

### Analysis of Internal Financial Factors Affecting Stock Price in Airline Businesses

#### Havayolu İşletmelerinde Hisse Senedi Fiyatını Etkileyen İşletme İçi Finansal Faktörlerin Analizi

##### Abstract

Along with the supply-demand effect, factors such as the economic situation of the country, future expectations and the performance of the enterprises are quite effective in determining the stock price. In this context, it is aimed to reveal the relationship between the internal financial factors of airline businesses and the stock price. In practice, the annual internal data of 28 airline businesses covering the years 2005-2018 were analyzed using panel data and panel VAR analysis methods, and the internal (TA, FL, ATR, OPM and BV) factors that determine the stock price were determined. As a result of the panel data analysis applied, it was determined that the total assets variable had a positive effect on stock prices, while the financial leverage variable had a negative effect. According to the panel VAR causality results, bidirectional causality between the total asset variable and the stock price, one-way causality between the beta value and acid-test ratio variables and the stock price was determined. In summary, airlines can increase their stock value by taking advantage of economies of scale, optimizing the liquidity situation, and taking into account the negative impact of financial leverage.

##### Öz

Hisse senedi fiyatının belirlenmesinde, arz-talep etkisiyle birlikte, ülkenin ekonomik durumu, gelecek beklentileri ve işletmelerin performansı gibi faktörler oldukça etkilidir. Bu kapsamda, havayolu işletmelerine ait işletme içi finansal faktörlerin hisse senedi fiyatı ile ilişkilerinin ortaya konulması hedeflenmektedir. Uygulamada 28 havayolu işletmesine ait 2005-2018 yıllarını kapsayan yıllık işletme içi veriler, panel veri ve panel VAR analizi yöntemleriyle analiz edilmiş olup, hisse senedi fiyatını belirleyen işletme içi (TV, FK, ATO, FKM ve BD) faktörler tespit edilmiştir. Uygulanan panel veri analizi sonucunda, toplam varlıklar değişkeninin hisse senedi fiyatlarını pozitif etkilediği, finansal kaldıraç değişkeninin ise negatif etkilediği tespit edilmiştir. Panel VAR nedensellik sonuçlarına göre, toplam varlık değişkeni ile hisse senedi fiyatı arasında çift yönlü nedensellik, beta değeri ve asit-test oranı değişkenleri ile hisse senedi fiyatı arasında tek yönlü nedenselliğin olduğu tespit edilmiştir. Özetle, havayolu işletmeleri ölçek ekonomisinden faydalanmak suretiyle, likidite durumunu optimize ederek ve finansal kaldıraçın negatif etkisini hesaba katarak hisse senedi değerlerini arttırabilirler.

##### Introduction

The main purpose of firms is to increase stock value in the meaning of maximizing market value. The stock price is a share value export by the issuer that contains the information required by the investor to evaluate the performance of an enterprise (exporting).

Stocks, one of the securities instruments for investors, are among the risky investments. In the context of the risk-return relationship, investors primarily pay attention to mobility (increase or decrease) of stock prices while making investment decisions. Stock prices are affected adversely or positively by the amount of stock demand and supply in the capital market, if the stock demand is higher than the stock offer, the stock price increases, otherwise if the stock bid is higher than the

##### Abdulkadir Alıcı

Arş. Gör. Dr., Necmettin Erbakan  
Üniversitesi, Havacılık ve Uzay Bilimleri  
Fakültesi, Havacılık Yönetimi Bölümü,  
aalici@erbakan.edu.tr  
Orcid: 0000-0002-4796-6385

##### Güven Sevil

Prof. Dr., Anadolu Üniversitesi,  
Açıköğretim Fakültesi,  
gsevil@anadolu.edu.tr  
Orcid: 0000-0001-7592-3799

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##### Keywords

Stock prices, Airline Businesses, Panel data  
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stock market demand, the stock price can decline. There is a crucial issue is that in determining the stock price, commonly including the supply-demand effect, the economic condition of the country, future expectations and the performance of the enterprises are very efficient. In this research includes the mutual financial relationships between the stock prices of airline businesses and internal factors in the world.

The main purpose of the study is that by analysing the internal financial factors affecting the stock prices of the airline businesses, it is intended to determine whether there are significant differences between the stock prices of the airline businesses and the internal factors and to test them with the factors affecting the stock prices in the economic literature. It is claimed that identifying internal financial factors that affect stock prices will contribute to airline managers in measuring and managing operational and financial performance. Moreover, it is believed that by the determination of these factors will lead to investors and policy makers. There are many factors affecting the stock price in airline businesses. In the study, it is aimed to investigate whether internal financial data can affect stock prices. In this context, in advance starting the analysis, the relation of financial factors with the stock price is defined conceptually, and it is also mentioned in the literature. Then, it was continued by including information about the analysis technique. Finally, by applying the analysis stages and the findings were reached and a general assessment was made about the analysis.

## **1. Relationship Between Stock Prices and Internal Financial Factors**

The study aims to estimate the relationship between airlines' internal financial factors and stock prices. To do this, the conceptual relationship (in terms of relevant literature) between internal financial factors and stock prices needs to be revealed. Internal financial factors to be used in the study include firm size (total assets), liquidity (acid-test ratio), profitability (operating profit margin), beta value, and financial leverage variables.

### **1.1. Relationship between Firm Size and Stock Prices**

Firm size has an important place among the investment criteria. Usually, large businesses offer investors better investment opportunities than smaller ones. Similarly, large businesses often have a stronger and more dominant position in the stock market due to their higher production capacities (Sharma, 2011, p.56). It is stated that large firms face fewer risks due to the fact that they are highly diversified and are therefore less prone to financial distress (Titman and Wessels, 1998). However, it is also stated that firm size has a negative effect on systematic risk during recessions (Lee and Jang, 2007).

There are two important factors that express firm size: The total assets of the firm and The capacity indicator regarding the area in which the firm operates. In the airline industry, capacity is expressed as available seat kilometers (ASK). For businesses, both indicators refer to scale indicators. Businesses with larger assets and capacities in their economies of scale have the advantage of offering products or services at lower costs (Cook and Billig, 2017, p.207). In order for airlines to benefit from economies of scale, they need to expand their flight networks and increase flight frequency and perform long-range flights (Oum and Zhang, 1997, p.310; Küçük Yılmaz, 2016, p.40). Airlines benefiting from the economy of scale show higher efficiency at lower costs than their competitors, thus having a competitive advantage over them. Therefore, it is thought that competitive advantage will bring profitability for airlines, which will, in turn, positively reflect on the stock price. In the study, the total assets indicator is used as the firm size.

### **1.2. Relationship between Liquidity and Stock Prices**

Businesses' working capital is related to the efficiency and productivity of their short term cash flows. A well-designed cash flow and working capital are expected to positively contribute to the value of businesses in terms of performance and productivity. A business should maintain a good balance between profitability and liquidity while using its working capital (Padachi, 2006, p.45). Therefore, rather than increasing their cash amounts or liquid amounts, businesses should aim to invest excess liquid amounts in assets and thus obtain a better return. Efficient use of liquidity also positively affects the profitability of the business (Davis and Peles, 1993, p. 729 as cited in Aydemir et al., 2012, p. 278).

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Liquidity risk is very important for airlines. Since the airline industry is a fairly cyclical and seasonal industry, airlines experience difficulties in cash flow in some periods of the year. In such periods, airlines may be exposed to short-term liquidity risk (Moody's-Passenger Airline Industry, 2018, p.18). Airlines often use bank loans as a short-term source of financing to manage short-term liquidity squeeze. In the case of long-term liquidity risks, airlines may want to shrink and minimize the risk (Standard and Poor's, 2018, p.16).

It is known that the liquidity squeeze may cause a business to default. Thus, a business with a low liquidity ratio may face the risk of being unable to repay existing debts and going bankrupt. In summary, the optimum liquidity level is one of the most important factors affecting positively the profitability of a business.

### **1.3. Relationship between Profitability and Stock Prices**

Profitability ratios, which indicate business performance ratios, reflect the ability of a business to earn profits on sales, assets, and equity, and show how well the business uses its resources to increase stock value. The long-term profitability of a business increases both the sustainability of the business and shareholders' and investors' interest in and demand for stocks (Arkan, 2016, p. 18).

Airlines have a profitability structure that is very sensitive to and fragile against macroeconomic events (Asian crisis, 2008 economic recession) and major destructive events (war, terrorism, natural disasters, etc.). For example, after the terrorist attack on the twin towers in the USA, the demand for air travel in the USA decreased by 7.4%, resulting in a reduction in the profitability of many airlines. But despite all the negative developments, the airline industry was able to recover quickly and regain its former profitability. Since the early 1970s, the number of airline passengers has increased exponentially (Vasigh et al., 2013, p.14; Cook and Billig, 2017, p.164-165).

### **1.4. Relationship between Beta Value and Stock Prices**

When investing in securities, investors pay attention to the risk-return relationships of securities. Because, in the selection of security instruments, the changes between risk and return are of great importance in terms of the stock price (Ceylan & Korkmaz, 2000, p. 264). While making investment decisions, investors consider the beta coefficient of securities as a risk metric. Beta coefficient indicates the sensitivity of the return of the security (stock, etc.) to market return (BIST100, etc.) (Tetik & Uğur, 2010, p. 15-16). Investors can estimate the increase or decrease in the stock price by looking at the beta coefficient of businesses. For example, if the beta value of Turkish Airlines stock is equal to 1, a 3% increase in the value of that share should be expected when the index (BIST100) increases by 3%, and a 3% decrease should be expected when the index decreases by 3%. For this reason, in the context of the airline industry, beta value, one of the stock market performance ratios, is thought to be significantly correlated with the stock price.

### **1.5. Relationship between Financial Leverage and Stock Prices**

Increasing costs (fuel, workforce, operation, etc.) increase the operating leverage and thus operational risks. Many airlines have difficulty finding sufficient revenues to cover their increasing costs and therefore use external borrowing to continue their operations. Increasing external borrowing increases businesses' financial leverage ratio (Lee and Jang, 2007, p. 440). A firm's business risk depends on its operating cycle and its response to operating leverage, thus increasing the impact of the leverage on risk. On the other hand, financial leverage, which shows the degree of a firm's utilization from debt, is similar to operating leverage. Therefore, a firm with high financial leverage tends to have a high risk (Hung and Liu, 2005, p. 295). In other words, the risk of a firm with high financial leverage increases, just like its profitability.

## **2. Literature**

There are many studies examining the relationship between internal financial factors and stock prices in different industries. However, there is no study examining the relationship between stock prices and internal factors in the context of the airline industry. Some studies examined the relationship between systematic risk (beta), which is thought to be associated with the stock price, and internal factors.

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The study conducted by Liu and Hung (2005) investigated the effect of stock prices and certain variables such as business cycle, operating leverage, financial leverage, total assets, debt/equity ratio, and return on equity on systematic risk of China Airlines and EVA Airways for 1993-2004. As a result of the analysis performed with the CAPM and 3-factor model, it was found that the business cycle, operating and financial leverage, and capital structure positively influenced but the return on equity negatively influenced the sample airlines' betas.

Lee and Jang (2007) aimed to investigate the relationship between firm-specific variables of 16 airlines and systematic risk for the period of 1997-2002. The variables used in their study include liquidity, financial leverage, operating efficiency, profitability, firm size, growth, and safety. According to the results of the multiple regression analysis, it was determined that profitability, growth, and safety factors negatively affected systematic risk, but financial leverage and firm size positively affected systematic risk. The authors recommended that future research include more firm-specific variables such as stock turnover ratio and earning dividend ranking.

In their study to investigate the determinants of systematic risk for the East Asian airline industry, Hooy and Lee (2010) used panel data from seven airlines in East Asia for the period of 1999-2009. The authors conducted analyses using the CAPM, 3-Factor Model, and International 4-factor models. Systematic risk determinants used in the study include:

- Firm size - Total assets
- Liquidity - Acid/test ratio
- Profitability - Net profit/ Assets
- Operating leverage - Percentage change in EBIT/Percentage change in sales
- Financial leverage - Total debts/Total assets
- Operating efficiency - Total revenue/Total assets
- Growth - Annual Percentage Change in EBIT
- Airlines safety - How many accidents per year (dummy variable)
- Asian financial crisis - 1997 - 1999 (dummy variable)

As a result of the analysis carried out with the relevant models, the authors concluded that only firm size and operational efficiency positively affect the systematic risk and that another important determinant was airline safety.

Lee and Hooy (2012) employed a five-factor asset-pricing model to estimate the systematic financial risk exposure of airlines in North America, Europe, and Asia between 1990 and 2010. The systematic risk determinants used in the study include firm size (measured by assets), profitability, financial leverage, and operating leverage. The authors concluded that the risk to North American airlines was positively related to operating leverage and profitability, but while European and Asian airlines also had risk positively related to operating leverage, their risks were negatively related to earnings growth. The authors also noted that the most important systematic risk determinant for Asian airlines was their size.

Also, Vasigh et al. (2015) listed the major risks for the airline industry as follows:

- Airline size
- Ownership structure
- Operating leverage
- Financial leverage
- Liquidity
- Oil prices
- The threat of labor action
- Aviation accidents
- Number of businesses seeking bankruptcy protection

As a result of the literature review on the airline industry, it has been revealed that firm size, profitability, EPS, operating leverage, financial leverage variables as internal financial factors determine the systematic risk. Based on this, it is assumed that these variables can also be related to the stock price. In this context, in the application part of the study, the relationship of financial factors [firm size (TA), liquidity (ATR), profitability (OPM), beta value (BV), and financial leverage (FL)]

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with stock prices for airlines was analyzed. Since there is no study on the effects of airlines' internal financial factors on their stock prices, the results of the present study are expected to contribute to the literature.

### 3. Method, Data, and Model

This study aimed to examine the internal financial factors affecting the stock prices of airlines. Twenty-eight airlines with uninterrupted financial data for the period of 2005-2018 were included in the study. Internal financial data (independent variables) and stock price data of the airlines in the sample were obtained from the Thomson Reuters Datastream. Panel data analysis and Panel VAR analysis were used, and analyses were carried out with GAUSS-10, STATA-15, and EViews-9 software packages. First of all, the panel data and panel VAR models used in the analyses are discussed.

The data resulting from the combination of time-series data and cross-sectional data is called longitudinal data or pooled data. Time and cross-section dimensions of such data may differ. Longitudinal or pooled data with unchanged horizontal section units are called panel data (Güriş, 2015, p. 2). The use of panel data provides many advantages in economics research compared to cross-sectional or time-series data. Panel data allows obtaining more observations than cross-sectional and time-series data. This increases the degree of freedom and decreases the collinearity between independent variables. Panel data usage also increases the efficiency of econometric estimates. In addition, the use of longitudinal data allows the researcher to perform a series of analyses that cannot be done using cross-sectional or time-series data (Hsiao, 2003, p. 3).

The panel data model is essentially a regression model estimated with panel data. Therefore, the tests, assumptions, and other features in the regression model are also valid for panel data models. Panel data models contain one dependent and one or more independent variables. In addition, since the model is a statistical or econometric model, the term error is also included in the model. Since the variables in the model show the change according to both units and time, different indices are used in the representation of both. "i" and "t" sub-indices in the panel data analysis indicate units and time, respectively (Güriş, 2015, p. 4-5). A linear panel data model made with panel data, where the dependent variable is represented by Y and the independent variable or variables are represented by X, can be shown as follows (Erol, 2007, p.33).

$$Y_{it} = \alpha_{it} + \beta_{it} + X_{it} + \varepsilon_{it}$$

Holt-Eakin, Newey, and Rosen (1988), who applied Sims' (1980) traditional VAR model to panel data and included the cross-section dimension in the model, obtained more robust results with the Panel VAR model. In the VAR model, which accepts all variables in the system as internal and independent, each variable consists of its own lag value and the lag values of other variables. One of the advantages of the VAR model is that it consists of a set of equations rather than a single equation. The Panel VAR model, on the other hand, provides asymptotic results by including unobservable unit effects into the model. The use of panel data practically violates the restriction that all units making up the cross-section are the same and that the coefficient matrix is the same in all units that make up the data. For this reason, fixed effects are added to the model in order to enable the heterogeneous structure specific to cross-section units (Türküz, 2016, p. 101; Yerdelen Tatoğlu, 2018, p. 121).

Under the assumption that all variables are internal, the Panel VAR model with maximum lag length p created with panel data is expressed as follows.

$$y_{it} = \delta_{1i0} + \sum_{j=1}^p \theta_{11j} y_{it-j} + \sum_{j=1}^p \theta_{12j} x_{it-j} + \lambda_{1i0} + \mu_{10t} + \varepsilon_{yit}$$

$$y_{it} = \delta_{2i0} + \sum_{j=1}^p \theta_{21j} y_{it-j} + \sum_{j=1}^p \theta_{22j} x_{it-j} + \lambda_{2i0} + \mu_{20t} + \varepsilon_{xit} \tag{1}$$

It is expressed in closed form as follows;

$$z_{it} = \Gamma_0 + \Gamma_1 z_{it-1} + f_i + \lambda_t + e_t \tag{2}$$

is obtained.  $z_{it} = \begin{bmatrix} y_{it} \\ x_{it} \end{bmatrix}$ ,  $\Gamma_0 = \begin{bmatrix} \alpha_{1i0} \\ \alpha_{2i0} \end{bmatrix}$ ,  $\Gamma_1 = \begin{bmatrix} \alpha_{11j} & \alpha_{12j} \\ \alpha_{21j} & \alpha_{22j} \end{bmatrix}$ ,  $z_{it-1} = \begin{bmatrix} y_{it-j} \\ x_{it-j} \end{bmatrix}$ ,  $f_i = \begin{bmatrix} f_{1i0} \\ f_{2i0} \end{bmatrix}$ ,  $\eta_t = \begin{bmatrix} \eta_{10t} \\ \eta_{20t} \end{bmatrix}$  and  $e_t = \begin{bmatrix} \varepsilon_{yit} \\ \varepsilon_{xit} \end{bmatrix}$ . While  $f_i$  represents unit effects,  $\eta_t$  indicates unobservable time effects-random effects. Since the PVAR model requires the restriction that each cross-section dimension is on the same substructure in order to overcome the problems that arise with the addition of the cross-section dimension, the  $\Gamma_1$  parameters vector is assumed to be the same for all units. With the thought that the existence of unit-specific heterogeneity would practically violate this restriction, the PVAR model includes unit effects as in (4.2). Since fixed effects are associated with regressors due to the lags of dependent variables, the mean-differentiation procedure widely used to eliminate fixed effects will create bias coefficients. Since it is thought that the differentiation method based on group averages for the purpose of deducting fixed effects from the model can cause biased parameter results, the required orthogonality assumptions can be achieved by taking a forward difference with the "Helmert Method" proposed by Arrellano and Bover (1995) (Love and Zicchino, 2006, p.195).

$$\begin{aligned} \Delta y_{it} &= \delta_{1i0} d_t + \sum_{j=1}^p \theta_{11ij} \Delta y_{it-j} + \sum_{j=1}^p \theta_{12ij} \Delta x_{it-j} + \lambda_{1i} \varepsilon_{it-1} + u_{1it} \\ \Delta x_{it} &= \delta_{2i0} d_t + \sum_{j=1}^p \theta_{21ij} \Delta y_{it-j} + \sum_{j=1}^p \theta_{22ij} \Delta x_{it-j} + \lambda_{2i} \varepsilon_{it-1} + u_{2it} \end{aligned} \tag{3}$$

$d_t$  is a vector representing deterministic components and expressed by  $d_t = 1$ .  $\delta_i$ , in this case, is a (k x 1) or (k x 2) dimensional matrix of parameters. Thus, when  $\delta_i d_t$  is a (k x 1) dimensional vector, it will be  $\delta_{11i0}$  or  $\delta_{11i0} + \delta_{12i0} t$  (Anderson et al., 2006, p. 4). The "p" lag length is determined with the help of information criteria. Engle and Granger (1987) argue that the presence of a cointegration relationship between two variables means that these variables are in equilibrium in the long run, but there may be some deviations from the equilibrium in the short run. These deviations that may occur in the short run can be corrected with the help of an error correction mechanism (Sevüktekin & Nargeleçekenler, 2010, p. 489). In the above equations, the error correction mechanism is represented by  $\lambda_{1i} \varepsilon_{it-1}$ . On the other hand,  $\lambda$  denotes the adjustment parameter (return to equilibrium speed) with a value in the range of  $-1 \leq \lambda \leq 0$  and should be statistically significant (Türküz, 2016, p. 103).

Since the first Panel VAR study developed by Holt-Eakin, Newey, and Rosen (1998), the use of the Panel VAR model has become quite common today. The estimation of panel VAR models is possible by completing certain stages and fulfilling certain conditions. The estimation of the panel VAR model includes the selection of the model, its creation, causality relationship, stability analysis, variance decomposition, and impulse-response analysis. As in the time series analysis, in the Panel VAR method, the coefficient interpretation and significance of the variables are not important, so the created model is interpreted with variance decomposition and impulse-response analysis.

Table 1 below provides a list of 28 airline businesses included in the study.

**Table 1. Airlines Included in the Study**

Turkish Airlines	Skywest Airlines
United Airlines	Eva Airways
Cathay Pacific	Finnair
Air Canada	El-Al Airlines
Singapore Airlines	Southwest Airlines
Qantas Airlines	Easyjet

Lufthansa	Norwegian
Air China	GOL Linhas Aeras
Korean Air	Westjet
Air France-KLM	Jetblue
Scandinavian Airlines	China Southern
Alaska Airlines	China Eastern
Thai Airlines	LATAM Airlines
All Nipon (ANA) Airlines	Aeroflot

The independent variables that determine the stock prices in the study were selected from the variables used in the literature. In this context, as independent variables; beta value, acid-test ratio, total assets, financial leverage and operating profit margin variables are used. Stock price data is used as dependent variable. The abbreviation, definition and measurement method of the variables used in the study are shown in Table 2 below.

**Table 2. Definitions and Abbreviations of Variables Used in the Model**

Variables	Symbol	Measurement Indicator	Measurement Method
Dependent Variable	SP	Stock Price	Stock Price
Independent Variables	BV	Beta Value	$\beta_{i,m} = \frac{Cov_{i,m}}{Var_m}$
	ATR	Acid-Test Ratio	$\frac{Current\ Assets - Stocks}{Current\ Liabilities}$
	TA	Total Assets	Price of Total Assets
	FL	Financial Leverage	$\frac{Total\ Debt}{Total\ Assets}$
	OPM	Operating Profit Margin	$\frac{Operating\ Profit}{Net\ Sales} \times 100$

As a result of the literature reviews, it is desired to examine the relationship between the variables expressed in Table 2 above. Hypotheses related to the relevant variables within the scope of the theoretical framework are listed below:

Ho: There is a relationship between internal financial factors and stock prices.

H1: There is no relationship between internal financial factors and stock prices.

The relationship between the explanatory variables and the stock price has been estimated:

- There is a positive relationship between profitability and stock price.
- There is a positive relationship between liquidity and stock price.
- There is a negative relationship between financial leverage and stock price.
- There is a positive relationship between firm size and stock price.
- There is a positive relationship between beta value and stock price.

#### 4. Research Findings

Using annual data for the period between 2005 and 2018, this study investigated the relationship between airline stock prices and internal factors and studied the dynamic relationships between stock prices, liquidity status (acid-test ratio), firm size (total assets), profitability (operating profit margin), financial leverage, and beta value. A model was established by taking the logarithms of all variables. First, estimations were made with panel data analysis, and then dynamic relationships were examined with Panel VAR analysis. As in all time-series analyses, firstly cross-sectional dependence and unit root tests are performed to determine whether the series are stationary or not.

A cross-sectional dependence test was performed to determine whether there is a cross-sectional dependence in the variables in the model. In the case of cross-sectional dependence in series, it is

necessary to determine the degree of integration of the series by using the second-generation unit root tests. If there is no cross-sectional dependence in the series, the stationarity levels of the variables can be determined using the first-generation stationarity tests.

**Table 3. Cross-Sectional Dependence Test Results**

Variable	CDLM adj.		
	Statistics	Prob.	Decision
LOGSP	9.027	0.000	Ho Rej.
LOGBV	4.102	0.000	Ho Rej.
LOGATR	2.507	0.006	Ho Rej.
LOGTA	5.587	0.000	Ho Rej.
LOGOPM	3.692	0.000	Ho Rej.
LOGFL	3.591	0.000	Ho Rej.

**Note:** In all hypothesis tests, significance was set at 0.05 (5%).

Table 3 presents the cross-sectional dependence test results for the variables. According to the analysis, the  $H_0$  hypothesis established as "no cross-sectional dependence" for all variables is rejected. Therefore, the stationarity levels can be determined by performing the second-generation unit root test.

**Table 4. CADF Panel Unit Root Test**

Variables	Model	Stat.	Critical Values		
			1%	5%	10%
LOGSP	Fixed	-2.36	-2.34	-2.17	-2.07
	Fixed and Trend	-2.299	-2.88	-2.69	-2.08
ΔLOGSP	Fixed	-2.462	-2.34	-2.17	-2.07
	Fixed and Trend	-2.159	-2.88	-2.69	-2.08
LOGBV	Fixed	-2.383	-2.34	-2.17	-2.07
	Fixed and Trend	-2.214	-2.88	-2.69	-2.08
ΔLOGBV	Fixed	-2.280	-2.34	-2.17	-2.07
	Fixed and Trend	-2.499	-2.88	-2.69	-2.08
LOGATR	Fixed	-1.846	-2.34	-2.17	-2.07
	Fixed and Trend	-2.313	-2.88	-2.69	-2.08
ΔLOGATR	Fixed	-2.421	-2.34	-2.17	-2.07
	Fixed and Trend	-2.508	-2.88	-2.69	-2.08
LOGTA	Fixed	-1.415	-2.34	-2.17	-2.07
	Fixed and Trend	-1.027	-2.88	-2.69	-2.08
ΔLOGTA	Fixed	-1.442	-2.34	-2.17	-2.07
	Fixed and Trend	-1.714	-2.88	-2.69	-2.08
LOGOPM	Fixed	-1.584	-2.34	-2.17	-2.07
	Fixed and Trend	-1.745	-2.88	-2.69	-2.08
ΔLOGOPM	Fixed	-2.021	-2.34	-2.17	-2.07
	Fixed and Trend	-2.137	-2.88	-2.69	-2.08
LOGFL	Fixed	-1.878	-2.34	-2.17	-2.07
	Fixed and Trend	-2.317	-2.88	-2.69	-2.08



$\Delta$ LOGFL	Fixed	-2.362	-2.34	-2.17	-2.07
	Fixed and Trend	-2.637	-2.88	-2.69	-2.08

**Notes:** Notes: The  $\Delta$  notation indicates the first-order difference of the series. The \*, \*\*, and \*\*\* values show that the test statistics are significant at 1%, 5%, and 10% significance levels, respectively. CADF test statistics critical values were obtained from Pesaran (2007). In all hypothesis tests, significance was set at 0.05 (5%).

Since all the variables in the study (SP, TA, ATR, OPM, and FL) have cross-sectional dependence, the second-generation unit root test (CADF) was applied to these variables. Table 4 presents the results of the CADF panel unit root test statistics. According to the test results, it was determined that LOGATR, LOGTA, LOGOPM, and LOGFL variables were not stationary, and the model was established by taking the first differences of these variables.

#### 4.1. Panel data model selection and estimation results

Before the PVAR model, panel data analysis estimation results will be examined and interpreted. First of all, either the fixed-effects model or the random-effects model should be selected for model estimation. To select the appropriate model, the Hausman test was used.

**Table 5. Hausman Test**

Test Hypothesis	Statistics	Probability	Decision
Random-effects model is appropriate.	0.2200	0.9989	Ho Accepted

Table 5 presents the results of the Hausman test statistics performed to test the random-effects model against the fixed-effects model and to test the  $H_0$  hypothesis that "the difference between parameters is not systematic" (the random-effects model is appropriate). As can be inferred from the table, the  $H_0$  hypothesis is accepted. In this case, the random-effects model was deemed appropriate for model estimation.

Once the appropriate model has been determined, heteroscedasticity and autocorrelation tests should be performed.

**Table 6. Heteroscedasticity Test Results**

	Statistics	Probability	Degree of Freedom	Test Hypothesis	Decision
<b>W0</b>	6.2232	0.0000	df (27, 336)	Ho Rej.	Heteroscedastic.
<b>W50</b>	3.9760	0.0000	df (27, 336)	Ho Rej.	
<b>W10</b>	5.7248	0.0000	df (27, 336)	Ho Rej.	

The heteroscedasticity test results revealed that the variance in the model is not fixed, in other words, there is a heteroscedasticity problem.

**Table 7. Autocorrelation Test Results**

Test	Statistics
Durbin Watson (DW)	0.7330
Baltagi-Wu (LBI)	0.9257

No critical value has been specified in the literature, but DW and LBI statistical values below 2 indicate autocorrelation. As seen in Table 7, the statistical value for DW and LBI autocorrelation tests is below 2. Therefore, there is an autocorrelation problem in the model.

As a result of the tests, the analysis was carried out with the Arellano-Froot-Rogers estimator, which takes into account both heteroscedasticity and autocorrelation problems.

**Table 8. Panel Data Estimation Results (Arellano-Froot-Rogers Resistant Estimation Results)**

Variable	Coefficient Estimation	Arellano, Froot, and Rogers Standard Error	z	Prob.	(95% Confidence Interval)	
LOGBV	0.069332	0.058533	1.18	0.236	-0.045390	0.184054
DLOGATR	0.112405	0.100615	1.12	0.264	-0.084797	0.309608

DLOGTA	1.270768	0.490221	2.59	0.010	0.309951	2.231584
DLOGOPM	0.029307	0.018233	1.61	0.108	-0.006428	0.065043
DLOGFL	-0.45624	0.227547	-2.01	0.045	-0.902225	-0.01025
C	1.392917	0.202510	6.88	0.000	0.996003	1.789829
<b>Number of Observations:</b>	F(3,4) = 47.79			R <sup>2</sup> = 0.273		
<b>364</b>						
<b>Group Size: 28</b>	Prob > x <sup>2</sup> = 0.0000			Wald x <sup>2</sup> (5) = 63.95		

Table 8 presents the resistant estimator results of the model in which stock prices (LOGSP) are used as dependent variables. According to the results of the random-effects model, which examines the factors determining the stock price, the total assets (DLOGTA) variable, which indicates the firm size, has a positive effect on the stock price at the 5% significance level. Also, the financial leverage (DLOGFL) variable has a negative effect on the stock price at the 5% significance level. No significant relationship was found between the other variables (LOGBV, DLOGATR, and DLOGOPM) and the stock price.

A Panel VAR analysis was conducted to examine the dimensions (causality, impulse-response, and variance decomposition analyses) of the significant relationship found in the panel data analysis.

The Pedroni (2001) cointegration test used in the assumption of cross-sectional independence and the Kao (1999) test used in the presence of cross-sectional dependence should be applied taking into account the features provided by the series.

The Breusch-Pagan test was performed to investigate the presence of cross-sectional dependence in the residuals of the model formed by the variables. The results are given in Table 9.

**Table 9. Breusch-Pagan (1980) Cross-Sectional Dependence Test Results**

	x <sup>2</sup> statistics	Probability Value
<b>Breusch Pagan - LM Test</b>	1836.58	0.000*

\*The H<sub>0</sub> hypothesis is rejected with a margin of error of 1%, 5%, 10%.

According to the results, the Breusch-Pagan (1980) LM test yielded consistent results with the Pesaran (2004) CD test, thus rejecting the basic hypothesis that there is no cross-sectional dependence. Hence, with the help of the error correction model, the long-term relationship between series can be tested with Kao (1999) in this study.

**Table 10. Kao (1999) Cointegration Test Results**

	Test Statistics	Probability Values	Results
<b>Modified Dickey-Fuller t</b>	1.1626	0.1225	Ho Accepted
<b>Dickey-Fuller t</b>	-0.5096	0.3052	Ho Accepted
<b>Augmented Dickey-Fuller t</b>	0.7984	0.2123	Ho Accepted

According to the results of the cointegration test, all of the statistical tests cannot reject the H<sub>0</sub> hypothesis that there is no cointegration with 1%, 5%, 10% margin of error. It is concluded that there is no long-term relationship between all variables included in the analysis.

#### 4.2. Estimation results of the panel VAR model

Before starting the analysis, it is necessary to determine the appropriate lag length for the estimation of the PVAR model, as in VAR models. After the lag length was determined, the estimation results of the PVAR model were revealed. Afterward, the stability analysis of the model was carried out, and finally, causality, impulse-response, and variance decomposition analysis of the variables in the model were performed.

As in time-series analyses, BIC, AIC, and HQIC criteria are used when determining the lag length. In order to determine the appropriate lag lengths, model selection criteria of  $MMSC_{AIC}$ ,  $MMSC_{BIC}$  and  $MMSC_{HQIC}$  developed for Panel VAR with the help of the Generalized Method of Moments developed by Andrews and Lu (2001) were used, and the results are shown in Table 11.

**Table 11. Panel VAR Model Appropriate Lag Length Results**

Number of Lags	MBIC	MAIC	MQIC
1	-451.8325*	-83.37474*	-232.1023*
2	-283.446	-37.8075	-136.9592
3	-142.0803	-19.261	-68.83684

According to the results analyzed with a maximum of 3 lags, 1 lag length in all criteria was deemed appropriate in the estimation of the model. Once the lag length was determined, the Panel VAR model with 1 lag was estimated with the help of GMM. Results of the PVAR model are presented in Table 12 below.

**Table 12. Panel VAR Model Estimation Results**

	Coefficient	Standard Error	Z Statistic	Probability
<b><math>\Delta</math>LOGSP</b>				
$\Delta$ LOGSP(-1)	0.9662357	0.0493162	19.59	0.000
$\Delta$ LOGBV(-1)	-0.0708299	0.2052012	-0.355	0.730
$\Delta$ DLOGATR(-1)	0.0893598	0.0765408	1.17	0.243
$\Delta$ DLOGTA(-1)	-1.847115	0.1860419	-9.93	0.000
$\Delta$ DLOGOPM(-1)	0.0411944	0.0352404	1.17	0.242
$\Delta$ DLOGFL(-1)	0.7428659	0.0938747	7.91	0.000
<b><math>\Delta</math>LOGBV</b>				
$\Delta$ LOGSP(-1)	-0.1244308	0.0137431	-9.05	0.000
$\Delta$ LOGBV(-1)	0.5556319	0.0628634	8.84	0.000
$\Delta$ DLOGATR(-1)	0.0826531	0.0200912	4.11	0.000
$\Delta$ DLOGTA(-1)	-0.320831	0.0405604	-7.91	0.000
$\Delta$ DLOGOPM(-1)	-0.0128767	0.0041143	3.13	0.002
$\Delta$ DLOGFL(-1)	0.0510858	0.0357507	1.43	0.153
<b><math>\Delta</math>DLOGATR</b>				
$\Delta$ LOGSP(-1)	0.0601331	0.0257347	2.34	0.019
$\Delta$ LOGBV(-1)	-0.0616089	0.0973262	-0.63	0.527
$\Delta$ DLOGATR(-1)	-0.0271456	0.0414684	-0.65	0.513
$\Delta$ DLOGTA(-1)	-0.2030327	0.0959701	-2.12	0.034
$\Delta$ DLOGOPM(-1)	0.0806624	0.0105589	7.64	0.000
$\Delta$ DLOGFL(-1)	0.2522206	0.0591478	4.26	0.000
<b><math>\Delta</math>DLOGTA</b>				
$\Delta$ LOGSP(-1)	0.0727337	0.0100182	7.26	0.000
$\Delta$ LOGBV(-1)	-0.202931	0.0423474	-4.79	0.000
$\Delta$ DLOGATR(-1)	-0.0358743	0.01419	-2.53	0.011
$\Delta$ DLOGTA(-1)	0.0437288	0.0273352	1.60	0.110
$\Delta$ DLOGOPM(-1)	0.0443803	0.0076125	5.83	0.000
$\Delta$ DLOGFL(-1)	0.1837477	0.0244505	7.52	0.000
<b><math>\Delta</math>DLOGOPM</b>				
$\Delta$ LOGSP(-1)	-0.0222015	0.0258656	-0.86	0.391
$\Delta$ LOGBV(-1)	-0.1154518	0.0970596	-1.19	0.234

$\Delta$ DLOGATR(-1)	-0.1651542	0.0434725	-3.80	0.000
$\Delta$ DLOGTA(-1)	-0.3522449	0.094457	-3.73	0.000
$\Delta$ DLOGOPM(-1)	0.1991759	0.0109539	18.18	0.000
$\Delta$ DLOGFL(-1)	0.8615909	0.0881389	9.78	0.000
$\Delta$ DLOGFL				
$\Delta$ LOGSP(-1)	-.0147979	.0137762	-1.07	0.283
$\Delta$ LOGBV(-1)	.0615873	.0508061	1.21	0.225
$\Delta$ DLOGATR(-1)	.0323375	.0213328	1.52	0.130
$\Delta$ DLOGTA(-1)	-.090754	.0326698	-2.78	0.005
$\Delta$ DLOGOPM(-1)	-.0342646	.0125147	-2.74	0.006
$\Delta$ DLOGFL(-1)	-.0002497	.05356	-0.00	0.996

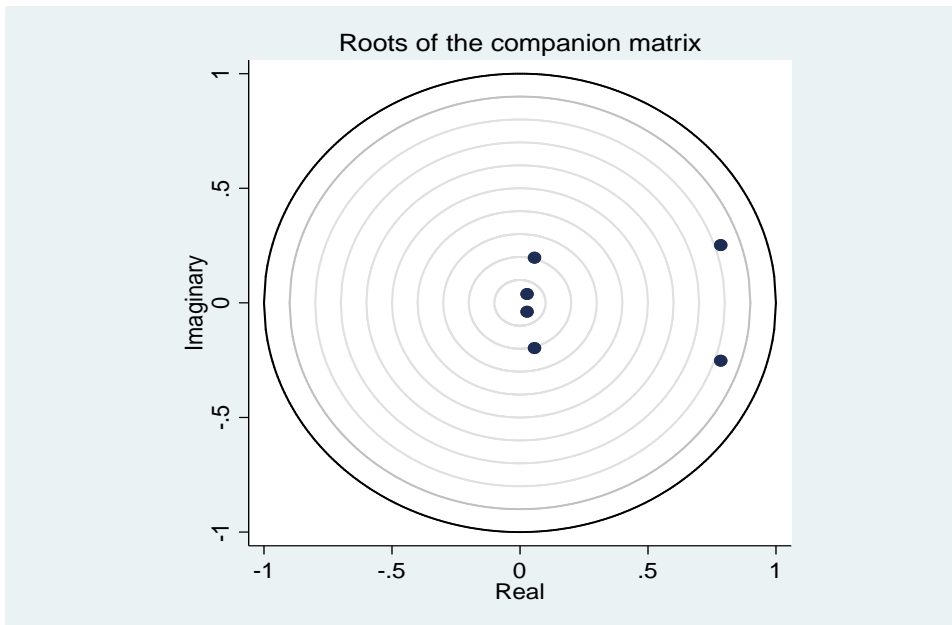
\* $\Delta$  Difference processor

The estimated Panel VAR model needs to be subjected to stability analysis. Eigenvalues of the estimated model below 1 ensure that the characteristic roots of the model are located in the unit circle. The results of the stability analysis are shown in Table 13.

**Table 13. Panel VAR Model Stability Analysis - Eigenvalue Results**

Eigenvalues		
Real Values	Estimated Values	Fixed Values
0.784306	0.2522003	0.8238573
0.784306	-0.2522003	0.8238573
0.0567468	0.1970523	0.2050605
0.0567468	-0.1970523	0.2050605
0.0276358	0.0385915	0.0474662
0.0276358	-0.0385915	0.0474662

According to Table 13, the eigenvalues of all characteristic roots of the Panel VAR model are below 1. Also, as seen in Figure 1 below, all of the characteristic roots are located in the unit circle.



**Figure 1. Location of Characteristic Roots in the Unit Circle**

The fact that the model passed the stability analysis is important in terms of obtaining the results of impulse-response analysis and variance decomposition. However, the results should be

supported by information about the existence and direction of the relationship between the variables.

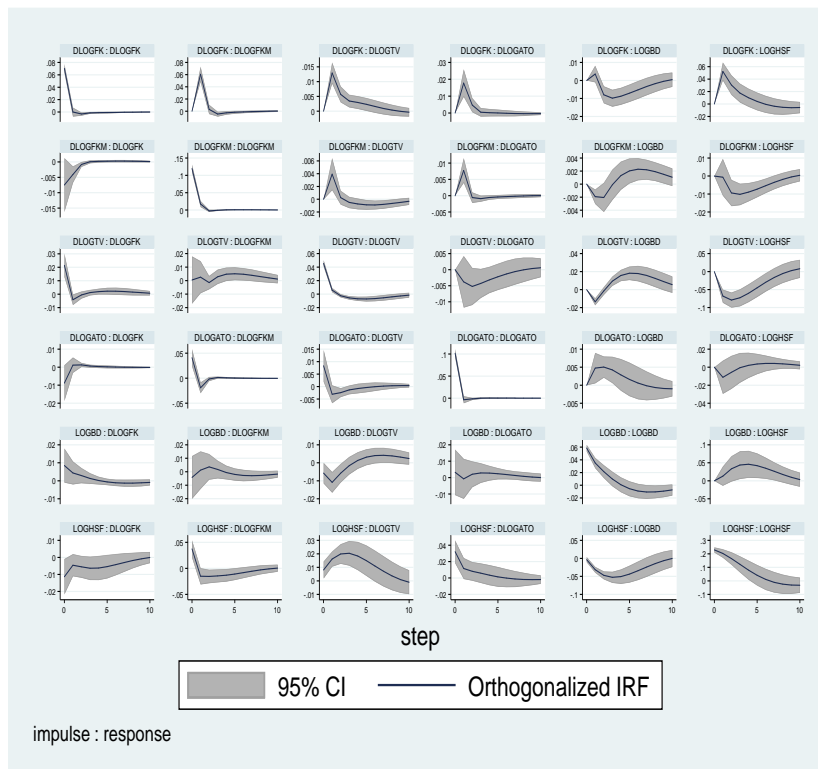
**Table 14. Panel VAR Causality Results**

Variables	$\chi^2$ Value	Probability Value	Decision
$\Delta \text{LOGSP} \rightarrow \Delta \text{LOGBV}$	0.119	0.730	There is no causality
$\Delta \text{LOGBV} \rightarrow \Delta \text{LOGSP}$	<b>81.976</b>	<b>0.000</b>	There is causality
$\Delta \text{LOGSP} \rightarrow \Delta \text{DLOGATR}$	1.363	0.243	There is no causality
$\Delta \text{DLOGATR} \rightarrow \Delta \text{LOGSP}$	<b>5.460</b>	<b>0.019</b>	There is causality
$\Delta \text{LOGSP} \rightarrow \Delta \text{DLOGTA}$	<b>98.575</b>	<b>0.000</b>	There is causality
$\Delta \text{DLOGTA} \rightarrow \Delta \text{LOGSP}$	<b>52.710</b>	<b>0.000</b>	There is causality
$\Delta \text{LOGSP} \rightarrow \Delta \text{DLOGOPM}$	1.366	0.242	There is no causality
$\Delta \text{DLOGOPM} \rightarrow \Delta \text{LOGSP}$	0.737	0.391	There is no causality
$\Delta \text{LOGSP} \rightarrow \Delta \text{DLOGFL}$	<b>62.622</b>	<b>0.000</b>	There is causality
$\Delta \text{DLOGFL} \rightarrow \Delta \text{LOGSP}$	1.154	0.283	There is no causality

**Note:** Causality results only over the dependent variable LOGSP are included.

According to the causality results above, Beta Value (LOGBV) and Acid-Test Ratio (DLOGATR) were found to be the reason for Stock Prices (LOGSP). A bidirectional causality was found between Total Assets (DLOGTA) and Stock Prices (LOGSP). Panel data analysis yielded a result consistent with the result that the total assets variable has a positive effect on the stock price. In addition, Stock Prices (LOGSP) were found as the reason for Financial Leverage (FL).

The fact that the coefficient interpretations of the dynamic relationships studied in the VAR analysis are not important, reduces the significance of the variables and the importance of their signs. The investigation of dynamic relationships is performed through impulse-response analysis and variance decomposition in conventional VAR analysis. In the panel VAR model, it is investigated how 1 standard deviation shock to one of the estimated random errors affects the current and future values of the other variables considered as internal. Chart 4.1 presents the analyses showing the effects of other variables on each other in the case of 1 standard deviation shocks in the balance of stock prices and internal financial factors (beta value, acid-test ratio, total assets, operating profit margin, financial leverage) in the context of the airline industry.



**Chart 1. Impulse-Response Analysis Chart**

Since the study examines the relationships between stock prices and other variables, the impulse-response analysis of stock prices and other variables is important. Accordingly, as a result of the impulse-response analysis, the relationship between SP and other variables is interpreted in the chart.

Looking at the chart above, LOGSP: LOGSP shows the effect of 1 standard deviation shock to the stock price on the stock price itself. As can be seen from the chart, a 1 standard deviation shock to the stock price negatively affects the stock price itself (this effect is seen until the fifth period and continues, albeit with a decrease, after the fifth period). It is observed that 1 standard deviation shock to stock prices has a negative effect on beta values (LOGSP: LOGBV) until the fifth period and a positive effect after the fifth period. One standard deviation shock to stock prices (LOGSP: DLOGATR) has a sharp negative effect on the liquidity ratio (acid-test ratio) until the first period. After the first period, the negative effect continues by decreasing. It is seen that 1 standard deviation shock (LOGSP: DLOGTA) to stock prices has a positive effect on firm size (total assets) until the third period and then a negative effect. One standard deviation shock (LOGSP: DLOGOPM) to stock prices has a very strong negative effect on profitability (operating profit margin) until the second period. After the second period, a slow positive effect is seen. It is observed that financial leverage ratios (LOGSP: DLOGFL) are almost not affected by 1 standard deviation shock to stock prices.

One standard deviation shock (LOGBV: LOGSP) to beta values has a positive effect on stock prices with little acceleration until the third period and a negative effect with little acceleration with the start of the fourth period. It is observed that the shock to liquidity ratios causes short-term fluctuations in stock prices (DLOGATR: LOGSP). One standard deviation shock to firm size data (DLOGTA: LOGSP) has a strong negative effect on stock prices until the second period and a positive effect after the second period. One standard deviation shock to the operating profitability (DLOGOPM: LOGSP) data has a stable effect until the first period and a negative effect after the first period and until the third period. After the fourth period, a slightly strong positive effect is observed. Finally, 1 standard deviation shock to financial leverage data (DLOGFL: LOGSP) has a strong positive effect on stock prices until the second period. A negative effect is observed after the second period.

In order to support the information obtained by the impulse-response analysis, variance decomposition analysis was performed. Results regarding which variables explain the changes in a variable can be obtained by variance decomposition analysis. Table 15 presents the variance decomposition results.

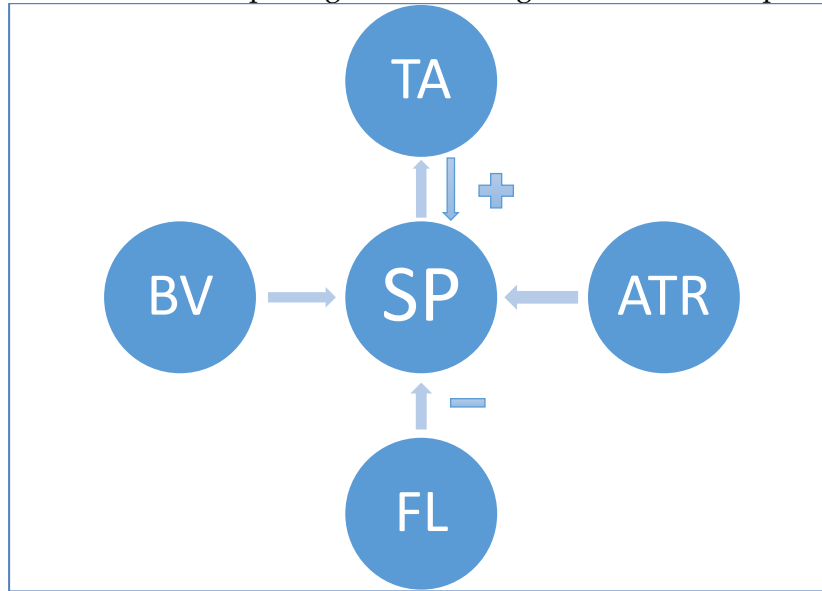
**Table 15. Variance Decomposition Results**

Response Variable LOGSP	Impulse Variable					
	LOGSP	LOGBV	DLOGATR	DLOGTA	DLOGOPM	DLOGFL
Period						
0	0	0	0	0	0	0
1	1	0	0	0	0	0
2	0.9245115	0.0016256	0.0012314	0.0456873	0.0000041	0.0269401
3	0.8828977	0.0092507	0.0011455	0.0793964	0.0006443	0.0266655
4	0.851786	0.019918	0.0009857	0.1012786	0.001197	0.0248349
5	0.8280298	0.030692	0.0009411	0.1150895	0.0015771	0.0236706
6	0.8115909	0.0397009	0.0009837	0.1228786	0.0018254	0.0230205
7	0.8019654	0.0459914	0.0010704	0.12628	0.0019634	0.0227294
8	0.7976643	0.0495221	0.0011614	0.126971	0.0020193	0.0226619
9	0.7966596	0.0509374	0.0012315	0.1264472	0.0020272	0.0226972
10	0.7970941	0.0511341	0.001273	0.1257306	0.0020165	0.0227516

In Table 15, variance decomposition was performed for each of the variables, and it was aimed to see the effects of other variables on stock prices. When the effects of variables on the stock price are examined, it can be said once that stock prices, which have 100% explanatory power of their own dynamics in the first period, are the most exogenous variables. In the second period, approximately 92% of the stock prices can be explained by the stock price itself, and 8% by the shocks to the other variables. In other periods, the stock price's explanatory power over itself decreases (80%), and the

variable with the most explanatory power (12%) after it emerges as the total assets variable, which is the indicator of firm size. Panel data analysis yielded a result consistent with the result that the total assets variable positively affects stock prices. According to the end-of-period data, the other variable with the greatest explanatory power (5%) was the beta value. It was observed that the financial leverage variable has an explanatory power of approximately 3% in all periods. Finally, other variables (DLOGATR, DLOGOPM, and DLOGFL) have very little effect on or explanatory power over stock prices.

As a result of the analysis, the relationship between the internal factors and the stock prices of the airlines is explained with the help of figures. This diagram of relationships is shown in Figure 2.



**Figure 2. Diagram of Relationships between Internal Factors and Stock Prices of Airlines**

In the study, as a result of the Panel data analysis, it was determined that the total assets variable positively affected while the financial leverage variable negatively affected stock prices. The panel VAR Causality results revealed bidirectional causality between the total asset variable and the stock price, and a unidirectional causality between the Beta value and Acid-test ratio variables and the stock price. In this regard, it was determined that TA, FL, BV, and ATR variables are significantly related to the stock price.

In this part of the study, it is aimed to compare the empirical findings obtained as a result of the panel data analysis applied to the 2005-2018 data of the airlines with the study hypothesis. In this context, the sign expectations for independent variables [Beta Value (LOGBV), Liquidity Ratio (DLOGATR), Firm Size (DLOGTA), Profitability (DLOGOPM), and Financial Leverage (DLOGFL)] and the findings obtained as a result of the empirical analysis were compared. Table 16 below presents the findings and sign expectations obtained from the analysis.

**Table 16. Comparison of Theoretical Expectations and Findings**

Measurement Indicator	Hypothesis	Findings
LOGBV	-	No relationship
DLOGATR	+	No relationship
DLOGTA	+	+
DLOGOPM	+	No relationship
DLOGFL	-	-

Accordingly, as a result of the analysis of the data obtained from the airlines in the sample, it is seen that the total assets (DLOGTA) variable showing the size of the firm is compatible with the hypothesis. In other words, increases in the total assets of airlines affect their stock prices positively.

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As a result of the analysis, it is seen that the financial leverage variable showing the financial structure is compatible with the hypothesis. It is concluded that the other variables (LOGBV, DLOGATR, and DLOGOPM) have an insignificant relationship with the stock price.

According to the panel VAR causality analysis, Beta Value (LOGBV) and Acid-Test Ratio (DLOGATR) were found to be the reason for Stock Prices (LOGSP). A bidirectional causality was found between Total Assets (DLOGTA) and Stock Prices (LOGSP). The result of the panel data analysis that the total assets variable has a positive effect on the stock price is consistent with the Panel VAR causality analysis result.

### **Conclusion and Discussion**

Airline businesses are remarkably sensitive to all systematic and unsystematic risks. Because the operational and financial risks of airlines are very high. Therefore, it is extremely important to determine the factors that affect the stock prices of airline businesses. In order to reveal these factors; Its use in testing the financial performance of airline businesses contributes to the examination of the financial statements in the context of systematic risk and enables the changes in the said statements to be explained. Meanwhile, in the context of unsystematic risk are described the effects of changes arising from macroeconomic factors on stock prices. In other words, determining which variables are effective in the change in the stock prices of airline businesses is important in terms of performance evaluation of airline businesses.

In the study, internal financial factors affecting the stock prices of airline businesses are examined. In this context, the relation between the stock prices of airline businesses and internal factors such as TA, ATR, OPM, FL and BV has been analysed by Panel data and Panel VAR methods.

As a result of the panel data analysis on internal factors, it was determined that the total assets (TA) variable has a positive effect on stock prices, while the financial leverage (FC) variable has a negative impact.

According to the panel VAR Causality results, bidirectional causality was determined between the total asset variable and the stock price; one-way causality between the beta value (BV) and acid-test ratio (ATR) variables and the stock price. In this framework, the significant relationships of TV, FK, ATO and BD variables with the stock price were determined. As a result of all analyzes (panel data, causality, impulse-response and variance decomposition), the TA variable, which is one of the indicators of firm size in airline businesses, has been found to be strongly related (+) to the stock price of airline businesses. Thus, airline businesses should increase the size of the firm as much as possible to maximize the value of the stock.

This result illustrates that airline businesses display adequate performance in terms of stock value by taking advantage of economies of scale. Airline businesses that benefit from economies of scale provide a competitive advantage by showing lower costs and higher efficiency compared to rival airline businesses. Therefore, the advantage of competitive will positively affect the performance criteria of airline businesses (profitability, stock value, etc.).

The negative effect of the FL variable, which is an indicator of the capital efficiency of airline businesses, on the stock price is concluded as expected in the hypothesis. Accordingly, it has been determined that airline businesses with high debt financing affect the stock value negatively. One of the most important reasons that increase financial leverage in airline businesses is the increase in costs. At this point, it may be an effective way for airlines to reduce operational costs. Oil cost is one of the biggest factors in airline cost control. There are two ways to decrease fuel costs. Firstly, airlines can optimize fuel costs with their hedging strategies. For instance, Southwest airlines maintained about 70% of their fuel consumption at a cost of \$ 51 a barrel in 2008, while the market price of oil was around \$ 100. Thus, Southwest continued to maintain its profitability without being affected by the 2008 crisis (Pyke and Sibdari, 2018, p.198).

Another way to reduce cost is that airlines can reduce fuel costs by having new fuel-saving aircraft. For example, Air France-KLM stated that as a result of the replacement of Boeing 747-300 aircraft with Boeing 747-300ER aircraft, fuel costs decreased by 26% (Lee and Jang, 2007, p. 440).



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In addition, airlines must control high labour costs. However, it is often becoming impossible for airline businesses to reduce labour costs. Compared to other industries, airline work takes on a high level of skill and responsibility (O'Connor, 2001, p.81). Therefore, costs could be increased by compress personnel wages. However, due to syndicate activities, operational and personnel costs of airline businesses are also increasing. All these difficulties make it difficult for airline businesses to control personnel costs. Airline businesses struggle with high-interest expenses while providing high debt financing. Airlines may experience liquidity congestion while meeting high-interest expenses and may not be able to fulfil short-term obligations like bank loans. In this case, airlines may face the risk of bankruptcy by experiencing a liquidity shortage. Airlines can raise capital through internal financing (auto financing) (increasing their revenues and/or reducing costs) or by offering stocks instead of external borrowing (which can have a negative impact on financial leverage). Thus, the financial leverage will decrease and the stock will gain value accordingly.

According to the panel VAR causality analysis, it was determined that the ATR variable, which is one of the liquidity indicators of airline businesses, is the cause of the stock price. Accordingly, it has been observed that the short-term cash flows (working capital) of airline businesses affect the stock value. Airline businesses can increase operating performance and stock value through well-designed cash flow planning and working capital. It is claimed that an enterprise with an ATR rate of less than 1 cannot repay its current obligations and may face bankruptcy. For the airline industry, the average liquidity proportion is 0.90, and several airline businesses are below this value (Lee and Hooy, 2012, p.33). The average ATO rate of the airline businesses (28 airline businesses) in the sample is lower than the industry average and is 0.73. Based on these data, it can be said that the ability of airline businesses to pay their short-term debts is low.

Airline businesses experience difficulties in terms of cash flow at some periods of the year, as they operate in high seasonal and cyclical operating environments.

During these periods, airlines can be exposed to short-term liquidity risk (Moody's-Passenger Airline Industry, 2018, p.18). As stated above, in cases where there is liquidity risk, airlines should prefer internal financing (auto financing) by increasing revenues rather than providing cash through external borrowing.

Alternatively, cash can be provided by issuing stocks. However, financing by stock supply is not preferred for short-term liabilities. Accordingly, one of the ways to obtain save of the liquidity crunch is to increase the revenues of airline businesses. In this way, it is thought that the good liquidity status of the airline businesses will contribute positively to the stock value.

According to the panel VAR causality analysis, it was determined that the BV variable, which is the systematic risk indicator, is the cause of the stock price. There are two views in the literature for the measure of systematic risk. Firstly, in the context of the risk-return relationship, it has been argued that stocks with high risk will have high profits and the risk positively affects stock prices.

Particularly risk-prone investors prefer stocks which are high risk to earn higher returns. The second idea is, it is argued that businesses with high systematic risk may have a loss or bankruptcy and adversely affect the stock value. As a result of the perspective, it was determined that BV is associated with the stock price, but it has not been found to have a positive or negative impact. According to the relationship between BV and SP, airlines should not ignore the BV effect. In order to pro-risk investors, the high BD of airlines businesses could be preferable.

According to the results of panel data analysis and causality analysis, no significant relationship was found between the OPM variable, one of the profitability indicators of airline businesses, and the stock price. It is thought that profitability, which is one of the basic indicators measuring business performance has a positive impact on stock value in theory. However, the sample made with airline businesses was determined that the profitability variable (OPM) does not affect the stock price. This result, it can be said that unlike the profitability of airline businesses, there are more significant internal factors affecting the stock value. In this study, other variables which, are TA, FL, ATR, and BV were found to be more important.

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To sum up, according to all the findings of the study; Airline businesses can increase their share value by taking advantage of the economics of scale, optimizing the liquidity position, and taking into account the negative impact of financial leverage, in order to increase stock value.

It is thought that the findings obtained as a result of the study will contribute to determining the factors affecting the stock prices of airline businesses, determining the variables that determine investment decisions and stock prices. In addition, it is thought that by bringing new solutions to these businesses in terms of maximizing stock prices, it will contribute positively to the financial performance of airline businesses.

The study has some limitations that will affect the research results. The first is that the research sample is limited. Another constraint is the frequency and duration of the statistical data used in the study. Another restriction is the limited number of independent variables. It is thought that in the future carrying more frequent and long-term study with more examples for airline operations and variables studies will produce more accurate results.

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