THE ECONOMIC CATALYTIC EFFECT OF ETHIOPIAN AIRLINES ON ETHIOPIA'S GDP

BY

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ADDIS ABABA, ETHIOPIA

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Declaration

I, **Abiy Damtie**, the under signed, declare that this thesis entitled: "**The Economic Catalytic Effect of Ethiopian airlines on Ethiopia's GDP**" is my original work. I have undertaken the research work independently with the guidance and support of the research advisor. This study has not been submitted for any degree or diploma program in this or any other institutions and that all sources of materials used for the thesis has been duly acknowledged.

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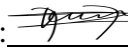
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Acronyms

ADD – Addis Ababa

AFRAA – African Airlines Association

ATAG – Air Transportation Action Group

BI – Business Intelligence

CAPA – Centre for Aviation

CEO – Chief Executive Officer

COVID-19 – Coronavirus Disease of 2019

ETG – Ethiopian Airlines Group

G.C – Gregorian Calendar

GDP – Gross Domestic Product

IATA – International Air Transport Association

ICAO – International Civil Aviation Organization

MRO – Maintenance, Repair, and Overhaul

SBU – Strategic Business Units

USD – U.S. Dollar

WBG – World Bank Group

Abstract

Since its establishments Ethiopian airlines has been owned and controlled by the government of Ethiopia. Air transportation sector particularly aviation is characterized by the involvement of many stakeholders' manufacturers, carriers, and governments. Ethiopian airline is being fully owned and controlled by the government. The research paper examines the impact of Ethiopian airlines on Ethiopian's economic growth particularly on its GDP. The research tried to showcase the relationship of air transport to economic growth of Ethiopian. Since Ethiopian airlines is the only predominant national airlines carrier in the country, this paper manly focuses on the various strategic business unit of the airlines group that affects economic growth. The indicators from the two sectors, which were air transportation and Ethiopian economic growth were selected according to their relevance and the degree of the indicator's capability to express each sector. Analyses has been performed to examine the impact of air transportation on Ethiopian's GDP using data within fiscal period from 2003/04 up to 2018/19. The analysis indicated that Ethiopian's economic growth, predominantly the GDP is indeed affected by air transportation sector in the short and long term. A single percentile increments in number of passenger and number of employees will result 0.26% and 0.48% increment in the GDP. and a single percentage change in GDP and cargo payload rill result 0.36 and 0.47 % in the number of passengers traveled. Accordingly, considering the air transportation sector's exceptional performance during the previous years and the contributions made by such performance to Ethiopian's economic growth, extra efforts and investment made towards expanding such service-providing airlines will dramatically improve Ethiopian's economic growth.

Key words: Air transport, Economic growth, GDP, Ethiopian Airlines

CHAPTER ONE

INTRODUCTION

This chapter covers the background of the study, statement of the problem, research question, objectives of the study, significance of the study, limitations of the study, organization of the research work and definition of terms. Each of the subtopics is discussed in detail as follows.

1.1. Background of the Study

Ethiopia, the second most populous country in Africa, is among African countries with fast economic growth. Historically, due to various factors Ethiopia's economic resources are controlled by the central and regional governments. However, in recent years some reforms have been made in terms of privatizing the of government owned sectors through the country's privatization process (Ibp. Inc. USA, 2015).

The air transport provides time and cost efficiencies, even though the efficiency level is affected according to the distance traveled, it is still useful even for relatively short distances. Air transportation also provides a communication or medical link, which is sometimes vital, between the different groups of people being served.(Maddalon, 2019) Such air transportation is achieved by number of carriers found within the aviation industry.

Aviation accounts for almost over 80 percent of U.S. exports to Ethiopia. Prior to the spring of 2020, the sector was shown to be rapidly growing with rising demand for air transportation, for both passenger and cargo (*Ethiopia - Aviation*, 2021). It will continue to play an outsize role given Ethiopian Airlines exceptional performance track and status as the leading airline on the continent, and the airline's infrastructure ambitions.

Despite its contribution for the economic development of Ethiopia, there is no enough study conducted that shows the systematic relationship of air transport and economic growth of the country. As such this research was aimed to fulfill the knowledge gap currently identified regarding the Air transportation's impact on Ethiopian's economic development.

The study will focus upon the country's national carrier airlines, Ethiopian Airlines. During its seventy- six years on air Ethiopian airline has now become the leading aviation group in Africa with its exceptional efficiency and effectiveness in provide services to its customers. Operating using the latest technologies, the airline has also become one of Ethiopia's major industries and a veritable institution in Africa. It commands a lion's share of the pan African network including the daily and double daily east-west flight across the continent. Ethiopian currently serves to and from vast number of destinations, currently 116 international and 23 domestic effectively operating the newest and youngest fleet (ETG, 2021a).

According to preliminary research assessment the air transport has a vast effect on a country, economical as well as social. Air transport is one of the world's most important industries. Its development, its technical and service achievements make it one of the greatest contributors to the advancement of modern society. Among the numerous benefits, Air transport improves quality of life by broadening people's leisure and cultural experiences. It also provides a wide choice of holiday destinations around the world and an affordable means to visit distant friends and relatives (ATAG, 2005).

The air transport industry contributes around US$ 880 billion a year to world GDP, considering the direct, indirect, and induced impacts – equivalent to 2.4% of global GDP. Its direct impact on GDP is US$ 330 billion (Oktal et al., n.d.).

The air transport industry has a significant impact on world economic growth either through its direct activity or through it enabling other industry. The catalytic impacts of the industry are considered to have a "spin-off" effect on other industries.

1.2. Background of the Ethiopian Air Transport Organization

Ethiopian Airlines (Ethiopian) is the leading and most profitable airline in Africa. Formerly Ethiopian Air Lines Group (ETG) and often referred as simply Ethiopian, is Ethiopia's flag carrier and is entirely owned by the country's government. ETG was founded on 21 December 1945 and commenced its operations on 8 April 1946, expanding to international flights in 1951. The firm became a share company in 1965 and changed its brand name from "Ethiopian Air Lines" to "Ethiopian Airlines". The airline has been a member of the International Air Transport Association (IATA) since 1959 and of the African Airlines Association (AFRAA) since 1968. Ethiopian is a Star Alliance member, having joined in December 2011. The company slogan is The New Spirit of Africa. (BBC, 2019)

Ethiopian's main objective is to provide safe, reliable and profitable air transport services for the passenger and cargo as well as other aviation related services and the vision of ETG is to become the most competitive and leading aviation group in the Africa content by providing safe, market driven and customer focused passenger and cargo transport, aviation training, flight catering, MRO and ground services by 2025 and having a mission to become the leading Aviation group in Africa by providing safe and reliable passenger and cargo air transport, Aviation Training, Flight Catering, MRO and Ground Services whose quality and price "value proposition" is always better than its competitors, to ensure being an airline of choice to its customers, employer of choice to its employees and an investment of choice to its Owner, to contribute positively to socio economic development of Ethiopia in particular and the countries to which it operates in general by undertaking its corporate social responsibilities and providing vital global air connectivity (ETG, 2021b).

In addition, Ethiopian have values that puts safety as a priority. The company stated its value as "*Ethiopian is a high performance and learning organization with continuous improvements, innovation and knowledge-sharing. We accept change for the growth opportunity it brings and always seek for and apply the best ideas regardless of their source, We recognize and reward employees for their performance and demonstrate integrity, respect to others, candor and team work, Act in an open fashion and be result-oriented, creative and innovative, Adopt Zero tolerance to indifference, inefficiency and bureaucracy, Encourage 360° free flow and sharing of information, Treat our customers the same way we would like to be treated and always look for ways to make it easier for customers to do business with us, We are an equal opportunity employer.*" (ETG, 2021a).

 In 2014 IATA ranked Ethiopian as the largest airline in Africa in revenue and profit. Over the past seven decades, Ethiopian has been a pioneer of African aviation as an aircraft technology leader. Ethiopian is currently implementing a 15-year strategic plan called Vision 2025 that will see it become the leading airline group in Africa with seven strategic business units. Ethiopian is a multi-award-winning airline, including SKYTRAX and Passenger Choice Awards in 2015, and has been registering an average growth of 25% per annum for the past ten years.

The CEO of Ethiopian Airlines Group is Mesfin Tasew and Tewolde Gebremariam had been serving the airlines as GCEO before Mesfin become GCEO in 2022. The airline, which is entirely owned by the government, has traditionally been unfettered by government intervention, even during times of significant turmoil and domestic hardship.

Ethiopian Airlines is now a full-service carrier that operates with a business model that includes offering a range of pre-flight and on-board services with the price of the ticket. This includes, checked baggage, in-flight meals, and multiple service classes. Its operations typically include both passenger and cargo services, and frequent flyer programs are on offer. Ethiopian offer domestic, international, long haul and short-haul flights (Ethiopian Airlines report , 2019).

1.3.   Statement of the Problem

Aviation is only sector that provides a worldwide transportation network, making it the most essential sector for global business and tourism. It plays a vital role in facilitating economic growth, particularly in developing countries(ATAG, 2005). Due to globalization, in the current competitive environment, air transport plays a significant role in eliminating the barriers between countries and fueling the cross-border economic transactions.

According to Heshmati and Kim(Heshmati & Kim, 2016), most of Ethiopian's framer rivals; notably South African Airways, Kenya Airways, and Egypt Air, are constantly running into losses during their operations and their survival is not because of their commercial viability but due to their governments' endless generosity (Heshmati & Kim, 2016b). Despite the opposing odds Ethiopian airlines have even managed to close the pandemic fiscal year with a profit.

With its continuous expansion in the aviation industry Ethiopian airlines is expanding its air transportation activities by strategically placing hubs within the Africa continent, which will be used to concentrate passenger traffic and flight operations at the hub operational airport countries. Considering the significant demand for the air transportation, supported with the airlines ability to overcome challenges most other airlines couldn't, it begs the question how and in what way such exceptional air transportation operation is impacting the economic growth and also the extent of such industries' contribution to the country's economic growth.

One study conducted by the ATAG in 2005, have concluded that the air transportation industry has a substantial economic impact, both through its own activities and as an enabler of other industries. Its contribution includes direct, indirect and induced impacts, which are related to the total revenues of the air transport industry (ATAG, 2005).

Another study conducted by IATA in 2018, which was titled the importance of air transport to Ethiopia, also concluded that the air transport industry, including airlines and its supply chain is estimated to support almost 1.54 billion USD of Ethiopian's GDP. In addition, foreign tourists spending also supports a further 2.61 billion USD of the country's GDP, bringing a total contribution of 4.15 billion USD. As a result, it can be said 5.7 % of the Ethiopian's GDP is supported and affected by the air transportation sector's inputs including the indirect foreign tourists arriving by air (IATA, 2018b). However, such research failed to highlight the contribution of air transportation to the country's economic growth. In addition, it doesn't provide any sort of analysis made for the conclusion it came to.

Similar research with the aim of determining the effect of Air transportation on the economic growth of specific countries were conducted, such as Turkey, Belgium, and Indonesia. Based on their study, it was concluded that the airline transport is an important factor which positively affects the regions' economic growth (Baltaci,N.,Sekmen, 2015). Such studies also made important and sound recommendation based on their respective research's finding.

There is very little source or study that explores and explains the air transportations impact on Ethiopian's economic growth. There is no research conducted to quantify the relationship of Ethiopia's GDP and air transportation. Accordingly, there is a need for a research paper filling the knowledge gap regarding the impact of Air transportation on Ethiopian's economy growth.

1.4.   Research Questions

The primary goal of the research was to answer the following research questions:

1. What is the direct impact of Air transportation on Ethiopian's economic growth (GDP)?

1.5.   Objective of the Study

The general and specific objective of the research are as followed.

1.5.1. General Objective

The general objective of the research paper is to assess the impact of air transportation on Ethiopian's economic growth during the fiscal period from 2003/04 up to 2018/19 G.C.

1.5.2. Specific Objectives

The specific objectives of the research are as followed:

✓ To determine the direct impact of air transportation (Ethiopian airlines), on Ethiopia GDP
✓ To determine and explain the relationship between air transportation and Ethiopian's economic growth.

1.6.   Significance of the Study

Ethiopia's economic growth has been remarkably rapid and stable over the past decade during the year 2004-2014. It was said Ethiopia stands out in many ways, including in the economic strategy that paved the way to success (Srinivasan, 2012). Also, during recent year 2019, With more than 112 million people, Ethiopia is the second most populous nation in Africa after Nigeria, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of $850 (African Development Bank Group, 2019).

According to a case study finding of Ethiopia country's government owned domestic airlines, Ethiopian Airlines, growth has been constrained by limited domestic capital, even though many other governments are financially supporting their major domestic airlines. On the other hand, the financial sector of Ethiopia lacks the required efficiency and flexibility to raising capital abroad. (Habte, 2015)Above all, the government's policy also constrains foreigners investing on the domestic capital due to the financial service regulations and investment restrictions.

Throughout the 75 years of Ethiopian's operation, Ethiopian has become the envy of all African governments with the top leading airlines within the continent. However, how and in what way

such air transportation service performed by Ethiopian Airlines has contributed to the country's rapidly growing economy have not been well documented and researched.

Even considering the size and complexity of both its passenger and cargo operations, Ethiopian outperforms many other government-owned public enterprises in Ethiopia. Its performance can be regarded as respectable even when compared to private run businesses' operations, also the current pandemic has shown the airlines capability to maneuver the challenging constrains it was faced with, which was the COVID-19. Such exemplary performance of Ethiopian Airlines, which is the major air transportation service provider in Ethiopia, contribution to the country's economy growth will help fill the knowledge gap currently identified, and serve as baseline research for further research or assessment for future investment considerations including the privatization option.

The study discusses the impact of air transport to Ethiopian's economic growth. Since, air transport will not be able to grow without interaction with other industry sectors (local & international) due to its business nature as a transportation means unlike other industry involved in the production of goods and services. Accordingly, the study will discuss the interaction of air transport with factors of economic development, and then the study will attempt to specifically specify the indirect impact of air transport to Ethiopian's economy.

Hence the research work will have a significant contribution in revealing the impact of air transportation on Ethiopian's economy by effectively assessing and analyzing its direct and indirect impact. In addition, it will help determine the direct and indirect impact it have on the local industries which are highly contributing to the country's economic development. As such the study paper will help to determine the relationship between the country's economy and air transportation and decide the best course of investment or related actions to be considered for the air transportation's operational future, such as, either to continue as a government owned or privates as done to many properties; either scale up via Hubs expansion or invest in expanding the current existing airports.

1.7. Delimitation (Scope) of the Study

The research is mainly focused on the Two major strategic business units of the airline namely Ethiopian cargo and logistic services and international passenger service. Even though aviation in general comprises a wide range of activities and business the scope of the thesis is mainly focused on Ethiopian Airlines Group.

Among the listed SBU the research focused on the entire airlines group. However, for the two variables, passenger count and cargo payload, the domestic airlines, MRO services, aviation academy, inflight catering services, ground services and skylight hotel strategic business units were excluded. Whereas from the economic sector the analysis considered the Real GDP of the country to analyses the direct impact and the GDP by Economic activity at constant price.

1.8. Organization of the Study

The research is organized into five chapters:

1. **Chapter One: Introduction** – It will start with the background of the study, statement of the problem, description of the research questions, including the general and specific objectives of the research, definition of terms the significant of the study, and scope of the study.
2. **Chapter Two: Literature Review** – It will include an overview of the previously published works on the impact of air transportation on the country's economy development topic.
3. **Chapter Three: Research Design and Methodology** – It will include, research design and sampling techniques, instrument of data collection, methods of data analysis.
4. **Chapter Four: Result and Discussion** – Which will include the result and discussion of the research finding in qualitative terms.
5. **Chapter Five: Summery, Conclusion and Recommendation** - Which will focus on the research's conclusions, and recommendations and suggestion for further studies

1.9. Limitation of the Study

There are three effect categories of air transportation on Ethiopia's economic growth, which are the direct, indirect, and induced effect. However, this study is limited to the analysis of air transportation's directly to Ethiopia's GDP growth without including the induced effect and indirect impact caused by the air transportation on Ethiopian's economic growth, due to unavailability of required data and resource. Due to unavailability of data and resource air transportation indirect impact to taxation policy, foreign exchange rate and the impact towards financial institution has not been discussed.

1.10. Definition of Terms

Aviation is the activities surrounding mechanical flight and the aircraft industry. Aircraft includes fixed-wing and rotary-wing types, morphable wings, wing-less lifting bodies, as well as lighter-than-air craft such as hot air balloons and airships(Torenbeek & La Rocca, 2010).

Air transport is an aircraft designed and dedicated for transporting passengers and freight from one location to another in the air using airplanes, jets, rockets helicopters, and drones. Each of these type of air transport possess its own unique way of achieving speed and the sustainability of it voyage, However there are other types of air transport which may or may not be used for conveying goods, but could be used for recreational purposes, they include, hot air balloons, blimps, gliders, hang gliding, parachuting etc.(Nansel, 2020).

Economic Indicator is a piece of economic data, usually of macroeconomic scale, that is used by analysts to interpret current or future investment possibilities. These indicators also help to judge the overall health of an economy(Barone, 2021).

CHAPTER TWO

REVIEW OF RELATED LITERATURES

2.1. Introduction

In this chapter several literatures that supports the research objectives and the research problem are reviewed. The literature review focused on original sources such as journals, books, thesis, and dissertations. The chapter is divided up as follows: theoretical literature review discussed about the meaning and concept of air transportation, including the general overview of Ethiopian's economic development. In addition to the theoretical literature various empirical literature were also reviewed and included under this chapter. Finally, the conceptual framework puts the framework for the model

2.2. Theoretical Literature Review

Air transportation is one of the most important components of the world's transportation system. Not only does it provide the major means of long-distance travel in the world, but its economic impacts on global and national economies is substantial(Nissalke, n.d.). Such air transportation is providing solution for the barriers of communication or international among different countries or even continents.

Worldwide the air transport industry is playing significant role in economic development and the demand for this industry's services was very high until the recent pandemic market offset, which soon is believed to recover. A report by the global aviation industry High-level Group on aviation's benefits underlined that air transport is improving the lives and livelihoods of billions of people around the world (Gittens et al., 2019).

Air Transportation Action Group stated that the contribution of air transportation can be summarized in three impact categories, direct, indirect and induced impacts. According to ATAG 2005, the direct impacts consists the direct employment and the service activities within the air transport industry, it also includes the activities of the aerospace manufacturers and aircraft components suppliers, suppling to the airlines related businesses. On the other hand, the indirect impacts category comprises indirect employment and activities of the air transport industry suppliers, such suppliers include aviation fuel suppliers; construction companies that build additional facilities; the manufacture of goods sold in airport retail outlets, and a wide variety of activities in the business services sector (call centres, IT, accountancy, etc.). At last

the induced impacts include spending by those directly or indirectly employed in the air transport sector that supports jobs in industries such as retail outlets, companies producing consumer goods and a range of service industries (e.g. banks, restaurants, etc.) (ATAG, 2005).

The aviation industry is a crucial global air transport network involving airlines, airports, air navigation service providers, and manufacturers of aircraft and their components. The ultimate objective of the air transport industry is connecting to the global economy, providing millions of jobs, making the quality of life modern, and connecting people internationally (Heshmati & Kim, 2016a). The African air transport industry has also a key role in realizing sustainable growth and development in the countries. A report by the Africa Development Bank (2019) shows that expanding air services leads to improvements in the level of services and prices for consumers and the national economies on the continent(Lo & Group, 2019).

According to the Global Aviation Industry, there is increasing evidence that air connectivity growth stimulates productivity, research and development (R&D), foreign direct investment and fosters trade specialization. Many States have come to understand that air connectivity is an asset, improving the global competitiveness of cities, regions and countries. They try to include aviation projects as a priority in their development strategies and formulate policies to influence and enhance connectivity outcomes, to achieve a connectivity portfolio that best meets society's needs (Gittens et al., 2019)

Another study also summarizes that, because of the very nature of aviation infrastructure (for example, airports) and the current technology for flight (for example, jet engines that consume fuel and emit air pollutants), air transportation plays an important role in efforts to improve environmental quality and promote sustainable development, which is a crucial factor to be considered during such time since it is among the major factors determining the future of any industry (Nissalke, n.d.). Among the major components of the air transportation system include airports, air traffic control systems, aircraft, MROs, Aerospace manufacturers and airlines. Any changes in each of these components will have important consequences for the future of the aviation industry.

The development of commercial aviation is instrumental in reducing the cost of trade and movement of goods and people, in attracting new investment to locations with good air transport links to the rest of the world. The air transport sector generates employment, both directly (aviation sector) and indirectly (tourism, developed industries etc.) (Lo & Group, 2019).

Even though air transport makes multidimensional contributions to the economy, the airline industry in particular is experiencing low levels of profitability. Airlines are operating under strong international market competition. Besides, it is a capital-intensive industry. Hence, it requires large capital investments (procurement of aircraft), high standard of facilities, and high-quality maintenance and operational equipment. Consequently, competition and the industry being capital intensive results in reduced revenues and high fixed costs. The nature of the aviation industry is highly volatile and extremely sensitive to losses and bankruptcies. Sustainability of the aviation market depends not only on a country's market capacity but also airlines' regional, continental, and world market shares. As airlines increase their market shares, the volume of passengers at airports (hubs) also increases. As additional passenger generates revenue and this in turn requires service provision with its associate cost for the aviation industry (Heshmati & Kim, 2016b).

An inventive research study was also conducted by Marazzo et al. (2010), regarding the aviation and growth relationship, in which they attempted to theoretically examined the relationship between the aviation (air transportation) demand and GDP in the Brazil country. They used the passenger-kilometer as an indicator for the air transportation or the aviation demand and GDP as the Brazil country indictor, the examination resulted a long-run equilibrium between the two separate sectors variables utilizing the bivariate Vector Autoregressive Model. Their study resulted to display a strong positive relationship between the variables; GDP, demand of aviation travel. However, such variables showed to have a week interconnection among them (Marcial Marazzoa, 2010).

GDP is the total monetary or market value of all finished products or goods including services produced by the country during a specific period, it is also a widely accepted primarily indicator of macroeconomic performance and as an absolute value displays the overall size of an economy. The GDP will incorporate all investments, public and private consumptions, government outlays, foreign balance of trade, private inventories addition and construction costs. However even with in GDP there are various types; (*Gross Domestic Product (GDP) Definition*, 2021).

1. Nominal GDP – which involves the inclusion of the current prices, without excluding inflation or the pace of price rising, in the assessment of the economic products within an economy. For the nominal GDP calculation all prices are taken at the exact price figure the goods are services are sold for during the specified period.

2. Real GDP – Unlike the nominal, real GDO considers the impact of inflation on the calculation, accordingly it reflects the quantity of products produced and services provided with a fixed price for the entire period, which will eliminate the inflation or deflation of the price which will offset the growth figure.

2.3. Empirical Literature Review

The following empirical literatures is believed to highlight the air transportation contribution to a country's economic development accordingly their literatures were reviewed and included under the empirical literature.

A study by Button and Taylor in 2000 was conducted to analyses the role of international air transportation stimulating the regional economic development. The study reviled that the international air transportation is likely to stimulate further growth in the economy (Button & Taylor, 2000).

Globally, the aviation industry acts as an economic engine for the world economy. Taking United Kingdom's economic size and population as an example, the Air Transport Association Group 2019 report, the aviation industry's contribution (direct, indirect, induced, and catalytic) was approximately about $2.7 trillion to the country's gross domestic product (GDP), and it supported about 65.5 million jobs worldwide in 2017 (ATAG, 2019). According to IATA's mid-year report showed a doubling in the networking airport-routes (city pairs), and passenger air transport costs reducing by half during the past 20 years. This encouraged passengers to spend about 1 percent of the world GDP on air transport. In 2017 airlines generated approximately $38.00 billion in profits signifying the airlines' contribution to economic development (IATA, 2018a).

A study supporting the role of air transportation on a country's economic growth termed Air passenger movements and economic growth in Sri Lanka, was conducted with the aim of investigating the aviation centric growth for Sri Lanka most recently in 2020. According to the research it was concluded that the air transport plays a significant role in the promotion of Sri Lanka's economic growth (Higgoda & Madurapperuma, 2020).

According to the Air Transport Action Group's assessment of the direct, indirect and induced contribution of the air transportation, it was stated that of the 5 million direct jobs generated by the air transport industry worldwide, 4.3 million people are employed by the airlines and airports (aviation sector) globally, contributing around US$ 275 billion of GDP to the global

economy. This is as large a world industry as the pharmaceuticals sector. The breakdown of the 5 million direct jobs is as follows: The civil aerospace sector (manufacture of aircraft systems, frames and engines, etc.) employed 730,000 (14% of total direct jobs) people in 2004. An estimated 2.1 million people (or 41%) work for airlines or handling agents (e.g. as flight crew, check-in staff, maintenance crew, etc.). Around 330,000 people (7%) work directly for airport operators (e.g. in airport management, maintenance, security, etc.). A further 1.9 million (38%) work on-site at airports in retail outlets, restaurants, hotels, etc. (ATAG, 2005).

During IATA's 2018 research of the importance of air tripartition to Ethiopia it concluded that, Airlines, airport operators, airport on-site enterprises (restaurants and retail), aircraft manufacturers, and air navigation service providers employ 19,000 people in Ethiopia. In addition, by buying goods and services from local suppliers the sector supported another 179,000 jobs. On top of this, the sector is estimated to support a further 80,000 jobs through the wages it pays its employees (IATA, 2018b).

In the most recent Air Transport Action Group's report of the global industry, it stated that the airlines transported over 4.5 billion passengers in 2019, with revenue passenger kilometers (the distance flown by all passengers) totaling nearly 8.7 trillion. Air transport facilitates world trade. It helps countries contribute to the global economy by increasing access to international markets and allowing the globalization of production. Nearly 61 million tons of cargo were carried by air in 2019 (ATAG, 2020).

Another similar study was conducted to identify the economic importance of air transport and airport activities in Belgium, with the aim of recording the economic results activities based at the six Belgian airports, Antwerp, Brussels, Charleroi, Kortrijk, Liège and Ostend, comprising the air transport, its cluster and related industries. And concluded that in considering the direct and indirect effects together, value added came to over 6 billion euro in 2006 for airport and air transport activities, or 2 p.c. of Belgium's GDP. The 78,000 employed by these activities and their suppliers are equivalent to 2 p.c. of Belgian domestic employment. In the same period the air transport cluster outside airports concerned totalling 840 million euro and 10,300 employees (Kupfer & Lagneaux, 2009).

A study was conducted by Ishutkina & Hansman in 2008, with the objective of describing the mechanics through which the air transportation is enabling the economic activity, which concluded that the unique characteristic of air transport has differentiated itself from other modes of transport. The needs of society for fast, cheap, efficient and reliable mode of transport

has made the role of air transport more crucial for the society nowadays (Ishutkina & Hansman, 2008).

The society dependency to air transport is predicted to be even larger in the future. It is predicted that air transport in US alone will double in two decades. From the economic point of view, the growth on air transport industry has created jobs opportunity in the aviation sector, and other spillover effect such as connecting people and goods to the new market. In return, the economy will provide capital and demand for air transport (Ishutkina & Hansman, 2008). Therefore, air transport certainly has an impact to the economic development through series of mutual relationship.

According to ATAG (2005), air transport industry contributes direct, indirect, and induced impact, contribute approximately 2.2% of the global GDP in 2004, which is the impact share to the globs GDP. Moreover, ACARE2 (2003) estimates that air transport contributes 2.6% of EU GDP. The reports imply that air transportation can contribute to the economic development through three ways directly, indirectly and induced impact.

Overall, the provision of passenger services at airports and by airlines was fast and safety and security at the airports and in airlines made air transport one of the most preferred modes of transport. This is the reason why it is important to continue providing value for airlines and airport users in the value chain.

According to the literature the air transportation sector directly impacts a countries' economic growth by the transportation services it provides, and the job opportunity created due to the air transportation operation. In addition, air transportation also possesses an indirect impact through the job opportunity created by its supplier pool. On top of all, through the expenditure of employees employed by the air transportation sector as well as by its suppliers, and tourism passengers' expenditure, have an induced impact on the country's economic growth.

2.4. Conceptual Framework

According to numerous literatures, the air transportation sector contributes to the country's economic growth with three categories: directly, indirectly and via induced impact. When considering the air transportation, it is comprised of two sectors the aviation sector, which encompasses almost all aspects of air travel including the activities that aid to facilitate the air travel, and the aerospace sector, which encompasses the manufacturing of a wide range of aircrafts and spacecrafts.

However, Ethiopian is currently evolved in the aviation sector only, meaning it is currently providing passenger traveling services as well cargo freight transportation service using its aircrafts along with its airport and cargo terminal to facilitate air transportation service. In addition, Ethiopian is also providing wide range of aircraft maintenance services using its maintenance repair and overhaul strategic business units.

Independent Variables   Dependent Variables

Passengers' Count

Cargo Payload   GDP

Number of Employees
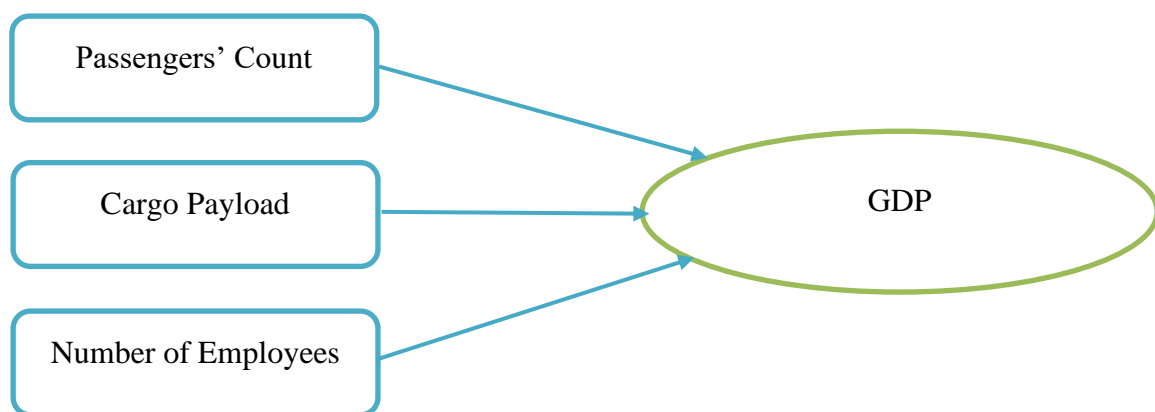
Figure 1: Conceptual Model

CHAPTER THREE

RESEARCH DESIGN & METHODOLOGY

3.1. Introduction

This chapter outlines the methodological approach of the study adopted to achieve the objectives stated in the first chapter. It focused on the Study design, data collection instruments, as well as the data analysis methods utilized in fulfilling the stated objectives.

3.2. Research Setting

This research was conducted within Ethiopian Airlines Group that consists strategic business units operating under the umbrella of the airlines group. The research was based on entirely secondary data collected from Ethiopian Airlines internal departments, sections, and divisions. Another secondary data source used for obtaining the relevant data is from accredited and dependable online source's generated reports such as the National Bank of Ethiopia and the World Bank.

3.3. Research Design

The research design for this study is descriptive. In addition, the study is time series research, which was used to determine the impact of air transportation on the country's GDP. Such research design was selected due to the numerical analysis requirement of the research and to fulfil research objectives.

The aviation industry including airports use various types of outputs and inputs to carry out their basic services and operations. According to the numerous literatures reviewed, they refer the number of passengers and cargo transported in kg as output variables of the aviation industry. Provision of passenger and cargo transportation services also has costs in terms of employee wages and salaries, maintenance and repairing costs, and other miscellaneous costs.

To attain the research objective of this thesis, time series data was obtained from the Ethiopian Airlines Group (EAG) on the air transport sector, and the data on Ethiopian's economic growth was obtained from Ethiopian Airlines Group's annual records and from the National Bank of Ethiopia.

To analyze the direct impact of air transportation three variables were selected, for the economic growth data required to perform the analysis for the research work: GDP data at constant from the World Bank national accounts was used and air passenger data or total passenger transported and cargo freight data from the International Civil Aviation Organization (ICAO) and Ethiopian Airlines Group.

3.4. Research Approach

The research used quantitative research approach to identify the air transportation effect on Ethiopian's economic growth particularly GDP. Quantitative research was used to elaborate and highlight the impact of air transportation on Ethiopian's economic growth with respect to various perspective and quantitative results were then interpreted to meet the research's objective.

3.5. Data and Model Specification

To determine the impact of air transportation on Ethiopian's GDP, the economic indicator for economic growth was determined. since economic indicators are a ratio measurement used to assess and evaluate the overall state of macroeconomy. Among the number of economic indicators currently Gross Domestic Product (GDP) at constant Price has been selected from the economic growth as dependent variable.

Considering the raising of products or services price during a specific period will also increase the countries' GDP without a change in their quantity, it will make the identification of the GDP expansion difficult to determine whether the reason for the expansion is because of price change or due to real expansion. Accordingly, Real GDP data are used for the direct impact analysis.

The air transportation activity is majorly concerned with transporting passengers. There are number of reasons for passenger to be traveling, among the reasons the major once includes personal, leisure and business. Under the personal passenger's category, reasons for air traveling may include, education related trip, family or friend visitation, personal health related reasons and migration. While business passenger includes, meeting, seminar convention or conference attending. From the air transportation sector, the data type used for the analysis of the direct impact include the total passengers transported count, cargo payload transported, and number of employees utilized to facilitate such services.

3.6. Model Specification

The air transportation's impact on a country's economy growth is divided among three impacts: direct, indirect, and induced impact. Out of the three only air transportation impact on GDP is investigated in this approach, considering the impact behaviour and availability of relevant data.

The air transportation sector's direct impact was identified through the utilization of one dependant variable from the economic data and three independent variables from the air transportation sector. The aviation or air transportation industry is the only industry capable of providing rapid transportation network for passengers as well as cargo, which are essential for the global business. Accordingly, the study has identified important indicator from the air transportation sector that are believed to have direct impact on the country's economic growth by benchmarking the vast number of literatures. Among the indicators air passengers count, cargo payload and direct number of employees were selected and used to identify the effect on the economic indicators. Such indicators were used to determine the direct impact of air transportation on the counties' economic development.

Air passenger count is used as an indicator for the analysis because of the direct impact it has on the country's gross domestic services, since the major service of an airlines is to transport passenger from a specific origination to a specific destination. The global air travelling network of the airlines was dramatically increasing through time at the current period Ethiopian airlines has almost 116 international and 23 domestic destinations making it the fourth ranking airlines with vast number of countries served.

In addition to air passenger count, Ethiopian Airlines cargo payload data was used to account for the airlines cargo and logistics service provided during the specified period. The inclusion of this variable will help the analysis to consider the performance of the one of the airlines strategic business unit, Ethiopian cargo, contribution to the country's economic growth. Cargo payload is used to indicate the performance of the Ethiopia's cargo SBU since it embodies the number of services or payloads of goods that have been transported during the period.

The air transportation sector of the countries has also contributed to the country's economy through providing access to the markets by enhancing the skills of local manpower and providing a job opportunity for the country's natives. According to the employee count variable is included to perform the analyse on the effect it poses on the economic growth. According to

literature findings one of the methods used to identify the relationship between air passenger movement and economic growth was by measuring the relationship between economic growth (GDP) and total air passenger movement (TPM), by adopting a generic regression equation GDP = f(TPM$_t$) (Higgoda & Madurapperuma, 2020). Accordingly, the same equation was used to identify the effect of air transportation on Ethiopian's economic growth, adding the variables cargo payload and number of employees to accommodate the cargo services provided by Ethiopian Airlines and include the job opportunities directly created due to such services. The augmented production function, including air passengers count, cargo payload and direct number of employees is expressed as.

$$GDP_t = f\,(\text{Passengers Count, Cargo Payload, Number of Employees}) \text{-------(1)}$$

The function can also be represented in a log-linear econometric format, making it;

$$\log(GDP)_t = \beta_0 + \beta_1 \log(Pax)_t + \beta_2 \log(CP)_t + \beta_3 \log(\,NoE)_t + \varepsilon_t \text{ ----------(2)}$$

Where:

» GDP – Real Gross Domestic product

» β_0 - The constant term

» Pax – Air passengers' count

» β_1 - Coefficient of variable (air passengers count)

» CP - Cargo payload

» β_2 - Coefficient of variables (cargo payload)

» β_3 - Coefficient of variables (number of employees)

» NoE - Number of employees

» t - The time trend

» ε - The random error term assumed to be normally, identically and independently distributed.

3.7. Variables Description

3.7.1. Dependent Variable

- **Real GDP (GDP)**

A real GDP was selected as an indicator for Ethiopian's economic growth. It was also used as a dependent variable to perform the time series regression to determine the direct impact of air transportation on Ethiopian's economic growth, in accordance with the literature study's approach (Higgoda & Madurapperuma, 2020). However, only an annual real GDP at constant market price was available during the fiscal period from 2003/04 up to 2018/19, from the Ethiopian National bank's annual report. Therefore, the data must first be converted to quarter based to perform the time series regression, for this reason with the assumption of a uniform rate throughout the years of the real GDP, which already considers the inflation rate, the annual GDP is divided by four to identify the quarter GDP data. And the quartered Real GDP at a constant market price during the fiscal period from 2003/04 up to 2018/19 was used as dependent variable to perform the time series regression.

3.7.2. Independent Variables

- *Passenger Count (PAX)*

Among the indicators of the air transportation sector, the total number of passengers transported during the fiscal period from 2003/04 up to 2018/19 was selected as one of the independent variables, according to the literature study's approach (Higgoda & Madurapperuma, 2020). The quarter passenger movement during the fiscal period from 2014/15 up to 2018/19 was obtained from Ethiopian airlines internal business systems, which was used to determine the average quarter percentile share of the annual passenger count. From Ethiopian Airline's annual report, the annual passenger count during the fiscal period from 2003/04 up to 2018/19 was obtained, on which the average percentile share calculated was used to convert the annual passenger count data for the period 2003/2004 up to 20013/2014 to quarter time period. Finally, the quartered passenger count data during the fiscal period from 2003/04 up to 2018/19 was used as one of the independent variables to perform the time series regression.

- *Cargo Payload (CP)*

The other indicator considered from the air transportation sector includes cargo payload, which was used as an independent variable to conduct the time series regression, during the fiscal period from 2003/04 up to 2018/19. Such variable was included to account for Ethiopian airlines cargo operations. From Ethiopian Airlines unpublicized records, the monthly uplift cargo payload was obtained for the fiscal period from 2007/08 up to 2018/19, which was converted to a quarter basis and each fiscal period quarter's share of the annual payload was identified. Ethiopian airlines public annual report was used to determine the annual fiscal period from 2003/04 up to 2006/07, which was converted to a quarter basis using the quarter's share of the annual payload during the fiscal period 2007/08 up to 2018/19. Finally, the quartered cargo payload data during the fiscal period from 2003/04 up to 2018/19 was used as the other independent variables to perform the time series regression.

- *Number of Employees (NoE)*

The last indicator variable for the air transportation sector was the number of employees that were responsible for providing the air transportation services during the fiscal period from 2003/04 up to 2018/19. The number of employees at the end of the fiscal year was obtained from Ethiopian's annual report and considering a uniform number of employees count throughout the quarter period the annual employee count was cascaded to a quarter employee count to perform the time series regression.

3.8. Method of Data Analysis

To analyses the impact of air transportation on a country's economic growth, a time serious regression, specifically the Autoregressive Distributed Lag Model (ARDL) in support with Error Correction Model (ECM) data analysis method was used. Such analysis method was selected due to the nature of the data collected. The data analyzing tool used was the statistical package system named Stata was used, it was selected to analyze, manage, and graph the collected data. Such analysis tool was selected due to the availability and flexibility of the system for a variety of platforms. In addition, such tool was selected considering the number of literatures selected tool to perform the qualitative analysis, to meet the research objective and answer the research questions.

To analyse the direct impact of air transportation on a country's GDP growth, specifically Ethiopia, three independent variables were used as an indicator of the air transportation sector,

such as total transported passengers count, total cargo carried including the number of employees involved in providing such services.

To identify the relative direct impact of air transportation on economic growth, the Autoregressive Distributed Lag Model in support with Error Correction Model was applied, since such models can examine the dynamic relationships that exist between the variables that interact with one another such as, air transportation and economic growth. However, before performing any regressions the variables were log transformed to minimize the scales effect of number. And the log transformed variables were termed GDPl (log transformed GDP), PaxL (log transformed passenger count), Carg_plL (log transformed cargo payload) and NoEL (log transformed number of employees).

Before performing the model regressions, numerous tests had to be performed, among which the stationarity test was the most important ones. Because the direct impact analysis model is to be based on a time series regression, a stationarity test is mandatory to avoid the regression variables resulting spurious results. It will help determine and display the properties of each variable throughout the time series. Using the Stata system, a graph representation is first used to determine the behaviour of each variable change over time, which will be used to perform the time series variables stationarity test.

To determine whether the time series variables; GDPl (log transformed GDP), PaxL (log transformed passenger count), Carg_plL (log transformed cargo payload) and NoEL (log transformed number of employees) are stationary or not an Augmented Dickey Fuller test (ADF Test) was applied.

After determining the stationarity of the time series variables, Johansen cointegration test was to be performed to determine if the variables are cointegrated. However, since the time series variables were stationary at different order, the Johansen cointegration test could not be performed. Accordingly, the Bounds cointegration proposed by Pesaran, shin and smith (2001) were applied due to the importance of identifying the cointegration of the variables before performing the regression.

Based on the Bounds cointegration test result, the short run model or the ARDL in support with the Error Correction Term was applied to demine the direct impact of air transportation. The ARDL stands for Autoregressive Distributed Lag Model, which is used for times series with mixed order of integration. Such model is specified as bellow.

$$\Delta GDPl_t = a_0 + \sum_{i=1}^{p} a_{1i}\Delta GDPl_{t-1} + \sum_{i=1}^{q} a_{2i}\Delta PaxL_{t-1} + \sum_{i=1}^{q} a_{3i}\Delta\text{Cargo\_plL}_{t-1}$$

$$+ \sum_{i=1}^{q} a_{4i}\Delta\text{NoEL}_{t-1} + \lambda ECT_{t-1} + e_t$$

Where

- λ - Speed of adjustment parameter $\lambda = (1 - \sum_{i=1}^{p} \delta_i)$

- θ - Long run parameter $\theta = \frac{\sum_{i=1}^{q} \beta_i}{\alpha}$

- ECT - Error Correction Term $ECT = (GDPl_{t-1} - \theta X_t)$

- $a_{1i}, a_{2i}, a_{3i}, a_{4i}$ − Short run dynamic coefficients of the model's adjustment long run equilibrium

3.9. Validity and Reliability

All data collected from each sector were obtained from reliable sources and are validated from the owner of such secondary data, to perform the analysis and conduct the research. The air transportation service indicating data was obtained from Ethiopian Airlines Group, the only governmental owned national airlines. Under which the data was obtained from the owner department of each secondary data, in support with annual and reports gathered from Business intelligent (BI) system. Whereas the economic indicators were obtained from the National Bank of Ethiopia's annual report which are assumed to be genuine and relabel.

3.10. Ethical Considerations

This research was conducted in accordance with all ethical standards for research without direct contact with human or animal subjects.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1. Introduction

The objective of the research is to identify the impacts of air transportation on Ethiopian's economic growth GDP. This chapter gives a quick overview of the study's overall analysis results and the interpretation of such results. Among the numerous impact categories of air transportation on a country's economy growth the impact of air transport on GDP is investigated and analysed to identify the impact of Ethiopian's national airline's impact on the country's economic growth particularly GDP.

4.2. Descriptive Statistics

4.2.1. Real GDP

As the research objective was to identify the impact of air transportation on Ethiopian's economic growth represented by GDP, number of indicators were selected. The indicators from the air transportation sector as well as Ethiopian's economic growth sector displayed how each sector was performing throughout the past 15 years. Ethiopian's economic growth exhibited to have a strong broad-based real GDP growth rate with the average of 10.3% from the fiscal period 2003/04 up to 2018/19. Such growth has also resulted an improvement in the rural and urban areas poverty (The Wold Bank, 2021). The real GDP at constant price in Ethiopian Birr acquired from the National Bank of Ethiopia's annual report displayed a growing or trending upward behaviour throughout the years, as displayed in the below graph.
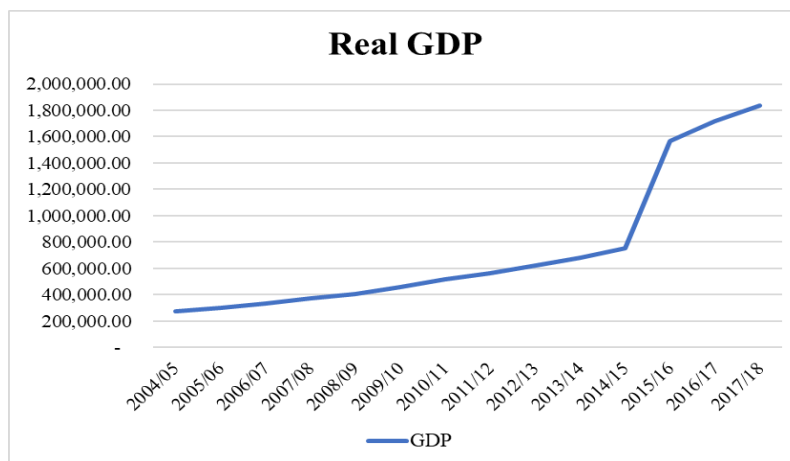
Figure 2: Ethiopian's Annual Real GDP

4.2.2. Total Number of Passengers and Cargo Payload

The air transportation sector's indicators such as transported passenger count, cargo payload and number of employees (labour) variables assessment throughout the fiscal period from 2003/04 up to 2018/19 acquired from Ethiopian Airlines Group's annual report, along with secondary data obtained from BI systems, provided interesting insights. The passenger count during the same fiscal period displayed that throughout the years the number of passengers was rapidly increasing along with the period. In addition, the cargo payload assessment during the same fiscal year also revealed that throughout the fiscal period the cargo payload was also increasing except during the fiscal year between 2011/12 and 2012/13, during which the cargo payload decreased. However, according to Ethiopian's annual report the airlines was still able to improve its cargo revenue by 1% during the same fiscal year.
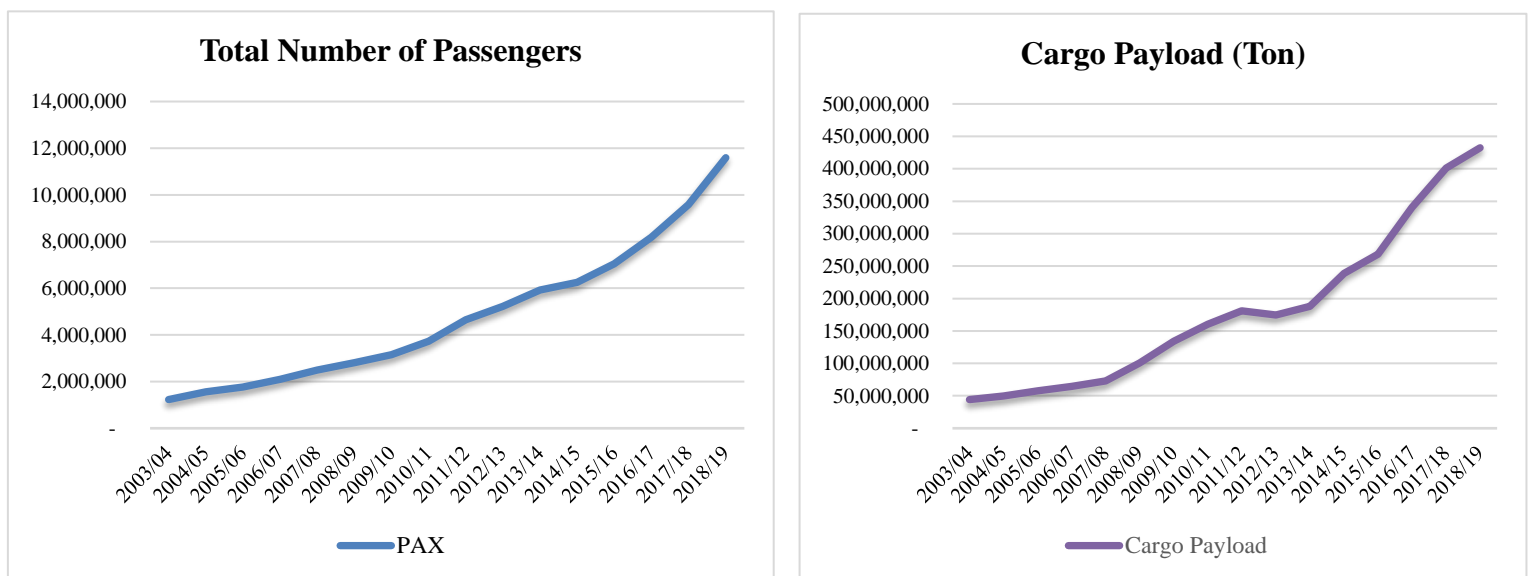
Figure 3: Passenger Count & Cargo Payload From 2003/04 - 2018/19

The other air transportation indicator assessed was the number of employees that ware involved to provide the airline group's services, which was obtained from Ethiopian's annual report. When the number of employees from the fiscal period 2003/04 up to 2018/19 was assessed, it indicated employees' number was increasing throughout the years except during one fiscal period in 2015/16 during which employees number dropped.

4.2.3. Number of Employees
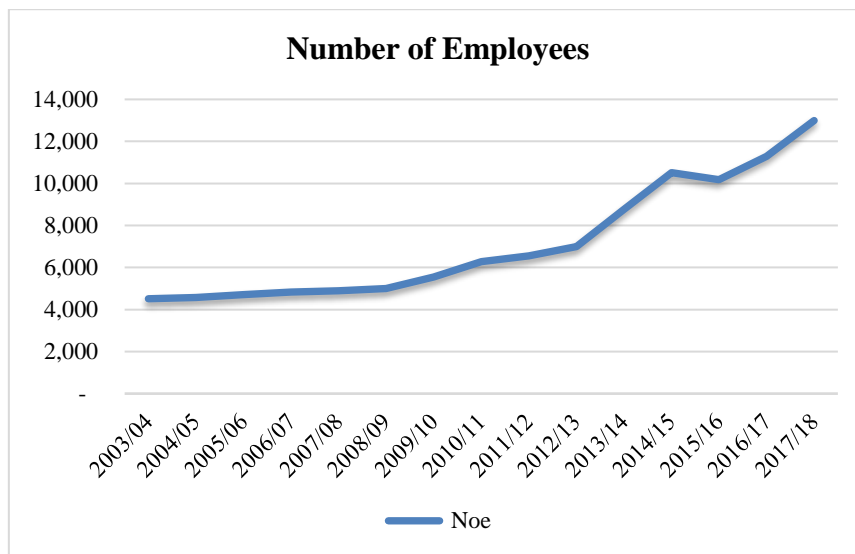
Figure 4: Ethiopian Airlines Number of Employees

As displayed in the above graphs during the fiscal period from 2003/04 up to 2018/19, when the air transportation indicators number of passenger, cargo payload and number of employees was manly shown to have an upward trend increasing value, in the same manner Ethiopian's economic indicator GDP also displayed to have an upward trend increasing value during the same fiscal period. Accordingly, it can be concurred that the selected indicators from the air transportation industry and Ethiopian economic sector, result to exhibit similar properties throughout the fiscal period and thus they can be considered to have a similar relationship with one another. And since the air transportation industry is a service providing industry that is accounted under a countries GDP, the air transportation industry does seem to have a direct impact on Ethiopian's economic development.

4.2.4. Direct Impact Analysis Result

Different data sources from two separate groups, which were economic indicator and Air transportation indicator, were collected to analyse the direct impact of the air transportation indicators on the economic growth indicator. From the air transportation side, the indicator Passenger count was used in order to address the passenger transportation service the airlines have been providing, and also the cargo payload transported, and the number of employees involved in providing such services, which are believed to directly impact the GDP service sector of the country's economic indicator.

To identify the direct impact of air transportation on a country's economic development, Autoregressive Distributed Lag Model in support with Error Correction Model was applied on the time series data collected. Such model was selected since the variables were stationary at different level when the Augmented Dickey Fuller test (ADF Test) was applied. Before performing the regression, numerous tests were conducted. The first test was the stationarity test. However, to stabilize the variance of all air transportation and economic indicating variables, a log transformation was applied.

To conduct the stationarity test the graphical representation of the variables over time was observed in order to determine the general nature of the time series variables in through time.
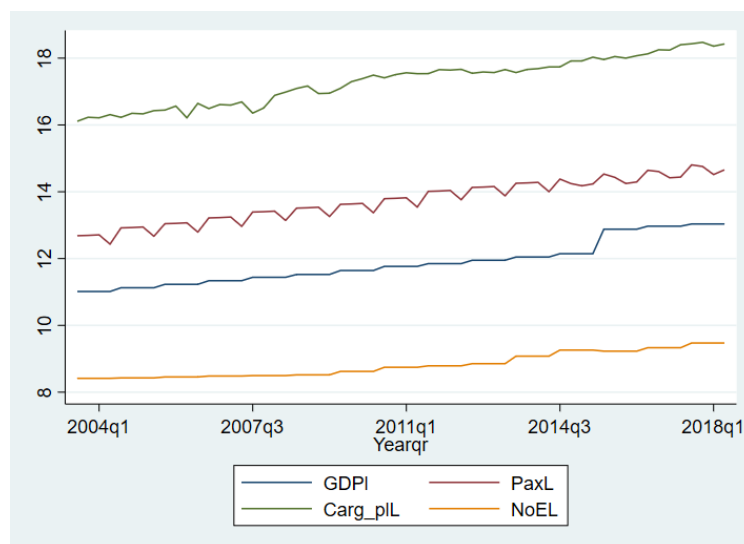
Figure 5: Graphical Representation of Direct Impact Analyzing Variables

4.2. ADF Stationarity Test

After determining the nature of the time series variables through time the Augmented Dickey Fuller test (ADF Test) was applied on every time series variable to determine their stationarity. Each variables stationarity test resulted as followed.

1. GDPl – The ADF test's p-value (0.3801) specifies the null unit root cannot be rejected, indicating a unit root presence and the test statistics was also greater that the 1%, 5% and 10% critical value indicating non stationarity in terms of difference stationary heads.

```
. dfuller GDPl, trend regress

Dickey-Fuller test for unit root                    Number of obs   =        63

                        ——————— Interpolated Dickey-Fuller ———————
                Test           1% Critical        5% Critical       10% Critical
             Statistic            Value              Value              Value

Z(t)          -2.399            -4.121             -3.487             -3.172

MacKinnon approximate p-value for Z(t) = 0.3801


D.GDPl  |       Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

  GDPl  |
   L1.  |   -.163735    .0682485    -2.40   0.020    -.3002523    -.0272177
_trend  |    .0062422   .0025323     2.46   0.017     .0011767     .0113076
 _cons  |    1.785851   .7359307     2.43   0.018     .3137708     3.257932
```

Figure 6: ADF Stationarity Test Result of GDP

To make the log transformed GDPl variable stationary the first difference was generated and tested for stationarity. As a result, the first difference GDP resulted to be stationary, as the p-value of 0.000 indicated that there are no unit roots and since the test statistics (-8.689) surpasses the 1% (-4.124), 5% (-3.488) and 10% (-3.173) critical value, it indicates the variable is indeed stationary.

```
. dfuller DGDPl, trend regress

Dickey-Fuller test for unit root                    Number of obs   =        62

                        ——————— Interpolated Dickey-Fuller ———————
                Test           1% Critical        5% Critical       10% Critical
             Statistic            Value              Value              Value

Z(t)          -8.689            -4.124             -3.488             -3.173

MacKinnon approximate p-value for Z(t) = 0.0000


D.DGDPl |       Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

 DGDPl  |
   L1.  |  -1.124007    .1293666    -8.69   0.000    -1.382869    -.8651454
_trend  |     .0004     .0007132     0.56   0.577     -.001027     .0018271
 _cons  |   .0255029    .0258766     0.99   0.328     -.026276     .0772819
```

Figure 7: ADF Stationarity Test Result of First Difference of GDP

2. PaxL – The ADF test for the passenger count variable displayed a p-value of 0.000 indicated that there are no unit roots and since the test statistics (-9.039) surpasses the 1% (-4.121), 5% (-3.487) and 10% (-3.172) critical value, it indicates the variable is a stationarity one.

```
. dfuller PaxL, trend regress

Dickey-Fuller test for unit root                    Number of obs   =        63

                              ───────── Interpolated Dickey-Fuller ─────────
                    Test         1% Critical       5% Critical      10% Critical
                 Statistic          Value             Value             Value
────────────────────────────────────────────────────────────────────────────
 Z(t)              -9.039          -4.121            -3.487            -3.172
────────────────────────────────────────────────────────────────────────────
MacKinnon approximate p-value for Z(t) = 0.0000


D.PaxL │      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
────────┼───────────────────────────────────────────────────────────────
  PaxL │
   L1. │  -1.156276   .1279192    -9.04   0.000    -1.412153   -.9003996
 _trend │   .0408311   .0046537     8.77   0.000     .0315223    .0501399
  _cons │   14.65872   1.617934     9.06   0.000     11.42237    17.89507
```

Figure 8: ADF Stationarity Test Result of Pax

3. Cargo_plL – As the Stata result bellow indicates the p-value (0.0039) was lower than the significance level of 0.05 and hence the null hypothesis was rejected and considering the test statics the result showed the variable to be a stationary one.

```
. dfuller Carg_plL, trend regress

Dickey-Fuller test for unit root                    Number of obs   =        63

                              ───────── Interpolated Dickey-Fuller ─────────
                    Test         1% Critical       5% Critical      10% Critical
                 Statistic          Value             Value             Value
────────────────────────────────────────────────────────────────────────────
 Z(t)              -4.240          -4.121            -3.487            -3.172
────────────────────────────────────────────────────────────────────────────
MacKinnon approximate p-value for Z(t) = 0.0039


D.Carg_plL │      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
────────────┼───────────────────────────────────────────────────────────────
 Carg_plL │
      L1. │  -.4604334   .1085955    -4.24   0.000    -.6776567     -.24321
   _trend │   .0179672   .0043308     4.15   0.000     .0093044    .0266301
    _cons │   7.459398   1.749619     4.26   0.000     3.959639    10.95916
```

Figure 9: ADF Stationarity Test Result of Cargo Pl

4. NoE – The initial ADF test resulted the acceptance of the null hypothesis and resulted to be non-stationary time series data. Accordingly, the variable was transformed to its first difference and tested for the ADF stationarity test. At which it resulted to have a p-value of 0.000 rejecting the null hypothesis and making the variable stationary, making it stationary after first difference.

```
. dfuller DNoEL, trend regress

Dickey-Fuller test for unit root                    Number of obs   =        62

                          ――――――― Interpolated Dickey-Fuller ―――――――
                  Test       1% Critical      5% Critical     10% Critical
               Statistic        Value            Value            Value
─────────────────────────────────────────────────────────────────────────────
 Z(t)           -9.184          -4.124           -3.488           -3.173
─────────────────────────────────────────────────────────────────────────────
MacKinnon approximate p-value for Z(t) = 0.0000


D.DNoEL  |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
─────────┼───────────────────────────────────────────────────────────────
 DNoEL   |
    L1.  |  -1.180174   .1285046    -9.18   0.000    -1.437311   -.9230372
 _trend  |   .0004388   .0003343     1.31   0.194    -.0002301    .0011077
  _cons  |   .0076631   .0119687     0.64   0.524    -.0162862    .0316125
```

Figure 10: ADF Stationarity Test Result of First Difference of NoE

4.3. Cointegration Test

Once the stationarity test is performed on time series variable, the Johansen cointegration test was to be performed in order to determine whether the time series variables are cointegrated or not. However, since the time series stationarity test determined that the time series variables were stationary in level and after the first difference, making the series integrated of different order, the Johansen cointegration test could not be performed.

Meanwhile performing the cointegration test is necessary to establish a long run relationship between the time series variables, therefore the Bounds cointegration proposed by Pesaran, shin and smith (2001) was applied. For such cointegration test the null hypothesis (H_0) assumes there is no cointegrating equation, while the H_1 assumes that the null hypothesis is not true.

To perform the Bounds cointegration test, the optimal lags must first be determined, after determining the optimal lags, using such optimal lags the Bounds cointegration test was conducting and the bellow result was determined. As displayed since the F statistics (F=2.369) is less that all the I(0) bounds, the null hypothesis was rejected. Also as displayed in the result below the F statistics is also less than all I(1) bounds which rejects the first hypothesis. Meaning the variables don't display a long run relationship.

```
Pesaran/Shin/Smith (2001) ARDL Bounds Test
H0: no levels relationship              F =   2.369
                                        t =  -2.838

Critical Values (0.1-0.01), F-statistic, Case 3

        [I_0]    [I_1] | [I_0]   [I_1] | [I_0]   [I_1] | [I_0]   [I_1]
         L_1      L_1  |  L_05    L_05 |  L_025   L_025|  L_01    L_01

  k_3    2.72     3.77 |  3.23    4.35 |  3.69    4.89 |  4.29    5.61
accept if F < critical value for I(0) regressors
reject if F > critical value for I(1) regressors

Critical Values (0.1-0.01), t-statistic, Case 3

        [I_0]    [I_1] | [I_0]   [I_1] | [I_0]   [I_1] | [I_0]   [I_1]
         L_1      L_1  |  L_05    L_05 |  L_025   L_025|  L_01    L_01

  k_3   -2.57    -3.46 | -2.86   -3.78 | -3.13   -4.05 | -3.43   -4.37
accept if t > critical value for I(0) regressors
reject if t < critical value for I(1) regressors
```

Figure 11: Bounds Cointegration Test Result

However, when the dependant variable for the model was replaced with Paxl, the bounds test for cointegration resulted a positive cointegration since the F- statistics was 8.394 greater than the I (0) and I (1) values. The bounds cointegration result was recorded as below.

Table 1: Direct Impact Bounds Cointegration Test

Bounds test for Cointegration			
Dependant Variable	**F- Statistics**	**Cointegration**	**Next Estimation**
GDPl	2.369	No	ARDL
PaxL	8.394	Yes	ECM
Cargo_pl	1.215	No	ARDL
NoEL	1.119	No	ARDL

When the ARDL was performed on the GDPl as a dependant variable, the analysis resulted the F statistics to show the model to be significant and the R square displayed that 98% of the variation in the dependant variable is explained by the independent variables as displayed below. When the p value and the coefficient of the result were analysed, they show a significance level at 5% on the first and second lag of Pax variable, meaning a percentage incremental change in the level lag of Pax output is associated with a 0.16% increase in GDP in the short run, also a percentile increment on the first lag of Pax will result a 0.18% decrease in the GDP output in the short run.

```
Sample: 2004q1 - 2019q2                    Number of obs   =        62
                                           F(  7,     54)  =    517.26
                                           Prob > F        =    0.0000
                                           R-squared       =    0.9853
                                           Adj R-squared   =    0.9834
Log likelihood =  67.161802                Root MSE        =    0.0878
```

GDPl	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
GDPl						
L1.	.8724864	.1275955	6.84	0.000	.6166729	1.1283
L2.	-.0132454	.1244153	-0.11	0.916	-.2626831	.2361923
Carg_plL						
--.	-.0340842	.1013268	-0.34	0.738	-.2372322	.1690637
L1.	.093697	.1015885	0.92	0.360	-.1099757	.2973696
PaxL						
--.	.1634593	.0700944	2.33	0.023	.0229285	.3039901
L1.	-.1837653	.0699512	-2.63	0.011	-.324009	-.0435217
NoEL	.1800178	.1213398	1.48	0.144	-.063254	.4232895
_cons	-.6437351	.3753134	-1.72	0.092	-1.396193	.108723

Figure 12: Direct Impact ARDL Result (GDP as Dependent Variable)

The ARDL was again performed on the NoEL variable (log transformed numbers of employees) as a dependant variable, which determined that the model was significant at a 1% and the R square displayed that 99% of the variation in the dependant variable is explained by the independent variables. As the ARDL result displays a significant level at 1% for the level and first lag of PaxL variable with a coefficient at level of 0.134 and -0.131 at first lag. Meaning a single percentile increment in the level lag of PaxL variable will result a 0.13% increment in the NoEL variable in the short run. Also, a single percentile increment in the first lag of PaxL will result a .13 % decrease in the PaxL variable in the short run.

```
                                           F(  8,     53)  =    783.07
                                           Prob > F        =    0.0000
                                           R-squared       =    0.9916
                                           Adj R-squared   =    0.9903
Log likelihood =  119.12123                Root MSE        =    0.0383
```

NoEL	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
NoEL						
L1.	.9400905	.0552675	17.01	0.000	.829238	1.050943
GDPl						
--.	-.0686126	.0606215	-1.13	0.263	-.190204	.0529788
L1.	.0333241	.0762283	0.44	0.664	-.1195706	.1862187
L2.	.0404682	.0540709	0.75	0.458	-.0679843	.1489208
Carg_plL						
--.	.0298235	.0442642	0.67	0.503	-.0589592	.1186062
L1.	.0039598	.0447104	0.09	0.930	-.0857178	.0936375
PaxL						
--.	.1341399	.0308889	4.34	0.000	.0721847	.1960951
L1.	-.131341	.0342265	-3.84	0.000	-.1999906	-.0626914
_cons	-.1411388	.1759412	-0.80	0.426	-.4940322	.2117546

Figure 13: Direct Impact ARDL Result (NoE as Dependent Variable)

Since the Bounds test for cointegration resulted the presence of cointegration when the PaxL (log transformed passenger count) variable was considered as a dependant variable, the ECM (Error Correction Model) is applied. Which will help determine the long run and short run behaviour of the time series variables.

When the ECM model was applied on the PaxL dependant variable, it resulted at a 5% significant level a single percentile increment in the variable NoEL will result a 0.61% increase in PaxL variable, and at a 1% significance level a single percentile increments in the variable Carg_plL will result a 0.56% increase in PaxL variable in the long run. Such variable also displayed a short run effect on the dependant variable at a significant level of 1%, a single percent increment of Carg_plL will result a 0.47% decrease on the PaxL variable.

On top of all, the GDPl variable displays at a significance level at of 5% a single percentile increment in the variable GDPl will result a 0.57 % increment on the PaxL variable as displayed in the bellow result.

```
Sample: 2004q1 - 2019q2                    Number of obs   =         62
                                           R-squared       =     0.5669
                                           Adj R-squared   =     0.5107
Log likelihood =  29.004254                Root MSE        =     0.1624


       D.PaxL |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

ADJ
         PaxL |
          L1. |  -.7697019   .1338461    -5.75   0.000    -1.038047   -.5013566

LR
         NoEL |   .6102324   .2862518     2.13   0.038     .0363322    1.184133
         GDPl |  -.0144089   .1692769    -0.09   0.932    -.3537886    .3249708
      Carg_plL |   .5640922   .1308948     4.31   0.000      .301664    .8265204

SR
         GDPl |
          D1. |   .5708195   .2376306     2.40   0.020     .0943988     1.04724
          LD. |   .2684648   .2273352     1.18   0.243    -.1873149    .7242446

      Carg_plL |
          D1. |   -.475539    .178068    -2.67   0.010    -.8325439   -.1185342

         _cons |  -.9559948   .7012108    -1.36   0.178    -2.361838    .4498482
```

Figure 14: Direct Impact ECM Result (Pax as Dependent Variable)

Durbin Watson autocorrelation and homoscedasticity test were also performed on the ARDL and the ECM models. And it indicated there were no autocorrelation and homoscedasticity from the outcome.

The Dublin Watson and Breusch- Godfrey autocorrelation test, which is test for autocorrelation in the errors in a regression model, revealed that there is no evidence of serial correlation on the ARDL as can be seen in the test output below.

```
. estat dwatson

Durbin-Watson d-statistic(  8,     62) =  1.859581

. estat bgodfrey, lags(1)

Breusch-Godfrey LM test for autocorrelation
```

lags(p)	chi2	df	Prob > chi2
1	1.247	1	0.2640

H0: no serial correlation

Figure 15: Dublin Watson & Breusch- Godfrey Autocorrelation Test Result

Also, the white's heteroskedasticity test revealed that the model is not suffering from heteroskedasticity as can be seen in the bellow test result output.

```
. estat imtest, white

White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(34)    =    35.63
         Prob > chi2 =    0.3916

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	35.63	34	0.3916
Skewness	8.74	7	0.2717
Kurtosis	0.89	1	0.3458
Total	45.26	42	0.3375

Figure 16; White's Heteroskedasticity Test Result

The direct impact analysis showed that number of passengers travelled, and countries economic growth have a short run as well as a long run relationship in terms of Ethiopia. Whereas the literature study concluded that air transportation have no long run relationship with its subject country's economic growth (Higgoda & Madurapperuma, 2020). It was also determined that Ethiopian economic growth (GDP) is affected by its previous lagged value of itself and the current and past lagged value of the number of passengers, as the same as the literature study finding(Higgoda & Madurapperuma, 2020).

4.4. Result Discussion

From the above-mentioned result findings for the direct impact analysis, it can be concluded that air transportation has short-run as well as long-run impact on Ethiopian's economic growth. In the short run, as the number of passenger travellers increases the indicator for the economic growth, which is GDP, is also expected to grow. Also, as the number of employees count, and cargo payload increased the number of passengers also increase indirectly impacting the economic growth in the short run as displayed by the above analysis findings.

When the time serious regression analysis was performed on the selected indicators for the direct impact, such as Ethiopian's GDP as dependant variable and passenger count, cargo payload and number of employees, using the regression models devised from other similar studies, it resulted that the air transportation and Ethiopian's economic growth indeed have a long run as well as a short run positive relationship within one another. When the Ethiopian's economic growth indicator, which is GDP, increased the air transportation indicator, the number of passengers also increased in the long run. When considering the short run effect, the analysis revealed that an increment in the air transportation indictors passenger count and number of employees resulted an increment in Ethiopian's economic growth indictor GDP. Accordingly, it can be said that the air transportation has a positive direct impact on Ethiopian's economic growth both in the long as well as in the short run.

Considering the long-run effect, when Ethiopian's economic growth indicator increased the number of passenger travellers also increased as well as the cargo payload transported, meaning the air transportation industry is positively affected by the economic growth of a country and vice versa. In summary, the air transportation sector directly impacts Ethiopian's economic growth positively both in the short-run as well as in the long-run. Which coincide with the descriptive results finding that the air transportation directly impacts Ethiopian's economic growth.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1.   Introduction

This chapter presents a summary of the numerous analysis findings, conclusions drawn based on these findings and recommendation based on such conclusions regarding the future activities of the government-owned air transportation sector currently operating within the country, Ethiopian Airlines.

5.2.   Summary of the Finding

The analysis for the impact of air transportation on Ethiopian's economic growth which is represented by GDP consisted of several air transportation and economic indicators to identify the impact or change of one indicator because of any change on the other. For the direct impact analysis, the indicator real gross domestic product (GDP) was used considering it is the optimal and frequently used indicator for a country's economic growth.

From the air transportation side, the total number of passengers transported, total cargo payload carried, and a total number of employees utilized to conduct such services were used as indicators. The indicators were selected considering the major service role of the air transportation sector operating in Ethiopia. The analysis conducted used time series data of each variable considering the fiscal period from 2003/04 up to 2018/19 on a quarterly basis.

During the time series analysis and test the variables resulted to have a trending upward behaving throughout the period. However, when the stationarity test was performed only the passenger count and cargo payload variables resulted to be stationary at level, whereas the GDP and number of employee's variable were stationary at the first difference.

Due to the mixed stationarity level of the variables, the bounds cointegration test was applied to determine the variables relationship with one another, during which only one dependant variable resulted to have a long-run relationship with the other independent variables, such variable was passenger count. Due to the presence of the long run relationship, the ECM (Error Correction Model) was performed, during which it was determined that a single percentage increment of GDP and cargo payload will result a 0.36% and 0.47% increment in the number of passengers traveled in the long-run. Considering the short-run relationship, a single

percentile change in the number of employees will result a 1.9% increment in the number of passengers transported.

However, since the remaining variables didn't display any cointegration in the long run when considered as dependent variables while performing the bounds cointegration test, the (ARDL) Autoregressive Distributed Lag Model was applied, during which it was determined that a single percentile increment in the number of passengers and the number of employees, resulted in a 0.26% and 0.48% increment in the GDP.

5.3. Conclusions

According to the quantitative research's analysis finding, the air transportation does indeed have an impact on a country's economic growth, not only that but also the economic sector has an impact on the air transportation sector as well. According to the analysis finding, the air transportation directly and indirectly impacts the country's economic growth in both in the long run as well as in the short run perspective. According to the short run analysis finding, as the number of passengers transported increases the GDP is also expected to grow, also as the number of employee count and cargo payload increase the number of passengers traveled also increased.

In conclusion, the air transportation sector's indicator, number of passengers transported, and the country's economic indicator GDP have positive relationship in the short run. According to the analysis finding such positive relationship was also witnessed in the long run relationship between the air transportation and Ethiopia's economic growth.

Accordingly, the research has confirmed that the air transportation is an effective factor to explain Ethiopia's economic growth and impacts Ethiopian's economic growth. Which coincides with the literatures findings and confirm that the air transportation (Ethiopian airlines) activities directly impact the economic growth in Ethiopia country.

5.4.   Recommendations

As the research clearly indicated that the air transportation service is directly and positively impacting the country's economic development in terms of long run as well as the short run, extra efforts and investment made towards expanding such service providing airlines will dramatically improve Ethiopian's economic growth. To secure sustainable economic growth policy makers should design a policy that suit the development of air transportation in the country.

As Ethiopian airline is Positively impacting the Ethiopian economy, it is wise for the government and policy makers in various industries to consult the airline prior to policy cascading.

5.5.   Suggestion for Further Studies

Since this study is limited to the relationship between three air transportation variables with one economic variable which is GDP.

- ✓ Further analysis can be conduct on the indirect and induces impact on the economy of the country as well.
- ✓ The relationship between air transportation and foreign exchange reserve can be also studied to check cause and effect of the two
- ✓ Furthermore, the relationship between access for credit and load and air transportation can also be studied.
- ✓ The future papers can also include intensive numerical data from various government organization including central bank and civil aviation authorities.

References

African Development Bank Group. (2019). *Ethiopia Overview: Development news, research, data | World Bank*. https://www.worldbank.org/en/country/ethiopia/overview

ATAG. (2005). *The economic & social benefits of air transport Contents*.

ATAG. (2019). *Air Transport Action Group (ATAG)*. https://www.atag.org/component/news/?tmpl=pressrelease&view=pressrelease&id=110

ATAG. (2020). Aviation Beyond Borders. *Atag*, 96.

Baltaci, N., & . G. A. (2015). The Relationship between Air Transport and Economic Growth in Turkey: Cross-Regional Panel Data Analysis Approach. *Journal of Economics and Behavioral Studies*, 7(1(J)), 89–100. https://doi.org/10.22610/jebs.v7i1(j).566

Barone, A. (2021). *Economic Indicator Definition*. https://www.investopedia.com/terms/e/economic_indicator.asp

BBC. (2019). *Ethiopian Airlines: Africa's largest airline - BBC News*. https://www.bbc.com/news/world-africa-47523958

Button, K., & Taylor, S. (2000). International air transportation and economic development. *Journal of Air Transport Management*, 6(4), 209–222. https://doi.org/10.1016/S0969-6997(00)00015-6

CAPA. (2012). *Profile on Ethiopian Airlines | CAPA - Centre for Aviation*. https://web.archive.org/web/20121004013025/http://centreforaviation.com/profiles/airlines/ethiopian-airlines-et

Darmawan. (2012). The Effect of Air Transport to Economic Development in Indonesia. *Erasmus University of Rotterdam Erasmus School of Economics Department of Applied Economics Master Specialization Urban, Port, and Transport Economics*, *August*.

ETG. (2021a). *Ethiopian Airlines-Overview*. ETG.
https://corporate.ethiopianairlines.com/AboutEthiopian/Overview

ETG. (2021b). *Ethiopian Airlines Vision and Mission*.
https://corporate.ethiopianairlines.com/AboutEthiopian/VisionandMission

Ethiopia - Aviation. (2021). https://www.trade.gov/country-commercial-guides/ethiopia-
aviation

Ethiopia suspends privatisation of Ethiopian Airlines. (2020). The Africa Report.
https://www.theafricareport.com/46281/ethiopia-suspends-privatisation-of-
ethiopian-airlines/

Ethiopian Airlines. (2019). *Ethiopian Airlines-History*.
https://corporate.ethiopianairlines.com/AboutEthiopian/History

Gittens, A., Hocquard, S., Juniac, A. de, Liu, F., & Fanning, E. (2019). Aviation Benefits
Report. *Convention on International Civil Aviation*, 76.
https://www.icao.int/sustainability/Documents/AVIATION-BENEFITS-2019-
web.pdf

Gross Domestic Product (GDP) Definition. (2021). Investopedia .
https://www.investopedia.com/terms/g/gdp.asp

Habte, W. A. B. and M. (2015). *Services Exports For Growth And Development: Case
Studies From Africa*.

Heshmati, A., & Kim, J. (2016a). Introduction to Efficiency and Competitiveness of
International Airlines. *Efficiency and Competitiveness of International Airlines*, 1–
14. https://doi.org/10.1007/978-981-10-1017-0_1

Heshmati, A., & Kim, J. (2016b). Efficiency and competitiveness of international airlines.
Efficiency and Competitiveness of International Airlines, 1–181.
https://doi.org/10.1007/978-981-10-1017-0

Higgoda, R., & Madurapperuma, W. (2020). Air passenger movements and economic growth
in sri lanka: Co-integration and causality analysis. *Journal of Transport and
Supply Chain Management*, *14*, 1–13. https://doi.org/10.4102/JTSCM.V14I0.508

IATA. (2018a). Annual Review 2018. *At-Automatisierungstechnik*, *65*(12), 68.

https://doi.org/10.1515/auto-2017-0118

IATA. (2018b). *The Importance Of Air Transport To Ethiopia The air transport sector makes a major contribution to Ethiopia ' s economy Air transport facilitates flows of goods , investment and people*. https://www.iata.org/en/iata-repository/publications/economic-reports/ethiopia--value-of-aviation/

Ishutkina, M. A., & Hansman, R. J. (2008). Analysis of interaction between air transportation and economic activity. *8th AIAA Aviation Technology, Integration and Operations (ATIO) Conference*. https://doi.org/10.2514/6.2008-8888

Kupfer, F., & Lagneaux, F. (2009). Economic importance of air transport and airport activities in Belgium. *National Bank of Belgium*, *No. 158*, 1–108. http://www.nbb.be/doc/ts/publications/wp/wp273En.pdf

African Development Bank Group. (2019). *Framework and Guidelines to Support the Aviation Sector*.

Maddalon, D. V. (2019). Air transportation. *Access Science*. https://doi.org/10.1036/1097-8542.018100

Marcial Marazzoa, R. S. & E. F. (2010). *Air transport demand and economic growth in Brazil: A time series analysis - ScienceDirect*. https://www.sciencedirect.com/science/article/abs/pii/S1366554509001148?via%3Dihub

Nansel, B. (2020). *Air Transport: Definition,Types, Development, Advantages Disadvantages of Air Transport - Jotscroll*. https://www.jotscroll.com/forums/3/posts/198/air-transport-definition-types-development-advantages-disadvantages.html

Nissalke, T. E. (n.d.). *THE AIR TRANSPORTATION SYSTEM IN THE 21 ST CENTURY*.

Oktal, H., Küçükönal, H., Korul, V., Sarılgan, A. E., & Ateş, S. S. (n.d.). *Social And Economic Impact Of Air Transportation: General*.

Srinivasan, D. J. S. and S. (2012). Ethiopia's Great Run. *American Accounting Association*, *87*(5), 1737–1765. http://documents.worldbank.org/curated/en/693561467988949839/pdf/99399-REVISED-PUBLIC-thiopia-Economic-Update-2-11-16-web.pdf

The Wold Bank. (2021). *Ethiopia Overview: Development news, research, data | World Bank*. https://www.worldbank.org/en/country/ethiopia/overview#1

Torenbeek, E., & La Rocca, G. (2010). Civil Transport Aircraft. *Encyclopedia of Aerospace Engineering*, eae379. https://doi.org/10.1002/9780470686652.eae379

USAID. (2021). *Agriculture and Food Security | Ethiopia | U.S. Agency for International Development*. https://www.usaid.gov/ethiopia/agriculture-and-food-security

Wikipedia. (n.d.). *Ethiopian Airlines*. Retrieved October 9, 2021, from https://en.wikipedia.org/wiki/Ethiopian_Airlines

World Bank. (2019). Ethiopia Tourism. *Country Snapshot*, *2017*(2017), 6–7.

Appendixes

Annex; Ethiopian GDP By Economic Activity at constant Price

Table 2: GDP By Economic Activity at Constant Prices (In millions of Birr)

Sectors/Year	1992 — 1999/00	1993 — 2000/01	1994 — 2001/02	1995 — 2002/03	1996 — 2003/04	1997 — 2004/05	1998 — 2005/06	1999 — 2006/07	2000 — 2007/08	2001 — 2008/09	2002 — 2009/10	2003 — 2010/11	2004 — 2011/12.	2005 — 2012/13	2006 — 2013/14	2007 — 2014/15	2008 — 2015/16	2009 — 2016/17	2010 — 2017/18	2011 — 2018/19
Agriculture, Hunting and Forestry	202,209.4	221,688.4	217,528.4	194,735.5	227,784.5	258,637.3	286,869.8	313,975.7	337,502.8	358,944.5	386,339.2	421,172.8	441,832.9	473,132.2	498,733.6	530,341.5	542,700.2	579,022.9	599,331.4	622,220.3
Crop	105,595.3	121,439.5	116,945.1	97,662.7	122,621.7	146,545.6	168,479.8	187,053.1	201,996.9	215,075.1	233,879.2	258,009.7	270,881.6	293,063.1	312,338.7	334,768.6	346,293.6	374,649.8	392,291.8	404,049.6
Animal Farming and Hunting	75,017.0	76,857.0	76,997.8	74,223.4	80,172.8	84,931.4	89,093.2	96,111.9	103,150.3	110,419.1	117,249.1	126,016.6	132,843.6	139,692.4	142,601.9	149,246.8	146,959.5	153,170.4	154,038.0	163,279.5
Forestry	30,547.9	31,353.1	32,228.0	33,166.2	34,048.8	34,883.0	35,814.5	36,846.7	38,393.2	39,595.9	40,906.7	42,138.1	43,440.5	44,867.9	46,751.8	48,368.2	49,447.1	51,202.7	53,001.7	54,891.1
Fishing	479.2	470.3	469.7	375.4	281.2	305.4	280.3	301.9	404.5	511.9	520.3	551.2	668.4	797.8	1,057.4	1,381.1	1,381.9	1,389.4	1,546.7	1,581.8
Mining and Quarrying	2,020.3	2,125.5	2,349.6	2,445.5	2,495.1	2,598.2	2,784.4	2,355.4	2,859.8	3,225.2	4,649.7	7,333.7	8,265.7	8,784.6	8,506.2	6,328.5	6,116.8	4,296.9	3,402.8	2,658.9
Manufacturing	18,235.5	18,886.3	19,128.2	19,279.7	20,550.4	23,177.6	25,633.8	27,772.7	30,636.9	33,417.3	37,292.5	41,815.8	46,752.0	54,668.7	63,764.0	75,383.5	89,246.7	111,249.6	117,410.7	127,986.7
Large and Medium Scale Manufacturing	9,313.8	9,506.7	9,529.8	9,667.5	10,413.7	11,623.1	13,209.7	14,462.2	16,280.9	17,955.8	20,398.0	23,282.3	26,985.0	33,516.2	40,743.0	50,174.6	61,687.4	73,528.2	77,966.5	87,691.9
Small Scale and Cottage Industries	12,399.9	13,208.4	13,636.5	13,581.4	14,190.6	16,324.3	17,123.4	18,157.6	19,171.7	20,393.7	21,814.3	23,384.1	24,366.4	24,838.1	25,895.4	26,874.8	27,559.2	37,721.5	39,444.2	40,294.7
Electricity and Water	3,027.5	3,128.2	3,430.7	3,596.7	3,833.4	4,135.7	4,501.6	5,114.4	5,362.3	5,630.6	5,771.0	6,872.5	7,802.9	8,585.3	9,165.6	9,577.4	11,015.5	11,552.5	11,929.0	14,115.4
Construction	18,291.7	19,758.8	22,964.7	26,097.1	31,193.8	33,548.2	37,068.0	41,110.6	45,773.6	51,117.9	56,684.7	63,932.5	84,041.1	116,588.0	144,420.0	190,028.6	237,545.0	286,749.6	331,691.4	381,443.8
Whole Sale and Retail Trade	41,685.1	43,818.7	45,310.9	46,723.2	49,085.2	55,498.3	65,230.6	76,197.9	88,274.6	98,627.8	107,792.1	114,122.5	128,411.1	141,360.7	166,337.5	186,850.2	202,241.5	215,351.0	241,936.3	268,037.0
Hotels and Restaurants	3,244.6	3,509.8	3,684.1	3,915.8	4,158.5	4,639.2	5,545.2	7,068.2	8,716.5	10,795.9	13,417.9	16,723.1	18,403.7	21,925.0	27,758.6	35,971.8	41,601.3	41,625.2	44,335.3	48,143.8
Transport and Communications	12,122.7	43,818.7	45,310.9	46,723.2	49,085.2	55,498.3	65,230.6	76,197.9	88,274.6	98,627.8	107,792.1	114,122.5	128,411.1	141,360.7	166,337.5	186,850.2	202,241.5	215,351.0	241,936.3	104,436.2
Financial Intermediation	7,228.7	3,509.8	3,684.1	3,915.8	4,158.5	4,639.2	5,545.2	7,068.2	8,716.5	10,795.9	13,417.9	16,723.1	18,403.7	21,925.0	27,758.6	35,971.8	41,601.3	41,625.2	44,335.3	57,368.6
Real Estate, Renting and Business Activities	12,755.9	13,911.3	17,139.2	18,807.0	19,652.3	21,104.9	24,168.3	27,845.9	32,659.3	37,846.4	45,401.8	55,423.4	57,543.4	59,781.2	62,114.2	64,690.9	67,062.9	70,005.2	74,364.0	79,942.0
Public Administration and Defense	27,130.1	24,575.2	20,734.0	21,021.1	21,063.2	23,516.8	25,015.9	27,966.7	31,469.5	37,248.7	40,567.8	44,391.8	45,760.0	49,253.6	54,681.3	57,979.5	62,259.2	70,488.5	76,754.1	83,662.0
Education	8,646.7	9,624.5	10,362.0	11,559.4	12,886.2	14,508.7	15,757.7	19,105.0	21,925.3	24,773.6	28,976.1	30,247.9	31,596.6	34,781.5	35,679.7	38,963.0	42,385.6	41,031.0	42,520.8	44,221.6
Health and Social Work	2,791.3	3,075.8	3,072.0	2,943.2	3,410.8	3,985.6	4,377.5	5,067.3	5,854.2	7,049.6	8,038.8	8,540.0	9,341.3	10,489.0	12,510.3	14,137.2	15,669.4	16,767.9	18,153.4	20,747.2
Other Community , Social & Personal Services	6,221.4	6,461.1	6,791.9	6,893.0	7,224.2	7,805.7	8,521.3	9,244.9	10,326.0	10,981.8	11,867.6	12,443.7	13,986.4	16,560.4	17,193.4	17,828.7	18,371.3	19,198.4	20,178.0	21,454.2
Private Households with Employed Persons	6,655.7	6,931.4	7,714.1	8,057.7	8,186.5	8,444.9	9,000.3	9,358.5	9,851.6	10,224.1	10,714.0	11,256.4	13,069.3	14,136.1	14,758.3	15,401.2	16,063.8	16,633.3	17,276.0	17,707.4
Total	368,080.7	395,256.6	400,319.5	392,316.0	438,516.7	494,086.6	552,177.4	617,397.5	687,588.5	756,824.5	836,539.1	931,759.1	1,011,606.3	1,111,987.7	1,227,058.7	1,355,280.4	1,463,883.2	1,613,519.9	1,739,254.9	1,895,726.7
Less : FISIM	3,163.9	3,284.6	2,098.1	2,407.1	2,853.6	3,323.6	4,663.8	5,294.9	6,884.3	7,747.2	8,334.9	9,258.8	8,274.0	8,803.4	10,512.8	12,393.0	14,485.8	17,038.3	19,763.6	21,037.4
Gross Value Added at Constant Basic Prices	364,984.3	392,058.8	398,464.8	390,102.9	435,859.5	490,970.4	547,625.4	612,217.2	680,706.9	749,058.0	828,212.7	922,512.8	1,002,766.9	1,102,467.8	1,216,015.3	1,342,555.9	1,449,397.5	1,596,481.6	1,719,491.3	1,874,689.3
Taxes on Products	26,584.3	32,155.5	32,154.9	31,199.9	42,936.1	44,257.1	45,442.0	48,711.5	51,420.5	47,148.0	68,567.2	74,437.1	80,410.1	95,162.9	104,547.5	115,169.8	118,700.0	120,645.6	114,575.2	112,468.2
GDP at Constant Market Prices	391,668.2	424,182.3	430,607.4	421,301.7	478,482.2	535,033.3	593,002.2	660,936.6	732,242.1	796,697.6	896,687.5	996,921.8	1,083,133.7	1,197,753.9	1,320,688.1	1,457,857.6	1,568,097.5	1,717,127.2	1,834,066.5	1,987,157.5

Source: MoFED

Annex Ethiopian Macroeconomic Indicators

Indicators	1999/00 (1992)	2000/01 (1993)	2001/02 (1994)	2002/03 (1995)	2003/04 (1996)	2004/05 (1997)	2005/06 (1998)	2006/07 (1999)	2007/08 (2000)	2008/09 (2001)	2009/10 (2002)	2010/11 (2003)	2011/12 (2004)	2012/13 (2005)	2013/14 (2006)	2014/15 (2007)	2015/16 (2008)	2016/17 (2009)	2017/18 (2010)	2018/19 (2011)
3. Macroeconomic Indicators																				
3.1: Real sector Development																				
GDP at Current Market Price (In Mn. Birr)	65,986.0	67,351.0	65,895.0	72,703.0	85,800.0	105,415.0	130,334.0	170,281.0	245,836.0	332,060.0	379,135.0	515,078.5	747,326.5	866,921.1	1,060,825.4	1,297,961.4	1,568,097.5	1,717,127.2	1,834,066.5	1987157.533
Nominal GDP Growth Rate (In %)	9.0	2.1	(2.2)	10.3	18.0	22.9	23.6	30.6	44.4	35.1	14.18	35.9	45.1	15.3	22.4	22.4	18.2	17.7	21.4	23.3
Average Marginal Exchange Rate (Birr per USD)	8.1400	8.3300	8.5400	8.5800	8.6300	8.6518	8.6810	8.7943	9.2400	10.4200	12.89	16.1	17.3	18.3	19.1	20.1	21.10	22.40	26.10	28.10
GDP at Current Market Price (IN Mn. USD)	8,106.4	8,085.4	7,716.0	8,473.5	9,942.1	12,184.2	15,013.7	19,362.7	26,605.6	31,867.6	29,413.11	31,957.1	43,314.2	47,424.6	55,628.0	64,575.2	74,297.0	81,760.0	84,356.0	96107.0
Nominal GDP per Capita (In USD)	135.1	131.3	122.1	130.8	149.5	178.4	214.5	267.4	355.2	415	373.26	396.1	523.5	559.1	639.6	725.0	815.0	876.0	883.0	985.0
Real GDP per Capita (In Birr)	3,313.8	3,495.7	3,458.8	3,300.5	3,652.6	3,976.7	4,300.5	4,634.2	4,962.8	5,266.1	5,776.60	5,895.00	6,947.5	7,299.1	7,625.2	8,571.2	8,864.0	18,257.5	19,204.9	20360.22063
Real GDP per Capita Growth Rate (In %)	4.8	5.5	(1.1)	(4.6)	10.7	8.9	8.1	7.8	7.1	6.1	9.69	9.00	6.1	5.1	4.5	12.4	3.4	8.0	5.2	6.015844217
GDP Deflator (% change)	6.9	(5.8)	(3.6)	12.8	3.9	9.9	11.6	17.2	30.3	24.2	1.70	20.08	33.5	4.9	11.0	10.8	9.5	5.7	12.5	20.08138958
Real GDP at constant basic price (In Mn. Birr)	184,625.4	198,320.9	201,561.3	197,331.5	220,477.2	248,354.8	277,013.3	309,686.8	344,331.9	378,907.4	418,946.95	475,647.50	517,026.5	568,432.3	626,977.4	692,221.7	1,449,397.5	1,596,481.6	1,719,491.3	1874689.297
Real GDP at constant market price (In Mn. Birr)	198,827.1	215,332.6	218,594.3	213,870.3	242,897.6	271,605.2	301,032.7	335,519.0	371,716.7	404,437.0	455,196.02	515,078.50	559,621.6	618,842.2	682,358.5	753,229.7	1,568,097.5	1,717,127.2	1,834,066.5	1987157.533
Real GDP Growth Rate (In %)	3.4	7.4	1.6	(2.1)	11.7	12.6	11.5	11.8	11.2	10.0	10.57	11.40	8.7	9.9	10.3	10.4	8.0	10.1	7.7	9.0
Agriculture & Allied Activities(In Billion Birr)	102.1	111.9	109.8	98.3	115.0	130.5	144.8	158.5	170.3	181.2	195.00	212.50	222.9	238.8	251.8	267.8	544.1	580.4	600.9	624
Industrial Sector(In Billion Birr)	17.7	18.6	20.2	21.4	23.7	25.9	28.4	30.6	33.9	37.3	41.99	49.80	59.6	73.9	86.5	103.7	343.9	413.8	464.4	526.2
Service Sector(In Billion Birr)	69.4	72.9	75.3	79.4	84.2	94.6	107.6	124.1	144.1	163.9	185.10	216.60	237.4	258.8	292.5	325.0	575.9	619.3	673.9	745.7
Agriculture & Allied Activities (% of GDP)	55.3	56.4	53.7	49.4	51.6	51.9	51.5	50.5	48.8	47.3	46.13	45.00	42.0	40.2	38.7	37.5	36.4	34.9	33.3	
Industrial Sector (% of GDP)	9.7	9.5	10.0	11.0	10.9	10.6	10.4	10.2	10.1	10.1	10.17	10.40	11.5	13.0	13.8	15.0	23.7	25.9	27.0	28.1
Service Sector (% of GDP)	37.0	36.3	36.3	39.6	37.5	37.5	38.0	39.3	41.0	42.6	43.70	45.23	45.9	45.5	46.6	47.0	39.7	38.8	39.2	40
Private Consumption Expenditure	45,611.0	47,981.0	49,319.0	56,765.0	60,866.0	81,445.0	102,537.0	130,118.0	197,461.0	268,002.0	309,132.00	373,088.50	541,536.3	636,901.3	744,978.0	1,042,265.0	1,219,366.0	1,147,628.0	1,441,581.0	1884070
Government Consumption Expenditure	12,615.0	10,543.0	10,448.0	10,422.0	11,973.0	13,971.0	17,016.0	19,123.0	25,782.0	31,544.0	34,801.00	53,147.10	62,044.5	77,636.9	98,121.0	116,995.0	174,599.0	203,608.0	225,523.0	247362
Investment	14,647.0	15,870.7	17,395.0	17,669.0	24,902.0	27,409.0	35,952.0	41,227.0	60,156.0	82,560.0	102,403.00	165,380.00	277,243.7	295,456.4	402,922.0	511,618.0	585,665.0	704,596.0	751,626.0	948866
Exports	8,010.0	8,146.0	8,389.0	9,779.0	12,913.6	16,076.9	18,205.4	21,854.2	28,317.0	35,233.0	52,168.00	85,949.80	102,887.0	108,227.1	123,496.0	121,532.2	122,501.0	139,830.0	184,282.0	213437
Imports	15,952.8	16,108.4	17,706.8	20,131.3	27,366.8	37,776.3	48,092.4	55,088.7	76,564.0	96,285.0	126,319.00	162,486.80	236,384.7	251,300.6	308,691.3	393,189.0	424,750.0	430,233.0	502,113.0	561512
Resource Balance	-7,942.8	-7,962.4	-9,317.8	-10,352.3	-14,453.2	-21,699.4	-29,887.0	-33,234.4	-48,247.0	-61,052.0	(74,151.00)	(76,537.00)	(133,498.0)	(143,073.5)	(185,195.3)	(271,656.0)	(302,249.0)	(290,403.0)	(317,831.0)	-348075
Gross Private Consumption (% of GDP)	69.1	71.2	74.8	78.1	70.9	77.3	78.7	76.4	80.3	80.7	81.54	72.43	72.5	73.5	70.2	69.0	67.9	63.6	76.7	94.61231199
Gross Government Consumption (% of GDP)	19.1	15.7	15.9	14.3	14.0	13.3	13.1	11.2	10.5	9.5	9.18	10.32	8.3	9.0	9.2	9.0	9.7	12.3	10.2	12.44603172
Gross Domestic Fixed Investment (% of GDP)	22.2	23.6	26.4	24.3	29.0	26.0	27.6	24.2	24.5	24.9	27.01	32.11	37.1	34.1	38.0	39.4	37.3	35.4	34.1	47.74991334
Resource Balance (% of GDP)	-12.0	-11.8	-14.1	-14.2	-16.8	-20.6	-22.9	-19.5	-19.6	-18.4	(19.56)	(14.86)	(17.9)	(16.5)	(17.5)	(20.9)	(19.3)	(16.9)	(14.4)	-17.61622576