S&P 500 index begins to weaken in any ways, it is usually an indication of commencing in new period of out-performance by small caps. Since 2014, the level of concentration within the S&P 500 has been steadily increasing, reaching its highest degree since the 1970s. This is primarily due to the outstanding performance of seven major constituents, which include Apple, Microsoft, Alphabet (the owner of Google), Amazon, Nvidia, Tesla, and Meta.[1] . The second is changing trends within the U.S. economy favor smaller companies, offering the potential for higher earnings growth[2]. Investors considering an allocation to small-cap companies should bear in mind that realizing the potential rewards may require patience, as these trends take time to fully materialize and deliver their benefits.

This research seeks to establish the impact of financial performance indicators on stock returns of small-cap companies specifically. Key financial performance indicators included here are earnings per share, return on assets, return on equity, net profit margin, net sales volume, and price-to-book ratio; by analyzing these variables the study seeks to uncover to what extent firm performance influences stock returns within this particular industry sector.

This research importance lies in its potential to advance our knowledge of the drivers of small-cap stock returns, providing investors and financial practitioners with valuable insights. Furthermore, by comparing its findings against those from larger firms represented by the S&P 500 Index index

[1] These companies have shown remarkable gains, ranging from 40% to 180% over the course of this year. In contrast, the remaining 493 companies in the index have seen relatively stagnant or minimal changes in their performance. URL: https://www.ft.com/content/b5281dfd-54a1-42fa-b01d-88b3aa8f3272

[2] T. Rowe Price. (2023). URL: https://www.investmentweek.co.uk/sponsored/4122142/trp-iw-engage-2023--outlook-us-companies-looks-increasingly-compelling

(which represents small-cap firms), any differential effects between small-cap and large-cap firms' stock returns can be assessed more easily; such analysis helps uncover how firm performance influences returns on shares.

To achieve our research objective, we will utilize a panel fixed effect model, which has demonstrated its effectiveness in numerous studies in analyzing financial panel data with observations spanning multiple time periods for one entity (in this instance firms listed in both the S&P 600 small-cap Index and S&P 500 Index). The first hypothesis assumes that there is a significant impact of chosen variables on stock return. The second hypothesis assumes that dummy variable L has a positive influence on stock returns meaning small-cap stocks tend to outperform large-cap stocks in terms of returns.

This thesis is structured as follows: Section 2 provides a comprehensive literature review, delving into prior research on stock returns, firm performance, and the interplay between the two. Key findings from previous studies are highlighted, and any gaps in the existing research are identified. Section 3 offers insights into the data collection process, sample selection criteria, and a justification for employing the panel regression model as the analytical framework. Section 4 presents the obtained results in detail, accompanied by a thorough analysis. Finally, Section 5 discusses the implications of the findings, providing valuable insights for investors, financial professionals and researchers. In addition, this section identifies future research directions to enhance our understanding of the complex relationship between firm performance and capital returns in large and small cap markets.

CHAPTER 2. INDUSTRY OVERVIEW AND RELATED STUDIES

The relationship between the capital structure and performance of companies listed on stock exchanges has been studied by many researchers. More than six decades ago, Kendall and Hill (1953) conducted a comprehensive analysis to explore whether past stock returns could be used to predict changes in stock prices. Their findings suggested that stock prices tend to follow a random walk pattern over time. Since then, numerous studies have employed various predictive factors like the book-to-market ratio, earnings-price ratio, liquidity ratios, interest rates, and dividend yields as variables in empirical tests. Basu's study (1977) brought to light an interesting observation: the P/E ratio, despite its significance in stock analysis, does not seem to have an immediate impact on share prices and investment performance. Campbell and Shiller (1998) highlighted the meaningful impact of price-earnings multiples and dividend price ratios when it came to long-term stock return predictions. They revisited this study in 2001 and reaffirmed that these ratios continued to provide valuable insights into predicting future changes in stock prices.

The subsequent literature tries to address the issues that were previously pointed out as recommendations in those papers. In previous research, there was a strong focus on financial ratios and stock returns from stock exchanges in Indonesia, Malaysia, and the United Kingdom[3]. Large-cap shares were the primary focus in most cases. However, many of the studies are based on rather small samples that consist only of some thirty companies[1]. Moreover, most of this research has covered only one or several year periods. Given these limitations, the present study seeks to overcome them by using a bigger sample for analysis, increasing the duration of study, and expanding the scope of companies in consideration of their capitalization.

Anwaar (2016) investigated the effect of firm performance on stock returns using data from companies listed on London Stock Exchange's FTSE-100 Index between 2005 and 2014. This study analyzes five independent variables (earnings per share, quick ratio, return on assets, return on equity, and net profit margin) as they relate to stock returns. Results demonstrate that net profit margin, return on assets, and earnings per share have significant positive influences on stock

[3] Choiriyah et al. (2021) used for their analysis 32 financial statements of companies from Indonesia Stock Exchange (IDX). Aldiena et al. (2019) study explored the effect of internal factors on stock returns among 30 companies listed on the Jakarta Islamic Index (JII). Anwaar (2016) selected a sample of 30 firms from FTSE-100 index of London Stock Exchange.

returns, while earnings per share have significant negative influences. Return on equity and quick ratio have insignificant effects on returns.

Faniband et al. (2023) investigated the effect of firm-specific factors on stock returns in different categories (large-cap, mid-cap, and small-cap). Researchers employed panel quantile regression analysis and compared it with ordinary least squares analysis, using as a sample of 100 companies from each of the NSE Large Cap 100, Mid Cap 100, and Small Cap 100 Indices that represent overall Indian stock market conditions. The study examined quarterly data from June 2010 to March 2022 and revealed some striking findings. Net sales had an exceptionally negative influence on stock returns across all categories of LMS stocks. On the other hand, both net profit and earnings per share (EPS) had a substantial positive effect on stock returns across all categories, but their significance varied by quantiles. Overall, the study highlighted how firm-specific factors affected returns differently across large-cap, mid-cap, and small-cap stocks; suggesting they do not impact performance uniformly.

Sudirman et al. (2020) examine the effect of Net Profit Margin, Debt to Equity Ratio, Return on Equity and Earnings per Share on Consumer Goods Industry stock prices from 2015 through 2019. Researchers collected data from 37 entities within the consumer goods industry traded on Bursa Efek Indonesia (BEI). Multiple regression analysis demonstrated that Net Profit Margin, Return on Equity, and Earnings per Share had a strong positive and significant effect on stock prices in this sector. However, Debt-to-Equity Ratio had no significant influence on stock prices. Overall, the study concluded that Net Profit Margin, Debt to Equity Ratio, Return on Equity, and Earnings per Share have had significant influence over consumer goods industry companies listed on BEI.

Choiriyah et al. (2021) investigated the impact of ROA, ROE, NPM, EPS and OPM on bank stock prices listed on Indonesia Stock Exchange (IDX). The data for their study came from 32 banks' financial statements providing positive profits during the research period from 2017 to 2020. According to this research, all four parameters combined had a significant effect on stock prices of banking companies listed on IDX while individually only ROE, EPS, or both had any significant bearing.

Ozturk and Karabulut (2013) conducted research to understand the relationship among EPS, Current Ratio, Profit Margin and Return in Istanbul Stock Exchange. This study examines data spanning from 2008 to 2016 using panel data analysis. To account for heteroskedasticity, cross-sectional dependence, and autocorrelation present in sample data, robust estimators are employed

in order to estimate a two-way fixed effects model. Parks-Kmenta method is employed to achieve uniform results to consider autocorrelated and cross-sectional heteroskedastic disturbances. It is also appropriate to use this method in the research because number of variables is small (11) and time period is large (32 quarters). Parks-Kmenta estimation model results indicate that earnings-to-price ratio and net profit margin significantly impact stock returns on the Istanbul Stock Exchange while the current ratio remains insignificant. Earnings-to-price ratio and net profit margin play a pivotal role in determining stock returns on Istanbul Stock Exchange; stocks with higher ETR/NPM tend to experience greater returns over time.

Allozi et al. (2013) studied the relationship between stock returns and financial indicators. Their investigation included exploring correlations among various indicators - specifically profitability and leverage measures - with stock returns. The sample for the research includes 65 manufacturing firms listed on Amman Stock Exchange in Jordan during a 10-year period from 2001-2011. The analysis focuses on five financial ratios to evaluate the relationship between profitability measures (Net Profit Margin, Gross Profit Margin, Return on Assets, Return on Equity and Earnings per Share) and stock returns. Additionally, three financial ratios illustrate the correlation between leverage measures (Debt Ratio, Debt to Equity Ratio and Interest Coverage Ratio) and stock returns. Statistics such as correlation analysis, multiple regression and descriptive statistics are used to analyze data in this study. Information taken from annual reports and monthly statistical bulletins published by Amman Stock Exchange during this period forms part of this analysis. Findings reveal a correlation between Gross Profit Margin, Return on Assets, Return on Equity and Earnings per Share with stock returns and their significance as economic metrics. However, Net Profit Margin and leverage measures (Debt Ratio, Debt to Equity Ratio and Interest Coverage Ratio) do not exhibit a strong relationship with stock returns. The study suggests that managers of manufacturing companies should prioritize financial ratios with strong associations to stock returns in order to enhance profitability and reduce debts, and for further investigation of this relationship in other sectors and employ alternative financial ratios.

Chhajer et al. (2020) conducted empirical research that expanded beyond traditional firm performance analysis. They included market-based factors such as beta and market capitalization to book value ratios. The study encompassed 347 companies listed on the National Stock Exchange (NSE) in Pakistan with market capitalizations exceeding Rs. 5000 million. Their findings partially aligned with the influential Fama-French model. Specifically, they confirmed the significance of beta and the value effect, two key components of the model, in explaining variations in stock returns. However, a notable deviation from the model was observed as the size effect appeared to be

statistically insignificant. They found that return on equity and dividend yield significantly influenced stock performance. Conversely, leverage, as assessed in the study, did not exhibit a substantial impact on stock returns.

Lestari et al. (2020) examined the effect of firm size, firm age, solvency ratio, interest rate and growth rate on the performance of stock returns within the manufacturing sector of companies listed on the Indonesia Stock Exchange. The sample for this research consisted of 77 manufacturing companies, and the study spanned from 2014 to 2018, utilizing financial statements as primary data sources. One of the principal findings of this study revealed that firm age did not exert any significant influence on stock returns within the Indonesian manufacturing sector. This result contrasts with the findings of a study conducted by Abbass et al. (2020), who suggested a positive and significant relationship between firm age and stock returns in the context of the energy sector in Pakistan. Furthermore, Lestari et al. (2016) uncovered that the solvency ratio had a positive and significant impact on stock returns within the manufacturing sector in Indonesia. However, the study's analysis did not reveal any substantial influence of interest rates on stock returns for manufacturing sector companies in Indonesia. Lastly, the research identified a positive and significant relationship between the growth rate and stock returns within the same sector.

Aldiena et al. (2019) study explored the effect of internal factors on stock returns among companies listed on the Jakarta Islamic Index (JII). Their research used panel data analysis on time series and cross-sectional data from 2014 through 2016, showing that Return on Assets, Net Profit Margin, Debt to Equity Ratio, and Price to Book Value all played significant roles in producing stock returns among JII-listed companies, with ROA being key. As opposed to other variable, ROA has negative significant effect. Furthermore, each variable NPM, NPM, DER, and PBV individually displayed significant effects when creating returns among JII listed companies listed within JII listed companies making this research fruitful indeed.

Considering all studies listed above, Anwaar (2016) and Faniband et al. (2023) are the most relevant to our research, primarily due to the methodology, data and expected results. However, it is worth mentioning that though these two studies have some similar aspects as our study, they are not a direct reflection of our whole methodology. Thus, we have equally adopted some analytical methods like autocorrelation and heteroscedasticity tests as they are basic in other similar studies. Our research contributes to the existing literature by building on it through adding new findings. This is mainly brought as distinct by using American indexes, an aspect that has not been studied

in this field by other scholars. Consequently, our research presents relevant additions to previously known literature, by adding new information which expands on current knowledge in the domain.

CHAPTER 3. METHODOLOGY

This study seeks to examine the relationship between firm performance and stock returns, specifically companies included in S&P 500 and S&P 600 small-cap indexes over the last decade. Firm performance is measured with the help of various financial ratios.

For this research study, two hypotheses have been developed for consideration. The first hypothesis assumes that there is a significant impact of chosen variables on stock return. We can determine the following subhypothesis:

- Net Profit Margin has a positive effect on Stock Return.
- Return On Asset has a positive effect on Stock Return.
- Return On Equity has a positive effect on Stock Return.
- Price to Book Value has a positive effect on Stock Return.
- Earnings Per Share has a positive effect on Stock Return.
- Price Per Earnings has a positive effect on Stock Return.

The second hypothesis assumes that dummy variable L has a positive influence on stock returns meaning small-cap stocks tend to outperform large-cap stocks in terms of returns.

We will implement a methodology standard to the literature as in Faniband et al. (2023), Anwaar (2016) and Ozturk & Karabulut (2023). These and many other papers rely on panel data regression analysis that incorporates pooled regression, random effect model and fixed effect model. This thesis focuses on the period of 2014-2022, which allows us to analyze long-term trends and patterns and helps us delve deeper into relationships linking financial ratios with stock returns as is commonly done in the field.

This statistical model estimates the relationship between our dependent variable, Stock Return, and several independent variables, which include financial ratios such as Return on Assets, Return on Equity, Net Profit Margin, Earnings per Share, Price per Earnings, and Price-to-Book Value. Additionally, we use a variable L which is a categorical variable, where all large-cap shares are assigned a value of 0, while all small-cap shares are assigned a value of 1. This categorical variable is employed to capture additional impact on stock returns, demonstrating the differential effects of stock capitalization on the model.

The model considers fixed effects to account for individual heterogeneity across firms. By including fixed effects, the analysis ensures that the unique characteristics and idiosyncrasies of each company are considered, leading to more accurate estimations of the relationship between firm performance and stock returns.

The regression model used to analyze the relationship between firm performance and stock returns is as follows:

$$SRit = L + NPM\ i,t + ROA\ i,t + ROE\ i,t + EPS\ i,t + PE\ i,t + PBV\ i,t + F\ i + u\ i,t$$

where: SRit – stock returns of company i in period t, L – categorical variable, ROA - Return on Assets, ROE - Return on Equity, NPM - Net Profit Margin, EPS - Earnings per Share, PE – Price per Earnings, PBV - Price-to-Book Valu, F - fixed effect, t – time factor, and u - Error term capturing unobserved factors specific to each firm.

The selection of variables in our model is based on their standard usage within the existing literature and their relevance to capturing important aspects of firm performance. Each variable was chosen with careful consideration for its significance in assessing and explaining stock returns. We anticipate that an increase in ROA, NPM, PE, PBV will likely have a positive impact on SR. However, when it comes to EPS and ROE, different academic studies have reported mixed findings, so our research will seek to clarify their effect on SR.

Return on Assets (ROA): It indicates the profitability of a company by measuring the efficiency with which it utilizes its assets to generate profits. The formula for ROA is:

$$ROA = \text{Net Income} / \text{Total Assets}$$

Return on Equity (ROE): It measures the profitability of a company from the perspective of its shareholders. ROE indicates how effectively a company generates profits from the equity invested by its shareholders. The formula for ROE is:

$$ROE = \text{Net Income} / \text{Shareholders' Equity}$$

Net Profit Margin (NPM): It evaluates the profitability of a company by measuring the percentage of each sales dollar that represents profit after deducting all expenses. The formula for NPM is:

$$NPM = (\text{Net Income} / \text{Net Sales}) * 100$$

Earnings per Share (EPS): It measures how much of a company's profit can be allocated to each outstanding share of common stock using this formula:

$$\text{EPS} = \text{Net Income} / \text{Number of Outstanding Shares}$$

Price per Earnings: It is a fundamental measure used to evaluate a company's value. It does so by comparing the current price of its shares to its earnings per share (EPS).

$$\text{P/E Ratio} = \text{Share Price} / \text{Earnings per Share (EPS)}$$

Price-to-Book Value (PBV): It is a financial ratio that compares a company's market value to its book value. The PBV ratio is calculated by dividing the market price per share by the book value per share. It provides insights into the market's perception of the company's value relative to its accounting value. The formula for PBV is:

$$\text{PBV} = \text{Market Price per Share} / \text{Book Value per Share}$$

Stock Returns (SR): Stock returns measure the percentage change in the price of a stock over a specific period, typically calculated as the difference between the current stock price (P_t) and the initial investment price (P_0), including dividends (D), divided by the initial investment price (P_0). The formula for calculating stock returns can be expressed as follows:

$$\text{Total Stock Returns} = ((P_t - P_0) + D) / P_0 * 100$$

Fixed Effect (F): The fixed effect variable accounts for differences between small-cap and large-cap companies. It captures any unique characteristics or idiosyncrasies associated with each company category that may affect stock returns.

Before applying regression models, the data undergoes preliminary checks. Multicollinearity is initially examined to ensure that the independent variables are not highly correlated. This is followed by a test for stationarity using the Augmented Dickey-Fuller test. After that, heterogeneity is examined, ensuring that variations within the data are accounted for. To account for individual and time-specific effects, two statistical tests, the Breusch-Pagan Langrange Multiplier and the F-Test, are used. The F-Test, favored for its superiority, is applied to determine whether these effects should be incorporated into the model. For both large-cap and small-cap stocks, the p-value for individual effects is compared to conventional significance levels.

Heteroskedasticity, where the variance of errors is not constant across observations, is detected using the Breusch-Pagan test. If no individual and/or time specific effect was found, then the analysis continues with a pooled regression approach. Nevertheless, in a closer and more elaborate investigation interaction variables are considered. Finally, in our last stage of this analysis, we will conduct a regression analysis with our variables to determine their statistical significance as predictors of stock returns.

CHAPTER 4. DATA

The primary research question of this study is to assess whether various factors might have an effect on stock returns in a selected group of firms drawn out from both S&P 500 and S&P 600 indices. The main differences between the two indices are in the number of companies they consist, of in the market value of their constitutes, as well as in risk and growth prospective they represent for particular firms included in every index. S&P 500 comprises of 500 of the largest publicly listed companies in the United States by market capitalization compared to S&P 600 which deals with emerging small firms with smaller companies with potential for growth but also greater risk. This type of indices are frequently selected as research benchmarks because they provide a comprehensive snapshot of the market's overall condition. Researchers, like Faniband et al. (2023) and Anwaar (2016), adopt similar indices (NSE Large Cap100, FTSE100) specific to their respective countries.

There are six independent variables and one dependent variable which will be analyzed in this study. The datasets span the timeframe of 2014-2022 with 60 companies included in total amounting to nine years. To ensure a diverse and representative sample, companies were drawn from both the S&P 500 and S&P 600 indices, collectively encompassing a wide spectrum of industries. Furthermore, the selection method incorporated a deliberate mix of companies from the upper, middle, and lower segments of these indices. This methodological diversity aimed to capture a comprehensive view of the stock market's dynamics, enabling a robust analysis over the nine-year timeframe. Upon the completion of constructing descriptive statistics tables, a critical examination will be undertaken to ascertain the representativeness of the respective samples.

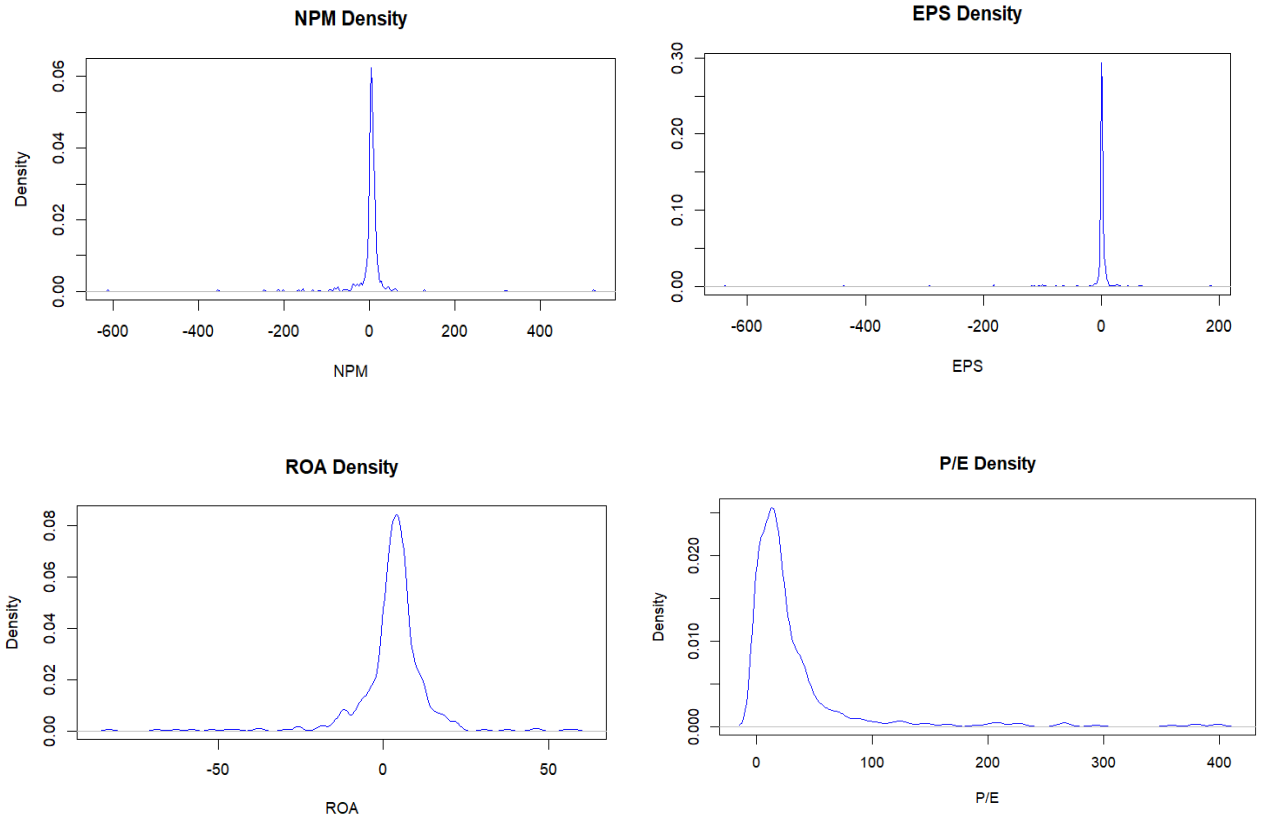
For our analysis, we've collected annual data from different sources. The primary variable we're focused on, which is stock return, was obtained from Yahoo Finance. We gathered the remaining six variables by extracting data from the financial statements of the companies, using Bloomberg as our source. The quantitative analysis comprised 1,062 units of observational data involving 531 observation units for small-cap firms and an equivalent number of observations for big-cap companies. There are no missing values, except Price per Earnings of several companies of small and large capitalizations. Before running a regression, it was taken into account and these values were omitted. Companies with extremely high values of stock return were excluded from our dataset as well and changed for another ones. Below are descriptions of the variables regarding small- cap companies that were used in the study.

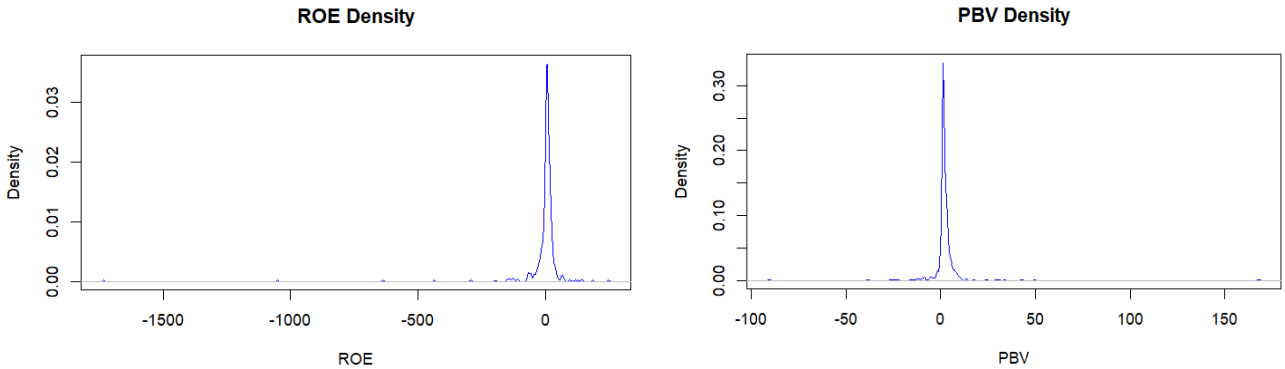
Table 1: Small-cap descriptive statistics

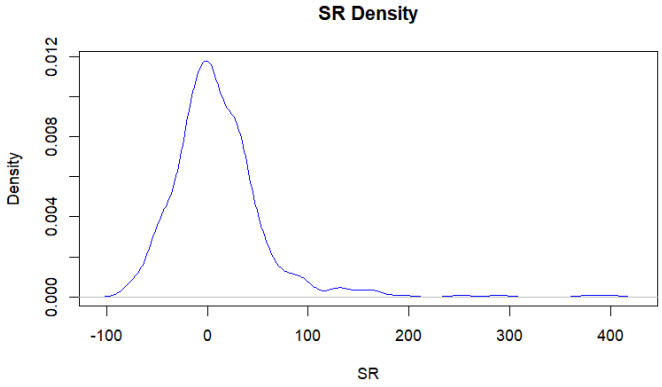
	SR	*NPM*	*ROA*	*ROE*	*EPS*	*PBV*	*PE*
Mean	10.95	1.63	2.86	-3.02	-2.43	2.21	37.59
Median	3.75	4.78	3.73	7.13	0.88	1.545	19.81
Mode	2.95	0.99	2.39	5.05	0.54	0.99	21.62
St. Deviation	49.47	48.79	11.48	101.49	40.30	9.95	53.60
Kurtosis	15.71	83.26	16.05	186.99	150.94	164.60	20.76
Skewness	2.75	-2.31	-2.03	-12.31	-10.86	7.58	4.19
Range	478.1	1138.57	140.69	1980.36	823.29	258.74	399
Minimum	-79.1	-613.57	-82.94	-1773.33	-638.3	-90.7	0.2
Maximum	399	525	57.75	247.03	184.99	168.04	399

Based on the results of the above calculations, we can observe a large range of stock return with an average stock return is approximately 10.95%. The median return is 3.75%, indicating potential influence from extreme values. The distribution is positively skewed (2.75), suggesting a longer right tail and its kurtosis value of 15.71 indicates heavy-tailedness or potential outliers.

Figure 1. Density of small-cap variables







NPM also has significant range of values with high degree of variability with a standard deviation of 48.79%. The distribution of net profit margins is negatively skewed (-2.31) and kurtosis value of 83.26 indicates heavy-tailedness and potential outliers.

ROA has the average return on assets is approximately 2.86% with standard deviation exhibiting moderate variability of 11.48%. It's The distribution is negatively skewed (-2.03) and kurtosis value of 16.05 indicates some degree of heavy-tailedness. ROE has significant range with the average return on equity is -3.02% and a high a high standard deviation of 101.49%. The distribution is highly negatively skewed (-12.31) and kurtosis value of 186.99 indicates a very heavy-tailed distribution with extreme values.

EPS exhibits moderate variability with a standard deviation of 9.95% and mean 2.21%. The distribution is highly negatively skewed (7.58) and kurtosis value of 166.40 indicates a very heavy-tailed distribution with extreme values.

The minimum value of PE is with a significant standard deviation 53.60. The distribution is positively skewed (4.19), suggesting a longer right tail and kurtosis value of 20.76 suggests some degree of heavy-tailedness. In general, our data distributions exhibit characteristics like a normal distribution, although they feature elongated tails due to the presence of residuals. It's worth noting that the

distribution of PE is skewed to the left, which is a typical occurrence since PE have typically positive values.

Table 2: Large-cap descriptive statistics

	SR	*NPM*	*ROA*	*ROE*	*EPS*	*PBV*	*PE*
Mean	16.43	12.21	8.52	26.41	4.53	8.57	29.46
Median	14.65	10.88	7.86	17.78	3.46	3.56	19.90
Mode	17.26	9.59	5.96	17.24	1.66	1.23	3.00
St. Deviation	32.68	18.95	9.54	341.66	6.12	75.44	40.56
Kurtosis	3.94	32.32	3.64	98.96	16.12	95.71	46.47
Skewness	0.87	-0.65	-0.30	2.44	2.12	-1.30	6.07
Range	310.88	349.91	82.26	790.01	88.06	1795.99	399.83
Minimum	-83.92	-160.58	-41.72	-356.68	-28.61	-905.59	0.00
Maximum	226.96	189.33	40.54	433.33	59.45	890.40	399.83

In contrast to their small-cap counterparts, the returns exhibited by large-cap shares demonstrate a noticeable uptrend, with an average return hovering around the robust figure of 16%. This elevated average is accompanied by a relatively restrained standard deviation of 32.7%, implying a more stable performance landscape within this segment. A positive skew of 0.87 suggests that the distribution of SR is right-skewed, meaning that there may be a few stocks with exceptionally high returns that are pulling the average up. A kurtosis value of 3.94 indicates heavy tails in the distribution of SR, suggesting that there are more extreme values (both positive and negative) than would be expected in a normal distribution. This could be due to the presence of outliers or significant variations in stock returns.

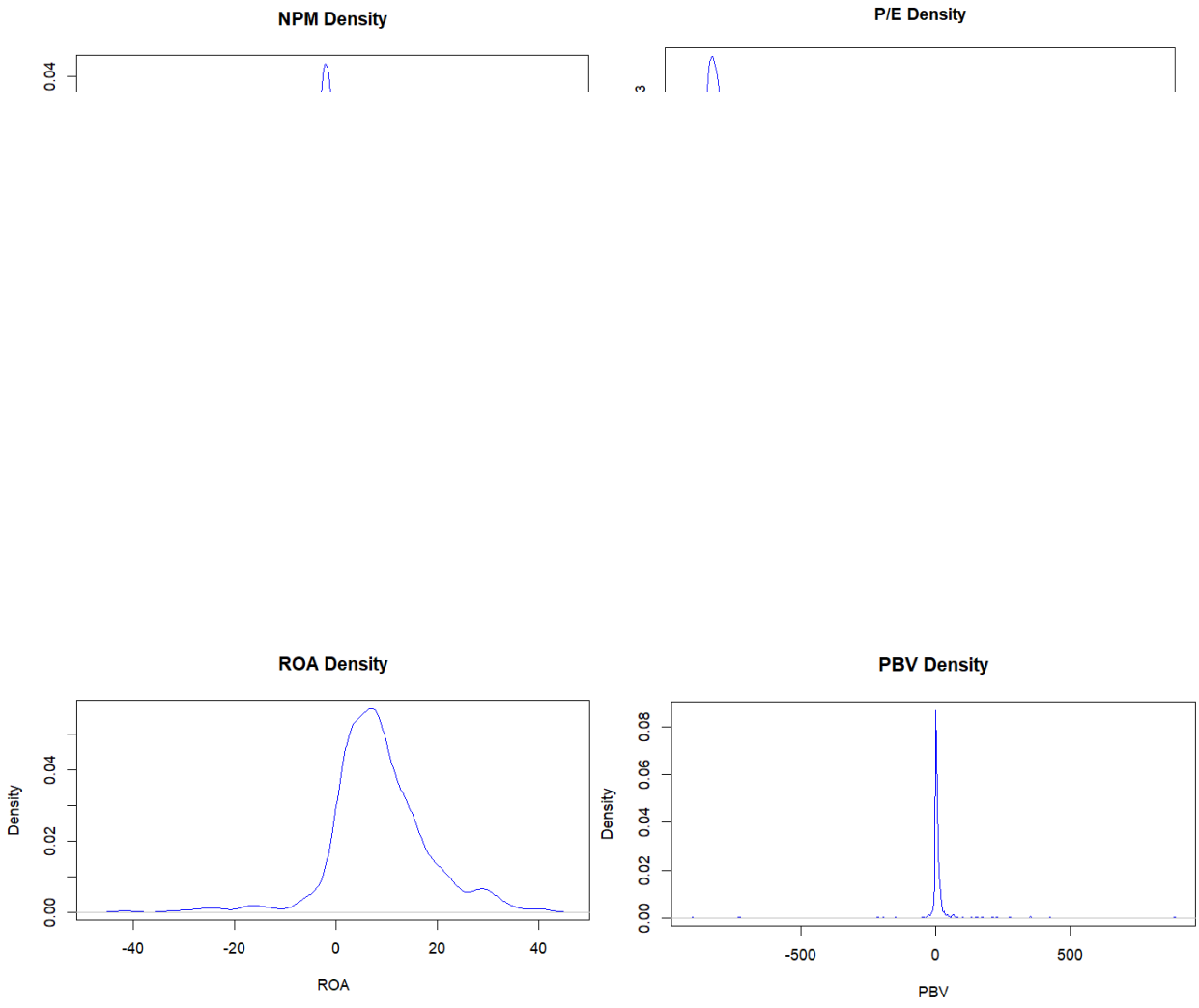
It is important to mention that for a long-time small-cap stocks generated greater returns than large caps, approximately before 2013. In our sample, the return of large-cap (16.43%) shares is higher than large-cap shares (10.95%). According to G.P. Morgan, it can be explained by the tendency on the market. The large cap stock segment experienced substantial returns because of the great success of big tech companies that happened for the past ten years and was approximately 160% price return of the segment. Nonetheless, if examine performance for a period of 25 years, small firms are found to have generally performed better than their large peers. Historical data shows that current strong performance of big caps could have been just lucky streak, rather than rule of thumb for future.

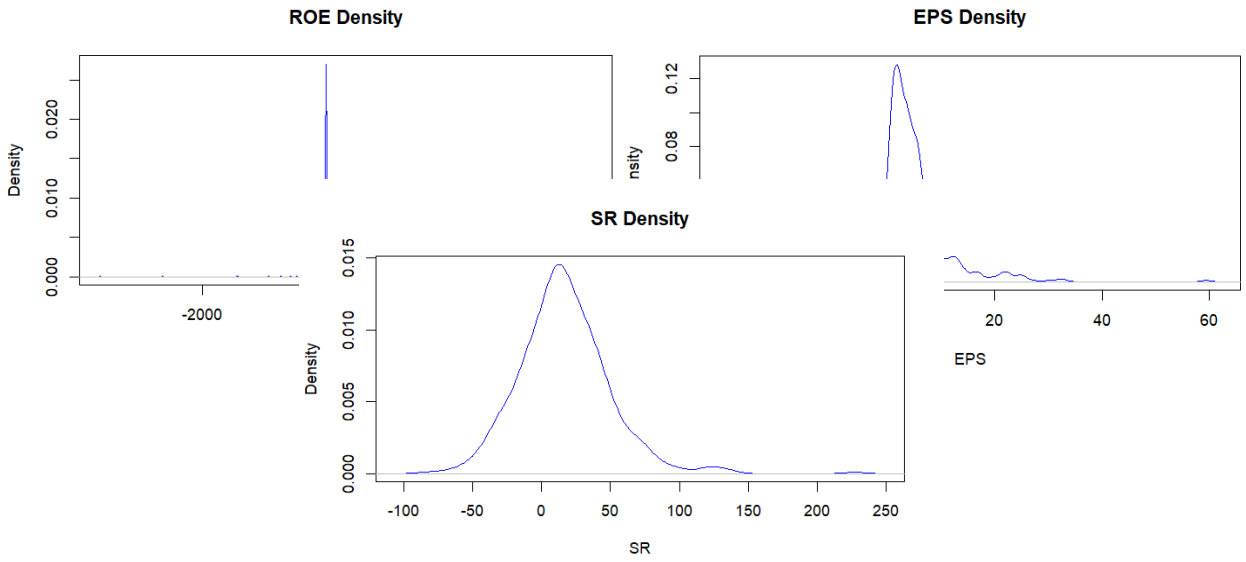
It is also pertinent to highlight that over the past decade, the return of the S&P 500 stood at 12.39%, while the S&P 600 exhibited a return of 8.12%, without adjusting for inflation. When we compare

these numbers with the data in our table, we can see that the general trend remains consistent. However, there are notable differences, which indicate that our dataset may not be fully representative in this study.

On average, the large-cap companies have a net profit margin of approximately 12.11%. This suggests that, on average, they retain about 12.31 cents of profit for every dollar of revenue generated. This value is much higher than 1.6% of small-cap stocks because of higher range. The negative skewness suggests that the distribution of NPM is slightly skewed to the left, with a longer tail on the negative side. This indicates the presence of companies with lower profit margins. The high kurtosis (32.32) value indicates that the distribution of NPM has heavy tails, meaning there might be some extreme values or outliers in the dataset, which can impact the normality of the distribution.

Figure 3. Density of large-cap variables





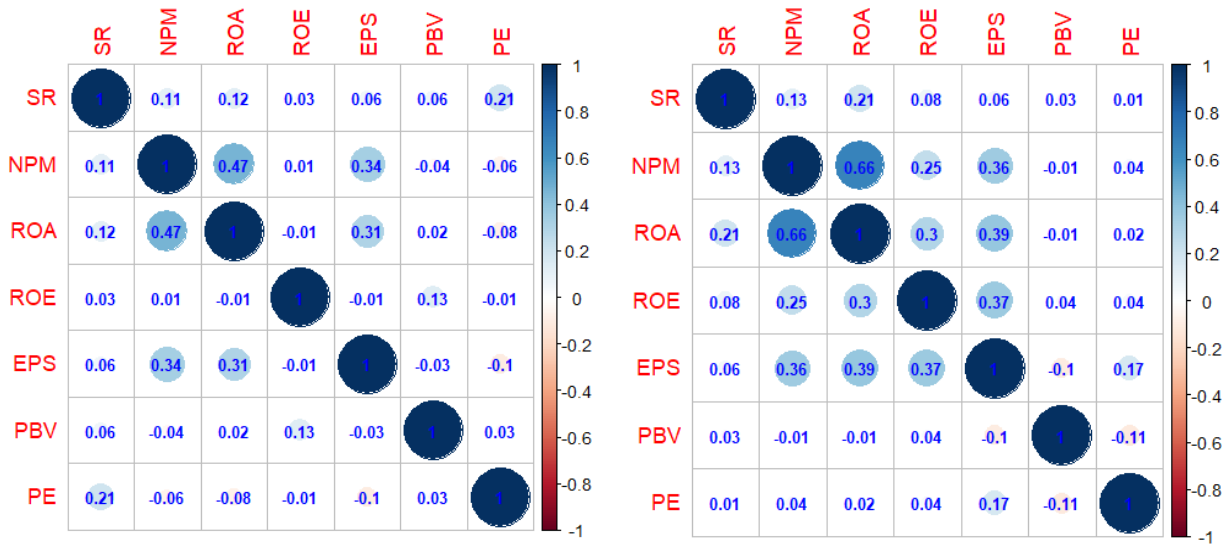
The mean ROA for the large-cap companies is 8.25% (against 2.86% of small-cap stocks) with relatively high standard deviation 9.54%. The positive skewness value of -0.3 suggests that the ROA distribution is slightly skewed to the left, and the relatively high kurtosis value of 3.64 indicates that the ROA distribution has heavier tails and is more peaked compared to a normal distribution.

The mean EPS value is approximately 4.42 (against -2.53% of small-cap stocks), suggesting that, on average, companies in your dataset earn $442 per share with a standard deviation of approximately 6.12, there is a notable degree of variability in EPS across the dataset. The positive skewness value of approximately 2.12 suggests that the distribution of EPS values is skewed to the right. This implies that there may be a few companies with significantly higher EPS values, causing the tail of the distribution to extend in the positive direction. The kurtosis value of 16.12 indicates that the distribution of EPS values is leptokurtic, meaning it has relatively heavy tails and may exhibit some outliers or extreme values.

PE is 29.46 which is obviously lower than one of its counterparts (37.59) The median is 19.90, which is lower than the mean. This suggests that there might be some very high values (outliers) in the dataset, pulling the mean higher. The skewness is 6.07, suggesting a right-skewed distribution, which means that there are a few companies with very high sales that are pulling the distribution to the right.

In order to gain a deeper understanding of the interrelationships between various financial variables, correlation matrices were constructed. These matrices serve the purpose of discerning potential distinctions between large-cap and small-cap stocks.

Figure 3: Comparison of correlation matrices: large-cap vs small-cap variables

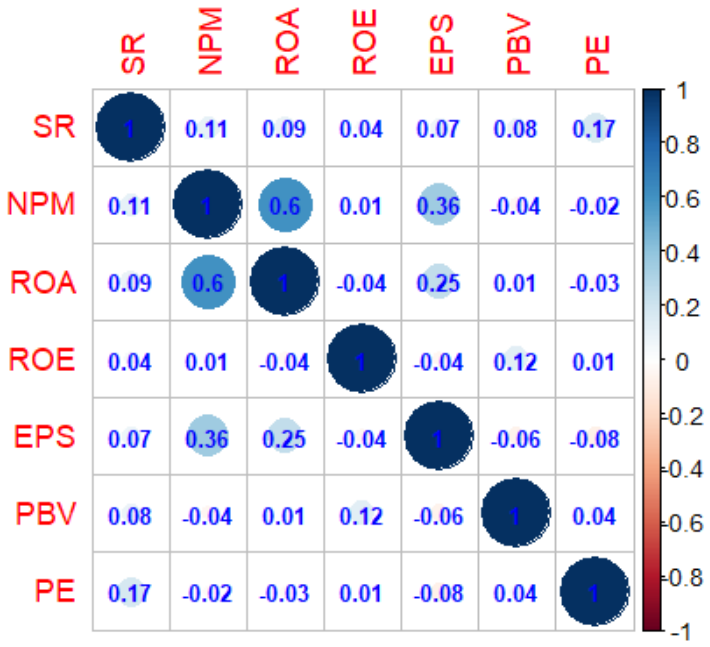


In the first large-cap matrix, we observe a moderately positive correlation between SR and key financial metrics. Specifically, SR demonstrates a moderate positive correlation with NPM at 47%, and also with ROA and ROE at 31%. Additionally, there is a moderate positive correlation between PE and SR, with a correlation strength of 21%. The correlation between ROA and SR is weaker, at 3%, and the correlation between NPM and SR is moderate but slightly lower at 11%. The correlation between ROE and NPM is nearly absent at just 0.1%.

In the second matrix, which represents small-cap stocks, we find a moderately positive correlation between ROA and NPM at 66%. Furthermore, EPS exhibits moderate positive correlations with NPM at 36% and with ROA at 39%. However, correlations between other variables in this matrix are notably lower and not statistically significant.

Both matrices provide an interesting revelation that the correlation between ROA and NPM is the highest among all the correlations, indicating a strong relationship between these two financial metrics. Additionally, there is a significant positive correlation between EPS and both ROA and NPM, suggesting that these metrics may be particularly interrelated in the context of your study.

Figure 4: Correlation matrix of small-cap and large-cap variables



Given the forthcoming construction of regression models utilizing a combined dataset, an essential consideration pertains to the interrelations among variables from both large-cap and small-cap categories. Notably, the overarching trend prevails, as the most substantial correlations persist between Net Profit Margin and Return on Assets at 560%, NPM and Earnings Per Share at 36%, and EPS and ROA at 25%. In contrast, correlations among other variables are notably weak or altogether absent.

CHAPTER 5. RESULTS

Before applying the regression model to assess the predictive influence of independent variables on stock returns, a series of tests were undertaken to ascertain the appropriate model and to verify the selection of relevant variables.

We have already conducted an examination in the "Data" chapter of our research regarding the possibility of multicollinearity in our dataset. Next, a check should be made whether the data is stationary to further boost the reliability of the analysis. To test this hypothesis, our concern here is investigating its non-stationary nature and thus we are concerned with the null hypothesis (H0). The null hypothesis (H0) we aim to investigate is whether the time series under consideration exhibits non-stationarity. In simpler terms, this implies the existence of time-dependent patterns and variations in variance over time. On the contrary, the alternative hypothesis (HA) posits that the time series is stationary, indicating a lack of significant time-dependent structures and a relatively constant variance over the observed period. Stationarity assessment is an integral part of our research and is crucial to ensure the validity and appropriateness of the time series data for further analysis and modelling.

Table 3: Dickey-Fuller Augmented Test

Variable	Dickey-Fuller	Lag Order (k)	P-Value	Result
SR	-18.687	2	0.01	(Stationary)
NPM	-16.835	2	0.01	(Stationary)
ROA	-11.988	2	0.01	(Stationary)
ROE	-16.171	2	0.01	(Stationary)
EPS	-12.442	2	0.01	(Stationary)
PE	-14.723	2	0.01	(Stationary)
PBV	-22.313	2	0.01	(Stationary)

The Augmented Dickey-Fuller test has being carried out to test for stationary of the variables. The findings show that the p-value is always less than 0.01 suggesting great statistical significance. Based upon this result, the variables have clearly passed the conditions of being stationary and are ready for rigorous time series analysis.

After checking our data on multicollinearity and stationarity, the next step is to build model and to check it for fixed and random effects. Two statistical tests, namely the Breusch-Pagan Langrange Multiplier and the F-Test, were employed for this purpose. Notably, according to Baltagi (2013),

the F-Test was preferred due to its perceived superiority over LR and LM tests in the context of both one-way and two-way models.

The underlying hypothesis of the F-Test posits that all unit or time-specific effects are equal to zero, while the alternative hypothesis indicates the presence of non-zero individual or time-specific effects in the model. To examine this, a scenario was created where either time or the individual variable was considered as the fixed factor, and the F-Test was employed to discern the necessity for both individual and time-specific effects within the model.

Table 4: F Test Results for fixed effect

F Test Type	F-statistic	df1	df2	P-value
Individual Effects	1.110	116	929	0.2125

With a p-value of 0.2125, the null hypothesis cannot be rejected at conventional significance levels (e.g., $\alpha = 0.05$). This suggests that there are no significant fixed effects in the model.

Table 5: Breusch-Pagan Langrange Multiplier Test for random effect

Lagrange Multiplier Breusch-Pagan Test		
Chi-squared	df	P-value
0.15929	1	0.6898

The p-value is relatively high (greater than the typical significance level of 0.05), indicating that there is no strong evidence to reject the null hypothesis. The null hypothesis typically states that there are no significant effects, suggesting that the model does not have significant random effects, and it is appropriately specified concerning heteroskedasticity.

We found that neither fixed effects nor random effects were significant in our initial model. Consequently, we have decided to continue with our original model, incorporating the dummy variable denoted as 'L'. The findings of this regression are presented in the ensuing table.

5.1.

Results of this regression are:

- L (0.133): The coefficient for the categorical variable L represents the difference in returns between small-cap and large-cap stocks. However, it is not statistically significant (p =

0.963), suggesting that there is no evidence to claim the difference in returns between the two.

Table 6: Pooled regression model results

	Dependent variable: SR
L1	0.134
	(2.946)
NPM	0.084*
	(0.047)
ROA	0.314*
	(0.161)
ROE	0.004
	(0.006)
EPS	-0.029
	(0.055)
PBV	0.024
	(0.026)
PE	0.062*
	(0.019)
Constant	7.662***
	(2.377)
Observations	1,061
R2	0.049
Adjusted R2	0.043
F Statistic	7.700*** (df = 7; 1054)

- L (0.133): The coefficient for the categorical variable L represents the difference in returns between small-cap and large-cap stocks. However, it is not statistically significant (p = 0.963), suggesting that there is no evidence to claim the difference in returns between the two.
- The variable NPM has a coefficient of 0.084. Although it is not statistically significant (p = 0.071), there is a positive relationship between NPM and returns, implying that higher net profit margins may be associated with slightly higher returns.

- ROA: A one-unit increase in return on assets corresponds to an average increase in stock return of 0.314. This effect is statistically significant (p-value: 0.025), suggesting that higher return on assets positively influences stock returns.
- ROE: The coefficient for ROE is very small (0.004) and not statistically significant (p-value: 0.506). This suggests that return on equity may not have a substantial impact on stock returns in this model.
- EPS: A one-unit increase in earnings per share is associated with a decrease in stock return by -0.029 on average. This effect is not statistically significant (p-value: 0.059), indicating that the relationship is weak and uncertain.
- PBV: The coefficient for PBV is 0.024, but it's not statistically significant (p-value: 0.355), suggesting that the price-to-book value ratio may not significantly affect stock returns in this model.
- PE: A one-unit increase in the price-to-earnings ratio results in an average increase in stock return of 0.062. This effect is statistically significant (p-value: 0.018*), implying that a higher P/E ratio is associated with better stock returns.

Building upon this result, we introduced interaction terms between L and the financial indicators to explore how the effects of these indicators on stock returns might differ depending on the value of L.

$$SR=\beta0+\beta1*L+\beta2*NPM+\beta3*ROA+\beta4*ROE+\beta5*EPS+\beta6*PBV+\beta7*PE+\beta8*NPM*L+\beta9*ROA*L+\beta10*ROE*L+\beta11*EPS*L+\beta12*PBV*L+\beta13*PE*L+\varepsilon$$

This extended model allows us to investigate not only the main effects of the financial indicators but also how their impact varies based on the categorical variable L. By introducing interaction terms, we aim to provide a more nuanced understanding of the relationship between these financial indicators and stock returns, considering different scenarios defined by L. Interpreting our results, lets firstly look at main effects of our variables.

5.2.

- The coefficient of NPM is 0.136. A positive coefficient of 0.136 for NPM indicates that, holding all other variables constant, a one-unit increase in NPM is associated with an increase in stock return SR of 0.136

- ROA and Return on Equity (ROE) also exhibit positive values of 0.217 and 0.003 respectively. These results indicate that, with all other variables constant, a one-unit increase in ROA corresponds to a 0.217 increase in stock returns, and a one-unit increase in ROE corresponds to 0.003 units of stock return.

Table 6: Results of pooled regression model with interaction variables

	Dependent variable: SR
L1	0.894
	(3.976)
NPM	0.136
	(0.122)
ROA	0.217
	(0.240)
ROE	0.003
	(0.006)
EPS	0.155
	(0.352)
PBV	0.023
	(0.027)
PE	0.160*
	(0.045)
L1:NPM	0.072*
	(0.133)
L1:ROA	0.315**
	(0.330)
L1:ROE	0.012
	(0.022)
L1:EPS	-0.218
	(0.357)
L1:PBV	0.149
	(0.204)
L1:PE	0.120*
	(0.049)
Constant	6.435**
	(3.230)

Observations	1,061
R2	0.060
Adjusted R2	0.048
Residual Std. Error	45.838 (df = 1053)
F Statistic	5.087*** (df = 13; 1053)
Note:	*p<0.1; **p<0.05; ***p<0.01

- EPS, PBV and PE ratios are 0.155, 0.023 and 0.160 respectively. While these coefficients are positive, they are not statistically significant, suggesting that their impact on stock returns may not be decisive.

Now let's interpret interaction effects:

- A positive coefficient of 0.072 for L*NPM indicates that holding all other variables constant, a one-unit increase in NPM has a strong positive effect on stock returns of small cap stocks In other words, a one-unit increase in NPM is associated with a 0.072 unit increase in SR for small-cap stocks, with all other factors remaining unchanged.
- Similarly, the significant positive coefficient of 0.315 for L*ROA indicates that the positive relationship between ROA and stock returns is more pronounced for small-cap stocks. In this case, when ROA increases by one unit, we would expect SR to increase by 0.315 units for small-cap stocks, while holding all other variables constant.
- The positive coefficient of 0.120 for L*PE indicates that the positive effect of PE on stock returns is larger for smaller stocks. With all other factors unchanged, a one-point increase in PE is associated with a 0.120 increase in SR for small stocks.

In panel data analysis, an R-square (R2) value of 0.060, which indicates that the independent variable explains less than 6% of the variance in stock returns, may initially appear as a result of explanatory power quite low but it is important to look at this leads to specific effects associated with panel data analysis. Low R2 values observed in panel data analysis, especially when dealing with cross-sectional data, are more common compared to time series data This difference is due to heterogeneity between cross-sectional units there is, causing unexplained variation beyond the influence of the independent variable.

Let us now conduct a comparative analysis of our research findings with those reported in the existing scholarly literature. Our examination of ROA reveals a coefficient of 0.314. In contrast,

Anwaar (2016) reports a considerably higher value of 1.283 for this variable. On the other hand, Aldiena et al. (2019) present a statistically significant coefficient of -2.097, signifying that a one percent increase in ROA is associated with a substantial reduction of 2,097 percent in a company's stock return. Choiriyah et al. (2021) report a statistically significant coefficient of 0.122, showcasing the diversity of findings in the literature.

Regarding ROE, it is worth noting that our analysis did not yield statistical significance, whereas other studies have reported significant ROE coefficients. Choiriyah et al. (2021) observed a significant ROE coefficient of 0.205. Anwaar (2016), in contrast, reported a negative statistical coefficient of -0.03 for ROE. Notably, Aldiena et al. (2019) documented a statistically significant ROE coefficient of -7.845 in their research.

In our research, NPM demonstrates statistical significance with a coefficient of 0.084. This finding contrasts with the results from other scholarly studies. Anwaar (2016) observed a statistically significant NPM coefficient of 0.05, while Ozturk and Karabulut (2013) reported a statistically significant NPM coefficient of 0.247 in their research. Additionally, Choiriyah et al. (2021) identified a statistically significant NPM coefficient of 0.06 in their study.

In our research, Earnings per Share (EPS) does not exhibit statistical significance, with a coefficient of -0.029. A comparison with other scholarly studies reveals varying results in the statistical significance and magnitude of the EPS coefficient. Specifically, Anwaar (2016) reported a statistically significant EPS coefficient of -0.03. In contrast, Ozturk and Karabulut (2013) found a statistically significant EPS coefficient of 0.3047 in their research. Additionally, Aldiena et al. (2019) documented a statistically significant EPS coefficient of 1.553.

In our research, the PBV coefficient is 0.024, and it is not statistically significant. This contrasts with findings from other scholarly studies, where PBV exhibited varying degrees of significance and direction in its impact on stock returns. For example, Ozturk and Karabulut (2013) reported a statistically significant PBV coefficient of 0.1456, while Aldiena et al. (2019) recorded a statistically significant PBV coefficient of 1.174 in their study.In our research, the Price-to-Earnings ratio (PE) exhibits statistical significance with a coefficient of 0.062. This result aligns with findings from other scholarly studies, where PE also demonstrates positive and statistically significant impacts on stock returns. For instance, Aldiena et al. (2019) documented a statistically significant PE coefficient of 4.465. Similarly, Anwaar (2016) reported a statistically significant EPS coefficient of 0.12 in their research.

While research findings may vary due to factors such as data sources and methodologies, it's noteworthy that the direction of the relationships between financial indicators and stock returns remains largely consistent across studies. These signs of coefficients being mostly the same highlight the enduring relevance of these financial metrics in financial analysis and decision-making.

The next step is heteroscedasticity verification. It is important when conducting a pooled regression analysis because heteroskedasticity violates one of the key assumptions of ordinary least squares regression, which is the assumption of constant variance of the error terms (homoskedasticity).

Now, lets check our model for autocorrelation. The Breusch-Godfrey test is a special test for assessing the presence of first-order autocorrelation in the residuals of a regression model. We applies it to the panel data regression model to determine whether there is a statistically significant correlation between the model's residuals and their lagged values.

Breusch-Godfrey test for serial correlation of order up to 1

LM Test Statistic	(df)	P-Value
2.9997	1	0.08328

The obtained results suggest that there is no strong evidence to reject the null hypothesis, indicating the absence of first-order autocorrelation in the model's. The p-value 0.08328 is higher than 0.05, and it does not provide sufficient evidence to conclude that autocorrelation exists at the residuals first order.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

This research sought to investigate the relationship between firm performance indicators and stock returns in both small-cap and large-cap stocks. Utilizing regression analysis on panel data, several key findings were discovered.

Our analysis revealed a statistically significant relationship between Return on Assets, Price-to-Earnings ratio, and Net Profit Margin with stock returns among small-cap stocks. This outcome aligns with our initial hypothesis, demonstrating a partial confirmation of our expectations. In contrast, Price-to-Book Value, Return on Equity, and Earnings Per Share emerged as statistically insignificant factors, partially refuting our hypothesis.

The second hypothesis assumed that dummy variable L has a positive influence on stock returns meaning small-cap stocks tend to outperform large-cap stocks in terms of returns. The results from our regression analysis demonstrate that the dummy variable L which distinguishes between small-cap and large-cap stocks is statistically negative. This means that in general small-cap stocks have lower stock returns compared to large-cap stocks that contradicts the hypothesis that small-cap stocks tend to outperform large-cap stocks in terms of returns. We reject this hypothesis. However, some of the interaction terms, such as PE*L, ROA*L and NPM*L, are statistically significant. This means that the influence of variables like Price to Earnings, Return on Assets and Net Profit Margin on stock returns differs between small-cap and large-cap stocks. In other words, while small-cap stocks, on average, may have lower returns than large-cap stocks, specific financial indicators like PE, ROA and NPM have varying impacts on stock returns in the two market segments.

The findings of this study indicate that the relationship between firm performance indicators and stock returns is complex and can vary significantly across both small-cap and large-cap stocks. While ROA was found to have an influence over returns for small-cap stocks, other variables either had limited or no significance at all. Based on these conclusions, various recommendations can be put forward for further research in this domain:

- Exploration of additional variables: to increase the explanatory power of models, future research should consider including additional financial and nonfinancial variables that influence stock return variations across both small-cap and large-cap stocks. By including more factors in their models, more comprehensive understanding can be gained of how firm performance affects stock returns.

- Extend the study period: To maximize results from future research endeavors, it is better to expand the study period beyond 10 years. By doing so, more comprehensive analyses of firm performance indicators and stock returns can be undertaken, taking advantage of any cyclical patterns, or providing more robust insights.
- Make sample more representative: Expanding the sample size and modifying the methodology for selecting companies can enhance the representativeness of the sample.

Adopting these recommendations, future study will be better equipped to address the complexities associated with firm performance indicators and stock returns, thus providing investors, financial practitioners, and policymakers alike with greater insight into factors influencing stock market dynamics.

REFERENCES

Muhammadriyaj Faniband, et al. 2023. Impact of Firm Performance on Stock Returns: Evidence from Large-Cap, Mid-Cap and Small-Cap Stocks. *Indian Journal of Finance and Banking 13* (March): 48-53.

Erifa Aldiena, and Muhammad Hanif al Hakim. 2019. The impact of companies' internal factors on the performance of their stock returns. *Journal of Islamic Economic Laws 2* (January): 120-149.

Yahoo Finance. Statistical information. https://finance.yahoo.com/.

Bloomberg. Statistical information. https://www.bloomberg.com/markets/stocks. Average annual rate. Statistical information. https://www.averageannualreturn.com/.

Macrotrends. Statistical information. https://www.macrotrends.net/.

Endri, Endri & Dermawan, Deny & Abidin[a], Zaenal & Riyanto, Setyo. (2019). Effect of Financial Performance on Stock Return: Evidence from the Food and Beverages Sector. 9. 335-350.

Medyawati, Henny & Yunanto, Muhammad. (2023). Determinants of Banking Sector Stock Prices in Indonesia. Journal of Economics, Finance and Accounting Studies. 5. 40-51.

Hakki Ozturk and Tolun A. Karabulut (2020). Impact of financial ratios on technology and telecommunication stock returns: evidence from an emerging market. Investment Management and Finan Faniband, Muhammadriyaj & Jadhav, Pravin & Marulkar, Kedar. (2023).

Impact of Firm Performance on Stock Returns: Evidence from Large-Cap, Mid-Cap and Small-Cap Stocks. Indian Journal of Finance and Banking. 13. 48-53. 10.46281/ijfb.v13i1.1969. cial Innovations, 17(2), 76-87.

Aufa, A.N, & Wahyuni, D.U. (2019). Pengaruh return on equity, earning per share, price earning ratio terhadap harga saham. Jurnal Ilmu dan Riset Manajemen, 8(5), 2 -15z

Medyawati, Henny & Yunanto, Muhammad. (2023). Determinants of Banking Sector Stock Prices in Indonesia. Journal of Economics, Finance and Accounting Studies. 5. 40-51. 10.32996/jefas.2023.5.2.4