VALUE ADDED TAX AND PRICE STABILITY IN ETHIOPIA: A PARTIAL EQUILIBRIUM ANALYSIS

A THESIS SUBMITTED TO SCHOOL OF GRADUATE STUDIES OF JIMMA UNIVERSITY, FOR PARTIAL FULFILLMENT OF THE REQUIREMENTS OF MASTERS OF SCIENCE IN ECONOMICS [ECONOMIC POLICY ANALYSIS]

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COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ECONOMICS

MAY, 2016
JIMMA, ETHIOPIA

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Declaration

I hereby declare that the Master's thesis report titled, **Value Added tax and price stability in Ethiopia: A partial Equilibrium Analysis** ,submitted by me for the partial fulfillment of the requirement of Masters of Science in Economics [Economic Policy Analysis] in Jimma University, school of Graduate studies , except the duly acknowledged literature of others, is my own original unaided work and has not been submitted earlier either to Jimma University or to any other institution for the fulfillment of the requirement for any degree. I also declare that no chapter of this thesis report in whole or in part is lifted unincorporated from any earlier work done by me or others. Finally, I declare that all part of this work has been carried out by me under the guidance and supervision of Jemal Abafita (PHD) and Yilikal Wassie (MSc).

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This is to certify that the thesis prepared by Isubalew Daba Ayana entitled: **Value Added tax and Price stability in Ethiopia: A partial Equilibrium Analysis**, and submitted in partial fulfillment of the requirements of the Degree of Master of Sciences in Economics (Economic Policy Analysis) complies with the regulations of the university and meets the accepted standards with respected originality and quality.

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List of Acronyms

ADF	Augmented Dickey Fuller
AIC	Akaike Information Criterion
CPI	Consumer price index
CGE	Computable General equilibrium Analysis
CSA	Central Statistical Agency
CUMSUM	Cumulative Sum
CUMSUMSQ	Cumulative Sum of Squares
ECM	Error Correction Model
EEA	Ethiopian Economics Association
ERCA	Ethiopian Revenue and Custom Authority
HQIC	Hannan-Quinn and Information Criterion
I(1)	Integrated of Order One
LM	Lagrange Multiplier test of residual serial correlation
LR	Likelihood Ratio
MOFEC	Ministry of Finance and Economic Cooperation
NBE	National Bank of Ethiopia
OLS	Ordinary Least Squares
PP	Phillips-Perron
SBC	Schwarz Bayesian Criterion
VAT	Value Added Tax
VECM	Vector Error Correction Model
WB	World Bank

Abstract

Value added tax (VAT), simply an indirect goods and services tax, which was implemented in Ethiopia starting from January, 1, 2003, is currently generating much debate especially with respect to its economic impact on aggregate level of prices. This study therefore, uses the quarterly time series data covering the period of 2004Q1 – 2014Q4 to empirically examine the relationship between VAT and price level in Ethiopia. The data was sourced from NBE, ERCA, MOFEC, and EEA. Partial equilibrium analysis through Johansen Co integration is adopted in this study as it allows one to explain the effect of the value added tax in isolation from other control variables in the study. The data is tested for unit root using the Augmented Dickey-Fuller (ADF) test and the Philips-Perron (PP) test, and the result shows that variables of the study are stationary in their first differences. The Johansen co integration test revealed that there is at least one co integrating vector implying the existence of long run relationship between Values added tax and inflation in Ethiopia. The coefficient of estimated ECM revealed that the speed of adjustment for errors in the short run is 47.9 percent. The coefficient of VAT in long run is 0.188578, while it is 0.0051 in the short run enlightening that it influence price with the lower coefficient in short run. The explanatory variables accounted for 80.3 percent of the variations in inflation during the period of the study with the error term accounting for the remaining 19.7 percent. The finding of the study shows that VAT has positive and significant relationship with price in both periods. The study also found that VAT Granger causes inflation and unidirectional causality runs from VAT to inflation. The positive significant impact of VAT on inflation is most likely due to the burden of the value added tax on intermediate out puts. The policy implication is that a very detailed post VAT cost benefit analysis and careful assessment of social desirability of VAT is essential.

Key words: VAT, Partial Equilibrium Analysis, Johansen co integration, Causality, Ethiopia

CHAPTER ONE

INTRODUCTION

1.1. Background of the Study

For any country in the world intensifying domestic revenue has a multi dimensional purpose in all aspects to tackle the economic bottlenecks. One of the main mechanisms to ensure the economic development is tax revenue. Among the most important elements of tax system value added tax (VAT) is one. The importance of Value Added tax was first advocated by German industrialist Wilhelm Von Siemens in 1918 followed by Maurice Laure (1954) who introduced this consumption tax in France. Currently, the importance of Value Added Tax (VAT) is increasingly being recognized. VAT is an indirect tax in which the burden is transferred to the consumers through pricing system regardless of their social and legal status (Egidijus and Emile, 2013). VAT is imposed on both private and public consumption. It is included in price by service providers and manufacturers as this is the way the burden is shifted to the consumers (Dilius, Kareivaitė, 2010).

Currently, Value added tax is an essential source of government budget in developing countries. For instance, in emerging Asian countries such as Pakistan Value added tax is among the most significant sources of government revenue and in its economic growth. The study conducted recently revealed that a one per cent increases in the growth of net value added tax revenue causes 0.24% increase in the growth of nominal GDP in Pakistan for the study period from 1991 - 2012 shows the importance of VAT (Hassan, 2015).

In addition, like many other developing nations VAT is the vital source of revenue and economic growth in Bangladesh. Introduced as consumption tax in 1991 in the country, VAT becomes an option of for government deficit financing in Bangladesh (Andrew *et al,* 2011). In Latin America developing countries also VAT is highly recognized as the most important taxes for revenue generation and economic growth in Argentina, Brazil, Mexico, and Chile. Thus, in developing nations of Latin America there is a general perception that suggest greater reliance on consumption taxes as this has significant positive effects on growth in Latin American in general(Canavire-Bacarreza *et al.* 2013).

When we come to Africa, developing African countries are using VAT to boost their internal revenues. Evidences reflect that Sub-Saharan African countries such as Cote d'Ivore, Benin Republic, Guinea, Kenya, Madagascar, Mauritius, Niger Republic, Senegal, Togo and Nigeria are reaping the fruit of VAT contribution in their total government tax revenues (Adereti *et al*, 2011). The study of Bogetic and Hassan (1993) revealed that by introducing VAT in 1983 Indonesia had raised the ratio of VAT revenue to GDP to 4.5 percent within five years in 1988. Similarly, Shalizi and Squire (1988) reported that, in the year 1982, VAT accounted for about 30% of total tax revenues in Cote d'Ivoire, Kenya and Senegal.

The study conducted before three years in Nigeria revealed that one percent increase in VAT revenue causes 1.47% increase in economic growth (GDP) between 1994-2010 (Emmanuel ,2013). Beside this, Value Added Tax has both positive and significant effect on investment growth in Nigeria (Asogwa & Nkolika, 2013). In addition, Chigbu (2014) found that *VAT* is one of the most important components of indirect taxes in Nigeria that positively affects the economic growth of the country.

In Ethiopia, the concept of VAT is relatively a recent phenomena having age of less than two decades as it was adopted in the country after 50 years of its implementation in France in 1954. The adoption of VAT in Ethiopia starts from January 1, 2003 when it was declared by proclamation no. 285/2002. This makes Ethiopia the late country that introduced VAT among African Union Member countries with exception of Angola which introduced it after three years in 2008 (Simon *et al, 2013;* Abate 2011).

According to Jalata (2014), VAT is significantly contributing to economic growth of Ethiopia. His study revealed that the growth rate of VAT revenue is 66.27% between the study period of 2003-2012 and the average ratio of VAT to GDP was 2.95 %. Using both descriptive and multiple regression analysis method, his paper also revealed that VAT is significantly contributing to both total tax and non tax revenue in Ethiopia. His work on VAT as an instrument of national development observed that VAT is engine in development, as the GDP growth rate of Ethiopia is one of the fast growing in Africa after VAT implementation in Ethiopia. The finding

of the paper from the OLS estimation has also shown that the countrywide development of Ethiopia is influenced by the adoption of VAT.

According to the VAT proclamation no. 285/2002 of Federal Inland Revenue, Ethiopia adopted VAT to overcome the inconvenience of the sales tax. The reason of adoption therefore was as follows. First, VAT consent to the collection of further taxes compared to sales taxes. VAT, permits collection of revenue at each stage of production, while the later cannot do this. Secondly, VAT curtails the attempt of tax evasion. Next, VAT is consumption tax. Thus it boosts consumption and investment. Finally, VAT advances the link between GDP and government revenue and hence increase the growth of Ethiopia

The work of Jalata (2014) titled, Value Added Tax Styles: which is adopted by Ethiopia added two grounds why the country adopted value added tax. For him, fair distribution of wealth and income is the main reason of the VAT to be adopted in Ethiopia. The other reason has international character. Thus, in order to obey the law of World Trade Organization (WTO) the country introduced VAT. He also reviewed the style of value added tax to know the approach of VAT adopted by Ethiopia. In his paper, he concluded that Ethiopia adopted the goods and services tax model of New Zealand which uses a reasonable single typical rate to levy tax on goods and services. According to his paper though the tax experts are debating on it, this form of VAT is relatively more ideal and preferable than Japanese and European model of VAT style.

In 2008, it became indispensable to amend the VAT proclamation with the objective of further boosting VAT revenue as Ethiopia amended it in accordance of VAT proclamation no. 609/2008. Value added tax proclamation no. 285/2002 declared single standard VAT rate of 15 % to all products and services except for those that are zero rate taxed. The VAT proclamation of Ethiopia also allows the exemptions of some rates under laws and regulations. According to this proclamation VAT credit is impossible.

The indirect consumption tax, VAT, is relatively very easy to administer and difficult to evade. For this reason empirically examining macroeconomic impact of VAT especially on aggregate price level is become urgently necessary. Despite the alarmingly increasing literatures in other African countries, in Ethiopia, as far as my knowledge is concerned, there is no empirical literature that relates VAT to price stability. The available literatures in Ethiopian context are limited to the contribution of VAT to economic growth and problems related with its

administrations. Thus, it is hoped that this paper will add empirical work to the existing literatures to overcome lack of empirical works in Ethiopian context as it will have the objective studying the relationship between VAT and price level in Ethiopia between the studies periods of 2004Q1-2014Q4 using quarterly data sourced from relevant government organizations.

1.2. Statement of the Problem

Rising domestic revenue has a paramount significance for any country of the world to overcome economic, social and political problems of the societies. In this globalized twenty first century, almost all scholars have the same view that VAT has significant contribution to the growth of a country. For instance, Alemu (2011), in his scholarly contribution, revealed that value added tax is clearly contributing to Ethiopian economic development and social spending.

According to Adereti *et al.* (2011), who studied value added tax and economic growth of Nigeria for the period 1994 – 2010, the correlation between VAT Revenue and GDP is positive and significant. Bogetic and Hassan (1993) revealed that by introducing VAT in 1983, Indonesia had raised the ratio of VAT revenue to GDP to 4.5 percent within five years in 1988.

Jalata (2014) found that, in Ethiopia, the growth rate VAT revenue is 66.27% between the study period of 2003-2012 and the average ratio of VAT to GDP was 2.95 % during the same period. His paper confirmed that value added tax has positive significant impact on economic growth of Ethiopia. In his study on value added tax as a tool for national development in Ethiopia, he also found that VAT is important resource in countrywide improvement.

However, members of societies and various stake holders have been raising their reservation in the sense that VAT is taking a toll on the prices of their products. From the angle of economics, it is natural to expect that the price of goods subject to VAT to rise. However, beyond this natural expectation businesses are taking the advantage of existence of VAT to increase the price of goods and services arbitrarily without any economic reason. This was supported by Aruwa (2008), when he argued that the resulting price increase causes inflation. According to Mclure, (1989), before considering adoption of VAT, macroeconomic impact of it, especially on prices, output, income and consumption should be the concern of policy makers.

In fact, there are few empirical works on the macroeconomic impact of VAT in developing countries especially on price level in general and in Ethiopian Context in particular. Ajakaiye

(1999), who conducted the most exhaustive study about the impact of VAT on key sectors macroeconomic aggregates, followed a Computable General Equilibrium (CGE) model for the Nigerian economy. While studying the impact of VAT on price stability, Marius and Alwell (2013), using partial equilibrium analysis, concluded that VAT has a strong positive significant effect on prices for the study period of 1994 – 2010 prompting the finding of Ajakaiye (1999), that VAT is more deleterious when viewed as a cost. On the other hand, Olatunji (2013) Studied VAT and inflation from 1990 to 2003 for economy of Nigeria and found that VAT has not affected the increase or decrease in inflation rate in Nigeria for the period under investigation.

The contribution of these scholars about the real context of Ethiopia, with exception of Jalata (2014) and Alemu (2011), who focused on VAT contribution to GDP, is unnoticed as there is no wide-ranging empirical work steered on the impact of VAT on price stability in Ethiopia. The study of these authors focused on the contribution of VAT to economic growth. However, when the governments raise revenue using several ways such as VAT, the price level in the economy may be distorted as the general price level (inflation) is the complex phenomena in the economy. Specially, in developing countries like Ethiopia such studies are very important in identifying the sources of price rise to combat the adverse effect of the revenues of government on the general price. Thus, this study focuses on empirical investigation of the relationship between VAT and price level as well as weather VAT causes inflation or not in Ethiopia for the period of 2004 Q1 to 2014 Q4.

Moreover, though there is a general perception that VAT is significant source of revenue for economic growth and national development in Ethiopia, critics of the policy according to Marius and Alwell (2013) argue that VAT can result in an upward pressure on prices and the negative consequences of it outweigh the gains derived from the revenue. The reason for this is related especially to problematic management of tax administration since many of the developing countries lack administrative capabilities in the areas of tax system. Thus, this study is conducted to examine the validity of the claims of different part of the society and it will have its major interest on investigating the impact of Value added tax on price stability using partial equilibrium analysis as there is no comprehensive work that is done on VAT and price stability in the context of Ethiopia since its introduction.

1.3. Objectives of the Study

In an effort to fill gap identified in the problem statement, setting objectives is very much important in the process of conducting a research. There is no also doubt that conducting meaning full research requires clear and achievable objectives.

Thus, the study aimed mainly at examining the influence of Value added taxes (VAT) on price stability in Ethiopia with the aid of Partial equilibrium analysis.

The specific objectives of the study are:

1. To ascertain if there exist significant Short run and long run relationship between VAT and aggregate price level in Ethiopia
2. To investigate the causal relationship between VAT and Price level in Ethiopia
3. To provide policy recommendations for the concerned government agencies of Ethiopia

1.4. Research Questions

In line with the objectives of the study, the following questions were raised:

i. Is there any significant Short run and long run relationship between VAT and aggregate price level in Ethiopia?

ii. Is there any causal relationship between value added tax and price level in Ethiopia?

Moreover, to meet the objective of the study, building hypothesis is among one of the compulsory activities. Literatures on this area that are conducted in different countries demonstrate that VAT has significant impact on inflation (Maries and Allwell, 2013). In order to agree or disagree on the statistical relationship of inflation and VAT in Ethiopian context, the following hypothesis was developed in null form.

Ho_1: There is no significant long and short run relationship between VAT and price level in Ethiopia

Ho_2: There is no significant causal relationship between value added tax and price level in Ethiopia

1.5. Significance of the Study

As it relates Value Added Tax (VAT) to price stability, inflation level, the study will support the government and other concerned bodies in policy formulation. It will also help to reinforce the operation of the relevant government agencies that are concerned with revenue generation and price stability in Ethiopia. Currently, different governments adopted diverse ways of generating revenue for their corresponding economy. The fresher but influential way of revenue generation, value added tax, has the age of not more than half century at international level.

In Ethiopian perspective the adoption of VAT has the age of only less than two decades. Despite its infancy, many empirical works have been conducted on the concept of VAT. However, the existing empirical literatures focused on its administration, implementation and contribution to the national development and economic growth (Jalata, 2014, Simon *et al 2013,* Alemu (2011), Yesegat, 2008). Thus, this study will be significant to fill the limited available literature on the relationships between VAT and aggregate price (inflation) in Ethiopian context from its full fiscal year inception in 2004 Q1 – 2014Q4. In addition to this, it will also enable the government and citizens of the country to be ready to curtail the adverse effects of VAT, while consolidating its benefits as it will be conducted from the viewpoint of Ethiopian situation.

1.6. Scope of the Study

The study limited itself to the period of 2004Q1 to 2014Q4. The concept of value added tax in this study was connoting the value added tax ideas expressed in the VAT proclamation No. 285/2002 and the amended proclamation 609/2008 of Federal Democratic Republic of Ethiopia. The study was focused on the VAT revenue at national level, and the regional states were not being considered separately.

1.7. Limitation of the Study

As a matter of fact, the availability of data is the major challenge of the researchers in developing nations like Ethiopia. This study faced a similar challenge encountered by African researchers in general and Ethiopians in particular. The consumer price index or simply price level is affected by a number of factors other than the explanatory variables used in this study. For instance it was intended to include the quarterly growth rate of GDP as independent variable of the study. But

due to lack of data it could not be included. In a similar fashion, producer price index and quarterly rate of interest failed to be incorporated due to unavailability of data for many years from the NBE. The drawback of such measures is that, the quality of estimated results could be reduced.

1.8. Organization of the Study

The study is arranged in five chapters. Chapter one deals with points discussed so far such as introduction, statement of the problem, objectives and significance. Chapter two is about review of literatures including theoretical and empirical literatures. Chapter three deal with methodology of the study such as data, variables, model specification and its estimation. Chapter four is on data presentation, analysis and discussion of the findings. Finally, chapter five concludes and provides policy implications.

CHAPTER TWO

LITRETURES REVIEW

This section, chapter two, deals with the critical and systematic review of the works of previous researchers that are closely related with Value Added tax (VAT) and price stability (inflation) which is further divided into two components: theoretical and empirical review of literatures. The former addresses issues related to how VAT defined and theoretically considered by different scholars while the later focuses with empirical findings of the past scholars.

2.1. Theoretical Literatures

VAT is an indirect consumption tax levied on products or services whenever value is added at each stage of productions or services provision and distributions at final sale. It is a neutral tax because everybody pays tax to the government when there is purchase of goods or services. VAT system is different from other taxes in view of the fact that it specifically assign the real cost to the end consumer during the time of purchase. The idea is that the more money you spend to buy goods or services, the more tax you pay, and VAT revenue is collected immediately by producers, sellers and distributors on the behalf of government (Nayeem and Parvez, 2012).

Very recently, Njogu (2015) defined VAT as cost charged on finished goods and services less a cost charged for inputs of production such as raw materials. According to Adereti *et al* (2011) VAT is a consumption tax levied on final consumer through the consumption chain. The definition of VAT by Bird (2005) consists of three components. The first is that VAT is a multi stage tax. The next makes VAT a tax on consumer while the third view Value added tax as an incidence on the final consumer. This was also supported by Jones (2003), who added that there are many process for VAT to be born at final consumer. For the case of manufactured goods the process might be primary producer, manufacturer, wholesaler and retailer stages. Abdul-Rahman *et al* (2013) focused on intermediate values that are created during the process and it is on this value created through process that VAT is taxed or levied.

The definition of VAT by Bhartia (2009) considers value added tax as a tax on the values added not tax on the value of the commodity sold. This definition explains VAT as a difference between the value of input and gross value, and that seller is responsible to pay the tax.

Adesola (2000) defined VAT as consumer tax since it is the sum of Wage and profit tax and levied on consumer before selling the good or service. Umeora (2013) defined VAT differently as a tax on estimated market value added to a product and explained that the additions are to the final customers.

The IMF definition of VAT consists of the following big points. The first is that VAT is an indirect tax and also consumption tax. The next is about the way VAT imposed on goods and services. VAT is levied on the beginning of each production and consumption vein. The third content of IMF definition is on the idea of who collects and who pays the value added tax. The sellers and distributors at each stage are responsible to collect it while the buyers at each level are payers of the tax. The fourth content of IMF definition on VAT is about the way consumers take the responsibility of paying it. This is about the refund and guarantee of the credit. Thus, consumers enter into the chain of VAT payment on her his way without any guarantee of credit as a part of the cost of the commodity purchased. The sellers also collect VAT on their way as a part of selling activities. The other idea regarding how to define VAT are the idea generated by IMF is the concepts that should take into account. Several transactions that are conducted for example, transactions from business to business, from business to private consumer and transactions from business to consumer should be taken in to consideration to define VAT as consumption VAT (Ezejelue, 2001).

Finally, Njogu (2015) argued that VAT is not intended to be a tax on value added; rather it is often intended as a tax on consumption despite its name. In general, almost all of them agreed that VAT is a burden of consumer and tax on value added during the process of production and service at all stages.

2.1.1. Theories of Indirect Taxation

The question of fairness in taxation has been the concern of economists in different times. Toward this end, several theories have been forwarded as guide line of the justice and equity of

taxation. This section takes some time to deal with relevant theories of indirect taxation specially focusing on four of them. They are discussed as follows.

A. The Cost of Service Theory of Indirect Taxation

This theory is largely discussed in the work of (Kaplow, 2010). The theory argue that some economists were of the opinion that if the state charges actual cost of the service rendered from the people, it will satisfy the idea of equity or justice in taxation. The cost of service principle can no doubt be applied to some extent in those cases where the services are rendered out of prices and are a bit easy to determine, e.g., postal, railway services, supply of electricity etc. But most of the expenditure incurred by the state cannot be fixed for each individual because it cannot be exactly determined. For instance, how can we measure the cost of service of the police, armed forces, judiciary, etc., to different individuals? However, the cost service theory did not convince many economists such as Dalton ever since he also rejected this theory on the ground that there s no quid pro qua in a tax based on this theory.

B. The Ability-to-Pay Theory of Indirect Taxation

The Origin of this theory dates back to sixteenth century when French political economist Jean-Baptist Say (1767-1832) and the English economist John Stuart Mill (1806-1873) advocated the idea that citizens of a country should pay taxes to the government in accordance with their ability to pay. Ability to pay theory looks like convincing and reasonable because it is in line with progressive taxation. The difficulty behind this theory is that the economists are not unanimous as to what should be the exact measure of a person's ability to pay. Though there is no common consensus among economists majority of them uses ownership of Property, tax on the basis of expenditure, and income to solve it. When one looks the VAT in the mirror of this theory, it does not coincide with the theory specially where there is single VAT implementation. VAT represents a smaller proportion of a person’s income as their income rises. Thus, it is a regressive tax (Jones and Rhoades, 2011).

C. The Benefit Theory of Indirect Taxation

According to Saleemi (2005) the concept of this theory was developed by Thomas Hobbes (1588-1679) and John Locke (1632-1704), and Dutch jurist Hugo Grotius (1583-1645) in seventeenth century. The main focus area of the theory is the benefit a person drive from the government services. The idea is that the more benefits a person derives from public

expenditure on developmental projects and others, the more he should pay. However, the theory has been criticized from three grounds. First, if the government maintains a certain connection between the benefits conferred and the benefits derived from the public expenditure the theory will be against the basic principle of the tax. Next, it is not possible to estimate the benefit enjoyed by a particular individual every year if most of the expenditure incurred by the state is for the general benefit of its citizens. Finally, the poor will have to pay the heaviest taxes if we apply this principle in practice, because they benefit more from the services of the public expenses on the project. He argues that it is against the principle of justice if we get more from the poor by way of taxes.

D. Equal Sacrifice Theory of Indirect Taxation

This theory was suggested for the first time by classical economists such as J. S. Mill. It raises the question of justice and equity through sacrifice entailed by the taxpayer as it takes in to account the equal distribution of burdens and opportunities in the societies. The general conclusion of the idea is that people who earn more should pay more taxes. According to economists of this category, charging proportional tax on individual income leads to equal sacrifice and equal scarification is measured by the same proportion of utility a person obtain income, same utility for the last unit of income, the same absolute degree of utility that one obtains from income. In general the equal scarification theory advocates that the rich should be taxed higher rate while the poor should be taxed relatively lower rate of tax as the support progressive taxation (Musgrave & Musgrave, 1989, Saleemi, 2005).

2.1.2. Principles of Taxation

In addition to these theories of taxation there are also tax policies guides on which most scholars agree. The common principles are

1. Principle of Simplicity

This principle asserts that the tax system and the way of taxing should be simple as much as possible. Bilal (2015) noted that the principle of simplicity shows the cost and benefit of adopting a certain tax. Therefore, it is the principle explaining how to administer the tax system by low cost.

2. Principle of Equity

Equity can be of two category namely horizontal equity and vertical equity. Principle of equity in its horizontal aspect shows that tax payers with the same income should pay the same tax. This means, peoples with equal status should carry equal burden. The other aspect of this principle is that of vertical equity which advocates the idea that peoples should be with different income level should pay different tax. Thus, this principle is a backbone of the tax policy guide (Bilal, 2015).

3. Principle of Adequacy

The principle of adequacy is the guide line which helps the government to generate sufficient income so that the process should be sustained. There are two criteria of adequacy. The first is stability while the second is elasticity of the tax. Stability deals with the situation of fluctuation in revenue generation as well as ups and downs in the process. Elasticity deals with the long run relationship between tax revenue and economic growth of a country (Bilal 2015).

4. Principle of Exportability

The principle of exportability shows the situation in which tax revenue is generated not only by residents but also by non residents. The reason here is that the infrastructure in a certain region benefits both peoples in and out of the region. Exportability can be realized through three different mechanisms. These are as follows. First, exportability obtained through non residents contributing tax. Secondly, taxes on business that surpasses the boundary. Finally, the last mechanism about principle of exportability is through cooperation of a state with the federal or neighbor states (Bilal, 2015).

5. Principle of Efficiency

This also called the principle of neutrality. According to literatures, a tax system is said be to production efficient if it leaves production undistorted as in line with by the production efficiency theorem and it does not interfere with the investment and spending decisions of the individuals (Bilal, 2015).

2.1.3. Types of Value Added Tax

Literatures come across different types of VAT. According to Ola (2001) value added taxes can be of three basic categories: VAT on production, VAT on consumption and VAT on income. VAT on income includes the value added tax on private income and corporate income. However, eight years after this work Bhartia (2009) in reported that four types of taxes are possible. Another area in which VAT is possible is the wage obtained by workers. This type of value added tax can be VAT on Wage. These are destination based VAT, consumption VAT, the income VAT, the Wage VAT, and production Value added tax.

1. Destination Based tax VAT

This type of VAT is when a value added tax is imposed only on consumption goods and services. Scholars agree that destination based VAT encourages export by including imports and excluding exports. Destination based VAT known by negatively affecting real exchange rate of the countries (Desai and Hines, 2005).

2. VAT on Production

Production VAT is a tax on produced commodities in the process of producing items. This contains the VAT on the raw materials and inputs of production. In this type of VAT there is a partial deduction in the value when firms buy the input for production. It is only the value of non capital input purchase that is deducted from the cost of production (Bhartia, 2009, Chigbu, 2014).

3. VAT on Consumption

When value added tax is imposed on consumption, all capital goods bought from other firms. The deduction of the capital good is carried out on the tax base. The unique property of this VAT is that there is no an exclusion of depreciation from the tax base. Under this type of VAT the base of the tax is consumption not investment. Here expenditure on capital and expenditures on the other items cannot be disintegrated from each other. This type of VAT is the most famous and popular type of VAT in many countries (Bhartia, 2009, Chigbu, 2014).

4. VAT on Income

Here the deduction of all value of non capital purchase from other producers is possible. Deducting depreciations of capital purchase is also permitted. According to Chigbu (2014),

under VAT on income the base of the tax is equal to net national product of a country implementing the VAT and is given by

$$TB = TS - M - DP$$

Where,

TB is tax base under VAT on income

TS is total sales

M is a material

DP is depreciation

5. VAT on Wage

Chigbu (2014) noted that VAT on wage is a category of value added tax under which tax base is capital minus net earnings of the individuals.

According to Keen (2008) good value added tax should include a tax on all domestic sells and imports with complete Vat refunds. For Keen, the VAT refund is the most important thing to define it. For instance, if the process of VAT refund is broken between payers and collectors of the VAT is not equivalent to the tax on the final consumption, the process of taxation cannot be dubbed as efficient.

2.1.4. Arguments that Support Value Added Tax

Though scholars agree that taxation is obligatory, they have different arguments regarding type of taxes and the optimality of the systems. Hence, VAT is also supported by many of the scholars. For instance, Brown & Gale, (2012) noted that value added tax is among the best ways to bring uniformity in the world of tax equity. The uniform tax rate gives the advantages of evading administrative disturbances of defining each goods and services for different VAT rate. The paper also argued that VAT permits a room for exemption of selected products or items which can help as an incentive in promoting growth and industrialization. In long time, value added tax with constant rate does not distort the house hold savings and consumption, and it can also provide a possible way of taxing consumption, production, distribution and serving at each stage. When VAT is charged on all goods and services with similar tax rate it is an easy tax simply for the purpose of self assessment. The other argument in favor of VAT is that it is exportable and can be easily charged on nonresidents to collect more revenue. In addition, value added tax is a difficult to evade and relatively very easy to collect and administer. The other admired aspect of VAT is that it provides strong incentive for primary tax base.

2.1.5. Arguments that do not Support (against) Value Added Tax

Scholars those are against value added tax arise the issue that VAT is regressive tax. When the percentage income of the poor is compared with relatively rich peoples, the rich pay less than poor as the poor is subjected to heavy tax burden.

2.1.6. Price Stability and Theories of Inflation

Price stability, which is highly exaggerated by inflation and the level of employment of a country, in words, is whereby prices of goods and services are more over vary very little by little or do not change at all. In quantitative terms, definition of price satiability according to governing council of European central bank is that it is two percent in a year. It is aimed at obtaining the inflation rate less than, but close to two percent in medium terms. It has also the purpose of defending both lengthened inflation and deflation to attain far above the ground level of economic activity and employment in economy. Ndidi (2013) defined that price stability is one of major challenges of growing economies as developing countries scarify much times in identifying the tendency and factors affecting the price stability in their economy. He explained further that price stability affect economic growth, standard of living and the value of currency of nations. Alexander *et al (2015)* concluded that retarded economic growth in developing nations is due to macroeconomic instability specially that of rate of inflation. According to Fatukasi (2005) maintenance of price stability is important for the economies as the level of consumer price index is an indicator of macroeconomic stability.

Inflation, which most of the peoples consider as bad to economy, mainly defined as the persistent increase in the general price of goods and services the annual percentage increase helps to measure it. It also determines the purchasing supremacy of the currency of the countries. The continuous or sustained go down of the value of money can be also taken as another meaning of inflation. The get higher in inflation dwindle the value of money, and go down of inflation results in the increase in the value of money. (Alexander *et al*, 2015).

According to Fatukasi (2005), inflation is uninterrupted rises in prices that occurred in into our economic history due to elusive factors. Jhingan (2002) defined inflation as considerable and continual increase in the general level of prices. Fatukasi (2005) underlined the fact that not all rise in price is taken as inflation. He said, for arise in the price to be considered as inflation, three conditions should be fulfilled. The first idea goes to constancy. The rise in price should

be constant. Next, the rise in price must be enduring and finally it has to be sustained. This means that the price should have effect on almost every commodity and should not be temporary. Alexander *et al (2015)* favored inflation rate between 3 to 6 percent as it encourages consumption, production and investment bringing positive effect on economy. In his paper, he explained that double digit economic growth is again positive effect of the economy. This is damage to economy by adversely affecting purchasing power of the consumer and crating uncertainty in economy to affect borrowers and lenders. In his work he supported the conclusions of (Syed, 2007), who also found that inflation discourages saving as it erodes the actual rate of return from financial assets. Generally, all scholars agree on two points. First a short time increase in price of all commodities should not be considered as inflation. Second, long time boom in price of one commodity alone cannot also described as inflation.

Economic growth and price stability are the most important macroeconomic objectives that any government wants to peruse. The economic growth enables a country to specialize in production of certain products and makes the nation to achieve its political and economic objectives while price stability focuses on availability of goods and services at reasonable prices. The well known monetarist Milton Freidman said that inflation is a phenomenon of always and everywhere. But rate of inflation should not be beyond the capacity of consumers and producers. If this is happen the government intervenes through policy for the purpose of maintaining price stability (Naphade, 2012).

Stable price also implies stable economy. Since price stability means that inflation is sufficiently low and stable so as *not* to influence the economic decisions of households and firms, peoples save and invest with confidence instead of wasting resources to protect inflation from them. Price stability has also a far implication in economy as efficient allocation of economic resources depends on the clarity of signals coming from the price system. In addition, price stability has the huge potential to erode uncertainty about the price level that makes it difficult for firms and households to determine whether changes in individual prices reflect fundamental shifts in supply and demand. That means stake holders now don not worry about the rate of inflation. In long run also price stability is the power full tool that overcomes the bad forecast which affects the return from investment project as well as borrowing and lending of financial sectors (William and Whelock, 2014). In different times different theories of inflation were developed. This

section takes some times to discuss some of them. These are: Monetarists theory of inflation, structaralist theories of inflation and Keynesian theories of inflation.

a. Monetarists Theories of Inflation

This theory was developed by the one of the well known economists Milton Freidman. In his work Friedman (1968), as cited by Gyebi and Boafo (2013), advocated that inflation is monetary phenomenon. In the words of Freidman it was explained as "always and everywhere inflation is monetary phenomenon is created when too few goods are purchased by too much money. This theory has its base on the quantity theory of money. The quantity theory of money associates the level of price with money supply in economy. Thus for monetarists an increase in level of money supply increase the level of price. The monetarist approach assumes three things in their theory. The first that the velocity of money is constant given the nominal level of money supplied and price level. They also assume that the volume of total real outcome is constant in the long run. The monetarists final assumption is that money supply can be controlled independently of demand for money in the economy. In symbol it the theory of money is given bellow.

$$MV=PY$$

Where, P is the price level in the economy

V is circulated money's Velocity

Y is the volume of total real output n the economy

b. Structurlists theory of Inflation

Unlike, the monetarists this theory of money advocates the structure of economy as the main reason for the consistent rise of price level. Thus, this theory argues that structural rigidities in the economy and sociopolitical factors in the economy are the main responsible factors for the rise in the price level in the economy. It also views inflation from the aspect of the structure of the economy. Thus, for them solving economic bottle necks such as shortage of agricultural products and exchange rates in the economy can help to attain low level of inflation in the economy (Gyebi and Boafo 2013).

c. The Keynesian's theory of Inflation

The Keynesians theory of inflation asserts that the force of demand and supply in the economy is responsible for the rise in the general price level. For this approach trade union (organized institutions can force the price to rise when they ask for increase in wage. Therefore, any rise in excess production causes inflation in the absence of excess demand. This time increased wage transferred to increased price and causes increased prices and also inflation. Generally, this approach to inflation supports cost push inflation theory. The other aspect of Keynesian's inflation theory is that it makes the level of employment in the economy as the main cause of inflation in the short run. When the expenditure in the economy is greater than the excess demand of real output in the economy, the general price rises and causes inflation (Gyebi and Boafo 2013).

d. Rational Expectation Theory of Inflation

This theory was developed during the macroeconomic revolution of 1970's. The idea was dominated by the rational expectations including the golden idea of Lucas (1972). This theory assumes that economic agents use both past and current information to make decision rationally. It not only consider backward looking information but also forward looking of adoptive price expectation in a sense that agents expect rise in price if authorities announces a monetary stimulus. This theory has also a unique behavior i.e. when government announces to reduce inflation; the agents know that the announcement itself is not enough but effective implementation of the announcements (Femi and Emanuel, 2015).

e. New Neoclassical Inflation Synthesis

New neoclassical synthesis of inflation considers that the main aspects responsible for inflation are the demand and monetary factors. For this theory synthesis view expectation is the main responsible factor for inflation. According to them monetary policy can manage expectation, but the synthesis of expectation is very difficult to manage and this why it is the main determinant of inflation under this theory. In this theory, price levels in an economy is considered as endogenous variable and enable Keynesians as well as the real business cycle to operate differently (Totonchi, 2011).

f. Neo political Macroeconomics of Inflation theory

The nonpolitical theory of inflation mainly focuses on factors that affect the economy. More over it focuses on the situations of institutions, culture and political process. This theory even

provides an empirical relationship between election, policy maker's performance and Political process in an economy. It also provides an empirical relationship between election, policy maker's performance and political instability. This theory also makes attention to the policy credibility, inflation process and reputation. According to this theory, budget deficit is the main cause of inflation especially when government expends more to lob peoples during election (Femi and Emmanuel, 2015).

g. The Fiscal Theory of Price Level

The fiscal theory of inflation postulates that the monetary policy is not the only way to control inflation. It shows the importance of fiscal authorities in inflation control. This theory of inflation assumes that fiscal deficit is exogenously determined. The well known advocator of this theory is the Surgent and Wallace (1981) who introduced the unpleasant monetarist hypothesis. More over this model crates the link between fiscal and monetary policy using the issue of inter temporal budget constraint. This theory makes the fiscal deficit as the most responsible factor to affect the price level. Accordingly, causality runs from fiscal deficit to inflation and then after from growth of money supply to price level. Thus, according to this theory, it is disturbance in the fiscal sector that affects the money supply in the economy implying neutrality of money supply in the environment of non Ricardian theory. This shows the idea of monetarists about inflation is contested by fiscalists. Fiscal theory of inflation argues that inflation is also influenced by the fiscalist authorities. According to this theory government budget deficit constraint is helps as the condition of equilibrium (Lozano, 2008, Daniel, 2004).

The fiscal theory of price level has two versions. One is the strong fashion of it while the other is the weak aspect. The former supports that even if the money supply growth remains constant, fiscal policy has the capacity of autonomously influencing price level, and the latter posits that monetarists have still power. And, the growth of money supply s dictated by the monetary authorities. Moreover, the weak form of fiscal theory assumes that fiscal policy do not indirectly affect the price level showing their independence from the monetary policy responses.

Generally, this theory implies that the growth of money supply plays a passive role in the long run as the main cause of inflation is through deficit (Daniel, 2004, Carlstorm and Fuerst, 1999).

2.1.7. Historical and Theoretical Foundations of Taxation

Taxation is almost as old as human being and it has a prosperous background. It has both Biblical and Quranic foundation. Its biblical history goes to where Zacchaeus, a chief tax

collector entertained Jesus and later became his disciple. "Now behold, there was a man named Zacchaeus who was a chief tax collector and he was rich (Luke 19:2-8). Its root to Islam prescribed upon that every Muslim top pay Zakat which is the third most important pillar of Islam. Zakat payment made obligatory in at least 22 vases of the Quran, the holy book of Muslim. "Know that whatever of a thing you acquire a fifth of it is for Allah, the messenger, the near relative and the orphans, the needy and he wayfarer… (Quran 8:41). This was also cited in the works of Okoye and Gbegi, (2013) when they studied the role of effective value added tax on wealth creation for the Nigerian economy.

Being compulsory payment, tax is imposed on individuals and corporate organization (Umeora 2013). The two main important concepts here are that tax is imposed by authority of the government and that it is mandatory payment imposed on peoples within domestic territory. Smith was the first scholar to come up with the concept of canons of taxation. In his book of wealth of nations published in 1776, Adam smith the so called the father of economics addressed four cons of taxation such as canons of ability, certainty, convenience and efficiency. Later, Lambert (1992) came up with another twelve canons expanding the four canons to sixteen of which saving tax payer and economic power are some. The former means that the tax system should not spoil (harm) the tax payers whereas the later ,economic power, implies that tax system should consider economic benefit rather than the legal issue that means if the societal benefit of that particular tax system is less than the overall social cost that tax system should be changed.

2.1.8. Value Added Tax in Developing Countries

From ancient time to this day, the productivity of tax structure in developing countries is open to debate for scholars. Evidences argued that the recent problem of public finance of these countries is that revenue from different sources (tax and non tax) is not sufficient enough to finance the rapidly increasing government expenditure. Fiscal deficit could inspire the aggregate demand to recover the economy (Onaolapo and Fasina, 2013)

Provided open debate among scholars the world's dominant institutions such as World Bank (WB) and International Monetary Fund (IMF), in the past few decades up to now, are suggesting developing nations to introduce consumption taxes specially value added tax (Tanzi and Howell, 2000).

Today, Value added tax (VAT) has become a major source of revenue in many developing countries including sub-Saharan Africa. For instance, during 1980s/1990s alone VAT was introduced and implemented in Côte d'Ivoire, Benin, Guinea, Kenya, Madagascar, Mauritius, Niger, Senegal, Nigeria and Togo. Currently, it is evidenced that VAT has major contribution in the total government revenues of these countries (Ajakaiye, 2009, Adereti *et al*, 2011).

2.1.9. Comparing Ethiopian VAT Rates with other African Countries VAT Rate

Value added tax was introduced in Ethiopia as of January 2003 upon the value added proclamation no. 285/2002 and it was amended in 2008 due to the value added tax proclamation no. 609/2008. The Ethiopian VAT system is similar with New Zealand's model of goods and services tax (GST) with the intention of raising domestic government revenue (Jalata, 2014). Until today, VAT is defined from different perspectives in different parts of the world. The definition of VAT in Ethiopia is also almost the same with the international definition since it is defined as a tax on exchange (Mesfin and Bogale, 2009).The Ethiopian VAT is the consumption type of tax with 15% standard rate. This rate cannot be reduced and there is no credit for its payment.

Ethiopia is non oil and land locked country generating majority of its revenue from tax of which tax revenue plays a major role in raising the income for the country. According to the World Bank (2011), currently 44 African countries are implementing VAT in their tax system with the objective of raising domestic revenue for their public expenditure and discharge of their constitutional responsibilities including Ethiopia. This shows that it is among one of revenue raising strategy as only 11 African countries are failed to implement it. Tunisia is the first country in Africa to implement VAT with rate of 18 % in 1988. The late country introduced VAT in Africa is Gambia in 2013. The VAT rate of Gambia is 40% which is also the highest VAT rate in Africa. Now, let us take some time to look at VAT rates and GDP per capita of African countries including Ethiopia.

In addition, evidence from World Bank (2011) shows that Ethiopia is the late country introduced VAT. Ethiopia is the country with the lowest pecapita income (357) introduced VAT with 15% VAT rates contrary to Egypt, the country with highest pecapita income (2,781) with the

corresponding VAT rate of only 10%. This VAT rate is the lowest in Africa next to Nigeria, country with VAT rates of 5%. With regard to Kenya, it is shown that the GDP pecapita of this country is more than two times of Ethiopian GDP pecapita but VAT rate of this country is not far from Ethiopia. VAT rates in Kenya are 16% while that of Ethiopia is 15%.

Now let us look at some comparisons of the countries with VAT rates of 15 %. Many African countries including Ethiopia adopted VAT rate of 15 % in different times. These are countries such as Namibia, Mauritius, Namibia, Seychelles, Sera Leon, Zimbabwe, Guinea –Bissau, Equatorial -Guinea and Cape Verde. In general, 9 countries in Africa including Ethiopia introduced a single VAT rate of 15% percent. In terms of time, all African countries with VAT rate 15 % introduced VAT after the new millennium, after 2000 with the exception of Mauritius, who introduced it in 1998. The latest 15 % VAT rate was introduced by Seychelles in 2013. Equatorial –Guinea is the country with the highest pecapita income out of these countries followed by Seychelles and Mauritius. Out of African countries with 15%VAT rates Ethiopia is the country with the lowest per capita income next to Sera Leone and Guinea-Bissau. In general, the pecapita income of Ethiopia is the lowest when compared to that of all countries that are implementing 15% VAT rates in Africa.

In 2003, two African countries introduced VAT. These are Ethiopia and Lesotho. As it is depicted in the table 4.3 below the two countries introduced VAT in the same year however, they introduced different Vat rates. Lesotho has higher capita income measured in terms of USD when compared to Ethiopia.

2.1.10. Brief History of Taxation in Ethiopia

Evidence reveals that the concept of taxation in Ethiopia is as old as the history of the country. However, its coercive development is comparatively in recent time. The original idea about tax was that it is the non obligatory payment upon subject, rather considered as voluntary contribution to the government expanses. This conception gradually transformed through time and currently tax is becoming more and more obligatory. At present time, in this globalized century and civilized citizen, the payment of tax is obligatory. Thus, the imposition and its rate depend on the tax payer and its concept itself is taking a contractual form between citizens and their government as it is a fee contributed for the services. In Ethiopia, during both imperial and revolutionary periods tax was used as a means of fair resource allocation though resources were

allocated differently among sectors. Evidences reflect that about 36 percent of the national budget of the country is dedicated to the national defense and law and order maintenance in the country. Emperor increased the budget of various ministries toward the end of its period having the stagnant tax yields. The tax could not increase due to the subsistent agricultural income of the time. Therefore, in order to overcome the shortage of budget and income of the time the emperor introduced several categories of indirect taxes such as customs, excise, and sales (Yohanis and Sisay, 2013).

According to Mengesha (2008), in 19 76, the revolutionary government of Ethiopia changed the structure of tax to combat the tax problems existed during the imperial period. Accordingly, the agricultural income and rural land taxes are replaced by the tax on income from agricultural activities and rural land use fees. Another problem existed during emperor was the collection problem as the revolutionary government delegated the peasant association in order to overcome the collection problem of the time. However, despite the maximum effort exerted by the government in the process of changing the tax structure, there was believe that the taxes are under paid due to the poor assessment of the peasant associations.

With effort to solve the problem during the revolutionary period, the current government of Ethiopia has made a major policy shifts in 1992/93. In line with the policy shifts from the central planning to the market oriented system, the government has reconsidered the tax and tariff structures. The main reasons to the changes were attributed to outdated tariff and tax laws, weak customs and tax administration, failure of the tariff and tax in order to facilitate the investment. The available evidences show that the tax and tariff structure reconsideration has made tremendous change in increasing both regional and federal government revenues ((NBE, 2002/03).

The reports of FIR reveal that the federal revenue has increased to Birr 6.7 billion in 2002/2003 from Birr 2.54 billion in 1993/94. It also reflects that federal revenue as percentage of the GDP increased from 8.97% in 1993/94 to 11.87% in 2002/03. The main reason for the rise in revenue is the dramatic increase in both direct and indirect taxes in the country. However, though there is dramatic increase in direct and indirect taxes, the overall budget deficit with and without grant has been increasing as the overall budget deficit without grants as percent of GDP has increased

from -5.2% in 1996/97 to -14.5% in 2002/03. This implies that revenue collection performance in Ethiopia has been low compared to the rest of Sub-Saharan African countries.

With widening of budgetary deficit and reduction in the import tariff, excise tax and income tax introducing the more efficient tax was considered and it is widely accepted that VAT is more efficient and effective compared to other types of indirect taxes. Since Vat is becoming major tax instrument in the world many developing countries are also including vat in their tax reform policies. As result Ethiopia also included introduction of Vat with 15% in her tax reforms (Yohannes and Sisay, 2008).

2.1.11. Incidence of Value Added tax in Ethiopia

Kotlikoff and Sumers (1986) defined incidence of taxation as the impact of tax policies on welfare distribution in the society particularly from the economic resources fair allocation point of view. The incidence of tax deals with identifying where the tax burden fall. It is one way of measuring the progressivity of tax. According to (Sarker, 2006) it is the analysis of tax policy incidence that shows the bearers of the particular tax burden. Faridy and Sarker (2011) conducted empirical study for Bangladesh using Household Income Expenditure Survey (HIES) 2005 data to evaluate whether the VAT in the country is progressive or not. In their empirical investigation they found that relatively the poor is bearing much burden while the rich is enjoying lower burden of VAT. In figure, they calculated that the lower tax burden of poor is 6.92 percent where as the minimum tax burden of higher income group is 4.56 percent. These researchers are against a single VAT rate which cannot differentiate the types of goods to set different rate of VAT.

In Ethiopia, Sònia Muñoz and Stanley (2003) conducted study in Ethiopia on behalf of international monetary fund (IMF). By using house hold expenditure as welfare measure they found that VAT in Ethiopia during the study was progressive reasoned to high ratio of in-kind transaction for the poor households. However, when economic growth increase and become more market based the share of in kind transaction lower and due to the tax become less progressive in the future. According to them, in urban area of Ethiopia tax is almost regressive attributed the fact that majority of urban immigrants are poor. This means that the introduction of value added tax has adverse impact on poor which is one percent of their consumption as poor

will be beneficiary when the government expend on education and health activities. Recently, Jalata, (2014) observed that VAT in Ethiopia regressive though it is significantly contributing to economic growth and national development. In his words, he said that beggar and millionaire paying the same VAT for similar benefit.

On the other hand several scholars devoted on the challenges of VAT adoption and implementation in Ethiopia. The following section therefore reviews the works taking some time. Almost all scholars are of the same mind that VAT is significant to economic growth and it is one of the latest inventions in taxing system by experts of taxation. At the same time there is also common consensus among researchers that it has some limitations. To illustrate this looking the example of drug and the order of doctor in medical science is enough. Drug is highly beneficial to our healthy. It cures as from diseases and enable us to hope health institution if we are feeling uncomfortable of unhealthy condition. It creates happiness in our life as we feel comfortable after having it. Both psychological and physical advantages can be derived from it. However, we need to be cautious. Prescription of the doctor should be taken into considerations. If we fail to follow the instruction of the doctor and other things related to the use of that specific drug, the drug is poison. The same is true in economics. The benefit of some Variable determined based its outcome on inflation. We are dealing with VAT and inflation right now. This coincide with the work of Egidijus and Emile *(*2013),who took the data of European country between 2004-2011 to evaluate factors affecting VAT revenue in order to discover that what largely happen to the price level in economy determines the consequence of VAT on economic growth, balance of payment and income distribution. This can be traced back to forty years when charlotte (1973) found that the likelihood of increase in general price, inflation, is the major concern of European countries due to enactment of VAT. He concluded this simply after twenty years implementation of VAT in France from its introduction in the country in 1954.

Hybka, (2009) investigated about the import as the main determinant of VAT revenue. According to his paper for major importing country, as VAT is the income from consumption, the income from VAT where import is high is greater. The challenge here for him is that the countries plan to be exporter. And especially in growing economies there is huge trade deficit negatively affecting the revenue from VAT. According to Bikas and Rashkauskas (2011) individual income has a greater thing to play with VAT revenue. For them the more the wage or

salary of individuals, the higher will be the VAT revenue. However, the challenge developing come across is higher unemployment. Majority of the peoples in labor force has no individual income which implies negation on their consumption. In general, for Egidijus and Emile *(*2013) the following variables positively affect the VAT income. These are, gross domestic product, gross domestic product per capita, consumption costs, households' consumption costs, governments' consumption costs, import. Contrary, VAT income is negatively affected by increase in export and unemployment.

Jalata (2014) reviewed the threat of Ethiopian VAT system. His paper argued that both VAT and sales tax in Ethiopia are regressive as there is single standard VAT rate for both poor and rich. For him both legal and administrative frame works of VAT refunds are also with importunate problems. His work prompted the findings of Tamaoka (1994) who found that VAT is regressive due to reduction in propensity to consume when income increases as VAT is consumption tax levied on goods and services. If tax is regressive in nature, as a tax base increases both average and marginal tax rate decreases. Graphically, as average tax rate lies above the marginal tax rate it puts greater burden on the lower income group classes reflecting that the VAT rate is automatically regressive.

2.2. Review of Empirical Literatures

This section reviews the relevant empirical findings of the precedent literatures. In modern research, the gap a given study going to bridge clarified not only in a statement of the problem but also in review of literatures. Since the main objective of reviewing literatures is also to identify the knowledge gap of previous studies, relevant empirical works bellow attempted to fulfill that scenario. In other words, review of relevant and related empirical findings is not a mere list of their methodology, finding and conclusion but with careful critics and cautious evaluation on variables, types of data and their result.

2.2.1. Value Added Tax and Economic Growth

There are plenty of empirical works conducted about the impact of VAT on economic growth around the globe. For instance, Nayeem and Parvez (2012) investigated the effect of VAT and tax on economy of Bangladesh. Using both primary and secondary data they observed that

about two-thirds of the tax revenue in developing countries comes from indirect taxes, mostly VAT. Only one-third of their revenue consists of corporate income tax. Replacing trade taxes with domestic consumption taxes, particularly value-added tax (VAT), developing countries have undergone several tax reforms. They also concluded that the purpose of replacing trade taxes with domestic consumption taxes is mainly to improve macroeconomic stability, and to introduce the benefits of free trade to developing economies. The main reason why vat viewed as more efficient in developing countries is that it does not discriminate between domestic and imported goods.

Secondly, Michael & Ben (2007) studied the causes and consequences of the spread of value added tax (VAT) in effort of developing the model of VAT adoption. The paper observed that VAT has significant and mixed impact on economic growth. A panel study approach was adopted. The data covered 143 countries for 25 years were used in the analysis. The result revealed that VAT has mixed but significant impact on revenue generation. It also revealed that there is a difference in the gain from VAT among countries.

Thirdly, Fredrick and Okeke (2013) carried out a work on value added tax on investment growth in Nigeria with the objective of examining the impact of VAT on investment growth. Their work employed multiple regression analysis. The study used time series data on variables such as investment, government expenditure, real exchange rate, real interest rate and trade openness, and found that Value Added Tax has significant effect on investment growth in the country. The policy recommendation of the study was that government should be apparent honest to improve the way of Value added tax collection.

Fourthly, Denis (2010) empirically investigated the relationship between Value Added Tax (VAT) and Gross Domestic Product (GDP) for Nigerian economy. The study adopted Pearson's Product Moment Correlation Coefficient to conduct analysis time series secondary data of 1994-2008 and observed that there is a strong positive correlation between VAT revenue and GDP.

The work of Ezeji and Peter (2014) examined the impact of value added tax on economic growth. Their econometric analysis shows that VAT has significant and positive effect on economic growth. The analysis conducted using Engle and Granger co integration technique on

annual data sample covering 1994 to 2012. The result of the technique reveals that relationship between VAT and GDP is absent both in short and long run in Nigeria.

Osoro (2003) conducted an empirical research whose objective is examining the implications VAT reforms for Tanzanian economy. The study adopted the estimation technique of double log form equation to calculate the tax buoyancy. The elasticity of tax is calculated by proportional adjustment method as it has the advantage of capturing series of discretionary changes. The overall elasticity of tax calculated for the period was 0.76 while that of buoyancy was 1.06, and the general conclusion of the paper was that tax reforms failed to improve the tax revenue in Tanzania.

Njogu (2015) carried out a work on effect of value added tax on economic growth in Kenyan economy. The casual study from 1990 to 2014 was adopted in the paper. The study used Gross Domestic Product (GDP), consumer prices as measured by consumer price indexes (CPI), and employment as measured by the unemployment rate as explanatory variables and VAT rates as explained Variable. The data analysis method adopted in the study was the time varying regression models, Poisson and negative binomial regression models. The study observed that there is a significant negative relationship between GDP and VAT rates as a percent change in the incident rate of GDP is an increase of 7% for every unit decrease in Value added tax. The study recommended that the concerned body (Kenyan government) should work hard to maintain positive relationship between VAT rates and economic growth by decreasing the VAT rate so that it can result in the increase in growth domestic product of Kenyan economy.

The empirical investigation of Izedonmi and Okunbor, (2014), shows that VAT revenue is an important determinant of economic growth for the study period of 1994-2010 in Nigeria. The paper used time series data analyzed using Cobb-Douglas regression model. Their study further explained that VAT revenue has statistically insignificant but positive effects on economic growth indicating deprived management of Value added tax in the country.

Okoye and Gbegi, (2013), who investigated the contribution of effective Value added tax on economic development using Pearson Product Movement Correlation Coefficient and the Student's T-test to investigate the hypotheses, observed that VAT is contributing significantly to GDP, and thus considered as a bedrock of wealth creation and economic development in

Nigeria. His study also prompted the finding of Denis (2010). This was also supported by empirical work of Ayua (1994), who related the decision for investment, tax incentives and political stability to economic growth and wealth creation and found positive relation between them.

Jalata(2014), when conducting his study on the role of value added tax on economic growth of Ethiopia, concluded that value added tax which was introduced to the country in 2003 is significantly contributing to economic growth of Ethiopia for about the decade from 2003-2012. Using descriptive and multiple regression analysis in his work he found out despite significance contribution of VAT to economic growth the contribution of VAT a mass to be regressive. The finding of his study also revealed that the VAT is not in favor of the poor as both poor and reach are subjected to the same VAT rate.

While dealing with the contribution of VAT to the national development Jalata (2014), by using OLS estimation for annual quantitative time series data, concluded again that VAT is a paramount significant to the national development of the country. His study further revealed that the continuous and full-fledged effort of the government is necessary in order to fully utilize the revenue from VAT and to have it only for the desired objectives.

The investigation of Umeora (2013), in his work on effects of Value Added Tax (VAT) on Economic Growth (GDP) and total tax revenue in Nigeria, found that value added tax is significantly contributing to both total tax revenue and economic growth via GDP for the period between 1994- 2010.

In studying impact of value added tax (VAT) on economic and human developments of emerging Nations, Unegbu and Irefin (2011) found that allocation of the VAT to state within the required period is significant. ANOVA and discriminant analysis used in the test of hypothesis while the period of analysis was for about decade from 2001-2009.

The work of Komal (2013) revealed that transparency is all that matters in India. The paper collected primary data to conduct analysis on impact of VAT on Business Enterprises and his study revealed that there is equal channel among consumers, whole sellers and retailers. Marius and Alwell (2013) concluded that the level of appropriate management is one of the determining factor of the benefit derived from any tax system. In general, these scholars argued that VAT is significant to economic growth, economic development, and the revenues of

government. However, all most all of them recommended that it has problem of progressivity especially where the single rate of VAT is implemented since it invite payment of the same rate for the same benefit. It is similar with the issue that a millionaire and beggar waiting others to get bread are subjected to the same value added tax rate. This unquestionably shows that there is a need to investigate the impact of VAT on price stability.

2.2.2. Value Added Tax and Resource Mobilization

Currently, the contribution of Value added tax in resource mobilization and distribution has attracted the attention of many researchers. For instance, Onodugo and Anowor (2013) evaluated the contribution of VAT to resource mobilization by using Ordinary Least Square (OLS) method of simple regression analysis method for Nigerian economy. From time series data between 1994- 2010, they empirically observed that VAT is contributing both positively and significantly to resource mobilization as well as capital formation using real gross domestic product, VAT, current and internal revenue variables.

Bastagali (2015) considered taxation from the point of view of social protection using simulation analysis method. He argued that taxes should be the center of social protection analysis and planning. The reflection in his paper also includes the concept that the society should be also protected from unreasonable price level and inflation rate. He also argued that the purpose of the resource mobilization to benefit the society. According to Crivelli and Gupta, (2014) resource revenue mobilization and non resource revenue mobilization negatively related. They conducted their study on 20 countries that are highly resource intensive. Their empirical finding shows that every 1% increase in resource revenues lowers non-resource revenues by up to 0.12% of GDP. This implies that easy revenues from extractive industries may deter politicians from embarking on deeper tax reforms. The main objective of these scholars was to shape policies for development. If not properly managed, the contribution of VAT in resource mobilization can be diverted to unequal distribution of resources in society which affect price stability. As matter fact, since developing countries are victim of this issue considering the relationship existing between VAT and price level has paramount significant for growing economies. The above literatures considered the contribution of VAT in resource mobilization. However, they failed to look at what happen to price when VAT is used in the process.

2.2.3. Value Added Tax and International Trade

The global community concern about the impact of VAT on the international trade started in nineties when Feldstein and Krugman (1990) conducted their study on how VAT is affecting international trade. According to Adereti *et al (2001)* the study conducted by these scholars was pioneer and the issue of VAT and worldwide trade was not considered before them. Before 1990 there was a belief that VAT encourages export not import as it is levied on import and rebate export. They used simple regression model in order to check whether the belief is true or not and found that it is completely wrong.

According to Umeora (2013) VAT is not protectionist measure because it can affect both imports and exports. For him protectionist assumption is functioning if and only if VAT is not acting as export tax. Feldstein and Krugman (1990) further explained that VAT fall more heavily on traded goods rather than non traded goods. After about a decade another study conducted by Desai and Hines (2002) in order to advance the work of the Feldstein and Krugman. Their study assumed two things. The first is that when VAT is levied on imports at destination, this is encourages export. Next is that adjustment of exchange rate save exports and imports from negative impact of VAT at destination. Their study concludes that growing economies are victims of negative consequences of VAT on international trade if they use VAT as import control and export incentives.

2.2.4. Tax Revenue and Expenditure Instability

Quite a lot of studies conducted regarding tax revenues instabilities in sub-Saharan Africa. For instance, Bleany et al (1995), in their paper published online in 2007; about instabilities of tax revenue found that instability has deep root in LDCs with open economies. According to their paper, economies of large output variance and inflationary problems are the place where instability is observed. Using time series evidence of six African countries, their study revealed that revenue instability is the source of expenditure instability. These researches in their work acknowledged the finding of Lim (1983), who revealed in his study that expenditure instability

is the immediate consequence of revenue instability. By using the study period of 37 Sub Saharan African countries, Ebeke and Ehrhart (2013, 2011) investigated that public investment is negatively affected by revenue instability. In their paper, they also found that, between1980-2005, the more dependants the countries are on internal indirect taxes; the smaller will be their tax revenue instability. The work of these scholars also gave credit for Diallo (2009), Thornton (2008), for their prompted contribution regarding tax revenue stability with special reference to sub Saharan Africa. In general the ideas of literatures above limited to the concept tax structure of which the Value added tax might be one. The literatures above also focused on the concept of expenditures instability rather than price instability or stability. The main focuses of the scholars in this section is simply expenditure as a component of GDP not price stability as the objective of macro-economy.

2.2.5. Indirect Taxes and Economic Growth

The relationship between indirect tax and economic growth got much attention with the earliest work of Harberger (1964), who conducted study about the growth effects of indirect taxes on the labor supply growth. Harberger observed that the degree of effect of indirect tax on investment is insufficient to stimulate economic growth. According to him, the changes in the taxation components do not impact on the labour supply and investment. Due to this, there is an insignificant change in economic growth.

Ilaboya and Mgbame(2012), in their work on the relationship between indirect tax and economic growth, using Engel-Granger two step procedure method to test, found that the relationship between indirect tax and economic growth is negative and at the same time insignificant. The study used Autoregressive Distributed Lag (ARDL) to correct the disturbance between short and long run as the ratio of total indirect tax ratio is appeared to be negative coefficient 0.5817. The finding of this paper is probably the first as far as the Nigerian economy is concerned.

The study of Scarlet (2011) investigated the relationship between taxation and economic growth in Jamaica using the standard growth functions within the autoregressive distributed lag. Employing quarterly time series data from1990 to 2010, the study found that relationship between indirect tax and economic growth in the long run is significant and positive. In addition, using panel data of direct and indirect taxes in Pakistan and India from 2000 to 2009,

Aamir, Qayyuum, Nasir, Hussain, Khan and Butt (2011), discovered that in Pakistan, indirect taxes have statistically significant positive impact on total revenue and by extension economic growth and, the finding of their study reveals that if total indirect taxes increases by Rs.1, the increase in total tax revenue would amount to Rs 1.495.

The work of these scholars, gives credit to the earlier work of Greenidge and Drakes (2009), who analyzed the relationship between tax policy and Macroeconomic Variables for the economy of Barbados. However, their study fails to capture the all component of indirect tax such as VAT. They did not focused on separate components of indirect tax though giving attention to all is very much important.

2.2.6. Value Added Tax and Inflation

At present, the establishment of VAT in both developed and developing nation as most imperative source of revenue attracted scholars as many studies are giving center of attention on the impact of VAT on general rise in price of goods and services.

Gelardi (2014) studied the impact of value added tax on inflation using graphical and statistical analysis for united stated of America, Canada and United Kingdom. His study used consumer price as index to measure inflation on the way to make sure that the introduction of VAT affected the price index of these countries. In his paper, he noted that in Canada the Value added tax introduction have caused the rate of CPI to increase. He also found that the goods and services tax introduction did not brought considerable impact on the consumer price indexes in the rest two countries. The finding of his paper also addressed that substantial change of rate of tax affect inflation while modest change does not affect inflation.

Tripathi et al (2011), who studied impact and future prospects of VAT in the industries of India, observed that intermediate level of trade faced problem due to reduced level of marketing by companies. He also suggested that it can negatively affect the purchasing power of poor class societies. His work concluded that retailers and final consumers can be depressingly debilitated.

Using the method of regression analysis Nawfor(2010)studied the effect of value added tax on the Nigerian economy. The finding of the study revealed that VAT has both positive and

significant effect on economy as well as on the Nigerian consumption patterns between 1997 up to 2007.

Asgowa and Nkolika (2013) investigated the impact of VAT on the growth of investment with the aid of multiple regression analysis. From time series analysis they observed that VAT affects the growth of investment in positive way. According to them VAT should have single influence on consumer prices. This should also be consistent with whatever the level of value added tax rate and stages of VAT collection.

According to the study conducted by Ajakaiye (1999), when VAT is treated as additional cost by VAT registered organizations, in growing economies, high risk of VAT sustainability exists. Using computable general equilibrium analysis to empirically investigate aggregated level consequence of VAT on essential sectors of Nigerian economy, his paper found that a 5%

VAT rate results in 12% percent swell in general price index. His study also concluded that the way VAT registered businesses consider VAT determines its effect on economy.

Maries and Alwell (2013) investigated the effect of VAT on price stability using partial equilibrium analysis. Empirical results of their paper confirm that between the periods of 1994-2010 VAT significantly influenced the price level as observed from multiple regression adopted in the model of study. In their paper, they underlined that in spite of its significance as source of revenue, VAT is not free from inflationary outcome. In general, their study concluded that the rise in price due to the VAT can create instability to the economy of Nigeria. They preferred partial equilibrium as it provides the advantage of forecasting well irrespective of sample size both in short and long run.

Generally, the literatures on VAT were interested to the significance of VAT on economic growth. The empirical studies about inflation also focused on determinants of inflation. Majority of the literatures failed to look at the relationship between VAT and price stability. Only Marius and Alwell (2013) and Ajakaiye (1999) considered the effect of VAT on price level for Nigerian economy. Except these authors others did not modeled VAT as a determinant of inflation. Moreover, there is no comprehensive work that is done on VAT and price stability in the context of Ethiopia since its introduction. Therefore, the present study is interested on examining the influence of VAT on price stability in Ethiopian context.

2.2.7. Inflation and import

Ademe (2015) examined the interaction of Ethiopian and world inflation for the time period 1981-2012. The study used vector error correction model coupled with impulse response function to analyze the time series data. The study found that the effect of import from south Asia is positively and significantly affecting inflation in Ethiopia. The result of impulse response function conducted in the study has shown that domestic inflation is to responsive for shocks resulted in the world inflation.

Volkan and Ugar(2011) carried out a research work whose objective was to empirically investigate the relationship between import and inflation in Turkey. Using monthly time series data between 1995 through 2010 they observed that there are positive relationship between the variables import and inflation. They applied the granger causality approach. The study concludes that there exists unidirectional causality between the two variables. They found that import granger cause inflation but there will no backward causation as inflation does not granger cause import. Their study used consumer price index as a proxy of inflation in Turkey.

Oriavwote and Eshenake (2012) conducted the study with the main objective of assessing the relationship of exchange rate and inflation for the period of 1970through 2010taking Nigeria as the case. They adopted the error correction model and the Johansen test of co integration as the way of analysis. From the analysis of co integration they found that real exchange rate positively affect the rate of inflation in both short and long run. Their study concluded that the real exchange rate is among the most responsible factors for the ups and downs of price level in Nigeria. The study recommended that policy should focus on boosting domestic production to combat the inflation imported on the economy.

2.2.8. Inflation and Fiscal Deficit

Everton *et al*(2012) studied the correlation between fiscal deficit and inflation using co integration and vector error correction model approach using the longitudinal data series covering the year 1970-2006 for Nigerian economy and they found that there is insignificant positive relationship between fiscal deficit and inflation for the study period. There study also observed from the analysis that there is also positive relationship between money supply and inflation showing that the rate of money supply growth faster than that of inflation level. Oliver

and Michael(2012) examined the impact of exchange rate on inflationary pressure between 1970 and 2010 using the ordinary least square in the form of multiple regression analysis The study concluded that there is positive relationship between exchange rate and inflation and the result from the granger causality test shows that there is no any directional causality between inflation and exchange rate.

Ezeabasili *et al* (2013) investigated the empirical relationship between fiscal deficit and inflation. The study used the technique of co integration and structural analysis from the period 1970 to 2006. They found that fiscal deficit has positive insignificant relationship in Nigeria during the period under investigation. They also found that past levels of fiscal deficit has no relationship with inflation in long run.

Orji *et al* (2014) conducted as study whose objective is examining a casual relationship between Inflation and fiscal deficit. Their study used structural model for the data between 1970 up to 2010 and observed that fiscal deficit causes inflation. For them it takes two years for fiscal deficit two affect inflation in Nigeria. Makonchekanwa (2011) conducted the study to investigate the causal relation relationship between fiscal deficit and inflation in Zimbabwe. The study found positive but insignificant relationship between the inflation and fiscal deficit for the study period.

In Ethiopia, Wolderufael (2008) studied the relationship between budget deficit money and inflation considering Ethiopia as the case. The study covered the period of 1964-2003. The paper applied bound co integration and modified Granger causality test. In order to check the robustness of the bound test conducted the dynamic ordinary least square. From their time series analysis they found that there is unidirectional causality budget running from deficit to inflation In addition, the finding of his study revealed that there is a single directional causality running from money supply to inflation. This study implied that stability in budget balance and money supply are important factor for price stability in Ethiopia.

Jude (2013) investigated the causal relationship among the government budget deficit, money growth and price level for the period of 1971 to 2008. The study used the multivariate co integration test and the Toda Yamamoto causality tests. The study found long term relationship between the variables. The study found also that there is unidirectional causality running from budget deficit to price level. In addition, the long term causal relationship among budget deficit, money growth, and inflation in Nigeria from the period of 1970 to 2005 was studied by Omake

and Oruta (2010). The Johansen co integration test with the vector error correction method is employed as a methodology. Moreover, the Granger causality test is applied and their revealed that there is unidirectional causality running from money supply to inflation.

2.2.9. Inflation and Real Effective Exchange rate

Irmana (2013) investigated the impact of real effective exchange rate on inflation using time series data of 1973 to 2007 for the economy of Pakistan. The study used OLS method to estimate the relationship of the variables and ADF to obtain the order of integration of the variables and found that there is very strong and positive correlation between the real effective exchange rate and rate of inflation under the investigation Period. The study recommended that policy makers should follow a tight monetary policy in an effort of getting price stability through control on the real effective exchange rate.

Oliver and Michael (2014) conducted study on the title exchange rate and inflation rate with the main objective of examining the nature of association between the two variables. They used ordinary list square and co integration procedure applied on the data from 1979 - 2010. The study observed that there is no causality in any direction between inflation rate and exchange rate. The study recommended policy makers to focus on exchange rate stabilization as it is one of the most volatile macroeconomic indices both in the short and long run.

Oravwote and Eshenke (2012) conducted an empirical study on the relationship between inflation rate and exchange rate. The found that the relationship between the two variables is observed to be positive in both times: short and long run. They used error correction model to the speed of adjustment and found satisfactory speed in the long run. They also used ARCH to determine the volatility of two variables. Their study recommended that policy makers should focus on improving exports and other strategies that can boost domestic economy rather than targeting simply on stabilizing inflation and exchange rate.

Vicente (2007) investigated exchange rate and consumer prices in Mozambique using co integration approach. Using monthly data from 2001 to 2006they found that money supply and inflation are important determinants of inflation in Mozambique. Further, they observed that exchange rate depreciation leads to 0.15percent rise in inflation.

Gossaye (2015), made an effort to investigate the impact of devaluation in the process of obtaining both external and internal balances in Ethiopia. The study used consumer price index as independent variable while real effective exchange rate is an explanatory variable. The study used a VAR model to analyze the time series data from the period of 1974 to 2014. The study found that real effective exchange rate has a positive impact on inflationary situations both in the short and long run in Ethiopia. The other study is that Mahammadnur (2012) also investigated the exchange rate pass trough to inflation and found that real effective exchange rate has positive on inflation in both periods.

2.2.10. Inflation and Money Supply

Denbel *et al* (January, 2016) investigated the causal relationship between inflation, money supply and economic growth in Ethiopia. Using a co integration and Granger causality to analyze time series data of 1970/71 to 2010/11, they found that there is bi directional causality between inflation and money supply. Their finding from Granger causality test revealed that there is a unidirectional causality running from money supply to inflation.

Sola and Peter (2012), made an effort to examine the linkage between money supply and inflation for the sake of national development implication. They used time series data between 1970 to2008. Employing unrestricted VAR model, the study observed that there is one way Causation running from money supply to inflation in Nigeria.

The work of Ghazali *et al* (2008) explored the relationship between money and price level (inflation). Using monthly data from January 1974 to September 2006, they observed that money supply and inflation have long run relationship. Using the Toda Yamamoto causality test, their study found that there is unidirectional causality running from money supply to inflation supporting quantity of money theorist's view.

Alpha and Pingfeng (2015) investigated the determinants of inflation in Sierra Leone using the co integration analysis. Their analysis covered the annual data from the period 1990 to 2013. From analysis of VECM and Johansen approach, they found that money supply and GDP of the country affected price level of the country both positively and significantly. Their findings also reveal that exchange rate and import has no significant relationship in the short run.

The determinant of inflation in Pakistan from the period of 1972 to 2010 was studied by Bashir *et al* (2011). They applied Johansen co integration approach and vector error correction model. Moreover, the study conducted a granger causality test for the purpose of causality analysis of annual time series data for the period under investigation. The finding of the author's empirical investigation revealed that the price level is affected by GDP, government expenditure, money supply and imports positively and significantly. Their result from Granger causality confirmed the result of VECM and Co integration analysis. Finally, they concluded that maintaining price stability in Pakistan requires optimal improvements in all variables of the study.

CHAPTER THREE

METHODOLOGY OF THE STUDY

3.1. Type and Sources of Data

This research is inferential in nature and requires the collection of quantitative data. Thus, Quarterly quantitative data for the period of 2004Q1- 2014Q4 is used in the study. The selection of the year is not random for the reason that the initial year is the warranted since value added tax is first implemented full fiscal year. The last year is found convenient for the reason that it was the highest full fiscal year execution of VAT seeing that more than quarter months left out of fiscal year of 2015 when this study proposed. The value added tax was implemented in Ethiopia starting from January 1, 2003 which was half of Ethiopian fiscal year as the fiscal year starts July 6 and ends July 7 of each year.

The study employed time series data from several government organizations. The quarterly time series data records of the former Ethiopian ministry of finance and economic development (MOFED) currently ministry of finance and economic cooperation (MOFEC), Revenue and Custom Authorities (ERCA), Central Statistical Authorities (CSA), Ethiopian Economic Association (EEA) and National Bank of Ethiopia (NBE) used in this study.

3.2. Variables of the Research and their Description

In order to attain its objectives, the study came across the variables that scholars used in different times. For instance, Marius and Alwell (2013) used Inflation (INF), Fiscal deficit (FD), Growth rate of money supply (GrM2), Real interest rate (RINT) and real exchange rate (REXG) to consider the impact of Value added tax on aggregate price level using partial equilibrium analysis. Another work was that of Ajakaiye (1999), who favored the use of Computable general equilibrium (CGE) analysis to study the macroeconomic impact of Value added tax at aggregate level of economy. The Variables in this study were more or less similar with the variables used by Marius and Alwell (2013). In order to achieve the objective of the study however, the variables were selected according to the real situation of Ethiopian context and the variables in this research were modified by adding Import (IMPT), the variable that is

not used in the work of Marius and Alwell (2013). Thus, the dependent variable of the research was consumer Price index (CPI) which is the most commonly used index in Ethiopia.

Explanatory variables were Fiscal deficit (FDFCT), Broad money supply (BRDM); this is also called M_2, Real Effective Exchange rate (REER), Value added tax (VAT) and Import (IMPT). Broad money supply was adopted as the concept of money supply and its growth rates was calculated as the ratio of the amount by which current period level of money supply differs from that of proceeding level.

Fiscal deficit (FDFCT) was considered as the main determinant of inflation when Bakare *et al* (2014) studied the relationship between fiscal deficit, money supply and inflation from the period 1975 to 2012. Real effective exchange rate (REER) was used as an explanatory variable that affect inflation in the work of Odusola and Akinlo (2010) in their effort to study output, inflation and exchange rate in developing countries. The value added tax (VAT was also considered as the variable that affect price level and hence inflation in developing nations and used as explanatory variable in the empirical work of Ajakaiye (1999) and Maries and Alwells (2013) both conducted to investigate the impact of VAT on price level for Nigerian economy.

Broad Money (BRDM) is used in several studies such as Olorunfemi and Adeleke(2013)during their study on money supply and inflation as an implication for the national development, and in almost all studies that are in an attempt to study about the determinants of inflation. Import (IMPT) was identified as the main source of inflation in the study of (Ariful, 2013) and Fatai (2015). In one or another way the studies used these variables are conducted in developing nations that share almost common property with Ethiopia. Therefore, the selection of variables used in this study is logical and precisely speaking, the variables and their corresponding description are given in table 3.1 bellow.

Table 3.1: Description of the variables in the study

Variables	Their Description
LogCPI	The general Ethiopian Consumer Price Index in log form
LogFDFCT	Fiscal Deficit in log Form
Log REER	Real effective Exchange rate of ETB to $ in log form
Log VAT	The Value Added tax Revenue in log Form
Log BRDM	Broad money(M2) simply money supply in log form
Log IMPT	Import of goods and services in log form

3.3. Definition of Variables in the Study

The described variables should be clearly defined in any scientific investigation. Thus, this section deals with the definition of variables. This study has six variables. The dependant variable is consumer price index while the left five are explanatory variables. The definitions of the variables in the view of this study are given as follows.

A Consumer Price Index (CPI): this index used as a proxy of inflation in this study. it is measure of changes in the price level of a market basket of consumer goods and services purchased by households, and its annual percentage change is used as a measure of inflation in many developing countries like Ethiopia. This index is sometimes termed as a way of calculating the cost of living in these countries. The consumer price index which measures the inflation in Ethiopia is a dependant variable of this study.

Fiscal Deficit (FDFCT): it is the accumulation of deficit in different times. In other words it can be defined as summation of budget of past years. Clearly speaking, budget deficit is the difference between total government receipts and total expenditures. Fiscal deficit however is the difference between income of government and its expenditures. The main difference is that

budget deficit is the excess of spending over income either by government, corporate individual under some time periods. The fact is that it may not be necessarily for government. The fiscal deficit is necessarily for government. This is why this study preferred this variable.

Real Effective Exchange Rate (REEER): it is an indicator obtained by deflating the nominal effective exchange rate (a measure of the value of a currency against a weighted average of several foreign currencies) by a suitable effective deflator. It is a number which can be expressed as index which shows what is happening to value of domestic currency against the whole basket of currencies of other countries. A comparison of the real effective exchange rate of a number of countries can show the level of competiveness in terms of trade. This data helps to capture the exchange rate change in Ethiopia in order to set it as an explanatory variable in the process of estimating the relationship between VAT and price stability in Ethiopia.

Value Added Tax (VAT): In Ethiopia or elsewhere, VAT is defined as a tax on exchange that is levied on the value added that result from each stage of exchange. Value added tax is a tax on the added values. Moreover, VAT is an indirect tax in that the tax is collected from someone other than the person who actually bears cost of the tax. In this study, V AT revenue which is collected thorough standard single VAT rate (15%) is used as an explanatory variable to see its effect on price level in the study period.

Broad Money (Money Supply) (BRDM): it is a variable that explain the total amount of monetary asset available in an economy at specific amount of time, say quarter in this study case. The brad money used in this study, include the currency in circulation plus saving accounts and non interest bearing bank deposits in the country. Generally, the broad money used here is M_2.

Import (IMPT): another variable used in this study is import (IMPT) and it can be defined as a good or service brought from an external boarder especially across the national border. This consists of transactions in a goods or service to the Ethiopian national residents from outside. Thus, the import variable used in the present study is the volume of import that our country imports in each quarter.

3.4. Methodological Framework of the Study

Choice of the variables and models is not random work in research. The researcher should have ground to select them and need to be cautious when dealing with models and variables.

Reasoning that others used this type of model and variables alone are not satisfactory. That means the reasons explained should be convincing. Thus, this study laid the frame work of the methodology that assisted it to select model and variables.

In the study of determinants of inflation in Nigeria, Fatukasi (2005) modeled inflation as a function of fiscal deficits, money supply, interest and exchange rates. In order to overcome the challenge of price instability in the country, his paper used the time series data 1981 and 2003. He used multiple regressions to obtain relationship between the explanatory variables and the rate of inflation. But, his model failed to capture import and real exchange rate though developing countries are the major importers.

In effort to improve the Work of Fatukasi, Odusanya and Atanda (2010) modeled inflation by adding import as percentage of GDP and first lagged inflation to his work. They studied the main determinants of inflation in Nigeria 1970 - 2007. The dependant variable they used was inflation while the explanatory variables where growth rate of GDP, fiscal deficit as a percentage of GDP, import as percentage of GDP, first lagged inflation and first lagged real exchange rate, interest rate and growth rate of money supply. They examined the time series properties of variables using Augmented Dickey Fuller (ADF) unit root test.

Ndidi (2013) also investigated the determinants of inflation between1970-2010. For him, inflation was the function of one year lag of inflation, level of output, Money Supply, Exchange rate and measuring trade openness. These empirics show that inflation is dynamic and its modeling depend on what economy is doing both in domestic and at international level. The search for a reliable inflation function according to Fatukasi (2005) continues to be an intensive activity. All of them used money supply, interest rate and fiscal deficit as their studies were conducted in developing countries. They did not how ever use VAT as determinant of inflation. But after a while the economic impact of VAT on aggregate price level brought question in the minds of Marius and Alwell (2013) as they investigated the impact of VAT on price stability using time series data of 1994-2010 through partial equilibrium analysis. The independent variables are inflation fundamentals, such as fiscal deficits as a percentage of GDP, the growth rate of the money supply, the real interest rate, the Value Added Tax, and the real exchange rate. Their model failed capture import as percentage of GDP even though developing countries are the major importers of final goods that are subjected to VAT.

Variable selection of this study takes into account about the real context of Ethiopia. VAT in this research is the main explanatory variable while others independent variables used as control.

3.5. Specification of the Model

Scholars have tried to consider the impact of VAT on price level in different times. Among them, Ajakaiye (1999), who favored the Computable General Equilibrium Analysis (CGE) to evaluate macro-economic impact of VAT on key sectors and Marius and Alwell (2013), who conducted their study using partial equilibrium, can be named. While Mclure (1989) was the first scholar to highlight his preference for the Computable general equilibrium analysis, Fatukasi (2005) conducted his study by combining the structuralist, monetarist and fiscalist approaches to inflation modeling. In their inflation modeling Marius and Alwell (2013) favored the partial equilibrium analysis as it allows one to clarify the effect of VAT in isolation from those of other control variables included in the model and according to them Partial equilibrium analysis has the advantage of providing simultaneously the short and long-run impacts of the variables included in the model.

To attain its objective, the model used in this study is more or less similar with Marius and Alwell (2013), who took inflation (INF), fiscal deficits as a percentage of GDP (FD), the growth rate of the money supply (GrM2), the real interest rate (RINT), the Value Added Tax (VAT), the real exchange rate (REXG) to study the impact of VAT on price stability.

However, this study has improvement upon them in which it considers the year between 2004Q1- 2014Q4, as it updates the analysis and it provides the information about impact of value added tax on price stability from the angle of Ethiopian context. The study also adjusts the variables based on its objectives.

Hence, the research is developed based on the selected variables: CPI, FDFCT, REER, and VAT, BRDM and IPMT.

The relationship is established as follows.

CPI= (FDFCT, REER, VAT, BRDM, IMPT)

Finally working stochastic model is

$$\text{LogCPIt} = \beta 0 + \beta 1\text{LogFDFCT}_t + \beta 2\text{Log REER}_t + \beta 3\text{logVAT}_t + \beta 4\text{logBRDM}_t + \beta 5\text{logIMPT}_t + \text{st} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Where, Log stands for the natural logarithm, S for the error term, t for the time parameter, β1, β2, β3, β4, and β_5 are the elasticity of VAT, fiscal deficits (FDFCT), real effective exchange rate (REER), money supply (BRDM) and import (IMPT). The study uses Log to bring normality and linearity under the study. In this study e-view 7.1 econometrics software is used for the purpose of estimation. The soft ware is preferred due to its convenience in the analysis of time series data.

The present study used the log of Consumer price index as a measure of inflation and it is taken as a dependant variable. Variables such as fiscal deficits (FDFCT), broad money (BRDM), the real effective exchange rate (REER), the Value Added Tax (VAT), and import (IMPT) are explanatory variables of the study. All independent variables; FDFCT, BRDM, REER, VAT and IMPT are expected to have positive relationship with the consumer price index (CPI). Thus, the priori expectation of the elasticity will be $\beta 1, \beta 2\ \beta 3, \beta 4\ , \beta 5\ > 0$.

3.6. Method of Estimation and Data Analysis

3.6.1. Test for Stationary of the Data

It is obvious that the nation of stationary plays a significant role in the analysis of time series data since the economic variables may be subjected to random walk. The appropriate performance of the model also requires the stationary data. Otherwise the result of model will be spurious since the R^2 of the model becomes over estimated with the understated t-value of the model. As a matter of fact, there are several ways of unit root tests such as Dickey fuller, Augmented Dickey Fuller (ADF), Philips Perron (PP), Kwiatkowski-Phillips-Schamid-Shin (KPSS), Elliot-Rothenberg-stock point optimal (ERSPO) and Ng- Perron.

This Paper however employed the two most popular way of unit root tests; ADF and PP. According to Gujurati (2004) and Gujurati and porter (2009) ADF is the most widely used model of the unit root test as it involves the actual procedure of conducting the unit root test. ADF is an augmented version of the Dickey–Fuller test for a larger and more complicated set of time series models. It has the advantage of providing unit root result with the lagged value of

regression. The inclusion of lagged variable in the unit root test has the capacity of cleaning any serial correlation in the regression model. This was supported by the work of Dickey and Fuller (1979), when they conducted study on unit root test of times series in vector auto regressive models.

On the other hand, this paper also adopted the PP unit root test as it over come the limitation of ADF by introducing the non parametric adjustment to the model. According to Enders (1995) PP unit root test is proposed by Phillips and Perron (1988) as alternative method to the ADF. The PP test advocated the inclusion of non parametric adjustment to the model to obtain error term instead of adding additional lag as the case of ADF. Moreover, Phillips Perron unit root test is distributed heterogeneously and widely used as way of checking the result of ADF unit root test result. It also provide confidence to the researcher if the two ways; ADF and PP gives the same result and it will be safe and more secured to conclude the about the presence or absence of the Unit root in the variables of the study.

Thus, in order to be sure about the stationary of variables the stationary will be checked including constant, constant and time trend, and also neither of them. Furthermore, the unit root test is carried out for both ADF and PP tests at level and at the first differencing in order to know the order of integration of the variables.

Thus, ADF with constant only, constant and trends as well as model with no constant and trend are expressed as follows. As explained in Odusanya and Atanda (2010) Equation (3.2) consists of ADF model without the intercept and constant while equation (3.3) is the model with constant. Equation (3.4) consists of both trend and intercept. The equations are given bellow.

$$\Delta Y_t = \delta\alpha y_{t-1} + a_i + \mu_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

$$\Delta Y_t = \alpha_o + \alpha Y_t - 1 + \sum_{i-1}^{n} \emptyset i \, \Delta Y_{t-i} + \omega_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots . (3.3)$$

$$\Delta Y_t = a_o + \alpha_1 Y_{t-1} + \alpha_{2t} \sum_{i=1}^{n} \emptyset \text{ i } \Delta Y_{t-1} + \omega_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

ωt = represents stochastic Variable while

Yt= represents time series variables in the study

In ADF unit root test, the null hypothesis is that a series contains a unit-root (non-stationary) and the alternative hypothesis (H1) is that the variable is stationary. If null hypothesis in augmented Dickey fuller is rejected, it implies that variables are stationary (there is no unit root). It follows that variables are ready to be used in the econometric analysis. If the null hypothesis is failed to be rejected it means that variables cannot be used in the model analysis. Thus, we go further until the variables are ready to be used in the analysis since stationary data is must in the econometric work. The level of stationarities of time series data is different from variables to variables. For instance, if a given time series becomes stationary after first differencing, it is said to be integrated of order one, *I* (1). If the time series becomes stationary after second differencing, it is integrated of order two *I* (2). If the original time series is stationary, it is integrated of order zero *I* (0). When a linear combination of two *I* (1) series is stationary, then the two time series are co integrated. Thus, Co integration implies a long‑run relationship between variables.

The Philips- Perron unit root test, which gives robust estimates especially in the presence of structural break (Maddala, 1992) is given as:

$$Y_t = \mu_0 + \mu_1\left(t - \frac{T}{2}\right) + \alpha_0 Y_{t-1} + \sum_{i=1}^{m} \omega \Delta Y_{t-1} + u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

Where, m is the lag length of the PP unit root test and

T is the number of observations used in the PP unit root test

In the Phillips Perron Unit root test the lag length to be used the test is determined based on Newey and West band width as it was suggested by Newey and West (1994).

3.6.2. Lag Selection Criteria and Lag Exclusion Test

The choice of lag order is also another important aspect of econometric analysis in modern researches. The current study uses the AIC information criteria due to its popularity. In addition, it is widely used by the recent literatures and it is also most of the time supported by majority of the criteria. Economists and statisticians have common consensuses that Johansen co integration

is multivariate generalization of ADF. A unit root test of Augmented Dickey fuller test examine a linear combination of variables for the test while maximum likely hood test of Johansen deals with all co integrated vectors. Lag exclusion is conducted because both Johansen co integration and Granger causality test is very sensitive to the lag level suggested in the study. Thus, Wald lag exclusion test is conducted to be sure and have confident about the suggested level of lag length by Akaike information criteria (AIC).

3.6.3. The Test for Co integration

After the confirmation of data series for the unit root and the selection of lag length, the next task is checking whether the variables move together in the long run or not. The idea is that if variables have relationship in the long run, there exists constant difference among them though they are trended. Therefore, the main purpose of co integration is to know the number of coin grating equation. According to Dickey *et al* (1991) this shows the importance of co integration because the absence of co integration implies that the variables have no any relationship in the long run. It follows that unless the co integration tests confirm the presence of co integration it is impossible to carry out any analysis of the rung run behavior of the variables. Moreover, Hall and Henry (1989) as cited in the work of Hossain (2015) argue that the long run relationship between variables can be defined if and only if the difference between the variables has no unit root.

In this study a VAR model based on co integration as suggested by Johansen (1991, 1995) is employed. The main reason why the Johansen co integration test is preferred in the study is that it performs better in the multivariate time series and it also enable to conduct analysis based on vector auto regression. In addition, the Johansen test gives the number of co integrating equations in the long run. Next, the Johansen test for co integration is a multivariate unit root test which can estimates the co integration rank in the multivariate case, and which is also able to estimate the parameters of these co integrating relationships among variables. The results of Johansen test for co integration also enable one to decide with which model to do next. Specifically, it enables one to prefer between unrestricted vector auto regression and vector error correction model. Moreover, it has the advantage of working with multiple co integrating vectors in multivariate time series. Johansen starts his methodology from VAR of order P given in equation 3.6 below.

$$Y_t = K + \Delta \mathrm{Y}_{\mathrm{t-1}} + \cdots + \Delta \mathrm{PY}_{\mathrm{t-p}} + u_t \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.6)$$

Where, Y_t represent an nx1 integrated vectors and the integrated vectors are usually order of one. Thus, VAR model, to estimated at first difference can be written as

$$\Delta Y_t = K = B + \Delta \mathrm{Y}_{\mathrm{t-1}} + \sum_{\mathrm{i-1}}^{\mathrm{p-1}} 1 + \mathrm{u_t} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.7)$$

In this case, $P = \sum_{\mathrm{i-1}}^{\mathrm{p}} \mathrm{Ai} - 1$ and $\prod i = a_0 + \sum_{j=i+1}^{n} Aj$

The step left now is reading the number of co integrating vectors and making decision. There are two tests suggested for this purpose by Johansen (1988, 1989) and also Johansen and Juselius (1990). The two ways are Trace test statistics and maximum Eigen value test statistics.

Trace Test Statistics: This is a maximum likely hood ratio identified by Johansen (1988). In the trace test of Johansen methodology the trace statistics will be small when there are characteristics roots that are very closer to zero and the null hypothesis is that the number of co integrating vector is less than or equal to co integrating relations. However, the presences of At least one co- integration rejects the null hypothesis and convinces (reflects) the presence of long run relationships among variables.

The methodology developed by Johansen (1988) identified here under in the following form

$$\pi\ trace = -T \sum_{i=r+1}^{K} \log(1 - \gamma 1 \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \ldots \ldots (3.8)$$

Where: $\boldsymbol{\gamma}$ represent the i^{th} largest Eigen value of matrix Π and T shows the number of observations included in the estimation.

The Maximum Eigen Value Statistics: This is another test developed by Johansen (1988) assuming the null hypothesis of exactly **r** co integrating relations against the alternative of ***r*+1** co integrating relations and the test is given as:

$\tau \max = -Tlog(1 - \gamma r + 1)$ ……(3.9)

Where,

$-\gamma r + 1$ Represent largest squared Eigen value of r+1.

It is possible to say that difference between trace statistics and maximum Eigen value of Johansen (1988) lies around their null and alternative hypothesis. The former assume the null hypothesis of r = 0 is tested against the alternative of r + 1 co integrating vectors while the later assumes exactly r co integrating relations against the alternative of r+1 co integrating relations.

All most all literatures agree that Johansen test of co integration is very sensitive to the level of lag length selected. So to overcome this sensitivity this study will follow the Akaike Information Criterion (AIC).

3.6.4. The Short Run Dynamic Relationship Between VAT and Inflation (Vector Error Correction Model)

Introducing and running vector error correction model for the purpose of obtaining short run relationship between VAT and inflation is to be estimated if the following steps are success full**.**

In the first step log of time series in the study should be found stationary in the first differences. This means that the variables should be integrated of order one. This is to be checked by ADF and PP unit root test. The second step is about the report of Johansen Co integration. This study takes in to account the report of both trace and maximum Eigen values. Thus, for the VECM to be estimated both should report the presence of co integrating relationship. Vector error correction model has the capacity of examining short and long run behavior of the variables. In this study, the VECM is used to have the short run influence of VAT on inflation (endogenous) variable of the study. This takes in to account the co integration of lagged values of residuals and explanatory variables in the first difference.

Thus, it will be conducted to see whether the effect of VAT in the long run also appear in the short run. VECM has also many advantages as it helps to eliminate deviations from long run equilibrium through error correction term. This error correction term is also called the speed

adjustment. Since there may be disequilibrium in the short run the speed of adjustment wants eliminate this disequilibrium. In this study, the error correction model used to see short run dynamics is as follows.

$$logCPIt = \alpha o + \sum_{i=1}^{q} \alpha 1i\ \Delta\, logCPI\ t-1 + \sum_{i=1}^{q} \alpha 2i\ \Delta logFDFCT\ t-1 + \sum_{i=1}^{q} \alpha 3i\ \Delta logREER\ t-1 + \sum_{i=1}^{q} \alpha 4i\ \Delta \log VAT\ t-1 + \sum_{i=1}^{q} \alpha 5i\ \Delta\, logBRDM\ t-1 + \sum_{i=1}^{q} \alpha 6i\ \Delta log\ \ IMPT\ t-1 + \mu ECM\ t-1 + st \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.10)$$

Where, μt shows the speed of adjustment,

S_t Represent white noise error term

αs Represent short run parameters

Since variables are checked for stationary there is no any fear of spurious regression in the model. The sign and coefficient of **μ** has important role in the analysis of the model. The negative and significant sign of **μ** shows that there is long run causality and **μ** is significant means that there is short run relationship between variables of the study. In other words, after the shock the short run, the speed of adjustment toward the long run is called μ.

3.6.5. The Granger Causality Test

When conducting empirical research we may be interested in determining the direction of causality between or among a given variables. If the interest of empirical investigators is to the direction of causality, the application of granger causality is among the most popular and commonly applied in econometric investigations.

According to Ergun (2011), the concept of Granger causality was first developed by Clive William John Granger (1934–2009) who won noble price in 2003 for his method of analyzing

the time series with common trend in 1969. The simple definition of causality can be explained using two variables X and Y, that is, if partial value of X can predict the present value of Y, then there is a causality running from X to Y. Causality can be tested with the objectives such as finding the direction of causality, finding how many times change in one variable affect the other and also to overcome structural changes. Toward the achievement of the objective of this study, the Pair wise Granger causality test is conducted to capture the direction of causality between VAT and price level in Ethiopia.

Sometimes, there is possibility in which the relationship we know in the theory may not work due to the reasons we cannot clearly identify. Thus, to make sure whether the past changes are responsible in the current observation, establishing the idea of causality test has much importance. Ajisafe (2006) noted that causation runs from X to Y if the past and present values of X are different from zero. The same is true when causation runs from Y to X, and however, if the results are significantly different from zero causation runs from both sides. This study used the Granger causality test to investigate the causation between VAT and price level in Ethiopia.

$$Y_t = \sum_{i=1}^{n} \alpha_i X_{t-1} + \sum_{i=1}^{n} B_j Y_{t-j} + u1_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.11)$$

$$X_t = \sum_{i=1}^{n} \gamma_i X_{t-1} + \sum_{i=0}^{n} \delta_j Y_{t-j} + u2_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.12)$$

Equation (3.11) shows that the present value dependant variable associated to the past value of the explanatory variable where X is independent variable and Y is dependant variables. The null hypothesis for equation is that the Variable X (explanatory) does not Granger causes the dependant variable(Y) while the alternative hypothesis is that X granger cause Y. The rejection of null hypothesis thus will depict that there is causality between X and Y. In order to reject or accept the null hypothesis however the result of calculated F value result should be compared with the value of F-statistics critical value computed as follows.

$$F = \frac{RSS_R - RSS_{UR/m}}{RSS_{UR}/(n - K)} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots. (3.13)$$

Where F is the result of F statistics, RSSR is regression obtained from running variables including lagged Y values in the form of Residual Some of Squared excluding lagged values of X; RSSUR is unrestricted residual sum of square obtained from running regression excluding the lagged variables of Y. m represent the number of restrictions while K is the number of parameters and Finally, shows the number of observation.

When testing the Granger Causality, the following possibilities may be obtained. As proposed by Granger they are four in number.

The first is unidirectional causality from say for example X toY, which happens when estimated lagged coefficient of X variables is not statistically different from zero and lagged coefficients of Y variables are statistically not different from zero. The second possibility during Granger causality test is unidirectional causality from Y to X in our particular example. This type of unidirectional causality happens when lagged coefficient of X is statically different from zero and that Y is not. Thirdly, one may come across the situation where lagged coefficient of both variables X and Y, for our case, is statistically different from zero. This type of Causality is Called bidirectional causality. In this Case, causality runs from X to Y as well as from Y to X. The final Possibility may be a situation where the coefficient of both Variables : X and Yin our case, not statistically different from zero. That is when the coefficient of both X and Y in our hypothetical example is independent from each other. This type of Granger causality possibility is called independence causality.

3.7. Model Diagnostic Tests

The following diagnostic tests were conducted for the sake of having non spurious regression.

3.7.1. Breusch-Godfrey Serial Correlation LM Test

In empirical investigations testing for autocorrelation in a time series is among the common task. This test was developed due to the work of Breusch and Godfrey (1978). Breusch-Godfrey Serial Correlation LM test is the most widely applied test of the serial correlation when compared to Durbin Watson test of serial correlation. The Durbin what son test is not valid if there are lagged values of the dependent variable in the study. Moreover, the Durbin Watson

statistics is not valid for higher order serial correlation. This study conducted the Breusch-Godfrey Serial Correlation LM test as it is well applicable in higher orders of serial correlation like AR (1), AR (2), AR (3) and R (p). There are two cases that should be considered for time being in this study. For the case of transformed LM test, the LM serial auto correlation test is given by;

$$LM = n - \frac{\mathrm{K}}{\mathrm{m}} \times \frac{R^2}{1 - R^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots .. (3.14)$$

Where, m is the number of restriction, K is the number of estimated coefficients

When there is the lagged dependant variable, LM test statistics is given as

$$LM = nR^{2\approx}\chi^2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.15)$$

Where,

R^2 Should be obtained from the regression result

In this study there is a suspect that that ut is first order serially correlated and thus the LM test equation to be applied is

$$u_t = \rho_1 + \mathrm{u}_{\mathrm{t}-1} + \varepsilon_{\mathrm{t}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.16)$$

Here, $N(0, \delta^2)$ and $t = 2004Q1\ to\ 2014Q4$

Where, εt represent error term which is first order serially correlated

When ut is above first ordered this LM test can be used which is another advantage of Breusch-Godfrey Serial Correlation LM tests.

$$u_t = \rho_1 u_{t-1} + \rho_2 u_{t-2} + \rho_3 u_{t-3} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.17)$$

The Null hypothesis of Breusch-Godfrey Serial Correlation LM test is that H0: ρ1 = 0 meaning that there is no serial correlation while the alternative is that HA: ρ1≠ 0. The alternative hypothesis says that there is serial correlation in the model which is not desirable. The decision to reject or not reject null hypothesis depend on the LM test statistics and the probability attached

to it. If the probability of LM test is more than 5% we do not reject the null hypothesis and this implies that the model is free from any serial correlation which the desirable result and the model is good and can be used in forecasting and further analysis. However, if the null hypothesis is rejected with the probability of less than 0.05, it shows that there is a problem serial correlation in the model.

3.7.2. Correlograms and Q-Statistics

Econometrics is a rich discipline having optional methods to conduct certain analysis in empirical works. Most of the time it is better if we cross check the results using different techniques. This has the advantage of directly giving the order of co integration of time series data and also as a method of detecting the serial correlation in the model.

3.7.3. The Breusch-Pagan test for Heteroskedasticity

Heteroskedasticity is a major concern in the application of regression analysis as it the true variance and covariance even if ordinary least squares estimator is still unbiased. This teat was developed in 1979 by Trevor Breusch and Adrian Pagan to solve the problem of hetroskedasticity in the linear models. This test helps to identify whether the estimated variance of the residuals depends on values of explanatory variables. It is this time that one can say there is hetroskedaticity.

In multivariate time series the Breusch-Pagan test for heteroskedasticity test can have the following form.

$$Y_i = \beta_2 + \beta_2 x_i + \cdots + \beta_{k X_{iK}} + u_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.18)$$

Where, Y_i is the dependant Variable, βs elasticity and $X_i .. X_{ik}$ are explanatory variables, and u_i is stochastic error term

Now the suspect is about the variance of the model and that is $\mathrm{Var}\ (u_i) \neq \mathrm{const}$ which is the functions of explanatory variables in the study.

In the test of hetroscedasticity the null hypothesis is that there is homoscedasticity in the model against the alternative hypothesis of hetroscedasticty. And, this can be explained as:

H0: $\sigma 2i$= constant: there is homoscedasticity

HA: $\sigma 2i$= $\sigma 2$: Heteroscedasticity

The decision to reject or not to reject null hypothesis depends on the test static for heteroscedasticity of Breusch-Pagan as given bellow.

$$LM ** = \frac{1}{2}\ \mathrm{ESS} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.19)$$

Where, ESS is explained sum of square in the regression

Generally, in hetroscedasticity test the probability should be also considered as usual. The null hypothesis of homoscedasticity should not be rejected if the model is desirable and ready to forecast. Therefore, when the probability attached to LM** test is above 5% Ho is failed to be rejected implying the constant variance (homoscedasticity) in the model. Otherwise, there is no constant variance in model and the model has the problem of heteroscedasticity.

3.7.4. Jerque Bera Normality Test

This test of normality is one of the most frequently applied tests of normality in time series analysis. Jerque Bera histogram normality test is developed due to Jerque and Bera (1987). The test of normality of Jerque Bera works through skweness and Kurtosis in multivariate econometric analysis. This study also uses the Jerque Bera normality test due to its power full ness and popularity in multivariate empirical work to check the normality of the study model.

In addition, Jarque–Bera test of normality, which is named after Carlos Jarque and Anil K. Bera, has the advantage of providing the a goodness-of-fit test of whether time series data have the skewness and kurtosis matching a normal distribution. The major of Skweness in multivariate time series is given as:

$$S = \frac{1}{\mathrm{N}} \sum_{n=1}^{N} \mathrm{W_{in}}^{3} / \left(\frac{1}{\mathrm{N}} \sum_{n=1}^{N} W_{in}^{3} \right) 3/2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3.20)$$

Where, W_{in} represents elements of matrix W and it is defined as

S represents the Skewness in the multivariate time series

$$W = \mathrm{US}^{-1}\, U \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.21)$$

Where, U represents the matrix of remainders obtained from estimation of variables in the equation.

$\mathbf{S_U}$ shows the upper triangular matrix

And, the major of multivariate Kurtosis is given as

$$K = \frac{1}{N} + \sum_{n=1}^{N} \mathrm{Win}^4 \Big/ \left(\frac{1}{N}\sum_{n=1}^{N} Win^2\right) 2 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.22)$$

Where, K shows the Kurtosis of Jerque Bera normality test

W_{in} represent elements of matrix W

In Jerque Bera normality test, null hypothesis (Ho) is that time series data is normally distributed while alternative hypothesis (HA) is that they are not normally distributed. Therefore, in Jurque Bera normality test, the rejection of Ho shows the absence of normality in the model under consideration. However, if the null hypothesis is failed to be rejected, it implies that the model is normal and desirable in the analysis and forecast. The rejection of Ho in Jerque Bera depends on the probability attached to Jerque Bera test. If the probability attached to the test should be less than 0.05 for the Ho of Jerque Bera to be rejected. Otherwise the null hypothesis will be accepted implying absence of normality but if the probability is greater than 0.05 the Ho cannot be rejected and the model is normal. Jerque Bera test is calculated as follows with regard to number of observations.

$$JB = \frac{\mathrm{n} - \mathrm{K}}{6}\left(\mathrm{S}^2 + \frac{1}{4}\,(\mathrm{c} - 3)^2\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.23)$$

Where, JB is Jerque Bera test statistics

And, n is the number of observations. K is the number of explanatory variables.

3.7.5. Model Stability Diagnostic

Stability diagnostic is also among the most important tasks of econometric analysis. This study also tests the stability diagnostic using the one step recursive residual, CUSUM test and also CUSUM of squares as the one studied by Defour (1982).

The advantages of this way are that, visual examination of the graphs of the recursive parameter estimates can be useful in evaluating the stability of the model in an econometric time series. Here the null hypothesis is that there is model stability against alternative hypothesis of no model stability. Fail to reject null hypothesis is desirable and result in the presence of the stability of the model making us happy about the model.

For this purpose, the one step recursive residual can be explained as follows.

$e_{t+1,t} = Y_{t+1} - Y_{t+1,t.}$ ..... (3.24)

This equation can be further written as,

$$et+1,t = Y_{t+1} - [\hat{\alpha}_{0,t} + \hat{\alpha}_{1,t}(t+1) + ... + \hat{\alpha}_{s,t}(t+1)^s + \hat{\varphi}_{1,t}Y_t + ... + \hat{\varphi}_{p,t}Y_{t-p+1}]$$

.....(3.25)

Where, t- shows the time period and the fact that they were estimated based on a sample whose last observation was in t time period.

The standard error of recursive residual is give by

$\sigma_{1,t} = \sqrt{\sigma(e_{t+1,t}}$ ..... (3.26)

And, final standard recursive residual is given as

$W_{t+1,t} = e_{t+1,/\sigma_{1.t}}$ ..... (3.27)

In addition to this, CUSUM (cumulative sum) shows if coefficient of regression changing systematically or not. In CUSUM, presence of model stability is Ho while absence of model stability is HA. The null hypothesis is rejected at the 5% significance level if CUSUM of time t is below the 2.5-percentile.

Graphically, the null hypothesis is rejected if the graph of the CUSUM does not lie in the 5% level of significance. Otherwise the null hypothesis is failed to be rejected implying the desirability of the model. The test statistics of cumulative sum is given as follow:

$$CUSUM_t = \sum_{i=K}^{t} W_{i+1,i} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.28)$$

Where, t = k, k+1, T-1, and k = 2p+s+1 is the minimum sample size in the model

In this study, the CUSUM of square is also used to check the model stability. Cumulative sum of square is helpful in identifying whether coefficients are changing suddenly or not.

CHAPTER FOUR

RESULTS AND DISCUSSIONS OF THE FINDIGS

In an attempt of examining the relationship between Value added tax and general price level in Ethiopia, this chapter presents and discusses the results of findings from the econometric analysis conducted on the quarterly time series data collected from the National Bank of Ethiopia (NBE), the Ministry of Economic Cooperation (MOFEC) and Ethiopian Revenue and Custom Authorities (ERCA) from the time period of 2004Q1through 2014Q4.

4.1. A Descriptive Analysis: Consumer price Index-VAT Nexus in Ethiopia

Before proceeding to the discussion of results and findings, it is better to look at the nexus between VAT and inflation in Ethiopia as presented in fig 4.1 bellow. Thus, this section now takes some time to conduct trend analysis for both macro variables. To start with Value added tax, since 2004, one year after its introduction in Ethiopia, the revenue from VAT has been moderate for the quarters of year 2004 and 2005 and relatively decreased for the quarters of the years 2006 and 2007 due to challenges faced to implement it in the regional states. After that the VAT revenue of the country has relatively shown an increasing trend in general.

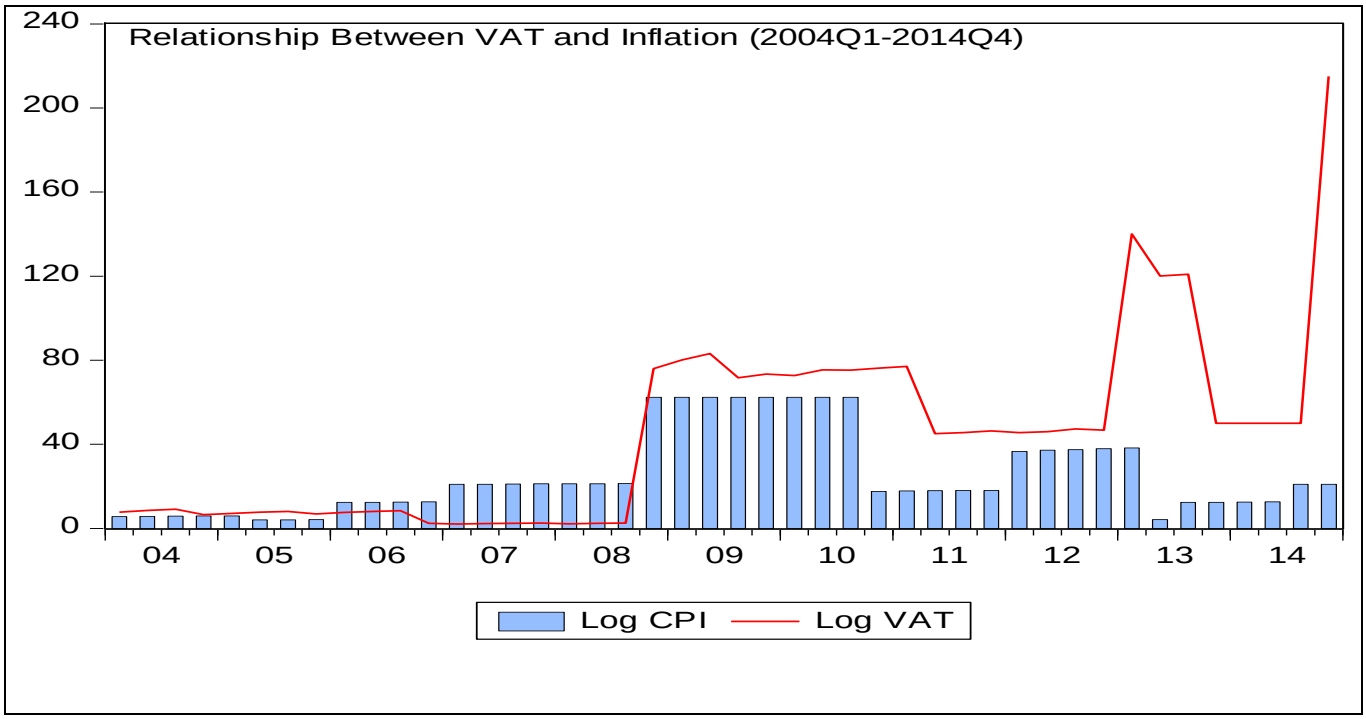
As far as inflation is concerned, evidences from the figure 4.1 bellow shows that the inflation rate of the country was moderate and dubbed as a single digit inflation on average during the quarters of 2004/2005 fiscal years. During the quarters of 2005/2006 this rate increased to 10.6 percent and further rose to 15.8 percent in 2006/2007 quarters of the fiscal years. The surprise happened in the next year. The rate of inflation increased to 25.3 in 2007/2008 and it reached 36.4 in 2008/2009 fiscal year. This rapid increment forced the government to implement several anti- inflationary policies through tight policy combined by prudent fiscal policies. The effort brought in good result as the rate was pulled down to 2.8 on average in the year 2009/2010. However, due to inflation dynamics in the modern economic system and globalized world, by the first quarter of 2011/2012 the double digit inflation was recorded in Ethiopia. For instance, the inflation rate recorded in the month of November 2011 was 39.2 percent while it was 15.6 % after one year in November 2012.

During the June 2013 it was reduced to 7.4 percent before its rise to 7.9 percent in November 2013. During the first quarters of 2014, and the end of its quarters as well the single digit

inflation was recorded. The evidence from African Development bank reflects that the aggregate price level in Ethiopia is affected by the price of agricultural products. It also reveals that the importing of the essential intermediate inputs, fuels, raw materials and capital goods exposed the country to the imported goods.

From this analysis one can conclude that there is some extent, clear trend between VAT and inflation in Ethiopia between the study periods. This reflects that inflation responds to the VAT policy in Ethiopian situation. Moreover, in modern economics, aggregate price is subjected to several anti inflationary measures that are aimed to maintain price stability in Ethiopia. In addition, due to plenty of anti inflationary policies conducted by National Bank of Ethiopia to maintain price stability, the relationship between VAT and price level is hardly clear from the trend analysis. VAT has been significantly higher than inflation after the second quarter of 2008. Here, vertical line represent VAT and inflation rate while horizontal line represent the year from 2004 to 2014.

Fig 4.1: **The Trend of VAT and Inflation in Ethiopia between 2004Q1 to 2014Q4**



Source: Own illustration from the NBE Data

4.2. The Unit Root Test of Variables in Study

It is well known that spurious regression is one of the major problems encountering in the study of econometric relationships among variables. As it is also mentioned in the methodology part, unit root test is among the vital conditions of econometric studies due to the fact that stationary data are required in the process of analysis. If data are not stationary they reveal non existing relationships among the variables without any reason for their relationships. In an effort to overcome this problem the order of integration of variables has a paramount significance. The way of knowing the order of integration of variables is unit root test.

Prior to formal unit root test, most of the time, it is advisable to have visual plot of time series in the study. Such graphical plots have the capacity of providing initial clue about the likely nature of time series. The inference from the graphs is that times series are subjected to fluctuation. They trend upward or downward. The log CPI, log REER, Log IMPT, Log VAT, log BRDM and Log of FDFCT seem to be upward sloping. The first three variables; log CPI, log REER and Log IMPT are trended up ward with insignificant fluctuations. On the other hand, log VAT, log BRDM and Log FDFCT trended up ward with relatively significant fluctuation. The series are fluctuating around non zero value at level but around zero value in their first differences. Such type of trending in the series suggests that the mean of all the above variables might be changing which perhaps implies they are non stationary at their level, and such an intuitive feel is important starting point for more formal tests of unit root in econometric study. The graphical plots of the variables in this study are provided in annex 3 and 4 at first differences and at level respectively.

Formally, the Unit root test in this study is conducted using both ADF and PP. This section takes time to discuss the result of Augmented Dickey fuller and Phillips Perron unit root test. Table 4.1 and 4.2 bellow shows the result of ADF unit root test at level and at the first differencing respectively while the PP unit root test results at level and first differencing is shown by table 4.3 and 4.4 respectively.

Table 4.1: Results of ADF unit root tests at level

Variable	Augmented Dickey Fuller (ADF)Test Equation (Level)					
	Constant	5% Critical Value	Constant and Trend	5% Critical Value	None	5% Critical Value
LOGCPI	-1.170321**	-3.536601 (0.6786)	-1.916036 **	-3.536601 (0.6261)	-0.296860**	-1.948686 (0.5730)
LOGFDFCT	-2.029056**	-2.931404 (0.2738)	-2.031483**	-3.518090 (0.5680)	-1.377332 **	-1.948686
LOGREER	-2.126964**	-2.931404 (0.2355)	-2.157372**	-3.518090 (0.5003)	-1.917213 **	-1.948686 (0.0535)
LOGVAT	-1.012474**	-2.931404 (0.7405)	-2.0 32045 **	-3.518090 (0.5677)	-0.036525**	-1.948686 (0.6650)
LOGBRDM	-0.521722**	-2.931404 (0.8769)	-1.437692**	-3.518090 (0.8352)	-0.443852**	-1.948686 (0.5186)
LOGIMPT	-1.567914**	-2.931404 (0.4900)	-1.366166**	-3.518090 (0.8596)	-0.438521**	-1.948686 (0.5186)

Source: Own computation from e-view 7.1 soft ware

Note: *** Shows non Rejection of the presence of unit root (the null Hypotheses) at 1%, 5% and 10% level of significance*

Numbers in () is the Probability values (Mackinnon (1996) one sided P-values.

The critical values for Constant are -3.592462 and -2.603944 for 1% and 10% level of significance respectively.

The critical Values for Constant and trend are -4.186481, and-3.189732 for 1% and 10% respectively.

And the critical values for none are -2.619851 and -1.612036 at 1% and 10% level of significances.

Table 4.2: Result of ADF Unit root Test Result at the First Difference

Variable	**Augmented Dickey Fuller (ADF) Test Equation (First Difference)**						I(d)
	Constant	5% Critical Value	Constant and Trend	5% Critical Value	None	5% Critical Value	
LOGCPI	-6.423763*	-2. 933158 (0.0000)	-6. 345536*	-3.520787 (0.0000)	-6.497052*	-1.948886 (0.0000)	I(1)
LOGFDFCT	-6.316745*	-2.933158 (0.0000)	-6.300484*	-3.520787 (0.0000)	-6.367730*	-1.948886 (0.0000)	I(1)
LOGREER	-4.469424*	-2.941145 (0.0000)	-4.448414*	-3.448414 (0.0000)	-4.534097*	-4.534097 (0.0000)	I(1)
LOGVAT	-6.458449*	-2.933158 (0.0000)	-6.499152*	-3.520787 (0.0000)	-6.403069*	-1.948886 (0.0000)	I(1)
LOGBRDM	-5.881076*	-2.933158 (0.0000)	-5.832347 *	-3.520787 (0.0001)	-5.539975*	-1.948886 (0.0000)	I(1)
LOGIMPT	-6.360523*	-2.933158 (0.0000)	-6.797921*	-3.520787 (0.0000)	-6.439533*	-1.948886 (0.0000)	I(1)

Source: Own computation from e-view 7.1 software

Note: ** shows the rejection of null hypothesis (Variables are stationary) at first differencing at 1%, 5%, 10% level of significance.*

Numbers in () is the Probability values (Mackinnon (1996) one sided P-values

The critical values for Constant are -3.596616 and - 2.604867 for 1% and 10% level of significance respectively.

The critical Values for Constant and trend are -4.192337, and-3.191277 for 1% and 10% respectively.

And the critical values for none are -2.621185 and -1.611932 at 1% and 10% level of significances.

In Augmented Dickey-Fuller Unit root test the null hypothesis is that the series has the unit root against the alternative hypothesis of no unit root. Accordingly, it is possible to definitely proclaim that all series in their level failed to reject the null hypothesis while the ADF test reveals very highly significant results at the first differencing. At their level null hypothesis

could not even be rejected at 10 % level of significance. When variables are differenced however, the variables strongly rejected the null hypothesis even at 1% significance level.

Cleary speaking , under unit root test of Augmented Dickey fuller the variables are not stationary at their level but stationary at their first differencing. In this study, it is planned to cross check the results of ADF using the Phillips-Perron unit root test to capture the criticisms of ADF test. The PP test use non parametric adjustment of band width and it is also alternative way of the ADF. The results of PP unit root test are depicted below at both their levels and in their first differencing. Table 4.3 below shows the result of PP test at level of the series and next table 4.4 shows the PP test for unit root the first differencing of the variables.

Table 4.3: Results of PP Unit Root tests of Variables at level

Variable	**Phillips-Perron (PP) unit Root Test Equation (Level)**					
	Constant	5% Critical Value	Constant and Trend	5% Critical Value	None	5% Critical Value
LOGCPI	-1.171079 *	-2.931404 (0.6783)	-1.699229*	-3.518090 (0.7344)	-0.296436*	-1.948686 (0.5730)
LOGFDFCT	-2.065696*	-2.931404 (0.2590)	-2.167526*	-3.518090 (0.8645)	-1.410326*	-1.948686 (0.1453)
LOGREER	-2.311108*	-2.931404 (0.1732)	-2.334652*	-3.518090 (0.4070)	-2.064016*	-1.948686 (0.0387)
LOGVAT	-1.012474*	-2.931404 (0.7405)	-2.142070*	-3.518090 (0.5085)	-0.036525*	-1.948686 (0.6650)
LOGBRDM	-0.579594*	-2.931404 (0.8645)	-1.619104*	-3.518090 (0.7688)	-1.794211*	-1.948686 (0.9809)
LOGIMPT	-1.642371*	-2.931404 (0.4527)	-1.310009*	-3.518090 (0.8721)	-0.438359*	-1.948686 (0.5187)

Source: Own computation from e-view 7.0 soft ware

Note: ** shows the presence of unit root (non rejection of null hypothesis) under the PP test at level at 1%,5% and 10% level of significance*

Numbers in () is the Probability values (Mackinnon (1996) one sided P-values

The critical values for Constant are -3.592462 and -2.603944 for 1% and 10% level of significance respectively.

The critical Values for Constant and trend are -4.186481, and-3.189732 for 1% and 10% respectively.

And the critical values for none are -2.619851 and -1.612036 at 1% and 10% level of significances.

Table: 4.4: The Result of the Phillips- Perron Unit Root Test (first Differencing)

Variable	**Phillips-Perron (PP) unit Root Test Equation (First Differencing)**						I(d)
	Constant	5% Critical Value	Constant and Trend	5% Critical Value	None	5% Critical Value	
LOGCPI	-6.423644	-2.933158 (0.0000)	-6.345068	-3.520787 (0.0000)	-6.497186	-1.948886 (0.0000)	I(1)
LOGFDFCT	-6.316745	-2.933158 (0.0000)	-6.300336	-3.520787 (0.0000)	-6.36773	-1.948886 (0.0000)	I(1)
LOGREER	-4.469424*	-2.933158 (0.0000)	- 4.448414*	-3.520787 (0.0000)	-4.534097*	-1.948886 (0.0000)	I(1)
LOGVAT	-6.458450	-2.933158 (0.0000)	-6.499159	-3.520787 (0.0000)	-6.403069	-1.948886 (0.0000)	I(1)
LOGBRDM	-5.881076	-2.933158 (0.0000)	-5.832347	-3.520787 (0.0001)	-5.558407	-1.948886 (0.0000)	I(1)
LOGIMPT	-6.360567	-2.933158 (0.0000)	-7.519263	-3.520787 (0.0000)	-6.439548	-1.948886 (0.000)	I(1)

Source: Own computation from e-view 7.1 soft ware

Note: ** shows the rejection of null hypothesis (Variables are stationary) at first differencing at 1%, 5%, 10% level of significance.*

Numbers in () is the Probability values (Mackinnon (1996) one sided P-values

The critical values for Constant are -3.596616 and - 2.604867 for 1% and 10% level of significance respectively.

The critical Values for Constant and trend are -4.192337, and-3.191277 for 1% and 10% respectively.

And the critical values for none are -2.621185 and -1.611932 at 1% and 10% level of significances.

In the Phillips –Perron unit root test the null hypothesis is the presence of unit root while the alternative hypothesis is the absence of unit roots in the corresponding series. Though the null and alternative hypothesis of the ADF and PP are the same, PP gives the advantage of cross checking and capturing the limitation of ADF test.

As explained in the case of ADF test, we also fail to reject the null hypothesis of unit root at level in the PP. Each series are even not significant at 10 % in their level. Since the main objective here is getting stationary time series for analysis, the variables are differenced. However, when Phillips-Perron unit root test is applied on the first difference of the variables, each series become stationary. All variables become significant even at 1% significance level, even though we normally consider 5% level of significance.

Generally speaking, the conducted unit root tests reveal that variables are non stationary at level and have to be differenced to achieve stationarity of data in the analysis. It follows that data are stationary at their first differencing. The reality of this is clearly confirmed by both ADF and PP unit root tests. In other words, both tests checked that variables have unit root at level but stationary at their first difference. Thus, it is now safe and sufficient to conclude that variables are stationary at their first difference and hence I (1). Due to the fact that data are confirmed for their statioanarity, the Johansen test for co integration does not suffer from mixed order of integration during the analysis.

4.3. Akaike Information Criteria (AIC) of Lag Length Selection

As matter of fact, like the unit root test, selection of lag length is also among the most important mechanisms of econometric analysis as the difference in the number of lags can change the results obtained from the analysis and by transition the conclusions drawn and the policy recommendations forwarded from the empirical works. In this research, an AIC information criterion is used as it is the most familiar and supported by majorities of the criteria (see table 4.2 here under and also annex 1) and the VAR diagnostic test was used to choose lag order for the analysis.

Table 4.5: The Selection of Lag Order Using AIC

VAR Lag Order Selection Criteria
Endogenous variables: LOG_CPI LOG_FDFCT LOG_REER LOG_VAT LOGBRDM LOGIMPT
Exogenous variables: C
Date: 03/31/16 Time: 13:35
Sample: 2004Q1 2014Q4
Included observations: 41

Lag	LogL	LR	FPE	AIC	SC	HQ
0	134.7432	NA	7.55e-11	-6.280156	-6.029390	-6.188841
1	298.0282	270.8141	1.55e-13	-12.48918	-10.73381*	-11.84997
2	346.9856	66.86865*	9.24e-14*	-13.12125*	-9.861281	-11.93415*
3	380.4110	35.87123	1.45e-13	-12.99566	-8.231095	-11.26067

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hanna-Quinn information criterion

Source: Own Computation from e-view 7.1 econometric software

As it is depicted by table 4.5, it is observed that the lag order suggested by Akaike information criterion is 2, and it is supported by majority of other selection criteria such as Hannan-Quinn information criterion (HQ), Final prediction error (FPE), and sequential modified LR test statistic (LR) while only Schwarz information criterion selected lag 1 which is out of majority's view. Therefore, lag 2 is accepted for the analysis.

In order to have high confidence about the lag length selected in this study the VAR lag exclusion test is conducted using Wald tests and the result is presented in table 4.5.1 below. The null hypothesis of Wald test is that the joint coefficients of lags, say for example lag1 is zero against the alternative hypothesis that the joint coefficients of each lag is different from zero. Rejection of null hypothesis means that the corresponding lag should be included in the study. However, fail to reject the joint null hypothesis leads to the

exclusion of the lag from the study. Accordingly, the results in Table 4.2.1 show that we cannot reject the joint hypothesis that the coefficients of lags 1 and 3 are all equal to zero because the joint p-value of both lags is above 5 %. For lag 2 however, we can reject the null hypothesis implying that the coefficient is different from zero and should be used in the study. Therefore, the lag 2, which is suggested by AIC lag length criteria cannot be excluded and used in the study. This is highly important since the Johansen co integration test is sensitive to the lag numbers. Lag 2 here means that the past two quarter VAT has the capacity of affecting (influencing) the current price level in time period under investigation in Ethiopia.

Table 4.5.1: Lag Exclusion Wald Test result

VAR Lag Exclusion Wald Tests
Date: 05/07/16 Time: 10:21
Sample: 2004Q1 2014Q4
Included observations: 41

Chi-squared test statistics for lag exclusion:

	LOG_CPI	LOG_FDFCT	LOG_REER	LOG_VAT	LOGBRDM	LOGIMPT	Joint
Lag 1	84.52754	20.70662	57.62885	6.150763	3.882701	8.824814	210.5120
	[4.44e-16]	[0.052071]	[1.36e-10]	[0.406515]	[0.692547]	[0.183673]	[0.178043]
Lag 2	22.60845	10.55215	13.70524	7.649428	7.442420	7.201150	85.99354
	[0.000039]	[0.003244]	[0.000008]	[0.000928]	[0.000861]	[0.006828]	[0.000000]
Lag 3	5.290998	7.472325	6.811027	6.341595	5.784730	3.251305	47.39851
	[0.507068]	[0.279364]	[0.338678]	[0.386032]	[0.447732]	[0.776708]	[0.496824]
Df	6	6	6	6	6	6	36

Source: own computation from e-view econometric software 7.1

Note: Numbers in [ ] are p-values

4.4. Analysis of Co integration: The Johansen Test for Co Integration

In most econometric and empirical investigations, Johansen test for co integration is the activity which comes after the test of unit root and selection of the lag length. Now it is witnessed that variables in the study are integrated of order one hence I (1). This was assured by ADF and PP unit root tests. The next question is how many co integrating vectors are there in the model? Johansen Co integration has answer for this question and conducted for this purpose. The trace tests and the maximum Eigen value statistics were conducted in line with the methodology proposed by Johansen and Juselius (1990).

As a matter of fact, the test of co integration is very sensitive to the number of lags selected since it provides different results for different number of lags. Therefore, in order to capture the issue of sensitivity of Johansen's test this study selected the lag by the AIC and the lag number used here is 2 as suggested by the criterion. In the process of testing the co integration, trace statistics and maximum Eigen value statistics with the 5%critical value are used. (See Table 4.6 bellow and annex 3).

Table 4.6: The Trace Statistics Result of Johansen Test of Co integration

Unrestricted Co integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigen value	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.769646	129.7313	95.75366	0.0000
At most 1	0.519108	69.53764	69.81889	0.0526
At most 2	0.452375	39.52099	47.85613	0.2401
At most 3	0.233458	14.83221	29.79707	0.7908
At most 4	0.082051	3.931733	15.49471	0.9090
At most 5	0.010230	0.421596	3.841466	0.5161

Notes:

Trace test indicates 1 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Own estimation from e-view 7.1 software using quarterly data, 2016

As it can be seen from table 4.6 above, the trace statistics value shows that there is at least one co integrating equations as the Johansen's test value 69.53764 is smaller than the critical value of 69.81889. Thus, at this point, the null hypothesis of at least 1 co integrating vectors cannot be rejected since the probability is greater than 5%, rather the null hypothesis of at least 1 co integrating equations will be accepted. The null hypothesis of no co integration is rejected for trace statistics because the value of Johansen test 105.4075 is greater than the critical value result of 66.52. But the rejection of null hypothesis under trace statistics alone cannot give sufficient condition for the presence of long run relationship between VAT and consumer price index (inflation). The application of the long run model is safe when the result of both tests (Trace and Maximum Eigen Value) confirm the same idea. The result of Maximum Eigen value statistics is also reported one co integrated equations at 5% level of significance and is shown in Table 4.4 bellow (see also annex 3)

Table 4.7: The Maximum Eigen Value Result of Johansen Co Integration

Unrestricted Co integration Rank Test(Maximum Eigen Value)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.769646	60.19362	40.07757	0.0001
At most 1	0.519108	30.01665	33.87687	0.1350
At most 2	0.452375	24.68878	27.58434	0.1124
At most 3	0.233458	10.90047	21.13162	0.6572
At most 4	0.082051	3.510136	14.26460	0.9071
At most 5	0.010230	0.421596	3.841466	0.5161

Max-eigenvalue test indicates 1 co integrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Own Computation from e-View 7.1, using quarterly data, 2016

The result of the maximum Eigen value statistics (on table 4.7 above) is also supporting the number of co integrated equations reported by trace statistics. As the maximum Eigen value statistics result, 30.01665, is lower than the corresponding value of 5% critical value, 33.87687, therefore, one fail to reject null hypothesis. The null hypothesis of no co integration for the maximum Eigen value is rejected as the critical value of 5% result, 33.46 is less than 47.0963.

Therefore, it is now very secure to conclude that the variables move together in the long run as they have long run association ship and this implies the presence of a long-run relationship between values added tax (VAT) and Price level in Ethiopia.

Table: 4.8: The Normalized Co integration Coefficients (1 Co-integrated equation)

LOGCPI	LOGFDFCT	LOGREER	LOGVAT	LOGBRDM	LOGIMPT	C
1.0000	0.037383*** (0.02165) [0.0356]	0.2810350*** (0.06122) [0.0000]	0.188578*** (0.03366) [0.0000]	0.574615*** (0.12683) [0.0000]	0.23970*** (0.06543) [0.0000]	1.672192 (0.076149) [0.0000]

Source: Own Computation from e-View 7.1, using quarterly data, 2016

Note: ***and *** represent the significance of the coefficient at 5% and 10% level respectively. Values in [] shows the P-values and the values in () shows the standard errors. C is constant.*

One of the good sides of Johansen test for co integration is that it provides the normalized coefficients of variables in the long run. Accordingly, table 4.8 shows that long run effect of VAT on the aggregate consumer price (inflation) is positive and also significant at 1% significance level for the period under examination i.e. from the first quarter of 2004 to the final quarter of 2014. Specifically, a 1% increase in VAT revenue has leads to 0.188578% during the period. This result confirms the positive relationship between VAT revenue and aggregate price level.

The positive sign of VAT was the one expected and it is in line of the priori expectation. The positive and significant relationship between VAT and price level in Ethiopia most likely be attributed to VAT charges on intermediate outputs and other materials. It may also be because of the fact that the final result of a given production process could be the input of yet another production process, whose outputs are successively subject to value added tax in Ethiopia. When this situation is observed in an economy, multiple value added tax burdens become the norm. As a result, it forces increases in prices of goods and services for the consumers as it push up the consumer price index. When it is observed from the producer's point of view, the value added

tax is the burden of producers whose inputs are intermediate outputs. This amounts of tax on value added increases cost of production for these producers. The finding of this study is similar with that of Maries and Alwell (2013), who found the positive and significant relationship between VAT and price level using OLS regression. The finding of this study also coincide with the finding of Ajakaiye (1999), who revealed that VAT is deleterious (push prices up) when considered and cascaded as cost using a computable general equilibrium analysis. Thus, it is adequate to conclude that the Variable of interest, VAT, exerts an upward pressure on price levels in Ethiopia within the limits of period studied. In other words, it is possible to conclude that the relationship between VAT and price level in Ethiopia is positive and significant in the long run.

On the other hand, the relationship between inflation and other control variables is discussed as here under follows. The estimated coefficient of fiscal deficit is found to be positive. This is the expected sign and it is in line with the priori expectation. The empirical evidence of the current study shows that when fiscal deficit increases by 0.037383%, the inflation is pushed up by 1% in Ethiopia for the period under investigation. Despite the expected positive sign, the relationship between inflation (CPI) and fiscal deficit (FDFCT) remain weak when observed from elasticity point of view when compared to other variables used in the study. The reason behind this may goes to the issue of government revenue and expenditure. It obvious that fiscal deficit happen when government expenditure is above the government revenue.

When developing countries like Ethiopia face fiscal deficit, they search the option of getting revenue such as grants and donations. When they get donations they spend on public infrastructure in the way it cannot significantly affect inflation level of a country in the long run. The finding of this study is similar with finding of Makochekanwa (2011), who found positive but insignificant relationship between fiscal deficit and inflation for Zimbabwe since study observed that massive monetization of fiscal deficit resulted in inflationary effects for Zimbabwean economy. The empirical finding of this thesis also coincide with Ezeabasili (2012), who found insignificant positive relationship between fiscal deficit and inflation using structural analysis and co integration technique for the economy of Nigeria. Everton et *al.* (2013) and Johan (2013) also observed that contribution of fiscal deficit is positive and insignificant for Nigeria and South Africa respectively.

The coefficient of broad money (BRDM) is found to be positive and significant at 1% level of significance in the long run. The coefficient is observed as 0.574615 indicating that a 1% increase in the level of money supply leads to 0.574615% rise in inflation for the study period in Ethiopia. The positive and significant relationship is expected and found to be correct as expected. The typical explanation for this is that broad money is the most power full component of money supply. The finding of this study is similar to Akinbobola (2012), who found positive relationship between money supply and inflation. For Ethiopia, Denbel et al (2016) found the positive and significant relationship that supports monetarists between money supply and aggregate price level (inflation) in the long run.

With regard to import (IMPT) variable, it is observed that the coefficient is in line with the priori expectation. The elasticity coefficient shows that inflation increase by 1% when the volume of import rise by 0.23970 %. The reason behind positive and significant effect of volume of import is attributed to large volume of commodities imported from abroad as manufacturing is at its infant in Ethiopia. It is obvious that Ethiopia imports goods and service ranging from capital goods up to basic necessities. The positive relationship between inflation and import in this study is similar with traditional theory of inflation, and import that asserts the positive relationship between import and inflation. The finding of this study also supports the finding of Ulke and Ergun (2011), who found positive relationship between inflation and volume of import for the economy of Turkey.

In a similar manner, the study found positive significant relationship between real effective exchange rate (REER) and aggregate price level in Ethiopia during the period under examination. In other words, In the long run, impact of real effective exchange rate on consumer price index is positive and significant. The specific coefficient found from Johansen co integration test is that aggregate consumer price level rise by 1% when real effective exchange rate (REER) of ETB to dollar increase by 0.2810350 %. To explain it from the policy aspect, it means that any increase/appreciation of real effective exchange rate by 1% increases the inflation or the consumer price indexes by 0.2810350 %. This finding is consistent with the study of Vicente (2007), who found that exchange rate has positive significant relationship on domestic price level for Mozambique economy. In addition, it is consistent with the finding of Imrana (2013) who found very strong positive impact of real effective exchange on the economy of Pakistan. Further, the finding of this study is also similar with what Mohammednur (2012), and

Gossaye (2015) found the same result when they studied exchange rate pass through to inflation, and effectiveness of devaluation in achieving internal and external balance, respectively for Ethiopian economy.

Here, there is some fact one can observe from the analysis. That is influence of IMPT and REER are closer to each other. The possible explanation for this is that imports, whatever the level of volume, are paid in terms of dollar. But when we change depreciated ETB to dollar the birr purchase few dollars and in turn few imports come to the country. This is the possible justification regarding the coefficients of IMPT (0.23970) and REER (0.2810350).

4.5. The short run Dynamic Relationship between VAT and Inflation (Vector Error Correction Model)

The co integration analysis so far focused on the long run influence of VAT on the price level. The short run influence of VAT on inflation is explored by introducing the vector error correction model. Conducting an error correction model has two important advantages. One is that it provides an estimated short run coefficients and the other is that it has the capacity of providing the speed of adjustment or where there is the convergence of short run dynamics to the long run. Here, the speed of adjustment from the result is 0.4790, which is 47.9 percent implying that there is no full adjustment to long run equilibrium within two quarters. Table 4.9 shows the short run dynamic relationship between price level (inflation) and VAT for the period under examination. Thus, the VECM associates the changes in inflation to the changes in the lagged variables of value added tax.

In the short run, past quarter VAT has both positive and significant influence on the current price level in Ethiopia. This is in line with the priori expectation. However, the past two quarters have insignificant positive relationship on inflation. From table 4.9 below it can be interpreted that when the past quarter VAT (revenue) increase by 5.1 percent the inflation increases by 1% in Ethiopia. This is due to the rise in VAT revenue for the purpose of monetizing the government budget deficit and other public expenditures.

The other significant Variables in the short run are the past quarter of import (D (LOG IMPT (-1) and the past and past two quarter of real effective exchange rate. From table 4.9, if the past two quarter inflation increases by 1 %, the past year import will increase by 8.3 percent. In a similar

manner, when the past two quarter exchange rate increases by 44 percent inflation increases by a percent. The past quarter records of fiscal deficit have positive effect on the current inflation on the inflation as expected. However, it is not significant in the short run. Broad money (M2) has also positive effect on the current inflation on the inflation as expected and, it is also significant in the short run. This result is in line with monetarists as they reasoned out it that inflation is monetary phenomena always and everywhere specially in the words of Milton Fried Man. The past quarter REER is also found to be significant in the short run. The adjusted R-squared is 0.803856, indicating that 80.3 percentage point variation in inflation (aggregate Price level) during the period 2004Q1 to 2014Q4 in Ethiopia is explained by the explanatory variables. The estimated error correction model enjoys a high goodness fit (R- squared = 0.871035 and adjusted R-squared = 0.803856).

Table 4.9: the Result of short Run influence from Vector Error Correction Model

Error Correction: D(LOGCPI)

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Speed of Adjustment	-0.479097	0.173396	-2.763026	0.0102
D(LOGCPI(-1)	0.494961	0.242479	2.041251	0.0211
D(LOGCPI(-2)	0.207072	0.188696	1.097381	0.2822
D(LOGFDFCT(-1)	0.455126	163.1658	1.375626	0.1802
D(LOGFDFCT(-2)	- 0.067432	120.3574	-0.723407	0.4757
D(LOGREER(-1)	0.903643	400.2433	2.409510	0.0154
D(LOGREER(-2)	0.569717	436.3085	2.689769	0.0121
D(LOGBRDM(-1)	0.110879	113.9535	2.237912	0.0137
D(LOGBRDM(-2)	0.448129	119.6652	2.443886	0.0213
D(LOGVAT(-1)	0.0051101	0.004980	10.26058	0.0000
D(LOGVAT(-2)	0.013417	0.012987	1.033076	0.3107
D(LOGIMT(_-1)	0.083851	2379.892	3.354600	0.0024
D(LOGIMPT(-2)	-0.229548	2221.000	-1.715547	0.0977
C	-32.27105	44.91970	-0.718416	0.4787

Statistical Behavior of the Model

R-squared	0.871035	Mean dependent variable	0.113570
Adjusted R-squared	0.803856	S.D. dependent variable	0.930167
S.E. of regression	0.191457	Akaike info criterion	14.07755
Sum squared residual	3.269769	Schwarz criterion	14.66267
Log likelihood	11.18575	Hannan-Quinn criterion.	14.29061
F-statistic	13.44390	Durbin-Watson stat	1.992217
Probability(F-statistic)	0.000031		

Source: Own Computation from e-view econometric software 7.1

4.6. Model Diagnostic Tests

No doubt diagnostic test is the backbone of econometric analysis as it helps as strength of the variable. In addition to this, for any meaning full research work, exemplification of analytical tool is very much important. Its model should be free from the fear of any spurious result. It is observed from the various test conducted for both the best regression model and the error correction model that we fail to reject the null hypotheses but rather accepted them, implying that the residuals of the model are not suffering from serial correlation; they are normally distributed and they are homoscedastic as reported by both Breusch-Pagan-Godfrey and ARCH tests respectively.

The lowest portion of Table 4.10 below shows the result of the multivariate diagnostic test of the vector error correction model. The result of the table shows that Vector error correction model (VECM) is desirable as it fulfills the requirement of the OLS model. With regard to the serial correlation the model is free from any serial correlation since the null hypothesis of no auto correlation in Breusch-Godfrey Serial Correlation cannot be rejected with the given probability of 0.2758 which is above 5% percent level of significance. Thus, it is now safe to conclude that the model does not indicate the presence of any serial correlation in the model of consumer price index. Regarding normality of the model, the Jerque Bera test of normality through Kurtosis and skewness reveals the absence of outliers in the series of the study implying normality of the model(also see annex 7). Furthermore, the result of the normality test is supported by the Jerque Bera test value of 1.520849 with the corresponding probability of 0.467468. This means that

the null hypothesis of normality of the model cannot be rejected since the probability is greater than 5%. Thus, there is sufficient evidence about the normality of the model used in the study.

Though, the heteroskedasticity is more relevant for the analysis of cross-sectional data than for Time-series data (Vogelvang, 2005), the Breusch-Pagan-Godfrey heteroskedasticity test is conducted in this study.

The null hypothesis of homoskedasticity of the model does not rejected as the probability attached to it is (0.99) greater than 0.05(5 %) though heteroskedasticity is not that much serious problem in time series analysis.

The other result from the model test (annex 7) is the correlaogram Q statistics also reveals that variables in the study are free from any auto correlation and partial auto correlation. This result is computed and obtained for 20 lags that is automatic selection of e-view econometric soft ware 7.1. All probability is greater than 5 % thus the null hypothesis of autocorrelation or partial auto correlation can be rejected.

Table 4.10: Diagnostic test result reports for residuals of the best estimated regression model and the Error Correction Model (ECM)

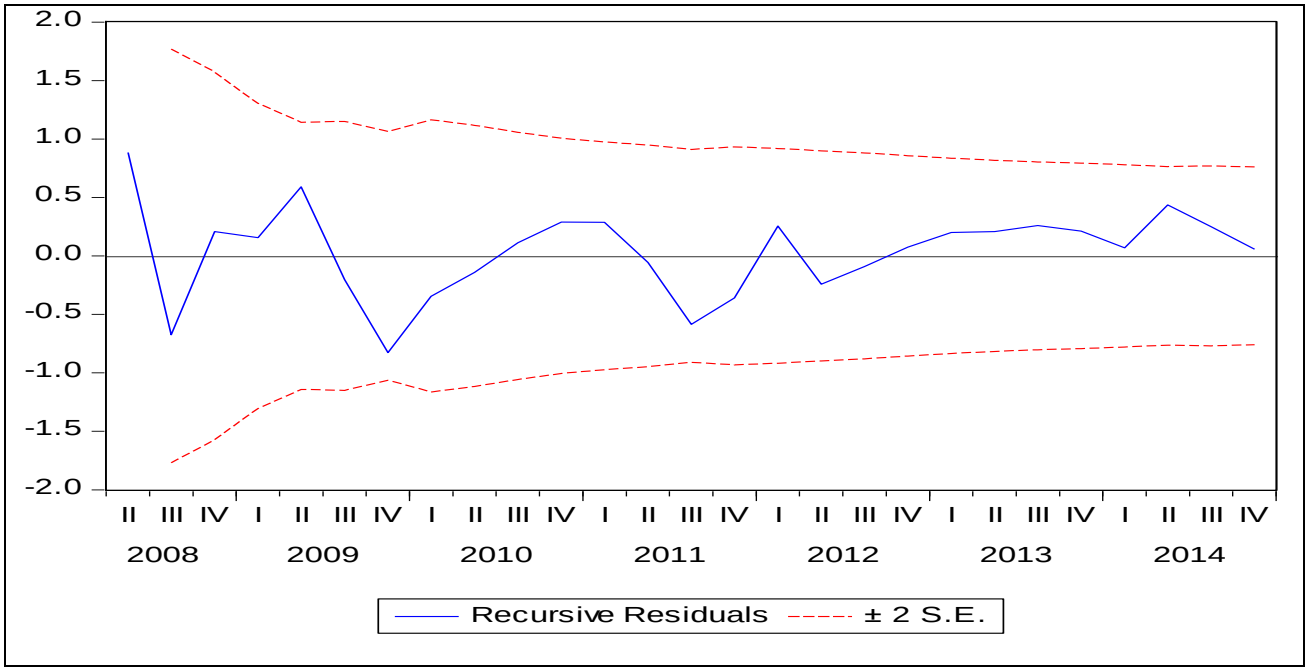
Diagnostic tests For Best Regression	Null hypothesis(Ho)	Probability Value	Decision (Inference)
Breusch Godfrey LM Test	No Serial correlation	0.3485	Fail to Reject Ho
Jarque-Bera Statistics	Normally distributed	0.932314	Fail to Reject Ho
Breusch-Pagan-Godfrey	Homoskedastic	0.2315	Fail to Reject Ho
ARCH	Not Heteroskedastic	0.3294	Fail to Reject Ho
Diagnostic Tests for ECM			
Breusch Godfrey LM Test	No Serial correlation	0.2758	Fail to Reject Ho
Jarque-Bera Statistics	Normally distributed	0.467468	Fail to Reject Ho
Breusch-Pagan-Godfrey	Homoskedastic	0.2878	Fail to Reject Ho

Source: Own computation from e-view econometric soft ware 7.1

4.7. Model Stability Diagnostic

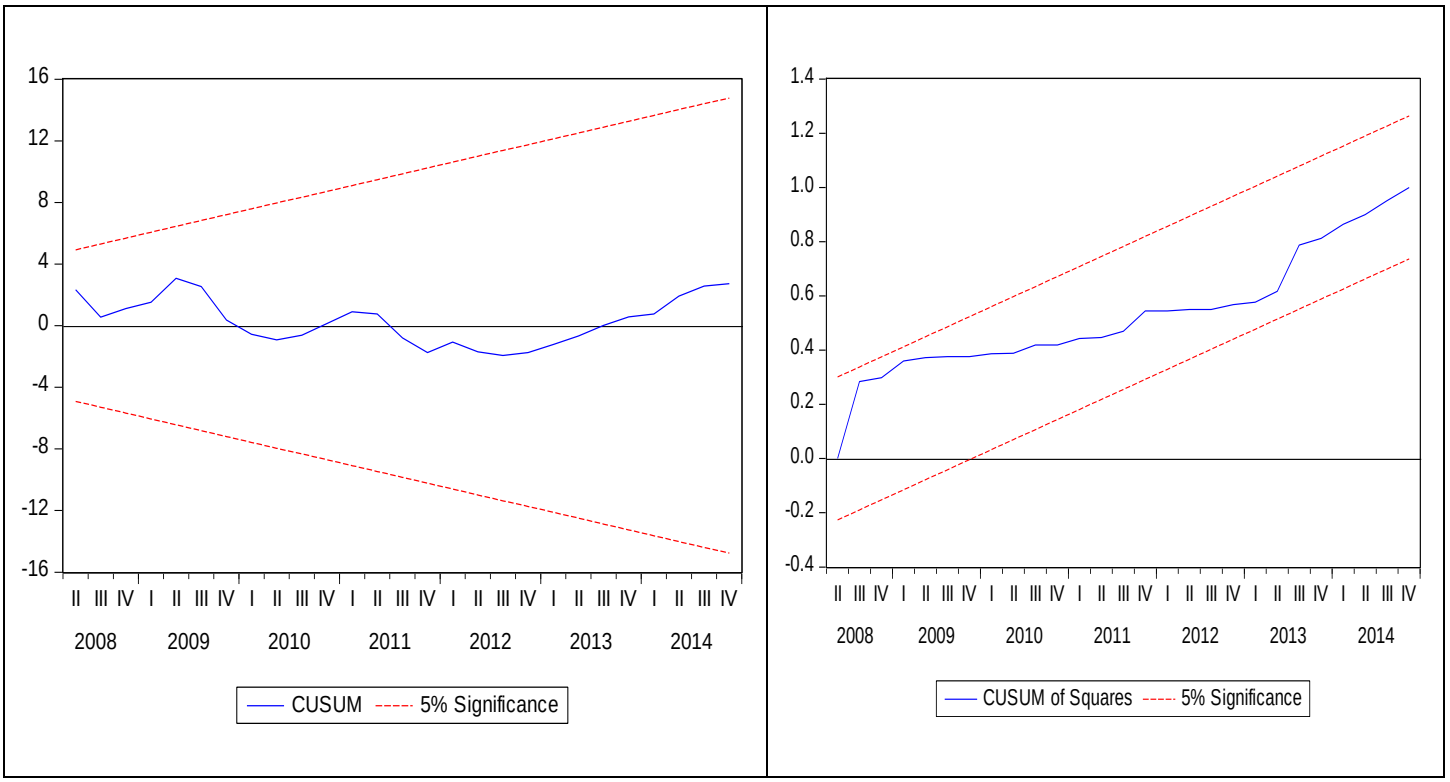
Existence of Stability is considered as strength of the model in econometric analysis. The stability in this study is established for the purpose of strengthening the analysis of the study. Satiability of the parameters was examined through plots from one step recursive residuals in a graphical estimate (see figure 4.2 bellow and annex 8) and also from cumulative sum of square (CUSUM) and CUSUMSQ at 5% percent level of Significance. The null hypothesis of parameter stability does not rejected as the plots of the recursive residual bounds within 95% critical values. This implies that parameters and coefficients study is stable for the period examination (see Fig 4.3 next to Fig 4.2)

Fig. 4.2: Model Stability from the plot of Recursive Residuals (+/- 2 Step)



Source: Own illustration from e-view Econometric Soft ware 7.0

Figure 4.3: Model Stability from the CUSUM and CUSUMQ statistics test results for model stability tests



Source: Own illustration from e-view econometric Soft ware 7.1

The cumulative sum of recursive residuals (CUSUM) and the CUSUM of squares (CUSUMSQ) tests were applied to test for parameter constancy. The plots of the CUSUM and CUSUM of squares statistics results clearly indicate the absence of any instability of the coefficients during the investigated period because the plots of the two statistics are confined within the 5% critical bounds pertaining to the parameter stability.

4.8. Causality Analysis: Granger Causality Analysis

As it is explained in the methodology part, Granger causality is applied due to its powerfulness and its simplicity to apply. Table 4.11 bellow shows the pair wise granger causality between inflation and value added tax with the objective of knowing the direction of Granger causality. Here there is something to note regarding the lag length and the order of variables. It has shown that the AIC criteria suggested lag 2 and thus lag two will be used in the granger causality

analysis. The other is about the order of co integration among the variables. The stationary test of ADF and PP has also shown that variables are integrated of order one. Thus, granger causality analysis is applied at the first difference of the variables.

From the granger causality test as shown on the table 4.11 below the null hypothesis which says real effective exchange rate does not granger cause inflation cannot be rejected since it appeared with the probability of more than five percent. At the same time the null hypothesis saying inflation does not granger causes real effective exchange rate also cannot be rejected as the probability value 18.15 % is greater than 5% level of significance. Given the F-statistics of 1.72378 with the probability of 0.1924; the Pair wise Granger causality test in 42 observations presented no causal relationship between exchange rate and level of inflation in Ethiopia. In this case there is no Granger-causality in any direction between real effective exchange rate and inflation. This result corroborates the findings of Oliver and Michael (2014) as they found positive relationship but no causality between the variables. The justification here may be due to the depreciation in real effective exchange rate of ETB that results in an increase in inflationary Pressure in Ethiopia.

The model was estimated with the two lag included 42 observations following the suggestion of lag selection criterion. Granger-causality results from the table 4.11 shows that the null hypothesis which says that fiscal deficit (D FDFCT) does not Granger causes inflation is rejected since the result is significant with probability less than 0.05 which is 5%. This implies that fiscal deficit could cause inflation in Ethiopia as it did during this study period. Therefore, the causal relationship found between inflation (DLOGCPI) and Fiscal deficit (DLOGFDFCT) is a unidirectional causality ruining from fiscal deficit to inflation. The result of this study is similar with the finding of Ozurumba (2012), who also found the unidirectional and non feedback.

Table 4.11 also reports results of the causality analysis of inflation (DLOGCPI) and import (DIMPT) in Ethiopia. The result of the table indicates that since F-statistic value of import is significantly big i.e. 11.2343, therefore import does Granger causes inflation as it is also significant with the probability of 0.0002. In other words, the null hypothesis that says import does not cause inflation can easily be rejected due to the significance of probability attached to it. However, one cannot reject the null hypothesis that says inflation does not cause import because the F value is very low with 0.63196 and the probability value is 0.5372 significantly greater

than 5 Percent. This simply shows that inflation does not Granger causes import in Ethiopia from the first quarter of 2004 to the last quarter of 2014. The general conclusion is that there is unidirectional causation running from import to inflation. The finding of this study is similar with what Ulke and Ergun (2011) obtained in their work as they found one-way Granger-causality running from import to inflation for Turkish economy.

The pair wise granger causality test presented in table 4.11 reveals that broad money (M2) causes inflation in Ethiopia. The null hypothesis that says broad money does not cause inflation cannot be rejected at 5% percent level of significance with the probability of 0.0021and high F-statistics of 7.32657. In addition, the null hypothesis that says inflation does not cause broad money cannot also be rejected with the given probability of 0.0074 and F-statistics of 0.575132. Thus, in Ethiopia there is bidirectional causality between broad money and inflation. This result coincides with the ideas of monetarists' view of inflation and money supply. This finding is also similar with the finding of Denbel *et al* (2016) ,who studied the relationship between inflation, money supply and economic growth from 1970/71 -2010/11 and observed bidirectional causality between money supply and inflation for the study period.

Table 4.11: Pairwise Granger Causality Test results

Pairwise Granger Causality Tests
Date: 04/24/16 Time: 10:10
Sample: 2004Q1 2014Q4
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG_FDFCT does not Granger Cause LOG_CPI	42	2.82561	0.0021
LOG_CPI does not Granger Cause LOG_FDFCT		0.25646	0.7751
LOG_REER does not Granger Cause LOG_CPI	42	1.72378	0.1924
LOG_CPI does not Granger Cause LOG_REER		1.78787	0.1815
LOG_VAT does not Granger Cause LOG_CPI	42	7.17168	0.0023
LOG_CPI does not Granger Cause LOG_VAT		1.43178	0.2518
LOGBRDM does not Granger Cause LOG_CPI	42	5.75132	0.0074
LOG_CPI does not Granger Cause LOGBRDM		7.32657	0.0021

LOGIMPT does not Granger Cause LOG_CPI LOG_CPI does not Granger Cause LOGIMPT	42	7. 32657 0.69099	0.0021 0.5074
LOG_REER does not Granger Cause LOG_FDFCT LOG_FDFCT does not Granger Cause LOG_REER	42	1.82347 1.05693	0.1757 0.3578
LOG_VAT does not Granger Cause LOG_FDFCT LOG_FDFCT does not Granger Cause LOG_VAT	42	0.32619 0.03980	0.7237 0.9610
LOGBRDM does not Granger Cause LOG_FDFCT LOG_FDFCT does not Granger Cause LOGBRDM	42	0.77634 0.18719	0.4674 0.8301
LOGIMPT does not Granger Cause LOG_FDFCT LOG_FDFCT does not Granger Cause LOGIMPT	42	0.21291 2.92532	0.8092 0.0661
LOG_VAT does not Granger Cause LOG_REER LOG_REER does not Granger Cause LOG_VAT	42	5.73738 0.01733	0.0068 0.9828
LOGBRDM does not Granger Cause LOG_REER LOG_REER does not Granger Cause LOGBRDM	42	0.88267 2.46304	0.4222 0.0990
LOGIMPT does not Granger Cause LOG_REER LOG_REER does not Granger Cause LOGIMPT	42	1.56662 0.28980	0.2223 0.7501
LOGBRDM does not Granger Cause LOG_VAT LOG_VAT does not Granger Cause LOGBRDM	42	2.46622 6.75006	0.0988 0.0032
LOGIMPT does not Granger Cause LOG_VAT LOG_VAT does not Granger Cause LOGIMPT	42	0.56161 1.18190	0.5751 0.3180
LOGIMPT does not Granger Cause LOGBRDM LOGBRDM does not Granger Cause LOGIMPT	42	7.66016 0.04398	0.0016 0.9570

Source: Own Computation from e-view econometric software 7.1

4.9. Causality Analysis : Long and Short Run Causality

The Johansen co integration test conducted has shown that variables in the study are co integrated meaning that they have long run relationship. Thus, it is possible to run the vector error correction model for the purpose of getting the speed of adjustment toward long run. In addition, it is also help full to get long run causality as well as short run causality between VAT

and inflation. It is obvious that the presence of co integration relationship between inflation and VAT implies that there is causality at least in one direction which may be unidirectional or bidirectional causality depending on the size of error correction model and the corresponding probability attached to it.

As it is possible to see from table 4.12 below, the error correction term in equation of LOGCPI is negative and also significant at 5% percent level of significance. This automatically tells the presence of long run relationship running from value added tax (VAT) to inflation. Generally speaking, it also implies the presence of long run relationship running from explanatory variables of the study (FDFCT, REER, VAT, BRDM and IMPT) to the dependant variable of the study (LOGCPI). The result from the VECM has shown that the speed of adjustment is negative 0.4790. This result implies that 47.9 percent of disturbances (disturbances) are corrected in consumer price index or inflation (LOGCPI) equation is adjusted each quarter (every three months). From the observed result, the speed of adjustment i.e. disequilibrium that results from change in one of the explanatory variables in the short run is not as such fast and it is 47.9 % implying that there is no full adjustment within two quarters.

Regarding the variables, the sign of error correction term when VAT is dependant variable is negative and but not significant at 5% level of significance (-1.67359 and 0.1058, error correction term and t-probability respectively) showing only unidirectional causality running from Value added tax(VAT) to price level in Ethiopia in long run. This result is similar with the report of Granger causality test result reported in table 4.11 above.

When the FDFCT is dependent variable the sign of error correction term is found to be negative and as well significant. This result reflects that there is bidirectional causality between fiscal deficit and inflation in Ethiopia from the first quarter of 2004 to the final quarter of 2014. Unlike the VECM estimates there is unidirectional Granger causality running from LOGFDFCT to LOGCPI.

The result of Table 4.12 also revealed that there is a bi directional causality between import (IMPT) and inflation in Ethiopia in the long run since the sign of error correction term is both negative and significant when error term is positive and significant when import is taken as a dependant variable in long run. The pair wise Granger causality test however reported that there is unidirectional causality running from IMPT to CPI.

The result of Table 4.12 further revealed that there is only unidirectional causality running from BRDM (Money supply) and real effective exchange rate (REER) to inflation (CPI) in the long run when BRDM and REER are taken as dependant variable as the error correction term associated to them is negative but insignificant. The reported result by VECM is similar with the report of Pair wise Granger causality test result reported in the previous section.

Table 4.12: Long run and short run causality from VECM estimation result

Explanatory Variables:	D(LOG_CPI)	D(LOGFDFCT)	D(LOG_REER)	D(LOG_VAT)	D(LOG_BRDM)	D(LOGIMPT)
ECOTCPI-1	-0.479097	-0.000590	-6.19E-05	-23.96577	-0.000368	- 3.09E-05
	(0.0102)	(0.0227)	(0.46611)	(0.1058)	(0.2640)	(0.0240)
	[-2.76303]	[-2.41622]	[-0.73931]	[-1.67359]	[-1.14068]	[2.39240]
D(LOG_CPI(-1))	0.494961	0.000106	-5.07E-06	44.77821	0.000449	-4.61E-05
	(0.0511)	(0.7576)	(0.9658)	(0.0338)	(0.3280)	(0.0166)
	[2.04125]	[0.31183]	[-0.04330]	[2.23609]	[0.99619]	[-2.55426]
D(LOG_CPI(-2))	0.207072	-2.71E-05	4.75E-06	41.66948	0.000174	-2.83E-05
	(0.2822)	(0.9194)	(0.9588)	(0.0126)	(0.6231)	(0.0542)
	[1.09738]	[-0.10208]	[0.05215]	[2.67395]	[0.49721]	[-2.01256]
D(LOGFDFCT(-1))	0.455126	-0.416671	0.128959	12700.39	0.360608	0.012067
	(0.1802)	(0.0.0809)	(0.1131)	(0.3543)	(0.2450)	(0.3291)
	[1.37563]	[-1.81372]	[1.63783]	[0.94251]	[1.18854]	[0.99388]
D(LOGFDFCT(-2))	0.067432	-0.074841	0.057355	9166.959	0.059784	0.013994
	(0.4757)	(0.6623)	(0.3322)	(0.3646)	(0.7914)	(0.1298)
	[0.72341]	[-0.44164]	[0.98751]	[0.92225]	[0.26713]	[1.56250]
D(LOG_REER(-1))	0.903643	0.240107	-0.659941	60897.34	-0.452464	-0.052659
	(0.0154)	(0.6734)	(0.0020)	(0.0764)	(0.0312)	(0.8809)
	[2.40951]	[0.42607]	[-3.41685]	[1.84235]	[-0.60795]	[-1.76809]
D(LOG_REER(-2))	0.569717	0.139274	-0.416344	15236.59	1.843924	-0.004912
	(0.0121)	(0.8224)	(0.0583)	(0.6758)	(0.1812)	(0.0020)
	[4.68977]	[0.22672]	[-1.97744]	[0.42285]	[2.27279]	[-0.15129]
D(LOG_VAT(-1))	0.0051101	-1.06E-05	7.98E-07	-0.381285	-1.27E-05	1.27E-06
	(0.0000)	(0.1430)	(0.7425)	(0.3621)	(0.5957)	(0.0690)
	[10.2606]	[-1.50878]	[0.33195]	[-0.92702]	[-1.37235]	[3.41638]
D(LOG_VAT(-2))	0.013417	9.91E-06	1.84E-06	-2.915089	-1.30E-05	1.83E-06
	(0.3107)	(0.5594)	(0.7710)	(0.0113)	(0.0049)	(0.8086)
	[-1.03308]	[0.54176]	[0.29407]	[-2.71793]	[-0.53690]	[1.89418]
D(LOG_BRDM(-1))	0.110879	0.002240	-0.047151	-37426.33	-0.649723	0.002074
	(0.0137)	(0.9890)	(0.3987)	(0.0005)	(0.0363)	(0.5182)
	[5.23791]	[0.01396]	[-0.85744]	[-3.97692]	[-3.06627]	[0.24456]
D(LOG_BRDM(-2))	0.448129	0.141644	0.032010	-22686.63	-0.490119	0.005830
	(0.0213)	(0.4779)	(0.5839)	(0.0297)	(0.2217)	(0.0137)
	[2.44389]	[0.84069]	[0.55432]	[-2.29562]	[-2.20264]	[0.65475]

D(LOGIMPT(-1))	0.083851	-3.991811	0.079852	262472.6	5.536158	0.466898
	(0.0024)	(0.2439)	(0.9451)	(0.1929)	(0.8019)	(0.9202)
	[3.35460]	[-1.19129]	[0.06953]	[1.33544]	[1.25101]	[2.63648]
D(LOGIMPT(-2))	0.229548	2.207293	0.789953	-265582.7	-1.046248	-0.016710
	(0.0977)	(0.4663)	(0.4674)	(0.1591)	(0.9437)	(0.1084)
	[1.71555]	[0.70586]	[0.73705]	[-1.44793]	[-0.25334]	[-0.10111]
C	-32.27105	-0.013052	0.051512	-1132.712	-0.005949	0.005549
	(0.4787)	(0.8381)	(0.0248)	(0.07625)	(0.0835)	(0.1184)
	[-0.71842]	[-0.20636]	[2.37638]	[-0.30534]	[-0.07122]	[1.66026]
R-squared	0.87103	0.781131	0.487577	0.681365	0.585464	0.722090
Adj. R-squared	0.803856	0.675749	0.240855	0.527948	0.385873	0.588281
F-statistic	13.44390	7.412413	1.976218	4.441266	2.933317	5.396435
Probability	0.000031	0.00006	0.65568	0.00005	0.00088	0.00011

Source: Own calculation from e-view econometric software7.1

Note: *Figures in ( ) are the p-value, and Figures in [ ] are the t –value with the corresponding parameters *Shows that p-value is significant at 5% level of significance*

ECOT- represent the error correction term

4.10. Short Run causality from Wald Coefficient Restriction Test Result

In the frame work of VECM, short run causality is obtained by conducting the Wald coefficient restriction test. In the short run also there is causality running from lagged variables of Value added tax to price level from 2004:Q1 to 2014:Q4. The reason is that coefficients of VAT from Wald coefficients are different from zero indicating the causality from VAT to inflation in Ethiopia in the short run. The result of the Wald coefficient restriction test has shown in table 4.13 below. With regard to other variables, the result found short run causality running from Broad Money (BRDM), import (IMPT) and real effective exchange (REER) to inflation (CPI) in Ethiopia for the periods under investigation. This result is similar with the granger causality test and also the long run causality test. The fiscal deficit does not cause inflation in the short run. The null hypothesis of Wald coefficient restriction cannot be rejected implying no causality

running from FDFCT to inflation in the short run. The possible justification may be that it takes time for the government to plan to monetize the fiscal deficit, and government may also solve the problem in the way that does not affect aggregate price level at least in the short run.

Table 4.13: the results of Wald tests on Coefficient Restrictions

The Null Hypothesis of the Wald Test	Statistics of Chi-square	P-Value	F-statistics	P-Value	Decision
Coefficients of Lagged LOGCPI are equal to Zero	66.1979	0.0000	33.09896	0.0000	Reject
Coefficients of lagged LOG FDFCT variables are equal to Zero	2.064050	0.3563	1.032025	0.3699	Do not Reject
Coefficients of lagged LOG REER Variables are equal to Zero	12.27875	0.0022	6.139373	0.0063	Reject
Coefficients of Lagged LOG VAT Variables are equal to Zero	129.6697	0.0000	64.83483	0.0000	Reject
Coefficients of lagged LOG BRDM Variables are equal to Zero	9.525848	0.0085	4.762924	0.0169	Reject
Coefficients of lagged LOG IMPT variables are equal to Zero	11.27283	0.0090	5.636415	0.0036	Reject

Source: Own Computation from e-view econometric software 7.1

CHAPTER FIVE

CONCLUSION AND POLICY IMPLICATION

5.1. Conclusion

This study attempted to investigate the relationships between Value added tax (VAT) and Price level (inflation) in Ethiopia using partial equilibrium analysis of quarterly time series data over the period 2004Q1 -2014Q4. It employed 44 quarterly observations and six variables. Inflation, an explained variable of this study, is a major challenge of Ethiopian economy despite its current fast growth. Thus, dealing with the relationship between value added tax and aggregate price level in Ethiopia is, unquestionable, important since it provide a base line to forging a long term solution. Moreover, curbing inflation bolster the economic growth as it is the multifaceted macroeconomic phenomena.

The finding of this study is a witness about the complexity of general price level especially in growing economies like Ethiopia. The macroeconomic uncertainties that are associated with inflation in Ethiopia are, but not limited to VAT; real effective exchange rate; imports of goods and services, fiscal deficit and broad money. The conclusion from the finding of this study is that these independent variables jointly and significantly influenced the general level of price in Ethiopia as much as 80.3 percent while the error term captured the remaining 19.7 percent at 5 percent level of significance.

The result of estimation revealed that inflation, value added tax, real effective exchange rate, import, and broad money are non stationary at level but stationary in their first differences. This is confirmed by both ADF and PP tests. In other words, variables under consideration become integrated of order one (I (1)). With the existence of unit root at levels for all the variables, the present study then employs the Johansen co integration analysis to test among the variables for the existence of a long run relationship and found that all the explanatory variables were found to be statistically significant at the conventional 5 percent level.

It is concluded, from the Johansen co integration, that Value added tax have a positive and significant relationship with inflation in Ethiopia in the long run. The finding of this study

shows that the coefficient of value added tax is 0.188578 implying that a one percent increase in VAT revenue in Ethiopia ceteris paribus would lead to a 0.188578 percent increase in inflation in line with the priori expectation. In a similar manner, the coefficient for VAT is 0.00511, meaning a one percent increase in the VAT revenue leads to a 0.00511 percent increase in inflation in the short run. Thus, it can be concluded that the relationship between VAT and inflation is positive in both short and long run. Moreover, the finding of this study revealed that the coefficient of VAT is greater in the long run when compared to the coefficient in the short run.

Another point of conclusion in this study is the finding from the Pair wise Granger causality analysis. The result indicates that there is unidirectional causal relationship running from VAT to general price level in Ethiopia. Besides, both in the long and short run VAT cause inflation from the period of 2004Q1 to 2014Q4. In both periods the causality is unidirectional and runs from VAT to inflation. This fact is explained by the Wald coefficient restriction test.

The strong positive relationship between VAT and general price, in both short and long run, is most likely due to multiple VAT burden exerted on individuals and corporate VAT burdens in Ethiopia. This happens through VAT charges on intermediate out puts. The other serious problem here is that it becomes very difficult to draw line between intermediate and final out puts even if they are exempted from the VAT. The conclusion inferred from this study is consistent with the conclusion drawn by Maries and Al well (2013) and Ajakaiye (1999), who concluded also that VAT strongly push up the price level. Thus, Value Added tax despite its significant contribution to the national revenue is not free from strong inflationary consequences in Ethiopia.

The other finding of the study, regarding other explanatory variables, is that there is a positive significant relationship between money supply (broad money) and the general price level in Ethiopia. And, that the elasticity of money supply is greater than the coefficient of all explanatory variables in the long run. The coefficient of broad money is 0.5746 implying that a one percent increase in broad money in Ethiopia ,keeping other things constant, would lead to a 0.5746 percent increase in inflation in line with economic theory specially that of monetarist. Results from the Granger causality test indicate that there exists bidirectional causal relationship between money supply and the general price level in Ethiopia. The typical conclusion here is that

the broad money is main source of inflation in Ethiopia, the landlocked and non oil country in east Africa. The conclusion drawn from this study is similar with the conclusions of Denbel *et al (*2016*),* Sola and Peter (2013) and Akinbobola (2012).

Real effective exchange rate, import of goods and services and fiscal deficit are also positively related to inflation in the long run. That is, with 1 percent increase in real effective exchange rate, inflation will increase by 0.2810 percent keeping other things constant. Also, with a 1 percent rise in import of goods and services and fiscal deficit; inflation got increment by 0.2397 and 0.0373 percents, ceteris paribus, respectively in the long run. From this, it can be inferred that import of goods and services, real effective exchange rate and fiscal deficit are also important to maintain price stability in Ethiopia. In the short run also all variables are positively and significantly related to the general price level in Ethiopia with the exception of fiscal deficit which has positive but insignificant relationship. The possible justification for this is that the government search options and react to fiscal deficit in the way that does not affect the general level of prices at least in the short run. As far Granger causality test is concerned, all variables cause inflation except real effective exchange rate which is attributed to the depreciation of real effective exchange rate that push up inflationary pressure in Ethiopia. The causality is unidirectional and runs from explanatory variables to inflation. The conclusion drawn here also coincides with what Vicente (2007), Gossaye, (2015), Irmana (2013), and Ulke and Ergun (2011), Oliver and Michael (2014) concluded in their work.

5.2. Policy Implication

In the modern economy, the issue of price cannot be ignored. This is due to the fact that authorities in both developed and developing nation wants the stable prices in their economy. The consequence of value added tax here is what authorities cannot ignore as inflation enters into the pocket of every citizen through increase in price of goods and services. Thus, the main policy implication of this study is that the post VAT cost benefit analysis should be carried out to ascertain social desirability of value added tax in Ethiopia. In addition, VAT revenue should be utilized in the way that does not significantly affect price stability in the long run since the study revealed that it is among the major variables that are influencing instability in the general price level in Ethiopia in the period under investigation.

Moreover, in order to attain price stability in Ethiopia, all fundamental factors should be taken into consideration. The finding of the study has shown that VAT is inflationary. In a similar manner, broad money (simply money supply) is also found to have inflationary consequences. The general policy implication therefore is that for effective price control in Ethiopia, both fiscal policy and monetary policy should be well coordinated. The idea is that though value added tax (VAT) is weaker than broad money when viewed from elasticity aspect the fact that it positively influence inflation suggests that stability in VAT revenue is necessary condition for stable prices in Ethiopia. It follows that ensuring fiscal stability seems to be a panacea for sustainable price stability in Ethiopia. In developing countries like Ethiopia the result from such study helps to consolidate the benefit of VAT by providing better management in the tax system.

5.3. Recommending Further Studies

There is no doubt that this area requires intensive subsequent studies as inflation affects the life of every people in day to day activities. Moreover, investigating factors affecting price level in any country is nowhere to end over a night. This is due to the fact that inflation is one of the complex phenomena that have diverse faces. In addition, in this globalized twenty first century, every country wants to have tolerable and acceptable single digit level of inflation. Thus, these conditions added together shows that there is wide room for further researchers in Ethiopia regarding this issue.

Thus, further studies can include foreign aid and remittances as well as other variables that are important factor in modeling of inflation in developing economies like Ethiopia.

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Annexes

Annex 1: Lag Length Selection Criterion

VAR Lag Order Selection Criteria
Endogenous variables: LOG_CPI LOG_FDFCT LOG_REER LOG_VAT LOGBRDM LOGIMPT
Exogenous variables: C
Date: 04/04/16 Time: 07:45
Sample: 1 44
Included observations: 41

Lag	LogL	LR	FPE	AIC	SC	HQ
0	134.7432	NA	7.55e-11	-6.280156	-6.029390	-6.188841
1	298.0282	270.8141	1.55e-13	-12.48918	-10.73381*	-11.84997
2	346.9856	66.86865*	9.24e-14*	-13.12125*	-9.861281	-11.93415*
3	380.4110	35.87123	1.45e-13	-12.99566	-8.231095	-11.26067

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Annex 2: The result of Johansen Co integatarion Test

Date: 04/28/16 Time: 16:18
Sample (adjusted): 2004Q4 2014Q4
Included observations: 41 after adjustments
Trend assumption: Linear deterministic trend
Series: LOG_CPI LOG_FDFCT LOG_REER LOG_VAT LOGBRDM LOGIMPT
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.769646	129.7313	95.75366	0.0000
At most 1	0.519108	69.53764	69.81889	0.0526
At most 2	0.452375	39.52099	47.85613	0.2401
At most 3	0.233458	14.83221	29.79707	0.7908
At most 4	0.082051	3.931733	15.49471	0.9090
At most 5	0.010230	0.421596	3.841466	0.5161

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.769646	60.19362	40.07757	0.0001
At most 1	0.519108	30.01665	33.87687	0.1350
At most 2	0.452375	24.68878	27.58434	0.1124
At most 3	0.233458	10.90047	21.13162	0.6572
At most 4	0.082051	3.510136	14.26460	0.9071
At most 5	0.010230	0.421596	3.841466	0.5161

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LOG_CPI	LOG_FDFCT	LOG_REER	LOG_VAT	LOGBRDM	LOGIMPT
-35.24889	6.647162	20.25453	1.317708	9.906162	8.452341
152.5303	2.468906	9.337252	-4.717884	6.127022	-23.53355
-253.6406	-0.819771	-13.41504	-10.21465	-11.57383	16.12924
-28.17217	1.548950	6.345658	-3.260738	-17.30220	-9.178484
-46.98293	0.238863	-17.72655	1.965391	3.421294	9.444693
-186.5124	-0.241998	27.79513	-9.008423	-8.709342	2.357482

Unrestricted Adjustment Coefficients (alpha):

D(LOG_CPI)	-0.000242	-4.90E-05	-0.000244	-6.92E-05	9.59E-05	0.000169

D(LOG_FDFCT)	-0.342213	-0.161704	0.062705	-0.112122	0.003773	-0.004987
D(LOG_REER)	-0.003008	0.007085	0.003094	0.000484	0.001138	-0.000179
D(LOG_VAT)	0.695069	0.194400	0.521418	-0.417290	-0.148581	0.054925
D(LOGBRDM)	-0.006693	-0.031496	0.029739	0.041973	-0.003286	0.001572
D(LOGIMPT)	-0.019731	0.018546	-0.013581	0.003707	-0.009306	0.002071

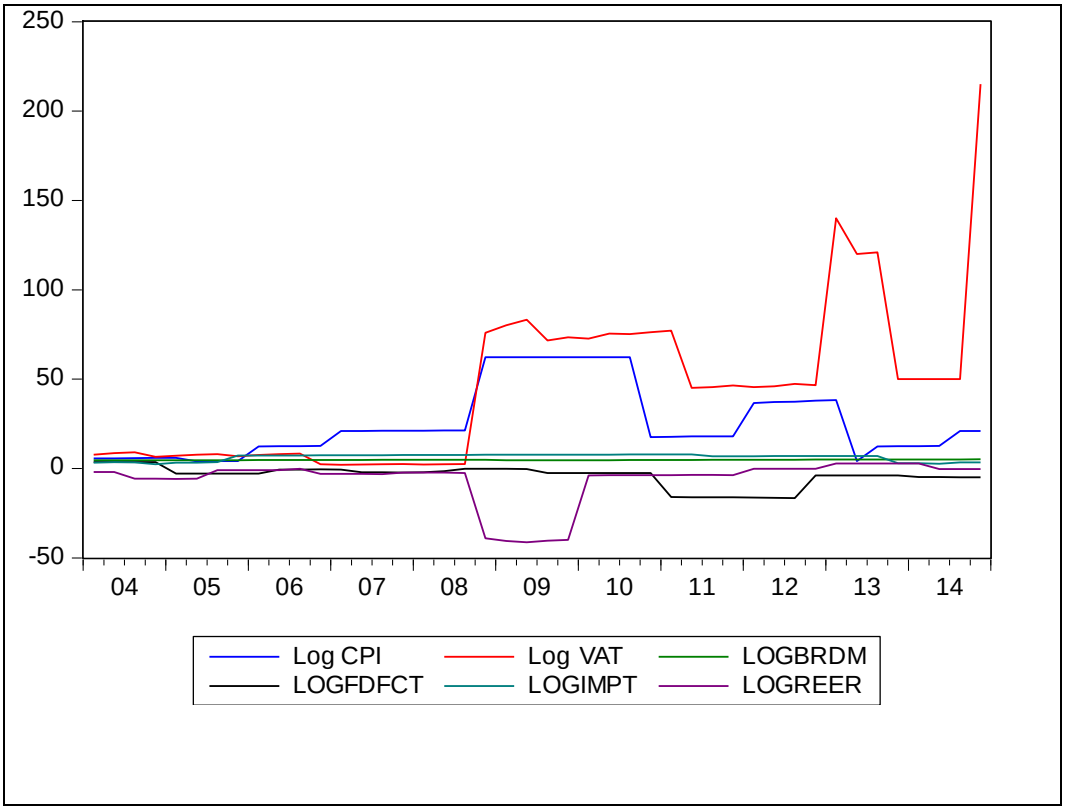
1 Cointegrating Equation(s): Log likelihood 345.6422

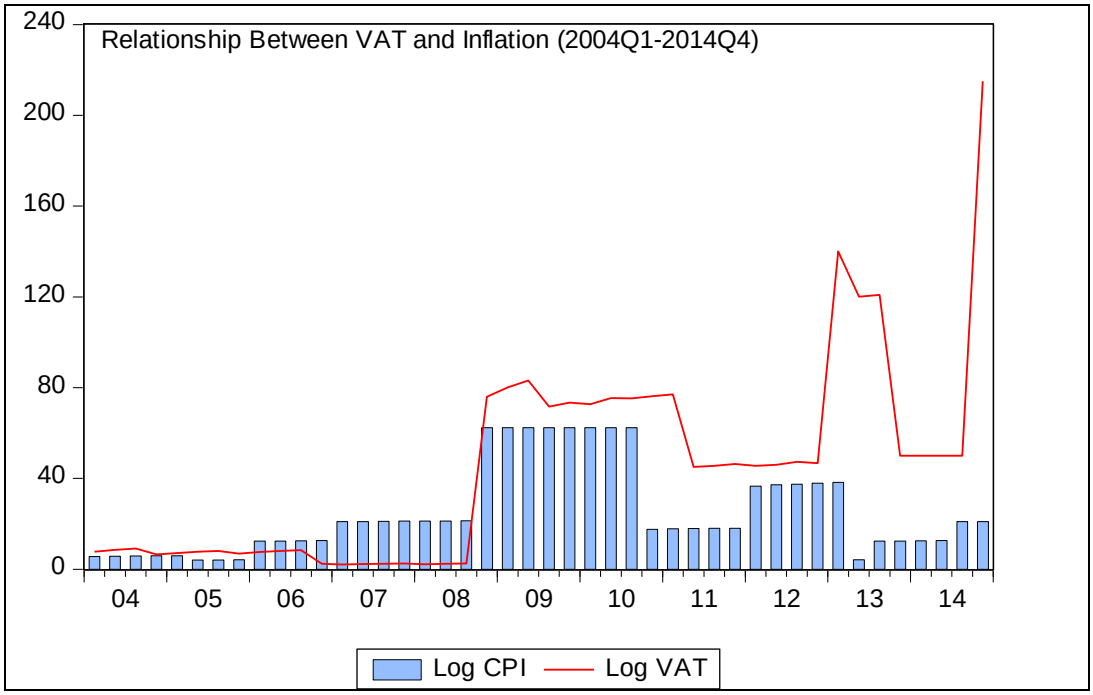
Normalized cointegrating coefficients (standard error in parentheses)

LOG_CPI	LOG_FDFCT	LOG_REER	LOG_VAT	LOGBRDM	LOGIMPT
1.000000	-0.188578	-0.574615	-0.037383	-0.281035	-0.239790
	(0.02165)	(0.12683)	(0.03366)	(0.06122)	(0.06543)

Annex 3: Unit root(visual inspection of variables at first difference)

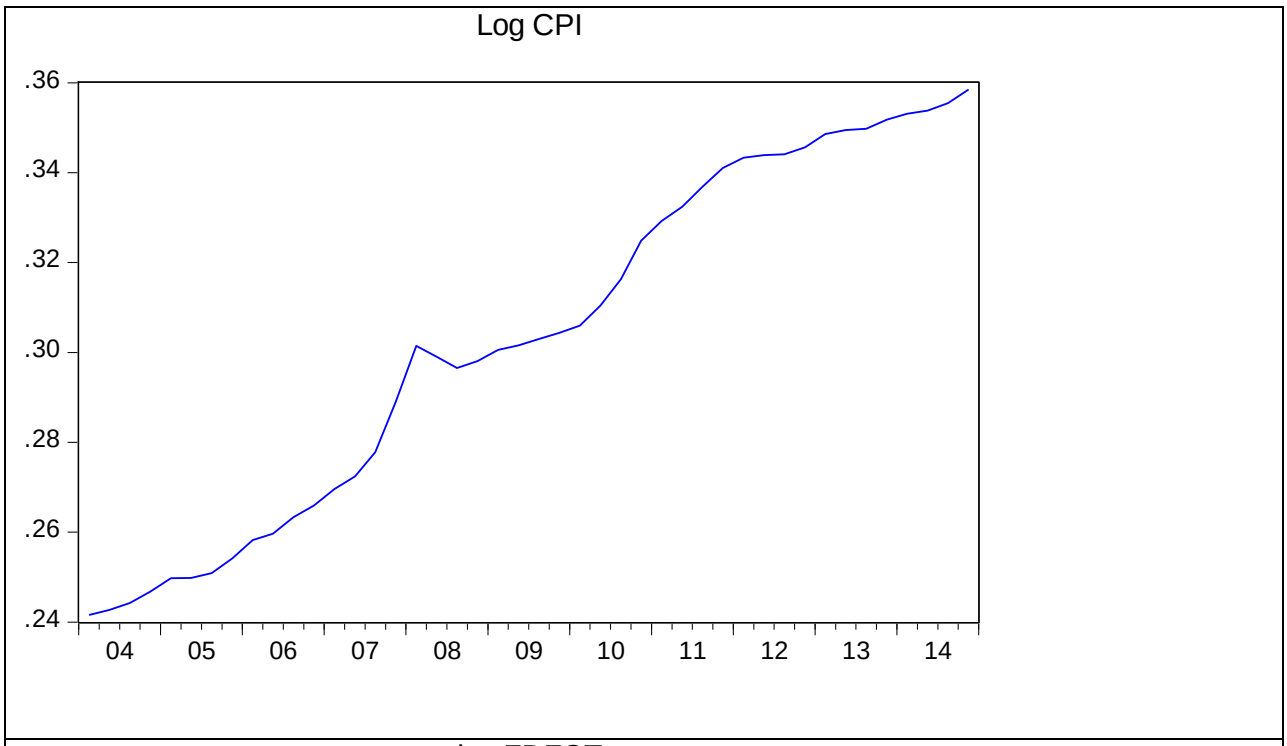
The mean of all variables revolves arround zero value , as shown below

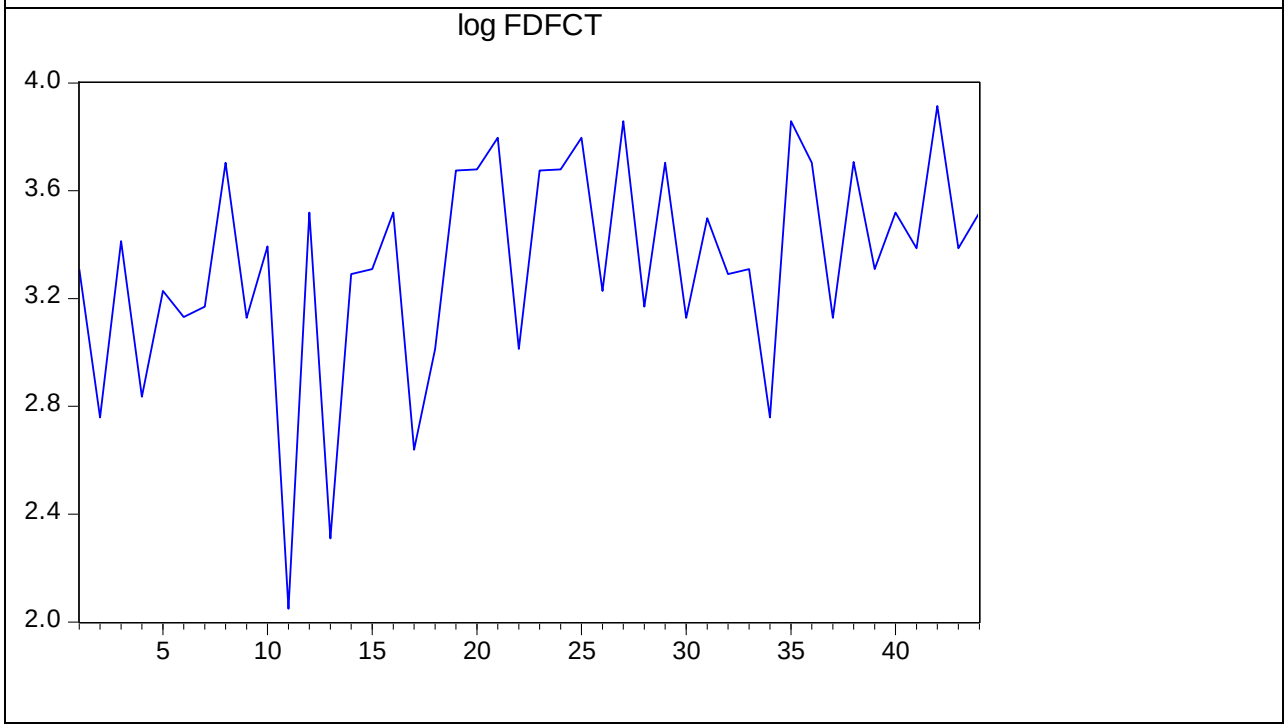


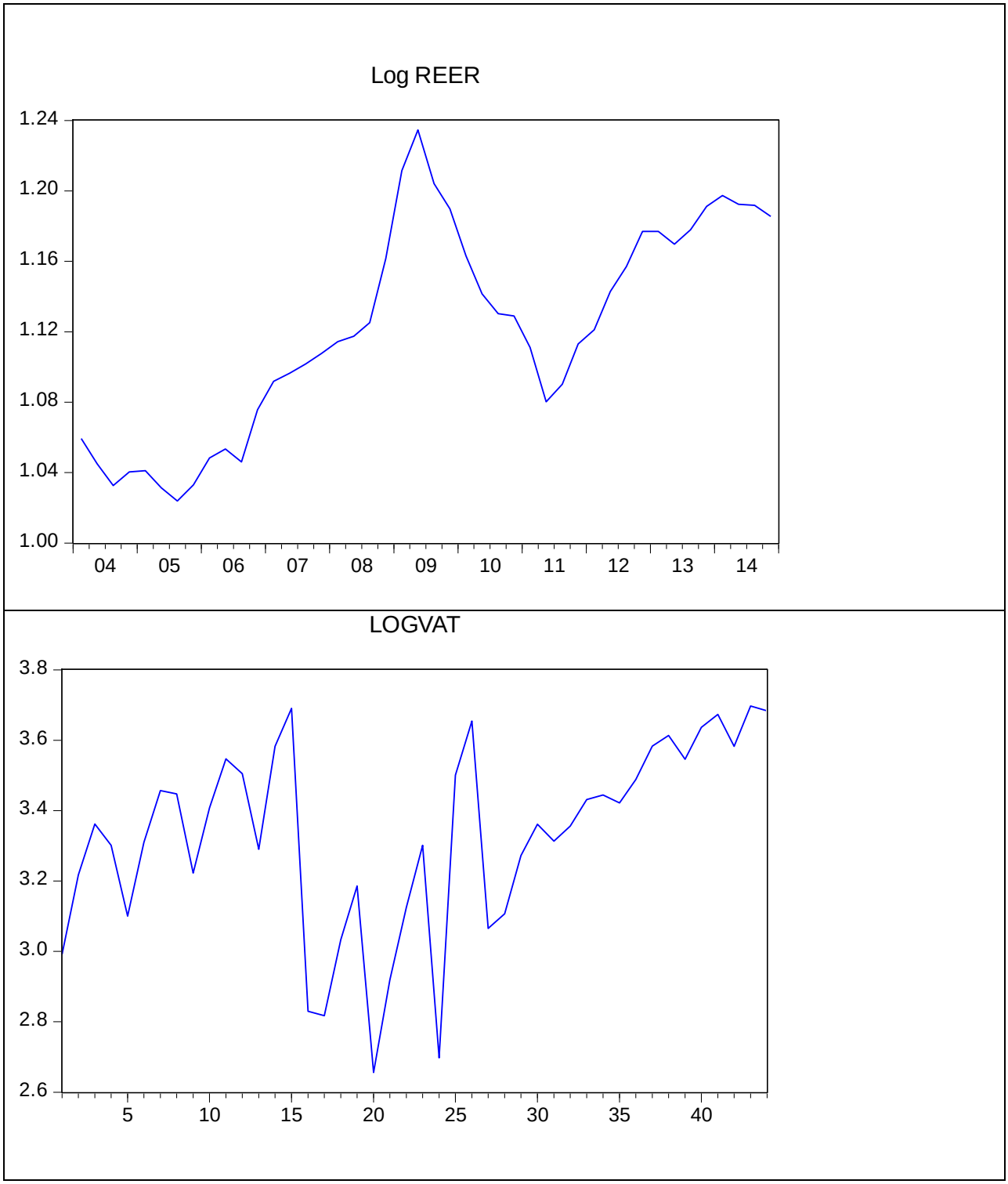

Relationship Between VAT and Inflation (2004Q1-2014Q4)
240
200
160
120
80
40
0
04
05
06
07
08
09
10
11
12
13
14
Log CPI
Log VAT

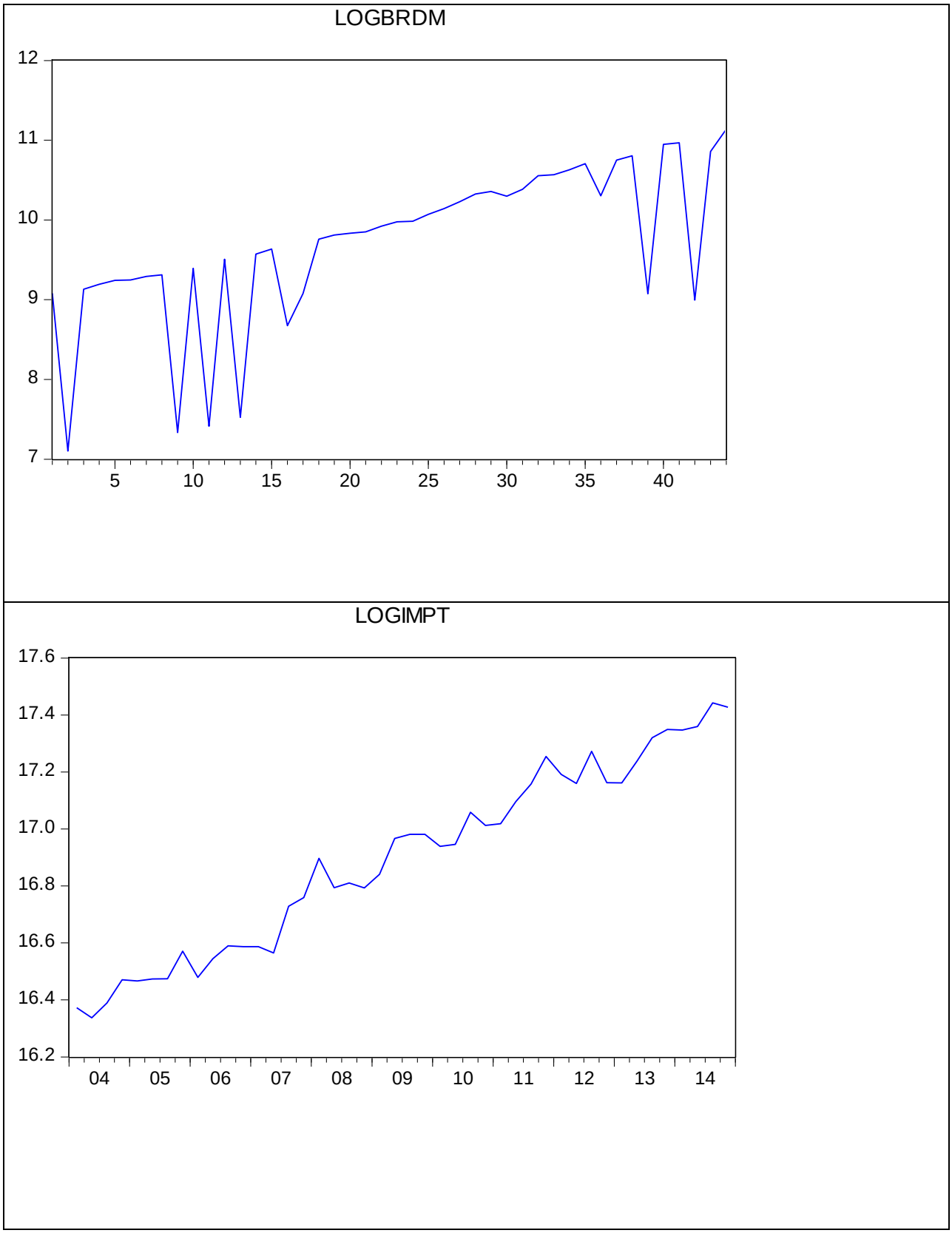
Annex 4: Unit root test(Visual inspection graphically at Level)

Variables increase or dcrease arround non zero values at level






Log REER
1.24
1.20
1.16
1.12
1.08
1.04
1.00
04
05
06
07
08
09
10
11
12
13
14
LOGVAT
3.8
3.6
3.4
3.2
3.0
2.8
2.6
5
10
15
20
25
30
35
40


LOGBRDM
12
11
10
9
8
7
5
10
15
20
25
30
35
40
LOGIMPT
17.6
17.4
17.2
17.0
16.8
16.6
16.4
16.2
04
05
06
07
08
09
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12
13
14

Annex:5 : The Results of Correlogram Test of Variales (way of checking stationarity)

Correlogram of logCPI at Level

Date: 04/04/16 Time: 07:53
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |*******	. |*******	1	0.935	0.935	41.137	0.000
. |******|	. | . |	2	0.871	-0.024	77.692	0.000
. |******|	. | . |	3	0.814	0.024	110.43	0.000
. |***** |	.*| . |	4	0.746	-0.122	138.59	0.000
. |***** |	. | . |	5	0.685	0.020	162.93	0.000
. |***** |	. | . |	6	0.625	-0.035	183.75	0.000
. |**** |	****| . |	7	0.504	-0.517	197.65	0.000
. |*** |	.*| . |	8	0.388	-0.068	206.13	0.000
. |** |	.*| . |	9	0.279	-0.101	210.64	0.000
. |*. |	. | . |	10	0.173	-0.002	212.41	0.000
. | . |	.*| . |	11	0.072	-0.114	212.73	0.000
. | . |	.*| . |	12	-0.026	-0.101	212.77	0.000
.*| . |	. |** |	13	-0.120	0.217	213.71	0.000
**| . |	. | . |	14	-0.206	-0.043	216.58	0.000
**| . |	. | . |	15	-0.278	0.057	221.99	0.000
**| . |	. | . |	16	-0.336	-0.001	230.15	0.000
***| . |	. |*. |	17	-0.376	0.145	240.73	0.000
***| . |	. | . |	18	-0.410	0.011	253.83	0.000
***| . |	.*| . |	19	-0.439	-0.186	269.40	0.000
***| . |	. |*. |	20	-0.448	0.132	286.28	0.000

Decision: The Variable is not stationary at level P-value is very low less than 5%

Correlogram of log CPI at first Difference

Date: 04/04/16 Time: 08:11
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	-0.014	-0.014	0.0084	0.927
. | . |	. | . |	2	-0.063	-0.063	0.1960	0.907
. |*. |	. | . |	3	0.075	0.074	0.4695	0.926
.*| . |	.*| . |	4	-0.068	-0.071	0.7006	0.951
. | . |	. | . |	5	-0.021	-0.013	0.7234	0.982
. |*** |	. |*** |	6	0.467	0.459	12.148	0.059
. | . |	. | . |	7	-0.049	-0.050	12.277	0.092
. | . |	. | . |	8	-0.057	-0.017	12.457	0.132
. | . |	.*| . |	9	-0.027	-0.108	12.499	0.187
. | . |	. | . |	10	-0.050	0.007	12.645	0.244
. | . |	. | . |	11	-0.032	-0.028	12.707	0.313
. | . |	**| . |	12	-0.035	-0.322	12.784	0.385
.*| . |	. | . |	13	-0.067	-0.034	13.074	0.442
.*| . |	.*| . |	14	-0.115	-0.135	13.955	0.453
.*| . |	.*| . |	15	-0.122	-0.079	14.990	0.452
.*| . |	**| . |	16	-0.143	-0.222	16.451	0.422
. | . |	.*| . |	17	-0.050	-0.075	16.638	0.479
. | . |	. |*. |	18	-0.055	0.119	16.869	0.532
. | . |	. | . |	19	-0.049	-0.044	17.065	0.585
. | . |	. | . |	20	-0.063	0.032	17.402	0.627

Decision: Log CPI is stationary at first difference as P-value is all above 5%.

Correlogram of log VAT at Level

Date: 04/04/16 Time: 08:17
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |***** |	. |***** |	1	0.759	0.759	27.109	0.000
. |**** |	.*| . |	2	0.527	-0.116	40.478	0.000
. |** |	.*| . |	3	0.279	-0.188	44.325	0.000
. |** |	. |** |	4	0.222	0.278	46.824	0.000
. |*. |	. | . |	5	0.207	0.032	49.039	0.000
. |*. |	.*| . |	6	0.193	-0.096	51.016	0.000
. |*. |	. |*. |	7	0.177	0.103	52.733	0.000
. |*. |	.*| . |	8	0.118	-0.072	53.519	0.000
. | . |	.*| . |	9	0.055	-0.086	53.695	0.000
. | . |	. | . |	10	-0.006	0.018	53.697	0.000
. | . |	. | . |	11	-0.031	-0.004	53.754	0.000
. | . |	.*| . |	12	-0.063	-0.108	54.008	0.000
. | . |	. |*. |	13	-0.036	0.133	54.094	0.000
. | . |	. | . |	14	-0.013	0.020	54.105	0.000
. | . |	. | . |	15	0.015	-0.061	54.119	0.000
. | . |	. | . |	16	-0.014	-0.028	54.133	0.000
. | . |	. | . |	17	-0.043	0.019	54.273	0.000
.*| . |	. | . |	18	-0.068	-0.042	54.632	0.000
.*| . |	. | . |	19	-0.073	-0.013	55.065	0.000
. | . |	. |*. |	20	-0.020	0.143	55.097	0.000

Decision: Log VAT is non stationary at level

Log VAT at First Difference

Date: 04/04/16 Time: 08:25
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	-0.021	-0.021	0.0202	0.887
. | . |	. | . |	2	0.018	0.017	0.0352	0.983
. | . |	. | . |	3	-0.050	-0.050	0.1573	0.984
.*| . |	.*| . |	4	-0.137	-0.139	1.0825	0.897
. | . |	. | . |	5	-0.008	-0.013	1.0856	0.955
. | . |	. | . |	6	0.001	0.003	1.0857	0.982
. | . |	. | . |	7	0.010	-0.004	1.0910	0.993
. | . |	. | . |	8	0.002	-0.019	1.0912	0.998
. | . |	. | . |	9	-0.010	-0.013	1.0967	0.999
.*| . |	.*| . |	10	-0.127	-0.130	2.0497	0.996
. | . |	. | . |	11	0.001	-0.006	2.0498	0.998
**| . |	**| . |	12	-0.206	-0.214	4.7090	0.967
. | . |	. | . |	13	0.001	-0.032	4.7090	0.981
. | . |	. | . |	14	-0.020	-0.062	4.7368	0.989
. | . |	. | . |	15	-0.001	-0.035	4.7369	0.994
. | . |	.*| . |	16	-0.012	-0.087	4.7476	0.997
. | . |	. | . |	17	-0.029	-0.056	4.8103	0.998
.*| . |	.*| . |	18	-0.085	-0.130	5.3708	0.998
.*| . |	.*| . |	19	-0.074	-0.121	5.8068	0.998
. | . |	.*| . |	20	0.011	-0.068	5.8168	0.999

Decision: Stationary at its first difference

LogBRDM at level
Date: 04/04/16 Time: 08:37
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |****** |	. |****** |	1	0.877	0.877	36.184	0.000
. |***** |	. | . |	2	0.758	-0.047	63.857	0.000
. |***** |	.*| . |	3	0.639	-0.066	84.024	0.000
. |**** |	. | . |	4	0.530	-0.030	98.249	0.000
. |*** |	.*| . |	5	0.406	-0.137	106.80	0.000
. |** |	.*| . |	6	0.283	-0.086	111.06	0.000
. |*. |	. | . |	7	0.180	-0.003	112.83	0.000
. |*. |	. | . |	8	0.091	-0.030	113.30	0.000
. | . |	.*| . |	9	-0.004	-0.107	113.30	0.000
.*| . |	. | . |	10	-0.073	0.026	113.62	0.000
.*| . |	. | . |	11	-0.119	0.020	114.49	0.000
.*| . |	. | . |	12	-0.149	-0.008	115.88	0.000
.*| . |	. | . |	13	-0.177	-0.038	117.92	0.000
.*| . |	. | . |	14	-0.186	0.024	120.24	0.000
.*| . |	. | . |	15	-0.173	0.038	122.32	0.000
.*| . |	. |*. |	16	-0.136	0.075	123.66	0.000
.*| . |	. | . |	17	-0.099	0.015	124.40	0.000
. | . |	. |*. |	18	-0.041	0.092	124.54	0.000
. | . |	. |*. |	19	0.037	0.114	124.65	0.000
. |*. |	. |*. |	20	0.124	0.088	125.95	0.000

Decision: Non stationary at its level

LogBRDM at First Difference

Date: 04/04/16 Time: 08:40
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.067	0.067	0.2060	0.650
. | . |	. | . |	2	0.047	0.043	0.3110	0.856
. | . |	. | . |	3	-0.010	-0.016	0.3163	0.957
. | . |	. | . |	4	0.072	0.072	0.5706	0.966
. | . |	. | . |	5	-0.028	-0.036	0.6097	0.988
.*| . |	.*| . |	6	-0.087	-0.091	1.0100	0.985
. | . |	. | . |	7	-0.044	-0.028	1.1157	0.993
. | . |	. | . |	8	0.037	0.045	1.1918	0.997
.*| . |	.*| . |	9	-0.172	-0.176	2.8758	0.969
.*| . |	.*| . |	10	-0.138	-0.114	3.9954	0.948
.*| . |	.*| . |	11	-0.137	-0.110	5.1259	0.925
. | . |	. | . |	12	0.016	0.017	5.1418	0.953
. | . |	. | . |	13	0.018	0.042	5.1619	0.971
. | . |	. | . |	14	-0.062	-0.062	5.4202	0.979
. | . |	.*| . |	15	-0.063	-0.083	5.6902	0.984
. | . |	. | . |	16	0.070	0.042	6.0395	0.988
.*| . |	.*| . |	17	-0.111	-0.141	6.9613	0.984
.*| . |	.*| . |	18	-0.072	-0.092	7.3655	0.987
. | . |	. | . |	19	-0.000	-0.002	7.3655	0.992
. |*. |	. | . |	20	0.125	0.051	8.6734	0.986

Decision: Stationary at its First difference

LogFDFCT at Level
Date: 04/04/16 Time: 08:47
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |****** |	. |****** |	1	0.841	0.841	33.274	0.000
. |***** |	.*| . |	2	0.680	-0.093	55.538	0.000
. |**** |	.*| . |	3	0.521	-0.088	68.940	0.000
. |*** |	.*| . |	4	0.364	-0.100	75.628	0.000
. |** |	. | . |	5	0.244	0.017	78.716	0.000
. |*. |	. | . |	6	0.143	-0.036	79.804	0.000
. | . |	.*| . |	7	0.022	-0.167	79.830	0.000
. | . |	. |** |	8	0.018	0.300	79.847	0.000
. | . |	. | . |	9	0.012	-0.063	79.855	0.000
. | . |	.*| . |	10	-0.025	-0.156	79.891	0.000
. | . |	. | . |	11	-0.048	-0.015	80.032	0.000
.*| . |	. | . |	12	-0.066	0.045	80.306	0.000
.*| . |	. | . |	13	-0.090	-0.052	80.840	0.000
.*| . |	. | . |	14	-0.083	-0.021	81.299	0.000
.*| . |	. |*. |	15	-0.068	0.153	81.617	0.000
. | . |	. | . |	16	-0.065	-0.063	81.922	0.000
. | . |	.*| . |	17	-0.057	-0.106	82.164	0.000
. | . |	. | . |	18	-0.064	-0.030	82.480	0.000
.*| . |	. | . |	19	-0.095	-0.038	83.211	0.000
.*| . |	. | . |	20	-0.106	-0.006	84.163	0.000

Decision: non stationary at Level

LogFDFCT at First Difference
Date: 04/04/16 Time: 08:54
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.001	0.001	7.E-05	0.993
. | . |	. | . |	2	-0.013	-0.013	0.0083	0.996
. | . |	. | . |	3	-0.009	-0.008	0.0118	1.000
. | . |	. | . |	4	-0.013	-0.013	0.0205	1.000
.*| . |	.*| . |	5	-0.068	-0.068	0.2571	0.998
. | . |	. | . |	6	0.072	0.072	0.5249	0.998
***| . |	***| . |	7	-0.425	-0.432	10.255	0.175
. | . |	. | . |	8	0.006	0.030	10.257	0.247
. | . |	. | . |	9	0.032	0.008	10.314	0.326
. | . |	.*| . |	10	-0.055	-0.084	10.489	0.399
. | . |	. | . |	11	-0.030	-0.030	10.545	0.482
. | . |	. | . |	12	0.019	-0.060	10.568	0.566
.*| . |	. | . |	13	-0.098	-0.047	11.190	0.595
. | . |	**| . |	14	-0.035	-0.275	11.270	0.665
. | . |	. | . |	15	0.040	0.053	11.379	0.725
. | . |	. | . |	16	0.003	-0.000	11.379	0.786
. | . |	. | . |	17	0.040	-0.045	11.499	0.829
. | . |	. | . |	18	0.060	0.027	11.775	0.859
.*| . |	.*| . |	19	-0.075	-0.142	12.231	0.876
. | . |	. | . |	20	-0.007	-0.054	12.236	0.908

Decision: Stationary at its First Difference

LogIMPT at level
Date: 04/04/16 Time: 08:58
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |****** |	. |****** |	1	0.842	0.842	33.348	0.000
. |***** |	.*| . |	2	0.688	-0.069	56.190	0.000
. |**** |	.*| . |	3	0.516	-0.157	69.337	0.000
. |** |	.*| . |	4	0.323	-0.189	74.614	0.000
. |*. |	. | . |	5	0.170	-0.000	76.120	0.000
. |*. |	. |*. |	6	0.092	0.155	76.572	0.000
. | . |	.*| . |	7	0.015	-0.079	76.584	0.000
. | . |	. |*. |	8	0.007	0.105	76.587	0.000
. | . |	.*| . |	9	-0.003	-0.081	76.588	0.000
. | . |	.*| . |	10	-0.040	-0.130	76.683	0.000
.*| . |	. | . |	11	-0.076	-0.054	77.038	0.000
.*| . |	. | . |	12	-0.113	-0.020	77.846	0.000
.*| . |	. | . |	13	-0.146	0.053	79.236	0.000
.*| . |	.*| . |	14	-0.177	-0.083	81.345	0.000
.*| . |	. | . |	15	-0.189	-0.002	83.831	0.000
.*| . |	. | . |	16	-0.199	-0.061	86.702	0.000
**| . |	.*| . |	17	-0.213	-0.092	90.099	0.000
**| . |	. | . |	18	-0.224	-0.038	94.019	0.000
**| . |	. | . |	19	-0.239	-0.051	98.637	0.000
**| . |	. | . |	20	-0.255	-0.016	104.11	0.000

Decision: non Stationary at Level

LogIMPT at First Difference
Date: 04/04/16 Time: 09:01
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	-0.005	-0.005	0.0012	0.972
. | . |	. | . |	2	0.021	0.021	0.0227	0.989
. | . |	. | . |	3	0.027	0.027	0.0586	0.996
.*| . |	.*| . |	4	-0.107	-0.107	0.6276	0.960
. | . |	. | . |	5	-0.010	-0.012	0.6326	0.986
. | . |	. | . |	6	0.012	0.016	0.6400	0.996
. | . |	. | . |	7	-0.006	0.001	0.6418	0.999
. | . |	. | . |	8	0.014	0.003	0.6531	1.000
. |*. |	. |*. |	9	0.120	0.119	1.4791	0.997
. | . |	. | . |	10	0.003	0.007	1.4796	0.999
. | . |	. | . |	11	0.007	0.001	1.4828	1.000
. | . |	. | . |	12	-0.023	-0.028	1.5148	1.000
. | . |	. | . |	13	-0.009	0.016	1.5206	1.000
. | . |	. | . |	14	-0.000	0.003	1.5206	1.000
. | . |	. | . |	15	0.004	0.004	1.5220	1.000
. | . |	. | . |	16	0.003	-0.002	1.5227	1.000
. | . |	. | . |	17	-0.010	-0.012	1.5304	1.000
. | . |	. | . |	18	0.005	-0.010	1.5322	1.000
. | . |	. | . |	19	0.012	0.013	1.5447	1.000
. | . |	. | . |	20	-0.014	-0.013	1.5602	1.000

Decision: Stationary at its first Difference

LOGREER at Level
Date: 04/04/16 Time: 09:03
Sample: 2004Q1 2014Q4
Included observations: 44

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. |****** |	. |****** |	1	0.796	0.796	29.821	0.000
. |**** |	.*| . |	2	0.580	-0.146	46.032	0.000
. |*** |	.*| . |	3	0.358	-0.153	52.356	0.000
. |*. |	.*| . |	4	0.142	-0.146	53.370	0.000
. | . |	.*| . |	5	-0.060	-0.146	53.556	0.000
. | . |	. |*** |	6	-0.064	0.371	53.774	0.000
.*| . |	.*| . |	7	-0.069	-0.112	54.035	0.000
.*| . |	.*| . |	8	-0.074	-0.108	54.344	0.000
.*| . |	.*| . |	9	-0.110	-0.197	55.037	0.000
.*| . |	.*| . |	10	-0.146	-0.101	56.313	0.000
.*| . |	. |*. |	11	-0.184	0.199	58.386	0.000
**| . |	.*| . |	12	-0.219	-0.108	61.417	0.000
**| . |	.*| . |	13	-0.266	-0.181	66.049	0.000
**| . |	. | . |	14	-0.254	-0.026	70.405	0.000
**| . |	.*| . |	15	-0.244	-0.093	74.570	0.000
**| . |	. |*. |	16	-0.234	0.103	78.529	0.000
**| . |	.*| . |	17	-0.224	-0.117	82.289	0.000
.*| . |	.*| . |	18	-0.202	-0.153	85.456	0.000
**| . |	. | . |	19	-0.205	-0.051	88.868	0.000
.*| . |	. | . |	20	-0.187	-0.015	91.811	0.000

Decision: Non Stationary at Level

LOGREER at First Difference

Date: 04/04/16 Time: 09:08
Sample: 2004Q1 2014Q4
Included observations: 43

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	0.030	0.030	0.0407	0.840
. | . |	. | . |	2	0.021	0.020	0.0614	0.970
. | . |	. | . |	3	-0.021	-0.022	0.0831	0.994
. | . |	. | . |	4	-0.037	-0.037	0.1524	0.997
****| . |	****| . |	5	-0.493	-0.491	12.509	0.028
. | . |	. | . |	6	-0.005	0.020	12.511	0.051
. | . |	. | . |	7	-0.000	0.019	12.511	0.085
. |*. |	. |*. |	8	0.082	0.086	12.887	0.116
. | . |	. | . |	9	0.004	-0.038	12.887	0.168
. | . |	**| . |	10	0.000	-0.325	12.887	0.230
. | . |	. | . |	11	-0.002	0.012	12.888	0.301
. | . |	. |*. |	12	0.038	0.096	12.979	0.371
.*| . |	.*| . |	13	-0.149	-0.089	14.413	0.345
. | . |	. | . |	14	0.006	-0.036	14.416	0.419
. | . |	**| . |	15	-0.002	-0.234	14.416	0.494
. | . |	. | . |	16	0.001	0.018	14.416	0.568
. | . |	. | . |	17	-0.031	0.074	14.485	0.633
. | . |	.*| . |	18	0.065	-0.070	14.813	0.675
. | . |	. | . |	19	0.000	-0.038	14.813	0.734
. | . |	.*| . |	20	-0.000	-0.183	14.813	0.787

Decision: The variable is stationary at its first difference

Annex 6: The Result of Short run Error correction Model

Explanatory Variables:	D(LOG_CPI)	D(LOGFDFCT)	D(LOG_REER)	D(LOG_VAT)	D(LOG_BRDM)	D(LOGIMPT)
ECOTCPI-1	-0.479097	-0.000590	-6.19E-05	-23.96577	-0.000368	- 3.09E-05
	(0.0102)	(0.0227)	(0.46611)	(0.1058)	(0.2640)	(0.0240)
	[-2.76303]	[-2.41622]	[-0.73931]	[-1.67359]	[-1.14068]	[2.39240]
D(LOG_CPI(-1))	0.494961	0.000106	-5.07E-06	44.77821	0.000449	-4.61E-05
	(0.0511)	(0.7576)	(0.9658)	(0.0338)	(0.3280)	(0.0166)
	[2.04125]	[0.31183]	[-0.04330]	[2.23609]	[0.99619]	[-2.55426]
D(LOG_CPI(-2))	0.207072	-2.71E-05	4.75E-06	41.66948	0.000174	-2.83E-05
	(0.2822)	(0.9194)	(0.9588)	(0.0126)	(0.6231)	(0.0542)
	[1.09738]	[-0.10208]	[0.05215]	[2.67395]	[0.49721]	[-2.01256]
D(LOGFDFCT(-1))	0.455126	-0.416671	0.128959	12700.39	0.360608	0.012067
	(0.1802)	(0.0.0809)	(0.1131)	(0.3543)	(0.2450)	(0.3291)
	[1.37563]	[-1.81372]	[1.63783]	[0.94251]	[1.18854]	[0.99388]
D(LOGFDFCT(-2))	0.067432	-0.074841	0.057355	9166.959	0.059784	0.013994
	(0.4757)	(0.6623)	(0.3322)	(0.3646)	(0.7914)	(0.1298)
	[0.72341]	[-0.44164]	[0.98751]	[0.92225]	[0.26713]	[1.56250]
D(LOG_REER(-1))	0.903643	0.240107	-0.659941	60897.34	-0.452464	-0.052659
	(0.0154)	(0.6734)	(0.0020)	(0.0764)	(0.0312)	(0.8809)
	[2.40951]	[0.42607]	[-3.41685]	[1.84235]	[-0.60795]	[-1.76809]
D(LOG_REER(-2))	0.569717	0.139274	-0.416344	15236.59	1.843924	-0.004912
	(0.0121)	(0.8224)	(0.0583)	(0.6758)	(0.1812)	(0.0020)
	[4.68977]	[0.22672]	[-1.97744]	[0.42285]	[2.27279]	[-0.15129]
D(LOG_VAT(-1))	0.0051101	-1.06E-05	7.98E-07	-0.381285	-1.27E-05	1.27E-06
	(0.0000)	(0.1430)	(0.7425)	(0.3621)	(0.5957)	(0.0690)
	[10.2606]	[-1.50878]	[0.33195]	[-0.92702]	[-1.37235]	[3.41638]
D(LOG_VAT(-2))	0.013417	9.91E-06	1.84E-06	-2.915089	-1.30E-05	1.83E-06
	(0.3107)	(0.5594)	(0.7710)	(0.0113)	(0.0049)	(0.8086)
	[-1.03308]	[0.54176]	[0.29407]	[-2.71793]	[-0.53690]	[1.89418]
D(LOG_BRDM(-1))	0.110879	0.002240	-0.047151	-37426.33	-0.649723	0.002074
	(0.0137)	(0.9890)	(0.3987)	(0.0005)	(0.0363)	(0.5182)
	[5.23791]	[0.01396]	[-0.85744]	[-3.97692]	[-3.06627]	[0.24456]
D(LOG_BRDM(-2))	0.448129	0.141644	0.032010	-22686.63	-0.490119	0.005830
	(0.0213)	(0.4779)	(0.5839)	(0.0297)	(0.2217)	(0.0137)
	[2.44389]	[0.84069]	[0.55432]	[-2.29562]	[-2.20264]	[0.65475]

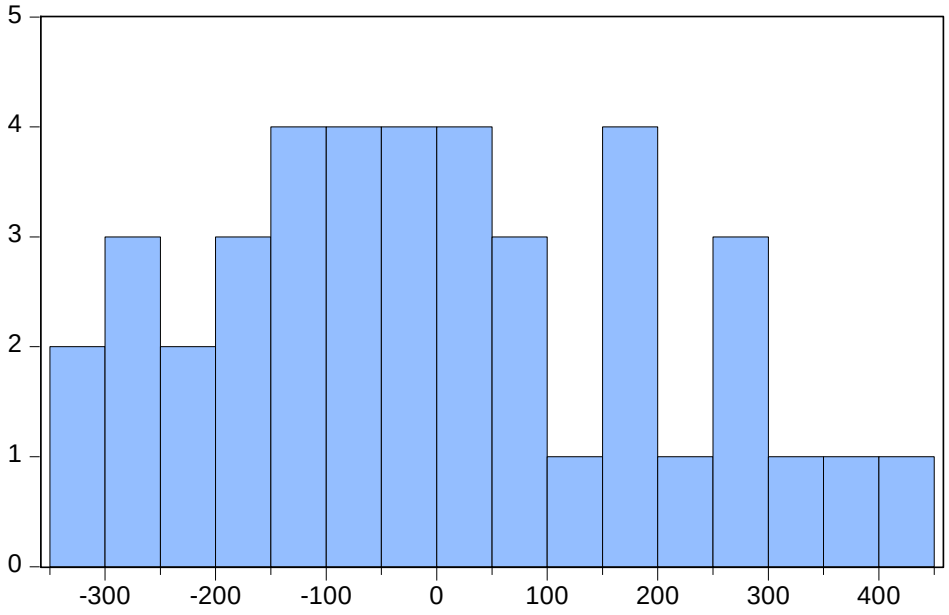
D(LOGIMPT(-1))	0.083851	-3.991811	0.079852	262472.6	5.536158	0.466898
	(0.0024)	(0.2439)	(0.9451)	(0.1929)	(0.8019)	(0.9202)
	[3.35460]	[-1.19129]	[0.06953]	[1.33544]	[1.25101]	[2.63648]
D(LOGIMPT(-2))	0.229548	2.207293	0.789953	-265582.7	-1.046248	-0.016710
	(0.0977)	(0.4663)	(0.4674)	(0.1591)	(0.9437)	(0.1084)
	[1.71555]	[0.70586]	[0.73705]	[-1.44793]	[-0.25334]	[-0.10111]
C	-32.27105	-0.013052	0.051512	-1132.712	-0.005949	0.005549
	(0.4787)	(0.8381)	(0.0248)	(0.07625)	(0.0835)	(0.1184)
	[-0.71842]	[-0.20636]	[2.37638]	[-0.30534]	[-0.07122]	[1.66026]
R-squared	0.87103	0.781131	0.487577	0.681365	0.585464	0.722090
Adj. R-squared	0.803856	0.675749	0.240855	0.527948	0.385873	0.588281
F-statistic	13.44390	7.412413	1.976218	4.441266	2.933317	5.396435
Probablity	0.000031	0.0006	0.65568	0.0005	0.0088	0.0011

Annex 7: Model Diagonistic Tests

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.837950	Prob. F(2,25)	0.4444
Obs*R-squared	2.575806	Prob. Chi-Square(2)	0.27585

Jerque Bera Histogram Normality Test



Series: Residuals
Sample 2004Q4 2014Q4
Observations 41

Mean	1.44e-13
Median	-14.29318
Maximum	423.1040
Minimum	-316.3576
Std. Dev.	198.4857
Skewness	0.278413
Kurtosis	2.238293
Jarque-Bera	1.520849
Probability	0.467468

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.262991	Prob. F(18,22)	0.2982
Obs*R-squared	20.83629	Prob. Chi-Square(18)	0.2878
Scaled explained SS	5.594659	Prob. Chi-Square(18)	0.9976

Correlogram Q -Statistics

Date: 04/19/16 Time: 13:46
Sample: 2004Q4 2014Q4
Included observations: 41

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
. | . |	. | . |	1	-0.029	-0.029	0.0383	0.845
.*| . |	.*| . |	2	-0.171	-0.172	1.3663	0.505
. | . |	.*| . |	3	-0.054	-0.067	1.5011	0.682
**| . |	**| . |	4	-0.217	-0.261	3.7465	0.441
. |*. |	. |*. |	5	0.121	0.082	4.4619	0.485
. |*. |	. | . |	6	0.088	0.002	4.8524	0.563
. | . |	. | . |	7	-0.001	0.018	4.8525	0.678
. | . |	.*| . |	8	-0.051	-0.084	4.9923	0.758
. |*. |	. |** |	9	0.180	0.262	6.7846	0.660
. | . |	. |*. |	10	0.065	0.076	7.0238	0.723
.*| . |	. | . |	11	-0.104	-0.025	7.6558	0.744
.*| . |	.*| . |	12	-0.085	-0.095	8.0982	0.777
**| . |	.*| . |	13	-0.221	-0.157	11.181	0.596
. | . |	.*| . |	14	-0.045	-0.146	11.315	0.661
. | . |	.*| . |	15	0.059	-0.138	11.550	0.713
. | . |	.*| . |	16	-0.001	-0.137	11.550	0.774
. |*. |	. |*. |	17	0.134	0.082	12.877	0.744
.*| . |	.*| . |	18	-0.066	-0.097	13.212	0.779
.*| . |	.*| . |	19	-0.148	-0.131	14.961	0.725
. | . |	.*| . |	20	-0.050	-0.073	15.171	0.767

Annex 8 :Pairwise Granger Causality Test results

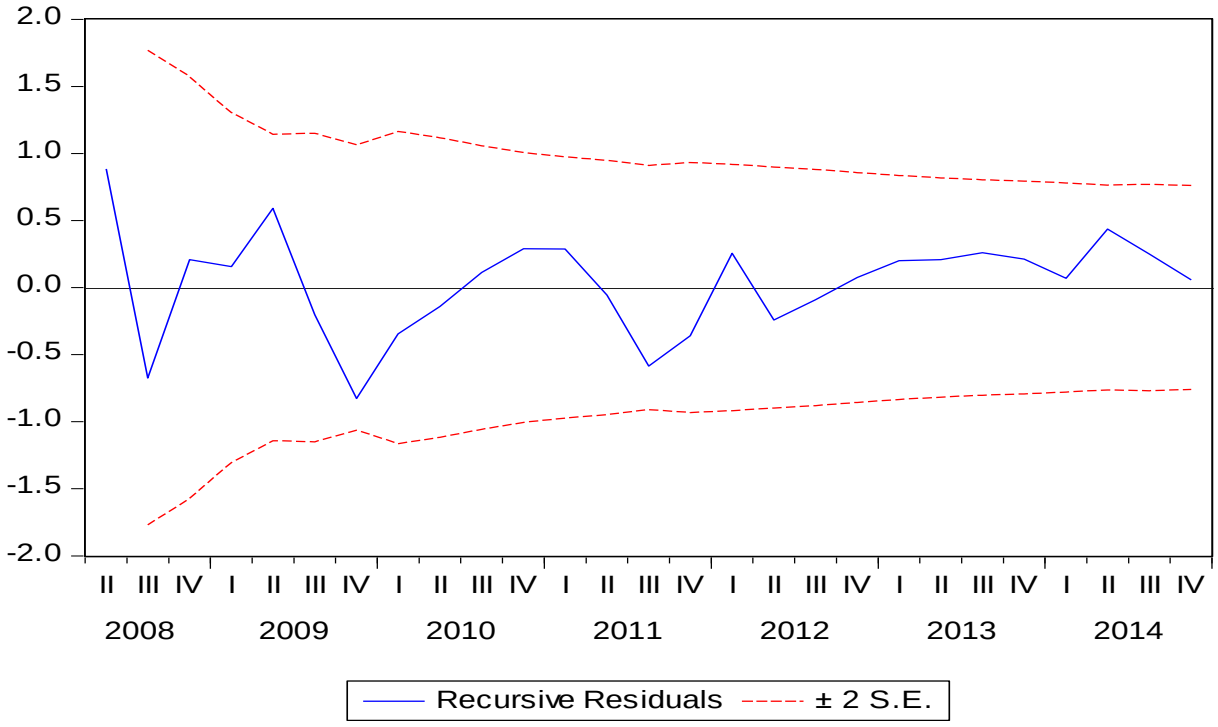
Pairwise Granger Causality Tests
Date: 04/24/16 Time: 10:10
Sample: 2004Q1 2014Q4
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG_FDFCT does not Granger Cause LOG_CPI	42	2.82561	0.0021
LOG_CPI does not Granger Cause LOG_FDFCT		0.25646	0.7751
LOG_REER does not Granger Cause LOG_CPI	42	1.72378	0.1924
LOG_CPI does not Granger Cause LOG_REER		1.78787	0.1815
LOG_VAT does not Granger Cause LOG_CPI	42	7.17168	0.0023
LOG_CPI does not Granger Cause LOG_VAT		1.43178	0.2518
LOGBRDM does not Granger Cause LOG_CPI	42	5.75132	0.0074
LOG_CPI does not Granger Cause LOGBRDM		7.32657	0.0021
LOGIMPT does not Granger Cause LOG_CPI	42	7. 32657	0.0021
LOG_CPI does not Granger Cause LOGIMPT		0.69099	0.5074
LOG_REER does not Granger Cause LOG_FDFCT	42	1.82347	0.1757
LOG_FDFCT does not Granger Cause LOG_REER		1.05693	0.3578
LOG_VAT does not Granger Cause LOG_FDFCT	42	0.32619	0.7237
LOG_FDFCT does not Granger Cause LOG_VAT		0.03980	0.9610
LOGBRDM does not Granger Cause LOG_FDFCT	42	0.77634	0.4674
LOG_FDFCT does not Granger Cause LOGBRDM		0.18719	0.8301
LOGIMPT does not Granger Cause LOG_FDFCT	42	0.21291	0.8092
LOG_FDFCT does not Granger Cause LOGIMPT		2.92532	0.0661
LOG_VAT does not Granger Cause LOG_REER	42	5.73738	0.0068
LOG_REER does not Granger Cause LOG_VAT		0.01733	0.9828
LOGBRDM does not Granger Cause LOG_REER	42	0.88267	0.4222
LOG_REER does not Granger Cause LOGBRDM		2.46304	0.0990
LOGIMPT does not Granger Cause LOG_REER	42	1.56662	0.2223
LOG_REER does not Granger Cause LOGIMPT		0.28980	0.7501
LOGBRDM does not Granger Cause LOG_VAT	42	2.46622	0.0988
LOG_VAT does not Granger Cause LOGBRDM		6.75006	0.0032
LOGIMPT does not Granger Cause LOG_VAT	42	0.56161	0.5751

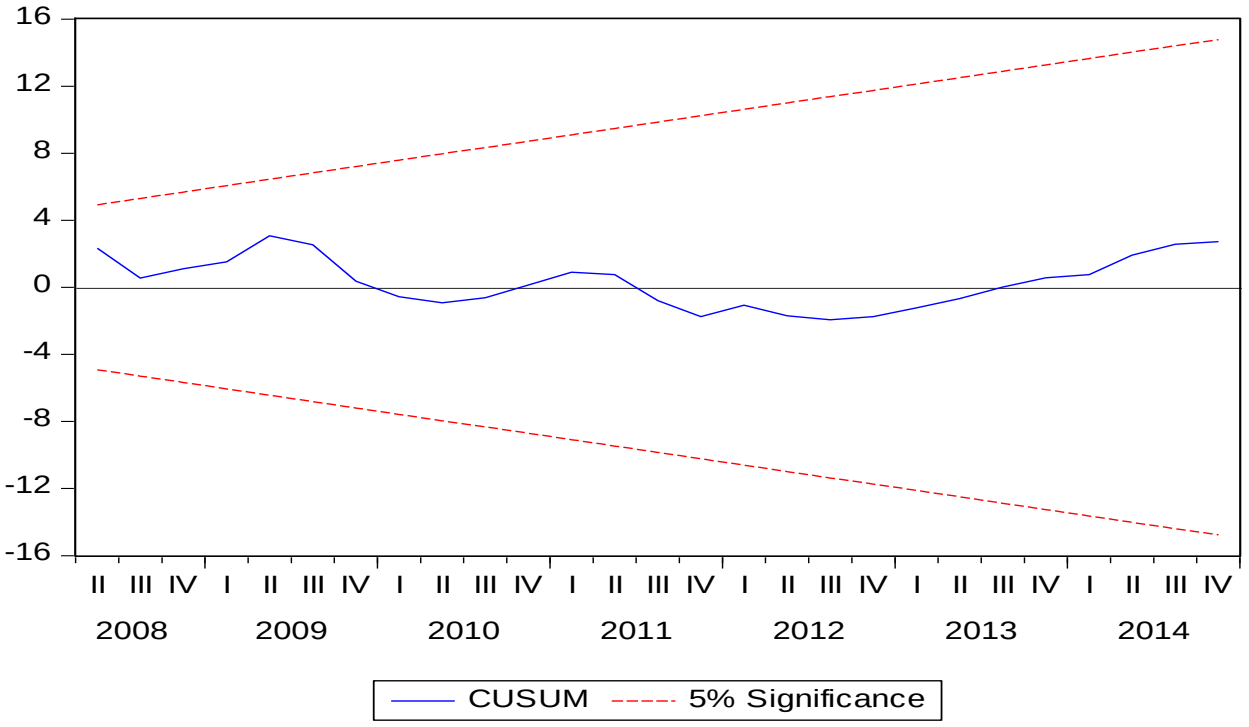
LOG_VAT does not Granger Cause LOGIMPT		1.18190	0.3180
LOGIMPT does not Granger Cause LOGBRDM	42	7.66016	0.0016
LOGBRDM does not Granger Cause LOGIMPT		0.04398	0.9570

Annex 9: Model stablity diagonistic (one step recursive plot, CUSUM and CUSUM of square)

A) One step recursive residual



B) CUSUM (Cummulative Sum)



C) CUSUM (Cummulative Sum) of squares