# THE FINANCIAL DETERMINANTS OF STOCKS PERFORMANCE

by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

# LIST OF ABBREVIATIONS

**BLUE** Best Linear Unbiased Estimator

**BS** Balance Sheet Statement

**CAPM** Capital Asset Pricing Model

**CEO** Chief Executive Officer

**CF** Cash Flow Statement

**D/E Ratio** Debt-to-Equity ratio

**DPS** Dividends per share

**EPS** Earnings per share

**MPT** Modern Portfolio Theory

**OLS** Ordinary Least Squares

**P&L** Profit and Losses Statement

**PE ratio** Price-Earnings ratio

**ROA** Return on Assets

**ROE** Return on Equity

**S&P 500** Standard and Poor's 500 Index

**SEC** Security and Exchange Commission

**SUR** Seemingly Unrelated Regressions

**US** United States of America

**VIF** Variance Inflation Factor

**YoY** Year over Year

# CHAPTER 1. INTRODUCTION

Since the COVID-19 outbreak in 2020, investing has become a popular way to preserve savings among private investors. The markets became more vivid due to the sudden rise of liquidity. Among the various investment options available, the stock market has gathered the most attention.

Stocks are the financial instruments, that give its holder the ownership rights of a part (i.e., the share) of the issuer's business. These instruments are extremely common as well, which makes them even more attractive to private investors. They are popular for a couple of reasons. First, it is one of the easiest markets to access. That implies that anyone who has free cash and is willing to use it for good can invest in stocks without deep-diving into the underlining theory. Second, it is also the most well-known instrument out there. Third, stocks provide the opportunity to diversify investment portfolios, spreading risk across multiple companies and industries. This diversification helps mitigate the impact of individual company performance on their overall investment returns. Finally, stocks offer the potential for long-term capital growth and the possibility of earning dividends from profitable companies. This potential for both capital appreciation and income generation makes stocks an attractive choice for investors seeking to build wealth over time.

However, there is a critical issue everyone has to take into account. Any investment landscape is subject to a lot of risks. Stocks are one of the riskiest instruments. It implies tons of factors that may affect the stock's price in both positive and negative ways Which is why the question arises: in what way one can predict future market movements? The short answer: there is no such way. However, one can still determine the factors that affect the price movements.

That is where the technical and fundamental analyses come in. Both are trying to find those determinants with different core approaches.

The core assumption of the technical analysis is that all material factors were already reflected in the price. That is why apologists of the approach focus on analyzing historical price and volume data. Usually, they do that graphically with the usage of different charts and tools. One of the most common approaches is the determination

of stock price movements' patterns, which may signify the reversal or continuation of the established trend. This approach is arguably more in use by short- to midterm investors and traders who target the so-called growth stocks.

Fundamental analysis, on the contrary, seeks to explain the price movements by looking at company-specific factors like financial statements and competitive position. Practitioners develop and use a variety of metrics to explain the intrinsic value of a company and whether it is below or above the market price at the time. That is how they come up with a conclusion about whether the company's stocks are over or undervalued respectively and invest accordingly. Arguably again, fundamental analysis is more in use by mid to long-term investors who aim to invest in value stocks. That is why this paper is focused on the fundamental approach.

Now there is again a burden of choice among the two fundamental sub-approaches. One is to analyze the impact of macroeconomic factors, such as GDP, interest rates, inflation, etc., on the stock price. Such an approach can give a better understanding of the overall state of the economy and help to identify companies that are likely to perform well in a particular economic environment.

Another one is the analysis of company-specific financial factors – the ones that can be found in or derived from the company's filings and reports. For example, one may use the Revenue and Revenue YoY growth rate from the Profit and Losses statement (P&L) to check on the company's ability to preserve or expand the market share and/or use the Capital Expenditures from the Cash Flow Statement (CF) to conclude on company's ability to grow and develop.

Just like macroeconomic determinants, financial determinants offer a variety of interconnected variables that are believed to affect the stock's prices and hence their performance. As for any portfolio manager and/or private investor (hereinafter – Investors for simplicity) capability to project the changes in the stock price is extremely useful. That is why among those who focus on financial variables the general approach is to deep-dive into the industry and discover subject company-specific factors that will help with that. However, it takes a lot of time and effort.

By analyzing public companies' financial statements, this study aims to provide a solution for Investors – identify the key factors that would be applicable across

different companies and industries. Ideally, Investors would be able to use it as a screening tool, so that they will be able to choose the companies for the analysis more efficiently and waste less time on the companies that would not add value to their portfolios.

What makes this research stand out is the analysis of stock returns instead of absolute price levels. This decision is motivated by the understanding that returns are a more meaningful measure of performance as they capture changes in investment value over time. Investors are primarily concerned with the returns they can earn from a stock rather than its price level at a specific point in time. Moreover, examining returns enables investors to compare the performance of various stocks and investments, as well as monitor the progress of their portfolios over time. By focusing on identifying key factors applicable across different companies and industries, this research aims to provide investors with a valuable screening tool. The objective is to enhance the efficiency of company selection for analysis, enabling investors to allocate their time and resources more effectively by focusing on companies that can potentially add value to their portfolios. This study's distinctive approach and practical implications make it a valuable contribution to the field, addressing the needs and interests of investors seeking to make informed investment decisions.

The data for this research was gathered through web scraping of the financial variables from the annual filings of the S&P 500 firms. The primary sources of data were the EDGAR search tool provided by the US Securities and Exchange Commission (SEC) and Yahoo Finance, both of which are public sources. To analyze the data, the Ordinary Least Squares (OLS) regression was chosen. It is a widely used statistical method in econometrics that allows for the estimation of the relationship between variables. Data collected and analyzed in such a way ensured the validity and reliability of the research findings. This approach provides valuable insights into the financial factors that influence stock returns and contributes to the existing body of knowledge in the field of investment analysis.

The paper is organized as follows: Chapter 2 provides a brief analysis of the underlying theory and examines related studies conducted in the field, which allows for a comprehensive understanding of the existing knowledge and the contributions made

by previous researchers; Chapter 3 describes the methodology applied in this research by explaining the financial metrics selected as explanatory variables for stock performance, as well as the sources and methods employed to gather the necessary information for the analysis; Chapter 4 provides the analysis of the data and dataset; Chapter 5 reveals, interprets and discusses the results obtained; Chapter 6 serves as the concluding section, summarizing the key insights, and makes suggestions for future research.

# CHAPTER 2. RELATED STUDIES

The idea to study the factors that determine or at least are associated with the price of the security is far from new. Grace to the progress in computational equipment in the 1950's development of more complex approaches became possible. The most well-known attempt was done by Harry Markowitz, Ph.D. He was the first to focus not only on assets' expected returns but also considered their risks (known as volatilities) and their cross-correlations in the portfolio. He combined returns and volatilities on a single chart and developed a so-called efficient frontier – a graphical representation of the portfolios that yield the highest expected returns at the lowest risk. Markowitz's contribution is now known as Modern Portfolio Theory (MPT).

Then, William Sharpe and other economists developed a Capital Asset Pricing Model (CAPM). This model explains the relationship between the expected return of an asset and its systematic risk (that is market undiversifiable one). It states that the expected return of the asset is determined by the risk-free rate and the market's excess return over the risk-free rate (market premium), adjusted by the asset's correlation with the market.

CAPM and the adjustment mentioned, which is known as the beta (β) coefficient, are still commonly used. Some of the Model's features were applied to this research as well.

Two core approaches were developed: technical and fundamental analysis. Technical analysis is about making projections based on the historic data and some patterns that occur on the graphs. Fundamental is about deep-diving into the core of security's value. For example, if one wants to analyze a stock, they would study the company's reports, market conditions and forecasts, competitors, etc. There are a lot of discussions on which approach is better, but an arguable consensus is that technical analysis is a short to mid-term tool, meanwhile fundamental analysis is a mid to long-term one.

The focus of the current research is the fundamental analysis. Luckily, the relevant area of research has been developed already.

To begin with, one has to recall the works by Fama and French who contributed to the CAPM and transformed it into a three-factor model, by adding factors of size and book-to-market valuation to it.

CAPM was originally intended to represent the relationship between the company's risk premium and market return via the beta coefficient. The latter in essence is the company's performance responsiveness to the market performance. What Fama and French (1992) did was incorporate the factors of firm size and book-to-market equity. Later on, they would improve the model once more and come up with the five-factor model by adding the factors of profitability and capital expenditures of the company analyzed. There is a lot of discussion around each model even today, however, they still end up being widely used and accepted.

The cluster of modern studies includes Hatta and Dwiyanto (2012). Their sample contained data from Indonesian Stock Exchange on share prices and relevant financial parameters. They conclude that EPS and PE ratio have a positive and significant relationship with the last-year stock price, meanwhile Debt to Equity ratio and Net Profit Margin – are negative and significant. EPS is found to be not only significant but also dominant, implying high sensitivity of the stock price to EPS. Other variables included in their model and found to be insignificant were the Current Ratio, Dividend Payout Ratio, Return on Asset (ROA), and the stock's Beta.

Data from the Indonesian Stock Exchange was also used in the study by Herawati and Putra (2018), yet was focused on the food and beverage industries during the 2012 – 2015 period. Such choice was determined by the industry's highest contribution to Indonesian GDP and its relatively stable growth during the observed period. Their results demonstrate that ROA and total asset turnover are the only significant factors that impact the stock price with a positive sign.

Another study in a similar spirit was conducted by Pradhan and Paudel (2017) who examined the impact of financials on both the market price per share and the returns on the Nepalese commercial banks' sample. They have concluded that EPS and dividends per share are significant and are positively related to the dependent variables.

The geographically closest idea was developed by Gill et al. (2012), who tested how financials affect the share prices of American public firms. With an OLS

regression, they examined a random sample of 333 annual reports for each year during the 2009 – 2011 period. They included most industries in the sample, except financial services, which is a common practice. As Fama and French (1992) correctly pointed out, for financial firms it is usual to have high leverage, meanwhile for other industries it is likely to imply distress. Hence to obtain the best results it is recommended to use consistent industries. What Gill et al. (2012) have found is that such financials as book value per share, EPS, dividend per share, PE ratio, CEO duality, and the internationality of the firm are mostly positively associated with the share prices. At the same time, in addition to the overmentioned, the dividend coverage ratio has also been found significant for manufacturing firms, meanwhile the dividend payout ratio – for service firms.

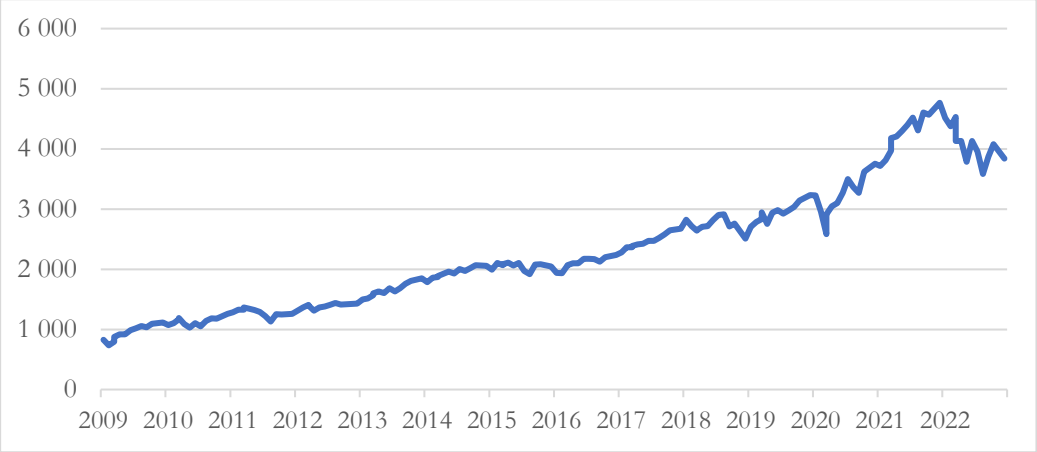
There is also research on the Japanese stock market, conducted by Chan et al. (1990). Using the seemingly unrelated regressions approach (SUR) and combining stocks into portfolios by categorizing them by some similar features, they were able to discover book-to-market ratio, cash flow yield, and earnings yield to be significant, as well as firm size to be significant in some cases. What makes them stand out from the other studies mentioned, is the usage of the returns in the form of market premia, that is the returns minus the risk-free rate at the time. Such an approach gives a better understanding of what are the real benefits of the returns, because as the name implies the risk-free rate is the return that can be obtained by investing in the least risky assets – sovereign bonds.

The focus of the current study is the sample of S&P 500 constituents. This selection yields a lot of advantages. One is that the Index covers a diverse range of companies across various sectors. Its composition represents a significant portion of the overall market, making it a valuable gauge of broader market conditions and trends. By focusing on this index, the study gains insights into the performance and dynamics of a comprehensive and representative set of companies. This is why it is common to consider the Index as the proxy for the whole Market.

It is worth mentioning the impressive results of the Index, depicted in Figure 1. Since the 2008 – 2009 crisis the Index has been growing, despite minor recessions along the way, but it started to decline in 2022 and the decline is by far the most notable

since 2009. It is also interesting to note that the rise in the Index's value seems to accelerate, as reaching each additional thousand USD took less time than the previous iteration. One of the reasons here is the inclusion of the technological sectors, which implies such global companies as Apple, Amazon, Alphabet (Google), and Meta (Facebook). These are one of the major drivers for the Index's price, meanwhile, other constituents provide the value to the Index.

**Figure 1. S&P 500 2009 – 2022 Dynamics, USD**




*1. Source: Yahoo.Finance.com*

As there is not a lot of similar research in the open access for the US market, the current one will contribute to the niche. S&P 500 is one of the most popular indices and is a widely followed benchmark for the performance of the US stock market. Hence, many investors consider it as a long-term investment option, making it crucial to have a good understanding of its change's drivers. Since the chosen index has been outperforming the market for a while, it would be a great idea to start by analyzing the financials behind that. Such a study could provide a valuable tool for investors seeking to make informed investment decisions and generate returns.

Moreover, the study can also have an impact on the investment choices of Ukrainian investors by highlighting which financial factors are worth deeper analysis. As some of the most popular S&P 500 constituents have been recently accepted in the Ukrainian stock exchange such a study is a great opportunity for Ukrainian households and private investors to diversify their portfolios and invest in international markets.

Overall, the study contributes to the development of the niche by providing some insights into the financial determinants of stock performance, rather than on

stock absolute price levels. By identifying the variables that have a significant impact on stock returns, the study aims to help Investors make more informed investment decisions. With the help of the screening tool developed by the study, Investors will be able to analyze the financial statements and make more informed investment decisions about companies throughout the American economy. That would be possible as S&P 500 covers the biggest companies across industries.

This could lead to more efficient portfolio management and ultimately to better investment outcomes not only for American but also for Ukrainian Investors. Overall, the study may have important implications for both academics and practitioners and be a good contribution to the field of finance.

# CHAPTER 3. METHODOLOGY

The model is the following:

$$Y = \beta_0 + \beta_1 EPS + \beta_2 DPS + \beta_3 ROA + \beta_4 ROE + \beta_5 NPM + \beta_6 DER + \beta_7 \ln(TA) + e \quad (1)$$

Y is the holding period return, more commonly referred to as a return. It is one of the key metrics in the analysis of stock performance and hence is the focus of the research. To calculate this metric firm's fiscal year-ending share price is divided by the prior fiscal year-ending share price and then subtracted by one. Then, the 30-year par yield curve rate is subtracted from the rate obtained in the previous step. In this way, a so-called market premium was obtained. That is the excess return of the stock's performance over the risk-free rate. The metric tells how well the stock performed during the period relative to the market. It is used as the dependent variable of the model, allowing the identification of the key financial determinants that affect stock performance.

In the related studies, it is common to see an absolute price as the dependent variable. However, this research specifically focuses on the returns, as Investors aren't explicitly interested in the prices themselves, but in their movements. In such cases, the investment decisions based on the model would be more result-driven and provide a better understanding of the market dynamics.

EPS is the earnings per share ratio which is a widely used metric to evaluate a company's profitability and its ability to generate earnings for its shareholders. It is calculated by dividing the firm's net income (which can be found in the P&L) by the number of shares outstanding (BS). Its interpretation is how much profit can an investor have a claim on for each share they have. Thus, the expectation is that the higher the EPS is, the more earnings are generated per share, which makes the share more attractive and drives its price up. Such a relationship has been found among peers, such as Hatta and Dwiyanto (2012), Pradhan and Paudel (2017), and Gill et al. (2012). This makes EPS one of the most potential variables in this research.

DPS stands for dividends per share ratio which is calculated as a firm's dividend payout (P&L) divided by the number of shares outstanding (BS). It states how much

dividends can an investor expect for each share they have. A common way of thinking is that higher dividends per share ratio should imply a higher share price. However, in practice, both positive and inverse relations have been found by Pradhan and Paudel (2017) and Gill et al. (2012) respectively. Such ambiguity was addressed by Kapouranis (2018), who noted that dividend policy distinguishes growth stock and value stock firms. He states that technology firms avoid dividends to reinvest them and hence develop faster. This makes them so-called growth stocks that are expected to have inverse relation between the dividends per share ratio and share price.

ROA is the return on assets ratio – a metric that tells how much profit is generated by each currency unit of the firm's assets value. It is calculated by dividing the firm's net income (P&L) by its total assets (BS). The result represents the efficiency with which the firm is managing its assets to generate profits. A higher ROA suggests that the company is better at utilizing its assets to generate profits. This is why this metric can be used to compare firms' asset management efficiency in different years or to compare different companies. It is expected to have a positive relationship with the share price as well, according to the results of Herawati and Putra (2018) and common sense.

ROE is the return on equity ratio – another profitability ratio that is very similar to ROA in a lot of ways. It is calculated by dividing the firm's net income (P&L) by its total equity (BS). ROE indicates how much profit a company can generate for each dollar of equity it has (that is, total assets of the firm that remain after subtracting total liabilities). A high ROE implies that the company is efficient at utilizing its equity to generate profits. Therefore, a positive relationship is also expected with the share price.

NPM stands for Net profit margin, which is a widely used financial ratio that provides insight into a firm's profitability. The ratio is calculated by dividing a firm's net income by its revenues (both come from P&L). It is interpreted as the portion of each dollar of revenue that is retained as profit after all costs and expenses occur. Hypothetically, a higher NPM ratio implies that a company is generating more profits per unit of sales, which should positively affect its share price. However, the expected effect is ambiguous as empirical evidence by Hatta and Dwiyanto (2012) suggests a

negative relationship between NPM and share price. Still, the metric is both important and easily obtainable for Investors.

DER stands for Debt-to-Equity ratio, which is an important financial leverage ratio that measures the proportion of a firm's financing that comes from debt compared to equity. It is calculated by dividing the total liabilities of the company by its total equity (both come from BS). The ratio shows how healthy the company's financials are and whose money is used to generate revenues. The impact of DER on a company's share price is ambiguous and has been found to have different signs by different studies. Hatta and Dwiyanto (2012) have found DER to have a negative effect, meanwhile, Herawati and Putra (2018) concluded the opposite.

ln(TA) is the proxy for the firm's size, which is measured by the natural logarithm of the firm's total assets (BS). Such specification is a common one as it also makes the distribution of variables closer to normal. Gill et al. (2012) proved this variable to be significant for US manufacturing industries' share prices throughout the 2009 – 2011 period. A positive relationship is more probable, as larger firms are typically viewed as more stable and less risky investments. However, it is possible that because of the size company's shares will be very expensive as well. In such a case even if the absolute change in price will be greater than the price change of the smaller company, the return would still be lower. That is another argument for the usage of stock returns rather than absolute levels.

The selection of variables for the research was driven by three main criteria:

1. Variables were to be commonly considered as important ones for the investment analysis;
2. Variables were to be relatively easy to find. That implies that any Investor would be able to find the statement in the relevant filing and/or derive the metric themselves;
3. Variables were to be used by peers in similar studies and proved to be significant.

The variables in the focus of this research are presented in Table 1. They have all these characteristics. These variables cover a range of financial metrics used in

investment analysis. Each of these variables has been identified as relevant and their significance has been established in prior research.

The chosen variables also enable broad accessibility and comparability by Investors from various backgrounds and levels of expertise. This allows for an effective investment decision-making process.

**Table 1. Variables description**

| Variable | Symbol | Exp. Sign | Description |
|---|---|---|---|
| Returns | Y | N/A | The performance of the stock, YoY |
| Earnings per share | EPS | + | How much profit can an investor have a claim on for each share they have |
| Dividends per share | DPS | ? | How many dividends can an investor expect for each share they have |
| Return on assets | ROA | + | How much profit is generated by each currency unit of the firm's assets value |
| Return on equity | ROE | + | How much equity is generated by each currency unit of the firm's assets value |
| Net Profit margin | NPM | ? | The portion of the sales that remains after all costs and expenses occur |
| Debt-to-equity ratio | DER | ? | Financial leverage ratio that shows the source of financing the firm's operations, i. e. whose money is used to generate revenues |
| Firm size | ln(TA) | + | Natural logarithm of the firm's total assets as a proxy for the firm's size |

The regression family of the model is the simple linear OLS, as used by Pradhan and Paudel (2017), whose model this research recreates. Such an approach was chosen for a couple of reasons. First – the variables it uses can be obtained relatively easily from public sources such as Yahoo Finance, Investing.com, and EDGAR search by

SEC.gov. This trait is extremely useful for both private investors and investment analysts for the preliminary acquaintance with the investment subject. Second, OLS regression is also an easy approach for the beginning of an analysis. Third, most of these variables were proved to be significant for the share price models across sectors and economies by other researchers, listed above.

On estimating the model, the hypothesis to be tested is whether the stock performance of S&P 500 is affected by the chosen financials or not. That will be seen from the coefficients' values and significance, as well as the model's significance via R-squared value and hypothesis testing. The data checks are to be conducted too.

# CHAPTER 4. DATA

This paper studies the financial determinants of stock performance. The data gathered for the analysis include the filings by S&P 500 constituents. Together those account for 500 firms, which were studied on an annual basis during the 2019 – 2021 period. That is, three separate regressions for each of the years in the sample were estimated in a similar way to the approach by Gill et al. (2012), and then compared.

The sample of choice is the data on S&P 500 for a couple of reasons. First, firms that are included in the Index are public, implying that they are obliged to share their reports via Security and Exchange Commission (SEC) filings. Thus, there will be no limitations on the financial data needed for the research. Secondly, the firms of the Index are the biggest ones on the US market by definition, which makes them industry drivers. And lastly, the S&P 500 covers a wide range of US industries, such as consumer cyclical (food, apparel, cars), healthcare, utility, etc. That gives the benefit of representativeness for the data and hence the wider applicability for the portfolio manager using the tool.

The data for the independent variables comes from the filings, reported by the firms via the SEC official website. As all S&P 500 constituents are public companies, they are all required to report to SEC their comprehensive financial information. As SEC is a government authority, this source can be considered reliable.

The search itself is provided by the EDGAR search tool that allows one to effortlessly gather the 10-K filings (that is, annual reports) needed for the research.

The data on daily stock prices was gathered from the Yahoo Finance, which is also a public source that collects data on price movements directly from exchanges stocks are traded at.

The 30-year par yield curve rates for the relevant years were taken from the US Treasury's official website. These were considered the market risk-free rate. it is a common practice among investment analysts, as the US is the dominant economy of the world and thus is considered the benchmark for others. The prices were transformed into the returns and then into market premia manually by the approach discussed in Chapter 3.

Overall, the dataset contains annual reports on 500 firms, during the 3 years of 2019 – 2021, yielding almost 1,500 observations in total. However, for each year the dataset is short for 10 companies on average because of no reports for some of the years by some companies. That is, for each regression there are approximately 490 observations.

The data's Descriptive Statistics are presented in Table 2:

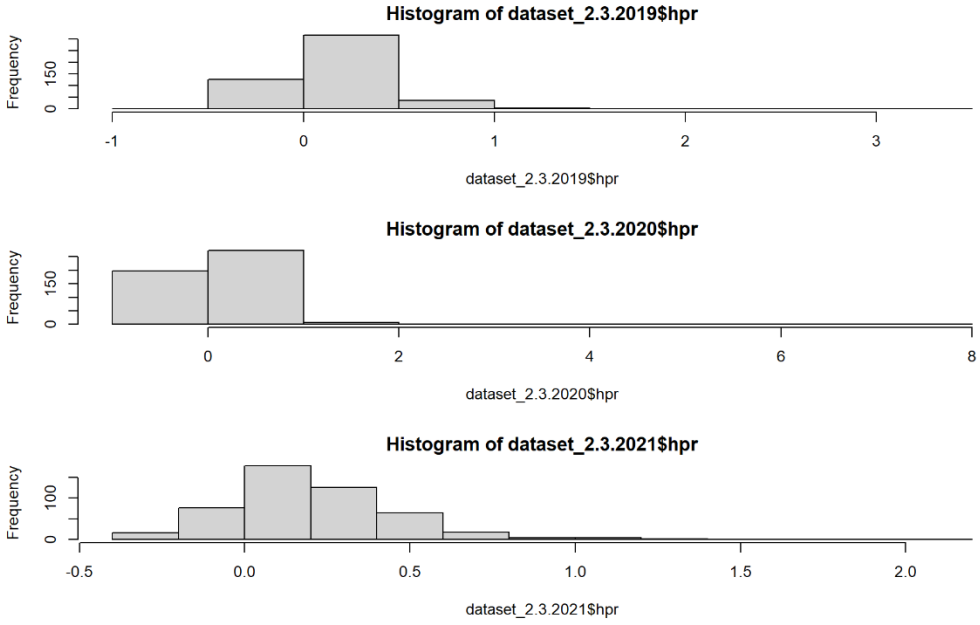
**Table 2. Descriptive statistics per period**

| **2019 Statistic** | **N** | **Mean** | **St.Dev.** | **Min** | **Pctl(25)** | **Pctl(75)** | **Max** |
|---|---|---|---|---|---|---|---|
| Return | 489 | 0.164 | 0.295 | -0.713 | -0.001 | 0.308 | 3.336 |
| EPS | 489 | 5.714 | 13.218 | -14.500 | 2.090 | 6.240 | 241.310 |
| DPS | 489 | 11.781 | 230.114 | -0.779 | 0.019 | 0.177 | 5,082.979 |
| ROA | 489 | 0.071 | 0.074 | -0.323 | 0.025 | 0.104 | 0.514 |
| ROE | 489 | -0.182 | 5.713 | -104.043 | 0.078 | 0.257 | 20.231 |
| NPM | 489 | 0.121 | 0.412 | -8.537 | 0.067 | 0.206 | 0.761 |
| D/E Ratio | 489 | -0.897 | 43.971 | -663.630 | 0.925 | 3.155 | 123.726 |
| Firm Size | 489 | 23.86 | 1.374 | 20.385 | 22.902 | 24.670 | 28.620 |
| | | | | | | | |
| **2020 Statistic** | **N** | **Mean** | **St.Dev.** | **Min** | **Pctl(25)** | **Pctl(75)** | **Max** |
| Return | 481 | 0.144 | 0.573 | -0.596 | -0.108 | 0.251 | 7.426 |
| EPS | 481 | 4.378 | 14.539 | -28.590 | 1.180 | 5.870 | 244.110 |
| DPS | 481 | 5.121 | 44.659 | 0 | 0.010 | 0.240 | 689.104 |
| ROA | 481 | 0.052 | 0.093 | -0.375 | 0.013 | 0.090 | 0.571 |
| ROE | 481 | 1.031 | 17.744 | -8.074 | 0.053 | 0.250 | 388.700 |
| NPM | 481 | 0.083 | 0.317 | -3.135 | 0.044 | 0.183 | 1.561 |
| D/E Ratio | 481 | 4.829 | 36.369 | -45.423 | 0.990 | 3.311 | 772.500 |
| Firm Size | 481 | 23.97 | 1.327 | 20.906 | 23.044 | 24.75 | 28.851 |
| | | | | | | | |
| **2021 Statistic** | **N** | **Mean** | **St.Dev.** | **Min** | **Pctl(25)** | **Pctl(75)** | **Max** |
| Return | 492 | 0.215 | 0.273 | -0.383 | 0.043 | 0.342 | 2.052 |
| EPS | 492 | 7.897 | 18.911 | -28.260 | 2.567 | 8.387 | 345.370 |
| DPS | 492 | 0.563 | 5.945 | -37.620 | 0.005 | 0.128 | 108.875 |
| ROA | 492 | 0.076 | 0.075 | -0.241 | 0.030 | 0.107 | 0.511 |
| ROE | 492 | 0.538 | 9.983 | -32.589 | 0.090 | 0.285 | 216.143 |
| NPM | 492 | 0.133 | 0.454 | -6.955 | 0.082 | 0.217 | 1.453 |
| D/E Ratio | 492 | -4.298 | 140.865 | -3,087.619 | 0.889 | 3.146 | 254.096 |
| Firm Size | 492 | 24.070 | 1.315 | 21.149 | 23.192 | 24.840 | 28.951 |

In Table 2 one can see that data does not exhibit any specific trend: the means and standard deviations maintain the bounds during the period, and the same is true for the distribution of the values, as seen from the 25th and 75th percentiles. No dramatic changes are detected as well.

The histograms of the returns' distribution depicted in Figure 2 reveal that they are relatively normally distributed, with a slight skew towards the positive side. This observation could be attributed to the sample consisting of the largest firms in the US economy, which tend to be more resilient during economic downturns. The positive skew also suggests that these companies have experienced more positive returns than negative ones. That may seem slightly biased at first but in fact it reflects the American market's growth during those years. This finding aligns with the notion that larger and more established companies often exhibit stability and growth in their stock performance.

**Figure 2. Returns' distribution per period, R output**




Compared to 2019, 2020 seems to be more skewed to the negative side, which is probably the result of the COVID-19 outbreak. Interestingly enough the form of the distribution remained the same, yet shifted more to the zero mean in 2021. The form of the distribution allows one to perform the OLS estimation.

Before running the regression, several common data checks were performed. The first was the Durbin-Watson test for autocorrelation, whose results are shown in Table 3. The autocorrelation appears not to be the case in any period analyzed. That can be seen from the D-W Statistic close to 2 and high p-values, as well as from the residual plots in Appendix 1. It implies that the regression residuals don't exhibit any trend and thus prove the OLS estimation to be applicable in the research.

**Table 3. Durbin-Watson test for autocorrelation, R output**

| Period | Lag | Autocorrelation | D-W Statistic | p-value |
|---|---|---|---|---|
| 2019 | 1 | -0.040 | 2.076 | 0.414 |
| 2020 | 1 | -0.055 | 2.110 | 0.108 |
| 2021 | 1 | -0.013 | 2.025 | 0.770 |
| Alternative hypothesis: rho != 0 | | | | |

Another test performed was the Breusch-Pagan test for heteroscedasticity. As seen from Table 4, except for 2019, the p-values for each period were greater than the commonly accepted threshold of 0.1. This indicates that there was not enough evidence to reject the null hypothesis of homoscedasticity, meaning that there is not enough evidence to reject the homoscedasticity assumption for the majority of the sample periods.

**Table 4. Breusch-Pagan test for heteroscedasticity, R output**

| Studentized Breusch-Pagan test |
|---|
| Period: 2019<br>BP = 14.054, df = 7, p-value = 0.050 |
| Period: 2020<br>BP = 11.825, df = 7, p-value = 0.107 |
| Period: 2021<br>BP = 3.208, df = 7, p-value = 0.865 |

Finally, the model was tested for multicollinearity, which is shown in Table 5. The rationale for that can be seen from the correlation matrices, presented in Appendix 2. Several explanatory variables exhibit correlations among each other, mostly because of sharing the same metric in the calculations. For example, the Debt-to-Equity ratio and ROE are linked by Equity, meanwhile, Net Profit Margin and ROA are linked by Net Revenue. The test was done by estimating the variance inflation factors (VIF) for each variable.

**Table 5. Test for multicollinearity, R output**

| Period | 2019 | 2020 | 2021 |
|---|---|---|---|
| EPS | 1.095 | 1.225 | 1.111 |
| DPS | 1.007 | 1.005 | 1.008 |
| ROA | 1.618 | 2.399 | 1.578 |
| ROE | 5.224 | 16.570 | 8.344 |
| NPM | 1.271 | 2.088 | 1.275 |
| D/E Ratio | 5.238 | 16.519 | 8.321 |
| Firm Size | 1.304 | 1.217 | 1.203 |

Apart from the extreme VIF values for ROE and Debt-to-Equity ratio in 2021, there are no signs of multicollinearity that can gradually affect the model. Most of the VIF values are relatively close to 1, indicating low levels of correlation between the independent variables. Some other variables' VIF values are in the lower bounds of the moderate multicollinearity threshold, which is close to 5. It suggests a modest level of correlation but is not critical enough to significantly impact the interpretation of the results.

It was decided not to omit ROE and D/E Ratio for two reasons. First, despite the presence of extreme VIF values, the data's applicability was supported by other tests. Second, the exclusion of these variables did not significantly affect the results. This decision allows for a more comprehensive analysis of the relationship between the independent variables and the dependent variable in the study, providing a wider understanding of the factors influencing stock performance.

Thus, the data appears to be suitable for the research, as it satisfies the classical assumptions needed to estimate OLS, as well as the Gauss-Markov theorem:

1. The model's specification is linear;
2. The data exhibit neither autocorrelation, nor heteroskedasticity;
3. The data exhibit no critical multicollinearity;
4. The errors are both independent and normally distributed.

Moreover, according to the Gauss-Markov theorem, the OLS estimator used in this research is not only unbiased but also efficient, which implies it is the Best Linear Unbiased Estimator (BLUE). OLS provides the best possible estimates of the true regression coefficients in such cases.

As discussed earlier, OLS regression also satisfies the absence of multicollinearity, heteroscedasticity, and residuals' autocorrelation. Therefore, the model can be considered a viable and trustworthy tool from an econometric point of view.

To conclude, OLS is a widely used and popular method for conducting regression analysis among peers. The data analysis above has proven that it is applicable to the research. Additionally, the BLUE criteria will ensure that the OLS estimates are both unbiased and efficient, making the model and its interpretations viable from the econometric point of view.

In a similar way to Gill et al. (2012) approach, the OLS regression was estimated for each year separately. The results of each regression are consolidated in Table 6:

**Table 6. OLS regression per year, R Output**

| | Dependent variable<br>Returns | | |
|---|---|---|---|
| | 2019 | 2020 | 2021 |
| EPS | 0.000<br>(0.001) | 0.001<br>(0.002) | 0.000<br>(0.001) |
| DPS | -0.000<br>(0.000) | -0.000<br>(0.001) | -0.002<br>(0.002) |
| ROA | 0.463***<br>(0.223) | 0.741*<br>(0.425) | 0.152<br>(0.205) |
| ROE | -0.006<br>(0.005) | -0.002<br>(0.006) | -0.003<br>(0.004) |
| NPM | 0.015<br>(0.035) | -0.059<br>(0.116) | 0.036<br>(0.030) |
| DER | 0.001<br>(0.001) | 0.000<br>(0.003) | -0.000<br>(0.000) |
| Firm Size | -0.043***<br>(0.011) | -0.086***<br>(0.021) | 0.030***<br>(0.010) |
| Constant | 1.164***<br>(0.262) | 2.167***<br>(0.512) | -0.515**<br>(0.251) |
| Observations | 489 | 481 | 492 |
| R2 | 0.077 | 0.067 | 0.030 |
| Adjusted R2 | 0.063 | 0.053 | 0.016 |
| Residual St. Error | 0.285 (df = 481) | 0.557 (df = 473) | 0.271 (df = 484) |
| F Statistic | 5.695***<br>(df = 7; 481) | 4.855***<br>(df = 7; 473) | 2.129**<br>(df = 7; 484) |
| Note: | *p<0.1; | **p<0.05; | ***p<0.01 |

The first thing to notice is that most factors are not as significant as initially anticipated. For instance, EPS, DPS, ROE, and Debt-to-Equity ratio did not appear to have a significant effect on the returns at all: they are both low as coefficients and not significant at any common level.

On the other hand, ROA is one of the most impactful coefficients that exhibit coefficient values of up to 0.741, yet it loses its significance throughout the sample period – 99% significance for the 2019 sample and no significance for 2021.

Interestingly, firm size stands out as the only variable that exhibited 99% significance across the years, yet with a different sign – negative for samples of 2019 and 2020 meanwhile positive for 2021.

The interpretation of factors found to be significant in the model is rather intuitive:

- As the size of a firm increases, it becomes less sensitive to market movements. This is likely caused by a tendency of larger companies to cover a larger portion of the market and hence be less affected by external market forces. Additionally, larger companies tend to have higher absolute stock price levels, which makes them less responsive in terms of returns as well. There is also a notion of "Too big to fail", implying that big companies or trends are too irresponsive to market shocks due to various reasons. That makes firm size a good factor to consider by an Investor who seeks a means of diversification;
- An increase in ROA implies that the firm's efficiency becomes better and the company generates higher profits from its assets. As a result, this factor tends to attract investors seeking profitable investment opportunities, which drives the demand for the firm's stock. This increase in demand, in turn, pushes the stock price of the firm up, resulting in higher returns for investors who have already invested in the stock. Therefore, ROA is another important factor for Investors to consider when making investment decisions, as it can have a significant impact on the future returns of the stock.

The interpretation of those variables would be the following:

- With a 1% change in the firm size, the expected change in returns would be in the bounds of -8.6% to 3%;

- With a unit change in the ROA (for example with 1 additional dollar), the expected change in returns would be in the bounds of 15.2% to 74.1%.

It is worth mentioning that the interpretation above is about the change in returns. That is, if the initial return is 1%, then with a unit change in the ROA by 1 dollar per asset value (other terms constant) the return would apply values of 1.15% to 1.74%. That may not seem significant at first, but taking into account the scale of investments and the efforts needed to increase ROA by 1 that is still a valuable discovery.

In terms of variables that appeared to be significant, one can see that the results obtained are partially in accordance with prior studies: with Gill et al. (2012) in terms of Firm Size, and with Herawati and Putra (2018) in terms of ROA.

Another issue to address is the R-squared metric, which is the proportion of the variation in the dependent variable that is explained by independent variables. In other words, it represents the extent to which the independent variables explain the dependent one. The model estimated exhibits a level of 3.0% to 7.7%, which is a relatively low one. However, it does not necessarily mean that the model is invalid or unusable. It may as well signify that the model does not capture the specter of explanatory variables and some other important ones were omitted or not included. In such cases, it may be useful to look for other independent variables or to use more advanced regression techniques to improve the model's predictive power. It is also possible that the low R-squared metric may be due to external factors that the model cannot account for, such as random noise or unobservable variables.

To double-check the results, joint significance tests were performed for three pairs of variables: Firm Size and ROA (which were found to be significant in the model), ROE and ROA, as well as EPS and DPS (which are connected via the same parameters in the calculation. The results are presented in Tables 7, 8, and 9.

From Table 7, it is seen that Firm Size and ROA are jointly significant at the highest conventional significance levels of 99% for 2019 and 2020 samples as well as at 90% significance for 2021. That proves the overmentioned conclusions and does make these two factors important at the screening stage of the investment analysis process.

**Table 7. Firm Size and ROA test for joint significance, R output**

| Model | Res. Df | RSS | Df | Sum of Sq | F | Pr(>F) |
|---|---|---|---|---|---|---|
| | | | | | | |
| 2019 restricted | 483 | 42.062 | | | | |
| 2019 unrestricted | 481 | 39.094 | 2 | 2.968 | 18.255 | 0.000*** |
| | | | | | | |
| 2020 restricted | 475 | 155.900 | | | | |
| 2020 restricted | 473 | 146.850 | 2 | 9.045 | 14.567 | 0.000*** |
| | | | | | | |
| 2021 restricted | 486 | 36.225 | | | | |
| 2021 restricted | 484 | 35.587 | 2 | 0.638 | 4.339 | 0.014* |

**Table 8. ROE and ROA test for joint significant, R output**

| Model | Res. Df | RSS | Df | Sum of Sq | F | Pr(>F) |
|---|---|---|---|---|---|---|
| | | | | | | |
| 2019 restricted | 483 | 39.553 | | | | |
| 2019 unrestricted | 481 | 39.094 | 2 | 0.459 | 2.824 | 0.060. |
| | | | | | | |
| 2020 restricted | 475 | 147.830 | | | | |
| 2020 restricted | 473 | 146.850 | 2 | 0.979 | 1.576 | 0.208 |
| | | | | | | |
| 2021 restricted | 486 | 35.694 | | | | |
| 2021 restricted | 484 | 35.587 | 2 | 0.107 | 0.728 | 0.484 |

**Table 9. EPS and DPS test for joint significant, R output**

| Model | Res. Df | RSS | Df | Sum of Sq | F | Pr(>F) |
|---|---|---|---|---|---|---|
| | | | | | | |
| 2019 restricted | 483 | 39.097 | | | | |
| 2019 unrestricted | 481 | 39.094 | 2 | 0.003 | 0.019 | 0.982 |
| | | | | | | |
| 2020 restricted | 475 | 147.030 | | | | |
| 2020 restricted | 473 | 146.850 | 2 | 0.180 | 0.289 | 0.749 |
| | | | | | | |
| 2021 restricted | 486 | 35.678 | | | | |
| 2021 restricted | 484 | 35.587 | 2 | 0.091 | 0.620 | 0.538 |

On the other hand, Tables 8 and 9 prove that despite being related, ROE-ROA and EPS-DPS pairs are neither individually, nor jointly significant. This again brings up the conclusion that these metrics may not be sufficient in explaining stock returns. In further research, it would be useful to consider a broader set of variables, including industry-specific factors, market conditions, and other relevant financial indicators.

As discussed in Chapters 3 and 4, the model is viable from the econometric point of view. However, despite its sound theoretical foundation, the model's practical implications and usefulness in the context of Investors' decision-making process do not align with initial expectations. Regrettably, the model with its current specification and range of explanatory variables, fails to deliver the intended value to investors seeking to screen the market and identify potential candidates for investment analysis.

While this study may not have yielded the desired outcomes in terms of a useful screening tool for investors, it lays the foundation for further research and exploration. The insights gained from this study can inform future researchers to develop more effective models that align with Investors' needs and provide valuable guidance in their decision-making processes.

# CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this research was to provide a screening tool for portfolio managers and private investors to use in selecting companies for further analysis before investing. To accomplish this goal, the financial factors that determine the stock performance were analyzed on the sample of S&P 500 constituents. The model of choice was the OLS regression, which was used to examine the annual market premia of stocks in relation to financial variables such as EPS, DPS, ROA, ROE, Net Profit margin, and Firm size. The sample contained annual financial data for the 2019 – 2021 period, which allows to estimate three separate regressions for each year and then compare them. The research managed to detect the intuitive relationships between the Returns and Firm Size (negative) and ROA (positive) and failed to detect any significant relationships with other variables.

The interpretation of the results shows that with a 1% change in firm size, an associated change in returns would be in the range of -8.6% to 3%. That implies that the effect is more likely to be negative. The observed negative relationship implies that larger companies tend to experience diminished returns, which is probably caused by an increased market coverage and hence reduced responsiveness to market movements.

Another finding suggests that a unit change in the ROA is associated with a 15.2% to 74.1% change in returns. This implies that improvements in a company's performance, profitability, and efficiency with asset utilization can attract Investors. Therefore, Investors may consider focusing on companies with higher ROA, as they are more likely to deliver favorable returns.

These findings make factors of financial performance and size crucial for Investors when making investment decisions.

The results are partially in accordance with studies conducted by Gill et al. (2012) and Herawati and Putra (2018), whose models also yielded Firm Size and ROA significance, among others, and of similar signs. These studies also employed a similar linear methodology to investigate the relationship between financial factors and stock returns. The fact that their models yielded comparable results further supports the

notion that Firm Size and ROA play a significant role in determining stock performance.

The firm size's detected negative effect is also consistent with the finding by Chan et al. (1990). They discovered that smaller firms tend to outperform large ones, which is an alternative way to interpret the negative sign. Small firms often have greater growth potential, as they have more room for expansion and are more agile in a constantly changing market environment. Large companies, on the contrary, tend to be more mature and hence limited in their potential for rapid growth. Additionally, large companies are subject to antitrust constraints, which impact their market opportunity heavily and ultimately result in lower returns, unless they choose to develop qualitatively. Anyway, it implies fewer returns for large companies.

The fact that DPS, ROE, Debt-to-Equity, and especially EPS – which was considered to be the dominant variable as found by Hatta and Dwiyanto (2012), Gill et al. (2012), and others – were not found to be significant at all, contrasts heavily with the related studies. This phenomenon can have multiple explanations. One of the most obvious ones is the difference in specification. As the focus of this research was the stocks' performance, returns in the form of market premia were used. However, among peers, it is commonly taken as an absolute value like by Pradhan and Paudel (2017) or the average like by Gill et al. (2012). Other reasons include, but not limited to:

- They might not be the most relevant factors for the particular companies or industry sectors analyzed. In the related literature it is common to sample specific sectors of the economy, which may result in inapplicability to other sectors;
- These variables may not have a direct impact on stock returns and thus further research has to find the ones that have a direct one.

Another important result to mention is a relatively low R-squared level ranging from 3.0% to 7.7% across the samples. This implies that the independent variables included in the model have limited explanatory power for stock returns. While the variables of firm size and ROA have shown significance and impact on returns, their overall contribution to explaining the observed changes in stock performance remains modest. It is important to acknowledge that other factors beyond the scope of this

study may also influence stock returns, indicating that a more comprehensive approach might be necessary to capture the full complexity of the market dynamics.

There were tests for joint significance conducted as well to double-check the model's results. The pairs tested were the following: Firm Size and ROA, ROE and ROA, EPS, and DPS. The tests proved that Firm Size and ROA found to be individually significant are jointly significant as well, meanwhile, pairs of interrelated metrics are not significant at all. That is another point on low explanatory power of the variables, implying that these metrics may not be sufficient in explaining stock returns.

The goal of the research was to come up with a screening tool for portfolio managers and private investors so that they could use the considerable and significant financials to choose the companies to deep-dive into further analysis prior before investing. Although the model is econometrically viable, it is not recommended for practical use by portfolio managers, unfortunately.

For further research, some recommendations can be suggested. First, it is worth trying to use other specifications, such as panel and time series, to examine whether the results will persist over long periods. The modeling of stock performance should not be too complex for the Investors to do, as market movements are impossible to predict and difficult to project. The model has to be a quick-to-use tool for screening, rather than software that requires constant operation.

For long-term research, it is not recommended to use the data of monthly or quarterly frequency, as it will become a time-consuming process that would not correspond to the overmentioned conditions.

Another recommendation is to stick to returns rather than the absolute level of stock prices. That is important because Investors are primarily interested in the price level changes that affect their portfolios. Their primary goal is to seek the price growth drivers, not necessarily the high prices themselves.

Also, further researchers can look for more explanatory variables to include in the model. They may include some industry-specific ones, market conditions, and other relevant financial indicators. That would benefit two-fold:

- First, that would drive the R-square metric up. However, it is worth stressing that it must not be the goal, but a consequence;

- Second, with a wider range of variables the model will be able to better demonstrate how powerful one variable is at explaining the returns, compared to others. In this way, one may prove that EPS does dominate the impact, or discover some other variable for that.

In conclusion, with the increasing popularity of investing as a means of preserving savings since the COVID-19 outbreak in 2020, there has been a growing need for an effective investment analysis tool for private investors and portfolio managers. While projecting future market movements is challenging, this study tried to define the financial factors that influence stock performance. Although the study did not yield significant findings in this regard, it has laid the basis for future research and exploration in this field.

# REFERENCES


Chan, Louis et al. (1990). Fundamentals and stock returns in Japan. Journal of Finance. 46:5, pp. 1739–789.

Fama, E.F. and French, K.R. (1992). The Cross-Section of Expected Stock Returns. The Journal of Finance Vol. 47, No. 2, pp. 427-465 (39 pages) https://www.jstor.org/stable/2329112

Gill, A. et al. (2012). Determinants of Equity Share Prices. Evidence from American Firms. International Research Journal of Finance and Economics. 90.

Hatta, A.J. and Dwiyanto, B.S. (2012). The company fundamental factors and systematic risk in increasing stock price. Volume 15, No. 2, August 2012, pages 245 – 256

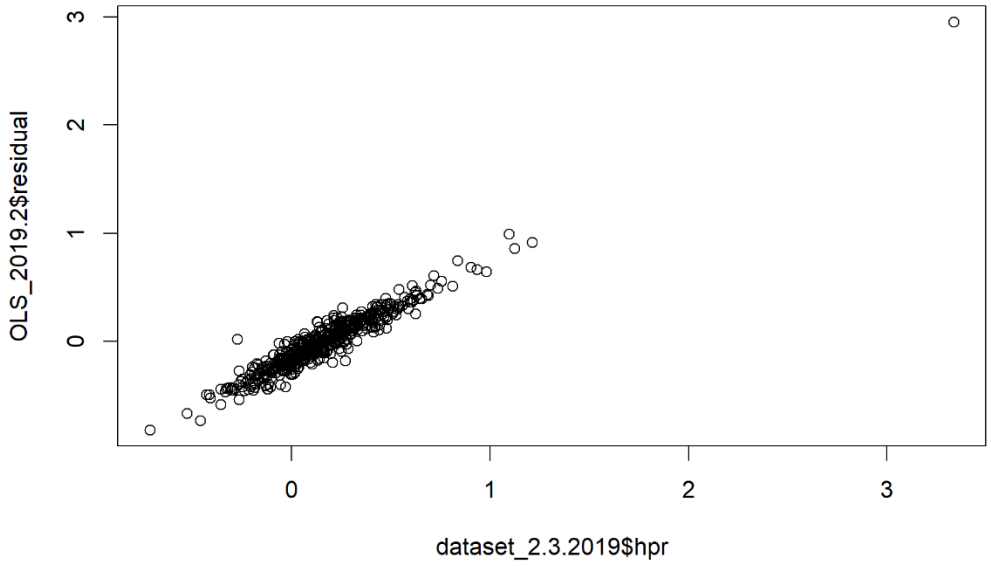
Herawati, A. and Putra, A.S. (2018). The Influence of Fundamental Analysis on Stock Prices. The Case of Food and Beverage Industries Volume XXI, Issue 3, 2018, pp. 316 - 326

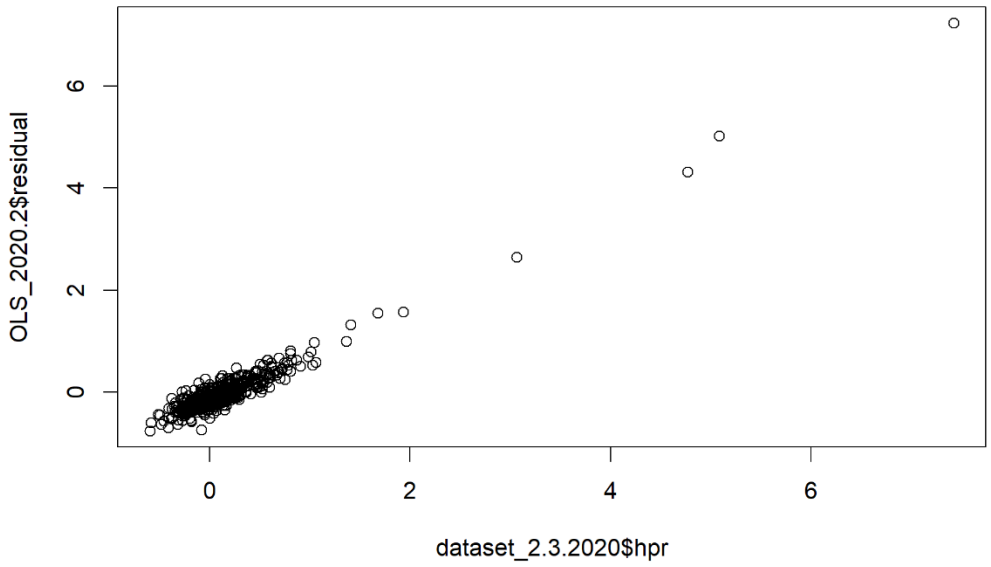
Kapouranis, D. (2018). Fundamental Values and Their Effect on Stock Prices. International Hellenic University

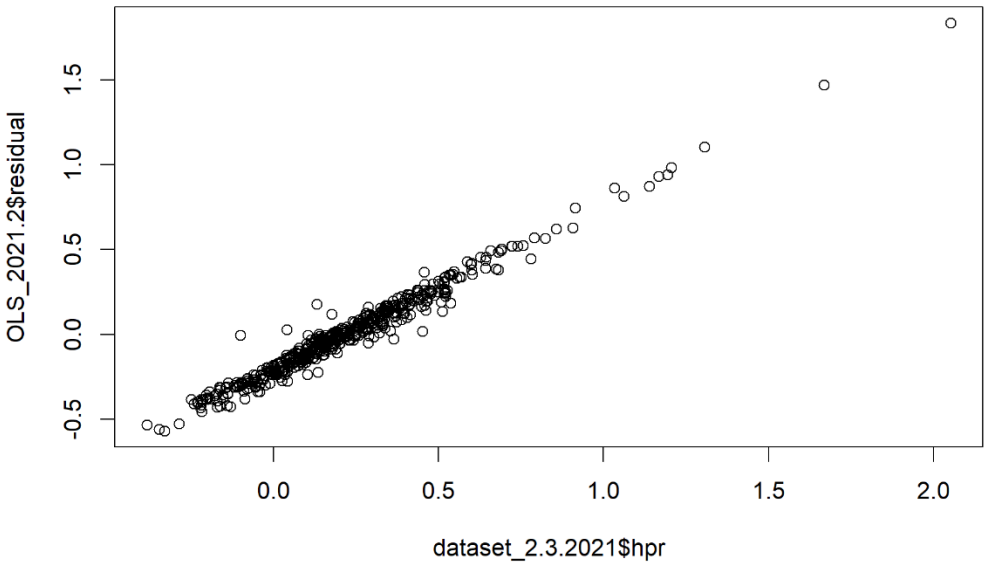
Pradhan, R. S. and Paudel, L. (2017) Impact of Fundamental Factors on Stock Price. A Case of Nepalese Commercial Banks. Nepalese Journal of Engineering. Nepalese Journal of Management. 1-13. 10.2139/ssrn.3044108.

# APPENDIX

**Appendix 1. Residual plots for each period analyzed (2019 – 2021), R output**

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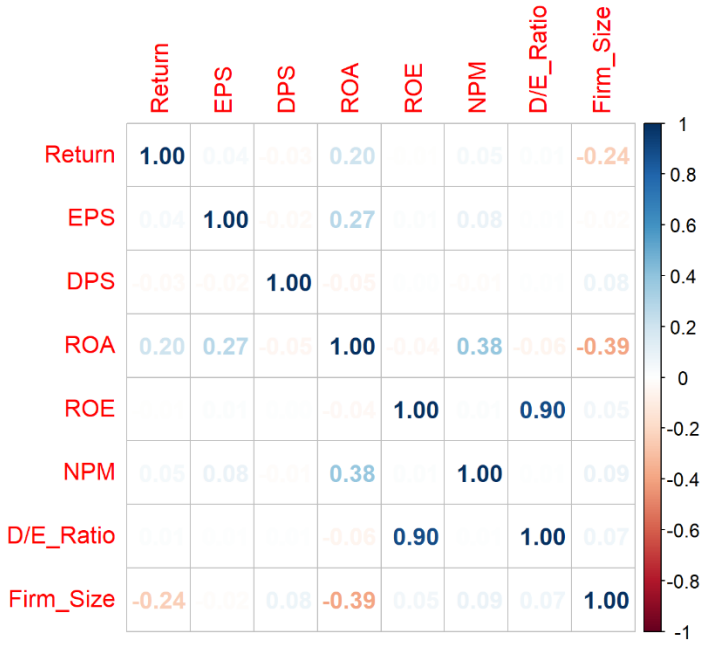
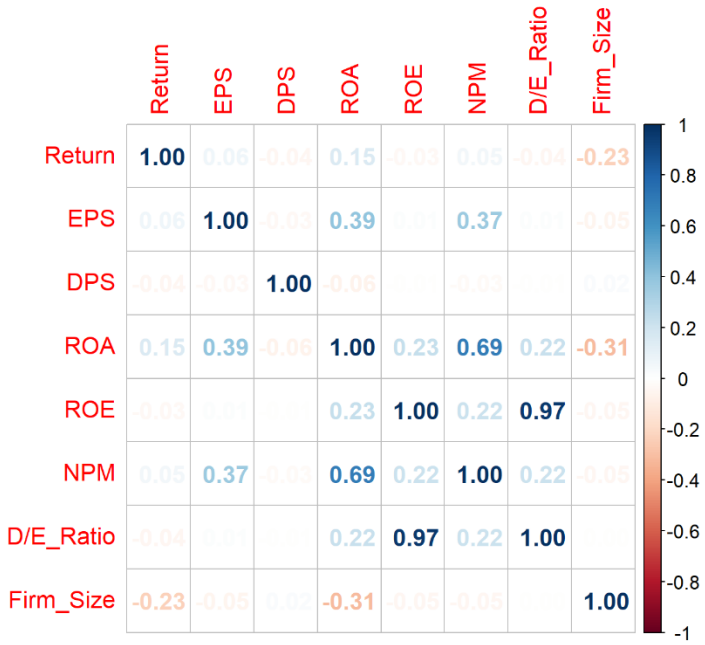
0.5
1.0
1.5
0.0
0.5
1.0
1.5
2.0
dataset_2.3.2021$hpr

**Appendix 2. Correlation matrices for each period analyzed (2019 – 2021), R output**




Return
EPS
DPS
ROA
ROE
NPM
D/E_Ratio
Firm_Size
1.00
0.03
-0.05
0.02
0.03
0.08
-0.04
0.13
0.03
1.00
-0.04
0.29
-0.09
0.16
0.08
-0.05
-0.04
1.00
-0.08
0.02
0.07
-0.35
0.03
-0.09
-0.08
1.00
-0.94
0.08
0.16
0.43
1.00
-0.04
0.08
0.07
-0.94
1.00
0.13
-0.35
1.00
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1