THE EFFECT OF LEVERAGE ON AIRLINES PROFITABILITY: AN EMPIRICAL STUDY ON SELECTED AFRICAN AIRLINES

BY

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A THESIS SUBMITTED TO DEPARTMENT OF ACCOUNTING AND FINANCE IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN ACCOUNTING AND FINANCE

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Advisor: Abebe Yitayew (PhD)

June, 2019

Addis Ababa, Ethiopia

Statement of Declaration

I, the undersigned, declare that this thesis entitled "**The Effect of Leverage on Airlines Profitability: An Empirical Study on Selected African Airlines**" is my original work and has not been presented for any award in any other university or institutions.

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Statement of Certification

This is to certify that Abaynew Demisew has carried out his research work on the topic entitled "***The Effect of Leverage on Airlines Profitability: An Empirical Study on Selected African Airlines***". This Thesis has been submitted for examination with my approval as a University advisor. The work is original in nature and is suitable for submission for the award of the Degree of Master Science in Accounting and Finance at the Addis Ababa University**.**

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Declaration:

This is to certify that this thesis prepared by **Abaynew Demisew,** entitled **" The Effect of Leverage on Airlines Profitability: An Empirical Study on Selected African Airlines**" and submitted in partial fulfilment of the requirements for the degree of Master of Science in Accounting and Finance complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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Abstract

The purpose of the study was to investigate the effect of leverage on selected African airlines profitability. Accordingly, secondary data obtained from audited annual reports of purposively selected seven airlines for the period 2008 to 2017 were analyzed through fixed effect panel regression model by using EVIEWS 10 software package. The study adopted a quantitative and explanatory research approach and design respectively. The effect of both the degree of operating and financial leverage on airlines profitability (ROA) was analyzed by inducing control variables (operating efficiency, size of airlines, and exchange rate) to isolate the effect of leverage on airlines' profitability and to capture the effect of variables other than the study's main objective variables (degree of operating and financial leverage). The result of the fixed effect regression model revealed that airlines degree of operating leverage has a positive and statistically significant effect on profitability (ROA). On the other hand, airlines degree of financial leverage, operating efficiency, size of airlines, and exchange rate have a negative and significant effect on selected airlines profitability (ROA). Accordingly based on findings airlines are advised to revise their operating cost and capital structure by increasing the degree of operating leverage (use fixed operating cost) as it maximizes their profitability and optimizing debt financing to easily manageable levels so that it will help them to maximize their profitability.

Keywords: *Profitability (ROA), African Airlines, Degree of operating Leverage, Degree of Financial leverage*

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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
CMA	Comair
DCL	Degree of Combined Leverage
DCL	Degree of Combined Leverage
DFL	Degree of Financial Leverage
DOL	Degree of Operating Leverage
DW	Durbin-Watson
EBIT	Earnings Before Interest and Tax
EFFIC	Operating Efficiency
EPS	Earnings per Share
ETA	Ethiopian Airlines
EXR	Exchange rate per US-dollar
FEM	Fixed Effect Model
GDP	Gross Domestic product
GNP	Gross National Product
IATA	International Air Transport Associations
ICAO	International Civil Aviation Organization
INF	Inflation

KQA	Kenyan Airways
LOGSIZE	Logarithm of Total Assets
NIAT	Net Income After Tax
OLS	Ordinary Least Square
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
SAX	South African Express
USD	United States Dollar

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CHAPTER ONE

1. INTRODUCTION

1.1. Background of the Study

Maximizing firms' wealth and minimizing its risk is achieved through financial managers leverage decision. In the field financial management, the term leverage is used to describe the firm's ability to use the fixed cost of assets or funds to magnify returns; the former is popularly known as 'operating leverage' and the latter is known as 'financial leverage'. Operating leverage is the extent to which an organization relies on fixed costs of assets in its quest for maximizing its operating profit. Whereas, financial leverage is a mix of debt and equity financing which is subject to different financial difficulties. Financial leverage deals with a fixed cost of funds invested and operating leverage is about the fixed cost of assets used in the operation. However, decisions of management are uncertain and this uncertain decision may induce risks on firms' returns (Gatsi, 2013. Therefore, operating leverage decision is about the reduce risks resulting from poor cost controls, cost structures, low productivity or pricing practices which dilute revenues, while financial leverage is about a decision to balance the cost (like cost of borrowing, direct and indirect cost of bankruptcy) and benefits (tax deductibility of interest expense) of debt financing (Tyrylahti, 2015).

In the airline industry, the long-term stable performance or profitability is adversely challenged by both operating and financial leverage. From an operating point of view, the stiff competitional forces and the inherent high fixed cost nature of the industry may induce a threat and financially highly leveraged nature of the airline industry makes them vulnerable by increasing borrowing cost, financial distress and economic declines (Gritta et al, 2006). To overcome the stiff industry competitions and to stable in long term period, airlines management should have to decide on its operating cost structure and which one is the best source of finance (either debt or equity) to maximize firms' wealth by minimizing its risk.

Generally, this industry provides air transport service to virtually every corner of the globe and has been an integral part of the creation of a global economy. According to Sewnet (2017), airline industry itself is a major economic force, both in terms of its own operations and its impacts on related industries such as aircraft manufacturing, tourism sectors and other businesses which transacted globally. These days, globally the airline industry is growing faster in a competitive way and one of

the most rapidly developing sectors with a growth rate greater than the world's GDP (Garefalakis et al, 2016). Regardless of this fact, African airline market shares according to the analysis of CAPA (2017) still accounted for only 35% of Africa-Europe, 40% of Africa-Middle East, 30% of Africa-North America, and 81% of Africa-Asia Pacific of capacity share (% of available seats).

Besides, the financial performance of the whole aviation industry in net profit and loss terms was $10.7 billion, $13.8 billion, $36 billion, $34.2 billion, $37.7 and $32.3billion in the financial year of 2013, 2014, 2015, 2016, 2017 and 2018 respectively (IATA, 2018). However, surprisingly as revealed in the report the Africa aviation industry was the only region incurred a net loss for consistent financial periods. In this industry increasing competition among airlines and increasing costs of operation necessitate improved efficiency in airline operations to generate profit. Accordingly, airline managers are using various strategies to stay profitable and continue operations despite the challenges, from these strategies leverage decisions are one of the most important strategies in the industry (Gritta et al, 2006).

Therefore, based on the foregoing discussions analyzing the effect of leverage on the profitability of the African aviation industry is a concurrent sensitive issue. Thus, this study tries to examine the effect of leverage (operating and financial) on airline profitability, particularly on seven selected African airlines by adopting explanatory research design.

1.2. Statement of the Problem

Long term performance of airlines industry is the result of financial strategies devised and implemented in the operation. According to Frederic (1961), the performance of the airlines industry is adversely affected by both operating and financial leverage strategies. Gritta et al (2006) also asserted that high fixed cost nature of airline industry resulted in high operating leverage which induced threat of return variability, and from financial leverage side, highly leveraged nature of the aviation industry may force to increase in the cost of finance.

According to Khazaaleh (2017), airlines operating in this dynamic environment may face financial and business risks that resulted from financial and operating leverage respectively. Even if the cost structure choice has a vital role in determining every firms' performance, the airline companies are not able to frame an effective cost structure which can make them immune to all the major financial and structural shocks that affect their profitability and development in the long run. Furthermore, Hassan (2015) also stated that airline industry is extremely sensitive to costs such as fuel, labor and borrowing costs. Because of the unchanging behavior of some costs, the profitability of individual companies is determined by efficient operations and on the favorability of fuel, labor and borrowing costs.

In African aviation industry, as stated by Menta (2015) despite efforts made by respective governments in the region with an aim of improving profitability, efficiency, and productivity, the financial performance of the airlines in the region has remained poor with substantial gaps in service delivery to customers. This poor financial performance, according to Raphael's (2013) argument resulted from low levels of credit rating and operational inefficiency of airlines industry, and this low level of credit performance is about the effect of financial leverage and operational inefficiency is about operating leverage. Additionally, AFRAA (2018) air transport statistics annual report also revealed that the overall industry average annual returns in 2015, 2016, and 2017 were $36 billion, $34 billion, and $39 billion respectively, but surprisingly, the Africa aviation industry was performed even below break-even. Moreover, IATA (2018) annual report also revealed that the profitability of airlines was highly varied by regions, for example, North America airlines earned four times more per passenger than in Asian-Pacific and Europe, and Latin American and Middle-East airlines generated return better than break even, however, African airlines remained in red. Thus, on the bases

of these facts, empirical evidences concerning the African airline industry has presented in the following sections in order to identify gaps missed by the previous researchers/ studies.

Generally, in aviation industry numerous researchers such as, Antoniou (1992), Capobianco (2004), Tsai (2008), Lee and Hooy (2012), Bratlie and Jotne (2012), G/Egziabher (2012), Alahyari (2014), Suat et al (2016), Kiracy and Aydin (2017), Khazaaleh (2017), Tomoiaga (2014), Enos et al (2017), Menta (2015), Solomon (2015), Deribe (2016), Sewunet (2017), and Abebe (2017) have been conducted their studies at local and global level. Generally, these studies focusing area was on the issue of the determinants of airlines profitability, determinants of airline capital structure, and financial performance and financial risk exposures of the airline industry. However, all of them are failed to consider the effect of the degree of leverage on airlines profitability.

For instance, at global level Antoniou (1992) and Alahyari (2014) conducted a study on determinants of the profitability of airline industry, but both of researchers were left out the effect of degree of leverage on airline profitability. Moreover, researchers such as Capobianco (2004), Bratlie and Jotne (2012), Kiracy and Aydin (2017), Khazaaleh (2017) and Tomoiaga (2014) conducted their study on determinants of capital structure in the airline industry. However, all studies emphasized only on identifying determinants of the capital structure rather than analyzing the effect of the degree of leverage on airlines profitability. Suat et al (2016) were also analyzed the financial performance of top 20 world airlines, but this study focused only on performance measurement rather than on determining factors of airlines performance.

In Africa also researches have been conducted in the area of airlines industry. For example, Tsai (2008) conduct a study on risk exposures in the airline industry in the case of South African airlines, but the study also failed to assess the business risk exposures (degree of operating leverage) in the industry. Enos et al (2017) also investigated determinants of airlines profitability in the aviation industry of Kenya however, the study only focused on whether management structure influenced the profitability of airline or not rather than on the effect of degree of leverage.

In case of Ethiopia also some studies had been done, for instance G/Egziabher (2012) examined the success of Ethiopian Airlines, its determinant factors as well as lessons that can be taken by other public companies from its experience, but the research has failed to consider the role of financial decision on the airlines' performance; Sewunet (2017) was also focused only on determinants of major African airlines capital structure; Deribe (2016) analyzed profitability in the airlines industry

but the study didn't have a clear rationality of model specification (the study used a threshold model but there is no clarification and reasoning) . In addition, one of the explanatory variable (net profit margin- net profit per revenue) of the study is more or less same as dependent variable ROE (net profit per equity), which leads the estimation of the study biased, and the study also overlooked the effect of the degree of leverage on airlines profitability; Solomon (2015) conducted a study on the determinants of Ethiopian Airlines profitability, however, the study focused only on supply and demand factors without considering even leverage as one of the determinants factors of profitability in airlines industry; Menta (2015) and Abebe (2017) also conducted their studies on determinants of profitability of major Sub-Saharan African airlines and Ethiopian Airlines respectively. But both studies have left out the effect of degree of leverage on airlines profitability.

As discussed in the above sections no one has conducted an empirical research on the effect of leverage on African airlines profitability. Thus, the study is intended to fill gaps identified by examining the effect of degree of leverage (both operating and financial) on seven selected African airlines profitability over the period 2008-2017.

1.3. Research objective of the study

1.3.1. General objective

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

1.3.2. Specific objectives

The specific objectives of the study include the following:

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

1.4. Research Hypothesis

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 (see section 3.5.2 for the detail discussions of each hypothesis).

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.

H3: Operating cost efficiency has a negative and significant effect on profitability (ROA) of airlines.

H4: Size of airlines has a positive and significant effect on profitability (ROA) of airlines.

H5: Exchange rate has a negative and significant effect on profitability (ROA) of airlines.

1.5. Significance of the Study

As core objective of the study was to examine the effect of both operating and financial leverage on selected African airlines profitability, it contributes its' own role on an existing knowledge about capital and operating cost structure choices of an airlines to maximize returns through optimal utilization of fixed financing and operating costs. Furthermore, the finding of the study is helpful to different stakeholders like management of airlines and policymaker in order to devise airlines' financial and operational strategies to improve performance, and as a reference for further researchers in similar issue and/or study area. Finally, the study suggested an optimal recommendable level of degree of financial and operating leverage and other factors which contribute to airlines' profitability to the financial managers and practitioners of the airlines' industry in Africa.

1.6. Scope and Limitation of the Study

The study has focused only on the effect of leverage on the profitability of selected (based on availability of online audited financial statement) African airlines (which are, Ethiopian Airlines, South African Airways, Kenya Airways, Air Mauritius, Comair, Air Seychelles, and South Africa Express). Therefore, the study result may not explain the reality of other airlines which are not included in this study. In addition, the study is delimited in investigating the effect of leverage (both operating and financial) by taking some control variables like exchange rate, size of airlines and operating cost efficiency since past research studies by Alahyari (2014), Menta (2015), Amundsen (2015), Birassa (2016) had found these variables as a factors affecting airlines' profitability. Therefore, the study doesn't examine all determinants of airlines profitability. In addition, the study analysis was based on secondary data only, mainly audited financial statements of seven African airlines for the period span from 2008 to 2017(this period is chosen since this is the maximum period of online data available for selected airlines). Since the study was a continental level, financial problem and geographical distance hindered the study to access all airlines' annual reports and primary data to examine the study objective. Because of that, the study took only seven airlines based on online data availability by purposive sampling instead of probability sampling. Though, it will be more productive, comprehensive and result in better findings and solutions if the study includes qualitative data and all airlines operating in the continent.

1.7. Organization of Study

The study is organized into five chapters. The first chapter included background of the study, statement of the problem, the general and specific objective of the study, research hypothesis, significance of the study, and the scope and limitations of the study. The second chapter discusses different theoretical and empirical literature related to operating and financial leverages, and finally conceptual framework of the study. Chapter three has included research design and methodology, method of sampling, data collection, analysis, and interpretation. And finally, it also discusses variable measurements and definitions, and model specification of the study. The fourth chapter presents the detailed analysis of the study including trend analysis, descriptive statistics, correlation matrix, diagnosis test of CLRM and empirical results of multiple regression analysis with possible interpretations. Finally, the fifth chapter presents summary of the study findings and possible recommendations to different stakeholders of the airlines' industry.

CHAPTER TWO

2. LITERATURE REVIEW

Introduction

This chapter discusses the theoretical and empirical literature related to the area of the relationship between the degree of leverage and profitability. Accordingly, section one presents on concepts and theories of capital structure, related empirical reviews of the relationship between leverage and profitability are presented under the second section, and empirical reviews specifically in the airline industry presented under section three. In theoretical review, Modigliani and Miller proposition I and II theory of capital structure, pecking order theory, Trade-off theory, Agency cost theory, and Market Timing Theory are discussed in detail. Under the empirical review section, different local and international study findings in the area of the relationship between leverage and firms' profitability are reviewed. Then, finally, the analysis and summary of different research findings and conceptual framework about the relationship between leverage and profitability and other control variables are presented.

2.1. Theoretical Review

Most essential capital structure theories that attempt to detail the financing decisions taken by various business organizations include the Modigliani and Miller theory, the pecking order theory, the trade-off theory, the market timing theory, and the agency theory. These mentioned capital structure theories are discussed in detail hereunder.

2.1.1. Modigliani and Miller Theory

Modigliani and Miller's (1958) theorem is considered by the literature to be the classic and seminal work on capital structure, inspiring many other studies. To this day, their academic contribution has triggered a progressive discussion on the relevance of capital structure in corporate finance. Based on the assumption that the capital markets are frictionless, an equal lending rate between investors and a corporation and identical capital structure among firms, Modigliani and Miller suggest two propositions.

The first proposition of M&M's theory releases the discussion by claiming that the market value of any firm is independent of its capital structure and is given by capitalizing its expected return at the rate appropriate to its class (Modigliani and Miller, 1958, p.268). The value of a firm will remain constant regardless of the mixture of debt and equity in its capital structure under perfect and efficient capital market conditions (i.e. irrelevance). Generally, M&M Proposition I stated that "In a perfect capital market, the total value of a firm is equal to the market value of the total cash flows generated by its assets and is not affected by its choice of capital structure". Furthermore, M&M stated their proposition I in an equivalent way in terms of firms average cost of capital as the average cost of capital to any firm is completely independent of its capital structure and equivalent to the capitalization rate of a pure equity stream of its class (Modigliani and Miller, 1958). As far as concerned M&Ms' proposition I capital structure theories they argued that firms financed with full of equity (by owners) and firms financed with a mix of equity and debt (by creditors) have the same market value and the average cost of capital.

Subsequently, Modigliani and Miller (1963), in their proposition II with corporation income tax, they argued that leverage reduces firm's cost of capital, but tax saving from debt financing may be offset by the rising cost of equity due to taking the highest risk by equity owners. In this proposition, they highlighted the key factors in the research regarding the determinants of capital structure: taxation, bankruptcy costs, transaction costs, asymmetric information, agency costs, and the equality of access to the market. These factors provide huge potential for developing the propositions both theoretically and empirically. Finally, M&M Proposition II stated that the expected rate of return on the common stock of a levered firm increases in proportion to the debt-equity ratio, expressed in market values. Debt issues have an explicit and implicit cost. The explicit cost is the rate of interest charged on the firm's debt. The implicit cost is that it increases the firm's financial risk and therefore causes shareholders to demand a higher return on their investment. The implicit and explicit cost together makes that debt is no cheaper than equity, and the return that the investors require on their investment is unaffected by the firm's capital structure (Antoniou, 1992).

2.1.2. The Tradeoff Theory

As the name of the theory indicates, the idea of trade-off theory is to find an optimal compromise between equity and debt. Firms that obey this kind of thinking try to balance between the advantages of debt, like tax-deductibility of interests and disadvantage like direct and indirect costs of bankruptcy (Tyrylahti, 2015). According to the trade-off theory, firms amend their capital structure by striking a balance between the tax deductibility and bankruptcy costs of leverage. In trade-off theory, particular needs for investments and capital expenditures of each industry are taken into account when searching for optimal balance between debt and equity. To determine this optimal capital structure, tradeoff theory add various imperfections, including taxes, costs of financial distress, and agency costs, but retains the assumptions of market efficiency and symmetric information (Fama & French, 2002).

Furthermore, according to Zhu (2014), the trade-off theory can be explored in depth by dividing the assumption into two parts. The first refers to a static part which assumes that firms trade off the tax savings of debt and the cost of financial distress within a single time period. The second part can be considered as a dynamic trade-off theory which assumes the target adjustment behavior when firms gradually deviate away from the optimal level of leverage over time. The difference depends on whether the balance is between the costs of benefit is static or whether the firms move towards the assumed optimal capital structure.

Generally, under the tradeoff theory, a firm's optimal debt ratio is usually viewed as determined by a tradeoff the costs and benefits of borrowing, holding the firm's assets and investment plans constant. In this theory, if firms seek external financing, they should issue equity when their leverage is above the desired target leverage, issue debt when their leverage is below the target, or issue debt and equity proportionately to stay close to the target (Fama & French, 2002).

2.1.3. The Pecking Order Theory

According to the pecking order theory, the presence of flotation costs and asymmetric information may cause firms cost of capital to raise. Therefore, to raise the needed capital this theory proposes that firms follow the standard pecking order in their financing decisions. However, this theory doesn’t give a well-defined target debt-to-value ratio but ranks the different financing options, and therefore been a contrast to the trade-off theory (Bratie and Andreas Jøtne, 2012). In this theory target leverage is second-order importance to support firms financial need (Huang & Ritter, 2004).

In the theoretical framework of Myers and Majluf (1984), because of the information asymmetry between manager and outside investors, investors are willing to buy risky securities only at discount cost and investors assume that managers issue risky security when they are overpriced. Accordingly, this information assymatry will lead the price of newly issued securities underpriced. To overcome such problems faced by firm managers, this theory advices that, managers prefer first internal funds; and external funds are raised if and only if when internal funds are insufficient. In addition to this, preference of internal funds over external funds, the firm also prioritize the external funds based on floatation coasts and negative signals on the firm. This theory also suggested that the order of external funds priority is: normal debt, convertible debt, hybrid securities and then finally equity securities as the last resort.

2.1.4. The Agency Cost of Free Cash Flow Theory

Corporate managers are agents of shareholders. Agency problems may arise if managers and shareholders have different objectives. Such conflicts are particularly likely to happen when the firm's managers have too much cash at their disposal (Brigham, 2011). According to Jensen (1986), managers with substantial free cash flow can increase dividends or repurchase stock and thereby pay out current cash that would otherwise be invested in low-return projects or wasted. This leaves managers with control over the use of future free cash flows, but they can promise to pay out future cash flows by announcing a "permanent" increase in the dividend. Such promises are weak because dividends can be reduced in the future (Tesfaye, 2018). The fact that capital markets punish dividend cuts with large stock price reductions is consistent with the agency costs of free cash flow. Debt creation, without retention of the proceeds of the issue, enables managers to effectively bond their promise to pay out future cash flows. By issuing debt in exchange for stock, managers are bonding their promise to pay out future cash flows in a way that cannot be accomplished by simple dividend increase. Thus, this theory argued that debt reduces the agency costs of free cash flow by reducing the cash flow available for spending at the discretion of managers.

Moreover, this theory stated that increasing leverage also has costs. As leverage increases, the usual agency costs of debt rise, including bankruptcy costs. The optimal debt-equity ratio is the point at which firm value is maximized, the point where the marginal costs of debt just offset the marginal benefits. Free cash flow theory says that dangerously high debt levels will increase value, despite the threat of financial distress, when a firm's operating cash flow significantly exceeds its profitable investment opportunities.

2.1.5. The Market timing of Capital structure

Baker and Wurgler (2002) attempt to investigate the determinants of the capital structure relative to stock performance in the market which intuitively expands the capital structure theory. The theory is simply that capital structure evolves as the cumulative outcome of past attempts to time the equity market. The market timing model assumes that financing decisions are built upon the time-varying relative costs of the capital structure. The issuances of securities have long-term effects on the capital structure because the observed capital structure at date "t" is the cumulative outcome of past attempts to time the market. This theory emphasizes that firms prefer equity when the relative costs are low and they prefer debt otherwise. In addition to preference of debt at the time of low equity cost, market timing theory of capital structure argues that firms time their equity issues in the sense that they issue new stock when the stock price is perceived to be overvalued, and buy back own shares when there is undervaluation. As a result, variability in stock prices affects firms' capital structure. In general, there are two versions of market timing capital structure that lead to similar capital structure dynamics (Luigi and Sorni, 2009).

The first assumes economic agents to be rational whereas the second assumes to be irrational. In the first version, companies are assumed to issue equity directly after a positive information release which reduces the asymmetry problem between the firm's management and stockholders. The decrease in information asymmetry coincides with an increase in the stock price. In response, firms create their own timing opportunities. The second theory assumes the economic agents to be irrational (Baker and Wurgler, 2002). Due to irrational behavior, there is time-varying mispricing of the stock of the company. Managers issue equity when they believe its cost is irrationally low and repurchase equity when they believe its cost is irrationally high. It is important to know that the second version of market timing does not require that the market be inefficient. It does not ask managers to successfully predict stock returns. The assumption is simply that managers believe that they can time the market.

Baker and Wurgler (2002) provide evidence that equity market timing has a persistent effect on the capital structure of the firm. They define a market timing measure, which is a weighted average of external capital needs over the past few years, where the weights used are market to book values of the firm. They find that leverage changes are strongly and positively related to their market timing measure, so they conclude that the capital structure of a firm is the cumulative outcome of past attempts to time the equity market.

Table 2.1. Summary of capital structure(leverage) theory

Theories	Relationship with profitability
1. MM's proposition I& II	Firm's profitability is unaffected by choice of leverage
2. Trade-off Theory	Leverage has a positive effect if it is efficiently optimized
3. Pecking Order Theory	Leverage has a negative effect on firms' profitability
4. Agency cost Theory	Leverage has a positive effect on firms' profitability

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

2.2. Empirical Reviews

This section presents empirical reviews of different researchers finding and the methodology used in their study. Generally, empirical studies on the relationship between leverage and firms' profitability can be divided into two groups. The first group considers leverage as the dependent variable and try to seek for its determinants, including indicators of firm performance. Whereas, the second group looks at determinants of the firm performance and profitability, including leverage as one of explanatory variable. This study is mainly designed to review determination of performance in accordance with the second group; leverages' (both financial and operating) effect on firms' profitability. Numerous studies had been conducted at global, continental and locally on the issue of the relationship between leverage and firms' profitability. Therefore, the next subsequent sections are tried to address empirical reviews on the issue of impact of leverage on firms' profitability in other industries and specifically in the airlines industry.

There are many empirical studies on the relationship between leverage and profitability. However, the findings from these studies are mixed. Some studies found positive relationships between leverage and profitability while others identified a negative relationship. A few others found no relationship between the two. In line with this, in this section research findings related to the relationship between financial leverage and profitability are reviewed firstly followed by studies on the area of the relationship between financial, operating and combined leverage with firm profitability.

2.2.1. Financial Leverage and Profitability

Singapurwoko and El-Wahid (2011), Azeez and Tunj (2015) and Negasa (2016) investigated and founded a positive and significant impact of leverage on firms profitability. the study of Singapurwoko and El-Wahid (2011), entitled as "the impact of financial leverage to profitability study of non-financial companies listed in Indonesia stock exchange", was used operational decision factor, macroeconomic factors, firm size, and industry factors to help understand the effect of debt on profitability and the study used equity multiplier as a proxy to measure debt used over the total assets of the company. In addition to this, the uniqueness of this research was to add industry difference by considering dummy variable regression analysis to compensate the other factors in determining the companies' profitability. They took a total sample of 42 companies from 8 industries i.e 6 companies from each industry listed in Indonesian stock exchange (IDX). In line with this, the study result indicated that in Uncategorized (not categorized into different industries) data; the effect of debt, firm size, and operational decision found positive and significant, but macroeconomics variables found to be insignificant factors.

Azeez and Tunj (2015) conducted their study by presenting an empirical insight into the relationship between financial leverage and return on equity and of a company in the oil and gas industry in Nigeria for the period 2004 to 2007. The study result revealed that there is a positive and significant relationship between financial leverage and the ROE of a company.

In addition to the above studies, there is also study conducted in Ethiopia by Negasa (2016) under the title 'the effect of capital structure on firms' profitability', and this study was aimed to found the effect of capital structure on firms' profitability with special emphasis on Ethiopian large private manufacturing firms using panel data of five consecutive years (2006/07-2010/11G.C). The study finding was there is a posetive and significant relationship between leverage and ROA (which is a proxy to measure profitability).

UR Rehman, (2013) investigated the relationship between financial leverage and financial performance by taking empirical evidence from listed sugar companies of Pakistan. The study measured financial performance (dependent variable) of the listed sugar companies by using five percentage indicators named as, Return on asset (ROA), Return on equity(ROE), Earning per share (EPS), net profit margin, and sales growth. The study has used financial leverage as an independent variable which is measured as debt to equity ratio. The study took a sample size of 35 listed companies from food producer sector for the period 2006-2011. Descriptive statistics were used to describe and summarize the behavior of the variables in a study. Accordingly, the results of the study contradicting, that means, there was a positive relationship of debt-equity ratio with return on asset and sales growth, while a negative relationship of debt-equity ratio with earning per share, net profit margin and return on equity.

On the other hand, studies by Tsuji (2013), Akinlo and Asaolu (2012), Al-Shamaileh and Khanfar(2014) and Nawaz (2015) was conducted on the relationship between leverage and profitability of a firm in different study areas and all of them founded as there is a negative and significant relationship between leverage and profitability. For example, by examining the relationship between corporate profitability and capital structures of the machinery industry firms listed on the Tokyo stock exchange, Tsuji (2013) found that the relationship between firm profitability and leverage ratio are generally negative. Akinlo and Asaolu (2012), have examined profitability and leverage evidence from Nigerian firms and the study result reveals that firm size has a significant positive effect on profitability, while leverage has a negative effect. Al-Shamaileh and Khanfar(2014), identified the financial leverage ratio and the rate of return on investment on profitability for sources of the funding in tourism companies which are operating in Jordan. This study revealed the presence of a statistically significant and negative impact of the degree of financial leverage on the profitability of the tourism companies listed on the Amman stock exchange.

Nawaz (2015) also conducted a study on the relationship between financial leverage and profitability of cement sector operating in Pakistan with a finding of the negative and significant relationship among them. The researchers have incorporated 18 cement manufacturers out of 21 companies. The study was used six years annual data from 2005 to 2010 regarding financial leverage and profitability (measured by ROA) of firms by applying ordinary least square model on the data to establish a causal relationship between the variables. The study finding revealed that financial leverage has a statistically significant inverse impact on the profitability of cement sector.

On the other hand, Olang (2017) was sought to establish the effect of financial leverage on the profitability of firms listed in the Nairobi stock exchange(NSE). In this study, the researcher took a sample of 30 companies financial statement from 2010 to 2015. To analyze the effect of financial leverage on profitability, the study considered financial leverage in terms of liquidity, firm size and growth opportunity determining their effects on the profitability of firms listed in the NSE. Finally, the study founded that, firm size has a statistically significant effect on the profitability of listed firms. Liquidity and growth opportunity, on the other hand, do not have a statistically significant effect on the profitability of firms listed in the NSE.

On other perspectives, Goddard et al (2005), a study to analyze performance of the European manufacturing and services industries, the study revealed that a firm's size had a negative relationship with profitability. On the other hand, findings of Nunes & Serrasqueiro (2008), argued that size of small and medium firms had a positive and significant correlation with profitability, while an insignificant relationship between size and profitability was observed in large firms. Moreover, Lindsey (1981) and Dhawan (2001) also found a negative relation between asset size and profit rate of firms. In addition, Banchuenvijit (2011) also finds that firm size in terms of a total asset has a significant and negative effect on return on assets (ROA).

Mocnik and Sirec (2010) were explained the relationship between a firm's profitability and firm size, leverage ratio and labor costs – using a sample of 782 Slovenian fast-growing firms from the years 2008 and 2009. The study revealed that firm size is negatively related to firm size.

2.2.2. Operating Leverage and Profitability

This section tried to discuss and review empirical findings related to profitability and financial, operating and combined leverages in the different study area. Researchers such as Kumar (2014), Habib (2014), Khedkar(2015) and Elangkumaran and Nimalathasan (2013) studied on the relationship between leverage (financial, operating and combined) and profitability. However, they are coming with a mix of findings, of which some declared significant and positive relationship among the variable, while others founded and claimed a negative relationship. On the other hand, some findings revealed that there is no a significant relationship between two factors.

Kumar (2014), conducted an empirical study on the relationship between leverage and profitability in Bata India limited by taking 7 of years financial statements (2005/06 to 2012/13). The study measured profitability by ROI and found that the degree of operating, financial and combined leverages have a statistically significant positive effect on profitability. Habib (2014) also tried to recognize the impact and relationship between the financial and operating leverage on firm's profitability of the consumer product companies of Pakistan. The study sample included two consumers' product companies on the Karachi stock exchange extended for the period 2002 to 2013. The study showed that there is no significant effect of leverage on ROA and ROE. But there is a positive and negative significant impact of operating and financial leverage on the net profit of the company respectively. However, the number of observations taken by Habib (seven observations) and Kumar (twenty-four observations) were too minimum to conclude the relationship between these variables.

Patel (2014) conducted a thesis titled as “impact of leverage on profitability” and examined the relationship 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, by taking data of Sabar Dairy for the period 1985/86 to 2013/14. The result of regression analysis indicated that the coefficient of DOL, DFL, and DTL was positive with ROCE, ROE, and EPS but the relationship is not significant. On the other hand, when the study taking ROA as a dependent variable, the overall model was statistically significant, and DOL and DTL has a positive and significant effect on ROA, while DFL was found a negative and significant effect on profitability (ROA).

On the other hand, Khedkar(2015) studied by taking financial, operating and combined leverage as explanatory variables and dependent variable, which was profitabilty proxied by return on investment(ROI), for Dr. Reddy's Laboratories which was the pharmaceutical firm having the highest sales turnover for the financial year 2013/14. With regard to profitability and leverage relationship analysis, the study founded a significant and negative correlation between the degree of operating leverage and profitablity. The degree of financial and combined leverages was positively correlated but the relationship was statistically insignificant according to the study. Moreover, after investigating 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, the study by Elangkumaran and Nimalathasan (2013) revealed that only 4% earnings can be explained by DOL, DFL, and DCL and there is no significant relationship with EPS.

2.3. Empirical Reviews in Airlines Industry

This subsection addresses the findings of different empirical studies in the area of the airlines industry at local and global levels. Alahyari (2014), investigated the determinants of profitability for the Turkish airlines. Accordingly, a sample of major airlines was chosen and their data was extracted from data stream covering 1994 to 2013. The researcher conducted two regression models to analyze the impact of independent variables on profitability which is measured by ROA and ROE. When the study took ROA as a proxy to measure profitability, the result revealed that tangibility of assets, growth opportunities, and liquidity ratios have negative and significant impacts on the profitability of the firms. But leverage has no significant impact on the profitability of the firms. Whereas, when the study took ROE as a proxy to measure profitability all independent variables were found insignificant.

Gritta et al (2006), conducted a study on the issue of operating, financial and total leverage and the effects on U.S. Air Carrier returns from 1990 to 2003. The study confirmed that combined leverage has created severe financial problems for many years in the industry. The finding of the study result revealed that the volatile financial situation faced by airline carriers was evident in the significant swings in the degrees of leverage and the consistently negative ROE ratios for the firms in the sample. The study also noted that this industry has been over-leveraged at both the operating and financial levels for a long period of time and this has resulted in the "boom and bust" cycle that plagues this industry. But the study didn't examine the effect of leverage rather than measuring the magnitude.

Antoniou (1992) investigated the factors determining the profitability of international airlines: Accordingly, a sample of 58 airlines was chosen out of 114 active IATA members, 1985. The study measured and defined dependent variable OPRM (i.e. operating profit margin) as the total operating profit per total operating revenue. And independent variables were categorized as; system-explanatory variables, network variables, fleet variables, and general economic variables (these are population, area, and GNP per capita). The study had also included ownership dummy which was equal to one if more than 50% as state-owned. Finally, the study revealed that variables such as passenger load factors, the share of capacity related costs, fleet age, the population share of passenger traffic and total ton-km available were found to be the most significant. The share of international and scheduled traffic, labor productivity, fleet size and average length per departure, while not statistically significant at the usual levels, cannot be totally ignored. A last group of variables, including weighted fleet utilization, GNP per capita, the share of regional traffic and type of ownership, were found to have no significant effect on operating profit. But this study didn't have explained the effect of leverage on airlines profitability.

Capobianco (2004) investigated the issue of capital structure in the world airline industry. Accordingly, the study was taking data of airlines from 1993 to 1997 and the result revealed that grouping the aviation companies by country and considering the indebtedness and return on assets does not reveal any significant comparative advantage between developed and developing countries. It can be observed that, companies with high and low levels of leverage and high and low returns on assets of both developed and developing countries. Kiracy and Aydin (2017), was also investigated the determinants of capital structure-empirical evidence from traditional airlines and their empirical finding showed that traditional airlines are operating in line with the tradeoff theory when determining their long term debt ratio and with pecking order theory when determining the total ratio, which also means that they tend to increase total leverage level. However, Capobianco et al (2004) and Kiracy and Aydin (2017) didn't investigate the effect of leverage on the profitability of airlines.

Lee and Hooy (2010) investigated the sources of systematic risk exposure for East Asia airline industry, the study found that only size and operating efficiency are positive and significant related to systematic risk, which means it affects the profitability of airlines. Additionlly, Lee and Hooy (2012), was estimated the systematic financial risk exposure of airlines in North America, Europe and Asia between 1990 and 2010. The study objective was determinants of systematic risk of the

aviation industry and its effect on profitability by focusing on firm size (measured by assets), and they revealed that most important systematic risk determinant was airlines size and operating leverage. Suat et al (2016) were also conducted empirical research entitled "Financial performance of top 20 world airlines" for the period 2011 to 2014. The study was measured the financial performance of airlines by harmonic index, but it was focused only on measuring performance rather than factors that affect airlines performance.

Furthermore, in Ethiopia, there are also researchers who have conducted their thesis on the area of Ethiopian airlines and major subsaharan African airlines. Deribe (2016) conduct a study on the analysis of profitability in the airlines industry, to do this the study was chosen a sample of top 20 world airlines by taking data from 2010 to 2014. Accordingly, the study selected explanatory variable as net profit margin, total asset turnover and efficiency, leverage and their effect on airlines profitability. The study finding revealed that there was a positive and significant relationship between return on equity (which is a proxy to profitability) and net profit margin, and leverage for the profitable and nonprofitable airlines, while efficiency was affected negatively profitability for nonprofitable airlines. In this study, there is no clear evidence to categorize airlines as profitable and non-profitable to make analysis on profitability. In addition, one of the explanatory variable (net profit margin) has simillarity with return on equity. That means, net profit margin is the ratio of net profits to revenues, and return on equity is the ratio of net profit to equity. The numerator of both measurements is similar. Because of that the study was more or less explained the dependent variable by itself, as aresul, the output of the study may be biased. Moreover, the study also failed to consider the effect of the degree of operating leverage.

Menta (2015), also studied factors affecting profitability in the airline industry (empirical study on major airlines in sub-Saharan Africa countries), the study examined the airline-specific, industry-specific and macro-economic factors affecting airline profitability for the three airlines in Sub-Saharan Africa, covering the period of 2003-2013. The study found that leverage has a negative and statistically significant and the size of airlines has a positive and significant effect on airlines profitability. Abebe (2017) also conducted a study on the determinants of aviation profitability in case of Ethiopian airlines. In line with that, the finding revealed that leverage has a negative and statistically significant effect on airlines' profitability. However, both of them are failed to consider the effect of operating leverage on the airline's profitability.

Additionally, Solomon (2015) also assessed the determinants of airlines profitability in case of Ethiopian airlines. For that purpose the study dependent variable was net profit after tax and independent variables were load, yield on the demand side and available seat kilometer (ASK), labor cost, fuel cost, maintenance cost, renting or leasing cost on the supply side however, his study objective considers only the demand and supply factors of the airline, which means he overlooked the impact of leverage on profitability. Sewunet(2017) also conduct his study on determinants of the capital structure of Airlines industry (the case of major airlines of Sub-saharan African airlines) and investigated that profitability is a statistically significant factor and it is related negatively with airlines' leverage. But this study was emphasized only on the factors that determine airlines capital structure. To add one more, G/Egziabher (2012) was examined the success of Ethiopian Airlines, its determinant factors as well as lessons that can be taken by other public companies from its experience, but this research has failed to consider the role of a financial decision on the airline's performance.

2.4. Summary and Knowledge Gap

In this chapter, the study was trying to discuss various theoretical and empirical literature related to determinants profitability and the relationship between leverage and profitability. The findings of studies discussed in previous sections revealed that the profitability of firms determined by both financial and operating leverage and other explanatory variables such as size, operational efficiency, and the foreign exchange rate was founded as determinant factors of profitability.

The empirical studies indicated that the effect of leverage may have various effects among different industries. Most of the studies conducted in airlines industries were emphasized on the issue of determinants of airlines capital structure, and even if some of them tried to analyze the determinants of airlines profitability, they overlooked the effect of degree of financial leverage and operating leverage.

From the empirical studies reviewed, it is possible to conclude the existence of inconsistent findings among researchers, that means, there was a positive and significant relationship (e.g. Singapurwoko and El-Wahid (2011), Azeez and Tunj (2015) and Negasa (2016)) investigated and founded a positive and significant impact of leverage on firms profitability), negative and significant relationship (e.g. Tsuji (2013), Akinlo and Asaolu (2012), Al-Shamaileh and Khanfar(2014) and Nawaz (2015)), and

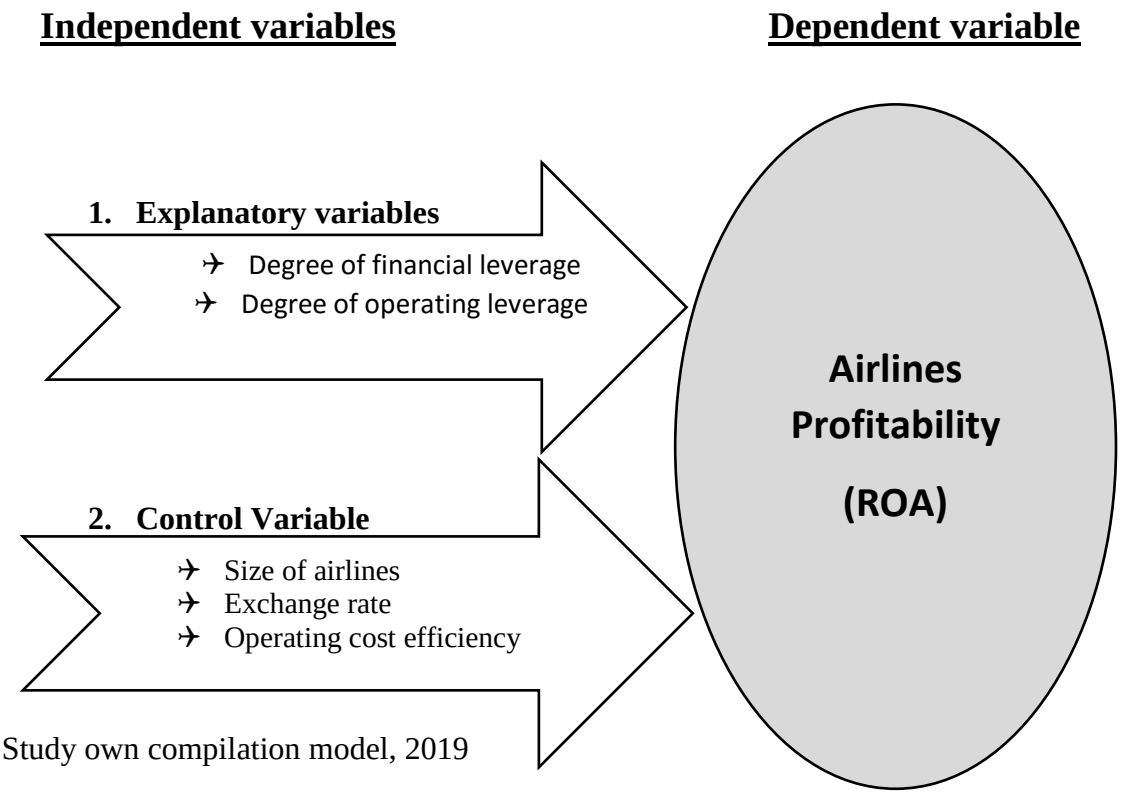
also no any significant relationship existed between the profitability of firms and determinant factors e.g. Khedkar (2015), and Elangkumaran and Nimalathasan (2013).

Thus, as discussed in the preceding sections of this chapter, lack of research studies on the effect of leverage on airlines profitability and finding inconsistencies of theoretical and empirical studies were motivate this study. Therefore, as far as the knowledge of the researcher concerned, there is no studies that have been conducted on the issue of the effect of leverage on African airlines profitability. Therefore, the study attempted to fill the research gap by examining the effect of leverage (both financial and operating) on selected African airlines profitability by taking in to account the effect of other control variables.

2.5. Conceptual Framework

A conceptual framework is a diagram which presents the research's focal point by showing the relationship between dependent and explanatory variables. Thus, the study compiled the following (fig. 2.1.) conceptual framework based on theoretical and empirical literature reviews in the previous sections of this chapter.

Fig 2.1 Conceptual Framework



Source: Study own compilation model, 2019

CHAPTER THREE

3. RESEARCH DESIGN AND METHODOLOGY

Introduction

This section of the study presents the research design and methodology to address the planned objective which was "to investigate and analyze the effect of leverage on selected African airlines profitability" and in order to make the study's analysis as possible as scientific. This section also discusses target population and method of sampling, data collection, and source of data. Moreover, dependent and independent variables including control variables concept and measurements, and model specifications of the study were discussed under this section. Therefore, in this part, the study tried to present and discuss its design and methodology by reviewing different books and previous studies on related issues to achieve objectives that motivate the researcher.

3.1. Research Design

Research designs are plans, and the procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (W. Creswell, 2009). Therefore, to achieve the purpose of the study mentioned, to maximize the reliability of collected and analyzed data, to minimize biases in the study output and by considering the nature of data employed for analysis, the study used a quantitative research approach. In addition, according to Kothari (2004), a quantitative research approach means a generation of data in a quantitative form which can be subjected to rigorous quantitative analysis in a formal and rigid fashion. This study involves collecting and analyzing secondary data only due to some factors that hindered to collect primary data with interviews and questioners. As a result, to understand and investigate the effect of leverage and other control variables on selected African airlines profitability, the study had adopted a quantitative research approach and explanatory research design.

3.2. Population, Sample Size and Sampling Method of the Study

To meet the purpose of the study, the total target population of the study was African airlines that are operating and providing continental and international air transport service. However, because of the study was a continental level factors such as expense, time, and broadness of study area was created difficulty in accessing the necessary data that hindered the study to include all African airlines under investigation. Thus, the study has selected only seven African airlines (Ethiopian airlines, South African Airways, Air Mauritius, Kenyan Airways, Air Seychelles, Comair, and South African Express) data from 2008 to 2017 purposively by considering data availability through online from their website.

3.3. Data Source of the Study

To undertake scientific and relevant study, collecting and analyzing the correct data is not only important but also mandatory tasks of the researcher. Hence, in this study, the source of data was secondary, which are collected and organized by different entities for their own primary purpose. Therefore, this study used secondary data (audited financial statements) of seven African airlines from the year 2008 to 2017 from each airlines website and exchange rate of each airlines home country from World bank database.

3.4. Data Collection and Analyzing Techniques

To get the correct output the researcher should analyze the collected data with appropriate data analyzing techniques, otherwise, the output will be inaccurate. As decisions made by different stakeholders may depend on the findings of this study, the researcher has adopted the most appropriate data collection and analysis techniques. Therefore, by reviewing previous researches conducted in similar areas and in other different areas which have similar data analysis and patterns, the researcher developed its own data collection and analysis method. Accordingly, this study has taken a balanced panel data of seven selected African airlines which were analyzed by EVIEWS 10 software application in order to make regression analysis of dependent variable against independent variables and to make different diagnostic tests.

Before proceeding to inferential statistics/multiple regression analysis, classical linear regression model (CLRM) assumptions and model selection tests were conducted in order to check whether the data and the model fit with CLRM assumptions. All diagnosis tests were conducted; normality test with Jarque-Bera's test for the assumptions of whether error terms are normally distributed or not; heteroskedasticity test by using White test for the assumption of constant variance of all error terms; serial correlation test with Brusch-Gudfery's test for testing whether the error terms are uncorrelated with one another or not; model specification test by using Ramsey's REST test to check whether the multiple regression model suffers from functional form misspecification or not and selection of model (random or fixed) test using Hausman's test to choose the fitted model.

To make analysis in common currency denomination, the study has changed all airlines financial statements into USD by the corresponding historical exchange rate. Finally, the study conducted multiple regression analysis and employed inferential statistical analysis to see the causal relationship between airlines profitability (ROA) and explanatory (degree of operating and financial leverage), and control (operating efficiency, airlines size, and exchange rate) variables.

3.5. Variables Definition and Measurements

The success of a study is highly dependent on the researcher's ability in identifying and measuring dependent and all other identifiable and measurable independent variables that explain the dependent variable. Due to this fact, the following subsection will try to identify, measure and define dependent, independent and other control variables by reviewing different theoretical and empirical literature on related issues. For analysis purpose, the study has taken a return on asset (ROA) as a dependent variable, degree of operating leverage and degree of financial leverage as explanatory variables and, firm size, operating cost efficiency and exchange rate as control variables that determine the profitability of airlines other than selected explanatory variables. Dependent and independent variables identification and measurement were made by reviewing previous empirical studies on related issues. The detail definition and measurements of all variables are discussed in detail in the subsequent sub-sections.

3.5.1. Dependent Variable – Airlines Profitability (ROA)

A dependent variable is a variable which is explained and/or affected by different explanatory variables of the study and other unobserved factors. In line with this, the dependent variable of the study is airlines profitability, since the initial purpose of this study was investigating the effect of leverage on African airlines profitability. Accordingly, by investigating prior studies in the area of the relationship among firm's profitability and other determinant factors, the study used return on asset (ROA) as a proxy to measure selected African airlines profitability. For instance, studies conducted by Schwambach (2010), Olang (2017), Yirgu (2017), Habib (2014) and Abebe (2017) were used ROA as a proxy to measure firms' profitability.

In fact, ROE is also one of the usual profitability indicators of a company. But according to Schwambach (2010), ROE would not provide a good analysis because the negative equity level of some sampled airlines would generate a distorted indicator of profitability. Even if ROA is not the best indicator in order to compare the performance of companies in different industries, since the scale factors and capital requirements may differ, however, this ratio is good to analyze the profitability of companies in the same industry. Therefore, based on this existing fact (negative ROE) in sampled airlines, the study has used return on asset (ROA) as a proxy to measure airlines profitability. Return on assets (ROA) is a measure of net profit after tax per dollar of assets (Stephen, 2008). The return on asset of airlines can be expressed as:

$$ROA = \frac{\text{Net Income(loss)}\ After\ Tax}{Total\ Asset} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.1)}$$

3.5.2. Explanatory Variables

Explanatory variables are determinant factors that are expected to affect the dependent variable either positively or negatively. In this case, to meet the purpose of the study by testing the alternative hypothesis stated, the researcher has identified the degree of operating and financial leverage as study's objective explanatory variables.

3.5.2.1. Operating Leverage

According to Brigham (2011), business risk is the risk inherent in the firm's operations, which arises from uncertainty about future operating profits and capital requirements. The business risk of firms depends on different factors like variability in product demand, sales price and input cost, currency fluctuation and political risk and if a high percentage of a firm's costs are fixed and hence do not decline when demand falls, then the firm has high operating leverage, which increases its business risk. Operating leverage is concerned with the relationship between the firm's sales revenue and its earnings before interest and taxes (EBIT). The degree of operating leverage (DOL) is the numerical measure of the firm's operating leverage. Empirically, high degree of operating leverage is associated with more variable EBIT levels. This will translate into more variable rates of return on assets (ROA) since it is the result of EBIT (Gritta et al 2006).

Besides, empirical studies of Patel (2014), Khedkar (2015), Tesfaye (2018), Habib (2014) and Kumar (2014) took the degree of operating leverage as a determinate factor of return on asset and they measured this variable by the percentage change of EBIT per percentage change of sales. This evidence indicated that there is a significant association between operating leverage and profitability firms. Gitman (2012) also noted that, whenever a percentage changes in EBIT resulting from a given percentage change in sales is greater than percentage changes in sales, operating leverage exists. This means that operating leverage exists only if it is greater than one. Accordingly, the study has adopted the following numerical formula and alternative hypothesis to test the relationship between DOL and airlines' profitability as follows:

$$DOL = \frac{\text{Percentage change in EBIT}}{Percentage\ chnage\ inSales} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

H_1: Degree of operating leverage has a positive and significant effect on airlines' profitability (ROA).

3.5.2.2. Financial Leverage

Financial risk is the risk placed on the common stockholders as a result of the decision to finance with debt (Brigham, 2011). Stephen (2008), also stated that financial leverage is the extent to which a firm relies on debt, and a levered firm is a firm with some debt in its capital structure. Because of a levered firm must make interest payments regardless of the firm's sales, financial leverage refers to the firm's fixed costs of finance. Another scholar Gitman (2012) also confirmed financial leverage as the potential use of fixed financial costs to magnify the effects of changes in earnings before interest and taxes on the firm's earnings per share or net income available for common stockholders.

In addition, previous studies conducted by EL-Wahid (2011), Ankilo (2012), Ur. Rehman (2013), Tsuji (2013), Azeez and Tunj (2015), Newaz (2015), Negasa (2016), and Tesfaye (2018) investigated the relationship between financial leverage and firms' profitability by using percentage change net income after tax per percentage change of EBIT as a proxy to measure financial leverage. The numerical measure of financial leverage is the degree of financial leverage (DFL), and the following equation present way of computing degree of financial leverage:

$$DFL = \frac{\text{Percentage change in Net Income After tax}}{Percentage\ chnage\ in\ EBIT} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

H_2= Degree of financial leverage has a negative and significant effect on airlines profitability.

3.5.3. Control Variables

Control variables are variables other than explanatory variables which are expected to affect the dependent variable and they are not objectives of the study. That means, even if dependent variable is affected by the study explanatory variables, there are also other variables which are explaining the dependent variable of the study. Therefore, to isolate the effect of both degree of operating and financial leverage the study tried to include some control variables which are expected to affect airlines profitability. Thus, the control variables included in this study were operating cost efficiency of airlines, size of airlines and foreign exchange rate that were found to affect profitability according to past studies. In line with this, the following paragraph has discussed control variables of the study.

a. Operating Efficiency

Operating efficiency is about the concept of how a firm efficiently utilized its asset, and human resources in order to meet and/or generate its expected profit. To measure the company's operating efficiency, there are different ratio measurements like revenue to total asset, revenue per number of employee and ratio of operating expense to revenue generated from its operation. For the purpose of this study, researcher believed that operating expense ratio is the most appropriate measure of operating efficiency of airlines, since it measures how airlines can make money from its operations, excluding financial gains, expenses and taxation effects. For instance, empirically like, (Tesfaye, 2018) and (Amundsen, 2015), were measured firms operating efficiency by the ratio of operating expenses to operating revenue. As indicated by Amundsen (2015), if the cost of operation exceeds the revenue generated from operations, it will result in a value higher than one and this result indicates that firm is in bad operation. That means companies are unable to cover their operating costs. On the other hand, if the revenue generated from operations is greater than the cost of operations, it will result in a ratio lower than one. A value lower than one indicates the profitable operations of companies. This indicates that operating efficiency and profitability have an inverse relationship. The operating expense ratio can be measured as:

$$\text{Operating efficiency} = \frac{\text{operating Expense}}{operating\ revenue} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

From the above discussion it is possible to generate an alternative a hypothesis as:

H_3: Operating efficiency has a negative and significant effect on profitability of airlines (ROA)

b. Firm Size

It indicates that the amounts of firms' owned assets in their operation. Hall and Weiss (1967) defined size as it is the amount of owned and borrowed money, to which the total assets of the firm is a good expression. The measurement of firm size in their study was the logarithm of total asset and in their conclusion, they found that size does tend to result in high-profit rates. Other researchers like Menta (2015), Birassa (2016), and Alahyari (2014) were used firm size as one of the determinants of airlines profitability, and all of them inferred that as the size of the company grows, it would be able to benefit from economies of scale more. On the other hand, if the size of the firm is large, it is possible to build a good image in the public and other stakeholders of the firm, which again increases profitability. As

per the argument by Hall and Weiss (1967), large firms are able to access finance easily by providing collateralls since they are expected to meet their obligation as compaired to small firms. However, , this easy availability of finance may increase firms interest expense wich inturn reduce profitability. Findings of Nunes & Serrasqueiro (2008), also revealed that the size of small and medium firms had a positive and significant correlation with profitability, while in larger firms relationship between size and profitability was insignificant.

On the other hand, many researchers disagree about the positive relationship between firm size and profitability. Some researchers have examined firm size's negative effect on profitability, such as Mocnik and Sirec (2010), Goddard et al (2005), Nunes & Serrasqueiro (2008), Lindsey (1981), Dhawan (2001) and Banchuenvijit (2011) was confirmed that firm's size had a negative relationship with profitability. Goddard et al (2005), were also analyzed the performance of the European services industries, the study revealed that a firm's size had a negative relationship with profitability. Moreover, Lindsey (1981) and Dhawan (2001) also found a negative relation between asset size and profitability under their study. In addition, Banchuenvijit (2011) also founds that firm size in terms of a total asset has a significant and negative effect on the return on assets (ROA). By considering the above theoretical and empirical evidence the study adopted the following variable measurement and alternative hypothesis in favoring positive relashinship.

Airlines size= Log(Total Assets)…….(3.5)

H_4= Size of airlines has a positive and significant effect on airlines profitability (ROA)

c. Foreign Exchange Rate

An exchange rate between two currencies is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country's currency in terms of another currency. Sales volume and cost structure of the international firms like airlines industry highly depends on foreign exchange fluctuations which implies that unfavorable fluctuations affect profits negatively whereas favorable fluctuations affect positively (Menta, 2015). Therefore, by considering the airlines industry vulnerability to the exchange rate fluctuation it is important to include this variable as one of the study control variables. This is because most of the transactions in the airlines industry are conducted through foreign currencies as most of customers and suppliers of the industry are international. Due to this fact airlines are obliged to conduct their transactions with other international currencies other

than their own local currency. Thus, movement of the exchange rate will hinder or boost airlines profitability. For the purpose of this study percentage change of average exchange rate against US dollars on a yearly basis is used to measure foreign exchange rate movements of each airlines' home country. Henceforth, the study developed the following alternative hypothesis.

H_5= Foreign exchange rate movement has a negative and significant effect on airlines profitability (ROA).

3.5.4. Summary of Variable

In line with the above variable definition and measurement deliberations the study summarized dependent variable followed by explanatory and control variable with their symbol, measurement, and expected effect on dependent variable in the following table.

Table 3.1: Summary of Variables Measurements

Variables	Symbol	*Measurement and/or definition of variables*	*Expected sign*
Dependent variable			
Airline profitability	ROA	Net income after tax per total assets	*NA*
Explanatory Variables			
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*
Control Variables			
Operational cost efficiency	EFFIC	Operating expense per revenue	*Negative*
Size of airlines	LOGSIZE	Logarithm of total asset	*Positive*
Exchange rate	EXR	Yearly average exchange rate in US dollar	*Negative*

3.6. Econometrics Model Specification of the Study

To investigate the relationship among dependent and independent variables of an empirical study, economic model specification is the crucial task. As findings of the study were highly dependent on economic modeling, it is important to specify the appropriate econometrics model. According to Wooldridge (2013), formal economic modeling is the starting point for empirical analysis especially to those involved in the testing of existing economic theories. An economic model consists of mathematical equations that describe various relationships among variables. Gujarati (2009) also stated that a model is simply a set of mathematical equations and, if the model has only one independent variable, it is called a single-equation model, whereas if it has more than one independent variables, it is known as a multiple-equation model wich is used in this study.

In this study, based on the stated hypothesis in the previous sections, by reviewing prior empirical and theoretical evidence, and by considering the nature of the data, panel data regression analysis is used. The nature of the data in this study includes both cross-sectional and time series for each object (airlines). According to Wooldridge (2013), a panel data(or longitudinal data) set consists of a time series for each cross-sectional units. In this case, for every seven airlines, there are 10 years time series, such a data set is a balanced panel because the same time periods are available for all cross-section units. Furthermore, the advantage of a panel or longitudinal data is described by Gujarati (2009) as panel data can enrich empirical analysis in ways that may not be possible if we use only cross-section or time series data. Thus, this study employed a panel data regression model to investigate the effect of leverage and other control variables on selected African airlines profitability.

The study dependent variable was airlines profitability which is proxied by ROA, explanatory variables were the degree of financial and operating leverage and, other control variables included were, airlines size, operating efficiency, and foreign exchange rate. The main reason of including control variables in the model is that, even if the primary objective of the study is to analyze the effect of leverage on airlines profitability, there are also other firm-specific and macroeconomic factors which explain airlines profitability either positively or negatively. Accordingly, the study has derived an equation describing the amount of airlines ROA as a function of the degree of operating leverage(DOL), degree of financial leverage(DFL), operating cost efficiency(EFFIC), airlines size(log of total asset), and foreign exchange rate (EXR).

The Function of dpendent and indpendent variables is expressed as:

$$Y=f(x1, x2, x3, x4, x5,)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3.6)$$

Where:

Y= airlines profitability(ROA),

X1= degree of operating leverage(dol),

X2= degree of financial leverage(dfl),

X3= operating efficincy(oeff),

X4= logarizim of total asset size(logsize), and

X5= foreign exchange rate (exr). *sourec: Wooldridge (2013)*

From the above basic functional relationships, the study adopted an econometric model to estimate the effect of different factors on African airlines profitability. Basically, panel data models examine group (individual-specific) effects, time effects, or both in order to deal with heterogeneity or individual effect that may or may not be observed (Hun Myoung, 2011). However, to analyze these effects, Gujarati (2009) set three possibilities. These are, either pooled OLS, fixed or random effect. In pooled OLS we simply pool all observations and estimate a grand regression, neglecting the cross-section and time series nature of our data. That means pooled OLS don’t capture difference over time and difference across cross-sections. A fixed effect model examines if intercepts vary across group or time period, whereas a random effect model explores differences in error variance components across individual or time period.

In this case, to capture difference over time and difference across cross sections, a Hausman test is conducted to decide whether the model is a random or fixed effect. If the test is failed to reject the null hypothesis, the random effect model is going to employed otherwise, the model is fixed effect estimator.

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:

$$roa_{it}=\beta_0+\beta_1 dol_{it} - \beta_2 dfl_{it} -\beta_3 effic_{it}+\beta_4 logsize_{it} -\beta_5 exr_{it}+\mu_i +v_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.8)$$

Where:

roait=return on asset for ith airline at time t

dol$_{it}$=degree of operating of ith airline at time t,

dfl$_{it}$= degree of financial leverage of ith airline at time t,

effic$_{it}$= operating cost efficiency of ith airlines at time t,

logsize$_{it}$ = natural log of total assets of ith airline at time t,

exr$_{it}$= exchange rate of ith airline home country at time t,

β_1 to β_5 = are parameters of each variables and they indicate that the directions of the direction and strength of the relationship between return on asset (ROA) and the explanatory variables of the model,

β_0= the intercept of the model,

μ_i = the error term that varies cross- sectionally but is constant over time(t) and,

v_{it}= the individual observation error term that varies over ith airline and time t, has constant variance (δ^2)

And the random effect panel econometric model was specified as:

$$roa_{it}=\beta_0+\beta_1 dol_{it} - \beta_2 dfl_{it} -\beta_3 effic_{it}+\beta_4 logsize_{it} -\beta_5 exr_{it+} \omega_{it} \ldots\ldots\ldots\ldots\ldots\ldots \quad (3.9)$$

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

Where; ε_i = disturbance term that varies cross-sectionally but is constant over time.

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

Thus, to choose whether the study model is a fixed effect or random effect the Hausman's test was conducted. In this test,

H0= random effect regression model is better

H1= fixed effect regression model is better

If the Hausman's test p-value >0.05 the test is said to be insignificant or it is failed to reject the null hypothesis in favor of random effect model whereas if the p-value <0.05 the model going to be fixed effect estimator.

CHAPTER FOUR

4. DATA ANALYSIS AND DISCUSSIONS

Introduction

In this chapter, the data collected from seven airlines for the purpose the study objective were processed, analyzed, and discussed based on the methodologies specified in the preceding chapter. The collected data on the airline's performance and its determinates are presented, discussed and analyzed in different categories like descriptive statistical analysis, trend analysis, and inferential statistical of multiple regression analysis with appropriate diagnosis tests. Since, these processes are essential for a scientific study and also for ensuring that we have all relevant data for making contemplated comparisons and analysis.

4.1. Trend Analysis on Explanatory and Dependent variables

The objective of the study analyzing the effect of both operating and financial leverage on selected African airlines profitability by including operating efficiency, asset size, and foreign exchange rate as a control variable. Accordingly, the trend analysis of dependent variable (ROA) and the study objective explanatory variables (DOL & DFL) is presented here under.

a. Degree of Operating Leverage (DOL)

The following graph (fig 4.1), shows that the trend of the average degree of operating leverages in the sampled (seven) African airlines. As the figure reveals that degree of operating leverage starting from 2008 to 2017 was unstable, and this volatility may difficult to estimate and adjust business strategies in the industry. As it can be observed from the graph in 2008 and 2009 DOL percentage was 71% and 83% respectively, thus, high degree of operating leverage is associated with more variable EBIT levels. This high degree of operating leverage resulted in more variable rates of return on assets (Gritta et al, 2006). On the other hand, to the next three consequent years, the degree of operating leverage highly moves downward to -2%, -1%, and -21% in 2010, 2011, and 2012 respectively. This decrement in operating leverage indicates that firms' EBIT had being decreasing from year to year and this may result in less return on assets and then, in 2013 it highly grows up to 117%, which is above 2008 and 2009 operating leverage, however, starting from 2014 up to 2017 the

degree of operating leverage consistently indicates that lower ratio, this resulted in negative profitability (ROA) in the airlines industry on average.

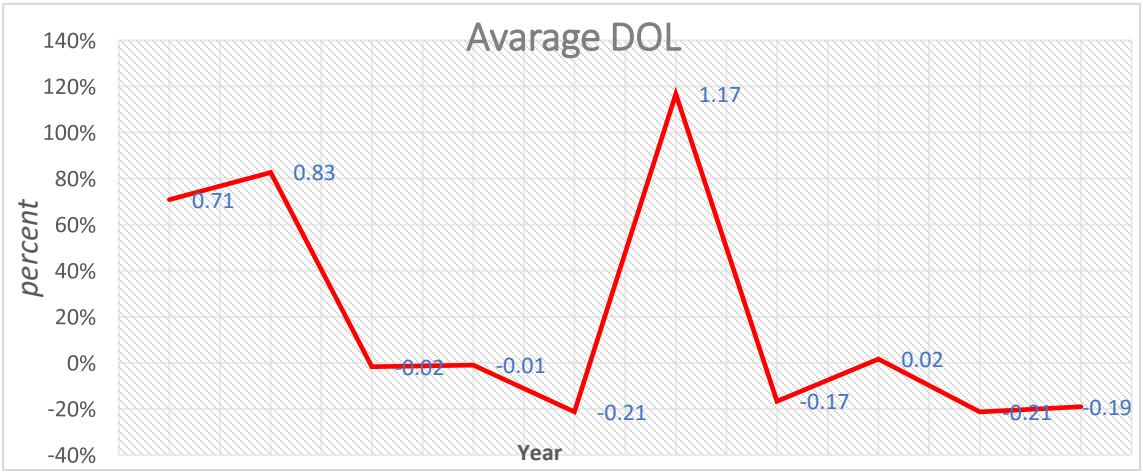


Fig-4.1 Trend analysis of airlines' average DOL (2008-2017)

b. Degree of Financial leverage (DFL)

The following (figure 4.2) shows the selected African airlines average degree of financial leverage for a span of 10 financial years from 2008-2017. It shows that most of the financial years' financial leverage were consistently positive except year 2016 and which positive degree of financial leverage was on average affect airlines profitability (ROA) negatively.

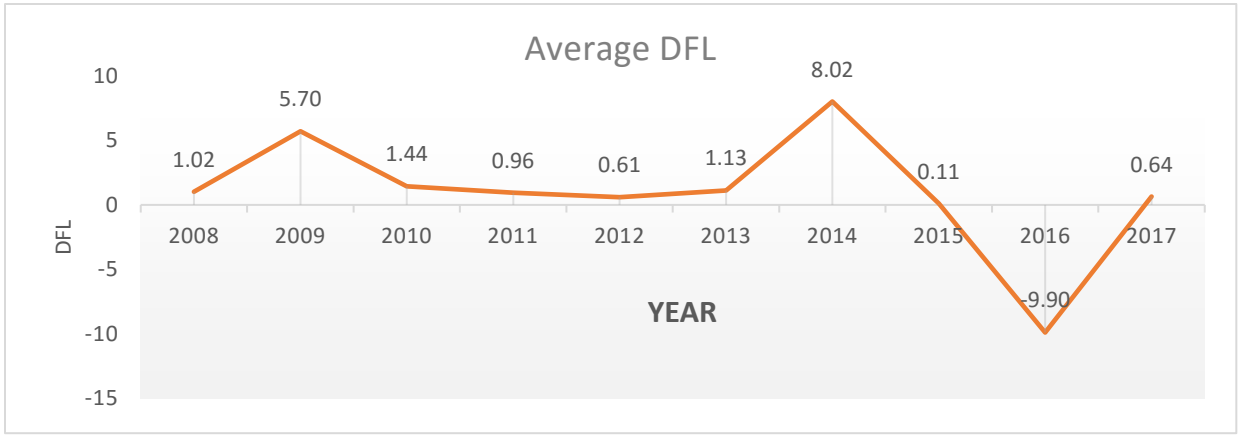


Fig-4.2 Trend analysis of airlines' average DFL (2008-2017)

c. Airlines Profitability – Return on Assets(ROA)

In this study as depicted in the below graph, on average the seven African airlines profitability (ROA) showed a record of loss and around break-even-point profit. This long period loss and breakeven profitability of selected African airlines are similar to Gritta's (2006) empirical finding, airline carriers are evident in the significant volatile degree of leverage and consistent negative profitability ratio (ROA). More or less, the relationship between the explanatory variables and the explanained variable is on average as hypothesized.

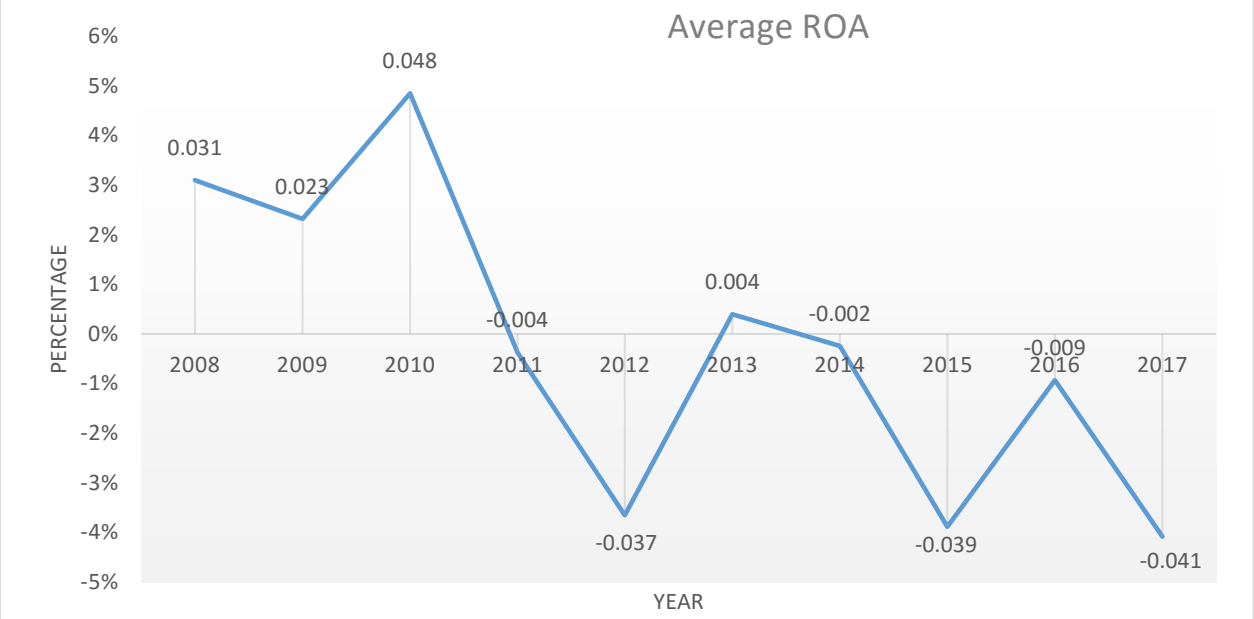


Fig-4.3 Trend analysis of airlines' average profitability (ROA) (2008-2017)

4.2. Descriptive Statistics

In this study, as we can observe from the table (4.1) below, the two most important statistical measures used to summarize this research data are a measure of central tendency and measure of dispersion. The measure of central tendency includes mean, median, and mode, whereas a measure of dispersion includes maximum, minimum, and standard deviation and the overall number of observations covered in the study.

Table 4.1. Descriptive statistics of dependent variable followed by independent variables for the study period of 2008-2017

	ROA	*DOL*	*DFL*	*EFFIC*	*LOGSIZE*	*EXR*
Mean	*(0.0025)*	*0.903976*	*0.972321*	*1.001603*	*2.977996*	*25.57747*
Maximum	*0.22645*	*49.50377*	*50.72265*	*2.118097*	*5.389006*	*103.5074*
Minimum	*(0.44505)*	*(103.9895)*	*(69.8267)*	*0.083158*	*1.609872*	*7.261132*
Std. Dev.	*0.09348*	*19.38098*	*11.09750*	*0.385598*	*1.023073*	*26.98634*
Observations	*70*	*70*	*70*	*70*	*70*	*70*

Source: EVIEWS 10 output, 2019

During the study period on average, the return on assets (ROA) of airlines measured by the ratio of net income(loss) to total asset varied from a minimum of (44%) to a maximum of 23% and the average value of profitability (ROA) over the study period was (0.25%). This implies that, during the study period, the airlines included in the study performed as "the highest profit and the highest loss in terms of ROA was 0.22 dollars and (0.44) dollars per one dollar of assets invested respectively" and the airlines' profit was varied on average by 9% from the mean.

Degree of operating leverage (DOL) of sampled airlines on average minimum and maximum was varying from (104) to 49 with the average value of 0.9 and standard deviation of 19.38 from the mean, which indicates that the variance of the degree of operating leverage among sampled airlines was highly deviated. Since they are operating in different dynamics of economic environments, this highest deviation is not surprising.

Degree of financial leverage (DFL) of airlines included in this study varies from minimum of (70) up to maximum of 51 during the study period, and the average value of DFL was 0.97 with an average a standard deviation of 11 from the mean.

Operating cost efficiency (EFFIC) of airlines which was measured as the average of annual operating expense to annual revenue revealed that an average value of one-dollar expense per each dollar revenue and ranging from a minimum of 0.08 dollars to maximum of two dollars per revenue with a standard deviation if 0.38 from the mean.

The size (total asset) of airlines included in the study period on average was ranges from minimum of $1.60 to maximum of $5.38 billion and the average value was $2.97 billion with a standard deviation of 1.02 from the mean.

Finally, the exchange rates of airlines' home country local currency against US-dollar revealed that an average value of 25.57 per dollar ranging from a minimum of 7.26 and maximum of 103.50 per dollar with a standard deviation of 29.96 per dollar from the average.

4.3. Correlation Analysis

Correlation is a measure of the degree of linear association between two variables that don't depend on the unit of measurements and it indicates about how the relationship is strong between two variables (Gujarati, 2009). Before conducting a regression analysis, it is important to conduct a correlation analysis among the study's explained variable and explanatory variables to check whether the association between the dependent and explanatory variable exists or not. Always, the association between two variables is either positive, negative or zero that means the correlation coefficient range from -1 to +1. A correlation coefficient of -1 indicates a perfect negative association between two variables, which implies that if one variable increases the other variable decrease or the relationship between them is perfectly inverse. If a correlation coefficient is +1, the relationship between two variables is said to be perfect positive, that means if one variable goes up the other variable also simultaneously increases. But if the correlation coefficient among two variables is zero, this indicates that there is no association between them. Generally, if the coefficient of correlation is negative and positive the variables tend to move in opposite and same direction respectively.

In this case, the following table 4.2 shows the correlation matrix of dependent (ROA) variable with other independent variables (DOL, DFL, EFFIC, LOGSIZE, and EXR) and correlation among independent variables with each other. Regarding the correlations between the dependent variable (profitability proxied by ROA) and explanatory variables, all independent variables are negatively correlated with profitability (ROA) except for degree of operating leverage. This positive correlation shows that when the degree of operating leverage increase airlines profitability (ROA) also increase and the reverse is true. On the other hand, the negative relationship implies that the airlines profitability (ROA) goes down as the independent variables rise and the reverse is true. Regarding the multicollinearity analysis (the correlation among independent variables) it is analyzed in the succeeding section (testing assumptions of CLRM).

Table: 4.2. Correlation Matrix- (with dependent variable)

Variables	ROA	DOL	DFL	EFFIC	LOGSIZE	EXR
ROA	1.000000					
DOL	0.561465	1.000000				
DFL	(0.66833)	(0.57067)	1.000000			
EFFIC	(0.36478)	(0.035)	0.041875	1.000000		
LOGSIZE	(0.35301)	(0.27237)	0.544162	(0.22809)	1.000000	
EXR	(0.16713)	0.065407	0.096997	(0.3764)	0.028492	1.000000

Source: EVIEWS output, 2019

4.4. Model Specification and Diagnosis Tests of CLRM Assumptions

The study adopted multiple regression analysis, which means explaining a dependent variable, return on asset, as a function of five independent factors- such as, degree of operating leverage, degree of financial leverage, operating efficiency, asset size, and foreign exchange rate. According to Wooldridge (2013), multiple regression analysis can accommodate many explanatory variables to our model that are useful for explaining dependent variable (ROA), then more of the variation in ROA can be explained, and it can incorporate fairly the general functional form relations. Thus, multiple regression analysis was adopted to build better models for predicting the dependent variable or airlines' profitability (ROA) by selected explanatory variables.

Therefore, a balanced panel data from seven airlines for a period of ten years (from 2008-2017) was analyzed using the EVIEWS 10 software package. Accordingly, in this study, the panel data regression model can capture balanced variations over airlines and over time.

4.4.1. Model Specification: Random Effect Vs Fixed Effect

The appropriate linear panel regression model was adopted based on the scholarly accepted panel model specification steps and criteria. For instance, regarding panel data analysis Brooks (2008), Gujarati (2009), Hun Myoung (2011), Wooldridge (2013), Pillai (2016), and Zulfikar (2017) argued that unlike the usual regression, panel data regression must go through the precise estimation modeling step. In line with that, they suggest a Hausman test as a panel data regression model specification statistical testing method to select among fixed effect and random effect model. Thus, this study has conducted a Hausman test to choose between fixed effect and random effect regression model with a random and fixed effect of null and alternative hypothesis respectively.

As depicted in the following (table 4.2), the Hausman test p-value (0.00761) is less than 0.05, which implies that the test rejected the null hypothesis (random effect model) in favor of alternative hypothesis (fixed effect model). Therefore, fixed effect model is adopted to regress profitability (ROA) of airlines against two explanatory variables (degree of operating and financial leverage) and three control variables (operating efficiency, size of airlines, and exchange rate).

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	9.969304	5	0.00761

Source: EVIEWS 10 output,2019

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

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

According to Brooks (2008), this assumption is required that the average value of the errors is zero, however, if a constant term is included in the regression equation, this assumption will never be violated. In this case, since the constant term (β_0) is included in the multiple regression model, this assumption is fulfilled. Therefore, in this study, it is possible to infer that the average value of the error term is zero.

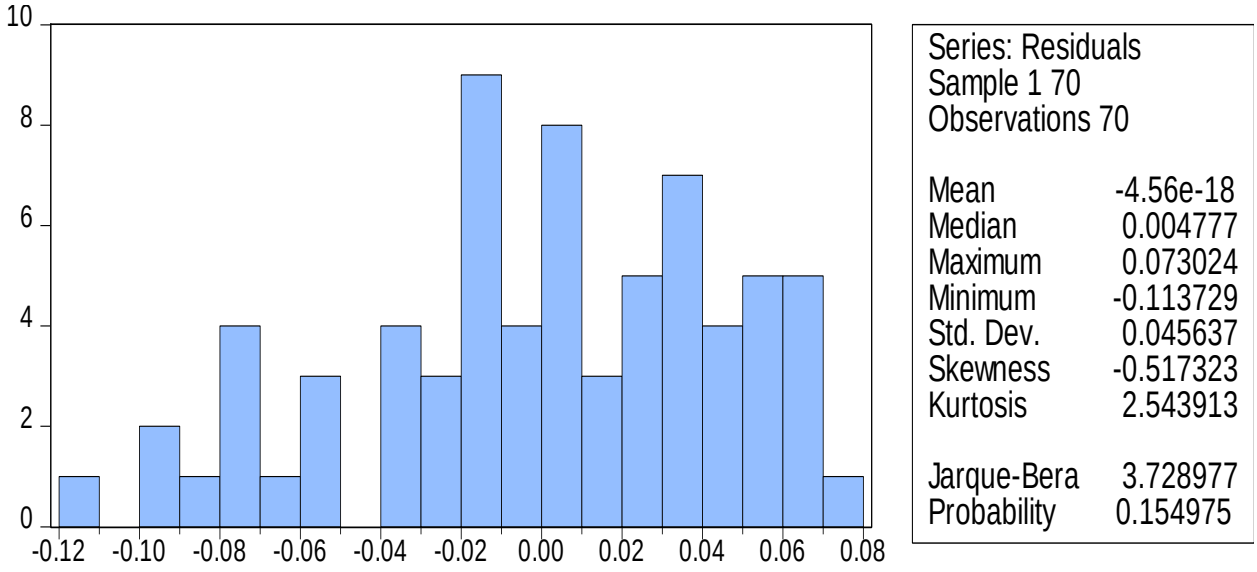
2. Normality Test- $\mu_{i\,t} \sim N(0, \sigma^2)$

According to (Gujarati, 2009) the classical normal linear regression model assumes that each error terms (μ_{it}) are distributed normally with zero mean and constant variance, simply it can be expressed as $\mu_{it} \sim N(0,\sigma^2)$ where the symbol ~means distributed as and N stands for the normal distribution, the terms in the parentheses representing the two parameters of the normal distribution, namely, the mean and the variance. In addition, Brooks (2008) also stated that the normality assumption ($\mu_{it} \sim N(0, \sigma^2)$) is required in order to conduct single or joint hypothesis tests about the model parameters. One of the most commonly applied tests for normality is the Bera-Jarque test. In this test, the null hypothesis is each error terms (μ_{it}) are distributed normally, and the alternative hypothesis is error terms are not normally distributed. Accordingly, if the p-value is greater than 5% the test result is insignificant, which implies that we failed to reject the null, and we can conclude that the error terms are normally distributed. Otherwise, we cannot conduct a hypothesis test about the model parameters.

In this study, the Jarque-Bera test was conducted after estimating multiple regression on the effect of degree of operating and financial leverage and other control variables on airlines profitability (measured by ROA). However, the output of the test resulted in non-normality distribution of error terms (μ_{it}). Since in financial modeling, it is quite often the case that one or two very extreme residuals (known as outliers) cause a rejection of the normality assumption, and to improve the chances of error normality is converting outliers in to dummy variables (Brooks, 2008). Due to this fact, in this study, the normality problem of error terms was solved by using two dummy (DUMM17 and DUMM64) variables in multiple regression analysis.

In this case, the following (figure 4.4) histogram normality test shows that Jarque-Bera *p-value of* 15.49% is greater than *0.05*, so we cannot reject the null hypothesis at 5%. In addition to this, the Skewness (-0.51) and Kurtosis (2.54) are nearest to zero and three respectively. Therefore, in this study, we can conclude that the error terms (μ_{it}) are normally distributed after inducing dummy variables so it is possible to conduct hypothesis tests with full of confidence about the model parameters.

Fig 4.4. Histogram Normality Test



Source: EVIEWS 10 output, 2019

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

This assumption assumes that the error μit has the same variance given any value of the explanatory variables, in other words, Var(μit|x)= σ2 (Wooldridge, 2013), this constant variance of the error terms is known as the assumption of homoscedasticity (Brooks, 2008). If the error terms variance is not constant, they are referred to as heteroscedastic. According to Gujarati (2009) and Brooks (2013) even if the estimation is made without fulfilling the homoscedasticity assumption, the estimation is still unbiased but not BLUE (best linear unbiased estimator). Therefore, in this study to make the estimation BLUE the heteroscedasticity test was conducted by using White-test and the null hypothesis was the variance of error terms are constant (homoscedasticity assumption is fulfilled) and with the alternative hypothesis of heteroscedasticity (the variance of error terms is not constant). If p-value of the White test is greater than 5%, the assumption of homoscedasticity is fulfilled and it will enable us to make best linear unbiased estimator (BLUE), otherwise the error term variances are not constant or problem of heteroscedasticity is exists.

In this case, the following table 4.4 shows that the White-test probability of F-statistic and Chi-square are 93.18% and 91.96% respectively. Thus, the result of p-values is strong enough to fail to reject the homoscedasticity null hypothesis assumption. Hence, it possible to conclude that, the variance of error terms is constant and the estimated results of this study were the best linear unbiased estimation.

Table 4.4. Heteroskedasticity Test: White

Heteroskedasticity Test: White

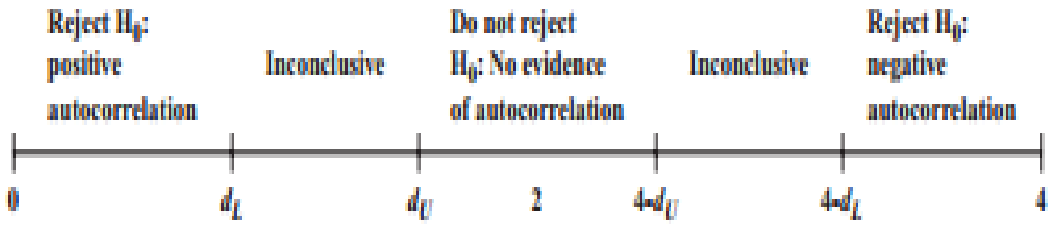
F-statistic	0.341223	Prob. F(7,62)	0.9318
Obs*R-squared	2.596721	Prob. Chi-Square(7)	0.9196
Scaled explained SS	1.572553	Prob. Chi-Square(7)	0.9797

Source: EVIEWS 10 output, 2019

4. Autocorrelation Test- cov(ui ,uj |xi, xj)=E(ui uj)=0 i≠j

Gujarati (2009) defined the term autocorrelation as "correlation between members of a series of observations ordered in time [as in time series data] or space [as in cross-sectional data]. This assumption requires that the observations error terms should not be serially correlated, in short $cov(u_i,u_j)=0$ for $i \neq j$. Brooks (2008) also stated that it is assumed that the errors are uncorrelated with one another. The consequences of ignoring autocorrelation when it is present are like those of ignoring heteroscedasticity. The coefficient estimates derived using OLS are still unbiased, but they are inefficient, i.e. they are not BLUE. To test whether error terms are serially correlated or not, we can use the Durbin-Watson (DW) test and/or Breusch-Godfrey Serial Correlation LM Test. But the first test, according to Brooks (2008), is only of whether consecutive errors are related to one another, and there will also be many forms of residual autocorrelation that DW-test cannot detect. In this case, lower (dl) and upper (du) 1% critical values for Durbin–Watson statistic for 70 observation and five explanatory variables are 1.31 and 1.61 respectively. The DW critical value of this study regression result is 1.74 (see table 4.7). The decision rule is, if regression output of DW is less than the lower critical value, the null hypothesis is rejected and concluded as the existence of positive autocorrelation, if DW is greater than 4-dl the null hypothesis is rejected and the existence of negative autocorrelation is presumed, and if DW is between the du and 4-du do not reject the null hypothesis and possible to infer that no significant residual autocorrelation exists. Accordingly, this study regression result DW (1.74) is between 1.61 and 2.26 (4-1.61). Thus, in this study there is no significant first order autocorrelation problem.

Fig. 4.5 Rejection and non-rejection regions for DW test



Source: Brooks, 2008 ed 2nd

Moreover, Breusch-Godfrey test is a more general test for autocorrelation up to the r^{th} order not only first order autocorrelation test as DW-test. In line with that, the Breusch-Godfrey serial correlation LM Test was conducted with the null and alternative hypothesis stated here under.

H0:$\rho_1=0$ and $\rho_2=0$ and.....and $\rho_r=0$

H1:$\rho_1\neq0$ or $\rho_2\neq0$ or.....or $\rho_r\neq0$

As depicted in the following table, the test result of the p-value of F-statistics and chi-square are 13.01% and 10.02% respectively. Therefore, the p-value is greater than 5%, so we failed to reject the null hypothesis of no autocorrelation of residuals. Thus, we conclude that there is no autocorrelation in the error terms of this particular study.

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

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	*2.110537*	*Prob. F(2,60)*	*0.1301*
*Obs*R-squared*	*4.600907*	*Prob. Chi-Square(2)*	*0.1002*

Source: EVIEWS 10 output, 2019

5. Multicollinearity Test

It meant the existence of a "perfect," or exact, linear relationship among some or all explanatory variables of a regression model (Gujarati, 2009). If independent variables are not correlated with each other, they would be said to be orthogonal to one another. That means if we exclude one a variable from regression analysis would not create change of coefficient to another existing variable. If a perfect relationship happens among explanatory variables, it is not possible to estimate all of the coefficients in the model and if this problem has happened, the significant variable may become insignificant by increasing the p-value of the variable and it will lead to non-rejection of the null hypothesis. However, in reality, the relationship among explanatory variables is non-zero, but for estimation purpose, it is advisable to limit the correlation among explanatory variable is up to ±0.8 (Brooks, 2008) and (Gujarati, 2009).

In this study, as depicted in table 4.6, there are no serious collinearity problems among five explanatory variables. Even, in this model, the highest correlations are between DOL and DFL, and DFL and LNSIZE are -0.57 and 0.54 respectively. Therefore, multicollinearity is not an issue in this case, and we can able to estimate all of the coefficients of the independent variable efficiently by this model.

Table:4.6 Correlation Between Indpendent variables of the study

	DOL	DFL	EFFIC	LNSIZE	EXR
DOL	1				
DFL	(0.57067)	1			
EFFIC	(0.035)	0.041875	1		
LNSIZE	(0.27237)	0.544162	(0.22809)	1	
EXR	0.065407	0.096997	(0.3764)	0.028492	1

Source: EVIEWS 10 output, 2019

6. Test for Model Specification: Ramsey RESET Tests

A multiple regression model suffers from functional form misspecification when it does not properly account for the relationship between the dependent and the observed explanatory variables (Wooldridge, 2013). For example, in this case, airlines profitability is determined by $roa_{it}=\beta_0+\beta_1 dol_{it}-\beta_2 dfl_{it}-\beta_3 effic_{it}+\beta_4 logsize_{it}-\beta_5 exr_{it+}\alpha_i+\mu_{it}$, however, if the study missed one or more explanatory variables from the equation, the model is going to face a problem of model misspecification, as a result, we cannot be able to make unbiased estimation. That means the estimated coefficients of the independent variable may not be appropriate. According to Brooks (2008), and Wooldridge (2013), whether the model functional form is correctly specified or not can be formally tested using Ramsey's (1969) RESET test, which is a general test for misspecification of functional form. The null hypothesis of the RESET test is, the model is correctly specified, and the alternative is not correctly specified. If the F- test p-value is greater than 5 %, the decision is, does not reject the null (i.e. the model is correctly specified).

In this case, as shown in the following table 4.7 the REST F-statistics is 3.56, with p-value is 0.0639 so we failed to reject the null at 5% significant level. Therefore, we can infer that this model is correctly specified and the estimated coefficients are appropriate to explain the airlines profitability.

Table 4. 7. Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: ROA DOL DFL EFFIC LNSIZE EXR DUMM17 DUMM65 C
Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.887283	61	0.0639
F-statistic	3.561836	(1, 61)	0.0639

Source: EVIEWS 10 output, 2019

4.5. Result of Multiple Regression and Interpretations

The fixed effect regression analysis was conducted to estimate the effects of DOL, DFL, EFFIC, LOGSIZE, and EXR on selected African airlines' profitability (ROA) for a period of ten years. To solve the problem of outlier observations, two dummy variables DUMM 17 and DUMM65 were included in multiple regression analysis. The R^2 and adjusted R^2 value have risen from 0.77 and 0.72 (see appendix VIII: regression without a dummy) to 0.82 and 0.78 (see table 4.8) respectively, because of the perfect fit of the dummy variables to those two extreme outlying observations (Brooks, 2008).

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

$$roa_{it}=\beta_0+\beta_1 dol_{it}-\beta_2 dfl_{it}-\beta_3 effic_{it}+\beta_4 logsize_{it}-\beta_5 exr_{it}+DUMM17+DUMM65+\mu_i+v_{it}$$

Table 4.8 Fixed Effect Regression output

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/08/19 Time: 09:08
Sample: 2008 2017
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	3.45E-05	7.11E-06	4.854145	0.0000 ***
DFL	-0.076044	0.029589	-2.570026	0.0129 **
EFFIC	-0.108199	0.019143	-5.652241	0.0000 **
LOGSIZE	-0.091827	0.041450	-2.215389	0.0308 **
EXR	-0.002349	0.001396	-1.683183	0.0979 *
DUMM17	-0.174796	0.048253	-3.622457	0.0006
DUMM65	-0.135278	0.049880	-2.712049	0.0089
C	0.510444	0.118403	4.311083	0.0001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.825006	Mean dependent var	-0.002500
Adjusted R-squared	0.784382	S.D. dependent var	0.093480
S.E. of regression	0.043407	Akaike info criterion	-3.259538
Sum squared resid	0.105513	Schwarz criterion	-2.809839
Log likelihood	128.0838	Hannan-Quinn criter.	-3.080912
F-statistic	20.30852	Durbin-Watson stat	1.745552
Prob(F-statistic)	0.000000		

*Note: ***, **, and * denotes that level of significances at 1%, 5% and 10% level respectively.*

Source: EVIEWS 10 Fixed effect regression output, 2019

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:

$$roa = 0.51 + 0.0000345dol - 0.076dfl - 0.10effic - 0.091logsize - 0.0023exr - 0.17dumm17 - 0.13dumm65 + \alpha i + \mu it$$

Where ***dol*** is a yearly degree of operating leverage, ***dfl*** is a yearly degree of financial leverage, ***effic*** is yearly operating expense per revenue, ***logsize*** is the logarithm of airlines size, ***exr*** is yearly average exchange rate, and ***dumm17*** and ***dumm65*** are dummies included to avoid outlier observations. Generally, the finding of the fixed effect regression model confirmed that except the size of airlines (***log size)*** the effects of all explanatory and control variables were as hypothesized. The detail results of the overall model's R^2, adjusted R^2, F-test, and the coefficients of each independent variables were discussed in the following sections.

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

R-Square and Adjusted R-squared:

R^2 is simply an estimate of how much the variation of dependent variable profitability (ROA) is explained by ***dol, dfl, effic, logsize, and exr*** in the population. Whereas, adjusted **R^2** (also known as penalized R^2)is a modification to R^2 often made taking into account the loss of degrees of freedom associated with adding extra variables (Brooks, 2008). In this case, as revealed in the table (table 4.8) fixed effect panel model regression result, the **R^2** and adjusted **R^2** are 82% and 78% respectively. Which implies that 82% the variation in airlines profitability (ROA) is explained by the combined effects of model explanatory variables(degree of operating leverage, degree of financial leverage, management operating efficiency, asset size of airlines, and foreign exchange rate), and the adjusted **R^2** is 78%, after taking in to account the loss of degree of freedom by adding one or more independent variables, indicates that the model is strongly fit to estimate the airlines profitability (ROA). Therefore, standing from the adjusted **R^2** value 78% of the model**,** it possible to infer that the on average 78% of dependent variable (ROA) variation is explained by this model indpendent variables and the remaining 22% variation in the selected airlines profitability (ROA) may be explained by other explanatory variables which are not included in the model.

F-Statistic:

In the regression result the p-value of each independent variables indicate that whether that independent variable is significant or not, whereas, the p-value of F-statistic indicates the overall significance level of the model used in the study or whether all variables are jointly significant or not. In F-statistic the null hypothesis is that the independent variables (***dol, dfl, effic, logsize, exr)*** do not have a joint effect on the dependent variable, profitability (*ROA*). If p-value of F-statistic is greater than 0.05 (i.e. test is insignificant), means we failed to reject the null hypothesis, otherwise we reject the null hypothesis or the test is significant. In this case, as depicted in table 4.8 F-statistic of 20.30 with the p-value of 0.0000 is even significant at 1%. Thus, we reject the null hypothesis at a 1% significance level. Thus, we can conclude that all independent variables included in this study model have a joint effect on airlines profitability (ROA).

4.5.2. Interpretations of Model Regression Results

Table 4.8 provided us the summary of fixed effect model regression estimated coefficients, standard errors, t-statistic, and p-values of all independent variables and the constant term of the model. From the above regression results of beta coefficients, we can observe that, degree of operating leverage has a positive and significant effect on selected African airlines profitability (ROA) and degree of financial leverage, airlines efficiency, size of airlines and exchange rates have a negative and significant effect on profitability (ROA) of sampled airlines. Moreover, the constant term of the model (β_0) implies that holding other explanatory variables at zero, on average the profitability (ROA) of selected African airlines would be 0.51%. The following sub-section discusses the detail effect of independent variables empirical results on profitability (ROA) of selected African airlines.

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

The effect of the degree of operating leverage (DOL) of airlines on profitability (ROA) was found to be positive and statistically significant at 1%, which is in line with the estimated hypothesis. This result suggested that, in sampled airlines the degree of operating leverage has a positive and significant effect on their profitability (ROA). The result is interpreted as, holding other factors remain constant, on average as the degree of operating leverage increase by one unit in selected African airlines lead to rising in profitability (ROA) by 0.000345 units.

The study result is consistent with empirical findings of Kumar (2014), Habib (2014) and Patel (2014). These researchers were argued that the degree of operating leverage has a statistically significant and positive effect on profitability (ROA) of firms. Similarly, the finding of this study revealed that profitability (ROA) of airlines will increase as the degree of operating leverage rises. Therefore, in this case as operating leverage increase, profitability (ROA) will also increase, this indicates that airlines were benefited by increasing the fixed cost of operation in their operating cost structure instead of high variable cost since variable cost per units or service delivered are rising directly as sales revenues increase.

This positive effect of airlines' degree of operating leverage on profitability (ROA) indicates that airlines can improve their profitability from service delivered without increasing variable costs. In addition, this finding revealed that in selected airlines existing employees and fixed assets like property, plant and equipment, and other operational fixed costs can generate more profit without incurring additional variable costs.

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

Degree of financial leverage (DFL) of selected African airlines was one of the explanatory variables included to capture the effect of fixed financial costs of airlines on their profitability (ROA). The regression results of the study found that on average the effect of degree of financial leverage was negative and statistically significant effect at 5% level on selected African airlines profitability (ROA), which is in line with the estimated hypothesis. Therefore, this finding is consistent with some economic theory and empirical results. This finding is in line with Mayers and Majiluf (1984) pecking order theory that states that firms are profitable, they should finance their operation by internally generated funds instead of issuing debt. The finding is also empirically supported by Asaolu and Ankilo (2012), Tsuji (2013), Habib (2014), Patel (2014), Al-Shamaileh and Khanfar (2014), and Nawaz (2015) were investigated a negative and significant effect of degree of financial leverage on profitability.

This indicates that airlines using debt beyond an optimum level will have adverse impact on the profitability. The inverse relationship is due to consistent net loss incurred by most airlines during the study period and because of the fixed nature of financial costs are incurred whether the airlines are profitable or not. In addition, because of most credit providers of airlines are international, the payment of interest should be settled in foreign currency, which is subjected to exchange rate

fluctuations and that again induced unexpected interest payments that directly affect airlines profitability (ROA). In general, this finding revealed that highly levered firms generate lower profitability, while lower leveraged firms have higher profitability. On other perspective, based on this empirical finding it is possible to conclude that, in selected airlines according to trade-off theory and agency cost theory, debt financing was not efficiently optimized and it was not able to force managements' capacity to generate more profitability respectively.

Based on table 4.8, the coefficient of the degree of financial leverage (DFL) interpreted as holding other factors remain constant, on average an increase of degree of financial leverage ratio in selected African airlines by one unit, leads to a decrease in their profitability (ROA) by 0.076 units. Thus, as airlines degree of financial leverage increases beyond optimum level lead to significant reduction of profitability (ROA).

3.Airlines operating Efficiency and Profitability of Airlines (ROA)

In this study, operating efficiency (EFFIC) was a control variable to capture the effect of airlines' management ability to manage expenses in the normal course of operation to generate expected returns and provide necessary services. As depicted in the table 4.8, the p-value of operating cost efficiency is 0.000 and it has a negative coefficient, which implies this variable is strongly significant at 1%. Therefore, airlines profitability (ROA) is highly determined by the utilization of resources and/or how many cents of operating expenses are incurred to generate a revenue of one dollar. This implies that airlines managements were unable to manage their physical, financial, and human resources.

This negative effect shows that, when airlines ratio of operating expense is greater than one, airlines will incur the highest operating loss even before the payment of other financing and related costs. This finding is in line with Amundsen (2015) and Tesfaye (2018) as they are found a negative effect of management operating cost efficiency on firms' profitability (ROA). Therefore, if the percentage of operating expense per total revenue increase, the airlines are said to be inefficient to minimize their operating costs to generate expected returns, and finally it results in the decrease of profitability (ROA). Thus, in order to boost profitability (ROA) airlines should be able to minimize the operating cost as much as possible simultaneously by keeping their effectiveness (goal achievements).

The coefficients of management operating efficiency (EFFIC) in the above empirical result (table 4.8) shows that -0.108, which means, operating efficiency have a negative effect on selected African airlines profitability (ROA). Thus, it is possible to infer that, holding other factors constant, on average as operating efficiency (computed as operating expense per total revenue) of selected African airlines increase by one unit leads to a decrease in profitability (ROA) by 0.108 units.

4. Airlines Size and Profitability of Airlines (ROA)

Size of airlines was included as one of the model control variables to capture the effect of size on airlines profitability (ROA). In contrast to the predicted hypothesis, the effect of airlines size has found to be a negative effect on profitability and the p-value (0.03) is statistically significant at 5%. This is may be due to the nature of high variable cost of airlines like fuel cost, which cover on average more than 30% (IATA,2017) of a total cost of airlines and always simultaneously increases as aircraft injected to the operation. This implies that on average, the largest airlines company may not able to benefit from the economy of scale by minimizing average variable costs to maximize profitability (ROA).

In addition, if firm sizes rise managements may be unable to administer the assets of the airlines efficiently and effectively. And as airlines size rises especially aircraft (which have a lion share from the total asset) may induced numerous costs to the airlines' company like insurance, fuel and maintenances costs. This finding is supported by Lindsey (1981), Dhawan (2001), Etebari (2010) and Banchuenvijit (2011) and this negative correlation is due to firm size and profitability linked through at trade-off of the economy of scale, transaction cost, and agency costs. This means if airlines economy of scale reaches the optimal point, then turns down to diseconomy of scale due to highest variable transaction costs. This diseconomy of scale happened when the size of firms exceeds an optimal point, some drivers of diseconomy of scale may arise due to increase in cost of management, operation, and IT and control system complexity contribute to increasing in cost of services delivered in the aviation industry. In general, unit cost of services increases as large size of airlines creates additional complexity costs (Dhawan, 2001). Furthermore, according to Hung and Liu (2005) and Lee and Hooy (2012) findings as the size of airlines increase the systematic risk of airlines also increases (which risk is undivesified), as a result, their profitability (ROA) becomes less.

The regression results of this model in the above table 4.8 showed that the coefficient of size is (0.091827), which is interpreted as holding other variables constant, on average if asset size of airlines increases by one unit, profitability (ROA) of airlines decrease by 9.18 percent.

5. Foreign Exchange Rate and Airline Profitability (ROA)

The average yearly foreign exchange rate was also included as a control variable to capture the effect of exchange rate against US-dollar. The coefficient and p-value of the exchange rate (EXR) as depicted in table 4.8, was (0.002349) and 0.0979 respectively. Which means, exchange rate has a negative and significant effect at 10% significance level, which is in line with the estimated hypothesis of the study**.** This result suggests that, in sampled airlines, the exchange rate significantly determines level of profitability (ROA) during the study period. Which means that unfavorable exchange rate fluctuation (when local currency depreciates) has a negative effect on airlines profitability (ROA) and the reverse has a positive effect. Since most of transactions of airlines are executed through foreign currencies, they are exposed to foreign exchange rate fluctuations. For example, the fuel cost of airlines which constitutes more than 30% of the total expense (IATA, 2017) and its prices are pegged to US dollars.

The study finding is consistent with finding by Menta (2015) who had founded a negative effect of exchange rate on the profitability of airlines. Thus, the coefficient of the exchange rate implies that, holding other factors constant, on average if exchange rate of local currency against US-dollar (i.e. local currency depreciated) increase by one lead to a reduction in airlines profitability (ROA) approximately by 0.00235 units. This negative effect revealed that during the study period in selected African airlines, on average expenses incurred in foreign currency were greater than revenues generated in foreign currency. That means significant portions of airlines expense were incurred in foreign currency.

4.6. Summary

In this chapter, the study has discussed the empirical findings of the effect of leverage (both financial and operating) on selected African airlines profitability (ROA) by including control. Generally, trend analysis, descriptive statistics, correlation matrix, classical liner regression model (CLRM) diagnosis tests, model specification tests, fixed effect multiple regression analysis, discussion and interpretations of explanatory variables, over all model significance level analysis and related issues were presented in detail. All diagnosis tests and model specification tests standards were fulfilled to estimate the empirical findings of the regression result with full of confidence. As it has been presented in detail, empirical results of regression analysis revealed that all independent variables were significant in explaining profitability of selected airlines and the effect of all variables was in line with formulated hypothesis except for total asset size of airlines. The detail summary of estimated hypothesis against the empirical findings are presented on table 4.9 here under.

Table 4.9 Summary of predicted hypothesis against empirical finding of the study

	Explanatory Variables	Predicted sign and impact on ROA	Actual sign and 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
3	Operating efficiency	Negative and significant	Negative and significant
4	Airlines size	Positive and significant	Negative and significant
5	Foreign exchange rate	Negative and significant	Negative and significant

CHAPTER FIVE

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

The preceding chapter presented the results and discussions of empirical findings of the study along with result and discussions of classical linear regression model (CLRM) diagnosis tests. The aim of this chapter is to summarize and conclude on empirical findings of the study and provide possible recommendations on findings to different stakeholders of the study. Accordingly, the first section presents the summary, the second section draws conclusion of empirical findings and the third section presents recommendations of the study based on the findings.

5.1. Summary

The study aimed to examine the effect of leverage on selected African airlines profitability. For this purpose, the study took seven African airlines audited financial statement from 2008 to 2017 by purposive sampling (based on online data availability). The dependent variable to estimate airlines profitability was the return on asset (ROA) proxied by net income after tax per total asset. On the other hand, to see the effect of leverage, the study's explanatory variables selected were the degree of operating and financial leverage. In addition, to capture the effect of other variables other than study's objective variables, the study included three control variables (operating cost efficiency, airlines size, and foreign exchange rate) in multiple regression analysis. Furthermore, to meet the initial purpose, the study reviewed the different theoretical and empirical literature on the issue of the relationship between the degree of leverage and firm's profitability and other control variables relationship with profitability. Depending on reviewed literature the study formulated an alternative hypothesis to test the effect of degree of leverage and control variables effect on sampled airlines profitability (ROA).

The study adopted explanatory research design to explain the causal relationship between explanatory and explained variables. The study has also adopted a quantitative research approach by utilizing secondary data source from each purposively sampled airline's financial reports. To analyze the effect of explanatory variables on dependent variable, the study conducted a trend analysis, descriptive statistical analysis, CLRM diagnosis tests, model specification tests, fixed effect panel multiple regression analysis, and finally inferential statistical analysis were draw based on empirical results of multiple regression.

5.2. Conclusion

The purpose of the study was to examine the effect of two explanatory and three control variables on selected African airlines profitability (ROA) and the empirical result revealed that independent variables have a joint significant effect on selected African airlines profitability (ROA) for the study periods. The effect of objective explanatory variables of the research was found in line with the estimated hypothesis, while from control variables the effect of airlines size was not as hypothesized. To make clear, the multiple regression result revealed that degree of operating leverage has a positive and significant effect, whereas the degree of financial leverage, operating efficiency, size of airlines, and foreign exchange rate were a statistically significant and negative effect on airlines profitability (ROA).

Regarding the effect of degree of operating leverage on airlines' profitability, this study finding was in line with empirical reviews, and the effect of degree of financial leverage was in line with the pecking order theory for the study periods. Generally, the selected airlines were faced high flexible nature of financial situations, and it is confirmed by the volatile degree of leverage and constantly inconsistent nature of profitability (ROA). The detail the empirical findings of the study on each explanatory variable effect were concluded as follows:

- Degree of operating leverage (DOL) has a positive effect on airlines profitability (ROA) at 1% significant level. This implies that airlines operating with a higher fixed cost of operation can improve the level of profitability (ROA). Since, fixed cost doesn't move as level of sales activity increases.

- The effect of the degree of financial leverage (DFL) on sampled airlines was negative and significant at 5%, which indicated that airlines operating with a higher level of degree of financial leverage incurred a lower profitability (ROA) and they were not able to optimize debt financing to maximize their return. Because, cost induced by debt financing was adversely affect airlines profitability (ROA).
- Regarding the operating efficiency (measured as annual operating expense per annual revenue), its effect on airlines profitability (ROA) was negative and statistically significant at 1%. This negative effect implies that, if airlines were inefficient (unable to control cost of operation at minimum standard level) in the utilization of their resources, their profitability (ROA) was adversely marginalized.
- In the study period size of airlines has a negative and significant effect on sampled airlines profitability (ROA), which implies that on average largest airlines in terms of a total asset were not able to benefit from the economy of scale, rather their size lead them to diseconomy of scale due to increase costs, besides, they were not able to identify trade-off economy of scale in order to keep their size at optimum.
- Regarding foreign exchange rate, the finding revealed that there is a negative and significant effect on airlines profitability. This can be concluded that, during the study period depreciation of local currency against US-dollar reduces the profitability (ROA) of airlines since the effect of costs incurred in foreign currency are significant than revenues generated in foreign currency. This is because of the most significant costs of airlines are incurred in foreign currency.

5.3. Recommendations

Based on empirical findings of the study, it is possible to forward possible recommendations and suggestions for airlines' financial strategist and practitioner related with the advisable degree of leverage to improve profitability (ROA) and other factors which contribute for airlines profitability. The proposed recommendations are presented in subsequent sections.

African airlines are advised to revise their operating cost and capital structure by increasing the degree of operating leverage (use fixed operating cost) and optimizing their degree of financial leverage so that it will help them to maximize their profitability. Therefore, airlines are advised to use debt financing at an optimum level in line with trade-off theory to improve their profitability (ROA), and during the study period the airlines' profitability was highly volatile so managers are advised to limit debt to easily manageable levels.

Moreover, airlines should able to enjoy the advantage of fixed operating cost since it will improve their profitability (ROA). In the study period the operating leverage has a positive effect this implies that the operating risk is very low, so still increasing the degree of operating leverage will not adversely affect their profitability.

To enhance airlines efficiency, airlines shall utilize resources efficiently by minimizing controllable costs which directly affect their profitability. In addition, to increase service revenue airlines are advised to make air travel costs affordable for the largest portion of the population by inducing low-cost air transport services in addition to their full-service transport. Besides, airlines can improve their efficiency and cost effectiveness by injecting more modern and fuel-efficient aircraft, installing light-weight seats to reducing the weight of aircraft (weight impact on fuel burn).

Regarding asset size of airlines, even if making the right decision on size and capacity of an investment is difficult because of incomplete information availability at the time of decision making, airlines operated with largest size of asset are advised to decide on their assets optimum size and capacity for providing efficient service to get advantage from the economy of scale. Moreover, they are also advised to diversify their operation across full service and low-cost airlines service by creating subsidiary to diversify negative effect of size results from diseconomy of scale. On the other hand, airlines operated with minimum size are advised to use leased aircraft to improve profitability and minimize stiff competitions of the market.

Besides, to minimize negative exposure of exchange rate, airlines management are advised to hedge USD loans against forecast USD sales to ensure that foreign currency obtained from their sales is used to settle any foreign denominated liability. This action will reduce simultaneously the risk of exchange rate and burden of interest payments denominated in foreign currency.

5.3.1. Suggestions for Further Studies

The study did not include all African airlines and it did not categorize airlines as public and privately owned, therefore, further researchers are recommended to categorize airlines and increase the sample size and/or investigate the entire airline company. In addition, the study analysis was only by secondary source of data, but airlines performance may be determined by other factors so that researchers are suggested to make analysis by including a primary source of data to make a comprehensive analysis. Likewise, because of the primary objective of the study was to examine the effect of leverage on selected African airline profitability, it has not investigated all factors that may affect airlines profitability due to this fact further researchers are recommended to include other factors that may influence African airlines profitability.

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Appendixes

Appendix I. Raw Data

Airlines	Year	ROA	DOL	DFL	effic	Logsize	EXR
ETA	2008	0.053867	3.455575	2.486899	0.953547	2.991905	9.599742
ETA	2009	0.120425	3.898911	1.292195	0.92024	2.977101	11.7776
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
SAA	2008	-0.08183	11.13568	0.776121	1.037826	5.150878	8.261223
SAA	2009	0.015933	-5.64431	1.151913	0.91494	5.171383	8.473674
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
KQA	2008	0.057759	-15.4825	-0.26491	0.641861	3.059108	69.17532
KQA	2009	-0.05215	-0.32061	31.4168	0.665358	3.005251	77.35201
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
AMU	2008	0.032734	545.3764	-0.06635	0.895323	2.845113	28.45284
AMU	2009	-0.08534	499.5038	1.263335	1.036782	2.737016	31.9598
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	0.072	30.51024	1.858823	0.903993	2.624817	34.4994
CMA	2008	0.04265	-1.57598	1.310804	0.958288	2.246553	8.261223
CMA	2009	0.04193	1.020799	1.15644	0.923459	2.306701	8.473674
CMA	2010	0.046652	-9.04248	2.783289	0.905348	2.445708	7.321222
CMA	2011	0.036566	-4.94316	0.205894	0.952945	2.462424	7.261132
CMA	2012	0.002493	6.05614	-0.9822	0.954981	2.426545	8.209969
CMA	2013	0.062899	63.44188	2.129815	0.883728	2.600055	8.984499
CMA	2014	0.065674	1.361422	1.235228	0.880131	2.59648	10.11052
CMA	2015	0.047436	61.612	1.042133	0.878002	2.526795	11.84279
CMA	2016	0.0306	27.19595	-0.35073	0.863619	2.575556	14.70751
CMA	2017	0.047172	0.062526	1.082877	0.083158	2.639502	13.31999
ASY	2008	-0.06598	-54.7453	3.517481	1.554724	1.924192	9.457243
ASY	2009	-0.10494	79.58313	0.151628	1.945776	1.850425	13.60994
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	0.96	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
SAX	2008	0.177656	8.057454	-0.64651	0.141029	2.127887	8.261223
SAX	2009	0.226457	1.014981	3.482634	0.19933	2.088718	8.473674
SAX	2010	0.072622	-2.16199	0.995285	1.327219	2.183009	7.321222
SAX	2011	-0.18078	-40.3071	1.572674	1.816827	2.153574	7.261132
SAX	2012	-0.17945	9.083679	0.915615	2.118097	2.133187	8.209969
SAX	2013	0.000473	-23.8959	1.114849	1.691085	2.185249	8.984499
SAX	2014	-0.0056	37.26798	50.72265	1.428754	2.256306	10.11052
SAX	2015	-0.0409	10.92792	-3.20995	1.527983	2.156069	11.84279
SAX	2016	0.009197	-2.13173	-2.18451	1.225266	2.098154	14.70751
SAX	2017	0.007355	1.356542	-0.42351	1.355464	2.204811	13.31999

Appendix II. Hausman Test

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	9.969304	5	0.00761

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DOL	0.000036	0.000034	0.000000	0.2908
DFL	-0.066189	-0.089986	0.000267	0.1449
EFFIC	-0.140687	-0.128893	0.000045	0.0776
LOGSIZE	-0.110354	-0.020643	0.002062	0.0482
EXR	-0.001987	-0.001258	0.000002	0.6343

Cross-section random effects test equation:
Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/08/19 Time: 09:05
Sample: 2008 2017
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

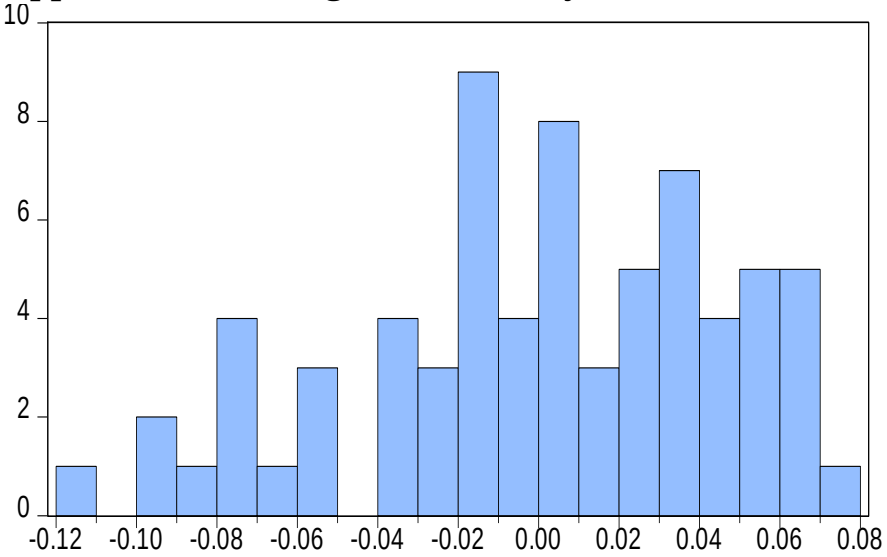
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.576338	0.131615	4.378980	0.0001
DOL	3.56E-05	7.98E-06	4.458690	0.0000
DFL	-0.066189	0.033108	-1.999179	0.0503
EFFIC	-0.140687	0.019336	-7.275943	0.0000
LOGSIZE	-0.110354	0.046255	-2.385763	0.0203
EXR	-0.001987	0.001564	-1.270773	0.2089

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.771579	Mean dependent var	-0.002500
Adjusted R-squared	0.728258	S.D. dependent var	0.093480
S.E. of regression	0.048730	Akaike info criterion	-3.050243
Sum squared resid	0.137727	Schwarz criterion	-2.664787
Log likelihood	118.7585	Hannan-Quinn criter.	-2.897135
F-statistic	17.81067	Durbin-Watson stat	1.801511
Prob(F-statistic)	0.000000		

Appendix III. Histogram Normality Test



Series: Residuals
Sample 1 70
Observations 70

Mean	-4.56e-18
Median	0.004777
Maximum	0.073024
Minimum	-0.113729
Std. Dev.	0.045637
Skewness	-0.517323
Kurtosis	2.543913
Jarque-Bera	3.728977
Probability	0.154975

Appendix IV. Heteroskedasticity Test: White

F-statistic	0.341223	Prob. F(7,62)	0.9318
Obs*R-squared	2.596721	Prob. Chi-Square(7)	0.9196
Scaled explained SS	1.572553	Prob. Chi-Square(7)	0.9797

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/08/19 Time: 09:12
Sample: 1 70
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.002147	0.000876	2.451029	0.0171
DOL^2	-4.38E-12	6.98E-11	-0.062764	0.9502
DFL^2	-0.000472	0.000799	-0.591057	0.5566
EFFIC^2	3.62E-06	0.000461	0.007838	0.9938
LOGSIZE^2	2.44E-05	5.84E-05	0.418463	0.6771
EXR^2	6.80E-08	1.29E-07	0.526911	0.6001
DUMM17^2	-0.002048	0.002844	-0.720075	0.4742
DUMM65^2	-0.001987	0.003053	-0.650897	0.5175

R-squared	0.037096	Mean dependent var	0.002053
Adjusted R-squared	-0.071619	S.D. dependent var	0.002569
S.E. of regression	0.002660	Akaike info criterion	-8.913958
Sum squared resid	0.000439	Schwarz criterion	-8.656987
Log likelihood	319.9885	Hannan-Quinn criter.	-8.811886
F-statistic	0.341223	Durbin-Watson stat	1.867693
Prob(F-statistic)	0.931780		

Appendix V. Breusch-Godfrey Serial Correlation LM Test:

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.110537	Prob. F(2,60)	0.1301
Obs*R-squared	4.600907	Prob. Chi-Square(2)	0.1002

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 05/08/19 Time: 09:11
Sample: 1 70
Included observations: 70
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	4.43E-06	7.91E-06	0.560846	0.5770
DFL	0.015509	0.028984	0.535101	0.5946

EFFIC	-0.003292	0.018818	-0.174923	0.8617
LOGSIZE	-0.001832	0.007248	-0.252821	0.8013
EXR	-1.43E-05	0.000237	-0.060037	0.9523
DUMM17	0.003927	0.050605	0.077604	0.9384
DUMM65	0.004630	0.051562	0.089803	0.9287
C	-0.003525	0.030684	-0.114882	0.9089
RESID(-1)	0.272515	0.135698	2.008241	0.0491
RESID(-2)	-0.107219	0.131665	-0.814337	0.4187

R-squared	0.065727	Mean dependent var	-4.56E-18
Adjusted R-squared	-0.074414	S.D. dependent var	0.045637
S.E. of regression	0.047305	Akaike info criterion	-3.132858
Sum squared resid	0.134263	Schwarz criterion	-2.811644
Log likelihood	119.6500	Hannan-Quinn criter.	-3.005268
F-statistic	0.469008	Durbin-Watson stat	1.950451
Prob(F-statistic)	0.889677		

Appendix VI. Ramsey RESET Test

Equation: UNTITLED
Specification: ROA DOL DFL EFFIC LOGSIZE EXR DUMM17 DUMM65 C
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.887283	61	0.0639
F-statistic	3.561836	(1, 61)	0.0639
Likelihood ratio	3.972471	1	0.0462

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.007928	1	0.007928
Restricted SSR	0.143709	62	0.002318
Unrestricted SSR	0.135780	61	0.002226

LR test summary:

	Value
Restricted LogL	117.2705
Unrestricted LogL	119.2567

Unrestricted Test Equation:
Dependent Variable: ROA
Method: Least Squares
Date: 05/08/19 Time: 09:14
Sample: 1 70
Included observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	-1.25E-05	2.50E-05	-0.499009	0.6196
DFL	-0.092786	0.028082	-3.304085	0.0016
EFFIC	-0.115703	0.020774	-5.569521	0.0000
LOGSIZE	-0.020374	0.007171	-2.841011	0.0061
EXR	-0.001243	0.000242	-5.141677	0.0000

DUMM17	-0.086532	0.061124	-1.415687	0.1620
DUMM65	-0.041429	0.064109	-0.646231	0.5206
C	0.296827	0.033072	8.975300	0.0000
FITTED^2	-1.958367	1.037665	-1.887283	0.0639

R-squared	0.774808	Mean dependent var	-0.002500
Adjusted R-squared	0.745274	S.D. dependent var	0.093480
S.E. of regression	0.047180	Akaike info criterion	-3.150192
Sum squared resid	0.135780	Schwarz criterion	-2.861100
Log likelihood	119.2567	Hannan-Quinn criter.	-3.035361
F-statistic	26.23494	Durbin-Watson stat	1.539570
Prob(F-statistic)	0.000000		

Appendix VII. Fixed Effect Regression Result

Dependent Variable: ROA

Method: Panel Least Squares
Date: 05/08/19 Time: 09:08
Sample: 2008 2017
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	3.45E-05	7.11E-06	4.854145	0.0000
DFL	-0.076044	0.029589	-2.570026	0.0129
EFFIC	-0.108199	0.019143	-5.652241	0.0000
LOGSIZE	-0.091827	0.041450	-2.215389	0.0308
EXR	-0.002349	0.001396	-1.683183	0.0979
DUMM17	-0.174796	0.048253	-3.622457	0.0006
DUMM65	-0.135278	0.049880	-2.712049	0.0089
C	0.510444	0.118403	4.311083	0.0001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.825006	Mean dependent var	-0.002500
Adjusted R-squared	0.784382	S.D. dependent var	0.093480
S.E. of regression	0.043407	Akaike info criterion	-3.259538
Sum squared resid	0.105513	Schwarz criterion	-2.809839
Log likelihood	128.0838	Hannan-Quinn criter.	-3.080912
F-statistic	20.30852	Durbin-Watson stat	1.745552
Prob(F-statistic)	0.000000		

Appendix VIII. Fixed Effect Regression Result (without Dummy)

Dependent Variable: ROA
Method: Panel Least Squares
Date: 05/08/19 Time: 09:07
Sample: 2008 2017
Periods included: 10
Cross-sections included: 7
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DOL	3.56E-05	7.98E-06	4.458690	0.0000
DFL	-0.066189	0.033108	-1.999179	0.0503
EFFIC	-0.140687	0.019336	-7.275943	0.0000
LOGSIZE	-0.110354	0.046255	-2.385763	0.0203
EXR	-0.001987	0.001564	-1.270773	0.2089
C	0.576338	0.131615	4.378980	0.0001

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.771579	Mean dependent var	-0.002500
Adjusted R-squared	0.728258	S.D. dependent var	0.093480
S.E. of regression	0.048730	Akaike info criterion	-3.050243
Sum squared resid	0.137727	Schwarz criterion	-2.664787
Log likelihood	118.7585	Hannan-Quinn criter.	-2.897135
F-statistic	17.81067	Durbin-Watson stat	1.801511
Prob(F-statistic)	0.000000		