



Effects of Changes in Financial Ratios of Companies on the Performance of Stock Prices in the Exchange Market: The Automotive Sector

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Abstract

By examining the relationship between financial ratios of companies and stock prices, this study investigates whether changes in the financial ratios of companies affect stock prices. Twelve financial ratios were used as independent variables and stock price was used as the dependent variable. The study was conducted via panel data analysis method with data from seven automotive companies traded in Borsa İstanbul (BIST) and six automotive companies traded in stock markets of Germany, the USA, and Sweden for the period of 2007Q1-2018Q4. For automotive companies traded in BIST, stock price is affected by liquidity ratios, financial structure ratios, and activity ratios but there is no statistically significant relationship between stock price and profitability ratios. On the other hand, for the automotive companies traded in stock exchanges in other countries, stock price is seen to be affected by liquidity ratios, financial structure ratios, activity ratios, and profitability ratios.

Keywords: Finance, Financial Ratio, Stock Price, Panel Data, Automotive Sector



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Effects of Changes in Financial Ratios of Companies on the Performance of Stock Prices in the Exchange Market: The Automotive Sector*

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I. Introduction

The circulation of capital in the world is associated with both desire for earnings and risk aversion or, in other words, the return-risk dilemma. Faced with this dilemma, investors need current information about the structure of the market in which they are investing and the formation of stock prices to evaluate their excess funds and savings, as well as to perceive positive or negative signals in that market. Prediction of the returns of stocks is an attractive topic for those who want to make a profit or at least preserve existing savings and for all investors who seek the most return with the least risk of loss.

Individual or institutional investors naturally want to evaluate their investments in a way that will allow them to obtain maximum return without any losses. Although the main purpose of investing in capital markets is to make a profit as a result of the transactions, it is preferable to have the amount invested in a given capital market instrument remain unchanged rather than being partially or completely lost. In other words, investors must also consider this “lesser of two evils” while weighing risks. Investors need to decide which stock to buy or sell and the timing of these transactions in efforts to invest in stocks with the highest returns and no losses. If the wrong decision is made in any of these cases, investors may see lower levels of profit than targeted or even the loss of their invested funds. For this reason, investors need foresight or predictions about the future returns of stocks in order to decide which stocks to invest in or to make appropriate decisions about the timing of buying or selling stocks.

Investors accordingly undertake some research and analysis before investing in stocks to keep the risk of loss at a minimum. Fundamental analysis and technical analysis are two types of analysis frequently used in financial markets to guide investors’ decisions. The current study explores whether changes over time in 12 financial ratios used in making investment decisions, selected from ratios utilized in the fundamental analysis of financial statements, affect the stock prices of companies

in the automotive sector. Changes in the ratios obtained from the financial statements of six automotive companies traded in various stock exchanges in other countries (Germany, USA, Sweden) and seven automotive companies traded in Turkey (BIST: Borsa Istanbul A.Ş.) are evaluated to identify the presence of any effects on prices.

II. Theoretical Framework

When we look at the studies in the literature on the price movements of stocks, the earliest studies considered whether there is any underlying system to the formation of price movements, such as the work undertaken by Kendall and Hill Kendall and Hill (1953). Much of the early literature on market efficiency tested whether price changes can be predicted using past returns. Empirical studies were later carried out on interest rates and dividend yields, and estimates were expanded to include other variables such as book value/market value ratio (BV/MV) and price/earnings ratio (P/E) (Lewellen, 2004).

Kothari et al. (1995) reconsidered whether beta (β) explains portfolio returns, showing that β is reflected in returns in the annual period as a result of their studies conducted with data from after 1926 and after 1940 obtained from Compustat. They noted, however, that this does not mean that it alone can explain all variations of expected returns, as in capital asset pricing models. They also underlined that there is no significant relationship between BV/MV and return, claiming that the size effect is explanatory. Kothari and Shanken (1997) subsequently investigated the power of the BV/MV ratio to predict expected return in a study covering the periods of 1926-1991 and 1941-1991 and concluded that power to be insufficient.

Khadafi et al. (2014) analyzed the annual financial data of 12 automotive companies traded in the Indonesian Stock Exchange between 2008 and 2012 and investigated the effects of financial ratios on business performance. They found that return on assets (ROA), return on equity (ROE), and net profit margin had positive significant effects on the profit growth of automotive companies while the debt/equity ratio and current ratio had significant negative effects on the corporate earnings growth of these companies.

Pal (2015) aimed to reduce the number of ratios used to reflect the real financial situation of the Indian automobile industry and find individual variables affecting the profitability of that industry, which has developed in recent years but has faced various obstacles due to financial difficulties in the domestic market. He began working with 36 financial ratios for the period of 1999-2014 and reduced that number to 13, finding that total working capital/total assets, inventory turnover, and

* This study has been produced from the doctoral thesis prepared by the first author under the supervision of the second author.

dividend payout ratios have significant impacts on the profitability of the Indian automobile industry.

Lebo et al. (2017) analyzed 2007-2016 data of 12 automotive companies traded in the IDX Indonesian Stock Exchange with a panel data random effect regression model. They concluded that there is a positive relationship between BV/MV, which they choose to represent stock value and ROA, but they could not demonstrate a statistically significant relationship between the current ratio or leverage ratio and BV/MV.

Yuniningsih et al. (2018) studied the corporate financial performances of automotive companies in the Indonesian Stock Exchange for the period of 2012-2016 considering ROA as the dependent variable together with independent variables of leverage ratio, firm size, and firm growth. They revealed that leverage ratio and firm size did not have a significant effect on business performance, but firm growth had a significant negative effect on ROA. They also emphasized that as a company grows, the funds obtained from debt or equity may be used to finance investment expansion, which reduces the company's profitability.

III. Automotive Sector

The automotive sector has a very important position in terms of development with its effects on social improvements as well as economic developments, increasing employment rates and exports through its contact with other sectors both in Turkey and around the world. This sector is in a constant process of change, development, and even transformation, being constantly renewed according to the demands of consumers and the integration of developing technology. At the same time, this sector is currently fragile, rapidly affected by economic cycles due to its connections with other sectors in the production phase and its direct role in consumption-related harms. The automotive sector has been selected for this study for those reasons, considering the relevant field of influence and the impact of the sector, allowing discussion of both the sector's sensitivity to economic cycles and the sensitivity of economic cycles to the sector. Although the total number of motor vehicles sold in the world was 97.1 million in 2017, it decreased by 4.5 percent in the following two years to 91.3 million in 2019 (OICA, 2020). In spite of these recent contractions under the general influence of the world economy, the automotive sector continues to pursue Research & Development (R&D) for new technology, equipment, and designs. It is one of the most important sectors dominating the world economy and reflecting increases in production volume and turnover in the real economy. It also has direct effects on human life in the fields of production and consumption. For these reasons, the automotive sector is a valuable field of study to be pursued in both the present work and future research.

IV. Methodology

Purpose of the Research

The aim of this study is to determine whether changes in the financial statements of companies affect the prices of stocks traded in the stock exchange and, if so, to what extent. This research is specifically conducted based on data from the automotive sector, which has a critical

position in the Turkish economy as well as the global economy due to both consumer demand and connections with other sectors.

Scope of the Research

This study includes automotive companies traded in the stock exchanges of Turkey and other countries within the scope of its analysis. Seven automotive companies traded in the BIST are included in the analysis and subsequently referred to as "Companies traded in Turkey": Anadolu Isuzu Otomotiv Sanayi ve Ticaret A.Ş. (ASUZU), Doğu Otomotiv ve Servis Ticaret A.Ş. (DOAS), Ford Otomotiv Sanayi A.Ş. (FROTO), Karsan Otomotiv Sanayii ve Ticaret A.Ş. (KARSN), Otokar Otomotiv ve Savunma Sanayi A.Ş. (OTKAR), Tofaş Türk Otomobil Fabrikası A.Ş. (TOASO), and Türk Traktör ve Ziraat Makineleri A.Ş. (TTRAK).

Six automotive companies traded in other countries' stock exchanges were also included in the analysis as follows: Daimler AG (DAI), Bayerische Motoren Werke AG (BMW), Volkswagen (VW) from the Deutsche Börse Xetra, and Caterpillar (CAT) from the US New York Stock Exchange and Volvo Group (Volva) and Saab (SAAB B) from the Nasdaq Stockholm AB. These companies are subsequently referred to as "companies traded in other countries' stock exchanges" in this text. Far Eastern companies were not included in the analysis due to differences in the start of fiscal years. Thus, in total, 13 automotive companies traded in the stock exchanges of Turkey and other countries were included in the scope of this research.

In the analysis phase, a common starting period was determined to ensure that the comparisons of the automotive companies traded in stock exchanges of Turkey and other countries would temporally overlap. It was decided to take the starting period as 2007-Q1 for both groups. Although the end of the period of study was originally taken as 2017-Q4 for both groups, it was first extended to 2018-Q3 and then to 2018-Q4 in the course of the research. At the end, for both groups, 48 quarterly datasets between 2007-Q1 and 2018-Q4 were assessed at both sector-level and company-level.

Research Model

Twelve financial ratios (current ratio, liquidity ratio, cash ratio, leverage ratio, debt turnover, maturity structure of liabilities, net profit margin, return on equity, return on assets, average collection time of receivables, average sales period of stocks, and asset turnover) were selected for analysis and considered within the four main categories of liquidity ratios, activity ratios, profitability ratios, and financial structure ratios. The research model was established with stock price as the dependent variable potentially affected by the independent variables of the 12 aforementioned financial ratios.

Data Collection Technique

The data of automotive companies traded in the BIST in Turkey were obtained via a letter from the Borsa Istanbul Marketing and Sales Directorate (datastore.borsaistanbul.com). Data on balance sheets, income statements, and end-of-day price information for the years between 2004-Q2 and 2009-Q3 were obtained in

that way. Data for the periods after 2009-Q3 were available online at www.kap.org.tr. In addition, online data from these companies and various securities brokerage houses were obtained, particularly by reviewing the “investor relations” sections of company websites.

Data for the companies traded in the stock exchanges of other countries were obtained from relevant stock exchange websites. Data on balance sheets, income statements, and end-of-day price information announced by the companies were also obtained from the “investor relations” sections of their websites. The websites of various securities brokerage houses were also reviewed.

Research Methodology

Panel data analysis, used in the present work, is an analysis method selected when the data to be analyzed have both horizontal and vertical dimensions. In other words, the data are both space- and time-dimensional (Kutlar, 2017). Panel data regression models are increasingly used by researchers in many fields particularly due to the increasing availability of panel data in the social sciences, combining features of both time series and cross-section data (Gujarati, 2004).

The general formula established for models in panel data studies is as follows: $Y_{it} = \alpha_{it} + \beta_1 X_{it} + u_{it}$. Here Y represents the dependent variable, α is a constant, β is the slope parameter, X is the independent variable, u is an error component term, i represents the cross-section dimension (individuals, countries, firms, households, etc.), and t represents the time dimension (year, month, period, etc.). The error component term can be defined in more detail as follows: $u_{it} = \mu_i + \lambda_t + \varepsilon_{it}$. Here, u is the error component term, μ is the unobservable individual effect, λ is the unobservable time effect, i represents individuals, t represents time, and ε represents the error.

Analysis

In preparation for the analysis, items from accounting records related to the 12 ratios listed above were extracted from balance sheets and income statements, and Excel tables were created with calculations of the quarterly ratios for each company. For the calculation of the dependent P variable, or price, the end-of-day closing price data of these companies were calculated as average prices corresponding to each quarter by taking the monthly averages and then determining the quarterly averages.

The Excel spreadsheets obtained in this way were analyzed using the Gauss and Stata computer programmes. Analysis stages were followed in the same way in the same order for all considered companies, both those traded in the BIST and those traded in the stock exchanges of other countries.

Cross-Section Dependence and Unit Root Tests

Cross-section dependence signifies the correlation between calculated error terms for each unit of a panel data model (Tatoğlu, 2018). First-generation panel unit root and stationarity tests are generally based on the assumption that cross-section units are independent or at least not cross-sectionally correlated with each other, but

in most empirical applications this assumption is incorrect. Therefore, it has become imperative to develop new tests that take into account the possibility of cross-section dependence in a series (Hadri and Kurozumi, 2012). Second-generation unit root tests (Pesaran, 2007; Hadri and Kurozumi, 2012) were accordingly applied in this work.

In both data panels, the time dimension is $T > 10$. To test whether a unit root was present in the datasets, the CIPS tests (H_0 : series contain unit roots) developed by Pesaran (2007) and the Z_A^{SPC} and Z_A^{LA} tests (H_0 : series do not contain unit roots) developed by Hadri and Kurozumi (2012) were used. The probability reference values for these tests are shown in Table 1.

Table 1: Probability Reference Values (p) for Unit Root Tests

(p) Probability Reference Values			
	T = 48, N = 7, CIPS tests		Z_A^{SPC} and Z_A^{LA} tests
	Intercept	Intercept + trend	
1 per cent	-2.55	-3.06	2.58
5 per cent	-2.33	-2.84	1.96
10 per cent	-2.21	-2.73	1.645

Source: (Hadri and Kurozumi, 2012; H. M. Pesaran, 2007)

Cross-section dependence was tested using the bias-adjusted LM(LM_AD) test (H_0 : no cross-section dependence) as suggested by (H. Pesaran, Ullah, and Yamagata, 2008) as cross-section dependence between series may lead to over-rejection of unit root tests. Since the test results obtained via the Gauss programme revealed cross-section dependence in all series for the companies traded in Turkey, second-generation unit root tests were applied to test whether the series were stationary as these tests allow for cross-section dependence, unlike first-generation unit root tests.

Cross-section dependence was seen in all of the series and the CIPS and Hadri-Kurozumi tests showed different levels of integration as a result of the unit root tests conducted for the companies traded in Turkey as seen in Table 2 below.

Table 2: Cross-Section Dependence and Panel Unit Root Test Results for Companies Traded in Turkey

	CIPS intercept	CIPS intercept + trend	Z_A^{SPC} intercept	Z_A^{LA} intercept	Z_A^{SPC} intercept + trend	Z_A^{LA} intercept + trend	LM_AD intercept	LM_AD intercept + trend
P	-2.530	-2.2073	-1.663	-0.415	-0.410	-0.524	125.269***	113.797***
CUR	-2.1298	-2.7183	0.361	1.133	0.915	0.969	140.872***	137.63***
LQR	-1.4345	-1.9784	-0.43	0.734	0.133	1.608	113.729***	109.165***
CAR	-2.2722	-2.4221	0.147	-0.009	1.108	-0.675	120.635***	119.189***
LVR	-2.722***	-2.5773	-1.189	-1.163	0.591	1.044	140.872***	128.536***
DTO	-3.1974***	-3.6397***	2.034	2.79***	1.117	1.107	140.872***	137.63***
MSL	-3.2255***	-3.9507***	-0.969	-0.931	-0.85	-1.131	131.917***	130.117***
NPM	-3.3323***	-3.7268***	1.499	0.653	-0.015	-0.756	140.872***	137.63***
ROE	-3.5727***	-3.6855***	0.713	0.098	2.774***	0.57	140.872***	118.887***
ROA	-3.332***	-3.5361***	0.166	0.121	5.872***	2.124	140.872***	113.908***
ACR	-2.7702***	-3.3891***	5.92***	8.243***	4.549***	4.599***	140.872***	121.297***
ASI	-3.2538***	-3.4475***	0.639	0.739	2.299**	2.627***	140.872***	137.63***
ATR	-1.6871	-2.4833	1.211	1.97**	1.285	1.444	140.872***	137.63***

Source: Stata Software Output

Bias-Adjusted LM(LM_AD) test: H_0 : no cross-section dependence; p-values: 0.01 (***), 0.05 (**), 0.10 (*). There is cross-section dependence.
 CIPS Test (Unit Root Test): H_0 : series contain unit roots (series are not stationary) (Pesaran, 2007).
 Hadri-Kurozumi Test (Unit Root Test): H_0 : series do not contain unit roots (series are stationary); p-values: 2.58 (***), 1.96 (**), 1.645 (*).
 *: Statistics are significant at the 10 per cent level of significance.
 **: Statistics are significant at the 5 per cent level of significance.
 ***: Statistics are significant at the 1 per cent level of significance.

In the data panel established for companies traded in other countries' stock exchanges, CIPS tests (H_0 : series contain unit roots) were applied as developed by Pesaran (2007) and Z_A^{SPC} and Z_A^{LA} tests (H_0 : series do not contain unit roots) were applied as developed by Hadri and Kurozumi (2012) to determine the presence or absence of unit roots. The p-values used in these tests corresponded to the same reference values as given in Table 1, since the number and periods of the companies traded in Turkey and those of the companies traded in other countries' stock exchanges were within the same ranges.

Considering the possibility of cross-section dependence between series, cross-section dependence was tested using the bias-adjusted LM(LM_AD) test (H_0 : no cross-section dependence) as proposed by Pesaran et al. (2008). These test results, again obtained via the Gauss programme, showed the existence of cross-section dependence in all series for companies traded in other countries' stock exchanges. Therefore, second-generation unit root tests were used to determine whether the series were stationary. After the confirmation of cross-section dependence in all of the series as a result of unit root tests, CIPS and Hadri-Kurozumi tests showed different levels of integration as seen in Table 3.

Table 3: Cross-Section Dependence and Panel Unit Root Test Results for Companies Traded in Other Countries' Stock Exchanges

	CIPS intercept	CIPS intercept + trend	Z_A^{SPC} intercept	Z_A^{LA} intercept	Z_A^{SPC} intercept + trend	Z_A^{LA} intercept + trend	LM_AD intercept	LM_AD intercept + trend
P	-2.1386	-2.1712	-1.451	-0.768	-1.157	-0.126	105.42***	104.776***
CUR	-2.3705***	-3.1323***	0.635	4.03***	1.229	1.02	85.647***	116.319***
LQR	-2.6031***	-3.1633***	0.557	5.812***	0.088	0.293	98.088***	94.165***
CAR	-2.5990***	-3.6067***	1.539	2.617***	-0.735	0.129	91.993***	88.244***
LVR	-4.0007***	-4.6048***	4.045***	4.834***	1.603	2.504**	113.475***	110.329***
DTO	-3.2703***	-3.7155***	1.409	4.504***	0.086	0.909	113.378***	107.235***
MSL	-2.3534	-3.2840***	0.910	4.314***	-0.473	-0.446	112.557***	105.337***
NPM	-2.3895	-2.7550	-0.165	-0.486	-0.696	-1.152	110.162***	108.929***
ROE	-2.9605***	-3.2567***	1.414	1.509	0.666	0.386	119.059***	116.319***
ROA	-2.8774***	-3.2729***	1.292	1.219	-0.13	-0.352	119.059***	116.319***
ACR	-3.511***	-4.6694***	5.564***	5.868***	1.331	1.363	119.059***	116.319***
ASI	-2.9554***	-3.3439***	4.872***	2.292**	1.662*	0.816	119.059***	116.319***
ATR	-2.0628	-3.0017	0.671	0.176	-0.719	-0.972	84.794***	85.048***

Source: Stata Software Output

Bias-Adjusted LM(LM_AD) test H_0 : no cross-section dependence; p-values: 0.01 (***), 0.05 (**), 0.10 (*). There is cross-section dependence.
 CIPS Test (Unit Root Test): H_0 : series contain unit roots (series are not stationary) (Pesaran, 2007).
 Hadri-Kurozumi Test (Unit Root Test): H_0 : series do not contain unit roots (series are stationary); p-values: 2.58 (***), 1.96 (**), 1.645 (*).
 *: Statistics are significant at the 10 per cent level of significance.
 **: Statistics are significant at the 5 per cent level of significance.
 ***: Statistics are significant at the 1 per cent level of significance.

Cointegration Tests

In analyses involving time series, cointegration tests are used to show whether the series move together in the long run. Cointegration tests analyze the correlations between series and they have been developed to allow for simultaneous consideration of stationary and non-stationary series (Westerglund, 2008).

Cointegration tests were conducted to investigate the presence of a correlation between stationary and non-stationary series, i.e., the series without and with unit roots. When series had different levels of integration [I(0)~I(1) or I(1)~I(0)], the Durbin-Hausman panel test (DH_p) (H_0 : no cointegration in the panel) developed by Westerglund (2008) was used to determine the presence of cointegration. This test takes into account the cross-section dependence of residuals. Therefore, the cross-section dependence test (LM_AD for residual cointegration) (H_0 : no cross-section dependence for cointegration) was carried out for residuals. Via the Gauss programme, results for (DH_p) and (DH_g) with the LM_AD test for residuals were obtained as shown in Table 4. According to these results, the hypothesis of " H_0 : no cointegration cross-section dependence for residuals" was rejected ($p=0.00$, <0.05). Second-generation cointegration tests considering cross-section dependence were then applied. Since $p=0.450$, <1.645 , in the (DH_p)

panel cointegration test, the hypothesis of “ H_0 : no cointegration in the whole panel” was rejected.

In the second stage of Durbin-Hausman testing, the Durbin-Hausman group cointegration test (DH_g) was performed for the groups, and since $p=0.838, <1.645$, the hypothesis of “ H_0 : no cointegration for all units” was rejected and the alternative hypothesis of cointegration for some units was accepted.

Table 4: Cointegration Test Results for Companies Traded in Turkey

Tests	Test Statistic	Probability Value	Reference p-Value
Durbin-Hausman panel (DH_p) test	0.126**	0.450	1.645
Durbin-Hausman group (DH_g) test	-0.985**	0.838	1.645
LM_AD for residual cointegration	6.481**	0.000	0.05

Source: Stata Software Output

** : Statistics are significant at the 5 per cent level of significance.

The LM_AD test and (DH_p) for residuals in companies traded in other countries’ stock exchanges are shown in Table 5. According to the LM_AD test results, the hypothesis of “ H_0 : no cointegration cross-section dependence for residuals” was rejected ($p=0.004, <0.05$). Therefore, second-generation cointegration tests taking into account cross-section dependency were applied. In the (DH_p) panel cointegration test, since $p=0.370, <1.645$, the H_0 hypothesis of no cointegration was rejected. In the second stage of Durbin-Hausman testing, the Durbin-Hausman group cointegration test (DH_g) for “ H_0 : no cointegration for all units” was performed for the groups. Since $p=0.811, <1.645$, the H_0 hypothesis was rejected and the alternative hypothesis of cointegration for some units was accepted.

Table 5: Cointegration Test Results for Companies Traded in Other Countries’ Stock Exchanges

Tests	Test Statistics	Probability Value	Reference p-Value
Durbin-Hausman panel (DH_p) test	0.331**	0.370	1.645
Durbin-Hausman group (DH_g) test	-0.881**	0.811	1.645
LM_AD for residual cointegration	2.687**	0.004	0.05

Source: Stata Software Output

** : Statistics are significant at the 5 per cent level of significance.

Tests for the Presence of Individual and Time Effects

In panel data analysis, in order to be able to choose between estimators and determine the model, the model to be used for prediction is obtained by testing whether there are individual effects or time effects. Various tests are available for this purpose, but F tests were used in this study. The results of F tests conducted with the Stata program for companies traded in the BIST are given in Table 6. According to the results of the F1 test, which determines whether there are individual or time effects, the test statistic is 6.04 and the H_0 hypothesis is rejected since the probability value is less than 0.05. Thus, the existence of at least one such effect was accepted. The H_0 hypothesis was rejected with a test statistic value of 38.49 and probability value of 0.00 by performing the F2 test to determine whether there were individual effects. Finally, in the F3 test to consider the existence of time effects, the H_0 hypothesis was rejected with a statistical value of 2.78 and a probability value of 0.00. It was thus concluded that there were two-way fixed effects in the model.

Table 6: F Tests for Companies Traded in Turkey

	Hypothesis	Test Statistics	Probability Value
F1 Test	$H_0 : \mu_i = 0, \lambda_t = 0$	6.04***	0.000
F2 Test	$H_0 : \mu_i = 0$	38.49***	0.000
F3 Test	$H_0 : \lambda_t = 0$	2.78***	0.000

Source: Stata Software Output

***: Statistics are significant at the 1 per cent level of significance.

The results of the F tests for companies traded in other countries' stock exchanges are provided in Table 7. According to the results of the F1 test to determine the presence of individual or time effects, the test statistic is 6.72 and the probability value is less than 0.05, so the H_0 hypothesis can be rejected. Thus, the existence of at least one such effect was accepted. The H_0 hypothesis was rejected with a test statistic value of 34.28 and probability value of 0.00 after performing the F2 test to determine whether there were individual effects. Finally, with the F3 test to consider the presence of time effects, the H_0 hypothesis was rejected with a test statistic value of 2.33 and a probability value of 0.00. It was concluded that there were two-way fixed effects in the model.

Table 7: F Tests for Companies Traded in Other Countries' Stock Exchanges

	Hypothesis	Test Statistics	Probability Value
F1 Test	$H_0 : \mu_i = 0, \lambda_t = 0$	6.72***	0.000
F2 Test	$H_0 : \mu_i = 0$	34.28***	0.000
F3 Test	$H_0 : \lambda_t = 0$	2.33***	0.000

Source: Stata Software Output

***: Statistics are significant at the 1 per cent level of significance.

V. Findings and Discussion

Findings for Companies Traded in Turkey

The following panel regression model was established for companies traded in the BIST:

$$PRICE_{it} = \alpha_{it} + \beta_1 CUR_{it} + \beta_2 LQR_{it} + \beta_3 CAR_{it} + \beta_4 LVR_{it} + \beta_5 DTO_{it} + \beta_6 MSL_{it} + \beta_7 NPM_{it} + \beta_8 ROE_{it} + \beta_9 ROA_{it} + \beta_{10} ACR_{it} + \beta_{11} ASI_{it} + \beta_{12} ATR_{it} + u_{it}$$

It is seen that the variables of current ratio, leverage ratio, debt turnover, maturity structure of liabilities, average collection period of receivables, and asset turnover give statistically significant results, while

the other variables give insignificant results (Table 8). The R^2 value, which represents the explanatory power of the independent variables in the model for the dependent variable, is 0.6306, while the F statistic, which reflects the general significance of the model, is 7.81. The model was reconstructed with these significant independent variables and the basic model was thus created. By adding the liquidity ratio variable to the basic model, its iteration (Model 1) was established, and when the results of Model 1 were examined, the R^2 value representing the independent variables' explanatory power for the dependent variable was found to be 0.6258. The F statistic expressing the general significance of the model was 8.52 and there was thus no significant change in terms of the explanatory power of the variables and the significance of the model. According to the results of Model 1, the variables of current ratio, leverage ratio, and asset turnover positively affect the dependent variable of stock price at the 1 per cent significance level. The variables of debt turnover rate, maturity structure of liabilities, average collection period of receivables, and liquidity ratio, on the other hand, negatively affect stock price at the 1 per cent significance level.

Thus, current ratio, leverage ratio, and asset turnover ratio positively affect the stock prices of automotive companies traded in the stock market in Turkey. Increases in the values of these ratios are reflected in the rising prices of stocks. These results are in line with most other studies in the relevant literature reporting positive relationships between stock price and current ratio (Alexakis, Patra, and Poshakwale, 2010; Aydemir, Serdar, and Demirtaş, 2012; Birgili and Düzer, 2010; Gümüş, Şakar, Akkın, and Şahin, 2017; Yaman, Korkmaz, and Açıkgöz, 2017), stock price and leverage ratio (Aydemir, et al., 2012; Büyüksalvarcı, 2011; Dwi Martani and Khairurizka, 2009; Gümüş, et al., 2017; Martikainen, 1991), and stock price and asset turnover ratio (Alexakis, et al., 2010; Büyüksalvarcı, 2011; Gümüş, et al., 2017; Oruç, 2009).

In contrast, it has been confirmed here that, for automotive companies traded in the stock market in Turkey, debt turnover rate, maturity structure of liabilities, collection period of receivables, and liquidity ratio affect stock prices negatively. Decreases in these ratios are reflected in the fall of stock prices. These results are in line with previous findings of negative relationships between stock price and the liquidity ratio and maturity structure of the liabilities (Birgili and Düzer, 2010) and between stock price and the collection period of receivables (Gümüş et al., 2017).

Table 8: Regression Models for Companies Traded in Turkey

	Linear Regression Model		Model		Basic Model		Model1	
	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation
CTR	35.86021***	12.26684	17.15179**	6.948715	9.340226***	3.50481	20.40887***	6.116152
LVR	142.9973***	47.85963	40.93913**	17.88357	39.20491***	16.76372	42.14555***	16.69452
DTO	0.308298	0.886807	-1.739237***	0.537861	-1.564613***	0.527635	-1.638763***	0.524856
MSL	-3.755514	26.71755	-22.30854**	9.433627	-31.19397***	8.450539	-24.44021***	0.524856
ACR	-0.026728	0.015925	-0.048359***	0.010892	-0.0492239***	0.008166	-0.0423035***	0.008068
ATR	1.204533	6.898651	22.01307***	4.191586	24.34138***	4.063074	23.32076***	4.060274
LQR	-7.728234	14.88863	-7.576528	9.55699			-14.40172***	6.474739
CAR	-20.2628	16.08477	-2.092715	7.737622				
NPM	53.93664**	24.74903	-30.22977	20.75466				
ROE	54.16473**	24.4988	11.02567	11.49795				
ROA	-34.04148	57.53778	-0.66618	38.83901				
ASI	0.033934	0.022883	0.000768	0.010261				
Constant	-116.5654**	54.88801	-5.878041	20.28962	7.603972	18.94099	-3.926667	19.7652
R ²	0.5761		0.6306		0.6191		0.6238	
F statistic	-		7.81***		8.46***		8.52***	

Source: Stata Software Output

*: Statistics are significant at the 10 per cent level of significance.

** : Statistics are significant at the 5 per cent level of significance.

*** : Statistics are significant at the 1 per cent level of significance.

CUR: Current ratio, LVR: leverage ratio, DTO: debt turnover, MSL: maturity structure of liabilities, ACR: average collection period of receivables, ATR: asset turnover rate, LQR: liquidity ratio, CAR: cash ratio, NPM: net profit margin, ROE: return on equity, ROA: return on assets, ASI: average sales period of inventory.

Findings for Companies Traded in Other Countries' Stock Exchanges

The following panel regression model was established using the common correlation effect (CCE) estimator (H. Pesaran, 2006) for companies traded in other countries' stock exchanges:

$$PRICE_{it} = \alpha_{it} + \beta_1 CUR_{it} + \beta_2 LQR_{it} + \beta_3 CAR_{it} + \beta_4 LVR_{it} + \beta_5 DTO_{it} + \beta_6 MSL_{it} + \beta_7 NPM_{it} + \beta_8 ROE_{it} + \beta_9 ROA_{it} + \beta_{10} ACR_{it} + \beta_{11} ASI_{it} + \beta_{12} ATR_{it} + u_{it}$$

It is seen here that the variables of liquidity ratio, cash ratio, leverage ratio, net profit margin, return on assets, average collection period of receivables, and average sales period of inventory give statistically significant results, while the other considered variables give insignificant results as observed in Table 9. The R² value representing the explanatory power of the independent variables in the model for the dependent variable is 0.5845, while the F statistic, which expresses the general significance of the model, is 5.32. The model was reconstructed with these significant variables and the basic model was thus created. By adding the independent variable of current ratio to the basic model, its iteration was established, and when the results of Model 1 were examined, the R² value was found to be 0.5734 and the F statistic was found to be 5.55. Thus, there was change in terms of the explanatory power of the variables or the

significance of the model. According to the results of Model 1, the variables of liquidity ratio, net profit margin, and average sales period of inventory positively affect the dependent variable of stock price at the 1 per cent significance level, while leverage ratio positively affects stock price at the 5 per cent significance level. Cash ratio and average collection period of receivables negatively affect the dependent variable of stock price at the 1 per cent significance level, while return on assets negatively affects stock price at the 10 per cent significance level. The addition of the independent variable of current ratio to Model 1 for iteration did not yield statistically significant results.

According to these findings, for the automotive companies traded in other countries' stock exchanges, liquidity ratio, leverage ratio, net profit margin, and average sales period of inventory affect stock prices positively. An increase in these ratios is reflected in rising prices of stocks. These results are in line with the results of most studies in the related literature reporting that stock price is positively associated with liquidity ratio (Aktas, 2009; Aydemir, et al., 2012; Ayriçay and Eren, 2014; Güngör and Kaygın, 2015), leverage ratio (Aydemir et al., 2012; Büyükşalvarcı, 2011; Dwi Martani & Khairurizka, 2009; Gümüş et al., 2017; Martikainen, 1991), and net profit margin (Aktas, 2009; Aydemir, et al., 2012; Dwi Martani and Khairurizka, 2009; Gümüş, et al., 2017; Kalaycı and Karataş, 2005).

In contrast, cash ratio, return on assets, and average collection period of receivables affect stock prices negatively among automotive companies traded in other countries' stock exchanges. Decreases in these ratios are reflected in falling stock prices. These results support the findings of other studies in the literature of negative correlations between stock price and cash ratio (Büyükşalvarcı, 2010; Gümüş et al., 2017) and stock price and collection period of receivables (Gümüş et al., 2017).

Table 9: Regression Models for Companies Traded in Other Countries' Stock Exchanges

	Linear-Regression Model		Model		Basic Model		Model 1	
	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation	Coefficient	Standard deviation
LQR	577.8948***	192.9913	230.6158***	76.13521	266.0456***	25.21841	276.1923***	72.09248
CAR	-338.743	189.4216	-314.109***	55.25441	-260.873***	49.44078	-262.703***	51.05556
LVR	39.56669	61.98033	50.39857***	26.76616	48.76801***	24.79914	48.75155**	24.85274
NPM	577.4717***	114.3199	454.2173***	207.1843	472.5721***	205.5832	469.5707***	207.8513
ROA	-485.701	1088.051	-1011.11***	519.5569	-660.529*	391.8901	-655.912*	395.2552
ACR	-0.69513	0.360241	-0.28656***	0.131627	-0.38014***	0.110267	-0.38747***	0.121028
ASI	0.424259**	0.175893	0.283409***	0.098427	0.34276***	0.077254	0.350006**	0.091683
CUR	-141.718	149.4641	-5.8655	60.72989			-8.14035	54.83976
DTO	-0.38412	2.348945	-3.48981	2.916206				
MSL	233.0003***	69.92086	-108.432	78.90413				
ROE	-47.4952	159.9672	112.7241	86.54642				
ATR	90.828***	37.88945	-40.9482	65.68234				
Constant	-338.611***	101.4955	-74.4714	94.21641	-175.350***	40.2696	-175.010***	40.4119
R ²	0.4448		0.3845		0.3733		0.3734	
F statistic	-		5.32***		5.67***		5.55***	

Source: Stata Software Output

- *: Statistics are significant at the 10 per cent level of significance.
- ** : Statistics are significant at the 5 per cent level of significance.
- ***: Statistics are significant at the 1 per cent level of significance.

LQR: Liquidity ratio, CAR: cash ratio, LVR: leverage ratio, NPM: net profit margin, ROA: return on assets, ACR: average collection period of receivables, ASI: average sales period of inventory, CUR: current ratio, DTO: debt turnover, MSL: maturity structure of liabilities, ROE: return on equity, ATR: asset turnover rate.

Findings for Companies Traded in the BIST and Other Countries' Stock Exchanges

The current ratio, which positively affects stock prices of automotive companies traded in the BIST, reflects the ability of companies to pay their short-term debts with their current assets. In countries with high inflation, due to the limited and costly use of long-term financing and liabilities from capital markets together with the high need for working capital as a result of the erosion of financial assets, it is reasonable to expect that the current ratio will be lower than in countries with low inflation (Özkan, 2019: 266). However, in evaluating this ratio, instead of merely considering high or low levels, the speed of conversion into cash to pay short-term debts with current assets when necessary can also be taken into account. Since the asset turnover ratio shows how effectively a company uses its resources, this ratio, which positively affects stock prices, should ideally be high.

The debt turnover ratio, which negatively affects stock prices of automotive companies traded in the BIST, reflects the debt payment speed of a company. Liquidity problems may arise if a company makes frequent payments without collection. Therefore, when evaluating this ratio, it may be more meaningful to evaluate the receivables together with the average collection period.

The maturity structure of liabilities ratio has also yielded important results as one of the ratios negatively affecting stock prices of automotive companies traded in the BIST. In the use of liabilities, the harmony of their maturity and the maturity of the area of use must be

considered. In other words, the fact that long-term investments are funded with long-term liabilities is substantial in the sense of affecting the liquidity of the company. Since the return of a long-term investment funded by short-term resources will take time, the repayment of the liability may cause liquidity problems. While evaluating this ratio, in addition to determining how much short-term debt a company has among its total debt, information about the maturity of projects can help to make more accurate decisions in terms of investments. If a company has found cost-effective short-term resources for its projects with suitable terms, a high level is acceptable for this ratio.

The net profit margin ratio, which has a positive effect on the stock prices of automotive companies traded in other countries' stock exchanges, represents the income obtained from the sales of the companies. With this ratio, the efficiency of operations can be evaluated. The asset profitability ratio, which also has a negative effect on stock prices, indicates how effectively a company uses all of its resources.

The cash ratio, which has a negative effect on stock prices of automotive companies traded in other countries' stock exchanges, reflects the ability of a company to meet its short-term debts with liquid cash reserves in the event of unexpected and urgent need, compared to the current ratio and liquidity ratio. While evaluating this ratio, similarly to other liquidity group ratios, acceptable levels can be determined according to the specific situations of the market, sector, and company because this ratio also reflects the amounts kept in hand by the company, remaining unused and not included in the operating cycle of the business, as well as the amounts held for urgent needs.

The leverage ratio was observed to have a positive effect on stock prices in both groups. This suggests that the liability usage of a company is an important factor for stock prices. As long as this use of liabilities remains at a level that does not burden the company in terms of costs, the value of the firm may be increased. When this situation is examined more specifically in terms of the automotive sector, the size of budgets allocated to R&D studies and the continuous increases in costs of raw materials and production lead companies to pursue continuous efforts for cost reduction. If the costs of liabilities used can be taken into account in this way and included in operational activities, it can provide benefits for the company in terms of growth and increase in market value. This ratio can also be evaluated as the cost to the company of a used resource and the production, sales, and profit growth rates that it provides in return.

The other ratio that affects stock prices in both groups, the liquidity ratio, reflects the ability to meet the immediate liquidity needs of the company with the cash in hand and assets that can be converted into cash immediately. Although some businesses recently prefer to operate by directing all of their positions that can quickly generate cash towards production, in the case of a sudden liquidity need, problems may arise when the conversion of stocks into cash is not as fast as expected. These values may reflect unused or idle funds of a company, or they may represent the first source that is turned to in unexpected situations of short-term need to allow the quick generation of cash and the resolution of the problematic situation. This is generally seen to be at a reasonable level in accordance with the sector and

company structures. This ratio has a negative effect on the stock prices of the companies traded in the BIST, however, in contrast to the companies traded in other countries' stock exchanges. This difference highlights the differences in the perspectives of investors and how they may take the same factors into account differently in their investments.

It has been further concluded that the profitability ratios of the automotive companies traded in other countries' stock exchanges affect stock prices, in contrast to automotive companies traded in the BIST. In addition, the structure of the markets is crucial for stock investments. Considering the findings of the present study in this context, the structure of markets and the stock market in Turkey come to the fore together with the issue of investor profiles. According to 2019 data of the Central Securities Depository of Turkey, 60.99 per cent of accounts in the BIST, representing a total balance of 476,179,642,086.05 Turkish Lira (TL), belong to foreign investors. With active balances of over 1 million TL, 10,105 Turkish investors have a total investment of 147,851,556,485.70 TL and 2,496 investors from outside Turkey have a total investment of 290,034,596,356.75 TL (MKK, 2020). The fact that a small number of foreign investors have a large investment volume provides foreign investors with the ability to change the balance of the stock market. The average foreign investor rate between 2007 and 2018 was 65.33 per cent while it was more than 60.99 per cent in 2019 (MKK, 2020) indicating a reasonably constant nature.

Turkey's average population is young, it is attractively positioned as a bridge between Europe and the East, and, most importantly, it offers unsaturated markets in many areas to attract foreign investors. However, in spite of these appealing points, the first priority for foreign investors in long-term investments is an environment of trust and economic stability. The upward trend of exchange rates in Turkey may lead to a loss of value in terms of foreign investors at the time of exit compared to entry into the market. Furthermore, in the event of a crisis or economic contraction, it is inevitable that the first outflows in investments will be experienced in developing countries, as has been the case with the global COVID-19 pandemic, which has caused a decrease in investments around the world in the past two years. In terms of domestic investors, in an economic environment with high inflation and exchange rates, an investor's behavior may lead to profitability rates being ignored, such as in cases of investors seeking to obtain returns from trading by reducing the loss caused by increases in inflation and exchange rates with shorter-term moves, rather than buying a company's stock and waiting until the end of the period to earn income from profit sharing. In the models established in the present study, the R^2 value was 0.6258 for companies traded in Turkey and 0.5734 for companies traded in other countries' stock exchanges. These values are acceptable in terms of the explanatory power of the independent variables for the dependent variable. However, changes in stock prices in certain periods may not reflect the financial performance of a company. The macroeconomic situation, the political situation, the government's industrial policy, and technical considerations within the company are factors beyond financial performance that can affect changes in stock prices (Purnomo, 1998). Hadi and Azmi (2005) further argued that other factors such as interest rate, inflation

rate, and exchange rate can significantly affect changes in stock returns (Dwi Martani and Khairurizka, 2009: 51).

VI. Conclusion

This research was carried out to determine whether changes in the financial statements of companies affect the prices of stocks traded in the stock exchange and, if so, to what extent. The automotive sector was considered here, as it has an important position in both the Turkish economy and the world economy due to consumer demand and exchanges with other sectors. Relationships between stock prices and ratios obtained from financial statements in the automotive sector were analyzed considering seven automotive companies whose stocks are traded in the BIST and six whose stocks are traded in other countries' stock exchanges (Germany, USA and Sweden). Financial data from these companies for the period of 2007Q1-2018Q4 were considered in quarters and the effects of changes in 12 selected financial ratios (current ratio, liquidity ratio, cash ratio, leverage ratio, debt turnover rate, maturity structure of liabilities, net profit margin, ROE, ROA, average collection period of receivables, average sales period of inventory, and asset turnover) on stock prices were investigated using the panel data analysis method. It was determined that, for automotive companies traded in Turkey, stock prices are affected by liquidity ratios (current ratio and liquidity ratio), financial structure ratios (leverage ratio, debt turnover, and maturity structure of liabilities), and activity ratios (average collection period of receivables and asset turnover rate). A statistically significant relationship could not be determined between cash ratio, net profit margin, ROE, ROA, or average sales period of inventory and stock prices and it was concluded that these ratios do not affect those prices.

For the automotive companies traded in other countries' stock exchanges, stock prices are affected by liquidity ratios (liquidity ratio and cash ratio), financial structure ratios (leverage ratio), activity ratios (average collection period of receivables and average sales period of inventory), and profitability ratios (net profit margin and ROA). A statistically significant relationship could not be determined between current ratio, debt turnover, maturity structure of liabilities, ROE, or asset turnover ratio and stock prices and it was concluded that these ratios do not affect those prices. Thus, this study has demonstrated that profitability ratios affect stock prices of automotive companies traded in other countries' stock exchanges but not those of automotive companies traded in Turkey.

The present research focused on the effects of changes in companies' financial ratios on stock prices based on data from a total of 13 automotive enterprises traded in Turkey and in other countries' stock exchanges with the aim of contributing to the literature on this subject with sectoral findings. In future studies on the effects of financial ratios on stock prices, different sectors can be analyzed to determine which particular sectors and ratios have correlations with stock prices. Such research would make it possible to identify the ratios that can effectively determine stock prices across multiple sectors. Instead of adding individual ratios to their models, researchers could categorize the ratios that correlate with each other via factor analysis and then establish simpler models with smaller numbers of variables. Finally, research on this

subject can be expanded in the future with the consideration of other macroeconomic variables that may affect stock prices together with financial ratios.

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