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COMPARATIVE ANALYSIS OF STOCK RETURNS OF ZOMBIE FIRMS AND BIST 30 FIRMS WITH STATISTICAL METHODS

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ABSTRACT

The concept of 'zombie' companies was first proposed by Kane in 1987. The three common features of these companies are listed as follows; high debt level, low profit rate and productive companies reduce their productivity. Zombie firms are defined as companies with persistently low profitability, high leverage, or negative equity capital. However, instead of defining a business as a zombie with single company data, it would be more accurate to look at bank and company level data that also show the lending relationships between credit institutions and corporate debtors. (Álvarez et al., 2023). In our study, companies having negative equity capital for at least three consecutive years were considered zombies, whereas these companies were selected from the ISO 1000 industrial enterprises. Particular attention was paid to ensure these companies continued to be traded on BIST. Additionally, BIST 30 companies were analyzed and stock returns and statistical evaluations were also analyzed.

Keywords: *Zombie Firms, Finance, BIST30.*

JEL classification: *G10, G17, G30.*

1. INTRODUCTION

Zombie firms are defined as companies that should go bankrupt due to low productivity and unprofitability, but manage to survive due to government subsidies or support from the banking sector (Han et al., 2020).

According to another definition, companies will be categorized as zombies in periods when they experience a decrease in quality and profitability and when they escape bankruptcy with external resources or government support. The number of companies in this situation is increasing worldwide, in both underdeveloped economies and developed economies alike (Chao et al., 2022).

In another definition, zombie companies are considered as inefficient companies that continue to survive immortally without exiting the market (Liu et al., 2019).

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Companies that became widespread especially in the mid-2000s and have difficulty in meeting interest payments are considered in the category of zombie companies. According to studies, zombie companies have low productivity and it is stated that during the time these companies survive, they will block the market, cause a waste of resources and restrict the growth of productive companies (McGowan et al., 2017).

Zombie companies are companies that cannot make a profit but still continue to operate. They are less productive, use more leverage, and invest less in intangible capital. Especially after the Covid-19 epidemic, there has been a rise in the number of zombie companies, and this has garnered the attention of the academic environment.

Zombie companies are mature companies mired in debt and have no potential to repay their debts because they cannot achieve profitability for a long time. Zombie companies forced to survive through restructuring in developed economies hinder the growth of productive companies and, in parallel, economic growth. Thus, it is thought that reducing the number of zombie companies in the market will provide positive developments in terms of economic growth. (Carreira et al., 2022).

Zombie companies reduce the profit margin of the sector by shifting the deposit supports they receive to higher deposit rates and lower loan rates. In parallel with this, they also increase the annual deposit insurance premiums that healthy companies have to pay (Liu et al., 2019).

Zombie firms have increased significantly in developed economies since the 1980s. This increase was not stable and the upward shifts due to the economic downturns in the early 1990s, early 2000s and 2008 were partially reversed in subsequent years. The increase in these firms is due to the fact that firms remain in the zombie state for longer, rather than recovering or emerging from bankruptcy (Banerjee and Hofmann, 2018).

According to studies conducted around the world, zombie companies may increase resource incompatibility and disrupt competitive conditions. It is thought zombie firms reduce product prices but, in turn, increase wages, negatively affect investments, reduce productivity and hinder industrial recovery (Feng et al., 2022).

According to research conducted in Japan, Europe and other developed economies, zombie companies exclude productive companies, hinder innovation, increase tax burdens, reduce the profits and productivity of normal companies with excess production capacity, and prevent the enterprises and investments of new companies. Again, these companies negatively affect prices and cause detrimental effects on employment and macroeconomic growth (Chao et al., 2022).

Zombie firms pose threats to the economy not only because they are inefficient, but also because they disrupt market rules and undermine the competitiveness and innovation of efficient firms (Han et al., 2020).

The rising tide of zombie companies in China in the 2000s increased the level of systematic financial risk, which became a crucial issue for the government. Particularly during economic downturns, financial resources were directed to zombie companies, resulting in exclusion of productive companies (Fang et al., 2020).

It is important to correctly understand the reasons that create zombie companies because they reduce productivity and cause a waste of resources. With the financialization of zombie companies, the threat is on course to shift from the manufacturing to the financial sector, whereby, the entire market will be negatively affected. Therefore, these companies must be identified early and necessary precautions must be imposed (Wu et al., 2021).

2. LITERATURE

Zombie companies are bankrupt companies that are still in operation. They have recently garnered great attention due to their rising numbers and their impact on the economy. These firms will disrupt market competition and reduce productivity. In short, zombie companies reduce economic performance.

Zombie firms have been recognized for more than a decade and are defined as companies whose interest coverage ratios have been below pre-interest earning expenses, taxes and depreciation for at least three years. (El Ghoul et al., 2021).

In a study conducted on Japan, it was concluded that in industries where zombie firms are concentrated, productivity is low, there is incorrect market structuring, and this reduces productivity performance. Again, in this study, it is claimed that the financial support provided by Japanese banks to zombie companies also has a negative impact on the economy and that productive companies are also negatively affected by this situation. Although export companies perform relatively well where competition is intense, it is observed that productivity levels decrease in industries where competition is suppressed and zombie companies are supported. (Ahearne and Shinada, 2005).

During the prolonged stagnation of the economy in the 1990s, some banks in Japan supported zombie companies, while some zombie companies tried to survive by downsizing their workforce and liquidating fixed assets. Even though their impact was small, structural changes also helped zombie companies recover (Fukuda and Nakamura, 2011).

In a study covering the years 2005-2007, it was suggested that the performance of zombie companies in China was increased by state investments, in turn hindering the growth of productive companies and that the increase in public sector enterprises created a suitable environment for zombie companies. (Tan et al., 2016).

In a study covering the years between 2011-2013, it was also suggested there was an overcapacity problem in heavy chemical industries, state sectors and zombie companies in China’s northeastern and

western regions. Moreover, the study also went on to state that zombie companies cause excess capacity by excluding productive companies (Shen and Chen, 2017).

According to studies, it has been concluded that zombie companies can weaken economic performance. The growth of more productive companies is prevented by the decrease in productivity in zombie companies and the congestion effect on resources. In addition, productive companies reduce prices in order to compete, causing funding costs to rise. Whenever the zombie share increases, productivity growth drops significantly (Banerjee and Hofmann, 2018).

With a decision taken in 2015, the Chinese Government suggested that companies with excess capacity that do not meet national energy consumption, environmental protection, quality and safety standards should be shut down, transferred or liquidated. In conjunction, while was decided to clean up companies that had been making losses for more than three years, Chinese companies continued to survive with government support (Liu et al., 2019).

In a study conducted in Europe, it was determined that the zombie company problem may arise from financial institution tolerance, whereas as the survival period of zombie companies increases, this may cause blockages in the markets and a decrease in productivity (Andrews and Petroulakis, 2019).

In a study conducted with data compiled from non-financial A-share companies, it was observed that zombie companies increased debt costs of normal companies. (Yu et al., 2021).

In a study covering the years 1993-2019, a positive relationship was found between sales, assets, equity, profit, exports and number of employees, which are taken as size indicators, and zombie duration (Şahin, 2021).

In a study covering 79 countries between 2005 - 2016, it was observed that zombie company rates increased from 4.5% in 2005 to 8.65% in 2016, whereas the rate of increase was higher in high-income countries compared to low-income countries. Again, according to the sectors covered in the study, it was seen that the rate of increase in aviation and public industries was lower than in the mining industry (El Ghoul et al., 2021).

While hindering economic development, zombie companies also cause social harm, such as wasting human resources and the overuse of material and financial resources. In this case, it leads to injustices in resource allocation, preventing developing companies from entering the sector, and even causing them to be eliminated before entering the sector. In times of crisis in industries, inefficient companies should be eliminated. Although this method is rational, companies in trouble can resist losses with the help of the state or banks and push quality companies out of the economy. Zombie companies can hinder economic development by influencing social innovation and technological development. Although eliminating zombie companies seems to be the right way to rectify this trend, it is still necessary to investigate why companies are in this situation in the first place (Chang et al., 2021).

Zombie firms have a negative impact on the operating efficiency of normal firms, resulting in resource mismatch. Between 2000 and 2007, the rate of zombie companies amongst Chinese industrial companies increased with the 2008 financial crisis. The long-term existence of zombie companies in the economy puts economic development in a difficult situation. According to studies, it has been suggested zombie companies were responsible for the stagnation of the Japanese economy in the 1990s and the subsequent decline of European Union country economies such as France, Italy and Spain. In an economy with zombie companies, job opportunities and employment will be negatively affected and zombie companies inevitably lead to overcapacity. In some developed countries, zombie loans produced by banks to cover their negative loans have also caused an increase in zombie companies. On the other hand, studies have revealed that state intervention is the biggest factor in the formation of zombie companies. State subsidies that support economic growth and development, as well as support for inefficient companies in the market to increase employment, lead to the formation of zombie companies (Geng et al., 2021).

During the Asian financial crisis of 1997, there was a significant uptick in zombie companies in China, and it was claimed these companies had lower operating efficiency and savings, but rather, they had easier access to external financing sources. In China, state interventions and non-marketization credit sources, especially the granting of privileges to public economic enterprises in finding loans as a result of the political influence of banks on credit policies, are seen as the biggest reasons for the emergence of zombie companies (Feng et al., 2022).

In order to eliminate the so-called zombie phenomenon, the Chinese economy is working to reduce excess capacity, reduce excess inventory, deleverage, reduce costs and strengthen weak areas. In fact, it is necessary to eliminate zombie companies, which are the main causes of excess capacity. The term zombie company has become a hot topic not only in official documents but also in academic research.

The purpose of providing government support is to ensure the growth and development of industries, increase employment and help the economic development of the country. According to research, government subsidies are given to protect weak companies. However, if some companies supported in this way continue to receive clockwork support instead of correcting themselves, it will negatively affect productive companies. In the study conducted on China, it was observed that zombie companies were generally concentrated in industries such as steel, cement and coal (Qiao and Fei, 2022).

Zombie companies are unprofitable companies that increase risk and cause waste of resources, and these companies use more loans at a lower cost than the real market interest rate, posing a threat to productive companies in the market and new companies that will enter the market. If some large zombie companies go bankrupt, market efficiency will decrease, unemployment will increase and economic development will not be achieved (Qiao and Fei, 2022).

Despite the change in technology and the increase in qualified workforce in developed countries, the total productivity amount has remained low. Studies have shown this decrease is related to the error in resource distribution. What is important at this point is that it has been suggested that companies with low performance hinder total productivity by negatively affecting the growth potential of productive companies. Thus, from an economic standpoint, the survival of zombie companies is a worrying situation (Nieto-Carrillo et al., 2022).

In the study conducted on China, it was seen that protecting employment and closing non-performing loans, as in developed countries, has led to the formation of zombie companies (Cai et al., 2022).

Zombie companies are defined as companies unable to cover their debt servicing costs from current profits over the long term. If a business has not been profitable for a long time, cannot pay its debts, has an interest coverage ratio lower than one for at least three consecutive years, and is at least ten years old, then the business is called a zombie company.

In investigating zombie companies amongst manufacturing and service companies operating in Portugal between 2004 – 2017, the study suggested that the situation of zombie companies could be improved by debt restructuring, downsizing and restructuring. (Carreira et al., 2022).

In the study, a simple theoretical model was created in which the increasing share of zombie companies will increase the external debt financing costs of non-zombie companies and disrupt the distribution of credit resources. It was demonstrated that when future investment projects of a non-zombie firm are risky and result in unstable cash flows, the firm can rely more on its savings to finance future investment in the face of increasing external financing costs. It has also been particularly noted that the incentive to save will be stronger if the risk of future investment projects is greater, or if the financial market environment is relatively tight, causing the firm's financing constraints to intensify (Feng et al., 2022).

According to the results of the study, while zombie companies decreased due to the financial reforms implemented in China, these reforms were also effective in boosting the self-confidence of the companies (Zhang and Huang, 2022).

The term ‘zombie company’ was first coined by Kane in 1987. The three common characteristics of these companies are; high debt levels, low profit rates and being blood suckers of productive companies. Zombie firms are defined as companies with persistently low profitability, high leverage, or negative equity capital. However, instead of defining a business as a zombie with single company data, it would be more accurate to look at bank and company level data that also shows lending relationships between credit institutions and corporate debtors (Álvarez et al., 2023).

3. APPLICATION

3.1. Descriptive Statistics

The definitions and calculations of the variables to be used in the analyzes regarding BIST30 and Zombie companies are shown in Table 1.

Table 1. Definitions of Variables to be used in Analysis

Variables	Definition
Profit Per Share	Annualized Net Profit / Paid-in Capital
Net Profit /1000,000	Profit declared in the income statement
Stock Closing Price	End of period stock market closing price
PD/DD	Market Value / Shareholders' Equity of the Parent Company
Number of Shares/1000,000	Number of shares at the end of the period
Debt Ratio 1	Total Liabilities/Total Assets
Debt Ratio 2	Total Liabilities/Equity
Equity Return Rate	Net Profit/Equity Capital
Price Earnings Ratio	Stock Price / Earnings per Share

Descriptive statistics for the variables used in this study are shown in Table 2. The average profit per share of all companies subject to the study is 11.23. The earnings per share variable, which will be used as the dependent variable in quantile regression models, shows distribution that is skewed to the right and steeper than normal. Looking at Table 2, it can be seen that the companies' net profit, stock closing price, PD/DD, number of shares, debt ratio 2 and equity yield ratio variables are skewed to the right and distributed steeply compared to normal. It is seen that the debt ratio 1 and price earnings ratio variables are skewed to the left and have a steep distribution compared to normal.

Table 2. Descriptive Statistics Calculated for all Companies

Variables	Mean	Median	Max	Min	Std. Deviation	Skewness	Kurtosis
Profit Per Share	11.23	6	74	0	15.857	2.497	6.774
Company Type (BIST30, Zombie)	0.58	1	1	0	0.499	-0.321	-1.975
Net Profit	762.469	58.712	11863.64	0.047	2008.173	4.26	20.037
Stock Closing Price	117.15	52.5	929	2	185.028	3.486	13.266
PD/DD	5.25	3	38	1	7.208	2.887	9.083
Number of Shares	4345.962	636.364	138000	18	19022.888	7.067	50.565
Debt Ratio 1	0.58	1	1	0	0.499	-0.321	-1.975
Debt Ratio 2	1.69	1	6	0	1.566	0.887	0.204
Equity Return Rate	0.19	0	1	0	0.398	1.608	0.608
Price Earnings Ratio	-51.0457	11.179	135.2982	-3689.41	515.138	-7.18	51.704

Descriptive statistical values of the variables considered for BIST30 and Zombie companies, which will be compared in the study, are shown in Tables 3 and 4.

According to the descriptive statistics of BIST30 companies given in Table 3, the average profit per share in these companies is 14.27. It is seen that the variables of net profit, stock closing price, PD/DD, number of shares, debt ratio 2 and equity yield ratio of BIST30 companies are skewed to the right and have a steep distribution compared to the normal. It is also seen that the debt ratio 1 and price earnings ratio variables are skewed to the left, but that the debt ratio 1 variable is flattened compared to normal and the price earnings ratio variable is distributed steeply compared to normal.

Table 3. Descriptive Statistics Calculated for BIST30 Companies

Variables	Mean	Median	Max	Min	Std. Deviation	Skewness	Kurtosis
Profit Per Share	14.27	6.5	74	0	18.975	2.063	4.082
Net Profit	1033.517	18.6335	11863.642	0.047	2607.951909	3.196	10.756
Stock Closing Price	144.8	55	929	8	229.916	2.876	8.157
PD/DD	4.3	3	20	1	5.279	2.38	4.794
Number of Shares	7127.116	2231.05	138000	102.3	24836.27116	5.395	29.371
Debt Ratio 1	0.57	1	1	0	0.504	-0.283	-2.062
Debt Ratio 2	1.7	2	5	0	1.535	0.606	-0.424
Equity Return Rate	0.17	0	1	0	0.379	1.884	1.657
Price Earnings Rate	-109.939	10.6606	72.8682	-3689.4118	676.1850458	-5.474	29.974

According to the descriptive statistics of Zombie companies given in Table 4; The average profit per share in these companies is 7.09. It is seen that the net profit, stock closing price, PD/DD, number of shares, debt ratio 2, equity yield ratio and price earnings ratio variables of zombie companies are skewed to the right and distributed steeply compared to normal. It is also seen that the debt ratio 1 variable shows a distribution, that is skewed to the left and flattened compared to the normal.

Table 4. Descriptive Statistics Calculated for Zombie Companies

Variables	Mean	Median	Max	Min	Std. Deviation	Skewness	Kurtosis
Profit Per Share	7.09	3.5	38	0	9.071	2.372	6.175
Net Profit	392.858	316.94	1373.916	1.239	391.59175	1.035	0.537
Stock Closing Price	79.45	42.5	374	2	86.966	2.239	5.609
PD/DD	6.55	3	38	1	9.2	2.618	6.825
Number of Shares	553.4806	142.757	3500	18	939.717478	2.403	5.239
Debt Ratio 1	0.59	1	1	0	0.503	-0.397	-2.037
Debt Ratio 2	1.68	1	6	0	1.644	1.272	1.252
Equity Return Rate	0.23	0	1	0	0.429	1.399	-0.057
Price Earnings Rate	29.26298	11.94	135.2982	0.085	36.6493023	1.858	2.716

3.2. Difference Tests

A comparison of variables related to BIST30 and Zombie companies was also made. Which tests will be used for comparison is determined based on the assumption of normal distribution. If the variables are normally distributed, the Independent Sample T test is used and the Mann-Whitney U test is used if not normally distributed. In this study, the normal distribution compliance tests of the variables that will be the subject of analysis were performed and are shown in Table 5.

Table 5. Tests for Suitability of Variables to Normal Distribution

Variables	Shapiro-Wilk	
	Statistics	Sig.
Profit Per Share	0.672	0.000
Net Profit	0.418	0.000
Stock Closing Price	0.548	0.000
PD/DD	0.560	0.000
Number of Shares	0.191	0.000
Debt Ratio 1	0.628	0.000
Debt Ratio 2	0.882	0.000
Equity Return Rate	0.482	0.000
Price Earnings Rate	0.150	0.000

According to the results provided in Table 5, it is seen that not all variables are suitable for normal distribution. Therefore, Mann-Whitney U test, one of the non-parametric tests, was used to compare BIST30 and Zombie companies. Statistically significant results regarding the comparison test are provided in Table 6.

Tablo 6. Mann-Whitney U Test Results

Variables	Type of Firm	N	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	Asypm. Sig. (2-tailed)
Net Profit	Zombie Firm	22	30.66	674.5	238.5	-1.695	0.090[c]
	BIST30	30	23.45	703.5			
Number of Shares	Zombie Firm	22	15.89	349.5	96.5	-4.325	0.000[a]
	BIST30	30	34.28	1028.5			

[a]p<0.01; [c]p<0.10

According to the results given in Table 6, net profit and number of shares variables show statistical differences for BIST30 and Zombie companies. The difference arose due to the higher net profit in zombie companies and the higher number of stocks in BIST30 companies.

3.3. Prediction of Models

Quantile regression models were estimated to determine the variables affecting the profit per share values of BIST30 and Zombie companies. The results of the estimated quantile regression models are provided in Table 7.

Table 7. Estimated Quantile Regression Models

Variables	Quantile Regression Models									
	q=0.10		q=0.25		q=50		q=75		q=90	
	β	Std. Error	β	Std. Error	β	Std. Error	β	Std. Error	β	Std. Error
Type of firm	1.896	1.830	-0.018	2.111	0.770	1.825	-1.061	4.316	-2.887	4.342
Net Profit	0.0002493	0.0004536	0.0002857	0.0005233	0.0009324 [b]	0.0004525	0.0010248	0.00107	0.0002727	0.0010763
Stock Closing Price	0.058[a]	0.006	0.074[a]	0.007	0.069[a]	0.006	0.058[a]	0.013	0.060[a]	0.013
PD/DD	-0.568[a]	0.137	-0.275[c]	0.158	-0.379[a]	0.136	-0.496	0.322	-0.720[b]	0.324
Number of Shares	0.0001845 [a]	0.0000459	0.0001541 [a]	0.0000529	0.0001467 [a]	0.0000458	0.0001274	0.0001082	0.0000768	0.0001089
Debt Ratio 1	11.921	6.972	4.248	8.043	-6.842	6.954	-5.193	16.446	6.578	16.543
Debt Ratio 2	-3.410[a]	1.128	-1.363	1.301	1.208	1.125	2.884	2.660	1.254	2.675
Equity Return Rate	9.967[b]	4.884	7.389	5.634	8.003	4.871	13.518	11.520	35.750[a]	11.588
Price Earnings Rate	0.002	0.002	0.004[b]	0.002	0.004[b]	0.002	0.004	0.004	0.003	0.004
Const.	-6.049[c]	3.074	-2.918	3.546	0.473	3.066	1.870	7.252	-0.021	7.294

[a]p<0.01; [b]p<0.05; [c]p<0.10

When the quantile regression models were examined, no statistically significant relationship was found between the earnings per share variable and company type in all models. However, the effect of the stock closing price on the earnings per share variable is positive and found to be statistically significant in all quantile regression models. It was determined that the net profit variable was significant only in the 50th quantile regression and its effect on the earnings per share variable was positive. The PD/DD variable was found to be significant in the 10th, 25th, 50th and 90th quantile regression and its effect on the earnings per share variable was negative. The number of shares variable was found to be significant in the 10th, 25th and 50th quantile regression and its effect on the earnings per share variable was positive. It was determined that the debt ratio 2 variable was significant only in the 10th quantile regression and its effect on the earnings per share variable was negative. The equity return ratio variable was found to be significant in the 10th and 90th quantile regression and its effect on the earnings per share variable was positive. The price earnings ratio variable was found to be significant in the 25th and 50th quantile regression and its effect on the earnings per share variable was positive. As a result, it is seen that the model results are better at lower quantiles since the earnings per share variable shows a right-skewed distribution.

4. CONCLUSION

Companies that are considered to have low profitability or negative equity in successive years are considered zombies. In this study, zombie companies were determined among the ISO 1000 companies that had negative equity capital for at least 3 consecutive years. BIST 30 companies were also included in the analysis for comparison. First, the variables to be used in the analyzes were defined. Then, descriptive statistics were calculated for all companies and the average profit per share of all companies

was found to be 11.23. In this analysis, the companies' net profit, stock closing price, PD/DD, number of shares, debt ratio 2 and equity yield ratio variables are skewed to the right and have a steep distribution compared to normal, and the debt ratio 1 and price earnings ratio variables are skewed to the left. whereby it was observed to show a steep distribution compared to the normal.

When we look at the descriptive statistical values of the variables considered for BIST30 and Zombie companies, which will be compared in the study, the average profit per share of BIST30 companies was found to be 14.27, and the net profit of BIST30 companies, stock closing price, PD/DD, number of shares, debt ratio 2, whereas it was observed that the equity return rate variables were skewed to the right and distributed steeply compared to normal. It was observed that the debt ratio 1 and price earnings ratio variables were also skewed to the left, whereas the debt ratio 1 variable was flattened compared to the normal, whereby the price earnings ratio variable showed a steep distribution compared to the normal.

Looking at the descriptive statistics of zombie companies, the average profit per share is 7.09 and the net profit, stock closing price, PD/DD, number of shares, debt ratio of these companies are 2, both the equity yield ratio and price earnings ratio variables are skewed to the right and are observed to show a steep distribution compared to the normal. It was also observed that the debt ratio 1 variable showed a distribution that was skewed to the left and flattened compared to the normal.

In our study, the variables related to BIST30 and Zombie companies were also compared and the comparison tests were determined based on the assumption of normal distribution. If the variables were normally distributed, the Independent Sample T test was used, and the Mann-Whitney U test was used if they were not normally distributed. The variables subject to analysis were tested for suitability for normal distribution and according to the results, it was seen that not all of the variables were suitable for normal distribution. For this reason, one of the non-parametric tests, that of Mann-Whitney U, was used to compare BIST30 and Zombie companies. The variables of net profit and number of shares showed statistical differences in terms of BIST30 and Zombie companies, whereas it was observed that this difference arose due to a higher net profit in zombie companies and a higher number of shares in BIST30 companies.

Quantile regression models were estimated to determine the variables affecting the profit per share values of BIST30 and Zombie companies. According to the results of the estimated quantile regression models, there was no statistically significant relationship between the earnings per share variable and company type in all models. However, the effect of the stock closing price on the earnings per share variable is positive and found to be statistically significant in all quantile regression models. It was determined that the net profit variable was significant only in the 50^{th} quantile regression and its effect on the earnings per share variable was positive. The number of shares variable was found to be significant in the 10^{th}, 25^{th} and 50^{th} quantile regression and its effect on the earnings per share variable

was found to be positive. The debt ratio 2 variable was found to be significant only in the 10th quantile regression and its effect on the earnings per share variable was negative. The equity return ratio variable was found to be significant in the 10th and 90th quantile regression and its effect on the earnings per share variable was positive. The price earnings ratio variable was found to be significant in the 25th and 50th quantile regression and its effect on the earnings per share variable was positive. As a result, it has been observed that the model results are better at lower quantiles since the earnings per share variable shows a right-skewed distribution.

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