DETERMINANTS OF CAPITAL STRUCTURE: EMPIRICAL EVIDENCE FROM TRADITIONAL AIRLINES[1]

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Abstract

The purpose of this study is to examine the factors that define capital structure of airlines with traditional business model by taking into account the capital structure theories. In line with this purpose, 31 airline companies, which have continuous financial data during the 2004-2015 period, were examined. Panel data analysis was used as a method in the study. Empirical findings of the study show that traditional airlines operate in line with the Trade-off Theory when determining their long-term debt ratio. In addition, findings of the study indicate that traditional airlines operate in line with the Pecking Order Theory when determining the total debt ratio, which also means that they tend to increase total leverage level.

Keywords: *Traditional airlines, Pecking order theory, Trade-off theory, Panel data analysis*
JEL Classification: *G20, G32, L93*

SERMAYE YAPISININ BELİRLEYİCİLERİ: GELENEKSEL HAVAYOLLARINDAN AMPİRİK KANITLAR

Öz

Bu çalışmanın amacı geleneksel iş modeli uygulayan havayollarının sermaye yapısını belirleyen faktörlerin sermaye yapısına ilişkin teoriler dikkate alınarak incelenmesidir. Bu amaç doğrultusunda finansal verileri 2004-2015 döneminde süreklilik gösteren 31 havayolu şirketi incelenmiştir. Çalışmada yöntem olarak panel veri analizi kullanılmıştır. Çalışmanın ampirik bulguları geleneksel havayollarının uzun vadeli borç oranını belirlerken Dengeleme Teorisine uygun olarak hareket ettiğini ortaya koymaktadır. Buna ek olarak çalışmanın sonuçları, geleneksel havayollarının toplam borç oranlarının belirlenmesinde Finansman Hiyerarşisi Teorisine uygun olarak hareket edildiğini diğer bir ifadeyle toplam kaldıraç düzeyini arttırma eğiliminde olunduğunu göstermektedir.

Anahtar Kelimeler: *Geleneksel havayolları, Finansman hiyerarşisi teorisi, Dengeleme teorisi, Panel veri analizi*
JEL Sınıflandırması: *G20, G32, L93*

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1. Introduction

The issue of whether capital structure or in other words debt/equity structure of firms is influential on the firm value is one of the most discussed topics in the finance literature. The foundations of the approach which was first introduced by Franco Modigliani and Merton Miller (1958 and 1961) are based on the irrelevance theory where firm value is independent of capital structure. After Modigliani and Miller's theory, many studies have been conducted and many theories have been proposed on the capital structure. However, two main theories stand out when explaining financing behaviors of the firms. The first is "Trade-off Theory", which underlines that the most appropriate capital structure can be achieved where debt borrowing costs (financial difficulty and bankruptcy costs) are balanced thanks to the tax shield advantage of the financing obtained by using external funds. According to the trade-off theory, capital structure is not independent of the debt/equity composition. Optimal capital structure is achieved when the tax advantage provided by foreign resources is balanced with financial difficulty and bankruptcy costs. According to the trade-off theory, reaching high debt/equity ratio will lead to financial difficulty and decrease of market value for a firm and therefore an increase in debt costs and capital cost. Moreover, when a firm is in financial difficulty, this will cause an increase in legal expenses, opportunity costs as well as direct and indirect costs related to suppliers and customers (Drake & Fabozzi, 2010, p. 170). Therefore, the firms define a debt/equity ratio based on their policies and attempt to progress towards this target step by step (Myers S. C., 1984, p. 576).

The second is the pecking order theory which was introduced by Myers & Majluf (1984) and Myers (1984). According to this theory, managers have more knowledge about the firm value than relevant potential investors. Therefore, investors make decisions by interpreting financing behaviors of a firm (Myers S. C., 1984, p. 187). The pecking order theory is an approach based on information asymmetry between managers and investors, reverse selection and representation assumptions. Managers and shareholders know actual value and growth opportunities of the firm. On the other hand, investors make estimations about the value of firm by observing its financing behaviors only since they do not have this information (Frank & Goyal, 2008, p. 151). According to the Pecking Order Theory, firms tend to make their financing preferences in a certain hierarchical order. Accordingly, while companies finance their investments, they prefer internal resources over external resources. Also, when internal funds are insufficient, firms tend to prefer low-risk borrowing options first. The issue of new shares is implemented as the last financing method in cases where debt financing is very costly for the firms (Bontempi, 2002, p. 2). In other words, firms benefit from the undistributed profits first in the financing of new investments. In cases where such profits fall short, they prefer using financing by equity as the last option from external funds (Chakraborty, 2010, p. 296).

In the study, panel data analysis method was used to examine the variables that were influential on debt-equity decisions of traditional airlines in the period of 2004-2015. The study included 31 airlines with fully accessible financial data in the period of 2004-2015. The study aims to reveal the factors that determine capital structure decisions of traditional airlines and examine capital structure behaviors of traditional airlines based on the Trade-Off and Pecking Order Theories.

In this study, where the factors that determine capital structure decisions of traditional airlines, the second section will cover the studies conducted on capital structure, the third section will cover the research model of study, the fourth section will cover data set and method of study, and the fifth section will cover empirical findings and their relation with the capital structure theories. In the last section of study, the results that were obtained as a result of empirical study will be discussed.

2. Literature Summary

There are few studies conducted empirically on the factors that determine capital structure of firms in the service industry. Among these, Karadeniz et al., (2009) studied the factors that determine capital structure of accommodation businesses quoted in İstanbul Stock Exchange by using the panel data analysis method. Empirical findings of the study indicated that there is a negative relationship between the asset structure, profitability, and tax level variables and debt ratio. Ajanthan (2013) conducted an empirical study on the 2008-2012 data of 15 service industry businesses quoted in the Colombia Stock Exchange. Results of the study showed that there is a negative relationship between profitability variable and short-term, long-term and total debt level. Serrasqueiro and Nunes (2014) examined capital structure of small and medium-sized hotels operating in Portugal. In the study, financial data of 177 hotels operating between 2000 and 2009 were examined using the panel data analysis method. Findings of the study revealed that firm size, asset structure, growth opportunities, non-debt tax shield and company risk variables are influential on the debt level. Pattweekongka and Napompech (2014) studied financial data of 140 accommodation businesses operating in Thailand between 2006 and 2010 by using the panel data analysis method. Findings of the study showed that profitability, liquidity ratio, company risk and asset structure variables are influential on the debt level.

Also, in the literature, there are studies where capital structure of firms quoted in national stock exchange of countries is examined. For example; Bauer (2004) examined capital structure decisions of 72 firms quoted in the Prague Stock Exchange between 2000 and 2001. Chen (2004) studied capital structure determinants of 88 China-based firms quoted in Dow-China 88 Index for the period of 1995-2000. Chakraborty (2010) studied the factors that affect capital structure of 1169 firms quoted in the Bombay Stock Exchange with no financial operations for the period of 1995-2008. Thippayana (2014) studied capital structure decisions of 144 firms quoted in the Thailand Stock Exchange for the period of 2000-2011. The literature also includes many studies where the factors that determine capital structure decisions of small and medium-sized enterprises (SMEs) are studied empirically (Bhaird & Lucey, 2010; Forte, Barros, & Nakamura, 2013; López-Gracia & Sogorb-Mira, 2008; Palacín-Sánchez & Pietro, 2016). As is understood from the literature, many studies have been conducted on the determinants of capital structure in different sector or stock market samples. On the contrary, there are not many studies conducted on the airline industry or the determinants of capital structure of traditional airlines. This study is expected to determine the factors that define the capital structure of traditional airline companies and contribute to the literature in this context.

3. Research Model

In the study, 3 models were developed to determine factors affecting capital structure. In the first model, the factors determining the total debt ratio of traditional airlines are examined. In the second model, long-term debt ratio of airline companies is used as dependent variable and the factors that define long-term debt ratio of traditional airlines are examined. In the third model, the factors determining the short-term debt ratio of traditional airlines are examined. Independent variables used in the study were chosen from among the most used ratios in the literature. The models that were developed within the scope of study are as follows.

Model 1: $TDR_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 GO_{it} + \beta_3 PR_{it} + \beta_4 NLTS_{it} + \beta_5 CR_{it} + \beta_6 AS_{it} + \beta_7 LR_{it} + \varepsilon_{it}$ (1)

Model 2: $LTDR_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 GO_{it} + \beta_3 PR_{it} + \beta_4 NLTS_{it} + \beta_5 CR_{it} + \beta_6 AS_{it} + \beta_7 LR_{it} + \varepsilon_{it}$ (2)

Model 3: $STDR_{it} = \beta_0 + \beta_1 CS_{it} + \beta_2 GO_{it} + \beta_3 PR_{it} + \beta_4 NLTS_{it} + \beta_5 CR_{it} + \beta_6 AS_{it} + \beta_7 LR_{it} + \varepsilon_{it}$ (3)

The models that were developed to determine capital structure of traditional airlines are seen in equations (1), (2) and (3) above. Model 1, Model 2 and Model 3 aims to reveal the factors that determine the total debt ratio (TDR), the long-term debt ratio (LTDR) and short-term debt ratio (STDR), respectively.

As it is explained in the literature section, theoretical and empirical studies conducted on capital structure show that firm size, growth opportunities, profitability, non-debt tax shield, company risk, asset structure and liquidity ratio variables affect capital structure of the firms. The independent variables used in the study and their measurement indicators can be listed as follows.

3.1. Company Size (CS)

Company size is one of the most important variables that influence borrowing decisions. From a theoretical perspective, it is seen that there are different approaches to the relationship between company size and debt level. According to the Trade-Off Theory, companies operating on a large scale have the ability to borrow at lower costs and in higher amounts. In addition, large-scale companies have a consistent and diversified cash flow. Therefore, large-scale firms tend to use more external funds than small firms according to this theory. Proposed by Myers (1984), the Pecking Order Theory argues that the fact that large-scale firms have more internal funds than small-scale firms and information asymmetry is lower and information flow to investors is at higher level in large-scale firms leads these firms to utilize external funds at a lower level. Studies in the literature shows that there is a positive relationship (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001; Colombo, 2001; Ozkan, 2001; Frank & Goyal, 2003; Baxamusa & Jalal, 2014; Umer, 2014) and a negative relationship (Seo & Choi, 2016; Jõeveer, 2013; Forte, Barros, & Nakamura, 2013; Ahmad, Juniad-ul-Haq, Nasir, Ali, & Ullah, 2011; Chakraborty, 2010) between firm size and debt level.

Measurement indicator = CS: Log (total assets)

3.2. Growth Opportunities (GO)

In the literature, there is an uncertainty about the relationship between growth opportunities and debt level. Companies with high growth opportunities tend to utilize liabilities to expand their capacity, implement new projects, launch new products, and perform maintenance and repair activities. Therefore, a positive relationship can be expected between growth opportunities and debt level. On the contrary, this indicates that firms with high growth opportunities have a floating cash flow trend, relatively low level of tangible fixed assets and high level of information asymmetry. This shows the existence of a negative relationship. Examples of studies that reveal the existence of a positive relationship between growth opportunities variable and debt level include (Nunkoo & Boateng, 2010; Öztekin & Flannery, 2012; Pacheco & Tavares, 2015; Arsov & Naumoski, 2016; Palacín-Sánchez & Pietro, 2016). Studies that indicate existence of a negative relationship can be listed as (Bandyopadhyay & Barua, 2016; Umer, 2014; Fosu, 2013; Forte, Barros, & Nakamura, 2013; Kayo & Kimura, 2011).

Measurement indicator = GO: % change in sales

3.3. Profitability (PR)

In the literature, there are different approaches about the effect of profitability on debt level. Tax-oriented approaches highlight that firms with high profitability level use more external funds in order to benefit from the tax shield. On the other hand, there are approaches which argue that firms with high profitability level mainly use internal funds in financing of investments, and use of external funds or issue of new shares are considered as financing resources that may be used in following stages. In the literature, there are studies which reveal the existence of a positive relationship (King & Santor, 2008; Nunkoo & Boateng, 2010; Ahmad, Juniad-ul-Haq, Nasir, Ali, & Ullah, 2011; Serrasqueiro, Armada, & Nunes, 2011; Forte, Barros, & Nakamura, 2013) and a

negative relationship (Vicente-Lorente, 2001; Bauer, 2004; Deesomsak, Paudyal, & Pescetto, 2004; Antoniou, Guney, & Paudyal, 2008) between profitability variable and debt level.

Measurement indicator = PR: Operating income/total assets

3.4. Non-Loan Tax Shield (NLTS)

Firms use instruments such as depreciation, pension funds, investment credits and investment allowances as non-debt tax shields in order to pay less corporate tax. This decreases tax shield requirement provided by borrowing for the firms with high non-debt tax shield and causes the firms to borrow at lower levels. Therefore, a negative relationship can be expected between debt ratio and use of non-debt tax shield. In the literature, there are studies that show the existence of a negative relationship between non-debt tax shield and debt level (Huang & Song, 2006; Cotei & Farhat, 2009; Serrasqueiro, Armada, & Nunes, 2011; Sheikh & Wang, 2011; Arsov & Naumoski, 2016) as well as there are studies in which the results that are contrary to the theory (Öztekin & Flannery, 2012; Ahmad, Juniad-ul-Haq, Nasir, Ali, & Ullah, 2011; Chakraborty, 2010; Gropp & Heinder, 2010).

Measurement indicator = NLTS: Depreciation/total assets

3.5. Company Risk (CR)

Company risk is used to express a company's likelihood of financial difficulty and bankruptcy and insolvency. A volatility in revenues of firms increases the possibility of financial difficulty and may cause the firms to fail to meet its obligations related to the borrowing. This also decreases borrowing capacity and increases borrowing costs of the firm as well. Therefore, a negative relationship is expected between company risk and borrowing level. In the literature, examples of studies where the existence of a negative relationship between company risk variable and debt level is argued include (Booth, Aivazian, Demirguc-Kunt, & Maksimovic, 2001; Miguel & Pindado, 2001; Delcoure, 2007; Serrasqueiro, Armada, & Nunes, 2011; Sheikh & Wang, 2011). There are also studies where the results were found contrary to the Trade-Off and Pecking Order Theories (Ovtchinnikov, 2010; Psillaki & Daskalakis, 2009; Tang & Jang, 2007)

Measurement indicator = CR: EBIT Standard Deviation

3.6. Asset Structure (AS)

Although there are many studies in the literature that examine the relationship between asset structure and debt level of companies, there is uncertainty about the indication of such relationship theoretically. According to the Trade-off Theory, the fact that tangible fixed assets can create value even after bankruptcy and be provided as guarantee when borrowing enables the firms to obtain external funds on more favorable terms and at lower costs. The Pecking Order Theory asserts that firms with high level of tangible fixed assets have lower level of information asymmetry, investors would prefer being a shareholder instead of making loan and therefore issue of shares will be less costly. In this case, the firms will concentrate on financing by equity and prefer less borrowing. In the literature, examples of studies where positive effect of asset structure on debt level is reported include (Colombo, 2001; Deesomsak, Paudyal, & Pescetto, 2004; Cotei & Farhat, 2009; Jong, Verbeek, & Verwijmeren, Firms' debt–equity decisions when the static tradeoff theory and the pecking order theory disagree, 2011; Öztekin & Flannery, 2012; Jõeveer, 2013; Lemmon, Roberts, & Zender, 2008). Examples of studies where a negative effect is reported include (Mazur, 2007; Psillaki & Daskalakis, 2009; Ovtchinnikov, 2010; Jõeveer, 2013).

Measurement indicator = AS: Fixed assets/total assets

3.7. Liquidity Ratio (LR)

In the literature, there are two different perspectives on the effect of liquidity ratio of companies on their debt level. The Trade-off Theory assets that firms with high liquidity ratio will

not have any difficulty in meeting their obligations and thus can obtain external funds at a lower cost. Moreover, there are views suggesting that conflict of interest between shareholders and managers will lead the firm to use external funds. Therefore, the first theory proposes a positive relationship between liquidity ratio and debt level. According to the Pecking Order Theory, firms tend to use their internal financing resources primarily when meeting their funding needs. The internal financing resources that can be used in this context are profit and liquidity ratio. Therefore, a negative relationship is expected between liquidity ratio and debt level of the firms. In the literature, there are studies where positive effect of liquidity ratio on debt level of firms is reported, such as (Umer, 2014; Pacheco & Tavares, 2015; Bhaduri, 2002), and where existence of a negative relationship between the two is revealed, such as (Colombo, 2001; Ozkan, 2001; Deesomsak, Paudyal, & Pescetto, 2004; Jong, Kabir, & Nguyen, 2008; Ahmad, Juniad-ul-Haq, Nasir, Ali, & Ullah, 2011; Sheikh & Wang, 2011).

Measurement indicator = LR: Current assets/short-term liabilities

4. Data Set and Methodology

This study aims to examine the factors that determine the capital structure of traditional airlines. The study included 31 airlines with fully accessible financial data in the period of 2004-2015. The study data were obtained from the Thomson Reuters Datastream database. The panel data analysis was used as the method and EViews-9 and STATA-14 software packages were utilized.

Panel data analysis refers to estimation of economic or financial relations with the help of panel data models created by using cross-sectional data with time dimension, in other words, the panel data (Yerdelen Tatoğlu, 2016, p. 5). Panel data equation can be defined as follows, where *i* cross-sectional units are shown as (*i=1,…,N*), *t* change over time as (*t=1,…,N*), and dependent variable as *Y*, and independent variable(s) as *X*.

$Y_{it} = \alpha_{it} + \beta_{it}X_{it} + \varepsilon_{it}$ where ε_{it} shows the error terms.

Panel data analysis was used as a method in the study. However, before panel data analysis, cross-sectional dependency of series and their orders of integration (stationarity) were determined. In the following stage, tests were made to determine which panel data model is appropriate. After selecting the appropriate panel data model, variance and autocorrelation tests were made. These tests will be covered in following sections of the study.

5. Empirical Findings

This section of the study is cover the correlation matrix, cross-sectional dependency and unit root tests results on the variables used in the study. Moreover, this section also cover the results of tests for identification of appropriate model, preliminary test and resistant standard error test.

Table 1: **Correlation matrix of independent variables**

	CS	GO	PR	NLTS	CR	AS	LR
CS	1						
GO	-0.0111	1					
PR	-0.0262	0.1039	1				
NLTS	-0.0774	-0.1587	-0.0869	1			
CR	0.2349	-0.0224	0.1236	-0.1413	1		
AS	-0.1374	-0.0522	-0.1357	0.2789	-0.158	1	
LR	-0.1333	0.0333	0.2061	-0.0588	-0.0467	-0.2909	1

Table 1 shows the correlation matrix between the independent variables. Existence of a high correlation in between the independent variables included in the regression model (above 0.80) causes multicollinearity problem. When the correlation matrix of independent variables is examined, correlation coefficients between the variables are well below the critical value.

Table 2**: Cross-Sectional Dependence Test Results**

Variable	CDLM adj.		
	Statistics	p-value	Decision
TDR	0.488	0.313	Ho Accept
LTDR	0.764	0.778	Ho Accept
STDR	-0.295	0.616	Ho Accept
CS	0.292	0.385	Ho Accept
GO	0.499	0.309	Ho Accept
PR	-1.022	0.847	Ho Accept
NLTS	0.529	0.298	Ho Accept
CR	-0.622	0.733	Ho Accept
AS	-0.882	0.811	Ho Accept
LR	0.928	0.177	Ho Accept

Table 2 shows cross-sectional dependence test results of the variables. The hypotheses H_0 "no cross-sectional dependency exists" is rejected for all variables. Therefore, stationarity levels must be determined by applying first generation unit root tests to the series.

Table 3: **Panel Unit Root Test Statistics**

Variable	Model	Levin, Lin & Chu -t		Im, Pesaran, and Shin -W		ADF - Fisher $\mathbf{Chi}^2$	
		Stat.	Prob.	Stat.	Prob.	Stat.	Prob.
TDR	Constant	-6.506	0.0000	-2.305	0.0000	90.158	0.0000
	Constant and Trend	-7.842	0.0000	-1.200	0.1152	76.778	0.0980
LTDR	Constant	-8.258	0.0000	-3.319	0.0005	110.629	0.0001
	Constant and Trend	-11.092	0.0000	-2.941	0.0016	109.140	0.0002
STDR	Constant	-20.056	0.0000	-7.944	0.0000	157.085	0.0000
	Constant and Trend	-26.362	0.0000	-7.202	0.0000	157.664	0.0000
CS	Constant	-6.211	0.0000	-2.270	0.0116	94.107	0.0053
	Constant and Trend	-13.103	0.0000	-1.595	0.0554	94.788	0.0046
GO	Constant	-25.709	0.0000	-12.294	0.0000	207.238	0.0000
	Constant and Trend	-20.950	0.0000	-7.032	0.0000	163.592	0.0000
PR	Constant	-10.224	0.0000	-5.310	0.0000	136.173	0.0000
	Constant and Trend	-23.037	0.0000	-5.057	0.0000	131.441	0.0000
NLTS	Constant	-16.865	0.0000	-6.537	0.0000	125.136	0.0000
	Constant and Trend	-18.252	0.0000	-3.093	0.0010	101.394	0.0012
CR	Constant	-15.462	0.0000	-5.218	0.0000	128.809	0.0000
	Constant and Trend	-9.704	0.0000	-1.981	0.0238	92.591	0.0071
AS	Constant	-19.756	0.0000	-7.399	0.0000	118.856	0.0000
	Constant and Trend	-18.695	0.0000	-4.606	0.0000	127.385	0.0000
LR	Constant	-7.813	0.0000	-4.117	0.0000	116.137	0.0000
	Constant and Trend	-14.819	0.0000	-4.473	0.0000	138.119	0.0000

Notes: The maximum delay length was taken as 1 and the optimal delay length was determined according to the SIC (Schwarz Info Criteria) criterion.

Table 3 shows unit root test results of the variables. Accordingly, all variables included in the analysis are stationary. Therefore, all variables are used in the analysis with the level values. After the cross-sectional dependency and stationarity tests of the series, a decision must be made on which model from among the classical model, fixed effects model and random effects model would be appropriate to use for the series. In this context, F-test was used to test validity of classical model or in other words, existence of unit and/or time effects, Breusch-Pagan LM test was used to test compatibility of classical model against random effects model, and Hausman test was used to make a selection between fixed effects and random effects models. Results of these tests are given below.

Table 4: **Model Identification Tests**

	F-test		LM Test		Hausman	
	Stat.	**Prob.**	**Stat.**	**Prob.**	**Stat.**	**Prob.**
Model 1	30.249	0.0000	595.600	0.0000	15.110	0.0194
Model 2	15.979	0.0000	398.700	0.0000	26.690	0.0002
Model 3	13.619	0.0000	313.100	0.0000	30.240	0.0000

Table 4 shows the results of tests for identification of appropriate model. As the table suggests, fixed effects model is considered appropriate for all three models.

Table 5: **Tests for Deviations of Assumptions**

	Modified Wald		Durbin Watson	Baltagi–Wu
	Stat.	**Prob.**	**Stat.**	**Stat.**
Model 1	1842.1	0.0000	0.7821	1.1871
Model 2	2354.8	0.0000	0.935	1.3792
Model 3	19002.4	0.0000	0.876	1.3074

Table 5 shows the results of modified Wald, Bhargava, Franzini and Narendranathan's DW autocorrelation test and Baltagi and Wu's LBI autocorrelation test for testing heteroscedasticity of Model 1, Model 2 and Model 3 which were estimated using the fixed effects model. In the modified Wald tests the H_0 hypothesis was rejected. This indicates that variance is not fixed in all models and there is a heteroscedasticity problem. Although no critical value is specified in the literature for DW and LBI autocorrelation tests, the fact that DW and LBI statistical values are smaller than 2 indicates the existence of autocorrelation. Test statistics show that the values obtained in both tests are significantly smaller than 2. This indicates that there is autocorrelation in all models.

It is observed that there is a heteroscedasticity and autocorrelation problem for all three models that were estimated using the fixed effects model in the study. Therefore, modified standard error terms must be obtained for the models. Driscoll and Kraay's (1998) method makes a modification like Newey-West for cross-sectional average series. Modified standard error estimates guarantee consistency of matrix estimators independently of cross-sectional dimension N (even N→∞). Driscoll and Kraay's (1998) method was developed as an alternative to Parks-Kmenta or PCSE approaches, which are weak especially when cross-sectional dimension of micro-economic panels is big and produce consistence covariance matrix estimators only if time dimension T is big. This method showed that consistency is achieved even if N is infinite. In addition, it also shows that standard errors obtained from the estimated covariance matrix are resistant for the most general forms of spatial and periodic correlation (Yerdelen Tatoğlu, 2016, p. 256-278; Driscoll & Kraay, 1998, p. 1). Driscoll and Kraay's (1998) modification is used obtain Driscoll and Kraay's resistant standard errors in the fixed effects model.

Table 6: **Driscoll-Kraay Robust Estimator Results (Model-1)**

Variable	**Coefficient Estimate**	**Driscoll-Kraay Standard Error**	**t**	**p-value**	**[95% Confidence Interval]**	
CS	0.0060374	0.012181	0.500	0.624	-0.0188399	0.0309148
GO	-0.0371708	0.012992	-2.860	0.008	-0.0637053	-0.0106363
PR	-0.0365113	0.139543	-0.260	0.795	-0.3214975	0.2484749
NLTS	-0.5556872	0.534921	-1.040	0.307	-1.648142	0.5367679
CR	1.22E-09	3.28E-09	0.370	0.712	-5.47E-09	7.92E-09
AS	0.0563913	0.084432	0.670	0.509	-0.1160435	0.228826
LR	-0.0814741	0.015356	-5.310	0.000	-0.1128365	-0.0501116
C	0.4208381	0.260873	1.610	0.117	-0.1119368	0.9536131
Number of Observations: 341		F(7, 30) =139.06			R^2= 0.1113	
Number of Groups: 31		Prob > F=0.0000			Maximum Delay: 2	

Table 6 shows robust estimator results of Model 1, where the ratio of total liabilities to total assets is used as a dependent variable. According to the results of fixed effects model where the factors that determine total debt ratio are examined, growth opportunities and liquidity ratios of firms have a negative effect on total debt ratio at a significance level of 1%. No significant relationship was found between the other independent variables of the study and the total debt ratio.

Table 7: **Driscoll-Kraay Robust Estimator Results (Model-2)**

Variable	Coefficient Estimate	Driscoll-Kraay Standard Error	t	p-value	[95% Confidence Interval]	
CS	0.030657	0.0048100	6.370	0.0000	0.020834	0.04048
GO	-0.025620	0.0115999	-2.210	0.0350	-0.04931	-0.00193
PR	-0.000300	0.1167595	0.000	0.9980	-0.23876	0.23815
NLTS	-0.739290	0.3800254	-1.950	0.0610	-1.5154	0.03683
CR	8.51E-10	2.89E-09	0.290	0.7710	-5.05E-09	6.76E-09
AS	0.203679	0.0793459	2.570	0.0150	0.041633	0.365725
LR	0.057551	0.0248012	2.320	0.0270	0.0069	0.108202
C	-0.279230	0.1115984	-2.500	0.0180	-0.50714	-0.05131
Number of Observations: 341		F(7, 30) =34.13			R^2= 0.0892	
Number of Groups: 31		Prob > F=0.0000			Maximum Delay: 2	

Table 7 shows robust estimator results of Model 2, where the ratio of long-term liabilities to total assets is used as a dependent variable. According to the results of fixed effects model where the factors that determine long-term debt ratio are examined, firm size has a positive effect on long-term debt ratio at a significance level of 1% and asset structure and liquidity ratio have a positive effect at a significance level of 5%. On the other hand, it was found that growth opportunities have a negative effect on long-term debt ratio at a significance level of 5% and non-debt tax shield usage level of firms have a negative effect on the long-term debt ratio at a significance level of 10%.

Table 8: **Driscoll-Kraay Robust Estimator Results (Model-3)**

Variable	Coefficient Estimate	Driscoll-Kraay Standard Error	t	p-value	[95% Confidence Interval]	
CS	-0.024619	0.009755	-2.520	0.0170	-0.0445	-0.0047
GO	-0.011549	0.003231	-3.570	0.0010	-0.0181	-0.005
PR	-0.036220	0.024688	-1.470	0.1530	-0.0866	0.01421
NLTS	0.183659	0.352980	0.520	0.6070	-0.5373	0.90448
CR	3.72E-10	8.76E-10	0.420	0.6740	-1.42E-09	2.16E-09
AS	-0.147328	0.050460	-2.920	0.0070	-0.2503	-0.0442
LR	-0.139025	0.024915	-5.580	0.0000	-0.1899	-0.0881
C	0.700063	0.201456	3.480	0.0020	0.28864	1.11149
Number of Observations: 341		F(7, 30) =28.76			R^2= 0.2536	
Number of Groups: 31		Prob > F=0.0000			Maximum Delay: 2	

Table 9 shows robust estimator results of Model 3, where the ratio of short-term liabilities to total assets is used as a dependent variable. According to the results of fixed effects model where the factors that determine short-term debt ratio are examined, growth opportunities, asset structure and liquidity ratios of firms have a negative effect on short-term debt ratio at a significance level of 1%. In addition, findings of the study show that firm size has a negative effect on short-term debt ratio at a significance level of 5%. No significant relationship was found between the other independent variables of the study and the short-term debt ratio.

Table 9: Comparison of theoretical expectations with empirical findings

Measurement Indicator	Model 1	Model 2	Model 3	Pecking Order	Trade-Off
Company Size		+	-	-	+
Growth Opportunities	-	-	-	+	-
Profitability				-	+
Non-Loan Tax Shield		-		NA	-
Company Risk				-	-
Asset Structure		+	-	-	+
Liquidity Ratio	-	+	-	-	+

Table 9 shows sign expectations of Pecking Order and Trade-Off Theories for independent variables and realized signs of Model 1, Model 2 and Model 3. For Model 2, the firm size variable shows results that comply with the trade-off theory, which underlines that large-scale firms tend to use more external funds than small-scale firms, large-scale firms can borrow easier and with lower interest rate thanks to their assets that can be provided as guarantee, and revenues of such firms have a relatively more consistent trend. For Model 3, the firm size variable is appropriate for the pecking order theory. This indicates that large-scale firms have more internal resources that small-scale firms and therefore the firms that need funds will firstly use these funds.

The growth opportunities variable generated results that comply with the trade-off theory for Model 1, Model 2 and Model 3. In this case, it can be argued that firms with high growth opportunities have lower level of cash flow and higher level of financial difficulty and bankruptcy costs and therefore tend to use less external funds. The non-debt tax shield variable generated significant results that comply with the trade-off approach for Model 2. Firms use instruments such as depreciation, pension funds, and investment credits as non-debt tax shields in order to pay less corporate tax. In this way, firms with non-debt tax shield may not need any tax shield that is provided by borrowing. This causes high non-debt tax shield to have a negative effect on the debt ratio.

The asset structure variable complies with sign expectation of trade-off theory for Model 2. This shows that being able to provide tangible fixed assets as guarantee when borrowing enables the firms to find external funds on more favorable terms. On the other hand, asset structure variable generated results that comply with the pecking order theory in Model 3. This shows that investors will experience less asymmetric information problem when investing in firms with higher level of tangible fixed assets and thus prefer being a shareholder rather than making a loan. Therefore, it is assumed that firms with high level of tangible fixed assets in their asset structure prefer financing by equity rather than using external funds.

The liquidity ratio variable generated results that comply with the pecking order theory for Model 1 and Model 3. This suggests that firms with high liquidity ratio do not have any difficulty in meeting their total and short-term obligations and therefore prefer having a lower debt/equity ratio. On the contrary, the liquidity ratio variable has a sign that complies with the pecking order theory in Model 2. This indicates that airline companies with high liquidity ratio can obtain long-term external funds on more favorable terms and therefore high liquidity ratio has a positive effect on the long-term debt ratio. In the study, no significant results were found for the profitability and company risk variables.

6. Conclusion

In this study, the factors that determine the capital structure were examined for traditional airlines using the panel data analysis method. Findings of the study show that firm size has a positive effect on the long-term debt ratio, and a negative effect on the short-term debt ratio in traditional airlines. Accordingly, asset size of the firms increases their ratio of using long-term

loans. This shows that traditional airlines can access to long-term external funds at a lower cost by using their asset sizes.

For traditional airlines, growth opportunities have a have effect on total debt ratio, long-term debt ratio, and short-term debt ratio. The fact that having high growth opportunities suggests that these firms have floating cash flow trend, their tangible fixed assets at a relatively lower level and their information asymmetry is higher. Therefore, findings suggest that traditional airlines with high growth opportunities borrow less. Findings of the study indicate that the level of non-debt tax shield level has a negative effect on long-term liabilities. This indicates that the increase in amount of instruments, such as depreciation, which are used by traditional airlines to pay less corporate tax, enables the firms to need less funds and thus use less external funds.

When the relationship between asset structure and debt ratio of traditional airlines is examined, it is observed that this relationship has a positive effect on long-term debt ratio and negative effect on short-term debt ratio. This indicates that firms can provide their tangible fixed assets as guarantee when borrowing and thus obtain external funds at a lower cost.

Lastly, liquidity ratio of airline companies has a negative effect on their total debt ratio and short-term debt ratio. This indicates that airline companies have a floating cash flow trend, relatively low level of tangible fixed assets and high level of information asymmetry. On the contrary, the liquidity ratio variable has a positive effect on the long-term debt ratio. Accordingly, this shows that airlines with high liquidity ratio tend to use more external funds to expand their capacities, implement new projects, open new lines or increase their frequency. In the study, no significant results were found about the effect of profitability and company risk variables on debt ratio.

When the findings related to traditional airlines are discussed theoretically, the firm size variable generated results that comply with trade-off theory for Model 2 and pecking order theory for Model 3. The asset structure variable was significant for all three models and generated results appropriate for the trade-off theory. The non-debt tax shield variable was significant for Model 2 only and generated results appropriate for the trade-off theory. The asset structure variable complies with the trade-off theory for Model 2 and pecking order theory for Model 3. The liquidity ratio generated significant results that comply with pecking order theory for Model 1 and Model 3 and trade-off theory for Model 2. In the study, no finding that is significant and/or complies with the theories was found from profitability and company risk variables.

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