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# THE INTERNAL FACTORS AFFECTING THE PROFITABILITY: EVIDENCE FROM THE GLOBAL AVIATION INDUSTRY*

*Araştırma Makalesi / Research Article*

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**ABSTRACT**

It is intended to reveal the internal profitability determiners of the leading global aviation companies, through this study. The data set consists of the financial ratios of 12 aviation companies between 2009 and 2016. The logistic regression method was employed to analyze the data. While "operating margin, net margin, return on asset (ROA) and return on equity (ROE)" were used as dependent variables, independent variables were selected as current ratio, inventory turnover, receivables turnover, payables period, asset turnover, and debt ratio. According results, while the other variables are constant, it can be argued that the increases in the average current ratio, inventory turnover, and debt ratio increase the likelihood that independent variables take negative values, while other independent variables have the opposite effect on dependent variables.

**Keywords:** Financial Performance, Profitability, Financial Ratios, Logistic Regression, Aviation Companies.

# KARLILIĞI ETKİLEYEN İÇSEL FAKTÖRLER: KÜRESEL HAVACILIK ENDÜSTRİSİNDEN KANITLAR

**ÖZ**

Bu çalışmada dünyanın önde gelen hava yolu şirketlerinin karlılıklarının içsel belirleyicilerinin ortaya koyulması amaçlanmıştır. Veri seti 12 hava yolu şirketinin 2009-2016 yılları arasındaki finansal oranlarından oluşmaktadır. Verilerin analizi amacıyla lojistik regresyon yönteminden faydalanılmıştır. Faaliyet karı, net kar, aktif karlılığı (ROA) ve özsermaye karlılığı (ROE) oranları bağımlı değişken olarak kullanılırken bağımsız değişkenler cari oran, stok devir hızı, alacakların dönüşüm hızı, ödeme süresi, aktif devir hızı ve borçluluk oranları olarak seçilmiştir. Analiz sonuçlarına göre diğer değişkenler sabitken ortalama cari oran, stok devir

* This paper is derived from the master's thesis titled "The Factors Affecting The Financial Performance: Evidence From The Aviation Industry".

hızı ve borçluluk oranlarında gerçekleşen artışların bağımsız değişkenlerin negatif değerler alma olasılığını artırdığı, diğer bağımsız değişkenlerin ise bağımlı değişkenler üstünde tersi bir tesire sahip olduğu ileri sürülebilmektedir.

**Anahtar Kelimeler:** Finansal Performans, Karlılık, Finansal Oranlar, Lojistik Regresyon, Hava Yolu Şirketleri.

## 1. INTRODUCTION

The logistics and transportation industry increased its importance, as a consequence of globalization and with the growth in consumption, so it has been studied by many researchers in both the private sector and academic context, and nowadays the aviation industry has become one of its most prominent sub-branch. With its own characteristics such as; special infrastructure and communication system requirement, the use of advanced technology tools and equipment, qualified human power, both national and international property through its legislation; aviation is an important and dynamic industry which even affects policies of countries. The aviation industry has played an indispensable role in creating a global economic value and therefore it is a remarkable economic force. Looking ahead, the industry is still facing real challenges, such as an apparent fuel-value imbalance, currency fluctuations, and a worldwide economic crisis. Infrastructure capacity is also a major barrier that threatens ongoing development and long-term profitability (Belobaba et al., 2009). The financial performance of airlines, including pricing in a competitive environment, affects short and long-term choices and shapes vital regulations.

The aviation industry needs to find short and medium-term methods that can generate sufficient revenue over environmental costs, to overcome fixed costs. One perspective of this is driven by contention that there is an excessive limit in air transport markets and returns will be underneath the cost of capital until the point when the limit is driven out. In this regard, the aviation industry has been weak for many years but still keeps increasing the capacity in almost every geographical market. This implies that capital markets are flawed and that they invest in airlines that cannot afford capital costs (Tretheway and Markhvida, 2014). The industry is able to continue its activities by supporting the subsidiaries as well as the aspect of flight. These activities include care, catering and travel agencies. These subsidiaries create attractive opportunities for the aviation industry as they have the potential to generate wider profit margins (Redpath et al., 2016).

Financial performance can be defined as a process where the results of policies and activities are evaluated in a financial base. In the studies carried out on an industry-specific basis, examining the financial statements of the companies operating in the field, comparing the ratios and searching for meaningful results are popular methods applied in finance. Although the factors affecting financial performance are generally similar, it is necessary to make separate examinations in order to reach the appropriate factors affecting the performance, for the specific characteristics, taking the industry dynamics into account.

It is difficult to determine whether the operating profits of companies are sufficiently based only on the information as regards to profit provided on the financial statements. These statements only show how much profit the company has made during a certain period of activity. Profitability ratios are useful tools to determine whether the profitability of business operations are sustainable. Shareholders and investors are the relevant parties, closely interested in revenue generation capacity and sustainable profitability of the business. For this reason, profitability ratios are the most widely used financial performance indicators to measure the efficiency of business resources (Güngör, 2014).

The wealth maximization of shareholders, including the latest innovations and developments in the business world, is accepted in the literature as one of the modern approaches. Maximization of wealth is more than profit maximization because the main aim of businesses is improving the value of shares (Paramasivan and Subramanian, 2008). From this point of view, a firm's and consequently its managerial staff's, board members' and all attendants' main objective should be maximizing the wealth of the owners which can be estimated by the firm's stocks share price (Gitman and Zutter, 2012). On the other hand, there exists a strong argument suggesting that the fundamental goal is profit making even in the business management literature. This research paper is conducted

based on the philosophy that "the essential goal of a firm must be maximizing the shareholder's wealth, and profit making may only be a tool".

## 2. LITERATURE REVIEW

There is a huge literature that explores the financial performance determiners of multi-industries or a unique industry. For example, Whittington (1980) conducted a study over multi industries in the United Kingdom, using the data between the years 1960 and 1974. By setting; "ROA, Profitability margin and Sales/assets ratio" as dependent variables, and "Net asset, Gross asset, Sales, Value-added and Return on Gross assets" as independent variables in a regression analysis, it was concluded that; smaller firm size, leads to lower profitability, as well as some factors such as average profit margins and sales/asset ratios do not change automatically according to the size of the company. Mesquita and Lara (2003) conducted a study over multi industries in Brazil, using the data between the years 1995 and 2001. By setting; "ROE" as the dependent variable, and "Short-term debt/total liability, Long-term debt/total liability, Equity, Long-term debt/equity" as independent variables in an ordinary least squares regression analysis, it was concluded that; an inverse proportion occurs among financial leverage and profitability, while a direct proportion between short-term debt and profitability occurs. Additionally, they couldn't determine any correlation among long-term debt and profitability. Pandey (2004), set "Total debt/asset" as a dependent variable, and "Tobin's Q, Profitability, Growth, Systematic risk, Size, Number of shares, Tangibility" as independent variables in a panel data analysis, in the study which has been conducted over Malaysian multi industries, using 1994-2000 data. The results demonstrates a negative relationship between asset size and profitability. Külter and Demirgüneş (2007) carried out a study over multi industries in Turkey, using the data between the years 1997 and 2006. By setting; "ROA" as the dependent variable, and "Company size, Market share, Net working capital, Receivable turnover, Stock turnover, and Leverage ratio" as independent variables in a pooled regression analysis, it was concluded that; profitability increases as the working capital investments and market share increase. Additionally, profitability decreases based on the company size and incrementing level of loans. Frank and Goyal (2009) conducted a study over multi industries in a Multi-National environment, using the data between 1971 and 2006. By setting; "Debt, Book value of equity, Equity issuance, Book leverage and Market leverage" as the dependent variables, and "Market value of equity, Assets, Debt issuance, Debt repayment, Equity repurchase, Cash balance, Profitability, Market/Book ratio and Tangibility" as independent variables in multiple regression analyses, it was deduced that; the correlation among firm profitability and leverage ratio is positive. Additionally, it was demonstrated that more profitable companies are rather inclined to have more lending and repurchase equity. As per the less profitable firms, they are more likely to apply the opposite. A study over Malaysian multi industry companies using pooled ordinary least squares regression and fixed-effects with 2012-2014 data, Alarussi and Alhaderi (2018), found positive correlation among total sales, working capital, assets turnover ratio and profitability(ROE and earnings per share). Additionally, they determined negative correlation among both debt equity ratio and leverage ratio and profitability. They couldn't detect a significant relationship between current ratio and profitability

While the above explained studies are examples of multi-industrial cases, industry-based studies have also been performed by the researchers. For example, Akkaya (2008) conducted a study over the Textile industry in Turkey, using the data between 1997 and 2006. By setting; "Tobin Q and Leverage ratios" as the dependent variables, and "Systematic risk, EBIT/Total assets, Growth, Total assets, Real assets/Total assets" as independent variables in a generalized least square regression analysis, he found a positive correlation between Tobin Q ratio, beta, tangible assets and scale variables, and a negative relationship with growth. The increase in the systematic risk level of the enterprise allows an increase in the profitability of the enterprise. Also, a positive relationship was found among leverage ratios and the scale variable, and a negative relationship was found with the growth variable. Gill et al. (2010) carried out a research over USA manufacturing industry, using 2005-2007 data. By setting; "Gross operating profit" as the dependent variable, and "Accounts receivables, Accounts payables, Inventory, Cash conversion cycle, Firm size, Financial debt ratio

and Fixed financial asset ratio" as independent variables in a weighted least squares regression analysis, they found a correlation among the accounts receivables and profitability in negative direction; additionally, they determined that cash conversion cycle is significantly related to profitability. On the other hand, they couldn't determine a significant relation among the company size and profitability. Karadeniz and İskenderoğlu (2011) conducted a study over the tourism industry in Turkey, using the data between 2002 and 2009. By setting; "ROA" as the dependent variable, and "Total Leverage, Short Term Leverage, Long-term leverage, Business Size, Market Share, Net Working Capital / Total Assets, Receivable Turnover, Stock Turnover Rate and Asset Turnover" as independent variables in a pooled regression analysis, it was concluded that; the leverage ratio had an adverse influence over the ROA, while the influences of size, market share, net working capital turnover, asset turnover were determined to be positive on the ROA. Moreover, it was determined that receivable turnover and inventory turnover had no influence on ROA. Škuflić et al. (2016) conducted a study over the manufacturing industry in Croatia, using the data between 2003 and 2014. By setting; "Net profit before tax" as the dependent variable, and "Debt/EBITDA, Concentration, Current ratio, Productivity, Indebtedness" as independent variables in a panel ordinary least squares model, it was concluded that; profitability has a positive and significant impact on productivity, and concentration, though it has negative impact on indebtedness and current ratio. Saripalle (2018) conducted a study over the logistics industry in India, using the data between 2010 and 2015. By setting; "ROA" as the dependent variable, and "size, market share, age, debt-to-equity, current ratio" as independent variables in a panel ordinary least squares model, it was concluded that; ROA has a positive and significant relation with Debt-equity, liquidity and market share.

In addition to studies that investigate the determinants of financial performance for several industries, the literature that focuses on the aviation industry has been emerging. Main studies like Schefczyk (1993) and Tsikriktsis (2007) focused more on the relation between operational performance and profitability in aviation industry. Schefczyk (1993) found that productivity is related to ROE while Tsikriktsis (2007) found that profitability depends on organization's operational model. Looking at studies that are more compatible with our research question; Mwangi (2013) conducted a study over the Kenyan aviation industry , using the data between 2008 and 2012. By setting; "ROA" as the dependent variable, and "Exchange rate, GDP growth, Money supply, Interest rate and Inflation rate" as independent variables in Multiple regression analyses, it was concluded that; there is a positive and insignificant correlation between the ROA of the firms and gross domestic products growth rate/annual change in the supply of money. Moreover, a weak, negative, and insignificant correlation between the ROA and exchange rate/ annual average lending rate/annual average inflation has been determined. Alahyari (2014) conducted a study over the aviation industry in a Multi-National environment, using the data between 1994 and 2013. By setting; "ROA and ROE" as the dependent variables, and "Company Size, Company Growth, Leverage Ratio, and Liquidity Ratio, Tangibility of Assets" as independent variables in Panel data analysis, it was concluded that; the influences of tangibility of assets, growth opportunities, and liquidity ratios are significant over the firm profitability. The tangibility of assets has an adverse influence on the profitability of the companies; on the other hand, the effects of growth opportunities on the profitability are negative. Moreover, a different element demonstrating an adverse and statistically significant correlation with the company profitability is the liquidity ratio. Garefalakis et al. (2016) conducted a study over again the aviation industry in a Multi-National environment, using the data between 2005 and 2011. By setting; "ROA" as the dependent variable, and "Cash Flow/Current Liabilities, Accounts Payable, Common Equity, Net Margin, Return On Invested Capital, Total Assets, Short Term Investments, Quick Ratio and Property Plant & Equipment" as independent variables in regression analysis, it was concluded that; the correlation among profitability and cash flow/liabilities, firm size, return on invested capital, net margin, quick ratio, location is positive. On the other hand, the relationship between the profitability of the firms and short term investments was determined to be negative. Finally, Yıldız (2018) conducted a study over again the aviation industry in a multi-national environment, using the data between 2006 and 2015 in panel data analysis. By setting; "ROA" as the dependent variable, and "Interest Coverage Ratio, Operating Margin, Long Term Debt/Capitalization, Asset Turnover, Fixed-Asset Turnover" as independent variables, it was

concluded that; the correlation between profitability and operating margin/fixed asset efficiency was positive and significant. On the other hand, the long-term financial capitalization position, which is another indicator, had an adverse and statistically significant influence over the profitability.

## 3. DATA and METHODOLOGY

The main motive of this study was to depict the internal factors that affect the profitability of the firms in the aviation industry. There are different classification groups for the leading aviation companies in the sector. These can be listed as Star Alliance, One World, Sky Team etc. In this thesis study we used the data of companies that are the members of Star Alliance. The Star Alliance network is the premier worldwide airline alliance established in 1997 to offer global access, recognition and uninterrupted service to international travellers. In the list, 12 members whose data available in the utilized database have been chosen as the sample. Then via ratio analysis, some liquidity, activity and capital structure ratios were designated as independent variables and profitability ratios designated as dependent variables. And finally, logistic regression analysis was employed. The aviation companies in the data set were Aegean Airlines, Air China, Air New Zealand, ANA, Asiana Airlines, Avianca, EVA Air, Singapore Airlines, Thai Airways International, United Airlines, Lufthansa and THY.

Financial ratios were obtained from the Morningstar.com database. The data set consists of the ratios between 2009 and 2016 in order to measure the effects after the global crisis. Fundamentally, financial ratios are evaluated under 5 groups. They can be classified as liquidity, activity, debt, profitability and market ratios (Gitman and Zutter, 2012, p. 70). The profitability ratios used as dependent variables due to the aim of depicting the factors affect profitability. In addition to that, because the study focused on internal factors related to the profitability, the market ratios were excluded. Hereby gross margin, operating margin, net margin, ROA and ROE ratios were designated as dependent variables, while current ratio, quick ratio, inventory turnover, receivables turnover, payables period, asset turnover and debt ratio designated as independent variables. Besides that, due to the high correlation level among the current ratio and quick ratio, the quick ratio was excluded. Additionally, since gross margin does not contain any negative values to perform logistic regression, it was also excluded. The correlation levels of independent variables were given in Table 1.

**Table 1:** Correlation Matrix of the Independent Variables

| | Current ratio | Quick ratio | Inventory turnover | Receivables turnover | Payback period | Asset turnover | Debt Ratio |
|---|---|---|---|---|---|---|---|
| Current ratio | 1 | | | | | | |
| Quick ratio | 0.95 | 1 | | | | | |
| Inventory turnover | 0.02 | 0.14 | 1 | | | | |
| Receivables turnover | -0.52 | -0.45 | 0.33 | 1 | | | |
| Payback period | 0.16 | 0.25 | -0.2 | -0.17 | 1 | | |
| Asset turnover | 0.48 | 0.5 | 0.37 | -0.28 | -0.09 | 1 | |
| Debt ratio | -0.6 | -0.66 | -0.17 | 0.3 | -0.46 | -0.03 | 1 |

The explanations of the variables were given in Table 2. The names of the ratios were preferred to use as they were specified in the database.

**Table 2:** The List of Variables

| Variable | Formula | Explanation |
|---|---|---|
| Current Ratio | $\frac{Current\ assets}{Current\ Liabilities}$ | Fundamentally, this ratio evaluates companies' capability to fulfill their short-term obligations (Gitman and Zutter, 2012). |

**Table 2 (Cont'd):** The List of Variables

| Variable | Formula | Explanation |
|---|---|---|
| Inventory Turnover | $\frac{Cost\ of\ goods\ sold}{inventory}$ | Fundamentally, this ratio frequently evaluates the activity or liquidity of companies' inventory (Gitman and Zutter, 2012). |
| Receivables Turnover | $\frac{Net\ Credit\ Sales}{Average\ Account\ Receivables}$ | Fundamentally, this ratio evaluates how fast companies turn their average receivables investment into cash (Richards and Laughlin, 1980). |
| Payables Period | $\frac{Accounts\ payable}{Average\ purchases\ per\ day}$ | Also known as average payment period. Fundamentally, evaluates the necessary time to compensate accounts payables (Gitman and Zutter, 2012). |
| Asset Turnover | $\frac{Sales}{Total\ Assets}$ | Fundamentally, this ratio evaluates companies' efficiency, by measuring their capability to generate sales using assets (Gitman and Zutter, 2012). |
| Debt Ratio | $\frac{Total\ Liabilities}{Total\ Assets}$ | Fundamentally, this ratio evaluates the percentage of the assets compensated by the company's creditors (Gitman and Zutter, 2012). |
| Operating Margin | $\frac{Operating\ Profits}{Sales}$ | Fundamentally, this ratio evaluates the proportion of profits acquired on operations in sales (Gitman and Zutter, 2012). |
| Net Margin | $\frac{(Earnings\ available\ for\ common\ stockholders)}{Sales}$ | Fundamentally, this ratio evaluates the proportion of income that remains after all costs and expenses have been reduced in sales (Gitman and Zutter, 2012). |
| Return On Asset (ROA) | $\frac{(Earnings\ available\ for\ common\ stockholders)}{Total\ Assets}$ | Fundamentally, this ratio evaluates the ability of companies to generate profit from their assets (Gitman and Zutter, 2012). |
| Return On Equity (ROE) | $\frac{(Earnings\ available\ for\ common\ stockholders)}{common\ stock\ equity}$ | Fundamentally, this ratio frequently evaluates the return acquired by the common stockholders' investment to companies (Gitman and Zutter, 2012). |

(Source: * Gitman and Zutter (2012); ** Richards and Laughlin (1980))

In Table 3, the main characteristics of the dependent variables, namely observation number, mean, standard deviation the maximum and the minimum observations can be seen. The firms had averagely 4.30% operating margin, 2.60% net margin, 2.19% return on asset and 8.59% return on equity. The standard deviation levels were generally similar except the standard deviation of return on equity. Parallel to that the minimum and maximum values remained similar except ROE.

**Table 3:** Descriptive Statistics of the Dependent Variables

| Variable | Observation | Mean | Standard Deviation | Min (%) | Max (%) |
|---|---|---|---|---|---|
| Operating Margin | 94 | 4.30 | 4.81 | -8.89 | 17.62 |
| Net Margin | 94 | 2.60 | 4.56 | -8.29 | 19.39 |
| Return on Asset | 94 | 2.19 | 3.97 | -6.28 | 18.77 |
| Return on Equity | 94 | 8.59 | 21.72 | -63.23 | 129.20 |

In Table 4 the descriptive statistics, such as mean, deviation, and range, of the independent variables were provided. The means of current ratio, inventory turnover, receivables turnover,

payables period, asset turnover and the debt ratio are respectively 0.92, 32.45, 16.10, 55.06, 0.83 and 73.21. The standard deviations of current ratio, inventory turnover, receivables turnover, payables period, asset turnover and the debt ratio are respectively 0.39, 21.11, 7.30, 41.20, 0.25 and 13.40.

**Table 4:** Descriptive Statistics of the Independent Variables

| Variable | Observation | Mean | Standard Deviation | Min | Max |
|---|---|---|---|---|---|
| Current Ratio (%) | 94 | 0.92 | 0.39 | 0.20 | 2.25 |
| Inventory Turnover Ratio (times) | 94 | 32.45 | 21.11 | 6.16 | 103.59 |
| Receivables Turnover Ratio (times) | 94 | 16.10 | 7.30 | 7.07 | 35.53 |
| Payables Period (days) | 94 | 55.06 | 41.20 | 1.84 | 194.36 |
| Asset Turnover (times) | 94 | 0.83 | 0.25 | 0.50 | 1.60 |
| Debt Ratio (%) | 94 | 73.21 | 13.40 | 40.10 | 115.04 |

In this study logistic regression analysis was employed. The logistic regression method helps to search for the systematic relationship between the dependent variable and independent variables.

## 4. EMPIRICAL RESULTS

In this section, the results of logistic regression analysis are demonstrated. Although the normality test results were not reported, Shapiro-Wilk Normality test results indicate that the variables were not normally distributed. Operating margin, net margin, return on asset and return on equity ratios used as dependent variables in the analysis so there would be 4 logistic regression estimations. In the case of income, dependent variables were coded as "1", on the other hand in case of loss, they were coded as "0". So the results were given in the same table. In addition, due to the same sign of the dependent variables of Net Margin, ROA and ROE the results did not differ.

**Table 5:** The Result of Logistic Regression Analysis related to Operating Margin

| Variables | Coefficient | Standard Error | z | P>\|z\| |
|---|---|---|---|---|
| Current Ratio | -7.817215 | 2.856974 | -2.74 | 0.01 |
| Inventory Turnover | -0.2121693 | 0.067497 | -3.14 | 0.00 |
| Receivables Turnover | 0.4913472 | 0.183988 | 2.67 | 0.01 |
| Payables Period | 0.0715542 | 0.033371 | 2.14 | 0.03 |
| Asset Turnover | 18.84567 | 6.613398 | 2.85 | 0.00 |
| Debt Ratio | -0.2701559 | 0.093430 | -2.89 | 0.00 |
| Constant | 11.80014 | 7.434148 | 1.59 | 0.11 |
| Hosmer-Lemeshow Test | | Chi-Square: 5.34 | | sig. : 0.8677 |
| Log Likelihood:-17.403483 | | LR Statistics: 43.31 | | p-value:0.0000 |
| Pseudo $R^2$: 0.5601 | | | | |

To answer how well the model fitted the data employed, The Hosmer-Lemeshow Test was performed. The Hosmer-Lemeshow Test hypothesis are as follows (Tuffery, 2011);

- H0: The established model fits the best to the data.
- H1: The established model does not fit the best to the data.

Pursuant to the Hosmer-Lemeshow goodness of fit test, because of the Chi-Square was 5.34 with the significance level of 0.8677, it could be argued that the model established fitted the best to the data. Furthermore, due to the likelihood ratio of p-value was 0.0000, the model was statistically significant. In addition to model significance, the Pseudo R2 was calculated as 0.5601. The coefficient for the variable current ratio was -7.817215. Holding other independent variables constant, this meant that one-unit (%) increase in the current ratio, it could be expected a 7.817215 decrease in the log-odds of the dependent variable operating margin. One-unit (times) increase in inventory turnover, because the coefficient is negative, it could be expected a 0.2121693 decrease in the log-odds of the operating margin, holding other independent variables constant. Holding other independent variables constant, for every one-unit (times) increase in receivables turnover, it could be expected a 0.4913472 increase in the log-odds of the dependent variable operating margin. Every additional day on the payables period, caused an increase of 0.0715542 in the log-odds of the dependent variable operating margin, holding other independent variables constant. One-unit (times) increase in asset turnover, holding other independent variables constant, it could be expected an 18.84567 increase in the log-odds of the operating margin. Finally, a one-unit (%) increase in debt ratio, it could be expected a 0.2701559 decrease in the log-odds of the operating margin, holding other independent variables constant. As it is seen in the interpretation of the coefficients of the logit model, it is hard to understand. So to overcome this complexity the marginal effects have been calculated in the following table.

**Table 6:** The Effect of One Unit Change of the Independent Variables to the Probability of Profitability (Operating Margin)

| Variables | dy/dx* | Standard Error | z | P>\|z\| |
|---|---|---|---|---|
| Current Ratio | -0.441261 | 0.1269811 | -3.48 | 0.00 |
| Inventory Turnover | -0.011976 | 0.0026324 | -4.55 | 0.00 |
| Receivables Turnover | 0.0277353 | 0.008193 | 3.39 | 0.00 |
| Payables Period | 0.004039 | 0.0016306 | 2.48 | 0.01 |
| Asset Turnover | 1.063788 | 0.2914615 | 3.65 | 0.00 |
| Debt Ratio | -0.01525 | 0.0037502 | -4.07 | 0.00 |

dy/dx is the derivative of y according to the x. Basically, it is the velocity of y according to the x (Gujarati, 2016). In the sample, holding other independent variables constant, if the average current ratio increased by one unit, the probability of having a positive operating margin decreased by 0.441261. Similarly, if the average inventory turnover increased 1 time, the probability of having a positive operating margin decreased 0.011976. In the case, the receivables turnover increased 1 time, the probability of having a positive operating margin increased by 0.0277353. If the payables period increased 1 day, the probability of positive operating margin increased 0.004039. If the asset turnover increased 1 times, the probability of positive operating margin increased 1.063788. And finally when the debt ratio increased by 1%, the probability of having a positive operating margin decreased by 0.01525.

**Table 7:** Logistic Regression Classification Table for the Operating Margin Model

| | Predicted Positive Operating Margin | Predicted Negative Operating Margin | Percentage Correct |
|---|---|---|---|
| **Observed Positive Operating Margin** | 79 | 5 | 84 |
| **Observed Negative Operating Margin** | 1 | 9 | 10 |
| Correctly Classified | | | 93.62 |

Finally, about the analysis of the operating margin, the classification table was performed to see the predictive accuracy, or in other words, the performance of the model employed. According to the table, the logit model correctly predicted 93.62% of the cases. In detail, 79 of the 84 profit–making (in terms of operating margin) companies had classified correctly, and 5 of them classified in the not profit-making companies incorrectly. On the other hand, 9 out of 10 non-profit-making companies were classified correctly, and only 1 of them was classified incorrectly.

**Table 8:** The Results of Logistic Regression Analysis about Net Margin, ROA and ROE

| Variables | Coefficient | Standard Error | z | P>\|z\| |
|---|---|---|---|---|
| Current Ratio | -3.054499 | 1.443973 | -2.12 | 0.03 |
| Inventory Turnover | -0.0896215 | 0.0320596 | -2.80 | 0.01 |
| Receivables Turnover | 0.2790458 | 0.090367 | 3.09 | 0.00 |
| Payables Period | 0.0152253 | 0.0109558 | 1.39 | 0.17 |
| Asset Turnover | 6.053446 | 2.700393 | 2.24 | 0.03 |
| Debt Ratio | -0.1883281 | 0.0578751 | -3.25 | 0.00 |
| Constant | 11.38679 | 4.798169 | 2.37 | 0.02 |
| Hosmer-Lemeshow Test | | Chi-Square: 8.66 | sig. : 0.5649 | |
| Log Likelihood:-33.538576 | | LR Statistics: 32.79 | p-value:0.0000 | |
| Pseudo $R^2$: 0.3283 | | | | |

According to the Hosmer-Lemeshow goodness of fit test, due to the Chi-Square was 8.66 with the significance level of 0.5649, the model fitted the best to the data. The Pseudo R2 was observed as 0.3283. The likelihood ratio p-value was 0.0000 the model was statistically significant. One-unit (%) increase in the current ratio, because the coefficient is negative, it could be expected a 3.054499 decrease in the log-odds of the above-mentioned profitability ratios, holding other independent variables constant. The coefficient for the variable inventory turnover was -0.0896215. Holding other independent variables constant, this meant that one-unit (times) increase in inventory turnover, it could be expected a 0.0896215 decrease in the log-odds of the above-mentioned profitability ratios. Every additional day on receivables turnover, caused an increase of 0.2790458 in the log-odds of the dependent variables, holding other independent variables constant. According to the regression results, the payables period was not significant. One-unit (times) increase in asset turnover, holding other independent variables constant, it could be expected a 6.053446 increase in the log-odds of the above-mentioned profitability ratios. Finally, a one-unit (%) increase in debt ratio, it could be expected a 0.1883281 decrease in the log-odds of the dependent variables, holding other independent variables constant. As in the logit model employed for the mentioned profitability ratios, due to the difficulty of interpretation of the logit model coefficients, marginal effects have been calculated also for the logit model employed for the Net Margin, ROA and ROE. The results can be seen in the following table.

**Table 9:** The Effect of One Unit Change of the Independent Variables to the Probability of Profitability (Net Margin, ROA and ROE)

| Variables | dy/dx | Standard Error | z | P>\|z\| |
|---|---|---|---|---|
| Current Ratio | -0.3500347 | 0.150758 | -2.32 | 0.02 |
| Inventory Turnover | -0.0102703 | 0.002963 | -3.47 | 0.00 |
| Receivables Turnover | 0.0319777 | 0.008145 | 3.93 | 0.00 |
| Payables Period | 0.0017448 | 0.001205 | 1.45 | 0.15 |
| Asset Turnover | 0.6937033 | 0.273554 | 2.54 | 0.01 |
| Debt Ratio | -0.0215817 | 0.005059 | -4.27 | 0.00 |

In the sample, holding other independent variables constant, if the average current ratio increased one unit, the probability of having positive Net Margin, ROA and ROE decreased 0.3500347. Likewise, the probability of having positive Net Margin, ROA and ROE decreased 0.0102703, if the average inventory turnover increased 1 time. The probability of having a positive Net Margin, ROA and ROE increased 0.0319777, if the receivables turnover increased 1 time. If the asset turnover increased 1 times, the probability of positive Net Margin, ROA and ROE increased 0.6937033. To close when the debt ratio increased by 1%, the probability of having positive Net Margin, ROA and ROE decreased 0.0215817.

**Table 10:** Logistic Regression Classification Table for the Net Margin, ROA and ROE Models

| | The Predicted Positive Profitability Ratio | The Predicted Negative Profitability Ratio | Percentage Correct |
|---|---|---|---|
| Observed Positive Profitability Ratio | 69 | 11 | 80 |
| Observed Negative Profitability Ratio | 4 | 10 | 14 |
| Correctly Classified | | | 84.04 |

To be able to understand the predictive accuracy of the model, the classification table created. Pursuant to the classification table the logit model correctly predicted 84.04% of the cases, which was a good score. To be more precise, 69 of the 80 profit–making (in terms of Net Margin, ROA and ROE) companies had classified correctly, and 11 of them classified in the not profit-making companies incorrectly. On the other hand, 10 of the 14 not profit-making companies had classified correctly, and 4 of them classified in the profit-making companies incorrectly.

## 5. CONCLUSION

Although the factors affecting financial performance or profitability are generally similar, it is necessary to make separate examinations in order to reach the appropriate factors affecting the performance for the specific characteristics, taking into account the industry dynamics.

Results of the models which we perform on the data from the aviation industry indicate that:

- Similar with the results of Alahyari (2014), aviation companies which were more liquid than the others had more likely lower profitability ratios, namely operating margin, net margin, ROA and ROE. This could proceed from the trade-off between liquidity and profitability. Or with another aspect, the firms with high liquidity ratios were more likely not to effectively use their current assets in making profits.
- Unexpectedly higher inventory turnover decreased the probability of high profitability. Industry dynamics may play a leading role here. As can be seen in the study of Karadeniz and İskenderoğlu (2011), inventory turnover had no influence on profitability in the tourism industry. The possible explanation for this result is that in the aviation industry, which has different infrastructural requirements than other service industries, inventory levels will be very low compared to other types of enterprises.
- Higher receivables turnover ratios increased the probability of high profitability. Higher receivables turnovers could be explained with higher credit sales or less accounts receivable levels. The firm must implement a careful credit policy and manage the accounts receivables. So the aviation companies collected accounts receivable as quickly as possible had more likely more profitability ratios.
- The aviation firms which made their payments as late as possible more likely had higher profit ratios. This is not an unexpected situation.

- Contrasting the conclusion of Yıldız (2018), the possible negative effect of asset turnover on profitability, our findings indicates that; an increase in asset turnover rate will increase profitability, which classically means that, those who use their assets effectively earn more profit.
- Finally, unlike the work of Alahyari (2014) which couldn't detect a significant relationship between leverage and profitability; our findings indicates leveraged aviation firms had more likely less profitability ratios. Leverage sometimes increases the profitability but conversely, it increases the risk. In these circumstances, it could be interpreted that the firms suffered a high level of financial risk.

Finally, the results provide important implications to the aviation companies, investors, regulatory agencies and standard-setting bodies. The topic can be analysed deeply by the help of more advanced statistical models by future studies.

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## GENİŞLETİLMİŞ ÖZET

### Amaç

Taşımacılık ve lojistik sektörü, artan nüfus ve küreselleşme ile doğru orantılı artan ticaret ve tüketim doğrultusunda önemini her geçen gün arttırmaktadır. Bu sebeple gerek iş dünyası gerekse akademik dünya tarafında farklı çerçevelerde incelenmektedir. Havacılık endüstrisi bu bahsedilen sektörün bir alt dalı olmakla birlikte kendine ait karakteristikleri (özel altyapı ve iletişim sistemi ihtiyacı, ileri teknoloji araç gereçlerin kullanımı, nitelikli iş gücüne ihtiyaç, ulusal ve uluslararası etkilere açıklık, büyüklük vb.) olan ve hızla gelişmesini sürdüren bir sektördür. Yapılan bu çalışma ile dünyanın önde gelen hava yolu şirketlerinin karlılığını etkileyen içsel faktörlerin neler olduğunun ortaya koyulması amaçlanmıştır.

### Yöntem

Belirtilen amaç doğrultusunda, önde gelen uluslararası hava yolu ittifaklarından Star Alliance'a üye olan Aegean Airlines, Air China, Air New Zealand, ANA, Asiana Airlines, Avianca, EVA Air, Singapore Airlines, Thai Airways International, United Airlines, Lufthansa ve THY gibi dünyanın önde gelen 12 hava yolu şirketine ait verilerden yararlanılmıştır. Bu şirketlere ait veriler Morningstar.com veri tabanından elde edilmiştir. Bunun yanında veriler 2009 – 2016 dönemini kapsamaktadır.

Faaliyet karı, net kar, aktif karlılığı (ROA) ve özsermaye karlılığı (ROE) oranları bağımlı değişken olarak kullanılırken bağımsız değişkenler cari oran, stok devir hızı, alacakların dönüşüm hızı, ödeme süresi, aktif devir hızı ve borçluluk oranları olarak seçilmiştir. Seçilmiş bağımsız değişkenlerin şirketlerin karlılıkları üzerinde ne şekilde etki yarattıklarını ortaya koyabilmek için lojistik regresyon yönteminden faydalanılmıştır. Bu bağlamda bağımlı değişkenler karlılık durumunda "1", zarar durumunda ise "0" şeklinde kodlanmıştır (bu durumda işaretlerinin aynı olmasından dolayı net kar, ROA ve ROE değişenleri için tek lojistik regresyon tahmini yapılabilmiştir). Lojistik regresyon tahmininin ardından sonuçların daha rahat yorumlanabilmesi için marjinal etkiler de hesaplanmıştır.

### Bulgular

Lojistik regresyonun tahmini sonrasında hesaplanan marjinal etkilere göre aşağıdaki bulgulara ulaşılmıştır.

Faaliyet karının bağımlı değişken olduğu lojistik regresyon tahmini sonrasında diğer değişkenler sabitken ortalama cari oranda gerçekleşecek bir birimlik artışın, pozitif faaliyet karı olasılığını 0.441261 kadar azalttığı; ortalama stok devir hızının bir birimlik artışının pozitif faaliyet karı olasılığını 0.011976 kadar azalttığı; ortalama alacak devir hızının bir birimlik artışının pozitif kar olasılığını 0.0277353 kadar arttırdığı; ortalama ödeme süresinin bir birimlik artmasının pozitif faaliyet karlılığı olasılığını 0.004039 kadar arttırdığı; ortalama aktif devir hızının bir birimlik artışının pozitif faaliyet karlılığı olasılığını 1.063788 kadar arttırdığı ve son olarak da ortalama borçluluk oranının %1 artışının faaliyet karlılığının pozitif olma olasılığını 0.01525 kadar azalttığı gözlenmiştir.

Net karlılık, ROA ve ROE bağımlı değişkenleri için tahmin edilen diğer regresyona göre diğer değişkenler sabitken ortalama cari oranda gerçekleşecek bir birimlik artışın, kar elde etme olasılığını 3.054499 kadar azalttığı; ortalama stok devir hızının bir defa artışının pozitif karlılık olasılığını 0.0896215 kadar azalttığı; ortalama alacak devir hızının bir defa artışının pozitif kar olasılığını 0.2790458 kadar arttırdığı; ortalama aktif devir hızının bir defa artışının pozitif karlılık olasılığını 6.053446 kadar arttırdığı ve ortalama borçluluk oranının %1 artışının karlılığın pozitif olma olasılığını 0.1883281 kadar azalttığı gözlenmiştir.

### Tartışma ve Sonuç

Yapılan analiz sonrasında likiditesi yükselen hava yolu şirketlerinin karlılıktan uzaklaştıkları gözlenmiştir. Bu durumun karlılık ve likidite ödünleşiminden kaynaklandığı ileri sürülebilir. Diğer bir sebep de yüksek likiditesi olan hava yolu şirketlerinin bu dönen varlıklarını etkin bir şekilde kar elde etmek için kullanamıyor olmaları da olabilir.

Beklenmedik bir şekilde stok devir hızının karlılık olasılığını düşürdüğü bulunmasına karşın hizmet sektörü olan hava yolu sektöründe stok seviyelerinin diğer tür işletmelere göre çok düşük olacağı öngörülebilir.

Yüksek alacak devir hızının karlılığı arttıracağı bulunmuştur. Yüksek alacak devir hızı yüksek kredili satış ya da düşük alacak seviyeleri ile açıklanabilir. Bu bağlamda hava yolu şirketlerinin kredi politikası ve alacak yönetimi konularına önem vermesi tavsiye edilebilir. Bu şekilde alacakların tahsilinin mümkün olduğunca hızlı olması ve böylece karlılığın artması sağlanabilecektir.

Bir diğer gözlem de beklendiği üzere ödemelerini mümkün olduğunca geciktiren hava yolu şirketlerinin karlılığının artacağı yönündedir.

Analiz sonucu elde edilen bulgulardan, aktif devir hızının artmasının karlılığı arttıracağı bulgusu, hava yolu şirketlerinin ellerinde bulundurdukları varlıklarla daha fazla satış yapabilmelerinin onların karlılığını arttıracağı anlamına gelmektedir. Klasik olarak varlıklarını etkin kullananlar daha fazla kar elde etmektedir.

Kaldıraç (borçluluk) bazen karlılığı arttırabilirken diğer taraftan riskliliği de arttırmaktadır. Analiz sonucunda borçluluğu artan hava yolu şirketlerinin kar elde etme olasılıklarını düşürmüşlerdir. Bu durum firmaların yüksek finansal risklilik seviyelerinde bulunuyor olabileceği öngörüsü ile açıklanabilir.

Araştırma çıktıları başta hava yolu şirketlerinin kendileri olmak üzere, bunun yanında yatırımcılar, düzenleyici-denetleyici kuruluşlar gibi paydaşlara da yararlı bilgiler sunmaktadır.