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# **THE EFFECT OF LEVERAGE ON AIRLINES PROFITABILITY; THE CASE OF SOME SELECTED AFRICAN AIRLINES**

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**By: BONA GUTU**

**A THESIS SUBMITTED TO THE COLLEGE OF BUSINESS AND  
ECONOMICS DEPARTMENT OF ACCOUNTING AND FINANCE FOR  
THE DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND  
FINANCE.**

**ADDIS ABABA UNIVERSITY**

**ADDIS ABABA, ETHIOPIA**

**JANUARY 2025**

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**Advisor: Degefa Duressa (PhD)**

**January 2025**  
**Addis Ababa, Ethiopia**

## Statement of declaration

I confirm that this is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Declared by:

Name: Bona Gutu

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Confirmed by Advisor:

Name: Dr. Degefa Duressa (PhD)

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Addis Ababa University

Addis Ababa, Ethiopia

January 2025

### **Statement of certification**

This is to certify that Bona Gutu has carried out his research work on the topic entitled “**The effect of Leverage on Airlines profitability; the case of some selected African Airlines**”. This thesis has been submitted for examination with my approval as a university advisor. The work is original and is suitable for submission for the award of the Degree of master Science in Accounting and Finance at the Addis Ababa University.

Advisor:

Name: Dr. Degefa Duressa (PhD)

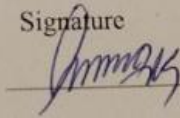
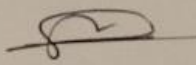

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Approval

The undersigned certify that they have read and hereby recommend to the Addis Ababa University to accept the project submitted by Bona Gutu Geleta, and entitled “The effect of leverage on airlines profitability; the case of some selected Africa airlines” in partial fulfilment of the requirements for the award of a master’s degree in accounting and finance.

### Approved by Examining Board

Advisor <u>Dr. Degefa Duressa</u>	Signature 	Date <u>17/03/2025</u>
External Examiner <u>Dr. Lamessa Bayisa</u>	Signature 	Date <u>13/03/2025</u>
Internal Examiner <u>Dr. Takele Fufa</u>	Signature 	Date <u>13/03/2025</u>
Chairperson _____	Signature _____	Date _____

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## Acronyms

AFRAA	African Airlines Association
AMU	Air Mauritius
ASY	Air Seychelles
BLUE	Best Linear Unbiased Estimator
CAPA	Centre for Aviation Partner
CLRM	Classical Linear Regression Model
DFL	Degree of Operating Leverage
DOL	Degree of Financial Leverage
DW	Durbin-Watson
EBIT	Earnings before Interest and Tax
EPS	Earnings per Share
ETA	Ethiopian Airlines
EXR	Exchange rate per US-dollar
FEM	Fixed Effect Model
FTZ	Fastjet
GDP	Gross Domestic product
GNP	Gross National Product
IATA	International Air Transport Associations
ICAO	International Civil Aviation Organization
INF	Inflation
KQA	Kenya Airways
NIAT	Net Income after Tax
OCF	Operating Cost Efficiency
OLS	Ordinary Least Square
RAM	Royal Air Maroc
REM	Ransom Effect Model
RESET	Regression Specification Error Test

ROA	Return on Assets
ROCE	Return on Capital Employed
ROE	Return on Equity
ROI	Return on Investment
SAA	South African Airways
SFR	Flysafair
SOA	Logarithm of Total Assets
USD	United States Dollar

## **Abstract**

*The study's goal was to find out how leverage affected the profitability of a few African airlines. Thus, using the EVIEWS 10 software program, secondary data from the audited annual reports of eight airlines that were purposefully chosen for the 2010–2020 timeframe were examined using a fixed effect panel regression model. The research design and approach used in the study were explanatory and quantitative, respectively. To isolate the effect of leverage on airlines' profitability and to capture the influence of variables other than the study's primary objective variables (degree of operating and financial leverage), the effect of both operating and financial leverage on airlines' profitability (ROA) was examined by introducing control variables (operating efficiency, airline size, and exchange rate). The degree of operating leverage used by airlines has a positive and statistically significant impact on profitability (ROA), according to the results of the fixed effect regression model. Conversely, certain airlines' profitability (ROA) is negatively and significantly impacted by their level of financial leverage, operating efficiency, size, and exchange rate. Considering the findings, airlines are recommended to update their capital structure and operating costs by increasing the amount of operating leverage (using fixed operating costs), which maximizes their profitability, and optimize debt financing to levels that are easily manageable.*

**Keywords;** *Profitability (ROA), Degree of Financial Leverage (DFL), Degree of Operating Leverage (DOL). African Airlines*

# CHAPTER ONE

## 1. INTRODUCTION

### 1.1 Background of study

The use of borrowed money to raise the possible return on investment is known as financial leverage. Companies utilize this strategy to boost their profits by borrowing money at a cheaper rate than the rate at which they anticipate a return on their investment. Leverage in finance can increase investment returns. In the subject of financial management, leverage is referred to as the capacity of an organization to use fixed costs of assets or cash to enhance returns. There are two types of leverage namely "operating leverage" and "financial leverage (Tyrylahti, 2015).

Leverage decisions made by financial manager's aid organizations in maximizing wealth and minimizing risk. Operating leverage refers to how heavily a business relies on fixed asset costs to maximize operating profit. On the other hand, financial leverage combines debt and equity financing and is susceptible to a variety of financial issues. Financial leverage deals with the fixed cost of the liabilities, whereas operating leverage is concerned with the fixed cost of the assets used in the operation (Abaynew, 2019). Financial leverage deals with the fixed cost of the invested money, whereas operating leverage is concerned with the fixed cost of the assets used in the operation. However, risks that affect a firm's return on investment could be part of management decisions (Gatsi, 2013).

The aviation industry faces major risks to its long-term stability, profitability, and performance from both operating and financial debt; the airline industries highly leveraged financial position makes it vulnerable to rising borrowing costs, financial distress, and economic downturns. From an operational perspective, the fierce competition forces and the industry's inherent high fixed costs may present a threat (Gritta et al, 2006). To survive the tough industry competition and maintain stability over time, airline management must determine its operating cost structure and the right source of capital (debt or equity) to maximize earnings while decreasing risk (Gritta et al, 2006).According to Sewnet (2017), the airline industry is a substantial economic force, both in terms of its operations and its impacts on related industries including aircraft production, the tourism industry, and other businesses engaged in international trade with a growth rate that

exceeds the global GDP, the airline industry is currently one of the fastest-growing and most competitive in the world (Garefalakis et al., 2016).

The International Air Transport Association's (IATA) 2018 performance figures reveal that African airlines have carried 92 million passengers, up 5.5 percent over 2017. These carriers had a market share of 2.1 percent. In terms of market share, Asia-Pacific region airlines carried the largest number of passengers (1.6 billion) worldwide, an increase of 9.2 percent compared to the region's passengers in 2017, which had a market share of 37.1 percent. It was followed by Europe which had a 26.2 percent market share (1.1 billion passengers, up 6.6 percent over 2017); North America with a 22.6 percent market share (989.4 million passengers, up 4.8 percent over 2017); Latin America with a 6.9 percent market share (302.2 million passengers, up 5.7 percent over 2017); and Middle East with a 5.1 percent market share (224.2 million passengers, an increase of 4.0 percent over 2017) (IATA, 2019).

Despite this, African carriers' market shares for flights between Africa and Europe in 2017, flights between Africa and the Middle East in 2017, and flights between Africa and Asia in 2017 were only 35%, 40%, and 30%, respectively. However, according to CAPA's 2017 data, African airlines only made up 35% of the capacity shares (% of available tickets) between Africa and Europe, 40% between Africa and the Middle East, 30% between Africa and North America, and 81% between Africa and Asia Pacific. Additionally, in the fiscal years 2013, 2014, 2015, 2016, 2017, and 2018, the aviation industry's overall financial performance was \$10.7 billion, \$13.8 billion, \$36 billion, \$34.2 billion, \$37.7 billion, and \$32.3 billion, respectively (IATA, 2018). Interestingly, the survey discovered that Africa was the only continent where the aviation industry constantly suffered a net loss (IATA, 2018). Due to increased competition among them and rising operating costs, airlines must operate more effectively if they want to make a profit. Because of this, airline management is using a range of strategies to retain profitability and continue running their businesses despite the challenges (Gritta et al., 2006).

Considering the above conversations, evaluating how leverage affects the profitability of the African aviation sector is a delicate topic at the same time. Therefore, using an explanatory research approach, this study attempts to investigate how operating and financial leverage affect airline profitability, specifically for eight chosen African airlines.

## **1.2. Statement of the problem**

According to Khazaaleh (2017), due to operational and financial leverage, airlines operating in the dynamic environment may be subject to financial and business hazards. Airline firms are unable to design a cost structure that will shield them from all significant financial and structural shocks, which will ultimately hurt their profitability and growth, even though the choice of cost structure is vital in defining each firm's success. In the same vein, Hassan (2015) asserted that the airline industry is particularly susceptible to changes in the cost of fuel, labor, and financing. A company's profitability depends on efficient operations as well as how favorable fuel, labor, and loan costs are because some costs have a set behavior.

Gritta et al. (2006) claim that the aviation industry's high fixed costs resulted in high operating leverage, which raised the risk of return unpredictability. Regarding financial leverage, the high level of financial leverage in the aviation sector can need an increase in borrowing costs. Raphael (2013) argued that ineffective operations and low credit performance were to blame for the airline industry's bad financial performance. The impact of financial leverage is at play with this poor level of credit performance, and operating leverage is at play with operational inefficiencies. Additionally, the IATA's 2018 annual report highlighted the notable regional variations in airline profitability. For example, North American carriers made four times as much per passenger as their counterparts in Asia-Pacific and Europe, while carriers in Latin America and the Middle East produced returns that were better than break even and carriers in Africa continued to lose money. (IATA, 2018)

Numerous researchers have generally conducted their studies at the local and global levels in the aviation industry, including Tsai (2008), Lee and Hooy (2012), Bratlie and Jotne (2012), Khazaaleh (2017), Tomoiaga (2014), Enos et al (2017), Menta (2015), Solomon (2015), Deribe (2016), Sewunet (2017), Abebe (2017) and Abaynew Demisew (2019). These studies frequently focused on the topic of the elements influencing airline profitability, the elements influencing airline capital structure, the financial performance and financial risk exposures of the airline sector and the effect of leverage on airlines profitability.

For instance, Alahyari (2014) investigated the elements that affect the airline industry's profitability on a global scale, however, neither researcher took the effect of debt level on airline profitability into account. Researchers have also looked into the variables that affect capital

structure in the airline industry, including Capobianco (2004), Bratlie and Jotne (2012), Kiracy and Aydin (2017), Khazaaleh (2017), and Tomoiaga (2014). Except Abaynew Demisew (2019), none of the studies specifically looked at how the financial structure was established or how much leverage affected airline profitability.

Studies on the airline industry in Africa have also been conducted. Tsai (2008), for instance, tried to study on risk exposures in the aviation industry for South African airlines, however, the study neglected to assess the business risk exposures (amount of operating leverage) in the industry. In a study comparable to Enos et al. (2017), the degree of debt was not taken into account; instead, they merely examined whether management structure had an impact on airline profitability.

The profitability of Ethiopian Airlines was studied by Solomon (2015), but the study only looked at supply and demand issues, ignoring even leverage as a potential driver of profitability in the airline business. Additionally, the study's explanatory variable (net profit margin- net profit per revenue) and dependent variable (net profit per equity) are nearly identical, which biases the study's estimation and leaves out the impact of leverage level on airline profitability.

According to the empirical studies that were conducted before and listed above most of the researchers were focused on the supply and demand issues, arguing profitability depends on efficient operations as well as favorable costs also blaming ineffective operations and low credit performance. However, neither researcher took the effect of debt level on airline profitability into account and none of the studies. Specifically, look at how the financial structure was established or how much leverage affected airline profitability. Hence, the researcher tried to study effect of leverage on Airlines profitability from the point of **ROA**. The study examined how much leverage (both operating and financial) affects the profitability of eight various African airlines from 2010 to 2020.

## **1.4. Objectives of the study**

### **1.4.1. General objective**

The general objective of the study was to investigate the effect of leverage on the profitability of selected African airlines.

### **1.4.2. Specific objectives**

The specific objectives of the study include the following:

1. To examine the effect and degree of operating leverage (DOL) on the profitability (ROA) of selected African airlines.
2. To examine the effect and degree of financial leverage (DFL) on the profitability (ROA) of selected African airlines.

### **1.5. Research Hypotheses**

According to (Kumar Y., (2006), the research hypothesis is a tentative solution to a problem and the research activities are planned to verify the hypothesis and not to find out the solution of the problem or to seek an answer to a question. In line with this, to meet the purpose of the study the following alternative hypothesis has developed.

H1: Degree of operating leverage has a positive and significant effect on profitability (ROA) of airlines.

H2: Degree of financial leverage has a negative and significant effect on profitability (ROA) of airlines.

### **1.6. Significance of the study**

The study will contribute to the existing knowledge about how to structure an airline's capital and operating costs to maximize returns through the effective use of fixed financing and operating costs. The study's findings will be used as a guide for other academics looking into the same or a related topic, as well as by various stakeholders like airline management and policymakers to develop financial and operational plans for airlines to improve performance.

### **1.7. Organization of study**

The study was organized into five chapters as follows. Chapter one tried to explain the study's background, statement problem, objective of the study and significance of the study. Chapter two reviewed several theoretical and empirical works on operating and financial leverages, as well as the study's conceptual framework. Chapter three explains the methodology and research design, sample technique, data collecting and how results were analyzed. Chapter four presents the study's comprehensive analysis. Lastly chapter five concludes by summarizing the research findings and offering potential recommendations to various airline stakeholders.

# CHAPTER TWO

## 2. LITERATURE REVIEW

### Introduction

This chapter examined the theoretical and empirical research on the connection between profitability and leverage levels. As a result, section one discusses concepts and theories of capital structure, section two presents relevant empirical studies of the relationship between leverage and profitability, and section three presents empirical reviews specifically for the aviation industry. The theoretical examination includes a thorough discussion of the capital structure theories proposed by Modigliani and Miller, propositions I and II, pecking order theory, trade-off theory, agency cost theory, and market timing theory. Different local and worldwide study findings on the connection between leverage and enterprises' profitability are evaluated within the "empirical review" section. Then, finally, a conceptual framework for understanding the relationship between leverage and profitability.

### 2.1. Theoretical Framework

The Modigliani and Miller theory, the pecking order theory, the trade-off theory, the market timing theory, and the agency theory are some of the most important capital structure theories that aim to explain the financing decisions made by diverse corporate organizations. The following section goes into further detail on the capital structure hypotheses.

#### 2.1.1. Modigliani and Miller Theory

The Modigliani and Miller (1958) theory, which served as the foundation for numerous other researches on capital structure, is regarded as a classic and fundamental study. Modigliani and Miller provide two ideas based on the premises that the capital markets are frictionless, that investors and corporations receive loans at the same rates, and that all businesses have the same capital structure.

The first assertion of M&M's theory, which states that the market value of any firm is determined by capitalizing its expected return at the rate appropriate to its class (Modigliani and Miller, 1958, p.268), opens the discussion. Under ideal and effective capital market circumstances (irrelevance), a firm's value will remain constant regardless of the proportion of debt and equity in its capital structure. According to M&M Proposition I, "In a perfect capital market, a firm's total value is

equal to the market value of the total cash flows generated by its assets and is unaffected by its choice of capital structure." The average cost of capital for any firm is completely independent of its capital structure and equal to the capitalization rate of a pure equity stream of its class (Modigliani and Miller, 1958), so M&M also stated their proposition I in terms of firms' average cost of capital in an equivalent manner. According to M&Ms' Proposition I capital structure theories, businesses that are fully financed by equity (by owners) and businesses that are partially financed by debt (by creditors) have the same market value and average cost of capital, respectively.

Then, Modigliani and Miller (1963) asserted in their proposition II about corporation income tax that although leverage reduces a firm's cost of capital, the tax advantages of debt financing may be offset by rising equity costs since equity owners bear most of the risk. The writers of this claim stressed the significance of the factors found in the research on the factors that determine capital structure, such as taxes, expenses associated with bankruptcy, transaction costs, asymmetric knowledge, agency costs, and equal access to the market. These components have enormous possibilities for the theories' theoretical and empirical growth. Lastly, M&M Proposition II states that the debt-to-equity ratio, represented in market values, directly increases the expected rate of return on the common shares of a leveraged corporation.

Both direct and indirect costs result from debt issues. The explicit cost is the interest rate applied to the company's debt. As a result, shareholders desire a higher return on their investment, thus increasing the firm's financial risk. When combined, the implicit and explicit costs demonstrate that debt is not more costly than equity and that investors' expected return on investment is unaffected by the company's capital structure (Antoniou, 1992).

### **2.1.2 The Tradeoff Theory**

As the name implies, the objective of trade-off theory is to determine the optimal ratio of debt to equity. Companies who follow this line of thinking try to balance the advantages of debt, like the ability to write off interest payments on taxes, with the disadvantages, including the upfront and ongoing costs associated with filing for bankruptcy (Tyrylahti, 2015). According to the trade-off approach, businesses adjust their capital structure by weighing the tax advantages and bankruptcy risks associated with leverage. The goal of trade-off theory is to find the optimal debt-to-equity ratio while accounting for each company's distinct capital expenditure and investment needs.

To determine the optimal capital structure, tradeoff theory adds other defects, such as taxes, expenses associated with financial distress, and agency costs, while maintaining the assumptions of market efficiency and symmetric information. (Fama & French, 2002).

Moreover, Zhu (2014) claims that a complete examination of the trade-off theory can be achieved by dividing the assumption into two parts. The first is a static component that suggests companies trade off the expense of financial difficulties vs the tax benefits of debt over a specific time period. The theory presented in the second section can be interpreted as a dynamic trade-off, wherein enterprises gradually deviate from the optimal amount of leverage over time, and the goal adjustment behavior is assumed. Whether the firms move closer to the assumed ideal capital structure or if the cost-benefit ratio remains constant determines the difference.

According to the tradeoff theory, a company's optimal debt ratio is usually determined by weighing the benefits and drawbacks of borrowing while maintaining the same level of assets and investment goals. This theory states that companies that require outside funding should issue debt when their leverage falls short of the goal, equity when their leverage exceeds the goal, or a mix of the two to stay within the goal (Fama & French, 2002).

### **2.1.3. The Pecking Order Theory**

According to the pecking order hypothesis, firms' capital cost may increase if flotation costs, and asymmetric knowledge are present. According to this theory, enterprises should make financing decisions in accordance with the conventional pecking order to raise the necessary cash. This theory, in contrast to the trade-off theory, rates the various financing possibilities rather than providing a clearly defined goal debt-to-value ratio (Bratie and Andreas Jtne, 2012). According to this view, target leverage is of secondary importance in addressing the financial needs of the company (Huang & Ritter, 2004).

According to Myers and Majluf's (1984) theoretical, because of the knowledge asymmetry between managers and outside investors, investors are only prepared to purchase risky securities at a discount price and believe that managers only issue risky securities when they are overpriced. The price of newly issued securities will therefore be underpriced because of this information asymmetry. This idea suggests that managers prioritize raising internal funds first, and only raise external funds when internal funds are insufficient, in order to address the issues firm managers, face. In addition to prioritizing internal funds over external funds, the company also gives external

money priority depending on flotation costs and unfavorable signals to the enterprise. According to this idea, the sequence of precedence for external financing is as follows: regular debt, convertible debt, hybrid securities, and as a last option, equity securities.

#### **2.1.4. The Agency Cost of Free Cash Flow Theory**

Managers of corporation's act as shareholders' agents. If management and stockholders have distinct goals, agency issues may occur. When the firm's managers have an excessive amount of money at their disposal, such conflicts are especially prone to occur (Brigham, 2011). Managers with significant free cash flow, according to Jensen (1986), can raise dividends or buy back stock, distributing current funds that would otherwise be invested in low-yield projects or lost. This gives managers discretion over how to spend future free cash flows, but they can also guarantee that future cash flows will be distributed by announcing a "permanent" dividend rise. Due to the possibility of future dividend reductions, such guarantees are tenuous (Tesfaye, 2018). The capital markets' substantial stock price declines in response to dividend reductions are consistent with the free cash flow agency costs. Managers can effectively bind their promise to pay out future cash flows by creating debt without keeping the proceeds of the issue. Managers are cementing their commitment to pay out future cash flows in a way that cannot be achieved by simple dividend increases by issuing debt in return for stock. Accordingly, this theory contended that debt lowers the agency costs of free cash flow by lowering the amount of cash available for managers to spend at their discretion.

Additionally, this view contended that using more leverage has costs. Leverage causes the standard agency costs of debt, such as bankruptcy expenses, to grow. When a firm's value is maximized, or when the marginal costs of debt barely outweigh the marginal benefits, the debt-to-equity ratio is said to be optimal. According to the free cash flow theory, when a company's operating cash flow greatly surpasses its viable investment opportunities, its value will rise despite its risky debt levels.

#### **2.1.5. The Marketing Timing of Capital Structure**

To expand capital structure theory, Baker and Wurgler (2002) investigate how capital structure influences stock performance on the market. The basic tenet of the idea is that capital structure develops because of prior attempts to time the equity market. The market timing model presupposes that financial decisions are based on the capital structure's time-varying relative costs. Because the observable capital structure at date "t" is the result of past attempts to time the market,

the issuance of securities has long-term repercussions on the capital structure. According to this hypothesis, businesses favor debt when relative expenses are high and equity when they are cheap.

The market timing theory of capital structure contends that corporations time their equity issues in the sense that they issue new stock when the stock price is regarded to be overvalued and buy back own shares when there is undervaluation. This is in addition to the preference of debt at the time of low equity cost. Therefore, stock price volatility has an impact on the capital structure of businesses. According to Luigi and Sorni (2009), there are two main types of market timing capital structures that produce comparable capital structure dynamics.

In the first, economic agents are presumed to be rational, whereas, in the second, they are presumed to be irrational. The imbalance between a company's management and stockholders is lessened in the first edition since it is believed that corporations will issue shares immediately following a favorable information release. A decrease in information asymmetry and an increase in stock price are related. As a result, businesses develop their timing opportunities. According to Baker and Wurgler (2002), the second theory presupposes that economic agents are irrational. The company's stock has time-varying mispricing because of irrational behavior. When they think the cost of equity is excessively low, managers issue equity, and when they think the cost is irrationally high, they repurchase equity. It's crucial to understand that the second iteration of market timing does not require an inefficient market. Managers are not required to accurately forecast stock returns. The simple presumption is that managers think they can time the market.

Evidence supporting the impact of equity market timing on the firm's capital structure is provided by Baker and Wurgler (2002). They define a market timing metric as a weighted average of the firm's market-to-book values over the previous few years of external capital requirements. They discovered that increases in leverage are strongly and favorably connected to their market timing metric, leading them to conclude that a firm's capital structure represents the culmination of prior attempts to time the equity market.

**Table 2.1. Summary of capital structure (leverage) theory**

Theories	Relationship with the profitability
1. MM's proposition I&II	Leverage selection has little impact on a company's profitability.
2. Trade-off Theory	If leverage is well optimized, it has a favorable impact.
3. Pecking Order Theory	Leverage has a negative effect on firms' profitability
4. Agency Cost	Leverage has a positive effect on firms' profitability

Source: Bratie and Jotne. (2012) and Antoniou, A. (1992)

## **2.2. Empirical Reviews**

Empirical assessments of the conclusions and methodologies used by different researchers are included in this section. Broadly speaking, empirical research on the relationship between leverage and a firm's profitability falls into two categories. The first group searches for dependent variables that influence leverage, like signs of business success. The second group, on the other hand, looks at variables that impact the firm's profitability and performance, and leverage is one such explanatory variable. This study's main objective is to investigate how the performance of the second group is assessed; particularly how operational and financial leverages impact a company's profitability. The relationship between leverage and a firm's profitability has been the subject of numerous international, continental, and local research. Consequently, the ensuing parts endeavor to tackle empirical assessments about the impact of leverage on the profitability of organizations across diverse industries, with a focus on the aviation industry.

There have been a lot of empirical studies conducted on the connection between profitability and leverage. Despite this, the findings of these studies seem incongruous. Some studies found a negative association between profitability and leverage, while others found a positive one. Others didn't find any link between the two. Accordingly, after reviewing the study findings on the relationship between financial leverage and profitability, studies on the topic of the association between financial, operating, and combined leverage with company profitability are analyzed.

### **2.2.1. Financial Leverage and Profitability**

In their respective studies, Singapurwoko and El-Wahid (2011), Azeez and Tunj (2015), and Negasa (2016) found that leverage had a favorable and significant impact on a company's profitability. The impact of financial leverage on the profitability of non-financial companies listed on the Indonesian stock exchange was studied by Singapurwoko and El-Wahid in 2011. To understand the impact of debt on profitability, the study used operational decision factors, macroeconomic factors, firm size, and industry factors. It also used the equity multiplier as a proxy to measure debt used over the total assets of the company.

In addition, this research was unusual in that it added industry distinction by taking into account dummy variable regression analysis to balance out the other elements affecting the profitability of the companies. They used a sample of 42 businesses, six from each of the eight categories that were listed on the Indonesian Stock Exchange (IDX). Accordingly, the study's findings showed that in unclassified data (data that was not broken down by industry), the effects of debt, company size, and operational decisions were positive and significant, while macroeconomic variables were unimportant.

In their study, Azeez and Tunj (2015) presented empirical data on the relationship between financial leverage and return on equity of a company operating in Nigeria's oil and gas sector from 2004 to 2007. The study's findings showed that financial leverage and a company's ROE have a positive and significant link. In addition to the studies mentioned above, Negasa (2016) asserted that leverage and ROA, a proxy for measuring profitability, had a positive and substantial association.

On the other hand, research on the connection between leverage and a firm's profitability by Tsuji (2013), Akinlo and Asaolu (2012), Al-Shamaileh and Khanfar (2014), and Nawaz (2015) was conducted in various study areas. All of these studies came to the conclusion that there is a negative and significant connection between leverage and profitability. As an illustration, Tsuji (2013) discovered that there is typically a negative correlation between firm profitability and leverage ratio when he looked at the relationship between corporate profitability and capital structures of equipment sector firms listed on the Tokyo Stock Exchange. Akinlo and Asaolu (2012) looked at evidence of profitability and leverage from Nigerian businesses, and the study's findings showed that firm size significantly improves profitability while leverage has the opposite effect. Al-

Shamaileh and Khanfar (2014) calculated the financial leverage ratio and the rate of return on investment (ROI) on profitability for the sources of funding in Jordanian tourism businesses. This study found that the degree of financial leverage has a statistically significant negative influence on the profitability of the tourism companies listed on the Amman Stock Exchange. Nawaz (2015) also conducted research on the connection between financial leverage and the profitability of the Pakistani cement industry, revealing a negative and significant correlation between the two.

Out of the 21 enterprises, the researchers have incorporated 18 cement producers. The study applied an ordinary least squares model to six years of annual data, from 2005 to 2010, to determine a causal association between financial leverage and company profitability (measured by ROA). The results of the study showed that financial leverage has a statistically significant negative influence on the cement industry's profitability.

However, Olang (2017) aimed to determine how financial leverage affected the profitability of companies listed on the Nairobi Stock Exchange (NSE). The researcher used a sample of 30 financial statements from 2010 to 2015 for this investigation. Financial leverage was examined in terms of liquidity, firm size, and growth opportunity to determine its effects on the profitability of companies listed on the NSE to analyze its impact on profitability. The study also discovered that business size has a statistically significant impact on listed companies' profitability. On the other hand, liquidity and growth potential have no statistically significant impact on the profitability of companies listed on the NSE.

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Mocnik and Sirec (2010) used a sample of 782 Slovenian fast-growing companies from the years 2008 and 2009 to explain the relationship between a firm's profitability, firm size, leverage ratio, and labor expenses. The study found a negative relationship between firm size and firm size.

### **2.2.2. Operating Leverage and Profitability**

This section attempted to review and discuss empirical data on profitability and operating, financial, and combined leverages in the various subject areas. Several researchers, including Kumar (2014), Habib (2014), Khedkar (2015), Elangkumaran, and Nimalathasan (2013), investigated the connection between profitability and leverage (financial, operating, and combined). However, their conclusions are mixed, with some claiming a strong and positive association between the variables, while others have established and asserted a negative relationship. However, several data indicated that there is no meaningful association between the two parameters.

By using seven years' worth of financial statements (from 2005/06 to 2012/13), Kumar (2014) conducted an empirical analysis of the relationship between leverage and profitability in Bata India Limited. The amount of operating, financial, and combined leverage has a statistically significant beneficial impact on profitability, according to the study, which examined profitability by ROI. Habib (2014) also tried to understand the influence and connection between financial and operational leverage on the profitability of Pakistani enterprises that manufacture consumer goods. Two consumer goods businesses listed on the Karachi Stock Exchange from 2002 to 2013 were included in the study sample. The analysis demonstrated that leverage had no discernible impact on ROA and ROE. However, operating and financial leverage have distinct positive and negative effects on the company's net profit. The observations made by Habib (seven observations) and Kumar (24 observations), however, were insufficient to draw any conclusions about the association between these factors.

Using data from Sabar Dairy for the years 1985–1986 to 2013–2014, Patel (2014) conducted a thesis titled "Impact of Leverage on Profitability" and examined the relationships between return on capital employed (ROCE), return on equity (ROE), return on assets (ROA), and earnings per share (EPS) with operating leverage, financial leverage, and total leverage. Regression analysis showed a favorable correlation between ROCE, ROE, and EPS and DOL, DFL, and DTL, although the link was not statistically significant. However, when ROA was used as the dependent variable

in the study, the total model was statistically significant. DOL and DTL had a positive and substantial impact on ROA, while DFL had a negative and significant impact.

In contrast, Khedkar (2015) examined Dr. Reddy's Laboratories, the pharmaceutical company with the highest sales turnover for the fiscal year 2013/14, using financial, operating, and combined leverage as explanatory variables and profitability as measured by return on investment (ROI) as the dependent variable. According to the study's investigation of the relationship between profitability and operating leverage, there is a significant and inverse association between profitability and operating leverage. The study found a favorable correlation between the level of financial and total leverage, but the connection was statistically insignificant. Furthermore, the study by Elangkumaran and Nimalathasan (2013) found that only 4% of earnings can be explained by DOL, DFL, and DCL and that there is no significant relationship with EPS after examining the impact of leverage on earnings and share price of listed companies on Colombo stock exchange (CSE) in Sri Lanka for the period from year 2007/2008 to 2011/2012.

### **2.3. Empirical Reviews in Airlines Industry**

The findings of numerous empirical studies on the domestic and international airline industry are covered in this section. Alahyari (2014) investigated the variables influencing the profitability of Turkish airlines. Consequently, information was extracted from several major airlines using data from a data stream that covered the years 1994 to 2013. The researcher used two regression models that she had created to look at the effects of independent factors on profitability as measured by ROA and ROE. The study's findings, which employed return on assets (ROA) as a stand-in for profitability, demonstrated that growth prospects, liquidity ratios, and the tangibility of assets all had detrimental and significant implications for the companies' profitability. Leverage has no impact on the firm's profitability, nevertheless. However, all independent variables were found to be insignificant when ROE was utilized in the study as a stand-in for profitability.

Gritta et al. (2006) conducted an analysis of operating, financial, and total leverage and its effects on U.S. air carrier returns from 1990 to 2003. The investigation demonstrated that linked leverage has long been a major source of financial problems for the industry. The study's conclusions indicate that the sample companies' consistently low ROE ratios and notable changes in their levels of leverage were indicators of the precarious financial situation airline carriers were in. The study also made note of the fact that this industry has been underleveraged financially for a long time,

which has added to its tendency toward "boom and bust" cycles. Nevertheless, the research solely assessed the extent of leverage's impact.

Antoniou (1992) investigated the following factors that influence international airlines' profitability: In 1985, 58 airlines were chosen as a sample from among the 114 present IATA members. The total operating profit divided by the total operating revenue was used in the study to calculate the operating profit margin, or OPRM. In addition, the fleet, network, and general economic factors (i.e., population, area, and GNP per capita) were separated into four types of independent variables. Additionally, the study included an ownership dummy that was set to one if the government controlled more than 50% of the business. Finally, the analysis found that the most relevant characteristics were the population share of passenger traffic, fleet age, total ton-km available, passenger load factors, and the percentage of capacity-related expenses. The percentage of scheduled and international traffic, labor productivity, fleet size, and average length per departure cannot be entirely ignored, even though they are not statistically significant at normal levels. Finally, characteristics that were demonstrated to have no noticeable effect on operational profit include weighted fleet utilization, GNP per capita, the percentage of regional traffic, and ownership type. But this study could not explain how leverage affects airline profitability.

The financial structure problem in the international airline industry was examined by Capobianco (2004). As a result, the study employed airline data from 1993 to 1997, and its conclusions demonstrated that there is no discernible competitive advantage between developed and developing nations when aviation companies are grouped by country and evaluated based on factors like debt and return on assets. It is possible to display businesses in developed and developing countries with varying degrees of debt and returns on assets. Kiracy and Aydin (2017) also looked at empirical data from conventional airlines to determine the factors that influence capital structure. Their empirical results showed that traditional airlines tend to increase the overall leverage level because they calculate their long-term debt ratio using the tradeoff theory and their total ratio using the pecking order theory. However, neither Kiracy and Aydin (2017) nor Capobianco et al. (2004) examined the effect of leverage on airline profitability.

According to a study by Lee and Hooy (2010) that examined the causes of systematic risk exposure for the East Asian airline industry, only size and operating efficiency are positively and significantly connected with systematic risk, suggesting that it affects the profitability of airlines.

Additionally, Lee and Hooy (2012) assessed the systemic financial risk exposure of airlines operating in North America, Europe, and Asia between 1990 and 2010. The aim of the study was to identify the elements that influence systematic risk in the aviation industry and their impact on profitability, with a focus on company size as defined by assets. The two elements that were determined to have the biggest effects on systematic risk were the size and operating leverage of the aviation sector. The years 2011 through 2014 were included in the empirical study "Financial performance of top 20 world airlines" by Suat et al. (2016). The study measured airline financial performance using a harmonic index, although its focus was on measuring performance rather than the factors that affect airline performance.

Deribe (2016), researchers in Ethiopia, studied airline profitability by selecting a sample of the top 20 international airlines based on data spanning from 2010 to 2014. As a result, the study selected as explanatory variables net profit margin, leverage, total asset turnover and efficiency, and their effects on airline profitability. The study's conclusions demonstrated that while efficiency had a negative effect on profitability for non-profitable airlines, there was a positive and substantial association between return on equity, a proxy for profitability, net profit margin, and leverage for both profitable and non-profitable airlines. This study lacks enough data to classify airlines as profitable or unprofitable and to do a profitability analysis. Furthermore, return on equity and the net profit margin are similar, as one of the explanatory variables is. Stated differently, net profit margin represents the ratio of net profits to revenues and return on equity is the ratio of net profit to equity. In both measurements, the numerator is similar. Because the dependent variable was essentially explained by the result, the study's results may be prejudiced as a result. Furthermore, the impact of operational leverage was not included in the study.

Menta (2015) investigated the industry-specific, airline-specific, and macroeconomic variables that impacted the three Sub-Saharan African airlines' profitability between 2003 and 2013. The main airlines operating in sub-Saharan Africa were the subject of the investigation. The analysis found that while leverage has a statistically significant negative impact on airline profitability, airline size has a positive and statistically significant influence on airline profitability. Abebe (2017) conducted a study on the elements influencing Ethiopian Airlines' profitability in the aviation sector. As a result, the findings demonstrated that leverage negatively and statistically

significantly affects airline profitability. But neither of them considered how operating leverage affected the airline's bottom line.

Solomon (2015) also assessed the variables influencing Ethiopian Airlines' profitability. Net profit after taxes was the study's dependent variable in order to achieve this, and the supply side variables available seat kilometer (ASK), labor cost, fuel cost, maintenance cost, and renting or leasing cost were the study's independent factors. But because his research goal was limited to analyzing the supply and demand dynamics of the airline, he ignored the impact of leverage on profitability. In a different study, Sewunet (2017) discovered that profitability is a statistically significant factor that has a negative relationship with leverage. The study focused on the major Sub-Saharan African carriers and examined the factors influencing the capital structure of the airline business. Nevertheless, this study's exclusive focus was on the elements influencing airlines' capital structures. To add another, Ethiopian Airlines' success was assessed by G/Egziabher (2012) along with its factors and the lessons that other public companies can take away from it. Nevertheless, the impact of a financial choice on the airline's performance was not taken into account in this study.

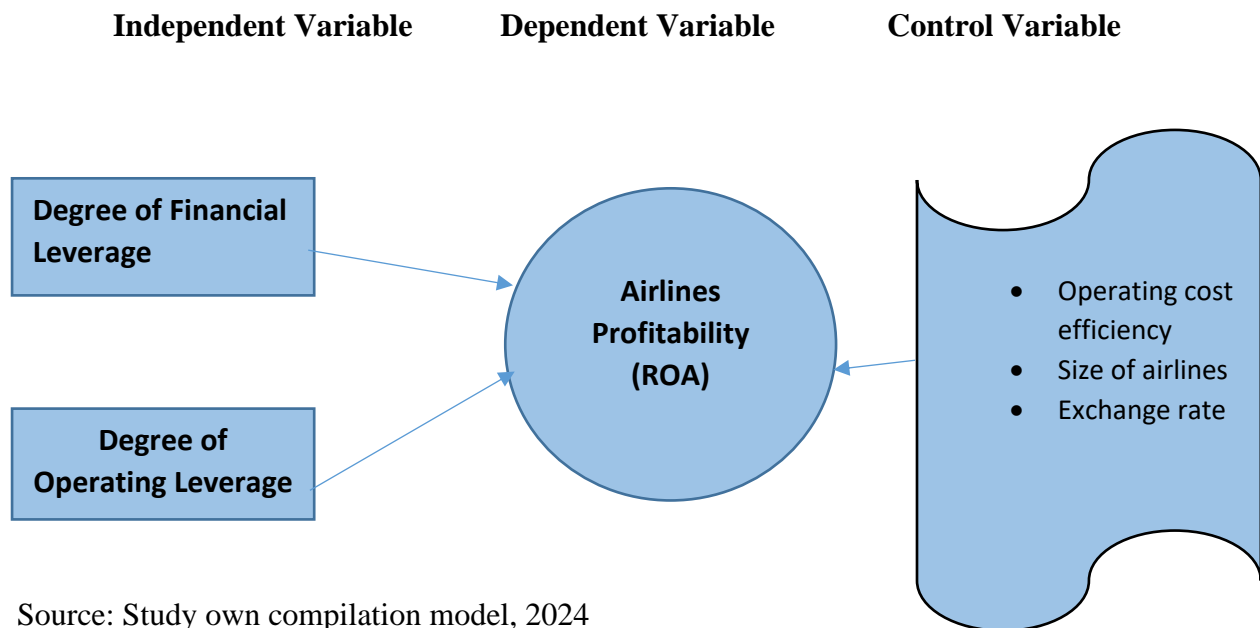
#### **2.4. Summary and Knowledge Gap**

The study attempted to address numerous theoretical and empirical works pertaining to factors that affect profitability and the connection between leverage and profitability in this chapter. The results of the studies covered in the preceding sections show that the profitability of enterprises were influenced by both financial and operational leverage. According to the empirical studies that were conducted before and listed above most of the researchers were focused on the supply and demand issues, arguing profitability depends on efficient operations as well as favorable costs. Also, blaming ineffective operations and low credit performance. However, neither researcher took the effect of debt level on airline profitability into account and none of the studies specifically looked at how the financial structure was established or how much leverage affected airline profitability. Hence, the researcher tried to study effect of leverage on Airlines profitability from the point of ROA. The study examined how much leverage (both operating and financial) affects the profitability of eight various African airlines from 2010 to 2020.

## 2.5. Conceptual Framework

A conceptual framework is a graphic that illustrates how dependent and explanatory variables relate to one another and offers the main idea of the study. Because of this, the study assembled the conceptual framework (fig. 2.1) that is based on studies of the theoretical and empirical literature included in the earlier sections of this chapter.

**Figure 2.1 Conceptual Framework**



Source: Study own compilation model, 2024

## **CHAPTER THREE**

### **3. RESEARCH DESIGN AND METHODOLOGY**

#### **Introduction**

To fulfill the planned purpose, which is "to investigate and analyze the effect of leverage on selected African airlines profitability," and to make the study's analysis as scientific as feasible, the research design and methodology is presented in this section of the study. The target population, sample technique, data collection, and data source are also covered in this section. To accomplish the goals that drive the researcher, the study attempted to explain and describe its design and methods in this section by reviewing many books and earlier studies on comparable topics.

#### **3.1. Research Approach**

To address the objective of the study quantitative research approach was employed. According to Kothari (2004), a quantitative research strategy entails collecting data in a quantitative format that can be submitted to rigorous quantitative analysis in a formal and disciplined manner. As the name implies, quantitative research attempts to quantify phenomena by posing queries like "how long" or "how many." Quantitative approaches aim to generalize findings from a sample of the target population and quantify data. A quantitative research approach was used in this thesis.

#### **3.2. Research Design**

A research design is a set of procedures that a researcher uses to provide legitimate, impartial, accurate, and cost-effective answers to questions. A research design has two main functions. The first relates to the identification and/or development of procedures and logistical arrangements required to undertake a study, and the second emphasizes the importance of quality in these procedures to ensure their validity, objectivity and accuracy (Kumar, 2011). Explanatory research design was employed to examine the effect of leverage on selected African airlines profitability.

#### **3.3 Population and Sample Size**

The study's overall target consisted of all African airlines that operate and provide domestic and international air transportation service. The sampling technique that the researcher applied was a purposive (Judgmental) sampling. Specifically, purposive sampling was used in selecting the top airlines based in Africa and operating both domestically and internationally. According to Kumar,

(2011) the primary consideration in this sampling design is your judgment as to who can provide the best information to achieve the objectives of your study. You as a researcher only go to those people who in your opinion are likely to have the required information and are willing to share it with you. Thus, the justification for purposively selecting the eight top Airlines in Africa is because they are ranked within a range of 1-10 as top performing airlines based on profitability according to different websites and availability of data from their official website. Using a purposive sampling technique, eight airlines has been selected as a sample size for the research which are Ethiopian airlines, South Africa, Kenya airways, Air Mauritius, Air Seychelles, Royal Air Maroc, Flysafair and Fastjet.

### **3.4. Data Source of the Study**

There are numerous approaches of gathering the necessary data, and they vary greatly in terms of the expenses in terms of both time and money as well as other resources available to the researcher (Kothari 1990). The collection and analysis of accurate data are not only essential but also required for conducting scientific and pertinent research. Because diverse entities were collected and organized the data for their own primary purposes, it is secondary for our study. As a result, the study examined secondary information (audited financial statements) of eight African airlines from the years 2010 to 2020 from each airline's website. As well as the exchange rate for each airline's home nation from the World Bank database.

### **3.5. Data Collection and Analysis Techniques**

The researcher used the right data analysis procedures to analyses the acquired data if they are to produce an accurate result. The researcher chooses the most suitable data collecting and analysis procedures because decisions made by many stakeholders may be based on the results of this study. In order to do a regression analysis of the dependent variable against the independent factors and to perform other diagnostic tests, this study used a balanced panel data set from eight chosen African airlines. This study used both descriptive and inferential analysis method. The data set was analyzed using the statistical software tool EVIEWS 10.

The study converted all airlines financial statements into USD using the matching historical exchange rate to conduct analysis in common currency denomination. In order to determine the causal relationship between airline profitability (ROA), explanatory (degree of operating and

financial leverage) the study conducted multiple regression analysis and used inferential statistical analysis.

### **3.6. Variables Definition and Measurements**

A study's capacity to identify and measure the dependent variable as well as all other quantifiable and identifiable independent factors that explain it is critical to its success. Because of this, the next paragraph will explore several theoretical and empirical works on related topics to identify, quantify, and characterize dependent and independent variables. In order to conduct analysis, the study used the return on return on asset (ROA) as a dependent variable and the amount of financial and operating leverage as explanatory factors to explain how airlines make money. By examining earlier empirical research on comparable topics, dependent and independent variables were identified and measured. Every variable's precise description and measurement are covered in detail in the sub-sequent section.

#### **3.6.1. Dependent Variable- Airlines profitability (ROA)**

A dependent variable is one that can be explained by, or influenced by, many explanatory variables as well as other unobserved factors in the study. Accordingly, as the primary goal of the study was investigating the effect of leverage on African airlines profitability, the dependent variable is airline profitability (**ROA**). Consequently, the study used return on asset (**ROA**) as a proxy to quantify the profitability of a subset of African airlines by looking into earlier research on the relationship between a firm's profitability and other determinant elements. For example, ROA was employed as a proxy to quantify firms' profitability in research by Schwambach (2010), Olang (2017), Yirgu (2017), Habib (2014), and Abebe (2017).

In order to approximate airline profitability, the study employed return on asset (ROA). The amount of profit that a business makes from every dollar it receives in revenue is indicated by its return on asset (ROA). Airlines' return on asset can be stated as follows:

ROA	Net Income
	Total Asset

#### **3.6.2. Explanatory Variables**

Determinant factors that are anticipated to have a positive or negative impact on the dependent variable are known as explanatory variables. In this instance, the researcher has determined the

degree of operating and financial leverage as the study's objective explanatory variables in order to fulfill the study's goal.

**3.6.2.1 Operating Leverage**

According to Brigham (2011), business risk is the risk that is part of a company's operations and results from uncertainty about operational profitability and capital needs in the future. Businesses' business risk is influenced by a variety of factors, including changes in sales prices and input costs, political risk, currency fluctuations, and product demand variability. If a large portion of a company's costs are fixed and do not decrease as demand declines, the company may have high operating leverage, which further raises business risk. The link between a company's sales revenue and earnings before interest and taxes (EBIT) is known as operating leverage.

Furthermore, the degree of operating leverage was found to be a determining factor of return on asset in empirical research by Patel (2014), Khedkar (2015), Tesfaye (2018), Habib (2014), and Kumar (2014). This variable was quantified by calculating the percentage change in EBIT per percentage change in sales. This data suggested that operating leverage and business profitability are significantly correlated. Gitman (2012) further pointed out that operating leverage exists if the percentage change in EBIT as a result of a given percentage change in sales is higher than the percentage change in sales. Accordingly, operating leverage can only be present when it exceeds unity. Accordingly, the study has adopted the following numerical formula to test the relationship between DOL and airlines profitability as follows:

DOL	Percentage change in EBIT
	Percentage change in sales

**H1:** Degree of operating leverage has a positive and significant effect on airlines profitability

**3.6.2.2 Financial Leverage**

The risk that common stockholders bear as a result of choosing to finance through debt is known as financial risk (Brigham, 2011). According to Stephen (2008), a corporation that has some debt in its capital structure is considered levered. Financial leverage is the degree to which a firm depends on debt. Financial leverage refers to a firm's fixed expenses of financing since a levered firm is required to pay interest regardless of the firm's sales. Financial leverage has been defined by another researcher Gitman (2012) as the ability to employ fixed financial costs to increase the impact of changes in earnings before interest and taxes on the company's earnings per share or net income available to common stockholders.

Furthermore, earlier research on the subject by EL-Wahid (2011), Ankilo (2012), Ur. Rehman (2013), Tsuji (2013), Azeez and Tunj (2015), Newaz (2015), Negasa (2016), and Tesfaye (2018) used a proxy to measure financial leverage, which was the percentage change in net income after tax divided by the percentage change in EBIT. The degree of financial leverage (DFL) is a numerical indicator of financial leverage. It may be calculated using the following equation:

DFL	Percentage Change in Net Income After Tax
	Percentage change in EBIT

**H<sub>2</sub>:** Degree of financial leverage has a negative and significant effect on airlines profitability.

### 3.6.3 Control Variables

Other than explanatory variables, control variables are those that are not research objectives but are anticipated to have an impact on the dependent variable. This implies that other variables are also explaining the study's dependent variable, even if the dependent variable is impacted by the explanatory variables. Therefore, the study attempted to incorporate several control variables that are anticipated to affect airline profitability in order to isolate the effect of both the degree of operating and financial leverage. Therefore, the study's control variables were airline operating cost efficiency, airline size, and foreign exchange rate, all of which have been shown in previous research to have an impact on profitability. Accordingly, the study's control variables have been covered in the paragraph that follows.

#### I. Operating Efficiency

The idea of operating efficiency refers to how a business effectively uses its human and financial resources to reach and/or exceed its target profit. A company's operating efficiency can be assessed using a variety of ratio measurements, such as revenue to total assets, revenue per employee, and the ratio of operating expenses to revenue from operations. The operating expense ratio, which analyzes how airlines may generate revenue from their operations after excluding financial gains, expenses, and taxes effects, was deemed by the researcher to be the most relevant indicator of airlines' operating efficiency for the purposes of this study. For example, the ratio of operating expenses to operating revenue was used empirically to quantify the operating efficiency of enterprises (Tefaye, 2018; Amundsen, 2015). This indicates that businesses are unable to pay for their overhead. On the other hand, a ratio less than one will occur if operating revenue exceeds

operating expenses. Businesses that operate profitably are indicated by a value of less than one. This suggests that there is an adverse link between profitability and operating efficiency. One way to calculate the operating expense ratio is as follows:

OCF	Operating Expense
	Operating Revenue

**H<sub>3</sub>:** Operating efficiency has a negative and significant effect on profitability

## II. Firm Size

It shows how much of a company's assets are used in its operations. Size is described by Hall and Weiss (1967) as the total amount of money held and borrowed, to which the firm's total assets are a good reflection. The logarithm of total assets was used in their study to evaluate firm size, and they concluded that size did typically translate into high profit rates. Firm size is one of the factors that determine airline profitability, according to other academics including Menta (2015), Birassa (2016), and Alahyari (2014). They all came to the conclusion that as a company's size increases, it would be able to take advantage of economies of scale more. However, a larger company size makes it possible to cultivate a positive reputation among the general public and other stakeholders, which boosts profitability once more. According to the claim made by Hall and Weiss (1967), big businesses can easily obtain financing by offering collateral because they are anticipated to fulfill their obligations more so than small businesses. However, this easy access to financing could result in higher interest costs for businesses, which would lower their profitability. According to Nunes & Serrasqueiro's (2008) research, the size of small and medium-sized businesses was positively and significantly correlated with their profitability, but not so for bigger businesses.

However, there is disagreement among studies regarding the favorable correlation between firm size and profitability. The negative association between business size and profitability has been studied by a number of scholars, including Mocnik and Sirec (2010), Goddard et al. (2005), Nunes & Serrasqueiro (2008), Lindsey (1981), Dhawan (2001), and Banchuenvijit (2011). The performance of the European services sectors was also examined by Goddard et al. (2005), who found a negative correlation between a firm's size and profitability. Additionally, Dhawan (2001) and Lindsey (1981) discovered a negative correlation between asset size and profitability in their

research. Furthermore, Banchuenvijit (2011) discovered that the return on assets (ROA) is significantly impacted negatively by the firm's size in relation to its total assets. The study adopted the following variable measurement and alternative hypothesis in favor of a positive association after taking into account the theoretical and empirical data mentioned above.

Airlines Size = Log (Total Assets)

**H<sub>4</sub>:** Size of airlines has a positive and significant effect on airlines profitability

### **III. Foreign Exchange Rate**

The rate at which one currency can be traded for another is known as the exchange rate between the two currencies. It is sometimes thought of as the worth of one nation's currency relative to another. Foreign exchange fluctuations have a significant impact on the sales volume and cost structure of multinational corporations, such as the aviation industry. This suggests that although favorable fluctuations have a beneficial impact on earnings, unfavorable fluctuations have a negative effect (Menta, 2015). Therefore, it is crucial to include this variable as one of the study control variables in light of the airlines industry's susceptibility to exchange rate fluctuations.

Because the majority of the aviation industry's suppliers and customers are from other countries, the majority of transactions in the sector are carried out in foreign currencies. Because of this, airlines are required to use currencies other than their own local currency while conducting transactions. Therefore, changes in the exchange rate will either increase or decrease the profitability of airlines. For the purposes of this study, the foreign exchange rate movements of each airline's home nation are measured as a percentage change of the average exchange rate against US dollars annually. The study went on to formulate the following alternate hypothesis.

**H<sub>5</sub>:** Foreign exchange rate has a negative and significant effect on profitability

#### **3.7. Summary of Variable**

The study outlined the dependent variable in the following table, followed by an explanation of the explanatory variables with their symbol, measurement, and anticipated impact on the dependent variable, in accordance with the above variable definition and measurement deliberations.

**Table 3:1 Summary of Variables**

<b>Variables</b>	<b>Symbol</b>	<b>Measurement and/or definition of variables</b>	<b>Expected Result</b>
<b>Dependent Variable</b>			
Airline profitability	ROA	Net income after tax per total assets	NA
<b>Explanatory Variables</b>			
Degree of Operating Leverage	DOL	Percentage change in EBIT per percentage change in sales	Positive
Degree of Financial Leverage	DFL	Percentage change in NI per percentage change in EBIT	Negative
<b>Control Variables</b>			
Operational Cost Efficiency	OCF	Operating expense per revenue	Negative
Size of airlines	SOA	Logarithm of total asset	Positive
Exchange rate	EXR	Yearly average exchange rate in US dollar	Negative

### **3.8. Econometric Model Specification of the study**

The critical aim of economic model specification is to examine the relationship between the dependent and independent variables of an empirical study. The right econometrics model must be specified because the study's conclusions heavily relied on economic modeling. Wooldridge (2013) asserts that formal economic modeling serves as the foundation for empirical analysis, particularly for those tasked with evaluating accepted economic theories. Mathematical equations that describe different interactions among variables make up an economic model. Gujarati (2009) also said that a model is just a collection of mathematical equations and that a model is referred to as a single-equation model if it just has one independent variable and as a multiple-equation model if it has several independent variables which is used in this study.

Panel data regression analysis is employed in this study based on the premise that was presented in the previous parts, by going over previous empirical and theoretical evidence, and by taking the data's nature into consideration. For each object (airlines), the data used in this study are both cross-sectional and time series in nature. A time series is included in a panel data set (also known

as longitudinal data set) for every cross-sectional unit, according to Wooldridge (2013). In this instance, there are eight years' worth of time series for each of the eight airlines; this type of data collection is balanced because the same time periods are accessible for all cross-section units.

The degree of financial and operational leverage was an explanatory variable. The dependent variable in this study was airline profitability, which is proxied by ROA. Although the study's main goal is to examine how leverage affects airline profitability. As a result, the study developed an equation that shows how the degree of operating leverage (DOL), the degree of financial leverage (DFL), relate to the amount of ROA of the airline.

The function of dependent and independent variables is expressed as:

$$Y = f(x_1, x_2, x_3, x_4, x_5)$$

Where:

Y= airlines profitability (ROA)

X<sub>1</sub>= degree of operating leverage (DOL)

X<sub>2</sub>=degree of financial leverage (DFL)

X<sub>3</sub>= operating efficiency (ECF)

X<sub>4</sub>= logarithm of total asset (SOA)

X<sub>5</sub>= exchange rate (EXR)

Source: Wooldridge (2013)

The study used an econometric model to quantify the impact of various factors on the profitability of African airlines based on the fundamental functional linkages mentioned above. To deal with heterogeneity or individual effects that may or may not be detected, panel data models essentially look at group (person-specific) effects, time effects, or both (Hun Myoung, 2011). Nonetheless, Gujarati (2009) presented three options for analyzing these effects. These can be fixed, random effect, or pooled OLS. Pooled OLS ignores the cross-sectional and time-series structure of the data

by simply pooling all observations and estimating a grand regression. This indicates that differences between cross-sections and differences over time are not captured by pooled OLS.

In this instance, a Hausman test is used to determine whether the model is a random or fixed effect in order to capture differences across time and across cross sections. The random effect model will be used if the test is unable to reject the null hypothesis; otherwise, the fixed effect estimator model will be used.

Hence, the profitability (ROA) of selected African airlines as a function of five factors was tentatively modeled as: The fixed effect of econometric model is specified as:

$$ROA_a = \beta_0 + \beta_1 DOL - \beta_2 DFL + \beta_3 OCF + \beta_4 SOA + \beta_5 EXR + \mu_i$$

$ROA_a$  = return on asset of  $i^{th}$  airline at time  $t$ ,

$DOL_{it}$  = degree of operating of  $i^{th}$  airline at time  $t$ ,

$DFL_{it}$  = degree of financial leverage of  $i^{th}$  airline at time  $t$ ,

$OCFit$  = operating cost efficiency of  $i^{th}$  airlines at time  $t$

$SOA_{it}$  = log of total assets of  $i^{th}$  airline at time  $t$

$EXR_{it}$  = exchange rate of  $i^{th}$  airline home country at time  $t$

$\beta_1$  and  $\beta_2$  = are parameters of each variables and they indicate that the directions and strength of the relationship between net profit margin (ROA) and the explanatory variables of model.

$\beta_0$  = the intercept of the model

$\mu_{it}$  = the error term that varies cross-sectionally but is constant over time( $t$ )

$v_{it}$  = the individual observation error term that varies over  $i^{th}$  airline and time  $t$ . has constant variance ( $\delta^2$ )

The random effect panel econometric model was specified as:

$$ROA_{it} = \beta_0 + \beta_1 \text{dolit} - \beta_2 \text{dflit} - \beta_3 \text{efficit} + \beta_4 \text{logsizeit} - \beta_5 \text{exrit} + \omega_{it}$$

$$\text{where } \omega_{it} = \varepsilon_i + v_{it}$$

**Where;**  $\varepsilon_i$  = disturbance term that varies cross-sectionally, but it is constant over the time

$v_{it}$  = disturbance remainder that varies over time and entities

## CHAPTER FOUR

### 4. DATA ANALYSIS AND DISCUSSIONS

#### Introduction

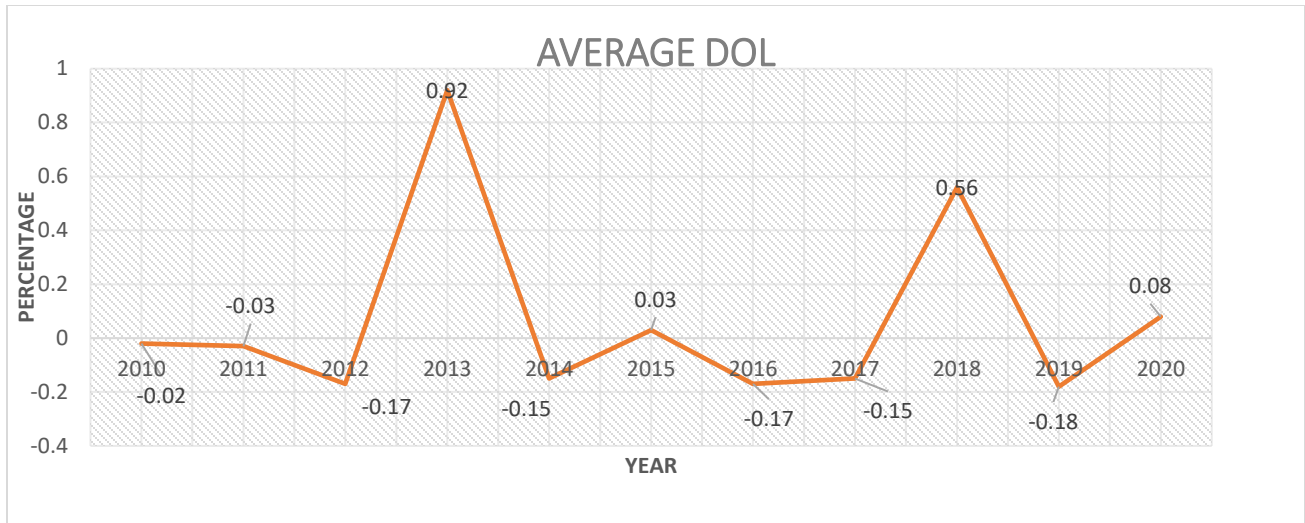
This chapter describes how the methods outlined in the previous chapter were used to process, evaluate, and explain the data that were gathered from eight airlines in order to achieve the study's objective. Presented, debated, and evaluated in a variety of ways, including trend analysis, inferential statistical multiple regression analysis with suitable diagnostic tests, and descriptive statistical analysis, are the data gathered on the airline's performance and its determinates. Because these procedures are necessary for a scientific investigation and to guarantee that all the information is necessary to make thoughtful comparisons and analyses

#### 4.1. Trend Analysis on Explanatory and Dependent Variables

The study's goal was to determine how operating, and financial leverage affected the profitability of African airlines. As a result, the trend analysis of the dependent variable (ROA) and the explanatory factors used to achieve the study's objectives (DOL & DFL) are shown below.

##### I. Degree of Operating Leverage (DOL)

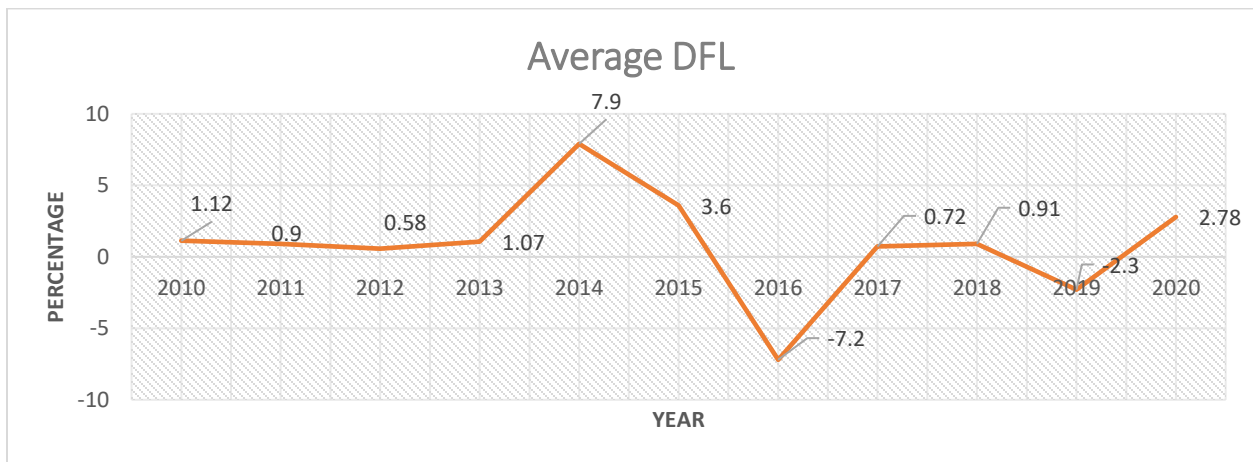
The average operating leverage of the top African airlines decreased by -2%, -3%, and -17% between 2010 and 2012. This decline in operating leverage suggests that the company's EBIT has been declining annually, which could lead to a lower return on assets. However, in 2013 and 2018, it increased by 92% and 56%, respectively. As a result, higher operating leverage is linked to more fluctuating EBIT levels. More fluctuating rates of return on assets were the outcome of this high level of operating leverage (Gritta et al., 2006). However, the period from 2014 to 2017 was erratic, and it may be challenging to predict and modify industrial business strategy during this time. In 2018 it slightly moves upward **56%** and move downwards in 2019 **-18%** due to covid 19 and post covid 19 little bits move upward in 2020 by 8%. This resulted in negative profitability (ROA) in the airlines industry on average.



**Fig-4.1 Trend analysis of airlines average DOL**

## II. Degree of Financial Leverage (DFL)

Figure 4.2 presents the average degree of financial leverage for a selection of African airlines during a period of ten fiscal years, from 2010 to 2020. It demonstrates that, most financial years had consistently positive levels of financial leverage except year 2016 and 2019 and which positive degree of financial leverage on average had a negative impact on airline profitability (ROA).

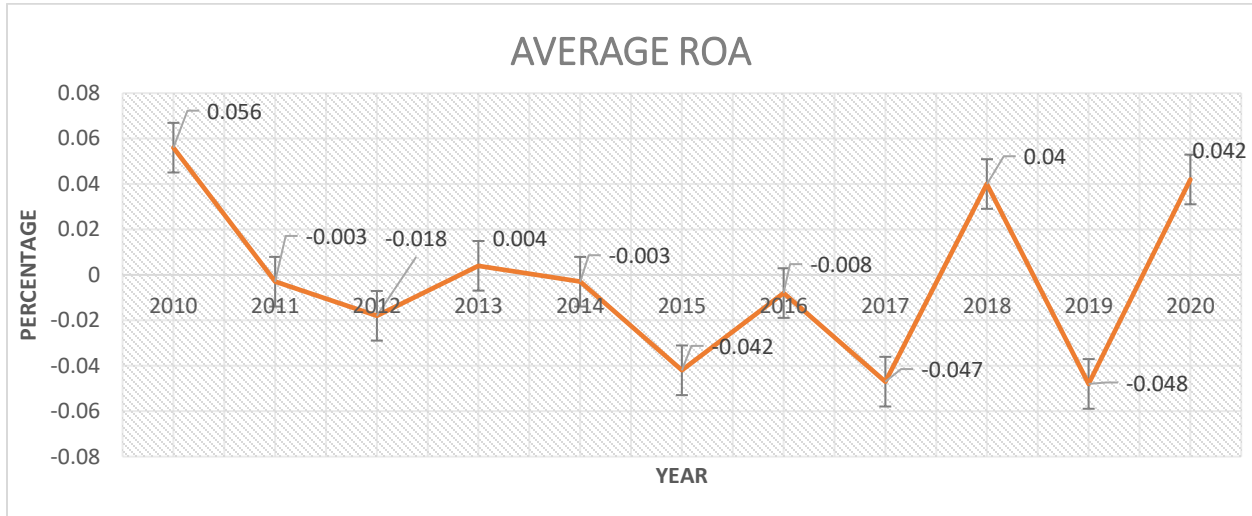


**Fig-4.2 Trend analysis of airlines average DFL**

## III. Airlines Profitability-Return on Assets (ROA)

The six African airlines' average profitability (ROA) in this study, as seen in the graph below, was around break-even profit and a record of loss. Selected African airlines' long-term loss and

breakeven profitability are comparable to Gritta's (2006) empirical conclusion, which showed that airline carriers are identifiable by their consistently negative profitability ratio (ROA) and highly variable degree of leverage. In general, the hypothesized link between the explanatory variables and the explained variable holds true.



**Fig-4.3 Trend analysis of airlines average profitability (ROA)**

## 4.2. Descriptive Statistics

The two most significant statistical measures utilized in this study to describe the research data are a measure of central tendency and a measure of dispersion, as shown in table (4.1) below. While the maximum, minimum, and standard deviation as well as the total number of data was included in the study to provide a measure of dispersion, the mean, median, and mode are a measure of central tendency.

**Table 4.1. Descriptive statistics**

Descriptive statistics for a period of 2010-2020 dependent variable followed by independent variables for the study

	ROA	DOL	DFL	OCF	SOA	EXR
Mean	(0.00282)	0.899436	0.792513	1.16573	2.367820	24.98412
Maximum	0.3645	51.14377	48.18465	2.328097	4.979731	100.6752
Minimum	(0.46505)	(105.0295)	(71.2367)	0.075138	1.804472	8.071251
Standard Dev.	0.08348	17.18032	9.99230	0.42513	1.426342	20.37149
Observations	88	88	88	88	88	88

The average return on assets (ROA) for airlines during the study period was 28%, with the average value of profitability (ROA) ranging from a minimum of 46% to a maximum of 25%, as determined by the ratio of net income (loss) to total asset. It may be inferred that the airlines that were part of the study had, on average, 8% variance in profit from the mean over the study period, and that "the highest profit and the highest loss in terms of ROA was 0.25 dollars and (0.46) dollars per one dollar of assets invested, respectively."

The sampled airlines' degree of operating leverage (DOL) minimum and maximum ranged from (105) to 51 on average, with an average value of 0.8 and a standard deviation of 17.18 from the mean. This suggests that there was a significant variation in the DOL among the sampled airlines. This biggest variation is expected given that they are functioning in various economic situations with distinct dynamics.

During the study period, the degree of financial leverage (DFL) of the airlines that were included in the analysis ranged from a minimum of (71) to a maximum of 48. The average DFL value was 0.79, with an average standard deviation of 9.9 from the mean.

Airlines' operating cost efficiency (OCF), which was calculated by averaging their annual operating expenses to their annual revenue, showed an average of one dollar in expenses for every dollar of revenue, with a standard deviation of 0.42 from the mean and a range of 0.07 to 2 dollars.

The size (total asset) of airlines included in the study period on average ranged from minimum of \$1.8 to maximum of \$4.9 billion and the average value was \$2.36 billion with a standard deviation of 1.42 from the mean.

Lastly, the local currency exchange rates of the airlines' home countries versus the US dollar showed an average of 24.98 per dollar, with a standard deviation of 20.37 per dollar from the average and a range of 8.17 to 100.67 per dollar.

### **4.3. Correlation Analysis**

A measure of how strongly two variables are related to one another, correlation is a linear link between two variables that is independent of measurement unit (Gujarati, 2009). In order to determine whether there is a link between the dependent and explanatory factors, it is crucial to do a correlation analysis between the study's explained variable and explanatory variables prior to performing a regression analysis. The correlation coefficient ranges from -1 to +1 since there is always a positive, negative, or zero link between two variables.

A correlation coefficient of -1 denotes a perfect negative link, meaning that if one variable rises, the other must fall, or the two variables have a totally inverse relationship. A perfect positive link exists when there is a correlation coefficient of +1, meaning that when one variable rises, the other variable rises at the same time. However, the absence of any link between two variables is indicated if their correlation coefficient is zero. The variables typically move in opposite directions or in the same direction depending on whether the correlation coefficient is positive or negative.

In this instance, the correlation matrix between the dependent variable (ROA) and the other independent variables (DOL, and DFL,) as well as the correlation between the independent variables is displayed in table 4.2. Except for operating leverage degree, all independent variables have a negative connection with profitability (ROA), which is the dependent variable measured by ROA, and the explanatory variables. This positive correlation demonstrates that airline profitability (ROA) increases in tandem with a rise in operating leverage, and vice versa.

Conversely, the negative relationship suggests that the profitability (ROA) of airlines decreases when the independent variables increase and vice versa. The correlation between independent variables, or multicollinearity analysis, is examined in the section that follows (testing CLRM assumptions).

**Table: 4.2. Correlation Matrix**

Variables	ROA	DOL	DFL	EFF	LOGSIZE	EXR
ROA	1					
DOL	0.507	1				
DFL	(0.778)	(0.271)	1			
EFF	(0.876)	(0.457)	0.754	1		
LOGSIZE	(0.824)	(0.277)	0.839	0.833	1	
EXR	(0.713)	0.272	0.573	0.720	0.631	1

Source: EVIEWS output, 2024

#### **4.4. Model Specification and Diagnosis Tests of CLRM Assumptions**

Multiple regression analysis was used in the study to explain the return on asset, a dependent variable, as a function of five independent factors: asset size, foreign exchange rate, operating efficiency, degree of financial leverage, and degree of operating leverage. Multiple regression analysis, according to Wooldridge (2013), can fairly incorporate the basic functional form relations and accommodate many explanatory factors that are valuable for explaining the dependent variable (ROA). As a result, more of the variation in ROA can be explained. In order to create more accurate models for forecasting the dependent variable, or airlines' profitability (ROA), by explanatory variables, multiple regression analysis was used.

Therefore, the EVIEWS 10 software program was used to examine balanced panel data from eight airlines over an eleven-year period (2010-2020). As a result, the panel data regression model in this study can capture balanced fluctuations across time and among airlines.

##### **4.4.1. Model Specification: Random Effect Vs Fixed Effect**

Based on the widely recognized procedures and standards for panel model selection, the suitable linear panel regression model was selected. For example, with relation to panel data analysis It has been argued by Brooks (2008), Gujarati (2009), Hun Myoung (2011), Wooldridge (2013), Pillai (2016), and Zulfikar (2017) that panel data regression requires exact estimation modeling, in contrast to ordinary regression. To choose between a fixed effect and a random effect model, they recommend the Hausman test as a statistical testing technique for panel data regression model specification. In order to select between a fixed effect and random effect regression model with a

random and fixed effect of the null and alternative hypotheses, respectively, this study did a Hausman test.

Table 4.3 illustrates that the Hausman test p-value (0.00672) is less than 0.05, indicating that the alternative hypothesis (fixed effect model) was accepted in lieu of the null hypothesis (random effect model). As a result, the fixed effect model is used to regress airline profitability (ROA) against the two explanatory variables (degree of operating and financial leverage).

**Table 4.3. A Hausman Test to compare fixed vs random effect**

**Correlated Random Effects - Hausman Test**

Equation: Untitled

Test Cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	9.784534	5	0.00672

**4.4.2. Testing Assumptions of Classical Linear Regression Model (CLRM)**

**1. Testing for Average Value of the error is Zero- $E(u_{it})=0$**

The average value of the errors must be zero, per Brooks (2008); however, if a constant term is present in the regression equation, this assumption will never be broken. This requirement is met in this instance since the multiple regression model includes the constant component ( $\beta_0$ ). Thus, it can be concluded from this analysis that the error term's average value is zero.

**2. Normality Test-  $\mu_{it} \sim N(0, \delta^2)$**

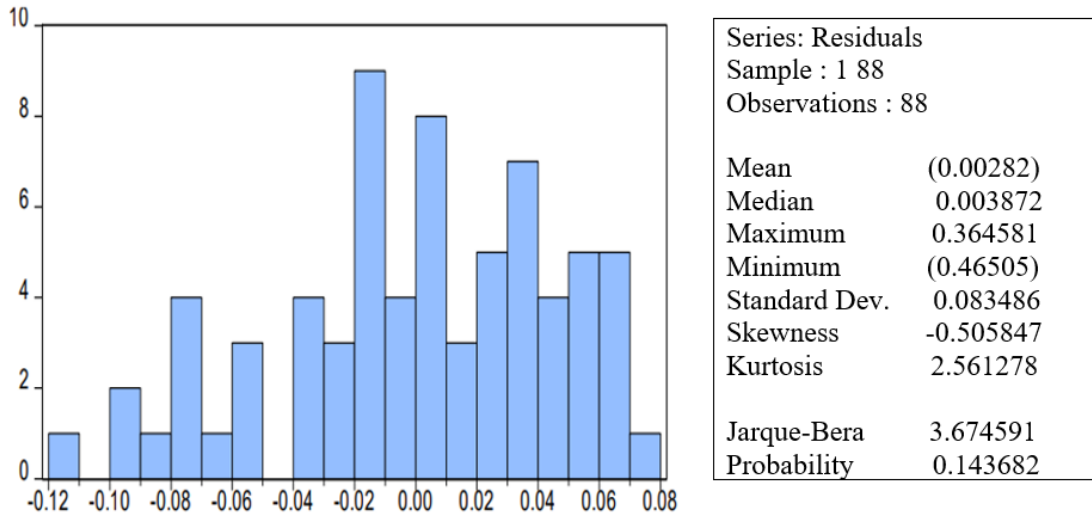
The classical normal linear regression model, according to Gandhi (2009), assumes that each error term ( $\mu_{it}$ ) has a normal distribution with zero mean and constant variance. Put simply, it can be expressed as  $\mu_{it} \sim N(0, \sigma^2)$ , where N denotes the normal distribution, the terms in parentheses represent the mean and variance of the normal distribution, and the symbol  $\sim$  means distributed as. Furthermore, Brooks (2008) noted that conducting single or joint hypothesis testing for the model parameters requires the normalcy assumption ( $\mu_{it} \sim N(0, \sigma^2)$ ).

The Bera-Jarque test is one of the most often used methods to determine normalcy. The alternative hypothesis in this test is that error terms are not normally distributed, while the null hypothesis is that each error term ( $\mu_{it}$ ) is distributed normally. Because of this, we can conclude that the error terms are normally distributed if the p-value is more than 5% and the test result is insignificant, indicating that the null hypothesis was not successfully rejected. If not, we are unable to test a hypothesis regarding the model's parameters.

After estimating multiple regression on the impact of operating and financial leverage levels as well as other control factors on airline profitability (as determined by ROA), the Jarque-Bera test was carried out in this study. Nevertheless, the test's results revealed that the error terms' ( $\mu_{it}$ ) distribution was non-normal. Given that the normalcy assumption is frequently rejected in financial modeling due to one or two extremely abnormal residuals, or "outliers," turning outliers into dummy variables increases the likelihood that the normalcy assumption will be upheld (Brooks, 2008). Because of this, the normalcy issue with the error terms in this study was resolved through the use of two dummy variables (DUMM17 and DUMM64) in the multiple regression analysis.

The subsequent (figure 4.4) histogram normality test indicates that the Jarque-Bera p-value of 15.49% in this case is greater than 0.05, hence we are unable to reject the null hypothesis at 5%. Additionally, the Skewness (-0.51) and Kurtosis (2.54) are closest to zero and three, respectively. We can therefore conclude from this study that the error terms ( $\mu_{it}$ ) are normally distributed after introducing dummy variables, which gives us full confidence to test hypotheses about the model parameters.

**Fig-4.4 Histogram Normality test**



Source: EViews 10 output, 2024

### 3. Heteroscedastic Test $\text{-var}(\mu_{it}) = \sigma^2$

The assumption of homoscedasticity (Brooks, 2008) states that the variance of the error terms,  $\text{Var}(\mu_{it}|x) = \sigma^2$ , is constant, meaning that the error  $\mu_{it}$  has the same variance regardless of the value of the explanatory variables. They are called heteroscedastic if the variance of the error terms is not constant. Gujarati (2009) and Brooks (2013) state that an estimate is still unbiased even if the homoscedasticity requirement is not met; nonetheless, it is not BLUE (best linear unbiased estimator).

The best linear unbiased estimator (BLUE) can be created if the p-value of the White test is more than 5%, which indicates that the assumption of homoscedasticity is met; if not, there may be a heteroscedasticity issue, or the error term variances are not constant. The White-test probability of the F-statistic and Chi-square in this instance are 93.18% and 91.96%, respectively, as indicated in table 4.4. Consequently, the homoscedasticity null hypothesis assumption cannot be rejected because the p-value finding is sufficiently strong. Thus, it is possible to draw the conclusion that this study's estimated results were the best linear unbiased estimation and that the variance of the error terms is constant.

**Table 4.4. Heteroscedasticity Test: White**

Heteroscedasticity Test: White

F-statistic	0.353242	Prob. F(7,62)	0.9235
Obs*R-squared	2.485467	Prob. Chi-Square(7)	0.9484
Scaled explained SS	1.652341	Prob. Chi-Square(7)	0.9594

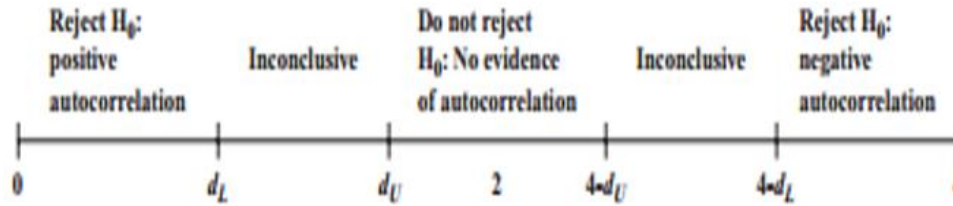
Source: EVIEWS 10 output, 2024

**4. Autocorrelation Test-  $cov(u_i, u_j | x_i, x_j) = E(u_i u_j) = 0 \text{ } i \neq j$**

Correlation between members of a series of observations ordered in time [as in time series data] or space [as in cross-sectional data] is how Gujarati (2009) defined autocorrelation. According to this supposition, the error terms in the observations must not be serially correlated, that is,  $cov(u_i, u_j) = 0$  for  $i \neq j$ . According to Brooks (2008), it is also presumable that the errors have no correlation with one another. Ignoring autocorrelation when it exists has similar effects as ignoring heteroscedasticity. Although the coefficient estimates obtained using OLS are not BLUE, they are nonetheless unbiased.

The Durbin-Watson (DW) test and/or the Breusch-Godfrey Serial Correlation LM Test can be used to determine whether or not error terms are serially correlated. However, the first test only looks for a relationship between successive errors, according to Brooks (2008), and the DW-test is not able to identify all types of residual autocorrelation. Here, the Durbin-Watson statistic's lower (dl) and upper (du) 1% critical values for the 88 observations and five explanatory variables are, respectively, 1.31 and 1.61. According to table 4.7, the study's regression result's DW critical value is 1.74. The decision rule states that the null hypothesis is rejected and the existence of positive autocorrelation is presumed if the regression output of DW is less than the lower critical value; the existence of negative autocorrelation is presumed if DW is greater than  $4-dl$ ; and the null hypothesis is not rejected if DW is between the du and  $4-du$ , allowing one to infer that there is no significant residual autocorrelation. Regression result DW (1.74) for this study is therefore between 1.61 and 2.26 ( $4-1.61$ ). Therefore, there isn't a big first-order autocorrelation issue in our investigation.

**Fig 4.5 Rejections and Non-rejection regions for DW test**



Source: Brooks, 2008 ed 2<sup>nd</sup>

Furthermore, the Breusch-Godfrey test is not simply a first order autocorrelation test like the DW-test, but also a more comprehensive test for autocorrelation up to the  $n$ th order. In keeping with that, the null and alternative hypotheses listed below were used in the Breusch-Godfrey serial correlation LM Test.

$H_0: \rho_1=0$  and  $\rho_2=0$  and, and  $\rho_r = 0$

$H_1: \rho_1 \neq 0$  or  $\rho_2 \neq 0$  or ..... or  $\rho_r \neq 0$

The test results for the p-value of the chi-square and F-statistics are 11.45% and 14.23%, respectively, as shown in the accompanying table. Since the p-value is higher than 5%, the null hypothesis that there is no residual autocorrelation was not successfully rejected. Therefore, we draw the conclusion that this specific study's error terms do not exhibit autocorrelation.

**Table 4.5 Breusch-Godfrey Serial Correlation LM Test**

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	2.215036	Prob. F(2,61)	0.1423
Obs*R-squared	4.510183	Prob. Chi-Square(2)	0.1145

Source: EViews 10 output, 2024

## 5. Multicollinearity Test

It denoted that some or all of the explanatory variables in a regression model had a "perfect," or exact, linear relationship (Gujarati, 2009). Independent variables are said to be orthogonal to one another if they do not exhibit any correlation with one another. This indicates that removing a variable from the regression analysis will not result in a change in the coefficient of an already-existing variable. It is not feasible to estimate every coefficient in the model if there is a perfect relationship between the explanatory variables. If this issue arises, the significant variable may become less significant by raising its p-value, which would result in the null hypothesis not being rejected.

Table 4.6 shows that there are no significant collinearity issues among the explanatory variables in this investigation. Even in this model, the largest correlations are seen between DOL and DFL. As a result, multicollinearity is not a problem in this instance, and this model allows us to effectively estimate every coefficient of the independent variable.

**Table 4.6. Correlation between Independent Variables of the study**

Variables	DOL	DFL	OCF	SOA	EXR
DOL	1				
DFL	(0.51532)	1			
OCF	(0.392)	0.043931	1		
SOA	(0.32762)	0.637432	(0.03425)	1	
EXR	0.053268	0.086246	(0.3582)	0.0547	1

Source: EViews 10 output, 2024

## 6. Test for Model Specification: Ramsey RESET Tests

When a multiple regression model fails to accurately capture the link between the observed explanatory variables and the dependent variable, it is said to suffer from functional form misspecification (Wooldridge, 2013). For example, in this case, airlines profitability is determined by  $roait = \beta_0 + \beta_1 dolit - \beta_2 dflit - \beta_3 efficit + \beta_4 logsizeit - \beta_5 exrit + \alpha_i + \mu_{it}$ . However, the model will have an issue of model misspecification if the study omitted one or more explanatory variables from the equation. Consequently, we will not be able to generate an impartial estimation. This implies that

the independent variable's calculated coefficients might not be acceptable. According to Brooks (2008) and Wooldridge (2013), Ramsey's (1969) RESET test, a general test for misspecification of functional form, can be used to formally verify whether or not the model functional form is correctly described. The model is correctly stated, and the alternative is not correctly specified, according to the RESET test's null hypothesis. In this instance, we were unable to reject the null at the 5% significant level, as indicated by the REST F-statistics of 3.47 and a p-value of 0.0618 in Table 4.7. As a result, we may conclude that the model's specification is accurate and that the computed coefficients adequately account for the profitability of airlines.

**Table 4.7. Ramsey RESET Test**

Ramsey RESET Test  
 Equation: Untitled  
 Specification Variables: ROA DOL DFL OCF SOA EXR DUMM17 DUMM65 C  
 Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.765438	61	0.0628
F-statistic	3.476342	(1,62)	0.0618

Source: EViews 10 output, 2024

#### 4.5. Result of Multiple Regression and Interpretations.

The effects of DOL, DFL, OCF, SOA and EXR on the profitability (ROA) of a few African airlines during a eleven-year period were estimated using a fixed effect regression analysis. Multiple regression analysis was performed using two dummy variables, DUMM 17 and DUMM65, in order to address the issue of outlier observations. Because the dummy variables perfectly fit those two extreme outlying observations, the R2 and modified R2 values increased from 0.79 and 0.73 (see appendix VIII: regression without a dummy) to 0.84 and 0.79 (see table 4.8), respectively (Brooks, 2008).

As shown in the following EViews 10 regression output table profitability (ROA) was regressed against DOL, DFL, OCF, SOA, EXR, DUMM17, and DUMM65 with a fixed effect regression model. The multiple regression equation is:

$$\text{roait} = \beta_0 + \beta_1 \text{dolit} - \beta_2 \text{dflit} - \beta_3 \text{efficit} + \beta_4 \text{logsizeit} - \beta_5 \text{exrit} + \text{DUMM17} + \text{DUMM65} + \mu_i + \nu_{it}$$

**Table 4.8 Fixed Effect Regression output**

**Dependent Variable: ROA**

Method: Panel Least Squares

Date: 15/12/2024 Time:08:32

Sample: 2010 2020

Periods included: 11

Cross-section included: 8

Total panel(balanced) observations: 88

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	3.48E-06	7.23E-07	4.784321	0.0000***
DFL	-0.084133	0.031674	-2.496340	0.0234**
OCF	-0.116435	0.015876	-4.458721	0.0000**
SOA	-0.084569	0.052131	-3.124312	0.0204**
EXR	-0.018391	0.002130	-1.542873	0.0928*
DUMM17	-0.186523	0.054327	-3.533821	0.0005
DUMM65	-0.126584	0.058486	-2.675328	0.0075
C	0.521033	0.127514	4.251863	0.0002
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.834012	Mean dependent var	-0.002801	
Adjusted R-squared	0.795431	S.D. dependent var	0.085467	
S.E. of regression	0.045627	Akaike info criterion	-3.19457	
Sum squared resid	0.132671	Schwarz criterion	-2.764037	
Log likelihood	125.0567	Hannan-Quinn criter.	-3.243687	
F-statistic	21.45363	Durbin-Watson stat	1.659881	
Prob (F-statistic)	0.000000			

Source: EViews 10 output, 2024

Table 4.8 summarizes the empirical results of the multiple regression equation using fixed effect panel regression model, and the empirical result can be expressed in the equation as:

$$roa = 0.52 + 0.0000348dol - 0.084dfl - 0.11ocf - 0.084soa - 0.0186exr - 0.18dumm17 - 0.12dumm65 + \alpha_i + \mu_{it}$$

In this case, the yearly degrees of operating and financial leverage are represented by **dol** and **dfl**, respectively, and the dummies **dumm17** and **dumm65** are introduced to prevent outlier findings. In general, the fixed effect regression model's results supported the hypothesized impacts of each explanatory variable. The following sections covered the specific findings of the R2, adjusted R2, F-test, and coefficients of each independent variable for the overall model.

#### **4.5.1. Interpretation of R-Square, Adjusted R-Square and F-Statistic R-Square and Adjusted R-Squared**

R2 is merely an estimation of the extent to which **dol** and **dfl** in the population account for the variance in the dependent variable profitability (ROA). On the other hand, adjusted R2, is a change of R2 that is frequently done when accounting for the loss of degrees of freedom that comes with include more variables (Brooks, 2008). Here, the R2 and modified R2 are, respectively, 83% and 79%, as shown in the table (table 4.8) fixed effect panel model regression result. Which suggests that the combined effects of the model's explanatory variables; the degree of operating leverage, the degree of financial leverage explain 83% of the variation in airline profitability (ROA). The adjusted R2 is 79%, which, after accounting for the loss of degree of freedom caused by the addition of one or more independent variables, shows that the model is strongly fit to estimate airline profitability (ROA). Consequently, based on the model's adjusted R2 value of 79%, it is possible to deduce that this model's dependent variables account for 79% of the variation in the dependent variable (ROA) on average, with other explanatory variables not included in the model potentially accounting for the remaining 21% of the variation in the selected airline's profitability (ROA).

#### **F-Statistic:**

The p-value of the F-statistic indicates the overall significance level of the model used in the study or whether all variables are jointly significant or not, whereas the p-value of each independent variable in the regression result indicates whether that independent variable is significant or not.

The independent variables (dol and dfl) do not jointly affect the dependent variable, profitability (ROA), according to the F-statistic null hypothesis. We either failed to reject the null hypothesis or the test is significant if the p-value of the F-statistic is more than 0.05, indicating that the test is insignificant. In this instance, the F-statistic of 21.45 with the p-value of 0.0000 is even significant at 1%, as shown in table 4.8. As a result, we reject the null hypothesis with a 1% level of significance. Therefore, we can draw the conclusion that the study model's independent variables all jointly affect the profitability (ROA) of airlines.

#### **4.5.2. Interpretations of Model Regression Results**

The estimated coefficients, standard errors, t-statistic, and p-values of the fixed effect model regression for each of the independent variables as well as the model's constant term are summarized in Table 4.8. The degree of operating leverage has a positive and significant impact on the profitability (ROA) of a subset of African airlines, while the degree of financial leverage have a negative and significant impact on the ROA of the sampled airlines, according to the above regression results of the beta coefficients. Furthermore, the model's constant term ( $\beta_0$ ) suggests that, if all other explanatory factors were set to zero, the average profitability (ROA) of a subset of African airlines would be 0.52%. The following subsection discusses the detail effect of independent variables empirical results on profitability (ROA) of selected African airlines

##### **1. Degree of Operating Leverage (DOL) and Profitability (ROA)**

According to the estimated hypothesis, the degree of operating leverage (DOL) of airlines had a positive and statistically significant impact on profitability (ROA) at 1%. According to this finding, the level of operating leverage in the studied airlines significantly and favorably affects their profitability (ROA). The outcome is understood to mean that, assuming all other variables stay the same, an increase of one unit in operating leverage in a chosen sample of African airlines results in an average rise in profitability (ROA) of 0.000348 units.

The study's conclusions are in line with empirical research by Patel (2014), Habib (2014), and Kumar (2014). According to these researchers, operating leverage has a statistically significant and favorable impact on a company's return on assets (ROA). According to this study's findings, airlines' profitability (ROA) will rise in tandem with their level of operating leverage. Since variable cost per unit or service rendered is rising directly as sales revenues increase, in this case,

increasing operating leverage will also increase profitability (ROA). This suggests that airlines benefited from increasing the fixed cost of operation in their operating cost structure rather than having high variable costs.

This suggests that airlines can increase their profitability from services rendered without raising variable costs due to the positive impact of their operating leverage on profitability (ROA). Furthermore, this research showed that certain airlines can increase profits without adding more variable expenses by utilizing their current workforce and fixed assets, such as property, plant, and equipment, as well as other operational fixed expenditures.

## **2. Degree of Financial Leverage (DFL) and Profitability (ROA)**

One of the explanatory variables included to reflect the effect of fixed financial costs of airlines on their profitability (ROA) was the degree of financial leverage (DFL) of certain African carriers. According to the study's regression results, the degree of financial leverage had an average negative impact on selected African airlines' profitability (ROA) that was statistically significant at the 5% level. This finding is consistent with the estimated hypothesis. This discovery, then, is in line with certain economic theory as well as empirical findings. This result is consistent with the pecking order hypothesis of Myers and Majluf (1984), which holds that when businesses are profitable, they should use domestically generated cash to finance their operations rather than taking on debt. The results of studies by Asaolu and Ankilo (2012), Tsuji (2013), Habib (2014), Patel (2014), Al-Shamaileh and Khanfar (2014), and Nawaz (2015) that looked at the negative and significant impact of financial leverage degree on profitability also empirically support the finding.

This suggests that using debt by airlines above a certain point will negatively affect their profitability. The majority of airlines experienced a steady net loss during the study period, and this inverse relationship results from the fixed nature of financial expenditures, which are incurred regardless of the profitability of the airline. Furthermore, since the majority of airlines' credit sources are overseas, interest payments must be made in foreign currencies. This has resulted in unforeseen interest payments, which have a direct impact on the profitability of airlines (ROA). This result showed that, generally speaking, less leveraged businesses are more profitable than highly leveraged businesses. From an alternative viewpoint, this empirical result suggests that, in

certain airlines, debt financing was not effectively optimized in accordance with trade-off theory and agency cost theory, nor was it able to compel management to increase profitability.

According to table 4.8, an increase of one unit in the degree of financial leverage ratio in a selected group of African airlines results in a 0.084 unit loss in their profitability (ROA). This is interpreted as the coefficient of the degree of financial leverage (DFL), assuming other parameters stay constant. Consequently, when an airline's level of financial leverage rises above an ideal threshold, profitability (ROA) is significantly reduced.

#### **4.6. Summary**

This chapter presents the study's empirical findings regarding the impact of operating and financial leverage on the profitability (ROA) of a few African airlines. In general, a detailed presentation was given on trend analysis, descriptive statistics, correlation matrix, diagnosis tests of the classical liner regression model (CLRM), model specification tests, fixed effect multiple regression analysis, interpretations and discussion of explanatory variables, overall model significance level analysis, and related topics. In order to fully confidently estimate the empirical findings of the regression result, all diagnostic tests and model specification tests passed. As has been thoroughly explained, empirical results of regression analysis showed that, all independent variables were significant in explaining the profitability of a subset of the airlines and that their effects were consistent with the hypothesis. Table 4.9 below provides a detailed summary of the estimated hypothesis compared to the empirical findings.

**Table: 4.9. Summary of estimated hypothesis**

	Explanatory Variables	Predicted impact on ROA	Actual impact on ROA
1	Degree of Operating Leverage	Positive and significant	Positive and significant
2	Degree of Financial Leverage	Negative and significant	Negative and significant

## CHAPTER FIVE

### 5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

#### Introduction

This chapter's goal is to provide a summary and conclusion of the study's empirical findings as well as any recommendations based on those findings for the various study stakeholders. As a result, the summary is given in the first section, the empirical findings are concluded in the second section, and study recommendations are given in the third section based on the findings.

#### 5.1. Summary

The purpose of the study was to investigate how leverage affected the profitability of African airlines. In order to achieve this, the study used purposive sampling to select eight African airlines' audited financial statements from 2010 to 2020 (based on online data availability). The return on asset (ROA), which is proxied by net income after tax per total asset, was the dependent variable used to measure the profitability of airlines. Conversely, the degree of operating and financial leverage was chosen as one of the explanatory factors for the study in order to examine the impact of leverage. In order to fulfill its original goal, the study also examined the various theoretical and empirical works that addressed the relationship between a firm's profitability and its level of leverage. The study developed a different hypothesis based on the studied literature to investigate the impact of leverage level on the profitability (ROA) of a sample of airlines.

In order to clarify the causal link between explanatory and explained variables, the study used an explanatory research design. The study has also embraced a quantitative research methodology, drawing on secondary data sources from the financial reports of each airline that was purposefully sampled. The study used trend analysis, descriptive statistical analysis, CLRM diagnosis tests, model specification tests, fixed effect panel multiple regression analysis, and finally inferential statistical analysis based on empirical multiple regression results to examine the impact of explanatory variables on dependent variable.

## **5.2. Conclusion**

The study's goal was to determine how two explanatory variables affected the profitability (ROA) of African airlines. The empirical findings showed that independent variables significantly impacted the ROA of African airlines over the course of the study periods. The effect of the research's objective explanatory variables was found to be consistent with the estimated hypothesis. To be clear, the results of the multiple regression analysis showed that the amount of operating leverage has a positive and significant effect on airlines' profitability (ROA), while the amount of financial leverage had a statistically significant and negative effect.

The study's findings about the impact of operating leverage level on airline profitability were consistent with empirical reviews, and the study's findings about the impact of financial leverage degree were consistent with the pecking order theory during the studied periods. The financial circumstances that the chosen airlines faced were typically highly flexible, as seen by the highly variable level of leverage and the consistently erratic nature of profitability (ROA). The study's empirical results on the effects of each explanatory variable were broken down into the following detail:

- At a 1% significant level, the degree of operating leverage (DOL) positively affects airline profitability (ROA). This suggests that airlines can increase their profitability (ROA) by running at a higher fixed cost of operation. Because fixed costs remain constant as sales activity levels rise.
- Indicating that airlines operating with a higher level of degree of financial leverage incurred a lower profitability (ROA) and were unable to optimize debt financing to maximize their return, the effect of the degree of financial leverage (DFL) on the sampled airlines was negative and significant at 5%. Due to the negative impact debt finance costs had on airline profitability (ROA).

## **5.3. Recommendations**

The study's empirical results allow for the potential forwarding of recommendations and ideas regarding the appropriate level of leverage to improve profitability (ROA) and other aspects that contribute to airline profitability to financial strategists and practitioners. The sections that follow provide the suggested recommendations.

In order to improve their profitability, African airlines are encouraged to change their capital structure and operational costs by enhancing operating leverage (using fixed operating costs) and maximizing financial leverage. In order to increase their profitability (ROA), airlines are therefore encouraged to use debt financing at an optimal level in accordance with trade-off theory. Additionally, because airline profitability was quite variable during the study period, management are advised to keep debt levels readily manageable.

Furthermore, fixed operational costs should be advantageous to airlines since they will increase their profitability (ROA). Because operating leverage has a favorable effect during the study period and suggests that operating risk is very low, expanding operating leverage further won't have a negative impact on their profitability.

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## Appendix

### Appendix I: Raw Data

Airlines	Year	ROA	DOL	DFL	OCF	SOA	EXR
ETA	2010	0.102046	1.106213	0.49984	0.917921	3.043626	14.40959
ETA	2011	0.039297	-1.48339	0.345615	0.983312	3.268427	16.89923
ETA	2012	0.027906	6.129744	-0.07515	0.960387	3.316741	17.70476
ETA	2013	0.038549	7.734897	0.937987	0.927933	3.454407	18.7144
ETA	2014	0.04657	1.602187	1.58336	0.920406	3.536005	19.6714
ETA	2015	0.04243	4.99788	0.394702	0.901869	3.604596	20.6862
ETA	2016	0.069008	5.081809	1.436159	0.865197	3.609273	21.8377
ETA	2017	0.053527	-3.79678	0.269776	0.933954	3.622742	23.9673
ETA	2018	0.053867	3.455575	2.486899	0.953547	2.991905	9.599742
ETA	2019	0.120425	3.898911	1.292195	0.92024	2.977101	11.7776
ETA	2020	0.523561	4.213421	2.342152	1.02022	3.912013	10.9981
SAA	2010	0.043243	-59.5533	0.134767	0.914827	5.04491	7.321222
SAA	2011	0.047374	12.02272	0.09804	0.951973	5.01219	7.261132
SAA	2012	-0.07548	-103.99	1.14467	1.0319	5.064699	8.209969
SAA	2013	-0.05341	-2.83967	0.699511	1.019575	5.122963	8.984499
SAA	2014	-0.15956	28.93409	0.771863	1.022345	5.186531	10.11052
SAA	2015	-0.13359	272.2329	1.030912	1.072965	5.21437	11.84279
SAA	2016	-0.07891	-163.17	0.812196	0.977909	5.389006	14.70751
SAA	2017	-0.44505	-7681.42	0.22571	1.104488	5.285722	13.31999
SAA	2018	-0.08183	11.13568	0.776121	1.037826	5.150878	8.261223
SAA	2019	0.015933	-5.64431	1.151913	0.91494	5.171383	8.473674
SAA	2020	-0.92451	10.24513	1.87631	2.137824	4.450821	9.241531
KQA	2010	0.027002	36.04858	2.749235	0.627285	2.978263	79.23315
KQA	2011	0.043366	10.13381	0.341609	0.622338	2.963145	88.81077
KQA	2012	0.020603	-3.017	0.684553	0.715655	2.979159	84.5296
KQA	2013	-0.06228	94.32731	0.726205	0.781155	3.166209	86.12288
KQA	2014	-0.02215	-9.65326	0.81645	0.710015	3.239234	88.01041
KQA	2015	-0.13718	127.7258	1.321674	0.690435	3.279114	98.68323
KQA	2016	-0.1636	19.745	-0.04424	0.63939	3.203652	101.5981
KQA	2017	-0.06528	22.21913	0.501629	0.621979	3.173361	103.5074
KQA	2018	0.057759	-15.4825	-0.26491	0.641861	3.059108	69.17532
KQA	2019	-0.05215	-0.32061	31.4168	0.665358	3.005251	77.35201
KQA	2020	-0.21342	17.3524	-0.15421	0.95243	4.224511	99.53241
RAM	2010	0.046652	-9.04248	2.783289	0.905348	2.445708	7.321222
RAM	2011	0.036566	-4.94316	0.205894	0.952945	2.462424	7.261132
RAM	2012	0.002493	6.05614	-0.9822	0.954981	2.426545	8.209969
RAM	2013	0.062899	63.44188	2.129815	0.883728	2.600055	8.984499

RAM	2014	0.065674	1.361422	1.235228	0.880131	2.59648	10.11052
RAM	2015	0.047436	61.612	1.042133	0.878002	2.526795	11.84279
RAM	2016	0.0306	27.19595	-0.35073	0.863619	2.575556	14.70751
RAM	2017	0.047172	0.062526	1.082877	0.083158	2.639502	13.31999
RAM	2018	0.04265	-1.57598	1.310804	0.958288	2.246553	8.261223
RAM	2019	0.04193	1.020799	1.15644	0.923459	2.306701	8.473674
RAM	2020	0.87452	51.68751	1.541253	0.979943	3.021321	10.96784
AMU	2010	0.005122	7.225901	0.885783	0.937417	2.737617	30.7844
AMU	2011	0.025172	7.315894	2.930963	0.916009	2.739665	28.70595
AMU	2012	-0.07899	-63.1859	1.600088	0.998964	2.677083	30.04997
AMU	2013	-0.01013	472.8246	0.973699	0.957079	2.676514	30.70136
AMU	2014	0.021036	-177.634	0.834588	0.933562	2.664977	30.7057
AMU	2015	-0.06904	-441.348	1.119656	0.976404	2.580963	35.1079
AMU	2016	0.044157	-36.0982	0.839226	0.909027	2.586366	35.5221
AMU	2017	0.072211	30.51024	1.858823	0.903993	2.624817	34.4994
AMU	2018	0.032734	545.3764	-0.06635	0.895323	2.845113	28.45284
AMU	2019	-0.08534	499.5038	1.263335	1.036782	2.737016	31.9598
AMU	2020	0.125173	6.315899	2.830968	1.116008	2.669234	25.92879
ASY	2010	0.042518	14.32556	2.046483	1.825593	1.808291	12.06776
ASY	2011	-0.03729	10.35346	1.203863	2.015596	1.746011	12.38103
ASY	2012	0.027403	-0.37988	0.963561	1.02146	1.609872	13.70403
ASY	2013	0.051803	1.207422	1.323193	1.508303	1.766517	12.05832
ASY	2014	0.037125	1.382383	0.20208	1.357267	1.935346	12.7239
ASY	2015	0.019088	-24.5866	-0.95913	0.982897	2.044544	13.3091
ASY	2016	0.024492	0.07379	-69.8267	0.655345	2.239367	13.2721
ASY	2017	0.044531	1.010686	0.984926	0.617021	2.137797	13.5819
ASY	2018	-0.06598	-54.7453	3.517481	1.554724	1.924192	9.457243
ASY	2019	-0.10494	79.58313	0.151628	1.945776	1.850425	13.60994
ASY	2020	0.187942	1.683112	0.721504	1.35428	1.452873	11.54218
FSA	2010	0.072622	-2.16199	0.995285	1.327219	2.183009	7.321222
FSA	2011	-0.18078	-40.3071	1.572674	1.816827	2.153574	7.261132
FSA	2012	-0.17945	9.083679	0.915615	2.118097	2.133187	8.209969
FSA	2013	0.000473	-23.8959	1.114849	1.691085	2.185249	8.984499
FSA	2014	-0.0056	37.26798	50.72265	1.428754	2.256306	10.11052
FSA	2015	-0.0409	10.92792	-3.20995	1.527983	2.156069	11.84279
FSA	2016	0.009197	-2.13173	-2.18451	1.225266	2.098154	14.70751
FSA	2017	0.007355	1.356542	-0.42351	1.355464	2.204811	13.31999
FSA	2018	0.177656	8.057454	-0.64651	0.141029	2.127887	8.261223
FSA	2019	0.226457	1.014981	3.482634	0.19933	2.088718	8.473674
FSA	2020	0.578246	7.134281	-0.54268	0.254601	2.687945	9.845172
FYA	2010	0.142512	13.32552	2.146481	1.92559	1.908291	11.06775

FYA	2011	-0.13799	11.35343	1.303864	2.205593	1.846016	12.1381
FYA	2012	0.057401	-0.57982	0.97124	1.12144	1.509873	12.70401
FYA	2013	0.071802	1.307421	1.423192	1.6083	1.966516	13.05833
FYA	2014	0.13712	1.482381	0.302081	1.457265	1.955344	11.7299
FYA	2015	0.119082	-22.5861	-0.85913	0.992895	2.144543	12.3094
FYA	2016	0.044491	0.17378	-65.8261	0.655345	2.439361	12.2723
FYA	2017	0.064532	1.210681	0.994922	0.717022	2.23777	11.5829
FYA	2018	-0.07598	-55.6453	3.817483	1.654723	1.854191	10.45724
FYA	2019	-0.11491	76.58312	0.251625	1.845775	1.950424	12.60993
FYA	2020	0.054623	0.27477	5.8261	0.755241	2.343521	11.34571

## Appendix II: Fixed Effect Regression output

**Dependent Variable: ROA**

Method: Panel Least Squares

Date: 15/12/2024 Time:08:32

Sample: 2010 2020

Periods included: 11

Cross-section included: 8

Total panel(balanced) observations: 88

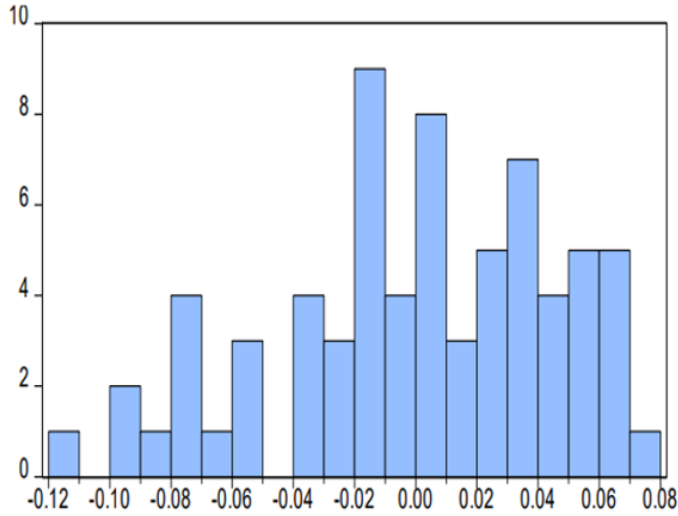
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	3.48E-06	7.23E-07	4.784321	0.0000***
DFL	-0.084133	0.031674	-2.496340	0.0234**
OCF	-0.116435	0.015876	-4.458721	0.0000**
SOA	-0.084569	0.052131	-3.124312	0.0204**
EXR	-0.018391	0.002130	-1.542873	0.0928*
DUMM17	-0.186523	0.054327	-3.533821	0.0005
DUMM65	-0.126584	0.058486	-2.675328	0.0075
C	0.521033	0.127514	4.251863	0.0002

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.834012	Mean dependent var	-0.002801
Adjusted R-squared	0.795431	S.D. dependent var	0.085467
S.E. of regression	0.045627	Akaike info criterion	-3.19457
Sum squared resid	0.132671	Schwarz criterion	-2.764037
Log likelihood	125.0567	Hannan-Quinn criter.	-3.243687
F-statistic	21.45363	Durbin-Watson stat	1.659881
Prob (F-statistic)	0.000000		

**Appendix III: Histogram Normality test**



Series: Residuals	
Sample : 1 88	
Observations : 88	
Mean	(0.00282)
Median	0.003872
Maximum	0.364581
Minimum	(0.46505)
Standard Dev.	0.083486
Skewness	-0.505847
Kurtosis	2.561278
Jarque-Bera	3.674591
Probability	0.143682

**Appendix IV: Ramsey RESET Test**

Ramsey RESET Test

Equation: Untitled

Specification Variables: ROA DOL DFL OCF SOA EXR DUMM17 DUMM65 C

Omitted Variables: Squares of fitted values

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	Value	Df	Probability
t-statistic	1.765438	61	0.0628
F-statistic	3.476342	(1,62)	0.0618

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