



ISSN: 2146-1740
https://dergipark.org.tr/tr/pub/ayd,
Doi: 10.54688/ayd.1243765

[Araştırma Makalesi/Research Article]



THE EFFECTS OF COVID-19 PANDEMIC ON FINANCIAL PERFORMANCE ANALYSIS OF AUTOMOTIVE COMPANIES: A STUDY IN BIST

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Article Info

Received:
28/01/2023

Accepted:
17/08/2023

Abstract

This study focused on exploring COVID-19 that would have an impact on the Turkish automotive companies' financial performance. For the 2012–2021 period, a research model was created using the paired samples test method with the data announced by six Turkish automotive companies in the BIST. The aim of this study is to determine whether the financial performances of automotive companies traded on BIST in Turkey were affected during and after the pandemic. According to the results of the study, it has been found that automobile companies grew their total assets during and after the pandemic, compared to pre-COVID-19 levels. It will be determined that the financial risks of companies operating on equity rather than debt are modest. Another result of the study was that COVID-19 had significantly affected BIST automotive companies' profit before tax to equity, earnings before interest and taxes to equity, and earnings before interest, taxes, depreciation, and amortization to equity ratios.

Keywords: Financial Performance, Covid-19, Automotive Companies, Financial Ratio

Jel Codes: C12, L62, M40.



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Cite: Açık Taşar, S. (2023). The effects of COVID-19 pandemic on financial performance analysis of automotive companies: A study in BIST. *Akademik Yaklaşımlar Dergisi*, 14 (2), 555-575.

1. Introduction

Today, companies must make prudent financial choices in order to survive in competitive marketplaces. Finance theory equips businesses with the knowledge and tools required to make prudent financial choices. Businesses may successfully allocate money, handle risks, manage capital structures, and forecast the future by implementing these principles. This, consequently, leads to enhanced profitability and long-term growth.

Finance theory has made major advances in understanding how capital markets work and how risky real and financial assets are valued. Tools derived from finance theory, particularly discounted cash-flow analysis, are widely used. Yet finance theory has had scant impact on strategic planning (Myers, 1984:126).

In the field of finance, decision makers in companies are presumed to choose opportunities which enhance the well-being of shareholders. As applied in concrete form this rule transforms into the admonition to maximize shareholder utility. To translate that broad goal into simple, easy to apply decision rules for managers is one of the tasks of finance theory (Racette, 1979:34). Therefore, finance theory is a branch of economics that studies how people, businesses, and governments make investments. It means applying basic economic concepts and mathematical techniques to comprehend and analyze numerous elements of finance, such as corporate finance, deciding on investments and valuation of assets.

As in all other sectors, in the automotive sector, starting from the theory of finance, automotive companies should be able to turn to the choices that will provide the most return to their businesses in risky situations. Since the automotive sector makes significant contributions to the country's economy, automotive company managers should analyze risky situations correctly based on the theory of finance. According to a report published in 2020, the automotive sector accounts for 5% of the world economy and generated 4.5 trillion USD in 2019 (Statista, 2020). However, the COVID-19 pandemic also drove the OECD economies into a deep economic crisis. International trade has declined significantly. Lockdown measures in spring 2020 forced many sectors to close down or operate at a fraction of their normal capacity (Klein et al., 2020). The automotive sector was one of the industries affected by the pandemic. For example, in Central and Eastern Europe, car sales have plunged by almost 32% in the first quarters of 2020 (ACEA, 2020; Klein et al., 2020). According to the OICA report, in 2020, global sales of passenger cars decreased by 16% to 54 million units compared to 2019, while this figure increased by 5% in 2021, increasing to 56 million units compared to 2020. Likewise,

global sales of commercial cars decreased by 9% in 2020 with 25 million units compared to 2019, and increased by 6% in 2021 with 26 million units sold compared to 2020 (OICA, 2021). This downward trend experienced around the world during the pandemic in the automotive sector is felt more in developing countries. In the OICA report, the number of vehicle sales in 2020 was compared with the number of vehicle sales in 2019. According to the results obtained from the report, a 23% decrease was observed in the number of vehicle sales in 2020 in India, a developing country, while a 30% decrease was observed in the number of vehicle sales in South Africa and a 21% decrease in the number of vehicle sales in Thailand (OICA, 2021). In Turkey, the automotive industry was also affected by the pandemic. According to the Ministry of Industry and Technology of the Republic of Turkey (2021), automotive companies finished 2020 13% lower in terms of automobile production amounts and 15% lower in terms of exports.

Another main crisis that poses a risk in the automotive industry is known as a chip shortage. The global chip shortage, which began in the first quarter of 2021, has delayed production of everything from smartphones and home appliances to driver-assistance systems. Major automakers, have already announced significant production cuts, decreasing revenue expectations for 2021 (Burkacky et al., 2021). Semiconductors, often known as chips, are essential components in the production of consumer electronics such as cellphones, cameras, and computers. They are required in automobiles for everything from entertainment systems to power steering. During the peak of the semiconductor scarcity, worldwide vehicle manufacturing fell by 26% in the first nine months of 2021 (JP Morgan, 2023). Therefore, an important crisis in the automotive industry was the chip crisis.

In the study, the automotive sector of a developing country such as Turkey is discussed. Because a few medium-sized developing countries, like South Africa, Thailand, and Turkey, are large and wealthy enough to support car assembly for their internal markets, as long as they can also export to their larger regions. Local automakers have an increasing opportunity to exploit the new, relatively open global supply base to become more competitive locally and globally (Biesebroeck & Sturgeon, 2010). In this study, the financial performances of the leading companies in the automotive industry in Turkey between 2012 and 2021 were analyzed using the ratio analysis method, and it was investigated whether the COVID-19 pandemic had an effect on the financial performance of the automotive companies.

2. Literature Review

In this study, it was investigated how COVID-19, which turned into a major health crisis in the world and provided massive and global effects to sectors, affected the automotive sector

in Turkey, one of the world's 20 largest economies (IMF, 2022). In the literature summary section below, the problems and developments experienced by the automotive industry in different countries and in Turkey during the pandemic are included.

Kufelova and Rakova (2020) performed a study in order to understand whether the COVID-19 had an effect on the automotive industry in Slovakia and some selected countries or not. The authors tried to indicate that the pandemic had an impact on the decrease in car sales, which also affected the car production volumes in Slovakia, Germany, Britain, Russia, etc. with respect to the year before the COVID-19 pandemic. Some recommendations, such as tax cuts and university funding for teaching technology, were also made as potential solutions to the pandemic's negative consequences.

In a study made by Kapparashetty (2020), the impact of the COVID-19 pandemic was searched through industrial sectors in India. The study is informative on the negative results of the pandemic, such as a decrease in production due to workforce dislocation, supply chain disruption, and an increase in the unemployment rate.

Özdurak performed a study on the subject of automotive stock returns during COVID-19. In the study, the author indicated that despite the pandemic, the automotive industry continues to reverse the negative impact of the first period of the pandemic, with an increasing momentum both in sales and exports. In the study, it was found that after the tax increase, Tofaş percent shares increased by 1.63%, while Doğu Otomotiv shares decreased by 5.77%.

Hoelt conducted research on the automotive industry in 2021 by using agile methods in order to explore market opportunities during the COVID-19 crisis. According to his study, 18 semi-structured interviews with automobile industry manufacturer company managers were conducted and analyzed with the NVIVO program. In conclusion of the study, it was found that chosen companies' top management teams time allocation shifted from 10% to 60% on strategic issues in the pandemic with respect to the pre-COVID-19 period. Software development tools were also used to transform the way their businesses performed due to the pandemic.

Yalçın (2021) realized his study on the automotive sector by using panel data econometric methods during the COVID-19 pandemic. In his study, data from 22 EU countries was analyzed in order to examine the effects of the pandemic on the automotive industry. According to the results of the study, it was found that the pandemic has a negative impact on the automotive industry by reducing sales by 6.7%.

In their review study in 2021, Özçelik and Baran described the changes and effects experienced by the automotive industry during the COVID-19 process and what results these effects left in the sector after the pandemic. Automotive sector-oriented precautions during a global crisis such as a pandemic were also included in the study.

Demiraj et al. (2022) performed a study on the impact of working capital management in the automotive industry on the profitability of firms, which made a significant contribution to the GDP of the European continent before and during the COVID-19 pandemic. In the conclusion of the study, the results showed that the cash conversion cycle had a negative impact on return on assets (ROA), a positive relationship with accounts receivable (AR) days and inventory (INV) days, but a negative relationship with accounts payable (AP) days.

Kablan and Marşap (2022) made a study on the automotive industry in order to evaluate the financial performances during the COVID-19 pandemic. In the study, the authors used the COPRAS method to analyze the financial data of automotive companies in BIST between 2014 and 2020. The results of the study indicated that a greater part of the automobile companies in BIST did not follow the requirements of Industry 4.0 in their financial performances, and COVID-19 had a negative effect on the automotive companies' financial performances. Within the scope of the study, Ford was found to be the most financially successful business.

In the research article conducted by Şahin and Özkan in 2022, the financial success of the automotive sector in the COVID-19 process was measured. The study was carried out on the data of automotive companies traded in BIST between the years 2017 and 2022, and the Altman Z-Score (1968), Springate S-Score (1978), Taffler T-Score (1982), and Zmijewski X-Score (1984) methods were applied and the results were compared.

In their research papers, Zhurova and Moshkova (2022) investigated the effects of the COVID-19 pandemic on the Russian automotive industry. In the study designed on Russian automotive production and sales, the authors discussed the main problems of the industry and the effects of COVID-19 on the global and Russian automotive markets.

Çalış and Sakarya (2022) performed an automotive industry study by examining the financial performances of BIST automobile industry companies during the COVID-19 period (2020–2021) and before (2018–2019). In the study, the CRITIC-based CoCoSo method was used. The results taken from the study were that the most important criterion was the equity turnover ratio, and the least important criterion was the economic profitability ratio. Also realizing the impact of the pandemic period with respect to the pre-pandemic period, there was

no significant change noticed in the financial performance ratings of automobile companies. As a result of the analysis, Federal Mogul and Ford took the first two places in the financial performance ranking for all years.

When national and international studies on the automotive sector are examined in general, it is clear that much research has been conducted using various methods and factors. The purpose of this study is to determine how automotive sector companies dealt with the crisis during the COVID-19 pandemic period, taking into account the results before and after the pandemic, which companies managed the pandemic crisis well and increased their financial performance, and which companies experienced a financial decline. Given the pandemic's impact on research, few studies have been discovered that assess the financial performances of corporations in the automotive sector using up-to-date data. The work is expected to contribute to the literature in this regard.

3. Methodology

3.1 The Aim of the Study

The aim of the study is to analyze the financial performance of automotive sector companies traded in BIST between 2012 and 2021 and determine whether COVID-19, which affected the whole world in 2020, has an impact on the financial performance of those companies.

The leading companies that are traded in BIST have been shown in Table 1.

Table 1.

Leading Automotive Companies Traded in BIST

Name of The Company	BIST Code
ANADOLU ISUZU OTOMOTİV SANAYİ VE TİCARET A.Ş.	ASUZU
DOĞUŞ OTOMOTİV SERVİS VE TİCARET A.Ş.	DOAS
FORD OTOMOTİV SANAYİ A.Ş.	FROTO
KARSAN OTOMOTİV SANAYİ VE TİCARET A.Ş.	KARSN
OTOKAR OTOMOTİV VE SAVUNMA SANAYİ A.Ş.	OTKAR
TOFAŞ TÜRK OTOMOBİL FABRİKASI A.Ş.	TOASO

3.2 The Method of the Study

In line with the purpose of the study, liquidity ratios, financial leverage ratios, return on assets ratios, and return on equity ratios were calculated based on the data of the automotive companies traded in the BIST for the years 2012–2021 disclosed in the Public Disclosure Platform (KAP). The COVID-19 pandemic is the independent variable in the study. The dependent variables of the study are the liquidity ratios, financial leverage ratios, return on assets ratios, and return on equity ratios of automotive companies, which are shown in Table 2.

The method of the study is basic linear regression. According to the basic linear regression method, which allows to model the dependent variables and independent variables in a linear mathematical equation, the effects of the study on the COVID-19 pandemic (independent variable) and financial ratios (dependent variables) are defined by the linear function. Basic linear regression is as below:

$$p(X)=\beta_0+\beta_1X$$

X on the right side of this equation is the argument; β_1 was the coefficient of the independent variable. In other words, a one-unit change in X affected the p(x) value (the dependent variable) by β_1 (Şirin, 2016).

Table 2.
Financial Ratios Used in the Study

Financial Ratio	Formula	
Liquidity Ratios	Current Ratio= Current Assets/ Current Liability	CA/CL
	Acid-test Ratio (Quick Ratio) =(Current Assets-Inventory)/ Current Liability	(CA-I)/ CL
Financial Leverage Ratios	Total Debt/ Total Asset	TD/TA
	Total Debt/ Shareholders' Equity	TD/SHEQ
Return on Assets Ratios	Profit before tax/ Total Asset	PBT/TA
	Earnings Before Interest and Taxes/ Total Asset	EBIT/TA
	Earnings Before Interest, Taxes, Depreciation and Amortization/ Total Asset	EBITDA/TA
Return on Equity Ratios	Profit before tax/ Shareholders' Equity	PBT/SHEQ
	Earnings Before Interest and Taxes/ Shareholders' Equity	EBIT/SHEQ
	Earnings Before Interest, Taxes, Depreciation and Amortization/ Shareholders' Equity	EBITDA/SHEQ

Moreover, in order to understand whether the COVID-19 has an effect on the financial performances of BIST automotive companies and to evaluate the level of differentiation, a “paired samples test” will be used since the data is parametric. The IBM SPSS Statistics 26 program was used to analyze the data mentioned.

Analyses were made to determine whether the changes in the current ratio, acid test ratio (quick ratio), operating profits, financial leverage, and profitability ratios are significant or not. In order to test the significance level of these expected changes, the following hypotheses were formed:

H₁: The COVID-19 pandemic significantly affects liquidity ratios of automotive companies.

H₂: The COVID-19 pandemic significantly affects financial leverage ratios of automotive companies.

H₃: The COVID-19 pandemic significantly affects return on assets ratios of automotive companies.

H₄: The COVID-19 pandemic significantly affects return on equity ratios of automotive companies.

4. Data Analysis

4.1 Liquidity Ratios

In Table 3 below, the liquidity ratios of the selected automobile companies traded on BIST are shown. The pre-pandemic period represents the average of 2012–2019 results.

Table 3.

Liquidity Ratios of the Automobile Companies Used in the Study

Liquidity Ratios	Company	Pre-pandemic Average	2020	2021	Pre-pandemic/2020	2020/2021
Current Ratio CA/CL	Anadolu Isuzu	1.6309	1.1151	1.3429	-32%	20%
	Doğuş	0.9588	1.0302	1.2942	7%	26%
	Ford	1.1219	1.4105	1.5789	26%	12%
	Karsan	1.2430	1.3987	0.9008	13%	-36%
	Otokar	1.4528	1.4946	1.3885	3%	-7%
	Tofaş	1.1986	1.1802	1.1753	-2%	0%
Quick Ratio (CA-I)/ CL	Anadolu Isuzu	1.0062	0.7361	1.0428	-27%	42%
	Doğuş	0.5285	0.4141	0.9070	-22%	119%
	Ford	0.8702	1.2143	1.3254	40%	9%
	Karsan	0.9433	1.2378	0.7538	31%	-39%
	Otokar	0.9214	0.8666	0.8884	-6%	3%
	Tofaş	1.0518	1.0401	1.0024	-1%	-4%

According to Table 3, the current ratio and quick ratio of selected automotive companies traded in BIST between 2012 and 2021 were calculated. In order to make a comparison between the pandemic period and the pre-pandemic period, the average of the results between 2012 and 2019 was calculated. Next, pre-pandemic period results were compared with 2020 results. The pandemic period results (2020 results) were also compared with 2021 results in order to understand if the effects of the pandemic were recovered or not.

Due to the current ratio results of the companies in Table 3, Anadolu Isuzu experienced the most significant decrease with 32% among other companies in the pre-pandemic and 2020 comparisons. The reasons for this decline are Anadolu Isuzu's 67% increase in short term bank

loans and 116% increase in short term accounts payables in 2020 compared to the pre-pandemic average. However, when the results of “2020/2021” were analyzed, Anadolu Isuzu increased its current ratio by 20%. Another important change occurred in the current ratio results for Ford. Although its competitors in the sector decreased or slightly increased their current ratios during the pandemic period, Ford achieved the highest increase compared to its competitors with an increase of 26%. Karsan experienced one of the most striking changes after the pandemic. When the “2020/2021” results were analyzed, it was observed that Karsan's current ratio had decreased by 36%. The reason for this decrease is that Karsan's short term bank loans increased by 113% in 2021 compared to 2020.

When the quick ratio results were analyzed in Table 3, Anadolu Isuzu again experienced a 27% decrease. Because the decrease in quick ratio was less than the decrease in current ratio for Anadolu Isuzu in “pre-pandemic/2020” results, it was interpreted as the increase in inventory of 43% being less than the increase in total current assets of 66%. Since inventory is not included in the quick ratio, the decrease rate for Anadolu Isuzu in the quick ratio was less than the decrease rate in the current ratio. However, when Doğu's quick ratio results were analyzed, a decrease of 22% was observed in “pre-pandemic/2020” results, although the company had a 7% increase in current ratio results for the same period. It means that the increase in Doğu's inventory exceeded the increase in its other current assets during the “pre-pandemic/2020” results. Other companies that draw attention in their quick ratio results were Ford, with a 40% increase in “pre-pandemic/2020” results, and Karsan, with a 39% decrease in the “2020/2021” results.

4.2 Financial Leverage Ratios

The ratios are also called “debt ratios” and “debt-to-equity ratios” because they measure the companies' ability to meet their long-term (one year and longer) debt obligations (Carlson, 2022). In other words, financial leverage ratios provide financial table users with information on how much the company's total assets depend on its creditors and shareholders. In Table 4 below, the financial leverage ratios of the selected automobile companies traded in BIST are shown. The pre-pandemic period represents the average of 2012–2019 results.

Table 4.
Financial Leverage Ratios of the Automobile Companies Used in the Study

Financial Leverage Ratios	Company	Pre-pandemic Average	2020	2021	Pre-pandemic/2020	2020/2021
Debt Ratio	Anadolu Isuzu	0.5963	0.7019	0.6140	18%	-13%
TD/TA	Doğu	0.6505	0.6774	0.5527	4%	-18%

	Ford	0.6532	0.7107	0.7628	9%	7%
	Karsan	0.7745	0.7320	0.7341	-5%	0%
	Otokar	0.8166	0.7676	0.7501	-6%	-2%
	Tofaş	0.7040	0.7706	0.7553	9%	-2%
	Anadolu Isuzu	1.5694	2.3546	1.5909	50%	-32%
	Doğuş	2.1133	2.1002	1.2354	-1%	-41%
Debt to Equity Ratio TD/ SHEQ	Ford	1.9347	2.4568	3.2167	27%	31%
	Karsan	3.8851	2.7312	2.7602	-30%	1%
	Otokar	4.6834	3.3026	3.0023	-29%	-9%
	Tofaş	2.4253	3.3583	3.0870	38%	-8%

According to Table 4, the debt ratio and debt to equity ratio of Anadolu Isuzu during the “pre-pandemic/2020” period increased by 18% and 50%, respectively. It can be interpreted that either the total assets of Anadolu Isuzu depended more on its shareholders than its creditors, or this change was caused by the restriction in the money supply. When the results of Tofaş were analyzed, like those of Anadolu Isuzu, a 38% increase in debt ratios and a 9% increase in debt-to-equity ratios were observed during the “pre-pandemic/2020” process. It is possible to say that Tofaş also restructured its debts through its shareholders at the same time.

However, other noteworthy financial leverage ratios during “pre-pandemic/2020” are shown in Table 4. These are the results of Karsan and Otokar. Since Karsan and Otokar's debt-to-equity ratios decreased by 30% and 29%, respectively, and their debt ratios decreased by 5% and 6%, respectively, during the “pre-pandemic/2020” period, it can be interpreted that companies associate their assets more with creditors.

When the “2020/2021” results are analyzed, it is understood that the debt-to-equity ratios of Anadolu Isuzu and Doğuş, which decreased by 32% and 41%, decreased more than the debt-to-equity ratios, which decreased by 13% and 18%, respectively. The reason for this was that Anadolu Isuzu's equity has increased by 142% and Doğuş's equity has increased by 90% in 2021 compared to the previous year.

4.3 Return on Assets Ratios

Return on assets (ROA) is one of the most popular and useful of the financial ratios. ROA has been used in industry since 1919 with the aim of failure prediction studies and the investigation of a company's financial position, performance, and future prospects (Jewell and Mankin, 2011:81).

In Table 5 below, the return on assets ratios of the selected automobile companies traded in BIST are shown. The pre-pandemic period represents the average of 2012–2019 results.

Table 5.

Return on Assets Ratios of the Automobile Companies Used in the Study

Return on Assets Ratios	Company	Pre-pandemic Average	2020	2021	Pre-pandemic/2020	2020/ 2021
PBT/TA	Anadolu Isuzu	0.0285	0.0003	0.0563	-99%	20324%
	Doğuş	0.0738	0.1809	0.3043	145%	68%
	Ford	0.1066	0.1687	0.2030	58%	20%
	Karsan	-0.0420	0.0208	0.0143	150%	-31%
	Otokar	0.0683	0.1442	0.1510	111%	5%
	Tofaş	0.0826	0.0940	0.1496	14%	59%
EBIT/TA	Anadolu Isuzu	0.0531	0.0274	0.0762	-48%	179%
	Doğuş	0.1309	0.2303	0.3576	76%	55%
	Ford	0.1113	0.1769	0.2086	59%	18%
	Karsan	0.0057	0.0619	0.0572	989%	-8%
	Otokar	0.1059	0.1720	0.1816	62%	6%
	Tofaş	0.0887	0.0994	0.1544	12%	55%
EBITDA/ TA	Anadolu Isuzu	0.0757	0.0502	0.0913	-34%	82%
	Doğuş	0.1463	0.2487	0.3762	70%	51%
	Ford	0.1526	0.2146	0.2332	41%	9%
	Karsan	0.0331	0.0864	0.0770	161%	-11%
	Otokar	0.1359	0.1943	0.1992	43%	2%
	Tofaş	0.1392	0.1383	0.2055	-1%	49%

According to the “profit before tax/total assets” results shown in Table 5, during the “pre-pandemic/2020” period, Karsan and Doğuş experienced a 150% and 145% increase, respectively. The gross profit of Doğuş increased by 134%; however, although the gross profit of Karsan in 2020 increased by 219% with respect to the average of the pre-pandemic period, some periods of Karsan were closed with a net loss between 2012 and 2019, thus the ratio was seen as negative. It was corrected since the ratio was increased from a negative to a positive. Analyzing the “2020 to 2021” results, the incredible change in Anadolu Isuzu's PBT/TA ratio stood out. The reason for this change of 20314% was that Anadolu Isuzu's pre-tax net profit increased by 38086% in 2021. This increase was associated with a 124% increase in gross profit.

When the EBIT/TA results in Table 4 were examined, Karsan's EBIT results during the pandemic period increased by 989% compared to the average of the pre-pandemic period. This result is consistent with the PBT/TA result in the same table. While calculating the EBIT, an interest expense of 111,659 thousand TL was also added, which caused the EBIT/TA ratio to be higher than the PBT/TA ratio.

EBITDA/TA results in the same table were also evaluated. It was observed that most automotive companies in the table experienced a smaller increase compared to the increase in the EBIT/TA ratio. This was because EBIT results, which were negative between 2012 and

2019, either became positive or their negative value decreased when depreciation and amortization were added.

It has been observed that automotive companies have increased their total assets during and after the pandemic compared to pre-COVID-19, and especially the current assets within the company. Firms that want to increase their return on assets are expected to work with higher total assets. Although the asset sizes of all automotive companies increased during and after the pandemic, it was concluded that the pandemic did not have a significant effect on their companies under the H₃ hypothesis. On the other hand, it has been determined that before the pandemic, the total assets of automotive companies consisted of around 10%–20% current assets, but after the pandemic, this ratio increased to 50%–70% (Karsan 40%). As a result, it can be interpreted that automotive companies have transformed their assets into cash in less than a year, despite the risks and uncertainties brought by the pandemic.

4.4 Return on Equity Ratios

Return on equity (ROE) measures how well a company generates profits for its owners. It is defined as the business' net income relative to the value of its shareholders' equity (Henricks, 2022). In Table 6 below, the return on equity ratios of the selected automobile companies traded in BIST are shown. The pre-pandemic period represents the average of 2012–2019 results.

Table 6.
Return on Equity Ratios of the Automobile Companies Used in the Study

Return on Equity Ratios	Company	Pre-pandemic Average	2020	2021	Pre-pandemic/2020	2020/2021
PBT/ SHEQ	Anadolu Isuzu	0.0298	0.0009	0.1459	-97%	15675%
	Doğuş	0.1987	0.5609	0.6803	182%	21%
	Ford	0.3165	0.5832	0.8560	84%	47%
	Karsan	-0.2044	0.0777	0.0539	138%	-31%
	Otokar	0.3614	0.6206	0.6044	72%	-3%
	Tofaş	0.2800	0.4097	0.6115	46%	49%
EBIT/ SHEQ	Anadolu Isuzu	0.0958	0.0918	0.1975	-4%	115%
	Doğuş	0.3950	0.7140	0.7993	81%	12%
	Ford	0.3302	0.6116	0.8795	85%	44%
	Karsan	0.0297	0.2310	0.2151	679%	-7%
	Otokar	0.5788	0.7401	0.7268	28%	-2%
	Tofaş	0.3008	0.4330	0.6310	44%	46%
EBITDA/ SHEQ	Anadolu Isuzu	0.1546	0.1682	0.2364	9%	41%
	Doğuş	0.4450	0.7710	0.8410	73%	9%
	Ford	0.4529	0.7417	0.9834	64%	33%
	Karsan	0.1605	0.3224	0.2895	101%	-10%
	Otokar	0.7489	0.8361	0.7971	12%	-5%
	Tofaş	0.4717	0.6028	0.8398	28%	39%

According to Table 6, the most noteworthy changes in PBT/SHEQ results in the “pre-pandemic/2020” period were at Anadolu Isuzu (97% decrease) and Doğuş (182% increase). The positive change in Doğuş can be explained by the fact that while the average profit before tax was 244 million TL in 2012–2019, it increased to 1288 million TL in 2020. Moreover, the negative change at Anadolu Isuzu can be explained by the fact that while the average profit before tax was 5838 thousand TL in 2012–2019, it decreased to 532 thousand TL in 2020. In the “2020 to 2021” changes, the company that experienced an extraordinary change was Anadolu Isuzu. Despite the 97% decrease experienced during the pandemic process, the 15675% increase after the pandemic was extremely remarkable. This incredible ratio was parallel to the PBT/TA ratio of Anadolu Isuzu. Since the profit before tax was 203 million TL in 2021, it created this remarkable ratio.

The most striking change from the EBIT/SHEQ results in Table 6 was the 679% increase that Karsan experienced during the pandemic period compared to the pre-pandemic average results. However, it experienced a 7% decrease in 2021 compared to 2020. The reason for this is that the company's average EBIT was 26 million TL before the pandemic, while it was 168 million TL in 2020 and 214 million TL in 2021. Although the company's EBIT results in 2021 showed an increase of 27% compared to the previous year, the SHEQ change of the same year caused a decrease in the ration as there was an increase of 36%.

The EBITDA to SHEQ result of Karsan was also remarkable among the companies examined in the “pre-pandemic/2020” period. The reason, again, was in parallel with the results of EBITDA to TA. Ford, Doğuş and Tofaş companies, on the other hand, experienced an increase in both EBIT to SHEQ and EBITDA to SHEQ results in the years examined.

The fact that the ratio of equity to total liabilities is higher than that of debts and has an effect on the return on equity means that automotive companies should work with high capital. For this reason, a high ratio indicates that businesses operate more on equity. Accordingly, it will be concluded that the financial risks of companies working with equity rather than debts will be low. Considering this result, while before the pandemic, Anadolu Isuzu and Ford companies' ratio of equity to liabilities was more than 50%, this ratio decreased to 20%–30% in all companies with the pandemic. In 2021, Doğuş and Anadolu Isuzu increased the share of equity in liabilities to 40%–45%, while the ratio of other automotive companies remained around 20%–30%. Based on this, it can be said that the financial risk of Doğuş and Isuzu is lower than that of other automotive companies.

4.5 Normality Test

A normality test was also performed in the study in order to understand whether or not the study's data were normally distributed. The normality test on the financial ratios for the pre-pandemic period, during the pandemic, and after the pandemic was done using the Shapiro-Wilk test tool with a significance level of 5% (0.05). If the value of sig. is greater than 0.05, the data is normally distributed, while a value of sig. less than 0.05 means that the data is not normally distributed (Rahmah & Novianty, 2021:218).

Also, a kurtosis value between +1.0 and -1.0 is considered excellent for most psychometric purposes, but a value between +2.0 and -2.0 is in many cases also acceptable, depending on the particular application (George and Mallery, 2012). In Table 7, the normality test results were shown.

Table 7.
Normality Test Results of the Study

	Shapiro-Wilk		
	Statistic	df	Sig.
Liquidity Ratios	0.921	6	0.576
Financial Leverage Ratios	0.876	6	0.346
Return on Assets Ratios	0.912	6	0.507
Return on Equity Ratios	0.877	6	0.332

According to the results obtained in Table 7, since $p > 0.05$ in all results except debt ratio 2021, it was understood that the results were parametric. The skewness value for the debt ratio in 2021 was -1.1 and 0.8, and the kurtosis value was -0.7 and 1.7. Since these values were between the +2.0 and -2.0 values accepted as the threshold value for normality by George and Mallery, it was understood that this ratio was also normally distributed and parametric tests should be applied.

4.6 Paired Samples Test

In the study, the paired samples test, which is one of the parametric tests, was also applied in order to analyze whether COVID-19 had an effect on the financial performances of automotive companies. In Table 8, the results were shown.

Table 8.
Paired Samples Test Results of the Study

		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Current Ratio Prepandemic – Current Ratio 2020	-0.004	0.276	0.113	-0.034	5	0.974
Pair 2	Current Ratio 2020 – Current Ratio 2021	-0.009	0.286	0.117	-0.073	5	0.944

Pair 3	Quick Ratio Prepandemic – Quick Ratio 2020	-0.031	0.240	0.098	-0.319	5	0.763
Pair 4	Quick Ratio 2020 – Quick Ratio 2021	-0.068	0.334	0.136	-0.502	5	0.637
Pair 5	Debt Ratio Prepandemic – Debt Ratio 2020	-0.028	0.062	0.025	-1.085	5	0.327
Pair 6	Debt Ratio 2020 – Debt Ratio 2021	0.032	0.064	0.026	1.221	5	0.277
Pair 7	Debt to Equity Prepandemic – Debt to Equity 2020	0.051	0.998	0.408	0.126	5	0.905
Pair 8	Debt to Equity 2020 – Debt to Equity 2021	0.235	0.590	0.241	0.976	5	0.374
Pair 9	Pbt/ TA Prepandemic – Pbt/TA 2020	-0.049	0.049	0.020	-2.443	5	0.058
Pair 10	Pbt/TA 2020 – Pbt/TA 2021	-0.045	0.046	0.019	-2.390	5	0.062
Pair 11	EBIT/TA Prepandemic – EBIT/TA 2020	-0.045	0.045	0.018	-2.470	5	0.057
Pair 12	EBIT/TA 2020 – EBIT/TA 2021	-0.045	0.046	0.019	-2.353	5	0.065
Pair 13	EBITDA/TA Prepandemic – EBITDA/TA 2020	-0.042	0.047	0.019	-2.189	5	0.080
Pair 14	EBITDA/TA 2020 – EBITDA/TA 2021	-0.042	0.050	0.020	-2.040	5	0.097
Pair 15	Pbt/SHEQ Prepandemic – Pbt/SHEQ 2020	-0.212	0.140	0.057	-3.716	5	0.014*
Pair 16	Pbt/SHEQ 2020 – Pbt/SHEQ 2021	-0.117	0.118	0.048	-2.415	5	0.060
Pair 17	EBIT/SHEQ Prepandemic – EBIT/SHEQ 2020	-0.182	0.115	0.047	-3.862	5	0.012*
Pair 18	EBIT/SHEQ 2020 – EBIT/SHEQ 2021	-0.105	0.113	0.046	-2.262	5	0.073
Pair 19	EBITDA/SHEQ Prepandemic – EBITDA/SHEQ 2020	-0.168	0.119	0.049	-3.448	5	0.018*
Pair 20	EBITDA/SHEQ 2020 – EBITDA/SHEQ 2021	-0.091	0.124	0.051	-1.790	5	0.133

*p<0.05

When Table 8 was examined, except for 3 of the 20 pairs, the rest of the sig. values were found to be greater than 0.05. This means that no significant relationship was found for 17 pairs. Based on this, H₁, H₂ and H₃ in Table 9 created in the study were rejected. The table also indicated the accepted hypothesis, which was H₄. Since the sig. values were below 0.05 in the profit before tax to equity, earnings before interest and taxes to equity, and earnings before interest, taxes, depreciation, and amortization to equity ratios, these hypotheses were accepted.

Although there was a significant difference in the comparison of the ROER hypotheses before and during the pandemic, no significant difference was found in the comparison of the same ratios in 2020 and 2021. In addition, another result obtained in the study was that no significant difference was detected in all ratio comparisons made between 2020 and 2021.

Table 9 shows the status of the hypotheses of the study.

Table 9.
Status of the Hypotheses

Hypotheses	Status
H₁ : The COVID-19 pandemic significantly affects liquidity ratios of automotive companies traded in the BIST.	Reject
H₂ : The COVID-19 pandemic significantly affects financial leverage ratios of automotive companies traded in the BIST.	Reject
H₃ : The COVID-19 pandemic significantly affects return on assets ratios of automotive companies traded in the BIST.	Reject
H₄ : The COVID-19 pandemic significantly affects return on equity ratios of automotive companies traded in the BIST.	Accept

5. Conclusion and Recommendations

In the study, the liquidity and financial leverage variables of the automotive sector companies in the BIST before and during the COVID-19 pandemic and the change in return on assets and return on equity ratios showing the financial performance of the company were measured. The aim of this study was to discover whether the financial performances of the leading companies in the automotive industry traded on BIST in Turkey were affected by the pandemic process or not. For this purpose, the liquidity ratios, financial leverage ratios, return on assets ratios, and return on equity ratios of six important automotive companies traded in BIST between 2012 and 2021 were calculated and analyzed in the study. In addition, the pre-pandemic and post-pandemic values of all calculated ratios were tested with the paired samples test, and the effect of COVID-19 was investigated. The study's method is basic linear regression. The the effects of the study on the COVID-19 pandemic (independent variable) and financial ratios (dependent variables) are defined by the linear function.

According to the results obtained in the study, Anadolu Isuzu, and Karsan were the companies whose financial ratios changed the most when the pre-pandemic (2012-2019 average) and 2020 were compared.

Anadolu Isuzu's pre-pandemic liquidity ratios decreased more than those of the other companies examined compared to 2020. On the other hand, it was observed that the financial leverage ratios of the mentioned company also increased during the same period. According to this result, it can be said that the company borrowed more than the average of the years before the pandemic, and the risk of having difficulties paying its loans increased. Compared to other companies, the company's return on assets and return on equity ratios decreased more in the pre-pandemic and 2020 comparisons. These ratios give investors an idea of how effective the

company is at converting the money they need to invest into net income for the company. The higher the return on assets ratio, the more money the company makes with less investment. In addition, a constantly rising return on equity value indicates that the company is able to generate more profit with less equity in each period. The fact that these values of the company were decreasing can be interpreted negatively. On the other hand, Anadolu Isuzu made a positive impression on its investors with its financial performance after the pandemic by correcting all the ratios mentioned in the 2020–2021 comparison.

Karsan, on the other hand, was one of the companies that achieved the best results in pre-pandemic and pandemic comparisons. A noticeable increase was observed in the return on assets and return on equity ratios of the company compared to the pre-pandemic average. In the 2020–2021 comparison, although the company's net profit increased, a larger increase was observed in total assets and equity, which reflected a decrease in the return on assets and the return on equity ratios.

If the results in other companies were to be summarized, Ford can be defined as one of the most successful companies by achieving positive values in all ratios both in the pre-pandemic and 2020 comparison and in the 2020 and 2021 comparison. Tofaş experienced a decrease in liquidity ratios in both comparisons, but it achieved positive results in other ratios. Although Doğuş had negative results in the quick ratio of the pre-pandemic and 2020 comparison, it achieved positive results in other ratios in both the “pre-pandemic/2020” and “2020/2021” comparisons. Finally, Otokar also achieved negative results in liquidity ratios in both comparisons and return on equity ratios in the “2020/2021” comparison, while all other ratios were positive.

It has been found that automobile companies grew their total assets during and after the pandemic, particularly their present assets within the company, compared to pre-COVID-19 levels. Firms that aim to boost their return on assets should work with more total assets. Although the asset sizes of all automobile companies expanded during and after the epidemic, the H₃ hypothesis indicated that the pandemic had no meaningful influence on their companies. On the other hand, it has been discovered that prior to the pandemic, automotive companies' total assets comprised of 10%-20% current assets, but after the epidemic, this ratio climbed to 50%-70% (Karsan 40%). As a result, despite the risks and unpredictability posed by the pandemic, it can be concluded that automobile companies converted their assets into cash in less than a year.

Since the equity-to-total-liabilities ratio is higher than the debt-to-total-liabilities ratio and has an effect on the return on equity, automotive companies should invest significantly. Accordingly, a high ratio shows that companies rely heavily on equity. As a result, it will be determined that the financial risks of companies operating on equity rather than debt are modest. Taking this into account, although Anadolu Isuzu and Ford had equity-to-liabilities ratios of more above 50% prior to the epidemic, this ratio dropped to 20%-30% in all companies affected by the pandemic. Doğuş and Anadolu Isuzu improved their equity-to-liabilities ratio to 40%-45% in 2021, while the ratio of other automobile companies remained around 20%-30%. According to this, Doğuş and Anadolu Isuzu's financial risks are less than that of other automotive companies.

In the study, the paired samples test, which is one of the parametric tests, was also applied in order to analyze whether COVID-19 had an effect on the financial performances of automotive companies. Four main hypotheses and ten sub-hypotheses were formed in the study. One main hypothesis and its three sub-hypotheses were accepted and three main hypotheses and their seven sub-hypotheses were rejected. Accepted hypotheses were that the COVID-19 pandemic significantly affects profit before tax to shareholders' equity ratios, earnings before interest and taxes to shareholders' equity ratios, and earnings before interest, taxes, depreciation, and amortization to shareholders' equity ratios of automotive companies traded in the BIST.

According to the results obtained in the study, automotive companies need to increase their total assets in order to increase their asset profitability. When the results of 2021 are compared with the results of 2020, Anadolu Isuzu and Ford were the automotive companies that increased their asset profitability the most, with a total asset increase of 87% and 76%, respectively, while this rate was 37%–38% in other automotive companies. Tofaş, on the other hand, has a lesser increase in asset profitability compared to other companies with its 21% increase in assets. Automotive companies are expected to make more long-term investments in order to be able to produce more, as well as accelerate cash flow by forming the majority of their total assets from current assets during and after the pandemic. In addition, it is recommended that automotive companies increase the share of equity in their capital structure in order to bear lower financial risk and lower debt costs.

As a result, the effects of COVID-19, which is a global health crisis, on the automotive sector were expressed in the study. These results were obtained in parallel with the studies of Çalış and Sakarya (2022) and Kablan and Marşab (2022). It was thought that by providing

comparison and analysis of the financial results of the automotive companies traded in the BIST in the last ten years, it will be a source for both automotive companies and academicians and will guide similar studies. However, the limitation of the study is that it was carried out on the automotive sector in Turkey, and future studies in different sectors in Turkey, in the automotive sector, or in different sectors in the world will make a significant contribution to the literature.

Peer-review: Externally peer-reviewed.

Conflicts of Interest: There is no potential conflict of interest in the study.

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