Determinants of Profitability of Ethiopian Airlines

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DECLARATION

This research project is my original work and has not been submitted in any other institution of learning for any academic award.

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ABSTRACT

The purpose of the study is to show factors that determine Ethiopian Airlines profitability. The dependent variable profit was regressed against the independent variables load, yield on the demand side and available seat kilometer (ASK), labor cost, fuel cost, maintenance cost, renting or leasing cost on the supply side to show which factor determine profitability. The study used explanatory research design and the model used was error correction model to show the impact of the independent variables on the dependent variable in the short run and long run. The study used annual secondary data from 1987-2014 which was obtained from Ethiopian airlines statistics office. The data was analyzed using time series econometrics methodology. The analysis is done by using E-views. The result revealed that the demand side variables have large contribution over the supply side variables by affecting Ethiopian Airlines profitability positively. Load and yield have a great contribution in the short run while ASK has a great contribution in the long run. Finally, it is recommended that the airline should have more concern to the demand side which greatly contributes to their profitability as compared to supply side.

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ABBREVIATIONS

ACF- Auto Correlation Function

ASK- Available Set Kilometer

EAL- Ethiopian Airlines

ECM- Error Correction Model

GDP- Gross domestic product

GNP-Gross national product

ACRONYM

AFRAA- African Airlines Association

IATA- International Air Transport Association

ICAO- International Civil Aviation Organization

OPEC- Organization of Petroleum Exporting Countries

PACF- Partial Auto Correlation Function

US- United States America

CHAPTER ONE

1. Introduction

Ethiopian air transport sector described as Ethiopia's ambassador at large serving to link Ethiopia with the rest of the world (Temesgen, 2006). Its status both within Africa and around the world has been increasing from time to time, and it has assumed a special status among African countries as the airline to be relied upon, as has been expressed at various forums. Ethiopian airlines were founded 21 December 1945 and commenced operation on 8 April 1946. Currently as of September 2014, the passenger network comprises 83 international destinations and 20 domestic ones, including 49 cities in Africa (excluding Ethiopia), 13 in Europe and the Americas and 21 in the Middle East and Asia; the cargo network serves 24 destinations, including 15 in Africa, seven in the Middle East and Asia and two in Europe. Ethiopian serves more destinations in Africa than any other airline. As of April 2013, the carrier's five densest routes were Addis Ababa–Dubai, Addis Ababa–Johannesburg, Addis Ababa–Guangzhou, Addis Ababa–Nairobi and Addis Ababa(http://centreforaviation.com)

Ethiopian airline‘s has contributed its part for the growth of Ethiopia since it was founded. The number of passenger and cargo it transports has been increasing from time to time connecting national and international passengers in different destinations. Ethiopian airline is also contributing to the national economy by transporting different export products of Ethiopia like flower, chat, injera and the like. Ethiopian airlines revenue and profitability has been increasing from year to year since it was founded up to now. For this reason, various international organizations and renowned individual persons has acknowledged its success. The airline was featured by ―The Economist” as an example of excellence in late 1987(The economist,1987) ,

and economist Paul B. Henze recognized it in 2000 as being "one of the most reliable and profitable airlines in the Third World"(Henze,2000). In July 2011, Ethiopian was named Africa's most profitable airline for the year 2010 by Air Transport World, and it has also been praised by AFRAA for its sustained profitability over recent years. As of 2014, Ethiopian airlines revenue rose to 38.4 billion birr with a net profit of over 2 billion birr making it the biggest airline in terms of profitability in Africa and the 18th biggest airline in the world (http://www.ethiopianairlines.com/en/news).

Even if aviation industry has a great importance for a country, it had faced many challenges in the past which has affected its growth and profitability. It had been hit by recent international phenomena like financial crisis of 2007-2009 which led to economic recession of western nations, the volatility of fuel prices (Ethiopian annual report, 2011-12). As a result, demand has been hit and many international airlines profitability decreased which led to their bankruptcy and many airlines changed their business strategy like merging, decrease of cost and the like. Even if Ethiopian airline‘s is among few airlines that is able to show profit, despite difficult time for the airlines industry, it has also been affected by this international phenomenon (Ethiopian annual report, 2011-12). For example, its expense has risen as a result of increase in fuel price and its demand has been affected by the economic crises in the world, by the recent outbreak of Ebola: thereby affecting its profitability. Its profit has been increasing at decreasing rate in the past years and its expense has been increasing from time to time due to many reasons. This paper addresses what major factors affects Ethiopian airlines profitability in the demand side and supply side. In short the paper tries to address the determinants of Ethiopian airlines profitability from 1987-2014.

1.2. Statement of the problem

The contribution of air transportation to a country's development is high (Temesgen, 2006). Its share of contribution to the GDP of a country is incontrovertible, though the nature and extent of the contribution varies from country to country. Air transportation plays a big role in the nation and international trade. Air transport also plays a role in the investment sector, in creating job opportunities and improves the living condition of a country‘s population. Because of its importance many countries have established their own airlines that are government owned or privately owned such as Ethiopian airlines as one of those airlines established by Ethiopia.

But the path of growth for many airlines has been difficult in the past years due to many reasons. Many airlines have shown loss in their profitability due to external factors like rise of fuel price and internal factors like bad economic condition and rising labor cost. Because of this, several authors studied factors that have affected airlines profitability in the past years. Morrison and Winston (1980), sought to come up with a structural model of airlines rate of return and find profitable effects of individual influence like load factor. Thoren (2002) and Antoniou (1992) studied the impact of load factor, fleet size, fuel, labor cost and productivity and a number of other factors on US domestic airlines and other international airlines. Several other literatures has also pointed out one factor having greater influence over another in determining profitability depending on single airlines case or panel of airlines located in some parts of the world with their distinct characters. Some of the factors that determine airlines profitability studied by different researchers are applicable in some parts of the world or in some specific airlines while these same factors may not be applicable for other airlines. So it‘s important to study what factors will

have greater influence over an individual airlines so that stake holders interested in a single airlines case can have a good understanding about that airlines.

This research will have theoretical value by adding knowledge on pointing out those factors that affect Ethiopian airlines profitability. Therefore, this research will fill the literature gap by studying what factors influenced Ethiopian airlines profitability. Again, it has a practical significance by enabling stakeholders to focus on the most important factors that determine profitability. In general, this research hopes to establish factors that determine Ethiopian airlines profitability.

1.3. Research question

- What demand side factors affect Ethiopian airlines profitability?
- What supply side factors affect Ethiopian airlines profitability?
- Which supply side and demand side factors affect Ethiopian airlines profitability in the long run and short run?

1.4. Objective of the study

The main objective of the study is to show factors determine Ethiopian airlines profitability. The sub-objective of the study is to show

- To identify the effect of demand side factors on profitability of Ethiopian airlines
- To identify the effect of supply side factors on profitability of Ethiopian airlines
- To investigate the short run and long run impact of both demand side and supply side factors on Ethiopian airlines profitability.

1.5. Scope of the study

The study focuses only on Ethiopian airlines and it is limited on the data that is collected from Ethiopian airlines. It tries to identify factors affecting Ethiopian airlines profitability from 1987-2014. This period is chosen because data is adequately available on this period.

1.6 Limitations of the Study

A number of limitations could be pointed out for this study. Firstly the study only focused on seven independent variables namely; load factor, yield, ASK, labor cost, fuel cost, maintenance cost, cost of renting or leasing an airplane. Other variables were not chosen for this study due to shortage of data on the other variables. The interpretation of these results as concerns to the variables should be restricted to variables under study. Secondly, the sample size taken could be considered small and other researcher could use a larger sample size. The study suffers from the fact that it is organization-specific therefore the results cannot be applicable to other airlines with different operating environment from Ethiopia. Interpretations of these results outside Ethiopian airlines should therefore be approached with care. Lastly, the study relied on secondary data which had already been compiled by Ethiopian airlines statistics office and published annual financial statements of the company.

1.7. Significance of the study

This study will be of value to different stakeholders including: Scholars and academicians, Ethiopian airlines mangers, government authorities, Ministry of Transport and policy makers in Ethiopia. To scholars and academicians, this study will increase body of knowledge by showing the effect of some demand side and supply side factors on profitability of Ethiopian airlines. For

the other stake holders like Ethiopian airlines managers, board of directors and various government bodies, the study will enable them to focus on factors that have higher impact on profitability in the short run and long run; therefore, it helps them in their decision making that help them to increase the company‘s success.

1.8. Organization of the study

The paper has five main chapters. Chapter one is the introduction part which contains background of the paper, statement of the problem, objective of the study, scope of the study, significance of the study and organization of the study. Chapter two is literature review which includes theoretical and empirical literature review. Chapter three is research design and methodology which contains research design, data source and sample size and methodology. Chapter four is the result and analysis part. Chapter five is finally conclusion and recommendation part.

CHAPTER TWO

2. Literature review

The literature review has two parts: the first part is the theoretical literature review and the second part is the empirical literature review. The theoretical literature focuses on some of the characteristics of airline industries and theoretically details the demand side and supply side factors that affects airlines profitability. It also gives some concept on transport sector. The empirical literature shows some of the previous literatures written on factors that determine airlines profitability.

2.1. Theoretical literature

2.1.1. The transport sector: some concepts

Five transport modes have been witnessed so far in the history of humanity's technological development: namely, road transport, water transport, rail transport, air transport, and continuous flow system (Temesgen, 2006)

Road transport consists of several types or modes, which are divided into two main sub-categories: motorized and non-motorized. Under the non-motorized category are included pedestrians, animal- or human-drawn or driven carts, wheel barrows, bicycles and tricycles, draught animals (horses, donkeys, camels, mules, elephants, etc.) and other hand drawn vehicles. Water transport is divided into local and international (marine) transport modes. Local transport mode includes river, lake, and canal transportation as well transportation on huge dams. Marine transport includes both cargo and human transport across seas or oceans between the ports of the different countries. Rail transport, which started about the time of the industrial revolution after

the 1810s and 1820s, has been serving the world for nearly 200 years. There are many types of rail transportation. The first phase featured a kind of train drawn by horses, followed by steam-powered train, followed by the street car. Next came the different types of rail transport modes: the regular surface railway, metro or subway, monorail, guided bus, trolley bus, etc. The rail transport system is classified as Light Rail Transit and Heavy Rail Transit. The other transport mode is what is known as continuous flow system, under which are subsumed water or petroleum pipe, belt conveyor, and slurry pipe, which is specially used in mines to transport soil and minerals mixed with water (Rodrique, Slack &Comotis,1998)

Finally, the other transport mode is, fairly recent in appearance and modern in its constitution, is air transport. The appearance on the scene of air transport is historically linked to the use of balloons for navigational purposes. But the basis for the development of the world's fastest transportation system is the series of experiments undertaken by the Wright Brothers. Like the other transport modes described above, air transport is divided into domestic and international, on the one hand and human and freight transportation on the other. Presently the world uses airplanes ranging from the smallest, accommodating only one person (the pilot), to the largest, accommodating 900 people and traversing long distances across lands and oceans to connect the different parts of the globe (Australian business traveller, 2012).

2.1.2. Special characteristics of airlines

What makes airlines business special is that most airlines have more or less some government regulations? Apart from those government regulations, the airlines have the normal headaches of any business: controlling costs, negotiating with labor unions, seeking rates that accurately reflect the various elasticity‘s of demand obtaining financing and making the kind of profits that

will keep stockholders happy and will attract capital. The following are some of the characteristics of airlines.

An Undifferentiated Product

Airline service tends to be what economists call an undifferentiated product—that is, to many passengers the service of one airline is rather hard to differentiate from the service of another(O'Conner,2001).Modern aircraft are very much alike, at least within any given size range. The speed, comfort, and safety aspects of a journey are likely to be much the same, whichever airline a passenger selects. Airlines frequently have concentrated their advertising on desperate attempts to differentiate their product by emphasizing steak dinners aloft, friendly smiles, and similar minor benefits. Yet probably a flight is chosen not by reason of favoring one airline over another but simply by the most convenient times of departure and arrival. In a sense, flight scheduling is a form of product differentiation, and it would appear to be the most important one.

A Highly Perishable Product

Perishability of services implies that service capacity cannot be stored, saved, returned or resold once rendered to a customer. An airline deals in a highly perishable product in the sense that an unfilled seat on a flight is immediately perishable—that is to say, it cannot be stored for future sale in the way manufactured goods can be stored. As with motel rooms and theater seats, empties seats are dead losses (Voneche, 2005).

Ease of Entry

It is relatively easy to enter the airline business and easier still for an existing airline to expand into a new market (Wensveen, 2012). Unlike a railroad, which must buy a right-of-way and lay

miles of track before it can make a nickel, an airline need own only the vehicle. It does not own the ~~r~~oad ~~o~~ver which its vehicles travel or the terminals (that is, the airports). And even the vehicle can be leased or bought on credit, aircraft typically being sold with a mortgage (often called an equipment trust) on them. The economic barrier seems small indeed, compared with almost any manufacturing industry. Here there are no factories to be built, no assembly lines to equip. It is relatively easy for anyone to buy a plane and jump into the business or easier still for an existing airline to move into a new market—to the extent that remaining governmental barriers, as in international service, will permit.

Modern aircraft are expensive, and monthly payments on them are huge. Various taxes, charges, and rentals must be paid for the use of airports and the airways. There are the costs of getting any business started—hiring and training personnel, advertising one‘s entrance into the new market. Then there is the question of the need to operate on a particular scale in order to realize cost savings (http://www.eca-watch.org)

Tendency to Monopoly or Oligopoly

Another characteristic of airline service may seem somewhat contradictory to the one just mentioned. It is that airlines may have an inherent tendency toward gradual elimination of competitors, with a resultant oligopoly, or even monopoly, in a market(O‘conner,2001). This is a controversial point, but a belief in such a tendency has been one basis for the existence of governmental economic regulation of the industry. Is it contradictory to say that this is a field that competitors can enter with ease, yet at the same time a field where only the strongest will survive? It is not contradictory if we distinguish between the short run and the long run. It is one thing for a small company to enter the airline business, and quite another for it to survive.

According to (O‘conner,2001) the relaxation of entry controls that came with deregulation act of airlines industry in United States in 1978 has been followed which lead for entry of many new small airlines.

Other economic characteristics

Another characteristic is that the long-run tendency to larger, faster aircraft served to make the airlines more capital-intensive and less labor-intensive, although this trend can give way to a fuel-intensive period when there are sharp hikes in fuel price levels. Still another characteristic has been that, as new technology brings new models of aircraft on the market, the airlines may go through years of financial problems as they receive earlier-ordered aircraft that cause their capacity to grow faster than their traffic. (Break-in costs of crews and aircraft may add to their woes.)

Airlines are particularly sensitive to business cycles, especially with respect to the demand for pleasure travel. They also tend to have high debt/equity ratios—that is, the total debt in the form of bonds, aircraft equipment trusts, and so forth is high relative to the stockholders‘ equity. A business enterprise in such a situation is not in a good position to survive an extended period of economic recession.

Characteristics of international service

By law, air traffic between one U.S. point and another U.S. point (the legal term for which is cabotage traffic) can be carried only by U.S. carriers, except that in certain emergencies foreign airlines may be authorized to participate temporarily in such service. Foreign airlines, however, have major scheduled services between the United States and foreign points, in competition with U.S. carriers, and carry about half of this international traffic.

Any international service by any airline can operate only with the consent of the governments at both ends of the trip, as we have previously noted. Any airline wishing to carry traffic between New York and London, for example, must serve two masters—the United States and Great Britain—whether the airline's nationality be U.S., British, or that of a third country. In this situation who decides questions of entry, routes, and rates? It is the government of the respective countries.

Entry—International

Entry into international markets is determined through an elaborate series of bilateral agreements between governments. If a U.S. airline wishes to fly across the Atlantic to several points in Europe and then continue through the Middle East to India, the U.S. government must have a separate agreement with each of the governments along the way that grants one or more U.S. airlines the right to conduct transportation business at specified cities in its territory along a route described in the agreement. In turn, the United States grants similar rights to airlines of the foreign country to serve a point or points in the United States.

Rate Regulation—International

The regulation of international airline rates used to fall largely to an association of airlines known as the International Air Transport Association (IATA), to which most, but not all, of the major airlines of the world belong. Although today much international ratemaking is accomplished outside its system, the IATA mechanism still applies over many routes. The rate agreements of IATA must receive the approval of every government, but to the extent that the airlines and governments wish to have an agreed set of rates, there is a built-in pressure to give ground in order to arrive at an agreement.

2.1.3 Factors affecting airlines profitability

2.1.3.1 Supply side of an airline

The supply side concerns the elements that are put together to make an airline service and what they cost. The principal cost categories should give us a general appreciation of the subject of airline cost problems. Such a list is as follows: Flying operations, Direct maintenance, Maintenance burden, Depreciation and amortization, Passenger service, Aircraft servicing, Traffic servicing, Reservations and sales, Advertising and publicity, General and administrative costs(O'Conner, 2001).

Flying operations include crew wages and fuel. Direct maintenance covers the costs of labor and materials directly attributable to the maintenance and repairing of aircraft, including periodic overhauls, and other flight equipment. Maintenance burden means the overhead costs related to the upkeep and repair of flight equipment and other property, such as the administering of stockrooms, the keeping of maintenance records, and the scheduling and supervising of maintenance operations. This category could also be called ―indirect maintenance costs."

Passenger service would take in the cost of food and providing cabin attendants. Aircraft servicing refers to routine servicing such as washing the aircraft and cleaning the passenger cabin, but not to mechanical servicing. It also includes landing fees. Traffic servicing includes ticketing and baggage handling.

Reservations and sales, as well as advertising and publicity, are self-explanatory, as are depreciation and amortization, but the latter item includes the cost of paying off the huge purchase price of modern aircraft. Lastly, general and administrative costs have been defined as: ―Expenses of a general corporate nature and expenses incurred in performing activities which

contribute to more than a single operating function such as general financial accounting activities, purchasing activities, representation at law, and other general operational administration not directly applicable to a particular function."

Commissions paid to travel agents—a major expense for any airline—fall logically under "reservations and sales," but are often given a separate category.

There are other ways to categorize airline costs. Some airlines use three categories: capacity costs, traffic-related costs, and overhead costs. The first would include wages of flight crew and flight attendants, fuel, maintenance, landing fees, depreciation of aircraft, and charges for leasing aircraft. Traffic-related costs would include ticketing, baggage-handling, other terminal expenses, passenger food, and aircraft servicing. Overhead costs would include "the expenses of maintaining the organization, such as personnel functions, planning and general management". Another source would use a generally similar set of three categories, but would put aircraft depreciation and leasing costs under "overhead."

2.1.3.2 Demand side of an airline

There are certain characteristics of the demand for airline service that, while not unique to airlines, are at least unusual. Passengers can be divided into categories by looking at the purpose of their trip. Typically the simplest of the divisions is into tourist or business travel, the latter including government travel. Another category would be visiting friends or relatives, often classified as "VFR" traffic. And there is always a "miscellaneous" or "other" category, which would include someone traveling to a new job or to attend college.

For each of these groups an airline will try to work out the elasticity of demand. Actually there are two elasticities involved: the price elasticity of demand and the income elasticity of demand.

In economics the term elasticity of demand is assumed to refer to price elasticity. That is, what is the sensitivity of the public to the price of a product? As the price is lowered, how much more will they buy? How much less as the price is raised?

But the other type of demand elasticity is particularly important to air transportation, especially with respect to the tourist market. It is the level of income in a country (or in a city or in a segment of the public) and ask how much of any increase in real income is likely to go into air travel. Conversely, if real income drops, what will be the proportional drop in air travel? The basic concept here is that, as real income rises, people will spend proportionally less on necessities such as food and shelter and proportionally more on luxuries or semi luxuries.

In price elasticity of demand, there is a similar distinction between business and tourist travel. Both have some price elasticity, but that of the tourist is greater. If air fares rise, some business firms will tighten up on their travel budget and may send employees by other modes or by rented automobiles. But the airlines have found that the tourist market is far more price-elastic, and this fact gives rise to the many discount fares weighted with conditions that make them suitable to vacationers but not to most business travel. For example, a discount may apply only when the ticket is bought a month in advance of the flight. Or the discount may be offered only for a round trip where the person must be gone for at least a specified minimum time including a full weekend. Business travel generally requires available space on short notice, often with same or next-day return.

The price elasticity of demand for the ―visiting friends and relatives" category (as well as the ―miscellaneous" or ―other" category) is as varied as the reasons for each trip, and consequently it is hard to generalize about it.

2.1.4 Main variables on demand side and cost side

The industry going through regulation policy changes, growth, different business cycles, strategies, different competition levels, failures and successes has been studied. With the industry as it is, going into certain growth and now in the new century, we assume it‘s worth looking at another model. Thoren (2002) has put some of the major determinants of profits in this industry more in depth, starting with yield and the management of as promised earlier.

2.1.4.1 Demand side: Revenue

Yield is the revenue received by a carrier per passenger kilometer. Naturally, it seems a higher yield would bring in higher profits, but there are possibilities where this doesn‘t hold true. With a high amount of fixed costs, the management, paying less and less attention to the yield, has the obligation to fill empty seats. This is done by attracting the customer, or offering more and more discount fares which would lower the revenue per passenger kilometer, and therefore, lower the yield. Thus, there is a battle between maximizing capacity use to offset fixed costs (if an airplane is flying, it might as well be full) and keeping the revenue up per passenger. Maximum profits cannot be achieved with maximum yield, nor maximum revenue (as this usually means maximum costs), but achieved with the best possible combination of both given the circumstances (Voneche, 2005). Thus, a new concept, yield management, became popular with airlines in describing the delicate computer assisted process of determining the number of discount fares to be made available while protecting the ever-important yield.

In this, there is a theoretical relationship between yield and the profits that airlines turn. If a yield is particularly low, an airline is taking in low revenues per passenger using its service. No matter how many passengers its serving or the lessening of empty seats, in comparison to the sacrifice of perhaps, lower ticket prices, the revenues gained will be slim. Alternatively, perhaps

the yield for an airline is especially high. Per passenger served (a per cost unit, more or less) revenues are high, however, high yields are achieved through higher ticket prices, perhaps suggesting that there is a better alternative for the shopping consumer. Finally a moderate yield should theoretically be a reflection of a ticket price reasonable to consumers and a reasonable profit per unit served to the airline (Voneche, 2005)

Load factor is another important factor that affects airlines profitability. Load is the percentage of seats filled on an airplane. It is important to increase load factor for an airline to increase its revenue because the higher that the seats are filled with passenger, the higher that revenue will be. But a number of factors affect load factor. For example, fares must be kept low on short trips as an airline must take in to account a travelers opportunity cost of going on the ground, and they must be kept high to pay for fixed costs. Perhaps this explains why many smaller and shorter routes are running on subsidies (O'Conner, 2001).

As the market is competitive, keeping prices low but having high costs keep firms in the industry looking for an amount in fares to cover costs and turn some profit, thus, the later of our yield barring situation should produce the most profits.

Whenever discussing the economics of anything, serious perspective will take into account in GDP. Unneeded to be said, GDP plays one of the major roles in determining airline demand, and therefore medium for a correct capacity estimate and a determinate of airline profitability (O'conner, 2001). Simply enough aggregate demand for air transport is based highly upon economic activity, growth and decline. Therefore, a simple but definite positive relation to form would be that of GDP and revenue passenger kilometers (RPK). Mentioned with the downfall of

eastern airlines and a major cause for airline alliance were the troubled times of the early 1990‘s for the industry. This was a time of recession in the U.S. and European economies.

Working with a larger market and larger demand theoretically means better profitability. A lower GDP is an economic slowdown, resulting in a weakening of the necessity for business travel, and additionally, consumers‘ disposable income. This lessens the demand for air travel, leading to more empty seats, less efficiency and less profit. On the other hand, a higher GDP does quite the opposite, filling seats and adding to efficiency and profits. However what would occur if a carrier couldn‘t meet the demand for its services? It‘s possible, if one season produced particularly high demand, a carrier that couldn‘t meet it may lose some of its consumer base to an airline that could. A key idea to the relationship between GDP and profits is not only the demand for air travel, but the prediction of demand. If a carrier over-predicts demand, it may be left with empty seats and overhead leading to profit losses (IATA press releases, 2014).

Underestimating demand would lead to a high load factor in the present, but a possible loss in consumer base in the future. Thus bringing GDP into the equation as a determinant of demand and therefore a revenue factor, the key variables that determine the profitability of an airline.

2.1.4.2 Supply side: costs

As the yield is to revenue, seat-kilometer-costs (ASK) are to costs. It is, quite simply, the cost of a seat being carried for one kilometer. To managers, this is what represents the cost for one unit of output. Also used is the term _cost per revenue-passenger-kilometer, usually simply referred to as _passenger kilometer‘. Revenue is attached to due to the fact that in rare cases, passenger may be carried for free, or at a very significant discount, such as employees and their families. Needless to say, firms want to minimize costs. Airlines face recurring situation making this

difficult to do; it would be appropriate to look at some of these and see the response, or what should be. The first of which is the short haul problem. Much like yield needs to be protected when calculating revenues, so do the seat mile costs. This can become disastrous when serving markets consisting of short distances. First of all, terminal rates be it passengers or cargo are going to be the same whether the flight is 200 miles or 2500 miles, making the shorter flight to creates a situation with little distance to spread these costs out. Other point costs include fuel consumption at take-offs and landing. If an airline is doing one round of porting on the longer flight, needless to say, these costs are much lower per seat- mile. The same will go for landing and terminal use fees (Smyth & Pearce, 2006).

Another issue is realizing that minimizing costs means minimizing costs per unit input and maximizing use per unit input or, minimizing cost per output. This is done by maximizing use of current inputs. Basically this can be looked at as any generic airline. If there are two carriers, America‘s United and Thailand‘s Thai Airways serving the San Francisco-Tokyo market, and let their production functions to be the same. In Thailand, wages are low, so most industries are labor intensive whereas in the U.S. industry is capital intensive. When flying 400 people from San Francisco to Tokyo in 9 hours, they are both going to use a Boeing 747 priced the same, they both use the same amount of fuel that they bought from the same company at a market price (which could vary a little based upon bargaining abilities), and they both pay the same expensive fees at both airports (Thoren,2002).

The big difference comes in as the industry standard, wages. High wage capital intensive nation‘s ability to compete in a homogeneous industry with Southeast Asian nations paying low wages is questioned. The answer comes in management and factor usage. It has been found that management in high wage nations are more effective at the key to minimizing costs, the

scheduling of inputs. Looked at constantly by managers and airlines economists are the questions: how many hours per month, per salary unit are the crews flying? Of 24 hours, how many of those are in the air on average for expensive aircraft that are constantly being charged depreciation? These need to be safely maximized in order to be in a lucrative business. Aircraft and crew must be utilized to a reasonable maximum, but again, as we found that a yield too high may not fill empty seats, an aircraft in the air 20 out of 24 hours (this would actually be rather unfathomable compared to a good rate of 10 or 12 hours)(O'Conner, 2001) probably won't be putting the capacity to best use. It would be poor managing to maximize aircraft utilization with low load factors. Thus, might the term _seat-utilization' be suggested?

In order to balance all of this an airline wants to have in its possession the necessary factors, and no more. Labor can be hired, fired, imported, and exported with less difficultly than other matters. Fuel can be acquired simply with capital and reasonable political relations. Slots at airports are in issue, but the industry is currently in operation only the future bringing major problems. The problem with having the correct amount of inputs is buying airplanes. The other factors already exists and are just being _released' in a sense (humans, oil) as needed, but aircraft need to be ordered and built in large numbers taking enough time to bring about the need for predicting with precision future demand of air travel, which depends on many, many factors including the economic state, the state of business, peoples' personal demands, the state of substitutes and sometimes future political relations making it quite an arduous task (Thoren, 2002).

Once a carrier has airplanes, efficient utilization involves scheduling. This involves the sorting out of many factors. A scheduler must consider markets, how large they will be and how much they will change with the day of the week and the time of day. Markets consist of local and

intermediate traffic. Some airports will have shortage of slots and time constraints or curfews. Scheduling a stop for maintenance or refueling must be such that the location is the point of origin for the next route to be flown. Thus a balance of aircraft utilization, load factor, crew utilization, availabilities of the aircraft and other factors, and scheduling must be achieved to minimize costs, thus maximizing profits. A discussion on cost wouldn‘t be complete without a little extra attention towards airlines‘ biggest costs, labor and fuel. Both present major problems besides the fact that they are the two major costs the airlines face. Attacking this root of the problem is key for the airlines‘ to be profit takers (Thoren, 2002).

Labor issues

One of the key problems with labor and labor costs is simply the power that airline employees can hold over their firms. Opposed to the level in most industries, the level of skill and responsibility involved in any task that is part of airline operations is of the highest. Dealing with wages and contact must reflect this and the fact that airline operations occur at all times, 24 hours a day 365 days a year and that employees are located and even moving all around the nation and the world (Thoren, 2002).

Knowing this, almost all airline employees in industrialized nations are part of unions. Unions are based upon the individual task group, such that mechanics, pilots, stewardess and so on all have separate unions. A problem in one group however involves a problem for all as if one group strikes, this shuts down operations, taking away the necessity for operations of the other groups. Airlines cannot keep their products in inventory to hold over and limp through the strike. When service stops, there is nothing to be sold. As well as knowing this, labor unions know peak seasons for airline service, increasing bargaining power to critical levels (Thoren, 2002).

The major tool that airlines used in the 1990‘s and currently with their labor cost problem, threats, and for improvement of labor efficiency is to tie their incentives to workers‘. This is done by ownership. A stake in the profitability of the airline (or then again, the lack thereof) is an incentive to work harder and boost worker morale. Employees pay for shares through wages, benefits and work rules spread over a number of years (Thoren, 2002).

Fuel and rent

Fuel is the major cost of airlines for most parts of the world. This year we estimate airlines will spend $212 billion on jet fuel, which represents almost 30% of their total operating costs. Jet fuel prices are stable, but there has never before been a 3 year period when energy costs have remained so high (IATA,2014). Political conditions in the Middle East could always send the price up due to an interruption in production of fuel causing shortages. Airlines answer this like any cost problem, increased efficiency. Fuel is such a large cost that it focuses intense effort in the industry to improve fuel efficiency better operations and efforts to try to persuade governments to remove the airspace and airport inefficiencies that waste around 5% of fuel burn each year. Amazingly enough, airlines have the same gas mileage as a passenger car. This is good as an airline often has well over 200 people on board, but in another way seems poor, as a traveling aircraft has no ground friction to deal with and scientifically should be much more efficient than an automobile. In answering the fuel efficacy situation, airlines do what is financially reasonable to keep a relatively new fleet in service, as newer aircraft are more fuel-efficient. Though expensive, efficiency pays for itself over time. On a smaller financial scale, airlines often consider the purchase of new, more fuel efficient engines to use with existing aircraft. Other than this, airlines can only be efficient in their operations, obtain high load factors

at existing prices and minimize short routes that have minimal miles and revenues per fuel consuming take-offs and landing (Symth & Pearce, 2006).

Finally, in a discussion of costs to airlines, we must include the cost of airplanes. Airlines face an extraordinary cost of one airplane, much less many planes to complete a fleet, and they face the challenge of deciding the number of planes necessary, certainly no more, precisely meet market demand. Carriers meet this challenge in similar ways that public often do with their cars, most of the current operating commercial airlines fleets are leased or rented, often with future ownership rights (Zintro, 2011).

2.2. Empirical literature

Mantina, Jen-Hung and Wang(2012) studied the determinants of profitability in the U.S. domestic airline industry by considering operations strategy, productivity, and service measures, while focusing the attention on the effects of the 9/11 attack. It finds that Prior to 9/11, operations strategy, productivity, and service measures are significantly related to profitability. However, after 9/11, none of the service measures are significant. Further analysis suggests that after 9/11 passengers are more forgivable to service glitches or are associating lack of service with the intensified security measures imposed after 9/11. We also find that after 9/11, the profitability of full-service carriers is improving faster than that of focused carriers.

Thoren (2002) examined profits and their determinants that keep USA carriers in service. The researcher assessed the impact of revenue components like GDP of a nation, revenue received by a carrier per passenger kilometer(yield) and load factor as well as the impact of cost components like cost paid for fuel, labor, maintenance, landing and other airport use fees, rent paid for aircraft use and the like on profitability of the airline. And it finds that load factor is a major

determinant of airlines profitability. A 1% change in the average load on operating flight can make a difference of tens or even hundreds of millions of dollars in profit. It also finds that unit costs are the determinants of the cost function and profit. Fuel was particularly important as it is the airlines second largest cost. Finally, like any firm in the marketplace, the study shows that airlines benefit from an expanding economy.

Eller and Moreira (2013) studied the main cost factors in airlines management. They analyzed the main factors that affect the strategies to reduce airlines costs. The results show that the main important factors for a cost-related airlines strategy are, in importance: route structure and mesh; type and characteristics of the aircraft; cost of labor and management quality. This hierarchy can help the decision maker when facing the need of defining priorities in reduction costs.

Mwangi (2013) studied the effect of macroeconomic variables on financial performance of aviation industry in Kenya. The purpose of this study was to determine the effects of macroeconomic variables on financial performance of aviation industry in Kenya. The financial performance measures of companies in aviation industry used was the Return on Assets (ROA) which was regressed against the macroeconomic variables including real exchange rate (USD/Ksh), GDP growth rate, the change in money supply (M3), average annual lending interest rates as computed by Central bank of Kenya and inflation rate measured by annual percentage changes in the consumer price index (CPI). The results revealed that return on assets of companies in aviation industry had weak positive insignificant correlation with gross domestic products growth rate (0.102) and annual change in money supply M3 (0.122). The study also found that ROA had weak negative insignificant correlation with exchange rate (-0.082), annual average lending rate (-0.041) and annual average inflation (-0.172).

Stepanyan A. (2006) studied the use of traditional ratio analysis in the airline business with a case study of leading U.S carriers. The paper addresses the traditional ratio analysis in the airline industry based on the U.S example. Given the specificity of the airline industry and its significant vulnerability to adverse changes in economic and business conditions, conducting a ratio analysis aims to reveal the airline industry-specific behavior of the selected liquidity, profitability and solvency ratios computed for eight U.S largest airlines over the period 2007-2012.Its profitability ratios showed profitability in the airline industry has been poor throughout the six-year period and remains so in the face of improvements primarily due to losses incurred during the economic recession, slowing demand for air travel and increasing operating expenses mainly driven by rising fuel expenses and labor costs whereas the analysis of long-term solvency risk has indicated high financial leverage in the U.S airline industry which puts the leading carriers at higher risk although coverage ratios have showed that on average selected air carriers have been able to cover interest expense and other fixed charges since 2010 when the global economic environment began to gradually better.

Antoniou (1992) studied factors determining the profitability of international airlines. He studied the impact of independent variables average passenger load factor, share of international traffic, share of scheduled traffic, share of passenger traffic, labor productivity, cost-structure, average lengths per departure, total ton-km available, weighted fleet utilization, fleet size, average fleet age, and general economic variables like population, area, GNP per capita on the dependent variable operating profit margin. The sample of 58 airlines was chosen out of a total of 114 active IATA members, 1985. Observations on the dependent variable were chosen from the ICAO publication for the same year while observation on the regressors had to be drawn from both sources. The result shows that average passenger load factor, cost structure, total ton-km

available, average fleet age and population are statistically significant. Together these 6 regresses alone can change the value of operating profit margin by upto 2%. These variables play a key role in airlines profitability. Share of International Traffic, Share of Scheduled Traffic, labor productivity and fleet size are not statistically significant and they have non-negligible effect on operating Profit Margin.

Shah (2009) studied the factors influencing the profitability of European budget airlines through a detailed analysis of three airlines: Ryanair, Easy Jet and Sky Europe. It begins by defining budget airlines and examining their origins in Europe. It then looks at previous studies that determine factors that influence the rate of return in aviation. It then undertakes a detailed analysis of the airlines performance from 2000 to 2008. He studied the impact of variables unit staff cost, unit fuel cost, other miscellaneous cost, the quality of management and business strategy and load factor on profitability of the three airlines. The study concludes by identifying the factors that influence profitability in this industry. They are giving employees stock options, discouraging unions, outsourcing or relocating jobs to country‘s with lower labor costs, fuel hedging, adopting more fuel-efficient aircrafts, outsourcing maintenance to countries with lower labor costs, improving management , a clear cut business strategy, a high load factor, the ability to generate ancillary revenue, size, scale and first mover advantage.

Alahyari (2014) studied determinants of profitability for the Turkish airlines. Accordingly, a sample of 13 major airlines is chosen turkey and their data is extracted from Data Stream covering 1994 to 2013. The study used the variables company size (logarithm of sales), company growth opportunities (growth of sales), leverage ratios, liquidity ratios and tangibility of assests (measured by Ratio between Fixed Assets and Total Assets). Based on the panel data analysis, findings show that tangibility of assets, growth opportunities and liquidity ratios have significant

impacts on the profitability of the firms. Tangibility of assets are negatively affecting the profitability of the firms in the airline industry, while growth opportunities are also inversely affect the profitability of airline companies in the sample. In addition, liquidity ratio is another factor which represents a negative and statistically significant relationship with the profitability of the firms.

Eyob (2014) studied profitability analysis of Ethiopian Airlines from 2009 to 2012. The research is targeting to accomplish three main objectives. First, to identify and clarify main reasons for the consistent increase of costs or expenses that impacted net profit of Ethiopian Airlines in the specified financial period. Second, analyze the income statement of EAL using financial statement analysis tools that implicate profitability of the company. This is also to analyse effects of consistently increasing operating expenses to profits from operations. Third, is to compare the results found from the income statement analysis with the direct competitors of the company in the continent. The analysis showed that Sales revenue of Ethiopian airlines increased in consistent during the four years. It has increased in 10% and over in comparison to preceding years mainly because of the company‘s strategy increase in its destination, due to its buying of latest aircrafts, increase in demand of air transport due to economic recovery and the like. Total operating expenses increased very high reaching to 97% of the total revenue. This basically means that the case company has to expend 97 cents in order to generate 1US$. Operating profits declined in 2011 and 2012 financial years in comparison to previous year‘s results mainly due to an increase of flying costs. Particularly, jet fuel expense with a great magnitude affected the operating results produced by the company. In case of Non-operating activities**,** The case company generated interest income for three years in the period accounting 1-3% of the total revenue and it contributed to the net profit. However, this has declined in 2012 when the

company incurred an interest expense higher than interest income produced. The benchmarking and ratio analysis conducted indicate that the overall performance of Ethiopian airlines profitability in the four years financial period were better than its direct competitors.

2.3 Summary of literature review

The chapter covered literature on different factors that affect Ethiopian airlines profitability. It first started by reviewing about the nature and characteristics of airline industry to show its unique nature from other industries. Second, it showed the theories on which the study was build, including the different demand and supply side factors affecting airlines profitability. O'Conner (2001) identified the different demand side and supply side variables that affect airlines operation. Thoren (2002) identified major variables that could affect airlines profitability from demand side and side theoretically.

The study further reviewed the empirical studies: for instances, Mantina, Jen-Hung and Wang (2012) studied the impact of operations strategy, productivity and service measures on profitability. Thoren (2002) studied the impact of GDP, load factor, yield, and different costs of airlines on profitability. Eller and Moreira (2013) pointed out type and characteristics of aircraft, labor cost, and management quality has an impact on profitability. Mwangi (2013) studied the impact of various macroeconomic variables like GDP on profitability of Kenyan airlines. Antoniou(1992) studied factors like Average Passenger Load Factor, Share of International Traffic, Share of Scheduled Traffic, Share of Passenger Traffic, Labor Productivity, Cost-structure, Average Lengths per Departure, Total Ton-km Available, Weighted Fleet Utilization, Fleet Size, Average Fleet Age, and general economic variables like population, area, GNP per capita and their impact in determining the profitability of international airlines. Shah(2009) studies the factors like the impact of variables unit staff cost, unit fuel cost, other miscellaneous

cost, the quality of management and business strategy and load factor on profitability of three European budget airlines. Alahyari (2014) studied the impact of company size, company growth opportunities, leverage ratios, liquidity ratios and tangibility of assets on profitability of Turkish airlines.

The review of literature clearly found a research gap in Ethiopia as most of the studies done in the area had focused on the impact of different variables in the airline industry profitability around the world. In this study, seven variables are explored in the model to show which one affects Ethiopian airlines profitability. The independent variables load, yield, ASK, labor cost, fuel cost, maintenance cost, rent or lease cost are chosen to show their impact on the dependent variable profit due to the fact that these variables have influenced profitability of other airlines as being illustrated in the literature review. Load and yield are demand side variable while ASK, labor cost, fuel cost maintenance cost, rent cost and lease cost are the supply side variables chosen for this study. The researcher has not used GDP of Ethiopia due to the fact that Ethiopian airlines major customers are not internal customers (Ethiopian use other means of transportation due to lower income),but they are foreigners. There was therefore a gap in literature as regards to the impact of different demand side and supply side factors that affect Ethiopian airlines profitability. The current study therefore contributed towards this research gap by establishing determinants of Ethiopian airlines profitability.

CHAPTER THREE

3. Research design and methodology

3.1 Research design

The study employed explanatory type of research design to estabilish causual relationship between variables. Explanatory studies are designed to test whether one event causes another (Hair, Babin, Money & Samouel,2003). The research is explanatory because the researcher used time series empirical data on the variables to examine the impact of independent variable (load factor, yield, ASK, labor cost, fuel cost, maintenance cost, cost of renting or leasing an airplane) and the dependent variable (profit).

3.2 Data source and sample size

In this study the researcher used secondary data to investigate the relationship between independent variable (load factor, yield, ASK, labor cost, fuel cost, maintenance cost, cost of renting or leasing an airplane) and the dependent variable (profit). The study includes time series data which is collected from year 1987 to 2014. This yearly data were collected from Ethiopian airlines statistics office. In order to smooth this time series data natural logarithmic transformation was made before doing any work for all series.

3.3 Methodology

The researcher uses time series econometrics on the variables to examine the effect of load factor, yield, ASK, labor cost, fuel cost, maintenance cost, cost of renting or leasing an airplane on the dependent variable profit.

3.3.1. Unit Root Test

The first thing in analyzing time series data is testing the stationarity of the series whether it is stationary or not that means whether it is time dependent or not. Because in order to generalize for all periods even, for those periods that had not included under study the mean and variance covariance of time series data must be independent of time. Unless the time series data is stationary the researcher can generalize only for those time period that are included in the study.

There are different methods of testing unit roots for those variables included under study. This study considered Dickey fuller test, Augmented Dickey fuller test among those different test of stationarity.

Dickey Fuller (DF) test is used when the error term is identically and independently distributed. But if there is serial correlation the researcher uses Augmented Dickey Fuller (ADF) test which adjusts it by including additional lags.

The hypothesis used to test unit root for all the above tests was stated as follows

H_0= *there is unit root (non stationary)*

H_1= *there is no unit root (stationary)*

If the time series data is not stationary at level the researcher make it stationary by differencing up to second order, But if it is not stationary up to second order, the time series data is not economically reasonable it is better to revise the data. But if the non stationarity is due to the existence of trend, it can be made stationary by detrending (including time period) the time series data (Gujarati, 2004).

3.3.2. Single Equation ECM

The single error correction model is used for this study because it is important for the analysis of both the short run as well as the long run effect between dependent and independent variables. Janko, Herbert & Guenette (2013) used a time series error correction model to determine the short run and long run impacts of the unemployment rates on death rates. Yaser, Nelson & Rejesus (1997) examined the short run and long run dynamics of the export-productivity relationship for Turkish manufacturing industries. Basically, single ECM can be written as:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_{1t} + \alpha_2 \Delta X_{2t} + \alpha_3 \Delta X_{3t} + ... + \alpha_k \Delta X_{kt} - \lambda(Y_{t-1} - \theta_1 X_{1t-1} - \theta_2 X_{2t-1} - \theta_3 X_{3t-1} - ... - \theta_k X_{kt-1}) + \varepsilon_t .....I$$

Where, Y and X are dependent and independent variables respectively.

α_0 is constant, $\alpha_1, \alpha_2, \alpha_3, \ldots\ldots \alpha_k$ estimates the short run effects of X's on Y, λ estimates the speed of adjustment to equilibrium after a deviation, ε_t is an error term and $\theta_1, \theta_2, \theta_3, \ldots\ldots \theta_k$ are estimates the long run effects of X's on Y.

The data was analyzed using time series econometrics methodology. The analysis is done by using Eviews.

3.3.3. Model specification

In this section the researcher explains the model specification based on economic theory which states Profit is a function of the revenue components and the cost components, or

Formulation of an econometric model presented as follows;

(+) (+) (-) (-) (-) (-) (-)

$$\text{Profit} = \alpha + \beta_1 \text{load} + \beta_2 \text{yield} + \beta_3 \text{ASK} + \beta_4 \text{LABOR} + \beta_5 \text{FUEL} + \beta_6 \text{MAIN} + \beta_7 \text{rent} + \varepsilon_t$$

Where

LOAD	the percentage of the available seats for sale on operating flights for the given airline that are filled
YIELD	is the total revenue per passenger mile
ASK	is the total number of seat kilometers available
LABOR	is the total cost of labor in wages, salaries and benefits per worker
FUEL	is the total cost of fuel
MAIN	is the total cost of maintenance
RENT	is the total cost of renting or leasing airplanes for the year airline
ε_t	An error term

Profit is the dependent variable used for the study. Here the profit means the net income of the company after interest payment and other payments and it is what the company announces at the end of its fiscal year.

LOAD is the percentage of seats filled on an airplane in operation. This is a critical factor in determining revenue, therefore profits. As the cost of operating a flight from one point to another going to be almost the same despite the load factor, an airlines objective is to concentrate on maximizing the ratio of filled seats to empty ones.

Unlike selling a manufactured product or a utility, a seat on an airline cannot be stored for later sale when the demand increases. When the gates to a flight are closed, so is the opportunity to sell empty seats, lost forever, along with the cost incurred in offering those seats, for which there will be, no revenue. Thus, having a higher percentage of seats filled will mean higher revenue,

offsetting costs and increasing profits, LOAD should have a relatively high value positive coefficient. Thoren (2002) and Antoniou (1992) showed the importance of load factor to the profitability of airlines.

YIELD, the average revenue per passenger kilometers can be achieved simply by selling tickets at high prices. After all, even if a few exceptionally expensive tickets are sold, the revenue for each of those passenger kilometers will be high. If this occurs, the general air traffic consumer will fly to the carrier that‘s cheaper, sending profits down for our high yield carrier. However, its assumable that no reasonable profit desiring airline will do this, so a maximum profit should be achieved with a high yield, but only after a high load factor. Thus, YIELD should positively contribute to profit, but not as much as LOAD.

Though they seem to be the most endogenous, all other variable are affected by many things at all times. Fuel prices depend on political situations, availability, demand, contracts, hedging, decisions made by fuel vending bodies (OPEC) and an unlimited number of other factors. Eyob (2014) showed that operating profits declined in 2011 and 2012 due to an increase of flying costs particularly fuel expense. Maintenance costs depend on labor contracts, labor supply, parts availability, fleet age regulations of authorities and an unlimited number of other factors. All of these factors are a fractional of the GDP and the economy‘s position in the business cycle, thus determining profitability of any firm and the amount of resources spent on variable costs and determining the number of aircraft or other inputs ordered for the next five years and boosting or causing the economy to decline again causing the continuation of an infinity cycle. Basically, it seems that the value of any variable in this model is determined by airlines actions as well as any number of outside factors in the course of events.

ASK is the cost of a seat flown in one kilometer. It is important to know the unit cost of flying an airplane from one point to another point. It is a measurement of aircraft use. Airplanes are ordered for lease 1-5 years in advance of use, so naturally demand for air travel will be taken into account upon ordering. If demand is over predicted, this figure will be low as some airplanes may not be used for a period of low demand leading to ASK to be low.

The result for LABOR should prove to be interesting, as when more is paid per worker, profit will surly drop. Eller and Moreira (2013) and shah (2009) showed labor cost as the most important cost of airlines that affect airlines profitability. However, economic theory states that wages and prices rise and fall together. This would mean it may be more expensive to fly with a Hong Kong or Japan based airline where prices and wages are high and high prices mean more revenue and profits for the airlines. However, this is only limited as wages are one of many costs to the airlines.

Labor being the first cost factor in many airlines, FUEL is also a major negative factor in Ethiopian airlines profits as it is the first most expensive necessity in running an airline. MAIN should also be very negative; it is the third largest expenditure by airlines. RENT most expensive necessity in running an airline. RENT is no different. RENT can be especially dangerous because it is contracted, a rented plane sitting on the ground due to low demand for its use still must be paid for unlike a canceled landing slot or laid off labor.

3.3.4. Measure of model goodness

R-squared

The R-squared (R^2) statistic measures the success of the regression in predicting the values of the dependent variable within the sample. In standard settings, R-squared may be interpreted as

the fraction of the variance of the dependent variable explained by the independent variables. The statistic will equal one if the regression fits perfectly, and zero if it fits no better than the simple mean of the dependent variable.

$$R^2 = 1 - (\hat{\varepsilon}'\hat{\varepsilon})/(y - \bar{y})'(y - \bar{y})$$

F-Statistic

The *F*-statistic reported in the regression output is from a test of the hypothesis that *all* of the slope coefficients (excluding the constant, or intercept) in a regression are zero. For ordinary least squares models, the *F*-statistic is computed as:

$$F = (R^2/(k-1))/((1-R^2)/(T-k)$$

Under the null hypothesis with normally distributed errors, this statistic has an *F*-distribution with k-1 numerator degrees of freedom and T-k denominator degrees of freedom.

The *p*-value given just below the *F*-statistic, denoted Prob(F-statistic), is the marginal significance level of the *F*-test. If the *p*-value is less than the significance level five percent the researcher rejects the null hypothesis that all slope coefficients are equal to zero which implies the overall model is significant vice versa.

3.3.5 Diagnostics test

3.3.5.1. Testing for Serial Correlation

Before using an estimated error correction model for statistical inference the assumption of there is no autocorrelation between the error term and the independent variables should be tested using

Durbin Watson test, Q-statistic and the Breusch-Godfrey LM test. The hypothesis test serial correlation test is presented as follows:

H0: there is no serial correlation

H1: there is serial correlation

In order to say our model is good to make any decisions using the regression result the null hypothesis should not be rejected which implies that there is no serial correlation and the researcher can say the independent variables and the error term are uncorrelated which satisfies Gauss–Markov assumption of there is no autocorrelation.

3.3.5.2. Normality Test

In order to say the model is good the residual should be normally distributed to satisfy the classical assumptions regression model. To test this normality the researcher uses Jarque-Bera statistics. If the residuals are normally distributed, the Jarque-Bera statistic should not be significant and the researcher do not reject the null hypothesis of the error term is normally distributed. The hypothesis of normality test is presented as follows:

H0: the residuals are normally distributed

H1: the residuals are not normally distributed

CHAPTER FOUR

4. Result and analysis

In this section the result of stationary test, multiple regressions and diagnostics tests like normality test, serial correlation test and other test was presented and discussed one by one.

4.1. Unit root test result

The table which is presented below shows the stationarity test of all variables included under study with and without constant.

Table 4.1: unit root test result

Variable	with intercept		without intercept	
	t-Statistic	Prob.*	t-Statistic	Prob.*
Lyield	0.021	0.953	3.204	0.999
d(Lyield)	-7.165	0.000	-2.390	0.019
Lfuel	1.767	1.000	4.604	1.000
d(lfuel)	-5.472	0.000	-0.615	0.441
Lprofit	-0.774	0.812	0.881	0.894
d(lprofit)	-5.463	0.000	-5.782	0.000
Lrent	-0.348	0.906	2.564	0.997
d(lrent)	-4.446	0.002	-3.555	0.001
Lmain	0.434	0.981	3.611	1.000
d(lmain)	-4.637	0.001	-3.499	0.001
Llabor	3.744	1.000	8.847	1.000
d(labor)	-3.937	0.005	-0.550	0.470
LASK	2.523	1.000	4.657	1.000
d(lASK)	-4.654	0.001	-0.546	0.471
Lload	-2.929	0.054	1.004	0.912
d(lload)	-7.015	0.000	-8.809	0.000

In the above table Lyied, Lfuel, Lprofit, Lrent, Lmain, Llabor, LASK, Lload are the variables at logarthimic level. Dyield, dfuel, dprofit, drent, dmain, dlabor, Dask, and dload are the results of the variables after first difference.

The above table shows the augmented dickey fuller test result for all variables for the dependent as well as well as explanatory variables with intercept and without intercept. The result of unit root test with intercept shows that all variables profit, rent, maintenance, labor cost load, ASK, fuel and yield are not stationary at logarithmic level. The probability of the variables is greater than 0.05 at logarithmic level that shows us that the variables are not stationary. But these variables are stationary after first differences which indicate the variables were integrated of order one. Stationarity of the variables without intercept was also checked and the same result of with intercept was obtained which shows that the variables are stationary after first difference of logarithmic level but not stationary at level. The probability is below 0.05 after first difference that shows stationarity of the variables.

4.2. Model diagnostics test

Table 4.2.1: Test of autocorrelation

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.01846	Prob. F(1,11)	0.8944
Obs*R-squared	0.04692	Prob. Chi-Square(1)	0.8285

The above serial correlation LM test suggests that there is no serial correlation for the selected error correction model because we have no significant evident to reject the null hypothesis of no serial correlation at 5% level of significance.

The residuals of correlograms from ECM which is offered in appendix II provide a summary of the autocorrelation and partial autocorrelation properties of the estimated residuals. The aim is to find a model in which no residuals autocorrelations are significant. For the residuals to be considered white noise, they must each be uncorrelated with lags of themselves as well as lags of all other residuals (i.e.my aim is to find a model in which the estimated residual auto-correlations lie inside the 95% confidence intervals). This result reveals that there are no significant spikes of ACFs and PACFs; it means that the residuals of the estimated model are white noise, so that there is no other significant patterns left in the time series and all are within the Bartlett bands. The Ljung-Box statistics are also good for small and moderate displacements. This result matches with the result of Durbin Watson test statistics which shows the value approaching to two and the LM serial correlation test which shows there is no serial correlation.

Table 4.2.2: Test of Heteroscedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.938602	Prob. F(15,12)	0.5534
Obs*R-squared	15.11608	Prob. Chi-Square(15)	0.4431
Scaled explained SS	2.670079	Prob. Chi-Square(15)	0.9998

From the above table 4.2.2 the Breusch-Pagan-Godfrey heteroscedasticity Test shows that there is no heteroscedasticity effect because the probability of the Breusch-Pagan-Godfrey test is greater than 5%. This implies the residuals have constant variance and it does not vary over time.

The normality test result was presented in appendix II. As the result depicts there is an evident to accept the null hypothesis of the residuals are normally distributed because the Jarque-Bera statistic should not be significant at 5% level of significance and the histogram of the residuals also suggest that the residuals appear to be fairly well approximated by a normal distribution.

4.3. Econometrics result

The impact of the explanatory variables on profit using error correction model which shows both long run and short run impacts are presented below:

Table 4.3.1: **Estimation Result of ECM model**

Dependent Variable: D(LPROFIT)
Method: Least Squares
Date: 04/10/14 Time: 11:08
Sample: 1987 2014
Included observations: 28
HAC standard errors & covariance (Prewhitening with lags = 1, Bartlett kernel, Newey-West automatic bandwidth = 18.2324, NW automatic lag length = 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRENT)	-0.222766	0.106863	-2.084585	0.0591
D(LYIELD)	2.417145	0.817213	2.957792	0.0120
D(LMAIN)	-0.564837	0.268621	-2.102731	0.0573
D(LLOAD)	3.142048	0.701496	4.479065	0.0008
D(LLABOR)	-0.615616	0.515261	-1.194765	0.2553
D(LFUEL)	-2.069985	0.857626	-2.413621	0.0327
D(LASK)	2.001826	0.596216	3.357551	0.0057
C	-58.99844	20.36475	-2.897087	0.0134
LPROFIT(-1)	-1.060974	0.116126	-9.136440	0.0000
LRENT(-1)	-0.357427	0.122566	-2.916208	0.0129
LYIELD(-1)	2.333798	0.999816	2.334227	0.0378
LMAIN(-1)	-0.116533	0.300156	-0.388243	0.7046
LLOAD(-1)	4.513890	1.430612	3.155216	0.0083
LLABOR(-1)	-1.163770	1.353430	-0.859867	0.4067
LFUEL(-1)	-1.660504	1.371566	-1.210663	0.2493
LASK(-1)	5.382132	1.589844	3.385321	0.0054

R-squared	0.793949	Mean dependent var	0.098663
Adjusted R-squared	0.536386	S.D. dependent var	0.564648
S.E. of regression	0.384465	Akaike info criterion	1.221629
Sum squared resid	1.773757	Schwarz criterion	1.982889
Log likelihood	-1.102811	Hannan-Quinn criter.	1.454354
F-statistic	3.082539	Durbin-Watson stat	2.018871
Prob(F-statistic)	0.027976		

D (LPROFIT) =-58.998-0.2228D (LRENT) +2.4172D (LYIELD)-0.5648D (LMAIN) +3.1421

(-2.897) (-2.085) (2.958) (-2.103) (4.479)

D (LLOAD)-0.6156D (LLABOR)-2.0699D (LFUEL) +2.0018D (LASK)-1.061(LPROFIT (-1)

(-1.195) (-2.414) (3.358) (-9.136)

+0.3574LRENT (-1)-2.3338LYIELD (-1) +0.1165LMAIN (-1)-4.5139LLOAD (-1) +1.1638

(2.916) (-2.334) (0.388) (-3.155) (0.860)

LLABOR+1.6605 LFUEL (-1)+5.0728LASK (-1))

(-1.211) (3.3853)

F-statistic = 3.082539 R-squared = 0.793949

Prob(F-statistic) = 0.027976

The F- statistics 3.08 or the probability value of 0.02 shows that the overall model is significant which implies that the model is good and shows the impact of explanatory variables on profit. The R-squared 0.794 value shows that 79.4 percent of the dependent variables were explained by the explanatory variables which is a good indicator of a good model.

The value which is presented in bracket refers the test statistics of the error correction estimation result shows that the significance of the variables in the short run and in the long run. When we see the result one by one;

Rent has a negative and significant impact on profit for both in the short run and long run. In the short run a one percent increase in the cost incurred for rent decreases the profitability of Ethiopian airlines by 0.22 percent. In the long run it affects more as compared to the short run which implies a one percent increase in the rent cost decreases Ethiopian profitability by 0.36 percent. This implies that rent has a negative impact on the airlines profitability because the cost

of leasing or renting airplanes has been increasing in the past years under study affecting its profitability.

The yield impacts on profit show that yield have a positive and significant impact on profit both in the short run and long run. Yield is ticket price reasonable to consumers and a reasonable profit per unit served to the airline or it implies maximizing ticket price with a good managerial skill which maximizes in turn profit. A one percent increase of yield increases profit by 2.4 percent in the short run and a one percent yield increase in the long run have about 2.3 percent impact on maximizing profit. The result shows the impact of yield is a beat larger in the short run as compared to its long run impact. This implies that any decision to increase yield fairly has a big importance in increasing the airlines profitability both in the short and long run.

The result of maintenance shows that it has a negative impact on profit which is significant in the short run and not significant in the long run. The result shows a one percent increases maintenance costs leads the profit decline by 0.56 percent. This implies that the cost of maintaining an aircraft has a short term impact on profitability and it doesn‘t affect profitability of the airline in the long run.

The load has positive and significant impact on profit both in the short run and in the long run. This impact of load on Ethiopian airline is in line with the finding of Thoren (2002) on USA carriers in service. It also supports with the finding of Antoniou (1992) who studied on factors determining international airline profitability. The load has a positive and significant impact on airlines profitability. Therefore, load that is the percentage of seats filled on airline operation has a positive and significant impact. A one percent change on the load factor has 3.1 percent changes on profitability in the short run and 4.5 percent in the long run. This implies the impact

of load on profitability in the long run is greater than its short run impact. This again implies that the decision to fill the aircraft seat with reasonable price leads to more profit in long run than in the short run.

The result of labor on profit shows that it has a negative impact both in the short run and long run but it is not significance for both. The cost of labor compared to the other cost of Ethiopian airlines is minimum. This is directly opposite to the study made by Eller and Moreira(2013) that that showed cost of labor as the main cost factor in airlines managment. Due to this reasons salary is not a significant variable to affect profitability negatively both in the short run and long run.

The result of fuel shows that its impact on profit is negative which implies it affects negatively the profit of Ethiopian airlines. Its impact is significant in the short run but not significant in the long run. The reason behind this is in the short run the fuel has a direct impact on profitability because other factors are fixed in the short run but in the long run the market adjusts itself and equilibrium will be reached. The short run negative and significant impact of fuel cost on Ethiopian airline profit matches with the finding of Eyob (2014) who found the operating profit of Ethiopian airline was decreased in year 2011 and 2012 due to an increase in fuel cost. A one percent change in the fuel cost decreases the profit of Ethiopian airline profit by around 2.1 percent in the short run.

The number of seat kilometers available per airplane (ASK) has a negative and significant impact on profit both in the short run and long run. As ASK is the cost of a seat being carried for one kilometer, a one percent increase of the number of seat kilometers available per airplane (ASK) decreases profitability of Ethiopian airlines by 2.0 percent in the short run and a one

percent increase of ASK decreases Ethiopian airline profitability by 5.07 percent in the long run. This implies that in the long run impact of an increase in the number of seat kilometers available per airplane on profitability is higher than the impact in the short run.

To generalize this research finding among the supply side variables fuel cost and maintenance cost significantly and negatively affects Ethiopian airlines profit in the short run but they are insignificant in the long run. Labor cost is not significant in affecting Ethiopian airlines profitability. The other supply side variable which highly affects the profitability of Ethiopian airline are ASK and rent (leasing cost) which affects negatively and significantly both in the short run and long run. The significant demand side variables which affect Ethiopian airlines are yield and load factor. The researcher investigates among those factors that determine the profitability of Ethiopian airlines load contributes more percent than others in the short run. The second determinant which highly affects Ethiopian airline profitability in the short run is yield which accounts great value growth next to load. But in the long run, the impact of ASK is higher than load and yield by affecting the growth of profitability in Ethiopian airline.

CHAPTER FIVE

5. Conclusion and recommendation

5.1. Conclusion

Studying the profitability of airlines is currently a big area for researchers since it contributes a great share of GDP in most countries like Ethiopia. During recent years in Ethiopia the service sector contributes higher percent of GDP share specifically Ethiopian airlines contributes a lot. Therefore, studying the determinants of Ethiopian airline profitability is a good contribution which fills the research gap on Ethiopian service sector. This paper was done by using error correction model which considers both long run and short run effects of the control variables on dependent variable (Ethiopian airlines profitability). To accomplish this study various tests like unit root test, normality test, autocorrelation test were conducted. Finally based on the estimation result the following findings were forwarded.

Demand side variables, both yield and load, are found to be more important in impacting Ethiopian airlines profitability both in the short run and long run positively. In the supply side variable ASK and rent have an impact on Ethiopian airlines negatively both in short run and long run while the other variables maintenance cost and fuel cost have an influence on profitability only in the short run. Labor cost, which is considered to have an influence on profit in many airlines, is found to be insignificant in determining Ethiopian airlines profitability.

In general demand side variables have more impact on the profitability of Ethiopian airlines both in the short run and long run. But ASK is found to have more impact on profitability in long run both from the demand and supply side variables.

5.2. Recommendation

Based on the findings of the study, the following key points are recommended to the Ethiopian airlines.

- Ethiopian airlines management should have more concern to the demand side which greatly contributes to their profitability as compared to supply side. The airlines‘ has to continue to use yield management technique to develop complex fare structure designed to maximize revenues on each flight through price discrimination. The companies trend toward maximizing load using load manager without compromising cost is very important.
- In the short run Ethiopian airlines should concern for fuel, maintenance, ASK and rent from the supply side variables. The company has to apply methods that enables to minimize the cost of fuel, maintenance cost, and available seat kilometer. For example: the company has to continue buying fuel efficient aircrafts like Dream liners or it has to apply new technologies on the existing aircrafts to save fuel and decrease available seat kilometer. The company has to decrease its use of rented aircrafts because it affects its profitability both in the short run and long run.
- In the long run the organization should concern to rent and ASK from the supply side variable and load and yield from the demand side variable.

5.3 Suggestions for Further Research

The objective of this study was to investigate factors that determine Ethiopian airlines profitability. This research could be replicated by studying on other airlines and establish whether the results would be different from the current study. Secondly, another study could be done but with more variables like passengers traffic, cargo traffic and aircraft movements, fleet size, cost of landing and terminal use to establish the effect of this and other variables on Ethiopain airlines profitability. Lastly, this study can be replicated to other transport sectors of the economy in order to find out whether some of the factors influence profitability.

REFERENCE

Books

- Gujarati D (2004), ―Basic econometrics", New york,4th ed
- Henze P(2000), ―Layers of time: A history of Ethiopia", Newyork:Palgrave, p.246
- O'conner W. ―An introduction to airline economics ―6thed. London:Praeger, 2001
- Rodrigue, Slack & Comtois(1998). ―The geography of transportation system". 2nd ed.London

Articles and journals

- Alahyari (2014), ―Determinants of profitability in the airline industry", Eastern mediterranean
- Antoniou A(1992). ―The factors determining the profitability of internal airlines: some econometrics results", north western university, Evanstan
- Eller R. and Moreira M. (2014), ―The main cost related factors in airlines Management", journal of transport. Vol 8, n.1, pp 8-23
- Ethiopian airlines annual reports from 2003/04-12/14
- Eyob B(2014), ―profitability analysis of Ethiopian airlines from 2009 to 2012". University of applied science.
- Hair, Babin, Money & Samouel, ―Essentials of business research", Wiley, 2003
- IATA (2014), ―Economic performance of the industry", semi annual report
- IATA press release No:66 date:10 december 2014

- Janko, Herbert & Guenette (2013). –The short run and long run relationship between mortality and the business cycle in Canada". Economic research international. vol2013, Article ID 409738, 11 page
- Mantin B and Wang J (2012), –Determinants of profitability and recovery from system-wide shocks". Journal of airline and airport management.
- Mwangi F(2013), –The effect of macroeconomic variables on fianacial performance of aviation in Kenya". University of Nairobi
- Shah K (2009), –factors influencing the profitability of European budget airlines"
- Smyth & Pearce (2006). –Airlines cost performance", IATA Economics Briefing no.5
- Stepanyan A (2006). –Traditional ratio analysis in the airline business: a case study of leading U.S carriers". International journal of advances in management and economics
- –Supersizing the super jumbo: Airbus says 1000 seat A380 due 2020", Australian Business Traveller.26 sep 2012
- Temesgen A (2006), –The role of transport in Ethiopia's economic development". Ethiopian Economic Association. Vol 9, no.4
- The economist(1987), –in search of excellence, the hard way"
- Thoren M (2002). –A study of airline profitability determinants". University of Oregon.
- Voneche(2005). –yield management in the airline industry"
- Wensveen(2012), –Air transportation: A management perspective"
- Yaser , Nelson & Rejesus (1997). –the dynamics of exports and product at the plant level: A panel data error correction model(ECM) approach", Contribution to Economic analysis, Elevester , Amsterdam

- Zintro (2011). ―How does the increased use of airplane leasing impact the airlines industry?"

Web-site

- http://centreforaviation.com/analysis/ethiopian-airlines-expands-its-global-footprint-to-link-the-worlds-high-growth-regions-102851
- http://www.ethiopianairlines.com/en/news
- http://www.eca-watch.org/problem/energy/hindustan_times_low_cost_airlines_10 dec

Appendix

Appendix I: Estimation Result of ECM model

Dependent Variable: D(LPROFIT)
Method: Least Squares
Date: 04/10/14 Time: 11:08
Sample: 1987 2014
Included observations: 28
HAC standard errors & covariance (Prewhitening with lags = 1, Bartlett kernel, Newey-West automatic bandwidth = 18.2324, NW automatic lag length = 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRENT)	-0.222766	0.106863	-2.084585	0.0591
D(LYIELD)	2.417145	0.817213	2.957792	0.0120
D(LMAIN)	-0.564837	0.268621	-2.102731	0.0573
D(LLOAD)	3.142048	0.701496	4.479065	0.0008
D(LLABOR)	-0.615616	0.515261	-1.194765	0.2553
D(LFUEL)	-2.069985	0.857626	-2.413621	0.0327
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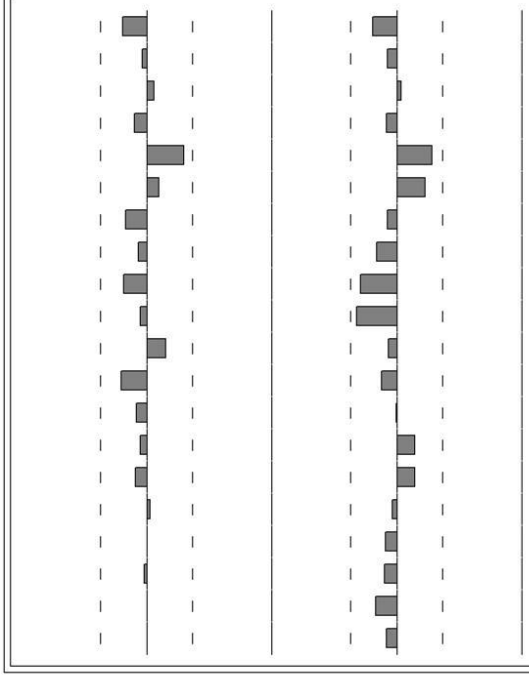
LASK(-1)	5.382132	1.589844	3.385321	0.0054

R-squared	0.793949	Mean dependent var	0.098663
Adjusted R-squared	0.536386	S.D. dependent var	0.564648
S.E. of regression	0.384465	Akaike info criterion	1.221629
Sum squared resid	1.773757	Schwarz criterion	1.982889
Log likelihood	-1.102811	Hannan-Quinn criter.	1.454354
F-statistic	3.082539	Durbin-Watson stat	2.018871
Prob(F-statistic)	0.027976		

Appendix II: Serial correlation test using corelogram of residuals squared

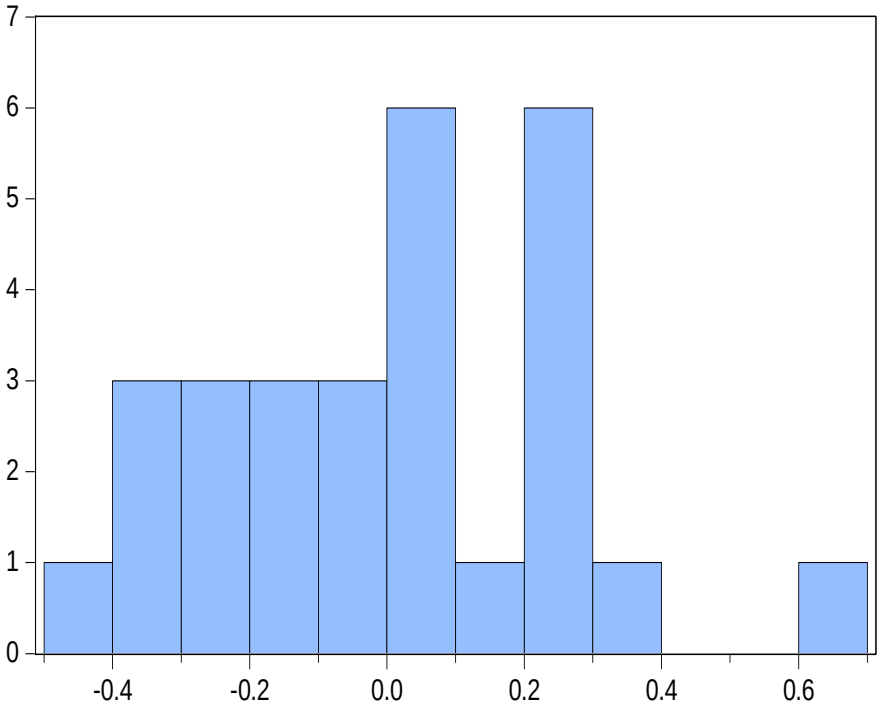
Correlogram of Residuals Squared

Date: 06/22/15 Time: 09:23
Sample: 1987 2014
Included observations: 28



Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.197	-0.197	1.2134	0.271
		2	-0.038	-0.080	1.2594	0.533
		3	0.058	0.036	1.3722	0.712
		4	-0.101	-0.089	1.7297	0.785
		5	0.309	0.292	5.2230	0.389
		6	0.102	0.236	5.6234	0.467
		7	-0.173	-0.074	6.8147	0.448
		8	-0.066	-0.168	6.9999	0.537
		9	-0.194	-0.298	8.6689	0.468
		10	-0.055	-0.333	8.8100	0.550
		11	0.163	-0.073	10.129	0.519
		12	-0.206	-0.127	12.355	0.418
		13	-0.085	-0.002	12.762	0.466
		14	-0.050	0.148	12.911	0.534
		15	-0.096	0.154	13.511	0.563
		16	0.030	-0.034	13.576	0.630
		17	0.008	-0.093	13.580	0.697
		18	-0.017	-0.107	13.606	0.754
		19	0.001	-0.173	13.606	0.806
		20	0.007	-0.085	13.611	0.850

Appendix III: Normality test



Series: Residuals	
Sample 1987 2014	
Observations 28	
Mean	6.09e-15
Median	0.000568
Maximum	0.656940
Minimum	-0.478711
Std. Dev.	0.256310
Skewness	0.332752
Kurtosis	2.923395
Jarque-Bera	0.523558
Probability	0.769681

APPENDIX IV

YEAR	PROFT	LABOR	FUEL	RENT	MAIN	YIELD	ASK	LOAD
1987	48144.0	41560.0	71237.0	2803.0	55127.0	82.5	2642832.0	49.1
1988	61874.0	43927.0	86539.0	3157.0	56124.0	78.9	2304648.0	56.7
1989	72057.0	45501.0	93980.0	3040.0	57169.0	80.5	2875079.0	55.5
1990	76854.0	47587.0	113278.0	5117.0	63531.0	88.2	3381975.0	46.8
1991	58849.0	52014.0	153205.0	4076.0	68614.0	110.0	2684777.0	54.9
1992	54194.0	55056.0	98140.0	4114.0	78266.0	83.1	2700076.0	58.7
1993	80064.0	81033.0	171948.0	6649.0	134254.0	161.9	3053362.0	57.3
1994	107646.0	84803.0	182806.0	6645.0	124024.0	175.2	2929127.0	55.8
1995	250029.0	99124.0	223382.0	2836.0	182255.0	215.8	2941720.0	58.5
1996	163870.0	111494.0	245795.0	5150.0	226612.0	224.9	3222841.0	56.7
1997	43726.0	113494.0	308609.0	48118.0	206279.0	205.1	3131440.0	60.9
1998	94681.0	115273.0	283995.0	88008.0	252094.0	176.3	3281144.0	89.8
1999	-47590.0	141958.0	282806.0	149466.0	376077.0	216.3	3653294.0	54.7
2000	-155940.0	158313.0	474941.0	201058.0	456125.0	211.5	4487308.0	60.6
2001	68852.0	170748.0	567122.0	200328.0	473238.0	250.6	4459853.0	60.3
2002	137106.0	183082.0	510255.0	198044.0	511744.0	238.5	5098161.0	59.7
2003	135572.0	201326.0	591749.0	223983.0	570421.0	252.5	5555360.0	61.6
2004	269268.0	235509.8	752754.7	267217.9	318529.5	263.4	6075921.0	63.1
2005	377339.0	287684.9	1276430.8	247342.8	369095.7	278.2	7472697.8	66.4
2006	236526.0	404250.9	1859146.8	323511.5	404329.9	306.2	9093831.4	64.1
2007	198041.0	453171.2	2593263.7	560038.8	474698.3	328.7	11156160.3	64.9
2008	427721.0	570130.4	3713571.9	663247.8	705574.8	367.3	12342518.6	70.3
2009	974169.0	706212.6	4482773.7	1108059.8	1221626.7	434.3	13400244.4	70.1
2010	1380266.0	928942.9	5659637.7	1590579.6	1696023.8	534.4	14831555.3	72.2
2011	411113.0	1243824.1	10073647.4	2253389.5	2193855.3	660.4	18395310.6	71.5
2012	1049137.3	1515678.9	15818159.5	2379980.1	2515901.1	728.1	22393335.0	72.2
2013	2774466.9	1877824.2	16648123.5	2228377.7	2665476.6	736.8	25726608.9	71.6
2014	3697435.7	2458903.9	19429043.1	2497713.2	3020279.9	787.0	30169528.2	70.8