

**DEVELOPMENT PLANNING AND MACROECONOMIC POLICY
INTEGRATION: A STUDY OF ERITREA**

BY

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DEDICATION

This dissertation is dedicated to my beloved wife Okuba Russom and our children whose encouragement, tolerance and perseverance saw me through this my academic life.

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DECLARATION

I hereby declare that the work presented in this dissertation is original. Where material from different sources has been used due acknowledgement is made. This dissertation has not been submitted to any other University for the purpose of award of a degree.



Welday, G. Abraham

TABLE OF CONTENTS

Dedication	ii
Acknowledgement	iii
Declaration	iv
Table of content	v
List of Figures	viii
List of Tables	ix
Appendix	x
Abstract	xi
CHAPTER ONE GENERAL INTRODUCTION	1
1.1 Introduction	1
1.2 Objective of the Study	4
1.3 Data and Methodology	5
1.4 Organization of the Study	6
1.5 Scope and Limitation of the study	7
CHAPTER TWO THEORETICAL FRAMEWORK	8
2.1 Introduction	8
2.2 Development Planning in Developing Countries	11
2.3 Market versus State Intervention	13
2.4 Empirical Evidence from East and Southeast Asian Countries	15
2.5 Models of Development Planning	17
2.5.1 Agriculture versus industrialization	17
2.5.2 Balanced versus unbalanced growth	19
2.5.2.1 Balanced growth	19
2.5.2.2 Unbalanced growth	21
2.5.3 The Harrod-Domar model for planning	22
2.5.4 The Cobb-Douglas production function model	25

2.6 Macroeconomic Policy and Planning	26
2.6.1 Fiscal policy	29
2.6.2 Monetary policy	30
2.6.3 Saving and investment planning	32
CHAPTER THREE ECONOMIC PERSPECTIVE AND SECTORAL	
CONTRIBUTION TO GDP OF ERITREA	36
3.1 Economic Background	36
3.2 Sectoral Assessment of the Eritrean Economy	39
3.2.1 Agricultural sector	41
3.2.2 Industrial sector	46
3.2.3 Service sector	50
3.3 Economic Growth in Eritrea	54
3.4 Relative Percentage Sectoral Contributions to GDP	55
CHAPTER FOUR MACROECONOMIC POLICY IN ERITREA	59
4.1 Introduction	59
4.2 Fiscal Policy in Eritrea	61
4.2.1 Public Expenditure	62
4.2.2 Taxation as a policy instrument in Eritrea	66
4.3 Balance of Payments Management and its Impacts	68
4.3.1 Deficit financing in Eritrea	69
4.3.2 The two gap models	72
4.3.2.1 Import-export gap	73
4.3.2.2 Investment-saving gap	74
4.4 Monetary Policy in Eritrea	76
4.5 Exchanging rate policy in Eritrea	80
4.6 Inflation Rate Trend in Eritrea	81
CHAPTER FIVE FRAMEWORK OF ANALYSIS	82
5.1 Introduction	82

5.2 Economic Growth Models	84
5.2.1 Sectoral contribution to GDP	84
5.2.2 The production function approach to economic growth	86
5.3 Macroeconomic Model Specifications	88
5.3.1 Government expenditure and government revenue	88
5.3.2 Government revenue and economic growth	92
5.3.3 Government expenditure and economic growth	94
5.3.4 Export growth and economic growth	96
5.4 Aggregate Demand Models	98
5.4.1 Partial adjustment model of government expenditure and revenue	98
5.4.2 Partial adjustment model of government revenue and GDP growth	99
5.4.3 Private consumption expenditure	100
5.4.4 Investment expenditure growth	101
5.4.5 Import demand growth	101
CHAPTER SIX RESULTS AND DISCUSSION	102
6.1 Introduction	102
6.2 Sectoral Contribution to GDP	103
6.3 Production Function Approach to Economic Growth	105
6.4 Aggregate Demand Analysis	109
6.4.1 Government revenue and government expenditure	109
6.4.2 Economic growth and government revenue	115
6.4.3 Government expenditure and economic growth	120
6.4.4 Export growth and economic growth	123
6.5 Private Consumption Expenditure	126
6.6 Investment Expenditure Growth	127
6.7 Import Demand and Economic Growth	130
CHAPTER SEVEN CONCLUSION AND RECOMMENDATION	132
REFERENCES	136
APPENDICES	143

LIST OF FIGURES

Figure 3.4.1. Percentage Sectoral Contribution to GDP of Eritrea (1992-2001)	57
Figure 4.3.1.1 Total Expenditure, Revenue, GDP and Deficit Patterns of Eritrea	72
Figure 4.4.1 Change in Money Supply versus Reserve Requirement and Domestic Credit Creation	79

LIST OF TABLES

Table 3.2.3.1 Economic Growth and Sectoral Growth Rate Trends of Eritrea	55
Table 4.3.2.2 Investment-Saving and Import - Export gaps of Eritrea	75

APPENDIX

Appendix i	Gross Domestic Product of Eritrea by Industrial Origin (1992-2002) at 1992 Constant Factor cost	143
Appendix ii	Summary of Government Expenditure and its Financing (1992-2002)	144
Appendix iii	Government Account Summary in Nominal and Real Time series data (1992-2002)	145
Appendix iv	Summary of Output, Capital, and Labor (1992-2002)	146
Appendix v	Summary of Aggregate Demand Expenditure (1992-2002)	147

ABSTRACT

The purpose of this paper was to assess the integration of development planning and macroeconomic policy in Eritrea. In the first section of the paper, assessment of output and sectoral contribution to GDP of the major sectors is carried out and it is found that output growth in Eritrea is mainly influenced by agricultural output variations. Furthermore, economic growth is analyzed based on unconstrained production function approach and the results indicated that economic growth is impeded due to scarcity of capital input. Similar investigation based on constrained production function indicated also that capital labor ratio has significant effect on output labor ratio.

In the next section, macroeconomic investigation using regression analysis is conducted. However, since most macroeconomic time series data on the level forms are non-stationary, ADF tests of stationarity are done. In addition, causation and cointegration tests are carried out to find the correct structure of the variables. Results from ADF statistic test indicated that all the time series data of the macroeconomic variables are found to be non-stationary. Furthermore, the Granger causal test indicated that government revenue causes government expenditure; economic growth Granger causes government expenditure and government revenue, while the analysis result of export growth versus economic growth indicated that causal relationship between the two variables is ambiguous. Moreover, although the time series data of most of the variables were found to be non stationary, the result indicated that they are cointegrated and this implies that they have long run linear relationships. Furthermore, regression analysis of consumption expenditure, investment expenditure and import demand on real income and other variables has been carried out. The results indicated that real income has significant coefficient estimators with respect to all the dependent variables used in the analyses.

Finally, the overall assessment indicated that development planning so far in Eritrea is a projection of simple growth models that does no account for many policy instruments, while macroeconomic policies are limited to manage all economic sectors. Moreover, the regression analyses indicated that lower growth rate is dictated more due to structural and institutional rigidity rather than complicated fiscal and monetary policies variability in Eritrea. Hence, it is very difficult to conclude that development planning and macroeconomic policy are integrated in Eritrea under such conditions.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Introduction

Almost all countries regardless of their policies have their own development plans and it is a way by which governments set out their objectives in order to achieve specific targets.

Economic planning is a deliberate government attempt to coordinate economic decision making over the long run and to influence, direct and in some cases, even control the level and growth of nations' principal economic variables. These variables could be income per capita, consumption level, employment rate, investment target, saving rate, export growth, and import volumes. Furthermore, models are required to show interrelationships among these different economic variables that indicate general structure of the economy and the constraints (capital, labor, and foreign resources) that should be overcome to realize the objective function (Todaro, 2000).

Macro econometric equations are now popular in planning exercises for LDCs. One way to demonstrate the application of such models is to use a simple Keynesian framework of analysis with more applicable dynamic model like that of Klein where public policy plays a significant role (Ghatak, 1986). Roemer and Stern (1981) also clarified that fiscal policy and development planning are tightly linked in numerous ways. They added that the first development plans of many countries were, to a great extent fiscal plans with some macroeconomic analysis grafted on them. Even today, when macroeconomic forecasting is at the root of national planning, the bulk of most development plans refers to government expenditure.

Perhaps the greatest shortcoming in planning to date has not been internal inconsistency, infeasibility or sub optimality of the plans per se, but rather the failure to link planning goals with practical and specific policy instruments, the utilization of which would ensure fulfilment of the planning goals (Nugent and Yotopoulos, 1976).

Ghatak (1986) also emphasized that economic planning has become one of the main instruments of achieving of a higher growth rate and better standard of living in many LDCs and it is a broad concept that goes beyond economic growth and seeks to promote significant economic and social structural changes through public intervention.

Furthermore, World Bank (1999) emphasised that integrated policy, planning and budgeting is fundamental in having expenditure programs that are driven by policy priorities and disciplined realities. Failure to link policy and planning may be a serious problem and mostly is reflected on poor budget outcomes and macro strategies at the operational level in many developing countries. Moreover, resource allocation in these countries is plagued by uncertainties. These uncertainties usually emanate from making optimistic revenue projections or unattainable planned activities while they are constrained by many factor inputs in one hand, or due to mismatch between policy decisions and available resources on the other hand. Thus, in the preparation and implementation of medium or long-term structure, an integrated bottom up or tops down strategic planning process are required. These, in turn, involve developing macroeconomic models that would be used to make projections of revenues and expenditures and assist in identifying problems by checking the internal consistency of proposals and generating accurate forecasts.

As is explained by D'Angelo (1989), the appropriate policy mix required to improve the macroeconomic management for African countries is not only to attain stabilization targets (such as, decline of external balance, curtailment of fiscal deficit, and control of inflation) but also to promote economic recovery in the long run. In addition, it is required to spell out the sectoral and social levels as complements to macroeconomic policies identified to stimulate growth and development. Furthermore, Sagasti (1988) emphasized that the implementation of development plan entails linking short term global, sectoral and regional plans to budgetary process associating medium term plan with the evaluation of investment projects, and lastly ensuring the commitment of political authorities to the development objectives specified in the long term plans.

These being some of the characteristics of development planning and policy integration of developing countries, it would be important to assess the relationship between aggregate demand

variables and macroeconomic policy of Eritrea in the past twelve independent years so that relevant development strategy and macroeconomic policy linkages would be identified.

Eritrea has got its independence in 1991 and a provisional government was assumed in power immediately to direct the country. This government inherited a centrally administered and controlled socialist economic system with totally devastated infrastructure, nearly demolished small and medium scale industries, with limited in urban and almost none in the rural areas of social services. These economic characteristics of the country necessitated great government intervention. Hence, the immediate task of the government was to structure the economic, social and political sectors and delegate the duty and responsibility for each ministry or sector on one hand, and on the other hand to rehabilitate the deteriorated infrastructure of the country. Thus, the need for development planning to manage its outlays and revenues properly as well as seeking for devices that are used as principal guide was important. Therefore, its first macroeconomic policy was embarked in 1994 and is used as basic guideline in formulating sectoral policies in the government sector and defines the role of the private sector in the economy.

However, development planning exercise is not common in Eritrea until recent time due to many factors. Two main problems are cited for the inability to prepare development planning and linking it to macroeconomic policies. First, as Eritrea is a newly re-emerging state and started from scratch, lacks the necessary inputs mainly skilled labor and institutional capacity. Second, Eritrean economy has been influenced by many internal shocks such as recurring drought and war in the past five years. Hence, under such conditions, plausible development planning and efficient resource allocation based on regular fiscal and monetary instruments could not be prepared appropriately. Nevertheless, line ministries prepare annual budgets, even though it was not processed regularly until recent times.

Moreover, Wai (1980) also emphasized that, if an economy is still dominated by small –scale subsistence agriculture, a limited financial market and little or no inter-industrial relations, then detailed quantitative planning can have little applicability. Market forces as well have no considerable contribution to the revitalization of such economy. It would probably be more appropriate to concentrate on individual social overhead public investments aimed at creating the

necessary conditions to initiate economic transformation and in case of most small economies possibilities of export expansion may be more important at this early stage.

Nevertheless, demand aggregates such as government expenditure and taxation have been relatively easy to maneuver using fiscal policy in Eritrea. However, monetary instruments have been very far to address macroeconomic problems for the young age of the National Bank of Eritrea and limited financial and exchange markets of the country.

In the past ten years, the Eritrean economy has grown on average by about 5.1 percent (IMF Country Report, 2003). Nevertheless, economic growth has been more aligned with agriculture than with other sectors and thus was fluctuating with the recurring drought. Government expenditure was also increasing with greater proportion than government revenue and led to continuous budget deficits. Private and public consumptions were rising, while domestic savings was tapered and resulted in low domestic investments. The percentage of imports to GDP also increased continuously with the need for machinery and input materials, while the contribution of exports to GDP was deteriorating and left series current account deficits. The border war also contributed to high government expenditure, which resulted in unexpected soaring budget deficits and spiking inflation rates. Thus, the preparation of development planning and integrate it with macroeconomic policy would help to address the above problems, and to predict the desired targets of economic growth and macroeconomic aggregates through the manipulation of policies. Further more, development planning would help to develop models that explain the correlation and causation of the variables that are employed to predict targets reasonably and integrate policies appropriately.

1.2 Objectives of the Study

This study is about development planning and macroeconomic integration in Eritrea and its main Objectives are: -.

- to assess the influence of development planning on the trend of economic growth and aggregate demand conditions and its integration with macroeconomic policies.
- To evaluate the percentage sectoral contribution of agriculture, industrial, and service sectors to GDP under different policy environments at national levels.

- to suggest a methodology for approaching the existing development planning and macro economic policy linkage of Eritrea.

1.3 Data and Methodology

The analytical approach adopted in this study is based on simple ordinary least square regression of the aggregate demand approach and production function approach to economic growth. Under the production function approach, unconstrained and constrained neoclassical production functions are used to analyze economic growth with factor inputs of labor and capital.

There have been a variety of proposed methods of using stationary tests and each has been widely used in the applied economics literature. However, there is now growing consensus that stationary test procedure due to Dickey and Fuller has superior small sample properties compared to its alternatives. Thus, in the analysis of aggregate demand approach, first, Augmented Dickey-Fuller (ADF) test for the stationarity of the time series data, Granger causality on the pair of variables, and cointegration test of the variables is carried out. Once these tests are conducted, simple regression of government expenditure on government revenue, government expenditure on economic growth, export growth on economic growth, and government revenue on economic growth are carried out to know their significance and trace out the policy implication from the constructed relationships. Furthermore, partial adjustment model is used to determine the long run desired expenditure and desired government revenue. Finally, private consumption, investment expenditure and import demand are analysed based on macroeconomic models for adjustment in developing countries.

The annual time series data used in this research are for the years 1992 through 2002 provided by the Ministry of Finance State of Eritrea Summary 2003, publications such as IMF Country Report for Eritrea 2003, African Development indicators 2001 extracted from World Bank, and National Bank of Eritrea Summary 2003. Both nominal and real data are used in the analysis where, real data are calculated from GDP deflator used at constant of 1992 values. All the data are expressed in millions of nakfa unless otherwise specified.

1.4 Organization of the Study

We will see that, the analysis of aggregate percentage sectoral contribution to GDP shows that economic growth in Eritrea is more dependent on agriculture. Alternatively, the aggregate production function analysis, using capital and labor inputs, also shows that economic growth has been more sensitive to capital. Furthermore, the analysis indicates that the low rate of saving of Eritrea could not boost domestic investment. Thus, economic growth has been impeded due to lack of sufficient investment mobilization. However, public and private savings dependent on growth of output, which in turn implies investment depends on economic growth. Therefore, there is a linkage between low economic growth and low agricultural output and low agricultural output is associated in turn with scarcity in capital investment. Thus, more capital investment in agriculture is demanded to increase economic growth in Eritrea. Hence, the over all implication is that policies should be drawn to improve the productivity of the inputs employed in the sectors to increase economic growth.

In the assessment of demand management, graphical observation showed that an increase in economic growth is associated with large government expenditure while government revenue was not changing over the sample period. However, unlike the expectation and contrary to the Keynesian approach, but consistent with Wagner's law economic growth- expenditure growth approach, Granger causality analysis indicated that huge government expenditure did not cause economic growth in Eritrea, rather the rise in economic growth induced higher government expenditure. This implies that government expenditure prediction should be based on economic growth targets. Similarly, the analysis of revenue versus economic growth indicated that an increase in economic growth led to higher revenue collection. This in turn indicated that, given the impact of interest rate and demand for money constant, lower tax collection at the present implies higher private saving, and if what is saved is invested output will rise and then more tax would be collected in the future.

Moreover, development literature took the relationship between export led growth and economic growth- driven export as one approach to differentiate between balanced versus unbalanced growth development strategies. Export led growth development strategy is deemed to prevail unbalanced growth, while economic growth driven export development strategy reflects balanced growth. Based

on this argument, the analysis of the causation and cointegration tests has been done between export growth and economic growth of Eritrea. Because of the embarked macroeconomic policy and the small size of the country, export promotion growth was expected to prevail from the analysis of the time series of the two variables. However, contrary to the expectation, the result indicated ambiguous causality and insignificant regression relationships between the two variables.

Finally, the paper is arranged in the following sequences. In this first chapter, the introductory part that includes the statement of the problem, objective, methodology, organization, and scope and limitation of the study are explained. In chapter two, theoretical review of development plan and its relation with macroeconomic variables is assessed. In chapter three, Eritrean economic background and its percentage sectoral contribution to GDP are explained. In chapter four, macro economic policy and planning of Eritrea is investigated. In chapter five, the framework analysis of aggregate macroeconomic models is specified. In chapter six, results and discussion of the related data is carried out. Finally, in chapter seven, conclusion and recommendation are given.

1.5 Scope and Limitations of the Study

The aim of this paper is to analyse the integration of development planning and macroeconomic policy in Eritrea. Development planning exercise at sectoral level has been very limited due to many constraints and short duration of independence. It is also very difficult to trace out the impacts of macroeconomic policies on each sector at ministerial level in Eritrea since there are not well-organized institutions and instrument, which enables to manage these policies. Thus, the study tries to focus at national level in both development planning and macroeconomic policies assessments.

Two limitations are recognized in this study. First, as in many other developing countries, it has been very difficult to get recorded relevant and organized data such as quarterly data of GDP, labor employment records, world export as well as import prices in Eritrea. Secondly, as Eritrea has got only twelve years from its independence, yearly data are relatively small to use them on regression analysis. Hence, it has been tried to minimize the number of explanatory variables in most of the regression analysis to maintain the degree of freedom. Thus, conclusions taken under these analyses should be taken with the above cautions.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.1 Introduction

Nowadays, almost all countries, whatever their political ideology, publish development plans and it is an ideal way of a government to set-up its development objectives and demonstrate initiatives in tackling the countries development problems (Thirwall, 1999). To achieve these objectives countries would follow different economic policies depending on resource availabilities and organizational structures. There have been three commonly recognized systems employed in the analysis of economic policy framework attributed to all countries in the world namely; market-oriented system, planned system, and a combination of both systems known as mixed economic system. These systems might differ one from another on how those countries pursue these policies in the process of production, distribution, consumption, and exchange of goods and services as well as on the magnitude of control and ownership of the public and private properties of the respective country.

Planning, as a component of resource allocation, goes back many decades when people started to arrange and prioritise their activities with expectations of desired results in the future. Starting from the Second World War, however, planning got strong emphasis and many countries took it as a means as well as an end to their problems. This came mainly with the expansion of socialist economic system, when the state has got an upper hand on steering the internal feeling of the people towards centrally planned economy.

Sagasti (1988), for instance, emphasised that the roots of the current approaches to development planning extend back at least to the late 1940s and early 1950s and had been accepted as an important policy instrument to attain specific targets in practice in most developing countries since 1960s. However, the concept of development planning has got now a wider version and tries to cover not only aspects of economic growth but also the social and institutional changes of the economy at large.

Basically, centralized national planning was widely believed to offer the essential and the only institutional and organizational activity to overcome all obstacles to development. It was also accepted to be the best policy to ensure a sustained high rate of economic growth, and therefore became a way of life in government ministries of less developed nations. Thus, every five years or so, the latest development plan was paraded with the greatest fanfare by those countries (Todaro, 1992). With this idea of full government intervention, detailed inter-sectoral and sectoral linkages of development planning were required to reach at specific target outputs or other objectives.

Nevertheless, development planning plays also a central role in directing the economic progress of market-oriented economies. Planning in such economies may not be very detailed and comprehensive rather is indicative, and mainly focuses on analysis of past trends and projection of future aggregate economic variables with most micro economic interactions not reflected in the planning document. Moreover, unlike administered prices of centrally planned economy, forces of demand and supply in the goods and services, markets determine microeconomic transactions.

Nowadays, however, these resource allocation decision- makings swayed from the centrally planned to the market oriented mechanism. This move has been attributed to many reasons some of which lied on the dissatisfaction of excessively government intervention in the whole economic decision making, which resulted in lower rate of economic growth, high inflation rates, and balance of payment problems experienced by numerous developing countries during the 1970s and 1980s (World Bank, 1997).

Moreover, development planning, as it is a proposed activity with anticipated result, is not sufficient by it-self to bring the intended objectives, rather there must be an instrument that would help in controlling and evaluating the implementation of the plan itself. Macroeconomic policies are the major instruments, which are used to direct development planning. In most countries, development planning targets mainly are economic growth rate, decreasing inflation rate, decreasing unemployment rate, increasing or decreasing consumption rate, and increasing saving rate. Policy instruments in turn influence these targets. According the neoclassical approach, for example, national output or growth rate is mainly determined by the availability of labor and capital in a given

country, but wage and interest rate policies play great roles to influence the availability of these inputs.

In well-prepared development plans, objectives and targets are reasonably and feasibly drawn and the most important variables are carefully identified and included in the final plan document. According to Wai (1980), development planning targets and objectives in developing countries should be able to check that:

- the level of output targeted will release sufficient resources to absorb not only the consumption and investment demand of the government and private sectors but also enough for the projected increase in the quantity of exports.
- the amount of bank credit allocated to the government sector is sufficient to finance the residual government budget deficit.
- the level of investment is reasonably divided between government and private sectors as well as the allocation of bank credit.
- the total level of bank credit is consistent with total aggregate demand projected in the presence of credit rationing.
- the excess aggregate demand projected is consistent with the price projections, that is, the difference between nominal aggregate demand and output plus imports at previous years' prices
- the quantity and volume of imports are consistent with both the output projection and the money income projections.
- the level of money supply implied from the credit projection and the overall deficit in the balance of payments are consistent with some demand for money function.
- the export and import price projection and any other exogenous balance of payment item such as official capital movements are realistic.

As is explained by Wai the nature and characteristics of development planning may vary among countries relative to how the above-mentioned variables are integrated in the formulation of development plan. Some countries might have the institutional set-ups to accommodate and influence the desired targets better than other countries through policy instruments.

Thus policy instruments have both qualitative and quantitative nature and they are linked through certain financial relationships to target variables and that is how economic policy is made effective.

2.2 Development Planning in Developing Countries

Development planning has been defined as deliberate government attempt to coordinate economic decision making over the long run and to influence, direct and in some cases even control the level and growth of nation's principal economic variables to achieve predetermined set of development objectives (Todaro, 2000). Sagasti (1988) also explained national development planning as anticipatory decision-making process concerned with guiding social changes, generating a sequence of desirable events and referring to the future evolution of a country with deriving present-day decisions from them.

Given the scarce resources in relation to development needs, the important issue in developing countries is then, the division of these resources among the competing ends. Furthermore, since these countries are mostly constrained due to imported equipments, the focal point is thus how to maximize output with available domestic resources and minimize the use of foreign exchange (Thirwall, 1999).

As explained by Todaro (2000), developing countries are characterized by low level of living, low level of productivity, high rate of population growth rate and dependency burden, high and rising level of unemployment, significant dependency on agricultural production and primary-product exports and dominantly dependent and vulnerability to international relation. Thus, these countries are challenged due to these to draw appropriate economic policies in order to solve their problems.

For example, if an economy is still dominated by small –scale subsistence agriculture, a limited financial market and little or no inter-industrial relations, then detailed quantitative planning can have little applicability. Market forces as well have no considerable contribution to the revitalization of such economy. It would probably be more appropriate to concentrate on social overhead public investment projects aimed at creating necessary conditions to initiate economic transformation and in

case of most small economies possibilities of export expansion may be more important at this early stage (Wai, 1980).

Another concerning issue is the institutional structure of the economy and the relative roles played by public and private sectors in the development process. When private sector is not very influential and is expected to play a relatively passive role, public sector is expected to provide the initial stimulus and continue overall direction. Thus public investment and government financing would play the needed role. On the contrary, if the private sector is wellorganized and plays a major role in the economic activity, then it would be better for planning to focus on the creation of favourable conditions so that private activities flourish. In this condition the state and the private sector would be complementary to each other rather than one crowded-out or crowded-in the other.

The availability of input resources would be also a decisive factor to forecast and formulate a sound development plan. In most developing countries, African countries in particular, scarcity of capital and foreign exchange is the principal bottleneck. This is either due to weak financial markets or limited capital inflow due to unfavourable investment environments, and/or their minimal export share in the world commodity and factor markets that would have contributed to their foreign exchange reserve.

Therefore, the quality of development plan should be tested mainly by examining what is achieved against what is proposed under each target plan of action. The trend towards putting more figures in development plan has unfortunately tended to obscure the fact. In development planning, basically, what matters is policy rather than figures. It is possible to write a good development plan by referring to empirical evidence and concentrating on policies that stimulate an upward movement of the economy. On the other hand it would be absurd to rely only on best policies without any plan. Good policies help but could not ensure success. Furthermore, the integration of development planning and macroeconomic policy could also be influenced by the degree of economic control. Thus, the analysis of market versus state intervention would add an impetus to our better understanding of the linkages.

2. 3 Market versus State Intervention

The concept of development planning most of the time is related with government intervention in economic decisions. Thus, the debate about market versus government failures would give an image of how development plan is conceived under different structures and economic theories.

The argument of market versus state intervention has been a debate since Adam Smith's invisible hand theory. In the classical view, market works perfectly and optimally in the absence of any government intervention and if there is any disequilibria it would be temporary because the forces of demand and supply would adjust this equilibrium through automatic prices' fluctuations.

Classical economists argue that market system has a remarkable power in raising living standards, if only government refrain from interfering with economic machine and problems are seen not as a result of unfettered free enterprise, but rather from the inevitable outcomes of inappropriate and unnecessary government intervention and competition is the most effective form of consumer protection. Weiss (1995) also noted that in many context markets are very effective means of transmitting of information and allocating resources between producers and goods between consumers. Nonetheless, only in an idealized development, markets are competitive and could be confident that market based solution will be optimal, albeit its income distribution.

However the classical free market argument was challenged after the First World War in the early of 1930s when the market economies had been exposed to world recession and severe unemployment. Keynes was one of the prominent economists who recommended government intervention to correct the business cycle through government expenditure without departing completely from the market orientation. On the other hand, Todaro (2000) emphasises that market failure in LDCs is due to badly organized commodity and factor markets and the existence of distorted prices often that producers and consumers are responding to economic signals and incentives that are poor reflections of the real cost to the society.

In general, market failure emanates from the incompetency of the market itself in allocative and productive efficiency. Market failure in allocative efficiency implies that when the forces of demand and supply do not allow efficient distribution of productive resources among alternative uses so as to produce the optimal mix of output. On the other hand, market failure in productive efficiency refers to the market situation where the society is not able to obtain the maximum possible outputs from the given scarce inputs. Thus, market failure is a situation where the market system produces an allocation of resources which is not Pareto-efficient and marginal social benefit are not equal to marginal social cost from the private goods.

Government failure is better understood from identification of the role it plays in the economy. There are different arguments as to the role of the state. The minimum functions could be summarized as to provide pure public goods and protect the poor, to address externalities, regulate monopoly, and overcome imperfect information. Thus government failure implies when the state fails to commit itself to the above minimum functions.

Todaro (2000), Thirwall (1999), Wallis and Dollery (1999), and O'Dowd (1978) summarized in short the causes of market failure as; the existence of monopoly and oligopoly, the existence of positive or negative externalities, asymmetric information, and government taxation. They also summarized the causes of government failure briefly as: government may increase risk by pointing every one in the same direction thus government could make bigger mistake than markets; government may be more rigid and inflexible than private decision-making; since complex decision-making machinery may be involved in government; government may be incapable to administer detailed plans; government control may prevent private sector initiatives if there are many bureaucratic obstacles; and controls create resource-using activities to influence those controls through lobbying and corruption often called rent-seeking or unproductive activities.

The need for government intervention basically emanates from market failure to comply with its principles. The emphasis on market-oriented policies, in turn, is recommended because governments fail in allocating resources optimally. However, the arguments about government versus markets, as they relate to policies of LDCs, seemed to shift against the former, with major implication for the design of policy strategies. Nevertheless, shifting to market oriented policies does not mean reducing

the relative role of the state and even if development plan is related with government instrument. Thus, it would be misleading to conclude that failure of development planning is synonymous with government failure. The consequence of the perceived reduced role of the state in the early of 1990s left most developing countries that were following the former Soviet Union model, to a more fundamental crisis. Development projects were interrupted and in some cases completely neglected. Hence the role of the state would have to be re-visited in the literature (World bank, 1997).

The pros and cons of market versus government should, however, be examined in comparison with different economic circumstances of countries. Because the role of the state might not be the same in all countries as they differ in their socio-economic structures, policy objectives, past practices, the supply of private entrepreneurship, and the absorptive capacity of the state it self.

Killick (1989) gave a statement of resolution for the conflicting approach saying that the essence of the problem is on balancing market failures against state failures, or identifying the costs of the state inaction against state intervention. The best solution would be to determine the comparative advantage between the role played by the private and the role played by the public sectors.

Furthermore, the experiences of East and Southeast Asian countries revealed that strong government intervention with prominent private sector could be complementary as actors of economic growth and development. The next section explains the policies they follow in pursuing their successful objectives.

2.4 Empirical Evidence from East and Southeast Asian Countries

The market failure and government failure arguments have been challenged by the developmental state theory that has been exercised by most East and Southeast Asian Countries. The developmental state theory argues that financial resources can be allocated efficiently using a combination of high bureaucratic capacity with significant autonomy from the society. The allocation would be to strategic industrial sectors that would generate rapid industrial growth. Furthermore, the hidden power of the developmental state is its knowledge on how to mobilize national financial sources to strategic sectors. This, in turn, lies on the ability to generate massive savings from the public sector

and directing these resources to finance high levels of investments that induces rapid economic growth rates (Gibbon and Schulpen, 2002). The World Bank Report (1996) for these countries has also traced out that the good performance of these economies heavily relied on high level of domestic savings; broad based human capital investment, good macroeconomic management and limited price distortions.

Moreover, as emphasised by Jonathan (2002), policies in these countries were drawn to assist financial sectors in capturing non-financial savings. Massive saving incentives were also central to increase household and corporate savings. This was followed by public investment complementing private investment, which increased orientation to exports. Public saving may crowd out private saving, especially if the individuals feel that government is doing their saving for them, however this effect could be partial and changes in fiscal policy would influences national savings at large.

Hayami (2001) added that the success of these countries was mainly because of government's stable macroeconomic management, maintenance of orderly financial systems and provision of public infrastructure that raised profit opportunities for private entrepreneur's productive activities in the market. Such conditions were instrumental in inducing entrepreneurs to allocate the best of their efforts to seeking profits from production under market competition rather than seeking institutional rent from lobbying for protective regulations.

Krueger (1990), and Balassa (1982) also emphasised that the underlying reasons for the successes of these countries were their export oriented industrialization policies that compelled domestic producers to improve product qualities and reduce costs in the international market competitions. These countries were also strongly driven to introduce new technologies from abroad using import substitution that enabled them to identify easily industrial policy failures and take corrective measures before hand. In contrasting to many other developing countries, where business cycles have caused rapid fluctuations in macroeconomic indicators, the East Asian countries have been successful in stabilizing their economies which became a potent of encouragement for the private saving, investment, exports and ultimately for the economic growth since the private sectors developed full confidence on relatively stable prices and interest rates.

Thus, it seems safe to conclude that all government interventions are not evil to economic development, as these countries with strong government interventions have created remarkable and consistent economic growth in the past three decades.

2.5 Models of Development Planning

Economic planning necessarily needs model building. These models are mainly required for policy decision-making, forecasting and projection purposes, and to blend economic theory with knowledge of empirical results taking into account the principal structure and institutional characteristics of a particular country. There are different types of economic models and planning approaches from which countries may choose to pursue their economic objectives. Aggregate models which are applied in indicative planning; sectoral and inter-sectoral models that are used in planning at micro-levels; and project appraisal commonly exercised for specific investment selection from different alternatives through feasibility studies are some of the universally accepted models in planning.

Furthermore, there are many development strategies that are important to determine development planning. Some of these strategies include: the choice of agriculture versus industrial, and balanced versus unbalanced growth. In addition, there are planning models that are used at sectoral and national levels. For example, the Harrod-Domar, Cobb-Douglas production function, and saving-investment gap models are used at both sectoral and national levels, while macroeconomic planning with more emphasis to monetary and fiscal policy are mostly employed at national levels. These development strategies and planning models will be discussed in this section.

2.5.1 Agriculture versus industrialization

The choice of agriculture versus industrialization development strategy has been a critical issue for developing countries. Most African countries gave greater emphasis to industrial sector than agricultural sector during their early independence years and were able to achieve higher economic growth rates. However, those economic growth rates did not continue consistently in the following years, mainly in the 1970s and 1980s. One of the given reasons is that they neglected the agricultural sector, which keeps more than fifty percent of income and employment of their population.

The importance of agriculture to most African countries is simply a way of life. Agricultural productivity in those countries, however, are very low due to many reasons such as: agriculture pricing policies, land tenure systems, lack of credits, inadequate new inputs, heavy government taxation, and neglecting of rural infrastructures. Thus, prudent agricultural policy is required to alleviate the above problems. Nevertheless, even though agriculture should be given priority, the importance of industrial sector and its linkage to agricultural sector could not be ruled out.

Thirwall (1994), for example, emphasises the interdependence of agriculture and industry in that growth of industrial sector adds to the demand for goods produced by agriculture and absorbs surplus labor. These industrial goods may raise the productivity of agricultural sector. Agriculture in turn, provides a market for industrial goods out of rising real income and makes factor contribution to development through the release of resources if productivity rises faster than demand. Furthermore, agriculture could provide a potential for capital accumulation through savings from its marketable surplus obtained from cheap food production, but industrial sector also needs a market for its industrial goods in agricultural sector. Thus, cheap agricultural outputs weaken purchasing power of agricultural sector for industrial goods. Hence, there must be an equilibrium by which the two sectors should grow parallel.

Lewis (1966) also argues that increase in industrial production raises the demand for food and raw materials from the farmers. If farm output is stagnant, agricultural prices would rise and this in turn raises wages and reduces the productivity of industrial production.

The complementarity between the two sectors mainly in developing countries is thus very important. These countries might not specialize in the production of one of the two sectors at the existing development stage. It is argued that in case of open market operation, mainly in developed countries, opportunity cost or comparative advantages that accrue to industrialization versus agriculture dominates the complementarities between the two sectors. Countries that specialize in industrial sector should be able to export excess industrial goods and import agricultural outputs and countries specializing in agriculture should be able to export from their excess production and import industrial output. Nowadays, however, this development strategy may not be realistic from the context of African economic conditions.

Thus, development strategy aimed at simultaneous investment on the two sectors might be appropriate in case of developing countries. Consequently, identifying agricultural constraints and drawing the appropriate agricultural and industrial policy should be the immediate assignment of these countries. Furthermore, this agriculture versus industry development strategy leads us to the arguments of balanced versus unbalanced growth development strategies.

2.5.2 Balanced versus unbalanced growth

Countries have many development planning and strategic choices on how to use and allocate the scarce resources they have based on their stage of development and policies frameworks. It had been argued that there must be a complement between investment on agriculture and industry development strategies mainly in the context of developing countries.

There are however opposing arguments, which state that either investing more on industrial sector first and then on agricultural sector or vice-versa depending upon the availability of resources of a country. The central issue between these two arguments is that either to invest in all sectors so that all would grow equally to keep the equilibrium between the supply and demand in all the sectors that is, balanced growth; or invest on those sectors which could bring high social return and later on a trickle-down effect can stimulate growth on the other sectors and that is, unbalanced growth.

2.5.2.1 Balanced growth

Roesentein-Rodan (1943) was the first to emphasise the importance of balanced growth from his observation of the big push of East and South-East Europe. He argued that a simultaneous growth of all industries would help to remove the indivisibility on the supply sides and at the same time the bottlenecks associated with the demand would be removed by the balanced growth. Nurkse (1953) also argued that if there were simultaneous expansion of many sectors, the expansion of income and employment in different sectors would create demand for all sectors and making all sectors worthwhile, on the other hand, the supply of all goods must expand at the same rate as the demand for them, so that bottlenecks do not retard the overall rate of growth. He added that capital formation

acts as a major constraint on economic development, but capital formation is by itself constrained more by an insufficient than inefficient demand for investment. Thus investment in one sector without accompanying investment in another industry will be self-defeating.

Lewis (1966) was also arguing for balanced growth in order to maintain the term of trade between different sectors so that excess capacities and wastes would be avoided. In his famous two-sector model, agriculture versus industry, he emphasised that parallel growth of the two sectors would maintain the demand and supply of agriculture with the demand and supply of industrial sector.

According Thirwall (1999), in balanced growth model, all activities are to grow simultaneously so that they could provide markets for one another. In this way activities that were not profitable separately would be profitable considering large scale-development programs. In this context government planning would be more significant than market orientation to stimulate and run programs. The supply side of the argument stresses that there would be huge benefit from external economies of scale from big-push investment of the program and this could bring higher social return than private return.

Scitovsky's (1990) argument of balanced growth model started from the Say's Law that states, "Supply creates its own demand". He elaborated that for structure of additional productive capacity to match structure of additional demand, investment would have to proceed simultaneously in the economy's various sectors in the same proportions in which the buying public apportions the expenditure on its additional income among outputs of those sectors and industries.

One problem of the balanced growth argument is that additional costs of inputs and capital investment goods could be too high if considered separately. At the same time there might be investment made on unproductive projects. Thus, there would be inefficient cross-subsidization because the cost of inputs and investment is shared by other more profitable sectors. Balanced growth has been also criticized that the model might not have universal application in the real world. Developing countries, for example, have shortages of the necessary inputs mainly capital investment, skilled labor, and entrepreneurship capability to stimulate all resources at the same time and achieve higher growth rates (Thirwall, 1999). He added also that in the absence of sufficient resources,

especially of capital, entrepreneurs, and decision makers striving for balanced growth might not provide sufficient stimulus to the spontaneous mobilization of resources or the inducement of investments.

2.5.2.2 Unbalanced growth

According Thirwall (1999), Hirschman was the first economist to argue for unbalanced growth. His fundamental idea was based on resolving the choice of investment either based on substitution choice or postponement choices. He stressed that the real problems with developing countries are not only the resources themselves rather lack of means and abilities to bring them into play. These means and abilities are today included in the structural and institutional capacities which still are the main constraints in the development of these countries.

So the concept of unbalanced growth model indicates that projects or investments should be selected according to their productivities or should be given priorities so that progress in one area would induce progress on the other area. This implies that countries with abundant resources of land and labor should first invest more on agriculture and then on industries. On the other hand, countries with more capital and technology would invest more in industries so that a trickle-down effect would stimulate growth in agriculture.

Unbalanced growth model is also criticised for some of its arguments. For instance, it relies mainly on probable outcomes that could lead to concentration of production in one or two goods with possible adverse effect on the balance of payments. Furthermore, there is also high possibility of inflation occurring on those highly priced goods with income inelastic demand that would infiltrate to other sectors. Thus, this model deemed to stick to the market oriented decision-making where it does not leave any room for government intervention (Thirwall, 1999).

The policy implication for developing countries to adhere to unbalanced growth model deemed inconclusive for they have low institutional as well as capacity to mobilize their resources accordingly. It is emphasised that balanced growth model gives more chance to strong government intervention while unbalanced growth gives more chance to market oriented policies. These

arguments would lead us to the choices of development strategies either market-oriented or government intervention policies. However, a country may choose one option for another depending upon the availability of resources and its economic stages.

2.5.3 The Harrod-Domar model for planning

The Harrod-Domar model has been used to develop a comprehensive aggregate plans for LDCs. The theory bases its argument on capital as factor of production and growth as dependent variable, which itself is dependent on two parameters; the ratio of saving to national income and the productivity of capital that is capital output ratio. Thus, the model is expressed as follows:

$$g = s/v \quad (2.5.3.1)$$

Where g is growth rate; s is saving to national income ratio, and v is capital output ratio. Thirwall (1999) argues that the Harrod-Domar model's assumption that income or output is in equilibrium implies plans to invest equals plans to save or injections into the circular flow of income should be equal to linkages. In its simplest form this is a closed economy model. The model highlights the importance of mobilizing domestic saving and investment to increase the productivity of capital. It might be used also to predict the required saving rate once the growth rate and capital output ratios are determined.

Fiscal and /or monetary policies may have indirect impacts on the desired rate of saving. But, saving depends on national income, thus policy instruments that influence national income will have an effect on saving and then investment that ultimately contribute to growth rate. The Harrod-Domar model is derived as follows as is explained by (Ghatak, 1995).

$S_t = I_t$	Planned saving equals planned investment.
$I_t = K_{t+1} - K_t$	Investment is a function of capital stock differential between two periods.
$S_t = sY_{t-1}$	Saving is a function of previous year's disposable income.
$K_t = vY_{t-1}$	Capital stock is a function of previous year's Output.

Where S is saving ;I is investment; k is capital stock; y is output; v is capital output ratio; and s is the marginal propensity to save. Thus, economic growth rate could be specified from the above relationships as follows:

$$\begin{aligned} sY_{t-1} &= vY - vY_{t-1} \\ sY_{t-1} &= v(Y - Y_{t-1}) \\ (Y_t - Y_{t-1}) / Y_{t-1} &= s/v = g = (Y_t - Y_{t-1}) / Y_{t-1} \end{aligned} \quad (2.5.3.2)$$

The model indicates that once the capital output ratio is exogenously determined and remains stable, growth rate could be determined through planned increase in saving income ratio. Thus, policy that increases the proportion of saving out of income will reinforce growth rate.

Once the growth rate is determined, planned domestic outputs, investment, saving, export, and import would be estimated using the following relationships.

$$Y_t' = Y_0 (1+g')^t \quad (2.5.3.3)$$

Where Y_t' is targeted gross domestic product, g' is targeted growth rate, and Y_0 is base year or initial gross domestic product. Thus, the targeted gross domestic product depends on the base year gross domestic product and the targeted estimated growth rate. The growth rate g' is determined from past experience outside the model by equation (2.5.3.2).

Once targeted gross domestic product is determined, targeted investment could be estimated by the following equation.

$$I_t' = kg'Y_t' \quad (2.5.3.4)$$

Where I_t' is planned investment and k is incremental capital output ratio. Thus, given k as constant predetermined outside the model, planned investment depends on planned gross domestic output and planned growth rate.

Furthermore, planned saving could also be estimated; once the planned gross domestic output and marginal propensity to save are determined outside the model, from the following relationships.

$$S_t^* = s_0 + s^* Y_t^* \quad (2.5.3.5)$$

Where S_t^* is Planned savings; s_0 is the minimum savings when gross domestic target is zero; and s^* is planned marginal propensity to save. Therefore, planned savings depends on the growth of output and the planned marginal propensity to save.

Planned export, however, does not depend on gross domestic product estimates. Rather it depends on world income changes and prices. Thus, it is estimated based on the export growth rate determined from previous years experiences.

$$X_t = X_0(1+x)^t \quad (2.5.3.6)$$

Where X_t is export required at any period; X_0 is export at the initial period; and x is export growth rate. Export growth rate in this model is assumed as determined outside the model and thus is exogenous. Export in any time period (t) then depends on the growth rate x and its initial exports.

Planned import demand could also be determined from the planned gross domestic product rate as specified below.

$$Z_t^* = z_0 + z^* Y_t^* \quad (2.5.3.7)$$

Where Z_t^* is planned minimum imports; z_0 is the minimum import requirement without output growth; and z^* is marginal propensity to import. Planned import depends on the growth of targeted gross domestic product, whereby the marginal increment of import (z^*) is determined outside the model and is exogenous.

The models are commonly used in LDCs for planning purposes for they are very simple to apply. However, it has got some drawbacks. First, it is too aggregate that one could not see the internal interaction of the entire economy. Second, it assumed only one factor capital, while labor, which is the dominant factor of production in the developing countries, is assumed to be constant as if it has a passive role. Third, economies of less developed countries are dualistic. In this context, dualistic refers to the coexistence of the subsistence traditional and non-monetized economy and

commercialised and monetized economy. Thus it would be very difficult to estimate actual saving. In addition, the financial intermediaries are also too weak to direct saving into investment. It might not also be reasonable to conclude that the capital output, saving rate ratios, marginal propensity to import, the export growth rates and the marginal propensity to save would remain constant throughout the time framework while there are high possibilities of resource mobilization to and out of the economy during that specified period (Ghatak, 1995).

Finally, fiscal policy could affect the saving rate indirectly, but the model failed to incorporate other instrumental variables such as government expenditure, foreign sources variables, exports and imports in its analysis. Therefore, more comprehensive macroeconomic planning may be required to accommodate all the variables.

2.5.4 The Cobb-Douglas production function model

The production function approach is another model used for estimating aggregate output growth rates from the major inputs such as capital, labor and land. The model exhibits either constrained or unconstrained production function depending on the assumptions of the theory that explains it. The constrained Cobb–Douglas production function assumes constant returns to scale but diminishing returns to each input and factors are paid their marginal product. Thus, according to the neoclassical theory, capital deepening, that is, a rise in the capital–labor ratio would involve diminishing returns, and a rise in savings and investment rates would boost growth only temporarily. In the long run, with exogenous and unexplained technical progress, growth could be sustained only at the rate of growth of the labor force. However, the temporary effect on growth of a higher rate of capital accumulation would place countries on a higher level of income per head (Thirwall, 1999). The model also implicitly takes saving rate, depreciation and population growth to be constant. Hence, the effect of the capital per labor input is only reflected on the output per labor. However, today the model has been used extensively to incorporate other variables such as human capital, Research and development, exports and government investment with modified assumptions.

Modern endogenous growth theory seeks to explain why per capita income growth continues in capital-abundant countries and is often faster than in capital-poor countries. The theory bases its

argument on the neoclassical production function framework, but suggests that capital deepening may avoid diminishing returns thanks to various externalities and productivity gains that are explained endogenously in these models. The production function then exhibits increasing rather than constant returns to scale and is now becoming endogenous rather than exogenous model by relaxing the assumptions of neutral technological progress and constant to scale (Thirwal, 1999; Todaro, 2000). The general framework of the Cobb-Douglas production function is presented below:

$$Y_t = \theta_0 K^{\theta_1} L^{\theta_2} e^t \quad (2.5.4.1)$$

Where Y_t is Output; θ_0 is Total productivity explained in terms of availability of technology; K capital stock or capital service at constant price; L is labor input index at constant wage and; θ_1 and θ_2 are Partial elasticities of output with respect to capital and labor respectively. Given θ_0 as exogenous and independent of changes in factor inputs, the sum of the partial elasticities of output with respect to factor inputs gives the scale of returns. However, the appropriate functional form is usually expressed in log-linear model, and explains the change in output for a unit change in the respective inputs, capital or labor. Thus, the partial derivative with respect to time t , and taking the logarithms of the variables gives estimated change in required output contributed from a change in each input.

$$\text{Log } Y_t = \text{log}\theta_0 + \theta_1 \text{log}K_t + \theta_2 \text{Log}L_t + u_t \quad (2.5.4.2)$$

This model could be used in either unconstrained or constrained form depending on the assumptions taken before estimation. Unlike the previous discussed Harrod-Domar model, the Cobb-Douglas model allows to exercise a policy either on capital or labor so that output would be influenced by the quantitative and qualitative changes of both input variables.

2.6 Macroeconomic Policy and Planning

In the previous two sub-topics we have assessed the strong and weak sides of the simple Harrod-Domar and production function models. The two models are used to assess aggregate outputs based

on production approach. However, it is also important to look at economic growth based on expenditure approach because it gives more information to examine direct policy implications.

There are many necessary elements that a model should include. It should have a statement of economic goals, a specification of policy instrument or instrumental variables, estimation of structural relationships, historical data, the recognition of exogenous variables, a set of national account for national income and expenditure, foreign trade and even manpower to ensure consistency between demand and supply (Thirwall, 1999).

Furthermore, Khan (et al, 1991) emphasise that formal macroeconomic models help to delineate the links between the principal variables. They also allow direct examination of the assumptions underlying the individual behavioural relationship and synthesise different views on macroeconomic phenomena.

Furthermore, macroeconomic management in developing countries has received much attention during the past decades. In formulating these models, some crucial economic aspects are very important. These are such aspects as the nature of financial markets, the degree of capital mobility, the form and functioning of the exchange rate regime, the degree of wage-price flexibility and the determination of aggregate supply. The problem, however, with these variables is that they might not be easily manipulated, or the necessary data that assist to form these structures may not be easily available in developing countries. Nevertheless, as Wallis (1989) emphasised it, the role of macroeconomic model and forecasting in macroeconomic policy making and the policy making itself have been important in the demand management.

Ghatak (1986) is of the opinion that macro econometrics is now becoming popular in planning exercises for the LDCs. One way to demonstrate the application of such models is to use a simple Keynesian framework of analysis with more applicable dynamic model like that of Klein. He adds that planning models are useful to achieve consistency between demand and supply in different sectors, to know whether investment demand would be large enough to produce a targeted output, to determine intermediate demands for inputs including capital and labor and to provide basis for testing feasibility and optimality of different projects within the plan.

Furthermore, the general macro econometric models used for planning purposes today basically emanate from the Keynesian aggregate demand model. They have advantages over the other models because they tried to accommodate many fiscal and monetary instruments in handling variables. Hence, aggregate models like that of Klein, which are based on Keynesians, and the IMF of macro economic models for adjustment for developing countries used for planning are specified as follows:

$$C_t = a_0 + a_1(Y_t - T_t) + a_2C_{t-1} + u_{1t} \quad (2.6.1)$$

$$I_t = b_0 + b_1Y_t + b_2K_{t-1} + b_3r_{t-1} + u_{2t} \quad (2.6.2)$$

$$Z_t = c_0 + c_1(Y_t - Y_{t-1}) + c_2Z_{t-1} + c_3(P_f/P_t) + u_{3t} \quad (2.6.3)$$

$$X_t = h_0 + h_1Y_{tw} + u_{4t} \quad (2.6.4)$$

$$T_t = d_0 + d_1Y_t + u_{5t} \quad (2.6.5)$$

$$Y_t = g_0 + g_1L_t + g_2K_t + u_{6t} \quad (2.6.6)$$

$$M_t = k_0 + k_1Y_t + k_2r_t + u_{7t} \quad (2.6.7)$$

Where C_t = Private consumption expenditure; I_t = Private investment expenditure; Z_t = Import demand; X_t = Export demand; K_t = Capital stock; T_t = Taxes revenue; Y_t = Aggregate output (GDP); M_t = Demand for money; L_t = Number of employments; Y_{tw} = World income; r_t = interest rate; P_f = World price of Domestic goods; and P_t = Domestic price of domestic goods.

These equations do not exhaustively represent the relationships of all economic variables. Moreover, there are different approaches to deal with each variable either in its current or lagged value. The theoretical assumptions along with the prevailing nature and economic background of the country understudy will determine how they are used in planning and analyses of policies. Furthermore, the relationships between the independent and dependent variables are the binding blocks in the analysis

of the models and it is important to relate these models with policy instruments so that targeted variables are determined appropriately. The two sets of policy instruments that are usually accepted in manipulating economic variables and stabilizing programs in developing countries are monetary and fiscal policies. Hence, they are assessed in the following subtopics.

2.6.1 Fiscal policy

Developing countries encounter many problems in seeking to manage their economies. One of their main problems is macroeconomic management. It is now widely accepted that a stable macroeconomic framework is necessary although not sufficient for sustainable economic growth. Fiscal policy is one of the macroeconomic instruments employed to manage imbalance of an economic entity. It refers to any action that alters the level of or composition of government expenditure or the structure or the burden of taxation. Roemer and Stern (1981) summarized the aims of fiscal policy as follows; governments should tax and spend to promote the greatest potential future consumption with the list possible expenditure of resources both in the current and future periods. This should be consistent with society's valuation of future versus current consumption. Fiscal policy should also work to stabilize economic activities by reducing unemployment and restraining inflation growth.

In many developing countries, monetary policy plays lesser role than fiscal policy owing to lack of development in the banking and financial infrastructure. Consequently the role of financial intermediation in facilitating borrowing and lending has been limited. Fiscal policy then captures private saving and translate them into investment largely enough through government capital expenditure program. Thus, new public investments are financed either through taxation or through increase in money supply (Cook and Kirkpatrick, 1990).

Barro (1990) argued that the ratio of real government consumption expenditure to real GDP had a negative association with growth and investment. This is because government consumption had no direct effect on private productivity, but lowers saving and growth through its distorting effects from taxation or government expenditure programs.

Another main argument of fiscal policy impacts is that private and public expenditure are not affected equally in the due process of economic interaction. In developing countries, most of the time, there is strong complementarity between the private and public capital formation. That is why an increase in public expenditure on infrastructure would entail an incentive to the private sector. On the contrary, a decrease in government expenditure, in most developing countries would lead to a decline in output. The impact of fiscal policy to maintain stability of the economic performance depends on the discretion of fiscal management of the economy at large. Tighter or expansionary fiscal discipline would convene its target when it is has a link to development planning.

Roemer and Stern (1981) clarified that fiscal policy and development planning are tightly linked in numerous ways. They added that the first development plans of many countries were, to a great extent, fiscal plans with some macroeconomic analysis grafted on. Even today, when macroeconomic forecasting is at the root of national planning, the bulk of most development plans refers to government expenditure.

Thus, prudent fiscal policy is required to implement a sound development plan. Similarly, the role of monetary policy is crucial in directing development planning to the appropriate target.

2.6.2 Monetary policy

The main objectives of monetary policy in developing countries are usually to control the money supply, credit arrangement, government borrowing, debt and interest rate management in such a way that it could contribute to the price stabilization and economic growth.

For example, both Ghatak (1986) and Barro (1987) argued that the growth of money supply could increase the level of profit, investment and rate of economic growth and this increase in economic growth in turn would create high employment opportunity. However, an increase in money supply induces higher prices thus increasing inflation rate. But, a modest rise in prices is not regarded as harmful to the economy and indeed in a growing economy.

Friedman (1968) also argued that monetary policy that stimulates an increase in money supply might lead to a fall in unemployment rate. However, prices would rise in the short-run and real wages would fall. The fall in real wages will increase the demand for labor, but money wage tend to rise and the supply of labor would rise too. Thus, as inflation gets underway in the long run unemployment will appear again.

However, monetary policy plays limited role in LDCs. The main reasons commonly explained are the existence of large non-monetized sectors, the narrow size of money and capital market with limited varieties of financial stocks and assets. In addition, in most LDCs cash comprises a major proportion of money supply that implies the relative insignificant of bank money in the aggregate supply of money. The ratio of cash to money supply is significantly influenced by the demand for money by the public. But, the effects of the changes in the central banks monetary policies will mostly be on bank credit. Increase in nominal money demand, would affect the price level and an increase in price level lowers the real demand for money and this decreases real output at large. The existence of non-financial intermediates and a high level of liquidity in the commercial banks of these countries, thus, have neutralizing effects on the monetary policy.

However, although the economic stages of these countries might not allow effective monetary regulations, monetary policies are also regarded as useful instruments for achieving equilibrium in the balance of payment and stabilizing the exchange rates in developing countries. A continuous increase in money supply relative to the money supply of the world would depreciate the exchange rate. This depreciation although would encourage exports and discourage imports, it however would lead to high inflation rate which in turn lower economic growth. Thus, the instability problems of these countries may arise from lack of balance between the demand and supply of goods and services arose due to imbalance between the demand and supply of monetary aggregates.

According Wai (1980), excess demand may arise due to low propensity to save and in part due to excessive bank credit expansion to finance government budget deficits and private investments. Excess demand may also arise from domestic output failure either due to sudden crop failure or inconvenient agricultural policies or excessive government ownership on the industrial sectors that produce outputs inefficiently. Moreover, Cook and Kirkpatrick (1990) added that monetary policy

would also help to transfer resources from areas where resources are in surplus supply to those areas where resources are in greater demand for investment purposes and the motivation for their reallocation is to improve the profitability of investment.

Thus, stable and consistent monetary policy contributes high impetus to predict and project the required target variables from the given resources accurately. Furthermore, the combined effects of the macroeconomic policies, mainly fiscal and monetary policies, and sound development strategies are necessary for achieving desirable national targets. Some of these national targets are saving and investment levels and are discussed below.

2.6.3 Saving and investment planning

Development planning that is designed to achieve certain targeted output must have good saving rate prediction and what is saved must be channelled to investment either directly or through the financial intermediaries.

Rostow (1960) emphasised the importance of saving to stimulate investment in that, during take-off period, the rate of effective investment and savings may rise from 5 percent of the national income to 10 percent or more. Although where heavy social overhead capital investment was required to create the technical precondition for take-off, the investment rate in the precondition for take-off should be higher than 5 percent. Nurkse (1953) also deals with the problem of developing countries to get rid-off the poverty trap, as the vicious circle of less developed countries is repeating. Low level of income – low level of saving – lower productive capacity due investment problem—again low level of real income which completes the circle. Thus the circle should be broken at one level and that is possible at the saving level.

Otani and Villanueva (1990) stressed that a once and for all increase in the domestic savings rate of 10 percent points would raise the long term growth rate per capita by 3 to 4 percents in many countries in which are still in the take-off stage. Thus it seems safe to conclude that domestic saving greatly facilitate the achievements of growth potentials in many developing countries. However, in most developing countries the levels of saving and investment are not the same due to either

deliberate government policy to control interest rate or due to rising inflation rates faster than nominal interest rate and this creates a higher gap between saving and investment.

Thus, with the weak private and public saving capacity of developing countries in one hand, and low exportable and high importable levels on the other hand, governments of these countries should plan how to finance their expenditure by other sources. One of the means is foreign borrowing.

Ghatak (1995) emphasised that foreign resources could be used to close the gap between saving and investment. In many development-planning models, a targeted level of investment is specified to achieve a certain rate of growth of income and then the saving required for the investment is estimated. If there is excess investment requirement, which could not be covered by domestic saving, then foreign resource is required to fill the gap.

If government can borrow to finance its expenditure and invest in activities with rates of return above the appropriate discount rate, then this borrowing should be socially desirable. For any particular economy the desirable level of budget deficit will depend upon a range of factors, including the extent of underemployment of resources, the return on the investment and the costs associated with deficit financing (Weiss, 1995; Ghatak (1995). Of course there are many criteria to get the foreign resources of which many developing countries fail to fulfil. One of the most striking required feature of those countries, which are eager to get foreign capital or borrowing, is their absorptive capacity. The case of developing countries however seems very ambiguous. Higher absorptive capacity requires modern infrastructure and skilled labor with qualitatively entrepreneurial ability. But these inputs are the main constraints of developing countries. Thus, they could not utilize the foreign resources efficiently due to the above constraints. Therefore, most developing countries remain immersed in debt crisis.

Thus, as has been shown in the empirical evidence from East and Southeast Asian countries' experiences, appropriate policies should be drawn to accumulate and mobilize domestic saving because it is the engine of growth by reinforcing investment. Furthermore, development planning targeting at certain level of saving rate must have a link with policies so that incentives that motivate it would be available. For example, the Harrod-Domar model relationship between investment and

savings, which is the foundation of much macroeconomic development planning, provides the most basic indirect link with fiscal policy (Roemer and Stern, 1981). Furthermore, there are many arguments, which explain the characteristics of investment. The naïve accelerator model states that net investment is determined by the current change in output, which could be presented as

$$I_t = K_t - K_{t-1} = v (Y_t - Y_{t-1}) \quad (2.6.3.1)$$

Where I is investment; K is capital stock; and Y is output; and v (constant acceleration coefficient), which indicates the fraction of the change in output translated into investment.

The Keynesian theory of investment on the other hand postulates that the rate of interest and business expectations are the principal determinants of investment spending although the investment function is likely to be relatively interest inelastic.

The third argument is that of neoclassical view, which states that the real cost of capital (investment), the real rate of investment plus the rate of depreciation are the principal determinants.

Empirical evidence, however, suggests that investment is one of the very difficult variances to forecast being subject to long and variable lags. Since capital markets mostly are imperfect and internal funds would be cheaper than external funds, then profits and expectations of profits would be important determinants of investment. Investment merely depends upon the level of income, however investment demand may be affected by changes in the prices of capital goods or changes in the expected rate of inflation (Ghatak, 1995). Other empirical studies indicate that private investment has a greater effect than public investment on long run economic growth, but it is very difficult to argue that promotion of private sector initiatives and reduction of the role of public sector in the area of investment would necessarily be beneficial to the overall growth of the economy (Khan and Reinhart, 1990).

Finally, failure to link policy and planning may be a serious problem and mostly is reflected on poor budget outcomes and macro strategies at the operational level in many developing countries. Future resource allocations based on specific policy mix allows government actors to predict and make

sound plans that would help again to manage resources more efficiently within the time framework specified. In many developing countries, resource allocation is plagued by uncertainties. These emanate from making optimistic revenue projections or unattainable planned activities while they are constrained by many factor inputs. Another factor that lead them to uncertainty is that there is mismatch between policy decisions and available resources.

As is explained by D'Angelo (1989), the most appropriate policy mix required to improve the macroeconomic management for African countries is not only to attain stabilization targets (like, decline of external balance, curtailment of fiscal deficit, and control of inflation) but also to promote economic recovery in the long run. In addition to that it is required to spell out the sectoral and social levels as complement to the macroeconomic policies identified to stimulate growth and development. Furthermore, as emphasised by Sagasti (1988) the implementation of development plan entails linking short term global, sectoral and regional plans to budgetary process; associating medium term plan with the evaluation of investment projects and lastly ensuring the commitment of political authorities to the development objectives specified in the long term plans.

In this chapter, we tried to review the theoretical framework of development planning and development strategies with more emphasis to developing countries macroeconomic planning and economic growth. We tried also to investigate further the choice of development strategy as well as the role of government versus market has been influenced by many domestic and external factors. Hence, examining the existing economic growth trend and the availability of factor inputs would help us to specify the correct linkage between planning and policy options in Eritrea. In the next chapter, thus, the Eritrean sectoral contribution to GDP and its impact on economic growth will be assessed.

CHAPTER THREE

ECONOMIC PERSPECTIVE AND SECTORAL CONTRIBUTION TO GDP OF ERITREA

3.1 Economic Background

Basically, the role of economic policy is the same in all countries. It aims to steer the economic performance to the desired objectives. Development planning on the other hand refers to decision-making by authorized bodies on how to utilize the scarce resources to maximize the national predetermined goals. However, differences among countries arise from different perspectives. The natures of the problems they encounter, the status of formulating policies, and ultimately the choices of the policy instruments they intend to use might differ. Thus, it is imperative to assess the relative strength and weakness of a country before starting to analyse its development plan and policies relationships. Moreover, It could also be helpful to include relevant information from grass root of problems for sound evaluations and policy implication analyses.

Eritrea re-emerged as a new state in 1991 and reaffirms its independence by referendum in 1993. It is situated in the horn of Africa and bounded on the east and northeast by Red Sea, on the southeast by Djibouti, on the south by Ethiopia, and on the west and northwest by Sudan. At this time, it has about 4.2 million population and an area of about 124000 square kilometres. Furthermore, it has been under many successive colonial powers starting from the Turkish and Egyptian (1550-1880), Italian (1889-1941), British (1941-1952), and was subsequently federated with Ethiopia (1952-1962). Finally it was incorporated by force as a province of Ethiopia until it got its independence in 1991. These colonial countries left many economic, social, and political impacts on Eritrea. However, there are different views concerning the colonial effects on the socio-economic and cultural development of the colonized African countries in general and in particular in Eritrea.

Some argue that colonizers exploited excessively the natural resources of these countries to get raw materials for the industries at their homes and as well used the cheap labor force in their agricultural and industrial sectors to the extent without payments and accumulated higher profits, while the living conditions of the people of the colonized countries were deteriorating from time to time. However, others argued that colonialists laid necessary infrastructures, industries, and commercial farms, which served the colonized countries to improve their economic and political conditions.

Thirwall (1994) elaborates that some argue that the initiating force behind industrialization was foreign exploitation of resources. Industrial activities took the form of mining operations and plantations. These activities exerted development impacts, but it is arguable whether development would have been more rapid or not, had the countries been left to their own devices.

On the other hand, Luiz and Solimano (1999) explained that income and wealth were heavily concentrated in the hands of the settlers, with local population receiving only small proportion of national income. In agriculture the major crops and earnings were coming from the settlers owned plantations, while traditional African small farm holders were neglected. In industry, plants were characterized by high cost of productions and geared towards the narrow markets of the colonizers. External and domestic imbalances were financed by heavily taxing African populations. Thus the arguments for the cons and pros of colonial impacts seek further detailed studies.

The economic impact of colonialism on Eritrean economy is traced back to the Italian days. The Italians were known for the construction of infrastructures, while the British and Ethiopian regimes were recognized for their deliberate dismantling and destruction of those infrastructures. But, like those other African colonized countries, Eritrea was a main source of raw materials and labor force mainly for Italian industries. There were many industrial branches, which produced intermediate products and fed Italian main industries abroad.

However, Eritrea was relatively more advanced in manufacturing and infrastructures than the neighbouring countries. At the end of 1930s, it had about seven hundred and thirty small and medium scale companies exporting industrial commodities as well as raw materials to many parts of the world. In addition, at the time of the Second World War, when imports from Europe to east

African markets were disrupted, Eritrean industries were strong enough to supply these markets (World Bank, 1994).

According to New African Year Book (1999/2000) report, by 1970 Eritrea accounted for thirty five percent of all industrial activities in Ethiopia as a whole. Furthermore, out of the seventy two companies taken over by the revolutionary Ethiopian government in 1975, a third was Eritrean-based, including the country's largest brewery, Melloti, and its second largest cotton producer Baratollo.

However, the thirty- years of devastating and prolonged war as well as recurring drought before independence deteriorated the whole economy. Almost all its infrastructures, economic and social service sectors were completely destroyed. Thus, for post independent state to fulfil its expected goal of economic liberation, it needed the commitment and competence to change the damaged economic structure inherited from colonial state by creating access to resources for its population over time.

According to the report of the Government of the State of Eritrea (2001), there were significant achievements made in structuring and reforming the economies and institutions in the first seven years of independence of Eritrea. The main steps taken during this period are summarized below as follows:

- restructuring government ministries to focus their main functions on formulating policies and regulations, research and human resource development activities
- reforming the civil service and decentralizing its management structure by reducing the public work force
- demobilizing and reintegrating the former combatants into private civilian life.
- reforming the tax system and its administration through tax rate reduction and broaden tax base
- motivating private sector development through creating conducive investment and licensing environments.
- unifying the exchange rate and broadening the foreign exchange market.

The government of Eritrea has thus been engaged in a continuous effort to set up and strengthen appropriate institutions and to implement integrated economic development policies based on

principles of market economy. It has adopted a market economy in which the private sector will play a leading role in economic development with a guiding economic principle of efficiency, competitiveness, decentralization and regional balanced growth (Government of the State of Eritrea 2001). A fundamental principle of Eritrea's national development program is to progress through self-reliance. However, the country depends on foreign countries and resources for technical assistance, emergency and grant funds, consultant studies, and direct foreign investments. Much of this foreign aid and assistance is received from World Bank, United Nation Organizations and bilateral aid programs for investment projects mainly directed to infrastructures and rural development programs.

This being a brief historical, economic and political background, more specific emphasis will be made on the sectoral contribution and its policy implications since independence in the next section.

3.2 Sectoral Assessment of the Eritrean Economy

The pattern of sectoral changes among agricultural (primary), industrial (secondary), and service (tertiary) sectors had been indicators for development. Countries, which produce dominantly agricultural output, are put under less-developed countries while those which produce dominantly capital goods are classified as industrialized countries. These patterns, however, might not give conclusive delineations among countries. Nevertheless, since Eritrea is one of the less developed African countries, more emphasis will be given to it in comparison to the economic characteristics of the less developed countries.

Many scholars have given different emphasises on how to transform agriculture from agrarian subsistence to commercial level. Lewis (1966) was one who tried to formulate an argument based on the assumption of existence of traditional and modern sectors and the transformation of agriculture through higher contribution to industrial sector as a critical stage for development. Agriculture, as a base for development of other sectors, is considered an initial stage of any economic development. Furthermore, industrial development is acquired by capital accumulation gained from agricultural marketable surplus through labor transformation from the subsistence agriculture to industrial sector.

Once industrial sector is developed a trickle down effect may transform the subsistence agriculture to commercialised agriculture until the balance is maintained.

Thirwall (1999), on the other hand, emphasises that a common starting point in the consideration of resource allocation and investment decisions is the answer to the questions, which sectors to invest in, which projects should receive priority given the factor endowments and development goals, and which combination of factors should be used.

Yotopoulos and Nugent (1976), made an assessment on structural changes among the main sectoral classifications that are agriculture, industry, and service sectors. They regressed the value added contribution to GDP on per capita income based on cross-sectional data for developing countries. They concluded that as income per capita increases, there was a dramatic decline of the proportion of GDP generated by the primary (agriculture) sector share but counterbalanced by dramatic increase in the share of the industrial sector, but with average growth in service sector. Then, they concluded that this decline in the share shows a structural change in the economy that is associated with agricultural transformation from the agrarian to commercial levels.

However, the size, trade policies, and natural resource endowments variations among different countries might lead to inconsistent results with their findings. For example, a small country open to trade with more natural resources behaves differently from a small country without natural resource endowments. The former may be more reluctant to undergo structural change and wants to maintain considerably larger share for agriculture and considerably smaller share for industry, but the latter may be ready to change. Large countries on the other hand, are more eager to undergo rapid industrialization than small countries because they are having excess economies of scale and higher probabilities of adopting new technologies Yotopoulos and Nugent (1976).

Similarly, Chenery and Syrquin (1975), quoted in Thirwall (1994), elaborated that the regression of the sectoral share to GDP on per capita income would give some indication on how the sector is improving. An income elasticity of demand for a good less than one would imply that its proportional importance in total output would decline as income rises, while at greater than one its importance would increase as income rises. Empirical finding from cross section data indicated that

for most countries, agriculture share was found to be about half, industrial about one and half, and service sector to be about unity.

Thus, in general, the sectoral contribution to GDP comparison among countries does not necessarily indicate the stage of development of each country for many reasons, among which specified above. However it would give more information to look for appropriate policy on decision-making of investments related to development planning. The sectoral contribution to GDP and over all condition of each of the conventional economic classification of the sectors that are agriculture, industrial, and service in Eritrea will be assessed in the following sub-topics.

3.2.1 Agricultural sector

Eritrea is a country of predominantly an agricultural and pastoral economy with sixty up to eighty percent of its population earning livelihood and employment from this sector. Like in most other African countries, agriculture in Eritrea is a main source of food consumption and contributor to foreign exchange earning. In addition, it provides raw materials to the industrial sector, and is a source of employment and surplus for other sectors.

The value added from crop production to total agricultural output was at its highest point in 1998. It contributed about five hundred and two million nakfa, which covered about fifty eight percent, but dramatically fell down to one hundred forty three million nakfa, which accounted about thirty two percent in 2000. The second major contributor to agriculture is livestock, which reached its maximum in 1999 with two hundred sixty six million nakfa and fell to one hundred and eighty six nakfa in 2000. Thus, agriculture as source of food consumption has not been sufficient to provide the required yearly food demand of the country in the last four years.

Thirwall (1999) also emphasised that the fundamental factors that contribute to low agricultural productivity are geography, organization of agriculture, incentives to produce and the supply of inputs. By the same token, agricultural output in Eritrea is very low compared to other African countries due to low productivity in this sector. This low productivity is dictated partly by geographical factors such as weather conditions and landscape, and partly by land tenure systems,

agricultural policies, credit facilities, and lack of extension services pursued in the country. For instance, the mountainous and arid regions of the northern, eastern and western escarpments of the country are not favourable for crop production. The highly uncertain and inconsistent rainfall coupled with weak agricultural infrastructure also contributed to its low agricultural productivity. On the other hand, the land tenure system in the highland part of the country is not conducive for farmers, due to the smallness and quick transfer of ownership of the land. Farmers are not motivated to invest more because ownership would be changed soon. Similarly, there are not economies of scale from investments on small plot of land. Thus, a land reform that does not give a security of tenure for a farmer is not expected to undertake capital improvement and raise productivity. However, the Eastern and Western lowlands of the country are highly fertile and there are high agricultural investment opportunities mainly on the long run.

Furthermore, as in most developing countries, the shortage of credit facilities and market pricing problems are also apparent in Eritrea. In the last three years (1998-2000), for example, the government started to purchase agricultural outputs mainly cereals at higher prices than the farm gate prices offered by the retailers. The policy was to encourage farmers so that they would produce more in the future. However, that could be only a temporary solution. The lasting solution is to invest in the agricultural infrastructure such as transport and communication facilities, financial institutions, water dams, and technical assistances that could help in transforming the traditional rain fed subsistence agriculture to commercial agriculture.

Low agricultural productivity is, some times, associated with either higher ratio of labor to land, like the Asian countries, or high land to labor ratio like in most African countries. In the former case small capital might be required to raise the productivity, while in the latter, high capital investment would be required to initiate higher output (Thirwall, 1999).

However, as Eritrean population is not evenly distributed throughout the country, one may identify high labor to land ratio in the highland region, while high land to labor ratio in the fertile lowland region of the country. Thus, the capital investment in the sector would be determined accordingly. The rearrangement of land holdings to reduce the variation in land to labor ratio, however, should be able to create more rural employment opportunities, alleviate poverty, reduce income inequalities,

and ultimately temper the push factors behind rural-urban migration, which aggravates the existing unemployment level in urban areas.

For agricultural sector to supply food, release labor, provide savings, contribute for the market for the industrial goods and earn foreign exchange, it must generate steadily rising surplus of production in excess of subsistence needs (Thirlwall, 1999).

Eritrea, however, has got unexploited natural resource that would contribute to its domestic food consumption and foreign exchange earning. This sub-agricultural sector is the fishing industry, which is treated as agriculture in the Eritrean National Accounting System. The country has got more than 1000kms coastal line of the Red Sea endowed with different types of fish, sea flowers, and mineral salt. It exports fish mainly to Europe and Middle East. Since the sea is not polluted so far, and has variety of fish with good flavor, there is high demand in the international markets. But, there is low productivity due to lack of skilled manpower and available capital investment in terms of fishing technology in this sector. Thus the demand is not always met. The maximum sustainable yield from the sea is sixty to eighty thousands of tones of fish per year (<http://www.shaebia.com/>, Government Investment Center, 1996). The present yield of the country is however below fifty percent of the maximum sustainable yielding. Thus, the percentage value added to GDP of the fish industry is insignificant. In 1992 it was only 0.1 percent and in 2001 it was only about 0.4 percent and this is insignificant growth in ten years time.

Along with the agricultural output fluctuations, however per capita income varied from one hundred U.S. dollars in 1992 to about two hundred U.S dollars in 1999 (World bank, 2001). This Agricultural output fall coincides with rising in per capita income and it seems to support the argument of Youtpoulos and Nugent. However, since the fall is mainly due to rainfall fluctuation and other factors, it is very difficult to conclude based on the findings of Youtpoulos and Nugent that there is agricultural transformation in Eritrea on direct observation. Furthermore, The time period of one decade might not also be enough to evaluate any structural change of economic sector of a country like that of Eritrea, which has been engaged on rehabilitation and construction of the war ravaged economy and whose agricultural output is mainly dictated by rainfall fluctuations.

The following comparison of agricultural contribution to GDP of other African countries might help to look at the agricultural condition of Eritrea. The average agricultural percentage shares to GDP of Ethiopia, Kenya, South Africa, and Eritrea for the period 1996-2001 were 52, 30, 3.62, and 18 respectively. In a complementary sense, the average industrial percentage shares to GDP for the period specified show 11.12 for Ethiopia, 18.33 for Eritrea, 17.38 for Kenya, and 31.65 for South Africa (World Bank, 2000). Furthermore, the percentage contribution to GDP of the industries and agriculture showed that the South African economy is relatively transformed, while those of Kenya, Ethiopia, and Eritrea are still at subsistence level. Eritrean agricultural share is less than that of Kenya and Ethiopia and its industrial share also is higher than that of Kenya and Ethiopia.

Based on Chenery and Syrquin approach, we regressed agricultural value added on per capita income for eleven years of Eritrea and the result is:

$$\begin{aligned} \text{Agr}^{\wedge} &= -156.5 + 0.832\text{percap}^{\wedge} && (3.2.1.1) \\ t &= (-.491) \quad (3.427) \quad r^2 = 0.595 \quad \text{D.W.} = 1.902 \end{aligned}$$

Where, Agr is agricultural share to GDP; percap is per capita income; r^2 coefficient of determination between the two variables, and D.W is Durbin-Watson test for autocorrelation. The result indicates that as income per capita increases by one unit, agricultural value added changes by 0.832 units only. The t-statistic indicates that the estimated coefficient is statistically significant at five percent significant levels. The coefficient of determination r^2 is not also too low which implies that the variation in agricultural value added is moderately explained by per capita income at least for the given data. Thus it seemed reasonable to conclude that agriculture in Eritrea is not transformed based on the argument of Chenery and Syrquin. Because as per capita income increases sectoral contribution to GDP is still very significant as compared to about 0.5 in their empirical results.

UNIDO (1995) and Government of the state of Eritrea Report (2001) emphasized that based on past experience; Eritrea's agricultural sector can produce large amounts of crops as well as raw materials for industrial enterprises, if there are accesses to use modern cultivation, fertilization, plant protection, and water conservation techniques. Similarly, if due attention and protection are give to

Eritrea's livestock population it is believed that high returns can be obtained from that valuable resources.

The question is, however, what remedial agricultural strategy is required to transform the agricultural sector and be able to get the intended agricultural and livestock outputs. The medium term objective for 2003-2005 of Eritrea emphasized that agricultural contribution to GDP is significantly less than most of other developing countries. Thus the central role of the Ministry of Agriculture now is to support investments in irrigation and conservation soil and water based on demand-driven priorities (Government of the state of Eritrea, 2001). Thus, given the above agricultural background, the long-run agricultural policy in general is aimed to:

- Continuing promotion and expansion program for land tenure improvement, resettlement programs of refugees, and creating basic physical infrastructures;
- Strengthening framework of basic services, particularly agricultural and animal husbandry extensions, crop and livestock marketing, and credit facilities.
- Increasing market production of key food and cash crops by raising crop yield per hectare.
- Increasing animal husbandry and production practices through greater extension efforts, better marketing arrangements, and improving breeding and supplementary feeding.

The long-run agricultural policy sounds good. The problem of Eritrea as developing country is, however, that resources at hand are scarce, but the targets are very ambitious. The return from agriculture is not only aimed to increase output, but also it is a major source of employment. Mechanization would help to increase the yield through improvement in productivity of the factor input, but it could also threaten the livelihood of those who are dependent on agricultural wage, because it minimizes the labor to land ratio and increases the rate of rural unemployment. Thus, marginalizing agricultural sector based on investment criterion might entail negative social return. The choice of agricultural development strategy could be a priority for Eritrean economic growth provided more investment is channeled to increase its productivity. However, the role of industrial sector could also be a push for higher agricultural output provided that the two are complementary to each other.

3.2.2 Industrial sector

Eritrea has predominant small-scale industries and informal sectors, with most of the outputs used for domestic consumption. The small-scale industries include textile factories, leather and shoe factories, plastic and food processing factories, and handicrafts such as welding and carpentry.

Eritrea's manufacturing capacity expanded from 1940s to mid 1970s when it was exporting goods worth about one hundred million U.S. dollars a year, which is almost four folds of today's export of Eritrea. However, it declined rapidly from 1975 when the socialist Ethiopian regime nationalized all the industries under the banner of socialism. Operations were centrally controlled and hampered by bureaucratic and corrupt management practices. In addition, inadequate maintenance, lack of modern technology investment, unnecessary overstaffing, poor management and low utilization capacity, hindered the growth of this sector during 1975-1991 (Government of the State of Eritrea, 2001).

After independence, the immediate task of the government of Eritrea concerning the industrial sector was, to rehabilitate and improve the productivity of these sectors in the short run and to privatize them to viable investors in the long run. Based on the market-oriented policy of the country, almost all the state-owned industries inherited from the socialist economic structure are privatized except four industries (Government of the State of Eritrea, 2001).

A question may be raised, however, whether Eritrean manufacturing goods could be competitive or not in the regional and international markets with the existing export potential and trade policy. Eritrean manufacturing sector is constrained by many factors such as cost of imported materials, skilled manpower, technological investment and above all managerial and entrepreneur ability. Thus it would be too early to conclude that Eritrean manufacturing goods would be competitive in the international market at this stage of development unless the existing constraints are minimized.

Nevertheless, the acceleration of industrial development is essential both to raise income and employment and to diversify the structure of the economy. Moreover, foreign direct investment may provide both the capital and technical knowledge required for industrial development. Along with this, deliberate policies must be pursued to encourage the growth of indigenous enterprises and to

increase national participation in management and financing of new industries. To know the comparative transformation of industrial sector of Eritrea, we regressed industrial contribution to GDP on per capita income, based on Chenery and Syrquin argument, and following are the results.

$$\begin{aligned} \text{Indus}^{\wedge} &= -452.61 + 0.999\text{percap}^{\wedge} && (3.2.2.1) \\ t &= (-1.563) \quad (4.530) \quad r^2 = .719 \quad \text{D.W} = 1.513 \end{aligned}$$

Where, Indus is industrial share of GDP; percap is per capita income; r^2 coefficient of determination between the two variables, and D.W is Durbin-Watson test for autocorrelation. The result indicates that for one unit increase of per capita income, the estimated industrial value added will change by .999 units. The relationship between industrial values added and percap is well explained, because r^2 is very high. Furthermore, the t-statistic indicates that the estimated coefficient of the explanatory variable is statistically significant at the five percent significance level.

Thus it seems reasonable to support Chenery and Syrquin arguments for the industrial sector because as per capita income increases industrial value added also increased at significant level. However, the estimated coefficient is very low compared to the 1.5 for transformed industrial sector suggested by Chenery and Syrquin. Thus, the industrial sector in Eritrea is not transformed.

Furthermore, it is widely accepted that high industrial growth rate induces increasing economic growth rates. Kaldor's engine-of- economic growth hypothesis postulates that industrial growth rate is the main cause for economic growth rate. Empirical analysis from Bairame (1991), and Drakopolous and Theododiou (1991) in Turkey and Greek respectively found a significant correlation relationship between industrial growth and economic growth. A simple regression of real economic growth on industrial growth and finding statistically significant estimated coefficient might lead to the conclusion of accepting the hypothesis that industrial growth is the engine of economic growth. However, Economic growth may also lead to industrial growth for the mere fact that when income raises the demand for industrial goods will also rise and increase industrial productivity and thus industrial growth. But, taking the assumption that industrial growth is the engine of economic growth hypothesis; economic growth is regressed on industrial growth in log forms and gives the following regression result.

$$\text{LnGDP} = 3.896 + 0.673\text{LnIND} \quad (3.2.2.2)$$

$$t = (14.58) \quad (16.88) \quad r^2 = 0.97 \quad \text{D.W.} = 2.32$$

Where IND is Industrial output, and GDP is Gross Domestic Product both at constant 1992 and for the years (1992-2002) of Eritrea. A unit percentage increase in industrial growth induces about 0.673-percentage change in economic growth. The t-statistic indicates that the estimated coefficient of the explanatory variable is statistically significant. Moreover, the high value of the coefficient of determination r^2 with less likely autocorrelation problem makes the fitted data robust. Thus the result supports Kaldor's engine of growth hypothesis and appropriate industry policy could enforce economic growth.

Consequently, it would be imperative to identify the appropriate industrial policy that enhances industrial output. There are many industrial policies explained through different economic theories. The commonly mentioned policies are import substitution and export promotion industrialization. Import substitution refers to the application of trade barriers such as tariffs and taxes to protect domestic industries in their early stage until they become cost effective in the international markets. Export promotion on the other hand, refers to trade or industrial policy where goods and services are sold and bought in the international markets without any additional cost of tariffs, subsidies, and taxes rather based on liberal and competitive markets.

As Lewis (1966) put it, industrialization policy based on import substitution is viable until the economy is substituting for all the manufacturing it can produce economically. But this stage should be temporary, until the import substitution is exhausted and the direction is reversed to export promotion as engine of growth. Import substitution has been successfully used in the East and Southeast Asian countries while it is failed in most Latin America and African countries. These failures are attributed mainly to excessively government intervention, which led the industries to be cost inefficient. Import substitution is criticized because it leads to misallocation of resources, as there are not incentives to maintain cost-price disciplines and improvement in productivity.

The implication of import substitution, however, lies on the ability of domestic market to absorb domestic manufacturing goods. Thus, import substitution industrialization may not be appropriate

industrial policy in small countries like Eritrea that has got very small domestic market. Most small size countries encounter many challenges and economic disadvantages in the international economic interactions due to their limited resources or markets. Thus it is always advisable to follow export-oriented policy in those small countries.

Brigulio (1995) emphasized that small countries would face limited possibilities for economies of scale due to indivisibilities and limited scopes for specialization which entail higher per unit costs of production; limited possibilities for endogenous technology development and more dependent on imported technology; limited natural resources endowments and high imported contents; small domestic markets and dependency on export markets.

Therefore, the competitiveness of manufacturing goods for export of Eritrea mainly depends on the structural reform and export-oriented policies. These in turn demand substantial new investments on equipment and quality control facilities, human capital developments, and effective market assessments. Moreover, export dynamism and diversification away from primary products to new products are prerequisites to manufacturing growth in particular, and to the economy in general (UNCTAD, 1995).

Salvatore (1989) described Africa as the least industrialized region of the world and having to import practically all investment goods and substantial consumer goods. Manufacturing in these countries consists primarily of light industries with quite inefficient by the world standard. Eritrea's manufacturing sector also has the same fate as Salvatore explained for African industries due to deliberate dismantling of the institutions by Ethiopia and low investment to improve its productivity.

Tribe (2000) also explained the characteristics of the manufacturing sectors of African countries and the barriers to their developments. He emphasized that most African neighboring countries produce similar range of products. For example, one finds textile factories producing the same types and qualities of outputs in Eritrea, Ethiopia, Kenya, Sudan and Uganda. He added, that there are difficulties to sustain cooperation in their respective regions due to political reasons, which led them to poor performances of the industrial sectors. Again the conflict between Ethiopia and Eritrea from 1998 shows how the manufacturing sector has been deteriorated in both countries. Both countries

loose markets for their manufacturing products and other accesses. Thus, Tribe's arguments are clearly supported in the context of east African manufacturing conditions.

Another most important point is that African countries do not have developed economic institutions for exports and thus have low capacity to break-in into the world firm markets, which are already established by the high income competitors of developed countries.

Moreover, the vulnerability of African countries' economies to natural disasters also contributed to their lowest shares of manufacturing in the world export markets. The intermittent droughts in east Africa mainly in Ethiopia and Eritrea substantiate this idea vigorously. In addition, the low price elasticity of demand for exports induces instability in the export earnings and creates small and sluggish domestic markets. Furthermore, higher costs of production, inefficiency, and lower productivity restricted them from the benefit of international markets.

The problem of most developing countries is, thus, how to address realistic strategies to achieve these objectives. The choice of appropriate industrial policy for Eritrea is decisive at this moment because both domestic and foreign resources are major constraints to its industrial development. The government owned industries are almost privatized and this could be a promising step to efficiency and higher productivity. Private sector productivity is, however, still low due many constraints. Thus, more skilled manpower, technological transfer, entrepreneurial ability, and capital investments on manufacturing industry are required to make them competitive in the international markets.

3.2.3 Service sector

The service sector includes mainly the financial sector, tourism industry, transportation, and communication services. These sub-sectors are prerequisite economic activities to agricultural and industrial investment opportunities that would increase the economic growth of a country at large. The agricultural sector and the industrial sectors are dependent on the service sectors. However, the over all linkage, coordination and complementarity among the sectors would determine the pattern of economic growth rates of a country.

Helleiner (1982) emphasized that in small-state economies, goods which are produced domestically tend to be exported, while goods which are sold domestically tend to be imported and the commodities which are both produced and consumed tends to be services. Even a substantial amount of these services may be purchased by foreigners, which specialize in tourism, offshore banking, and offshore insurance or tax avoidance facilities.

Tourism is one of the important service sectors commonly practiced in many African countries and it is believed to be an industry, which is the largest single employer in the world. In addition, it is a major source of foreign exchange earnings. Tourism industry is also increasingly providing opportunities to the wider service sectors, as well as for the construction and development infrastructure.

According to Helleiner statement, Eritrea might have both benefits of tourism and offshore services. It has many geographical sites with varying convenient climatic conditions and full security to tourists. The strategic location with the two ports along the Red Sea coastlines allows higher potential and opportunity to develop easily offshore financial services. But, Eritrea is one of the developing countries that lacked opportunities to develop competent service sector in the past forty years. Thus, it has got infant service sectors mainly the financial and the tourism sectors at this moment.

Furthermore, communication facilities as part of service sector are not fully developed so far .The demand for telephone lines is now beyond the reach of the capacity of the sector with the existing old and manual telecommunication facilities. The statistical data of the African Development Indicators (2000) showed that the number of telephones per one thousand people were five and the number of telephone waiting list per one thousand people were forty-two in the year 1999. The number of TVs was also one for one thousand people in 1994. However, the TV coverage area in the country has been increased to almost all of the country starting from 2001. Thus, it is expected to be higher than that by now. Nevertheless, one of the important infrastructures required to develop investment opportunity in Eritrea is communication facility.

Financial sector is another service sector, which could contribute higher share to GDP if fully developed. The financial sector of most LDCs are, however, dominated by commercial banks whose deposits provide the main financial assets other than cash, held by the public. Banking systems are usually oligopolistic and small number of government owned banks control the bulk of markets.

In small country economies, like Eritrea, domestic financial markets are also frequently non-existent, and international movements of capital are usually controlled. The fragmented market structures and high transaction cost of financial institutions of these countries constrain the process of financial intermediation. It is believed that there is a positive correlation between the levels of economic development and financial developments. Financial development plays a great role in augmenting the quantities of real saving and capital formation from given national income. It is also ensured that it facilitates capital movements and increases productivity of investment by improving its reallocation.

The financial sector of Eritrea has limited financial services relative to other countries' financial institutions. The government owned Commercial Bank of Eritrea with more than eighty percent of deposits and domestic lending shares dominates the sector. There is only one housing and commerce bank and another one development and investment bank in the country. The National Insurance Corporation of Eritrea is another non-bank financial sector, which would play a role in the financial transaction of the country. However, the banking system of the country has limited competition capacity under the narrow or non-existence of capital market. Thus it has got abundant liquidity reflecting high level of transfers from Eritreans in Diasporas but at less rate of alternating between saving and investment.

Thus, the financial sector in Eritrea has very limited contribution to GDP. Financial development is measured by the percentage contribution of the financial asset to the total wealth. If the percentage of financial asset contribution for Eritrea is compared from 1992 to 2001, we see that the fluctuation moves with the growth of the whole economy. In 1992 its contribution was 0.1 percent and in 2001 to 0.4 percent. Thus, to mobilize sufficient public and private savings and provide investment capital to all the sectors in the country, Eritrea needs to develop modern and competitive financial institutions that are easily accessible to savers and investors.

Furthermore, as it is analyzed in agriculture and industry sectors, the regression of service share to GDP on per capita income based on Chenery and Syrquin arguments gives the following result:

$$\begin{aligned} \text{Serv}^{\wedge} &= -269.9 + 2.322\text{percap}^{\wedge} && (3.2.3.1) \\ t &= (-0.356) \quad (4.026) \quad r^2 = 0.67 \quad D.W = 1.228 \end{aligned}$$

Where, Serv is Service share to GDP, and percap is per capita income; r^2 is coefficient of determination between the two variables, and D.W is Durbin-Watson test for autocorrelation.

The result indicates that a unit increase in per capita income changes service share of GDP by 2.322 units. The t-value also shows that the estimated coefficient is statistically significant. Furthermore, the coefficient of determination r^2 between the two variables is also reasonably high. However, since the Durbin-Watson test for autocorrelation is low there is more likely that there is autocorrelation problem. However, per capita income change has more effect on service share of GDP than in agriculture and industrial share of GDP. According to the empirical findings of Chenery and Syrquin, the estimated coefficient would have fallen between the estimated coefficients of agricultural and industrial sectors and that is about one. However, albeit the problem of autocorrelation in the estimated parameters, it has been greater than the expected range.

In general, two possible inferences could be done from these analyses. First, Chenery and Syrquin models might not be applicable equally for all economies as they might differ in many economic instances. Secondly, the small sample size may give mixed estimates outside the expected results. However, the sequences of value added contributions to GDP from agriculture to industrial and then to service sectors resemble that there were successive transformations of Eritrean economy from primary goods production stage to secondary and then to tertiary stages. Nonetheless, the economic transformation has not been associated with the emergence of a strong industrial base but rather with growing service sector triggered by a significant expansion of public spending. Thus, this economic transformation is not in conformity with structural transformation defined in the literature as a gradual sectoral shift over a long period of time from agriculture to manufacturing and then to service sectors.

3.3 Economic growth in Eritrea

Economic growth refers to the change of total output expressed in terms of GDP of a country in a specified period of time mostly yearly. The total value of goods and services produced within the border of a country, say Eritrea, regardless of who owns the assets or the nationality of the labor used in producing that output is GDP. The growth of output could be measured in nominal or real terms.

The conventional classical theory posits that aggregate output depends mainly on the three input factors, namely; labor, capital and technological availability explained as factor productivity. It is the production approach to economic growth and describes how inputs contribute to total growth rate. On the other hand, Keynesians explain that aggregate output depends on consumption, government expenditure, investment expenditure and net exports.

In the previous sub-topics we looked at each sectoral contribution to GDP in Eritrea and it was identified that fluctuations in total output have been influenced by many factors before and after 1998. Economic growth was rising at increasing rate up to 1997. But, war and drought have been the major supply shocks to economic growth after 1998. The intermittent rainfall throughout the decade has also adversely affected agricultural output. Public and private sectors that have been major contributors to industrial output have also been seriously affected due to deficiency in skilled labor.

The change in the rate of growth in real economic activity calculated based on simple growth model reflects the changes of gross domestic product from year to year. Thus, the following table gives us a comparative changes among the sectoral growth and economic growth of Eritrea as calculated based on simple growth model.

Table 3.3.1 Economic Growth and Sectoral Growth Rate Trends of Eritrea 1993-2002 (%)
at 1992 constant factor cost

Growth	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Aver 93-02
GDP	9.9	25.7	2.8	9.2	7.8	3.9	0.3	-12.0	8.7	-1.2	5.1
Agriculture	-19.4	36.6	-11.7	-5.8	-0.5	57.3	-7.7	-43.5	29.2	-35.5	-4.5
Industry	43.4	14	21.2	36.9	19.8	-6.5	2.8	-6.4	6.3	9.2	13
Service	18.4	24.7	4.2	6.7	5.7	-7.1	3.0	-0.7	4.6	5.2	6.2
Non-agriculture	22.8	22.5	7.4	13.1	9.3	-6.9	3	-2.3	5	6.3	7.7

Source: Ministry of Finance and IMF estimates

The table shows that economic growth fluctuation is dictated mainly by the growth of agricultural sector. It portrays that the low growth rates have been correlated with the negative growth rates of agricultural sector. The maximum economic growth rate within the given time period was about twenty-six in 1994. Likewise, maximum growth rate in agriculture has been recorded at the same time amounting to about thirty-seven. On the other hand, negative economic growth rate of twelve was reflected mainly due to very low agricultural growth rate of about forty-four in 2000. The industrial and service sectors were also retarded due to the war and drought but the agricultural sector was harmed more seriously. The average growth rate of about five for the ten years seemed not very low compared to the average growth rate of Sub Saharan countries of which Eritrea is part.

Thus, in Eritrea, economic growth is mainly influenced by agricultural development. This might lead to the conclusion that more investment in agricultural infrastructure is required to boost the economy of the country.

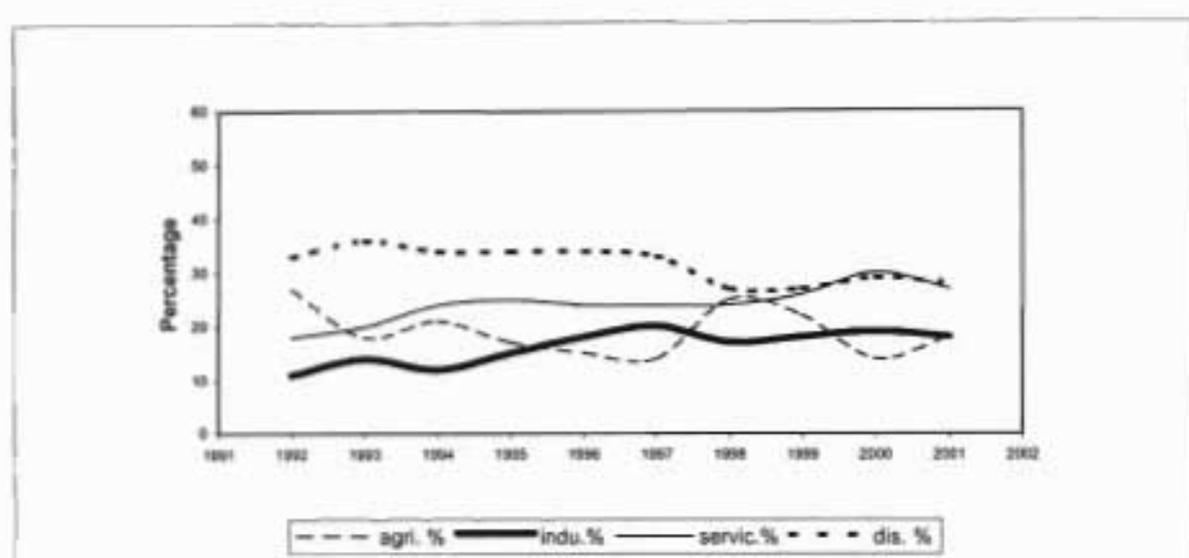
3.4 Relative Percentage Sectoral Contributions to GDP

The economy is generally classified into agriculture, industry and service sectors. Agricultural sector includes crops, livestock, fishing, hunting and forestry. Likewise, industrial sector includes, mining and quarrying, manufacturing, small-scale industries and handicrafts, construction and electricity and water. Moreover, service sector includes, banking and insurance, public administration and development, real estate and housing, tourism, education, health and other domestic services. Finally

distribution sector includes, wholesale and retail trade, transport, and communication. In most cases, the distribution sector is included in the service sector, however, since it contributes major percentage to GDP in our analysis we tried to separate it from service sector.

The graph below shows the relative percentage sectoral contribution to GDP for the ten years for Eritrea.

Figure 3.4.1. Percentage Sectoral Contribution to GDP of Eritrea (1992-2001)



Source: Ministry of Finance of Eritrea Summary Report Jan 2003

The relative share of distribution outweighs the other sub-classifications mainly from 1992-1997. The industrial and service shares grow from 1992-2001 even though they show some fluctuations, while the agricultural sector does not show significant improvement relative the other sectors. The graph depicts another important point about the distribution sector contribution to GDP. It added greater contribution than the other sectors during 1992-1997. Trade was flourishing in this period mainly with African countries until the war with Ethiopia irrupted. Thus, investment on trading business could be more profitable in Eritrea than elsewhere in the neighboring countries due to its strategic location in the region.

Total agricultural output in Eritrea is characterized by high fluctuations throughout the decade. Its average percentage contribution to GDP in 1992 was twenty-seven, but declined to eighteen in 1993, and deteriorated to fourteen in 1997. It was boosted again to twenty-five in 1998 and falls back to fourteen in 2000 (Government of the State of Eritrea Summary, 2003). These show clearly that agricultural output in Eritrea is mainly dependent on rainfall because outputs are fluctuating with variations in rainfalls in the country.

Moreover, the contribution of manufacturing sector to GDP has grown from one hundred and thirty seven million nakfa in 1992 to two hundred and fifty six million nakfa in 2001. It contributed eleven percent in 1992 and consistently improved up to twenty percent in 1997 but declined to eighteen percent in 2001. The decline in manufacturing output from 1998 to 2001 was due to border conflict with the neighboring country, Ethiopia. The reason is that Ethiopia was one of the major importers of Eritrea's manufacturing output. Eritrea's manufacturing export also improved from fifteen millions U.S dollars in 1992 to ninety six millions U.S. dollars in 1996 at F.O.B current prices. It fell down again to twenty millions U.S. dollars in 1999 and started to revive in 2000 to about thirty-seven millions U.S. dollars (World Bank, 2001).

This result or trend of industrial growth has good implication for industrial policy of Eritrea. It gives a lesson that policies should be revised to diversify and specialize in industrial output. It is also required to widen its trade scope in the international market rather than limiting to few countries. One of the alternatives, which Eritrea could benefit from, is regional trade membership. Today, it is a member of the regional organizations such as COMESA, IGAD, and Sahelo- Sahara in African countries. Regional trade partnership enables a country to produce at economies of scale and specialize on those goods with higher comparative advantages

Finally, the percentage share of service sector to GDP is relatively higher than other sectors. When the distribution service is added to other services, it accounts for more than fifty percent of the share to GDP. However, considering only service sector, it contributes about eighteen percent to GDP in 1992 and grows smoothly to about thirty percent of GDP in 2000 (Government of the State of Eritrea Account Summary, 2003).

An equal growth of all sectors may require full utilization of resources and dynamic integrated capacity to mobilize these resources. Eritrea as poor developing country, lacks the complements of skilled manpower, capital, and technological know how. Thus balanced growth development strategy might be very challenging given the above resources. Capturing the available resources and directing them to very strategy sectors and expecting a trickle down effect on other sectors might also be challenging due to low entrepreneurial capability and capital investment. Thus, detailed development strategy study that captures all resources and incorporates planning and policy is required to reach at conclusive results. Nevertheless, balanced growth development policy is more likely than unbalanced growth model in the existing economic conditions, where public sector plays a greater role than the private sector in the economic arena of the country.

CHAPTER FOUR

MACROECONOMIC POLICY IN ERITREA

4.1 Introduction

Macroeconomic policy plays an important role in either stimulating or depressing economic growth in many developing countries. For example, a neutral fiscal policy in regard to its effect on private investments, and liberal monetary and financial policies would play a crucial role in promoting economic development. Similarly, a tight or flexible monetary policy has significant influence on the interest rate and inflation rates, which in turn, affects economic growth positively or negatively. Thus, in this topic of macroeconomic policy of Eritrea and its role to promote economic growth and maintain macroeconomic instability will be discussed.

Eritrea has adopted a market economy that is directed to pursue prudent fiscal, monetary, trade, and investment policies that mobilize and allocate resources efficiently with the aim of rapid economic development. Its policies focus on maintaining macroeconomic stability and promoting competitive private sector development supported by effective public sector management (Government of the State of Eritrea, 2001).

Eritrea, as a newly emerged state with limited institutional structures, has been striving to develop well-integrated macroeconomic policy in the past ten years. There are some exercises of development plans attempted at ministerial levels in short term and medium term to reflect sectoral objective targets. These development plans were, however, projections of expenditures and revenues that do not account for policy instruments. For example, the medium term objectives presented below highlight the general projection and framework of its macroeconomic plans for the years 2003-2005. According to the Government of the State of Eritrea (2001) report, the macro economic projections cited for the above period are:

- to increase the rate of economic growth from negative twelve in 2000 to over ten percent in 2005.
- to minimize inflation rate from about twenty-six in 2000 to the level of five percent in 2005.
- to boost export from a level of twenty six million (in US dollars) in 2000 to two hundred million (in US dollar) in 2007.
- to maintain macroeconomic stability through decreasing the external current account deficit to the level of twenty percent of GDP
- to rebuild the reserve requirement from a one month in 2002 to a five month of imports in 2005.

One of the main opportunities so far proposed that could substantiate the achievement of the above targets is to develop new export markets. The report indicated that Eritrea is very eager to use the trade access awarded to African countries from USA and EU. These accesses promised the elimination of duties and quotas in all products. Many people, however, are not confident enough on the reliability of policy on the Western and American markets. In fact, it would help Eritrea to boost its export sector in the long run if it is able to compete with many well experience export-oriented countries on the world market. However, this policy seemed far-reached and unrealistic relative to the existing export potential of Eritrea because of the comparative advantage it has at this stage. Thus, it would be profitable to exploit domestic markets and expand to neighboring countries mainly African markets and enter step by step to the international markets.

The second proposed promising factor that would contribute to higher targeted output mentioned in the development plan is to increase agricultural productivity. This has been assessed in the sub-topic of agriculture in Eritrea, which implies that Eritrea has got many promising factors that contribute to agricultural growth rate mainly in livestock and fishing industries. However, there are many challenging problems that hinder the productivity of the sector. Such factors mainly include dependency on rainfall, intermittent droughts, low investment initiatives, shortages of skilled manpower, limited and almost none agricultural entrepreneurial ability, and above all constraint in technology, and research and development. Hence, the target will be met only when the above problems are alleviated or minimized.

Furthermore, maintaining macroeconomic stability is another factor that can help to achieve the desired projected development plans. Macroeconomic stability refers mainly to managing balance of payments, stable exchange rates and interest rates, and maintaining minimum inflation rates with increasing economic growth rates and lower unemployment rates. The immediate instruments used to maintain macroeconomic stability are fiscal and monetary policies. The effect of fiscal policy mainly depends on two options: that is to decrease the expenditure as much as possible or to increase the revenue to keep balance of payments in balance. The former option seems more likely than the latter because in most developing countries in general, and in particular in Eritrea, the ability to collect more revenues through taxation is handicapped by low per capita income and weak tax collection administration. Furthermore, the tax base may be limited and raising tax rates may simply lead to more tax evasion. Thus, government expenditure reduction would be relatively easier mechanism. However, on the other hand political pressures make it very difficult to cut government expenditure particularly current expenditure, since this often involves cutting welfare programs and wages and salaries of public employees. Thus, government expenditure reductions in these countries moved from recurrent expenditure to capital expenditure. Consequently, capital projects are either abandoned or extended to long period of time, which led them again to low economic growth and poverty. As a result, expenditure reduction solely might not be an appropriate policy when the expenditure is targeted to basic needs and public investments and project programs. Thus, increasing revenue through improved tax administration and reduction of non-productive consumption would be appropriate policy to narrow the gap of macroeconomic imbalances.

4.2 Fiscal Policy in Eritrea

Fiscal and monetary policies are commonly used in maintaining stability of the economy. There are, however, other interlinked macroeconomic policies such as exchange rate, interest rate, inflation rate, and other microeconomic policies, which play a great role in open market economies to maintain macroeconomic stabilities. Fiscal sustainability is not affected only by expenditure and revenue variables, but real GDP also has crucial role in maintaining fiscal balances. For example, a rise in interest rates would lower economic growth. Moreover, an appreciation of exchange rates would also lower exports and affects economic growth rate negatively in the short run provided that

other parallel remedial policies are not taken and economic growth in turn affects the expenditure and revenue variables, hence fiscal imbalance.

In Eritrea however more weight is given to fiscal policy than to monetary and other policies mainly due to low institutional capacities to use complementary policies. Fiscal policy can take either the form of discretionary change in the amount of government expenditures or a change in the tax rates for personal income taxes, corporate income taxes, excise taxes or other type of taxes. The most powerful short-term policy weapon a government has is then the ability to change its purchases of goods and services from the private sector of the economy such as construction of infrastructure or additions to government employment. According to the IMF Country Report for Eritrea (2003), fiscal sustainability is said to exist when the present value of budget constraint is satisfied without a major abrupt correction having been made in the balance of income and expenditure to avoid solvency and liquidity problems.

Recent developments in the theory of investment indicate that monetary policy might be the least effective of all the macroeconomic policy instruments. The most effective policy instrument would be expenditure and tax policy through their effect on aggregate demand and marginal efficiency of capital (Barret, 1975).

Therefore fiscal policy used to increase the rate of growth of GDP took the form of decreasing tax rates mainly on investment goods provided there is a prominent private sector. If the private sector is not efficient to mobilize domestic resources that are accumulated due to tax cuts, then public investments are justifiable. Thus, based on the above rationale of fiscal policy, the main fiscal policy components will be discussed below in the context of Eritrean economy.

4.2.1 Public Expenditure

Government expenditure comprises current expenditure consisting of consumption, subsidies, salaries and wages for the public sector and capital expenditure consisting of mainly public fixed investments and project expenditures with limited life spans. There are many arguments for and against government expenditure for the fact that it is related to many economic targets.

Empirical studies have shown different results as to the effect of government expenditure on economic growth in the context of developing countries. Keynes was the first to recommend that increasing government expenditure during the severe depression of the 1930s would restore the disequilibria through high demand. He proposed that fiscal policy which allows an increase in government expenditure has a strong effect on output and balance of payments under fixed exchange rates and is also used to offset an adverse effect on real output caused by income policies.

Monetarists, however, argued that given highly interest elastic aggregate investment and highly inelastic demand for money, the money supply might have a powerful effect on real output in the short run, while government expenditure has little or no effect because of crowding out. However, in the long run neither increases in expenditure nor in money supply affect real output. Thus, the rate of growth of money supply determines both the rate of inflation and change in the exchange rates (Cuthbertson, 1979).

The argument that fiscal policy could enhance economic growth has gained additional support from the new economic growth theory. Unlike the neoclassical growth theory, which does not give any room for government expenditure, the new economic growth theory postulates that there is a possibility of long run and short run effect of government expenditure on economic growth (Ram, 1986).

However, there is no single analytical framework or model appropriate for tackling problems of macroeconomic instabilities in all developing countries. In addition, there are many other factors that affect the macroeconomic stability of a country. For instance, the levels of income and development, sectoral structure, demographics and politics are known to influence the level and trend of government spending in all countries. Thus, these differences can lead to different results from the expected policy impact on targeted objectives. For example, governments of developing countries are usually obliged to carry out those investment projects necessary for the creation of the infrastructure required to increase economic growth rates to the extent that private investments are not forthcoming. These emanate from the overall processes of changes from traditional to modern pattern of living and social mobilization, which increase the demand for social services. Thus, in

pattern of living and social mobilization, which increase the demand for social services. Thus, in African context, the long standing responsibilities assigned to governments to provide basic social and infrastructure services in the face of limited taxable capacity have put the overall budget positions of many countries under some restraints (Cook and Kirkpatrick, 1990).

Similarly, Hassain and Chowdhury (1998), and Jha (1994), added that expenditure reduction through tighter fiscal and monetary policies might affect the poorer section of the population severely. When these policies are applied to restore the internal and external balances, care must be taken whether the shock is temporary and reversible or permanent and irreversible. They argued that using such policies would lead to reduction in output and employment or higher inflation rate that worsen again the external balance. They recommended that if the shock is temporary, borrowing from abroad to mitigate the short run effect on domestic expenditure would be appropriate. But if the shocks were permanent, declining consumption to new level of national income would be the permissible policy.

The point is however, whether the government expenditure source is to be financed from revenues extracted through taxation or other sources such as domestic credit creation, printing more money or selling bonds in the financial market. When a government finances its expenditure through other sources rather than its taxation it is termed as deficit financing. Deficit financing would have positive or negative impact on the rate of economic growth. Most of the time it is recommended that government spending would be financed by tax revenues because other alternative policy measures would lead to other consequences such as severe inflation rates and balance of payments problems if they are not carefully managed. Deficit financing will be discussed in the next sub-topic.

Nevertheless, there is not a question for the rigidity of the supply side of the Eritrean economy for many reasons. Albeit its short time experience of its independence, it is endowed with limited natural, physical and human capital, institutional, and technological resources. Thus, maintaining macroeconomic stability heavily lies on fiscal arrangements. However, it would also be important to look for policies, which would improve the productivity of the economy so that economic growth is maintained. Consequently, the coherence between the demand management and output improvement lies on designing appropriate policies, as there are trade-offs among many policies.

The expenditure and revenue records of Eritrea for 1992-2002 showed that the country never experienced a surplus within these years. However, it has achieved increasing positive economic growth rates from 1993-1997 with some fluctuations despite its deficit financing. According to IMF Country Report for Eritrea (2003), and Government of the State of Eritrea Account Summary (2003), the percentage economic growth rate of Eritrea was about ten in 1992, increased to about twenty-six in 1994 and fluctuating in positive rates up to 1998. In fact, it started to decline from about less than half rates in 1999 to about negative twelve in 2000, but again recovered to about negative one in 2002 (table 3.2.3.1). The average economic growth rate for the ten years of Eritrea was 5 percent. This relationship indicates that government expenditure and economic growth in Eritrea seemed to have an impressive relationship.

Similarly, World Bank (1996) emphasised that robust empirical evidence supports the view that government spending tends to be productive and to promote economic growth where it corrects proven market failures and truly complements private activities as do some infrastructure investments, preventive cares, and basic educations. Hitiris (1990) also said that as economy grows, government expenditure as a ratio of GDP tends to rise.

Furthermore, in Eritrea, total government expenditure excluding net lending and special programs as a percentage of GDP in 1993 was about fifty-four percent and rose to sixty seven percent in 1995 and spiked to about ninety one percent in 1999. Total government revenue was not growing with increase in expenditure and this resulted in about fifty eight percent to GDP government deficits in 1999. These excess deficits however were due to high defence expenditures, imported inputs, and consumer goods prices during the war. Defence expenditure rose from about thirteen percent of GDP in 1997 to an average of thirty eight percent of GDP during 1998-2000. Therefore, it is true that deficit financing would have positive effect in the short-run if the spending were directed to more selected and productive projects. Another interesting observation from the trend of expenditure and economic growth is that, government expenditure has lagged short run effect on the economy. High expenditure in 1993 might led to high growth rate in 1994 and high spending in 1995 led to higher growth rate in 1996. This might have an implication on the argument that government expenditure has a positive effect on economic growth.

Moreover, in the government versus private share of economic performance debate, the shares of government expenditure and government revenue to GDP are taken as a measure of government dominance in a specified economy. This explicitly implies that huge government expenditure goes with lower output growth because of crowding out, while private sector is considered more efficient and good contributor to growth than government. However, in the absence of efficient and strong private sector, dominant government expenditure directed mainly to public investment would be a better performer than an undeveloped private sector.

Thus, during transition like that of Eritrea, the fiscal budget could be an important instrument of economic policy. The effectiveness in maintaining macroeconomic stability, implementing new spending priorities and promoting efficient use of public resources hinges on improved budget management and expenditure control.

Therefore, the appropriate policy implication is to reduce consumption and other non-productive expenditure and divert it to public investment so that the economy would recover. Designing updated and efficient tax regulations and administration would contribute to increasing the domestic resources mobilization. At this stage, however, domestic resource mobilization would not be sufficient, but foreign resources would help to fill the gap. Countries that have faced long period wars require huge capital to rehabilitate their economies. Likewise, Eritrea is now on a stage to reconstruct its war damaged economy through economic campaign in some specified plan period. In this context, it could be said that Eritrea might face huge deficit in the short term due to excess government expenditure on infrastructures and rehabilitation programs. However, good economic growth rate is expected in the long run.

4.2.2 Taxation as a policy instrument in Eritrea

Taxation is the process by which government collects revenue to finance public activities conducted under its mandate. It is another policy instrument used to regulate the budget balance of the balance of payments. It is also used to reallocate resources between high and low-income groups as well as between savers and investors in a country. Furthermore, the amount of tax to be collected depends on many factors such as level of income, structure of the economy and cost of collecting the tax. The

demand for generating greater tax revenue in LDCs emanates from the necessity to finance public investment projects. But sharp drops in output, together with a series of limitations in current tax administrations have constrained the capacity of those countries of raising revenues.

Ghatak (1995), for example, argues that the tax structures of most LDCs are narrowly based, inelastic with respect to income and greatly dependent upon indirect rather than direct taxes. Thus if fiscal policy is to play a more vigorous role to promote revenue, growth and stability, it is imperative that the taxation system be improved. Basically, taxation affects either consumption or saving and this in turn affects real output. Jackson (1993) stated also that taxes levied on income would have a discouraging work effort, but expenditure tax curtails consumption so that savings would be raised. Thus, there is a trade-off between current and future consumption, hence saving. There is an income effect that raises savings and substitution effect that reduces saving because the relative price of future consumption has been increased as a result of the tax. Moreover, most governments face policy problems to choose that tax rate, which maximize welfare and revenue as well as that tax rate, which minimizes cost of taxation. Optimal taxation assumes that governments have to raise a fixed amount of revenue with limited set of tax instruments that should be administered costless. Decreasing expenditures or/and raising revenues can generate government savings.

However, according to (Abedian & Standish 1992), on the other hand, massive tax cuts with substantial productive incentives may cause deficit. It is also possible that the favorable results of tax cuts might out weigh crowding out effect of borrowing. Likewise, it is conceivable that the beneficiaries of an expenditure scheme one which leads to fiscal deficit could generate economic growth in excess of what has been forfeited due to the crowding out effect.

If we investigate the percentage ratio of total revenue excluding grants to GDP for Eritrea for the years 1993-2002, it has not shown so much improvement. In 1992 it was about thirty six percent of GDP reaching its maximum about forty one percent while dropped to its minimum of twenty five percent in 2000 percent. Total tax revenue percentage to GDP was maximum in 1992 with twenty one percent to GDP in 1992 and its lowest contribution was about sixteen percent to GDP in 2000. This shows that, either there is not an initiative taken to change taxation policy or the policy taken does not improve the collection of taxes in Eritrea. Basically government revenue from taxes is

expected to increase with the rise in economic growth although, this did not prevail in Eritrea during the past ten years.

Todaro (2000) explained that direct taxes make up from twenty percent to thirty percent of total tax revenue for most LDCs and ranges from twelve to twenty percent of their GNP. Tanzi (1991), also indicated that tax revenue as a percentage of GNP is very low for developing countries averaging to twenty percent while it is over thirty percent in developed countries.

The percentage of direct tax to total tax revenue for Eritrea, however, was thirty five percent in 1993 and reached a maximum of fifty three percent in 1998. These ranges are greater than the average percentages identified by Todaro for LDCs. This may have good implication for the development of private sector in Eritrea. The total tax revenue collection that varied between twenty-four and forty one percent to GDP is not too low in comparison with Tanzi's range in the above. However, it would be important to compare the revenue collection with expenditure paralleling it. Extreme government expenditure might stripe out high taxation collection and results in a series deficit problem. Leod (1973) explained from his findings carried out on developing countries that there is a positive response of the changes of economic growth from a change in government revenue share to GDP.

Finally, an assessment of the impact of tax reform depends not only on the changes in tax policy, but also on the elasticities of substitution along all the relevant margins. The intertemporal margin involving the allocation of resources between present and future consumption is essential to the evaluation of the consequence of a tax reform involving changes in the treatment of income from capital (Jorgenson and Yun, 1990). Thus a tax structure that substantially improves mobilization of revenue, promotes efficient use of resources, and provides incentives to investors is basically needed.

4.3 Balance of Payments Management and its Impact

Balance of payments comprises of a current account that summarizes a country's exports and imports of goods and services and capital account that keeps track of short and long-term capital movements between the domestic country and the rest of the world.

Monetarists and the structuralists have different views in analysing the balance of payments as a stabilization objective. Monetarists argue that, it is irrelevant to decompose the balance of payments into current and capital accounts; instead, it is seen as a reflection of the interaction between the demand and supply of money. Thus, the balance of payments is linked to domestic money through exchange rate, and devaluation is the standard prescription for balance of payments deficit.

On the other hand the structuralists argue that balance of payments disequilibrium in LDCs is looked in terms of the economic structure versus the international economic forces at work. The reason behind the disequilibrium is that primary product exports from LDCs face inelastic demand on the international market and the protectionist measures against LDCs' exports. Thus, higher demand of imports associated with low export instability, and scarcity of foreign exchange earnings have adverse effects on the balance of payments (Cook and Kirkpatrick, 1990).

Furthermore, the impact of balance of payments instability could also be reviewed through the analysis of deficits and its financing as well as the two gap models in the Eritrean context.

4.3.1 Deficit financing in Eritrea

Public sector deficit, in short, is the excess of government expenditure over total government revenue. Similarly, when there are excesses of imports over exports, a country's national account prevails current account deficit. As is explained by the New Cambridge Expenditure Approach to economic management, general relationships between budget and current account deficits could be constructed as follows.

$$(G-T) + (I-S) = (X-M) \tag{4.3.1.1}$$

Given (G-T) as budget deficit, (I-S) investment- saving differential or gap, and (X-M) as the current account deficit, the cumulative effect of budget deficit and investment saving gap would be reflected on the current account balance. The common explanation of the above relationship is that, as the investment-saving differential is very small with undeveloped private sector, the budget deficit is the cause of the current account deficit. Recardian argument, however, states that budget deficit does not

cause current account deficit. It expresses that a reduction of taxation or increase in expenditure due to any inflow of foreign resources does not have any effect on the households' decisions on consumption overtime. Thus, Ricardian equivalence hypothesis argues that government dissaving is matched by an increase in private saving and, in this way, the government dissaving does not affect the equilibrium of trade balance, interest rate, demand for money, private consumption, investment (Vomvoukas, 1997).

There are also other arguments for and against any direct link between budget deficit and economic growth. Ghatak (1995) says that budget deficit would contribute to economic growth because it can stimulate investment profitability and greater utilization of capacity through increased demand and consequently lowering of the cost of production if there is excess capacity. These benefits are however attainable provided that the supply side of the economy is elastic otherwise inflation is inevitable.

However, the negative argument for budget deficit postulates that it stimulates wrong type of investment and inflation may also go out of control and retard development. It would also affect adversely the productive investments and the balance of payments and ultimately distorts real rate of return, induces inefficient allocation of resources and creates inequalities in income distribution.

If we look at the Eritrean balance of payments condition, the average budget deficit percentage to GDP excluding grant as revenue for the years (1993-1997) was about nineteen percent, but it escalated to about forty two percent for the average years (1998-2002). This implies that expenditure has been growing in an extremely higher rate than revenue. The average economic growth of Eritrea within the first five years specified was about eleven percent, while for the second five years it was about point two percent. The extremely high deficit identified in the second half was due to increased defense expenditure of the war. Thus a moderate deficit could be associated with high performance in economic growth in Eritrean context.

In most cases persistent deficits are attributed to the dependency on excess money creation that results in higher inflation. In a growing economy it would be possible to finance deficit through expanding monetary base to a limited extent but, the rate of money creation should not exceed the

growth rate of demand for money. In this context, individuals are taxed by inflation because the real value of their money holding falls as the government's claims on real assets (seignorage) and this is implicitly inflation tax. This inflation tax is forced saving attributed to income redistribution either from low to high propensities or transferred resources from holders of money to the government (Thirwall 1999).

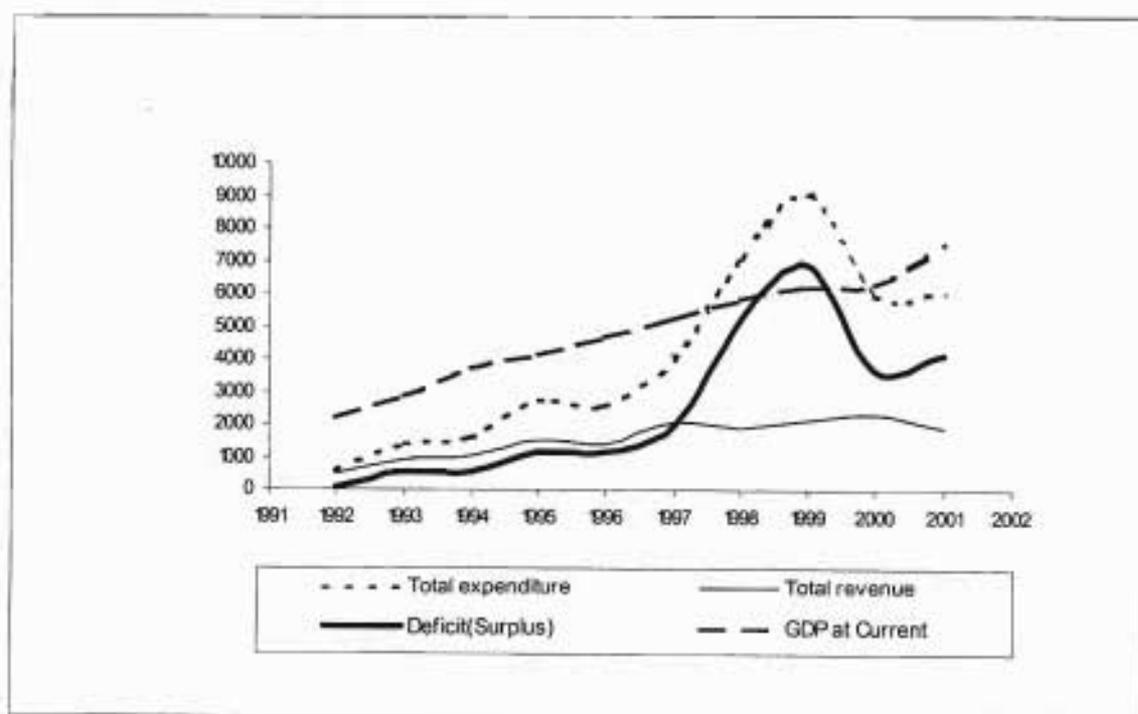
On the other hand, over reliance on foreign borrowing can cause appreciating real exchange rate, which widen current account deficit, dwindling foreign exchange reserve and unsustainable external indebtedness. Over reliance on domestic borrowing may also result in higher real interest rate and falling private investment due to crowding out effect (World Bank, 1988; Tuffour, 1999). When growth rate exceeds the real interest rate on government debt, then permanent deficits are feasible (Chalk, 2000; Fisher and Easterly, 1990). Consequently, Fisher and Easterly (1990), suggested that the maximum rate of non-inflationary money creation in the long run is estimated to be around 2.5 percent of GNP for developing countries.

Moreover, according to the IMF Country Report of Eritrea (2003), deficit in Eritrea is financed at large by domestic credit and Diasporas remittance and by the substantial increase in external assistance for reconstruction. Financing of the government expenditure from domestic sources reached only about 43 percent of GDP in 1999, but domestic borrowing in 1999 accounted for more than 100 percent of the increase in domestic credit of the banking system. The argument forwarded by the Fund is that more borrowing to the government reduces excess liquidity in the financial system and crowded out private sector demand, which in turn impairs private sector growth and development. Most loans of Eritrea, until it faced the series drought and war in 1998, however, were channelled to public infrastructures and other public investment program and large part of it was covered from domestic borrowing. For example, seventy-five percent of its debt was domestic borrowing while the remaining twenty-five percent was external debt in 1995. But, in 2002 the proportion has been changed with sixty percent domestic debt and the remaining forty percent external debts.

The graph below summarizes how government expenditure, government revenue, and overall budget deficits are related to output growth in terms of GDP in Eritrea. Most of the economic indicators

were moving together up to 1997. Government expenditure was growing at the same pace with gross domestic product. Total revenue, however, was not progressing as government expenditure and it shows almost the same growth from 1992 to 2001. Budget deficit was swaying with government expenditure as tax revenues were highly dominated by extreme spending. It is observed that government expenditure started to rise at higher rate from mid 1997 and reached its maximum around 1999. Both the government expenditure and deficit started to decline from 2000 and GDP seemed to revive. This shows that government expenditure and GDP have a direct relationship in the context of Eritrea. But, extremely high expenditure has a negative effect on GDP. Thus, deficit financing would have also a positive implication but to the extent of a limited level.

Figure.4.3.1.1 Total Expenditure, Revenue, GDP and Deficit Patterns of Eritrea (1992-2002)
In millions of nakfa



Source: Ministry of Finance; Jan.2003

4.3.2 The two-gap models

The dual (two) gap analysis indicates, how foreign resources may be used to supplement the foreign exchange at times when exports are not sufficient to provide enough fund to import goods in one

hand, or to supplement the deficiency of domestic saving so that sufficient investment is implemented to foster higher economic growth. These models are used for planning purposes. They would help to indicate priorities for policy planning and suggest the extent to which resources are to be projected in the future.

When the investment requirement is less than the flow of foreign resources plus total saving, then the saving gap or constraint is binding. When the foreign resources are not enough to bridge the gap between imports and exports, then it is binding. The World Bank also used the model in its analytical approach to stabilization and adjustment program. It tried to specify the targets of changes of output and international reserve through the manipulation of policy instruments of government consumption and taxation revenues.

4.3.2.1 Import -export gap

The choice of a country whether to follow a trade policy oriented to import substitution or export promotion has been debatable. The empirical investigations between export growth and economic growth expansion has been dealt in different ways. It is believed that export growth primarily has a direct impact on output growth. Likewise, it plays a great role in stimulating demand and encouraging saving and capital accumulation. It also relieves the balance of payments constraint as far as there is output growth that boosts the proportional of exports more than imports. If minimum import requirements to achieve the growth rate target are greater than maximum level of export earnings then import-export gap exists. The relationship between exports and imports in the gap is represented (Thirwall, 1994) as follows.

$$M_t - X_t = (r/m') Y_t - iY_t \quad (4.3.2.1a)$$

Where M_t is quantity of imports; X_t is quantity of exports; r is rate of growth; m' is output – import ratio; Y_t is nominal output; and i is import to output ratio. Thus, the difference between changes in imports and changes in exports should be disclosed by the changes in foreign borrowing to sustain the required growth rate.

$$\Delta M_t - \Delta X_t = F_t - F_0 \quad (4.3.2.1b)$$

Where, F_t is Foreign borrowing at period t and F_0 is Foreign borrowing at the initial (base) year. The export gap will also become less and less restrictive as time goes on, provided that export increases at a faster rate than national income and import falls as more capital goods are produced domestically.

On the other side, the level of domestic income influences the level of imports. Basically, in a balanced budget economy what is imported should be financed by what is exported. In countries at transition period, like Eritrea, however the amount of goods and services imported is larger than what is exported because imports are required for physical investment and necessary inputs for many manufacturing plants. The main problem is that exports add negligible amount to the revenue let alone to cover imports. Thus, in the Eritrean context, it is expected that import growth will have positive impact on economic growth when the imported goods or inputs are investment goods. Nonetheless, when the imported goods are for consumption it is expected to have a negative effect to economic growth, although it would increase utility from higher consumption. Imports, however, depend on the growth of income of a country and as income increases the demand for imported goods also rise.

4.3.2.2. Investment-saving gap

Saving is a function of disposable income. As income rises saving would also rise provided that the marginal propensity to save is not lowered. If what is saved is invested in turn income would rise. Saving however comprises private and public savings. Public saving depends on taxation revenue and government expenditure, while private saving depends on households' and private sector' income and consumption levels. If domestic saving is calculated to be less than the level required to achieve the targeted rate of growth, then there exists an investment- saving gap explained by the following relationships (Thirwall, 1994).

$$I_t - S_t = (r/p)Y_t - sY_t \quad (4.3.2.2a)$$

For, I_t is investment; S_t is saving; r is rate of growth; p is capital-output ratio; Y_t is nominal output; and s is saving output ratio. Thus, the difference between changes in investment and changes in saving should be disclosed by the changes in foreign borrowing to sustain the required growth rate.

$$\Delta I_t - \Delta S_t = F_t - F_0 \quad (4.3.2.2b)$$

Where, F_t is Foreign borrowing at period t and F_0 is Foreign borrowing at the initial or base year. The policy implication to increase saving, then lies upon the manipulation of fiscal policy on taxation and expenditure. If domestic saving is not sufficient to fill the gap, then either domestic borrowing from private sector or foreign loan should play to fill the gap.

When a trade constraint is active, the impact of foreign inflow on ex-post saving is more likely to be positive, since external resources then help to relieve the independency on investment imposed by a shortage of specific required imports. However, the results test designed to distinguish among alternative binding constraints suggest that the savings constraint has more often been binding than the trade constraints (Thirwall, 1994). However, Weisskopf (1972) suggested that an increase in foreign saving constitute an addition to the total supply of resource and induces domestic residents to increase absorption, therefore lowering domestic savings.

**Table 4.3.2.2 Investment-Saving and Import - Export gaps of Eritrea
as % of GDP (Real U.S.dollars (1992-1998))**

Time	1992	1993	1994	1995	1996	1997	1998
Public investment	3.6	14.1	10.5	11.1	15.4	18.9	16.9
Private investment	1.8	1.0	7.3	8.2	13.9	22.0	24.0
Gross domestic investment	5.4	15.1	17.8	19.3	29.3	40.9	40.9
Gross domestic saving	-31.3	-24.6	-35.4	-31.5	-31	-17.4	-29.0
Saving-Investment gap	-36.7	-39.7	-53.2	-50.8	-60.3	-58.3	-69.9
Exports of goods and non-factor services	20	33.9	28.3	29.9	31.5	30.7	19.7
Imports of goods and non-factor services	56.6	73.6	81.4	80.7	91.8	89.0	89.6
Resources balances	-36.6	-39.7	-53.1	-50.8	-60.3	-58.3	-69.9
Real GDP	521	508	558	574	612	661	681

Source: African Development Indicators 2000

The table depicts that public investment has been growing for the whole time period specified and private investment as well was growing even at a higher proportion than public sector investment. Thus, the crowding out effect of public sector to private sector seemed not viable in the context of Eritrea at least for the given data in the above table. In ex ante, the two-gaps are equal, however the existence of the two gaps has been evident for all the years.

Furthermore, gross domestic investment in 1992, as percentage of GDP was about five and half of which about two were private investment and three and half public investments. Domestic saving on the other hand was about negative- thirty-one and half percent to GDP. Thus, the saving investment gap was negative thirty-six and half percent of GDP. Furthermore, domestic investment increased to about forty-one percent of GDP for 1997 and domestic saving also increased to about negative seventeen percent to GDP, but the saving investment gap is still widening. This shows that both public and private domestic savings are not augmenting.

In addition, the export of goods and non-factor services percentage to GDP grew from twenty in 1992 to about thirty-one in 1997, while the imports increased from fifty-six percent of GDP in 1992 to eighty-nine percent in 1997. This shows that imports were growing at a greater proportion than exports and thus, widening the gap.

Thus, with low per capita income and widespread poverty, Eritrea's ability to mobilize sufficient domestic savings to finance the required investment is limited. These low saving rates that accounted for very negligible contribution to investment are then main constraints to economic growth. Consequently, exports constitutes less than 50 percent of imports in all the years specified. These inadequate export earnings did not provide enough foreign exchange earnings necessary to import machinery, equipment, and essential production inputs of the country and thus external account imbalance prevailed.

4.4 Monetary Policy in Eritrea

Eritrea was in de facto currency union with Ethiopia until November 1997. The government decided to take full control of its own monetary policy and introduced a new national currency, nakfa,

effective November 8, 1997. It thus, terminated the birr's (Ethiopian currency) status as legal tender in Eritrea as of November 27, 1997(Government of the State of Eritrea, 2001).

The main objectives of National Bank of Eritrea are to maintain price stability, create conducive conditions for private sector, and establish dynamic financial sector and finally to reinforce economic growth. Some of the key instruments of monetary policy are open market operation, reserve requirement, interest rate intervention, and direct control over the amount of money supply through credit creation. In most developing countries in general and in Eritrea in particular, many of the monetary instruments do not function properly. The main reason is that they do not have a well-established capital market, which would help them to facilitate open financial market and interest rate transactions. For example, there are only three banks in Eritrea currently; with more than 80 percent under control of the state-owned commercial bank. In this condition, financial markets are far from competitiveness. Interest rates for lending are determined by the banks based on their analysis of risks on each project in each sector. However, the bank of Eritrea would make sure that the term structure of the interest rates reflect the long term opportunity cost of funds to the banking system, a risk premium and attracting investors to strategic sectors (Government of the State of Eritrea, 2001).

Furthermore, the current lending interest rate of the banks spreads from eight to twelve percent per year based on the sectors demanding the credit, while the deposit or saving interest rates range from six to six and half percent per annum (National Bank of Eritrea, 2003). These ranges have not been changed since the official control of the monetary policy of the National Bank of Eritrea in 1997. Actually, upper and lower interest rate ceilings are imposed and market operation are not expected to function properly in this dual monetary characteristics. Thus, the National Bank Eritrea has little control on the money supply through interest rate instrument.

In principle, consistent with its overall market based, export-oriented, and private sector-led development strategy, Eritrea adopted a managed floating exchange rate system following the introduction of nakfa (Government of the State of Eritrea, 2001). Consequently, the National Bank of Eritrea is expected to monitor and influence the exchange rate movement through selling and buying foreign currencies in the foreign exchange market. However since 1998, with the break of the

boarder war with Ethiopia, the bank could not defend the exchange rate through market operation and hence temporary exchange rate control was imposed. In addition, although Eritrea gets some foreign exchange earning from abroad remittance, the imposition of exchange control led to high demand of foreign exchange in the black market, which pushed the rate of exchange and inflation rate simultaneously upward. People thus preferred the black market to the official exchange rate, which give them more domestic currency relative to the official rate. Thus, this limited foreign exchange earning impedes the bank to monitor the money supply through the reserve requirement instrument. Thus, the bank is left with domestic credit creation as monetary instrument to maintain its money supply balance. The relationship of money supply to reserve requirement and domestic credit creation, is explained as follows:

$$\Delta Ms = \Delta R + \Delta DC \quad (4.4.1)$$

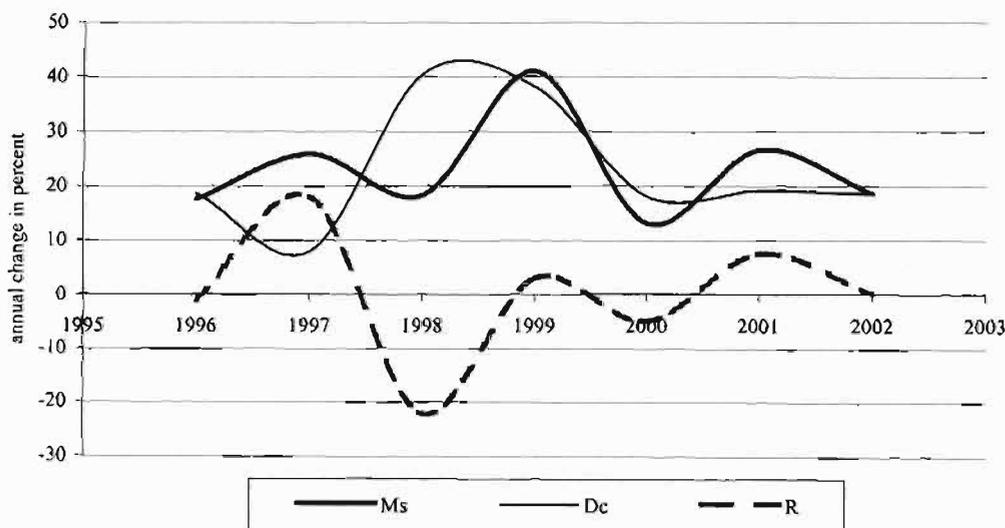
ΔMs is change in money supply; ΔR is change in reserve requirement and ΔDC is change in domestic creation. Thus, with meagre export earning, non-existence of monetary assets and markets the only possible instrument left for the Bank of Eritrea to influence money supply is through domestic creation. Had the reserve requirements been sufficient enough to offset any increase in changes of domestic creation, and then the money supply would have remained stable.

According to the IMF Country Report for Eritrea (2003), monetary policy in Eritrea has been weak to pursue its objectives due to many reasons. First, National Bank of Eritrea has no complete independence to manipulate its monetary instruments, thus is subordinate to fiscal policy. Second, the National Bank of Eritrea lacks an analytically sound and transparent monetary framework, thus, it does not state its policy objectives on exchange rates, interest rates, and inflation rates. Third, monetary policy is also complicated due to lack of effective tools for controlling monetary base. Furthermore, the limited and undeveloped financial institutions also limited the scope for effective monetary policy implementation.

The graph below depicts that change in money supply was associated partly with changes in reserve requirement and partly with changes in domestic creation. The patterns show that the money supply changes have similar trend with changes in reserve requirements. However, change in reserve

requirements remain very low and to the extent negative between 1997 and 1998. But, the changes of money supply and the changes of domestic credit creation remain very high although they fluctuate in opposite directions. We have seen that Eritrea has negligible export earnings, thus is dependent on foreign resources and to some extent on diaspora remittances. Under this meagre foreign assets condition, the only monetary instrument, which could help manage change in money supply, is domestic credit creation. Thus, the increase in money supply is mainly associated with domestic credit creation.

Figure 4.4.1 Change in Money Supply versus Reserve Requirement and Domestic Credit Creation (1996-2002) in millions of nakfa



Source: IMF country report 2003

Moreover, it is evident that monetary policy in Eritrea has been less effective due to many internal and external factors. It would be very difficult to measure monetary policy effect in Eritrea with the parameters and criteria used in countries that have developed goods and assets markets. Thus, it may be reasonable to some extent to emphasise more on fiscal policy than monetary policy in the existing economic condition of Eritrea. However, steps are required to improve and manage with international standards so that the policies and the objectives are coherent to tackle the existing challenges.

4.5 Exchange rate policy in Eritrea

Exchange rate is the price of foreign currency in terms of domestic currency and links an open economy of a country with the rest of the world. Dornbusch (1993) has clearly elaborated the linkage of exchange rate to macro economy and micro economy through the goods and asset markets. The aim of exchange rate policy is to promote a healthy balance of payments and maintain a sustained foreign exchange reserve position. It affects the volume of exports and imports as well as the asset's risk and return in terms of domestic or foreign denomination holdings.

Countries would pursue fixed exchange rate, flexible exchange rate, or multiple exchange rates depending on how their foreign exchange markets and at large their economies are developed and complicated. For instance, under flexible exchange rate regime, controlling money supply would help to curb inflation and maintain current account balance. Eritrea's foreign exchange regime as a policy is supposed to work under flexible exchange rate. But, with problems of monetary tools of National Bank of Eritrea, and the operations of Foreign Exchange Bureaus, flexible exchange rate could not function properly. The increasing shortage of foreign exchange at official rate during the war (1998-2000) and severe drought put high pressure on foreign exchange market and led to the development of parallel exchange rate. Thus, the National Bank of Eritrea managed to peg the foreign exchange rate for the three years of wartime, although managed to lift it latter on. Moreover, IMF Country Report for Eritrea (2003) suggested that the strong overvaluation of nakfa at the official rate raises real exchange rate and thus reduces competitiveness for those exports and lowers import prices, which aggravated the current account deficit.

The scarcity of foreign exchange is not only attributed to the pegged official exchange rate in Eritrea, but also to the rigidity and structural problems of the economy, which resulted in lower productivity and lower exports. Eritrea's economy has been disrupted during the war and intermittent drought and decreased agricultural output substantially. Thus, it would be very imperative to adhere to the improvement of productivity of the economy along with the reform of the exchange rate regime. Reforming the existing managed floating foreign exchange rate regime to free exchange rate policy without accompanying increase in productivity would lead to severe inflation rate problems.

4.6 Inflation rate trend in Eritrea

Inflation is a situation of continuously rising prices accompanied with a continuous falling of the value of money. The main factors that cause an increase in inflation rate are; cost-push, demand-pull factors and structural changes of most developing countries. However, inflation rate would also be influenced by other factors, such as exchange rates, interest rates, money supply, and output.

It is argued that lower inflation rates might stimulate better allocation of resources through increase in saving and hence has positive impact on economic growth. However, high inflation rate might have a negative impact on economic growth through distorting resources allocations, deteriorates exports, and promotes inequalities of income among profit and wage earners.

Inflation rate in Eritrea has been influenced by many factors during the past ten years. Thus, there were high variations and fluctuations with economic growth changes. In the first seven years (1991-1997), inflation rate was reasonably moderate ranging below 10 percent. Inflation rate was 4.6 in 1993, spiked to 11.6 in 1994 and dropped to 3.7 in 1997. During the war, however, again spiked to 19.9 in 2000. In addition, inflation has been very sensitive to fluctuations in agricultural productivity and fiscal policy manipulations. From 1998 onward, however, unstable exchange rate movements have influenced it. Empirical analysis conducted by IMF Country Report for Eritrea (2003), indicated that inflation in Eritrea has also been seriously influenced by recurring drought and the war of 1998-2000.

Thus, macroeconomic variations in Eritrea have been influenced mainly through fiscal policy. But monetary policy, exchange rate policy, and inflation rate policy would also play a great role in attaining the planned targeted objectives. Planning in fiscal policy is concerned mainly with domestic instruments in a closed range, however, in an open economy the implication of monetary and exchange rate policies are very crucial as there are many interactions with the rest of the world. The expected good economic performances in Eritrea lie on how to link the policies in one hand, and development objectives on the other hand. Therefore, it would be helpful to develop and explain the relationships among aggregate outputs in different approaches using macroeconomic models and examine their policy impacts.

CHAPTER FIVE

FRAMEWORK OF ANALYSIS

5.1 Introduction

In the previous two chapters, we have tried to assess the pattern of economic growth and characteristics of macroeconomic policies of Eritrea of the past eleven years. The assessment of sectoral growth compared to economic growth indicated that Eritrean economic growth is mainly dependent on agricultural productivity. Although, the other sectors also contributed significant percentage to GDP, GDP has been more sensitive to agricultural productivity than to other sectors. In addition, regression analysis of these sectors showed that structural rigidity, as in many African countries, has also hampered economic growth in the Eritrean. Moreover, development planning at national level on these sectors is reflected only as projected growth rates based on the simple growth rate models, which are specified in equations (2.5.3.3 up to 2.5.3.7) in Chapter Two. Furthermore, we have also seen some of the macroeconomic projected targets of Eritrea for the coming two years. Similarly, these simple extensions based on growth estimates do not account for policy instrument effects. Thus, we will try to specify relevant models that enable us to assess the integration of development planning and macroeconomic policy by including the important policy instruments and examine their effects on economic growth and macroeconomic managements in Eritrea.

Therefore, in the first part of this chapter, constrained and unconstrained production function models are specified so that they would be used to analysis the effect of capital and labor inputs on economic growth. Furthermore, simple ordinary least square regression equations based on the time series data of the major sectors are specified. This would enable us to look which sector has more significant effect on economic growth so that policy application will have the right direction.

Subsequently, aggregate demand models are analysed to examine the effect of each variable on economic growth rather than analysing all aggregate demand variables on economic growth as a

whole. In addition, partial adjustment models will be specified to estimate the long run desired expenditure and desired revenue levels from current revenue and GDP respectively, as are used by Aghevli and Sassanpour (1982), Vaez-Zedah (1989). The simple Keynesian aggregate demand equation explains, aggregate output as a function of consumption, investment expenditure, government expenditure, and net exports. This approach indicates how much each variable contributes to the total aggregate output. A simple linear regression of time series data of output on these variables verifies that by how much output would increase for every unit increase in each variable. Nowadays, however, it has been common practice to look at each variable effect on the output. The disaggregating of the variable enables us to look at separate policy implications of each variable. However, most macroeconomic time series data in the level form are non-stationary and may have a relationship not only due to their correlation but also due to their similar time trend over the same period (Gujarati, 1995). But, if two variables have a long run relationship and are of the same order of integration, they are said to be cointegrated. Thus, once the stationarity, causality and cointegration test models are specified, policy direction and relationship could be determined appropriately from their regression analyses. In this context, four structural relationships are to be identified to address fiscal policy implications.

- Government expenditure versus government revenue
- Government revenue versus economic growth (GDP)
- Government expenditure versus economic growth (GDP)
- Export growth versus economic growth (GDP)

Furthermore, investigation on the stationarity and causality is required for valid and reliable result. Thus, three steps are to be taken on each equation for correct specification of the models.

- The model for the test of the unit root on each time series data using Augmented Dickey-Fuller (ADF) t-test.
- The model for tracing out the direction of causation using Granger causal test based on F-statistics.
- The model for cointegration based on unit root test on the estimated residuals using Augmented Dickey-Fuller (ADF) t-test.

Furthermore, private consumption, investment expenditure, and imports demand models are specified based on macroeconomic relationships.

5. 2 Economic Growth Models

Two different equations from two approaches, which show the trend of economic growth, are specified in this section. The first part refers to the determination of the equation that explains the relationship between total output growth and each sectoral contribution to GDP. Although, this does not illustrate the effect of factor inputs on the aggregate output, it shows how economic growth is correlated with each sectoral output and could serve for prediction of the targeted output and the contributions from each sector. The second part will refer to the production function approach that has more advantage over the simple regression model in that inputs could be influenced by policy option.

5.2.1 Sectoral contribution to GDP

The relationship between gross domestic product and sectoral contributions to GDP of the main economic variables is specified to assess the performance of each sector in Eritrea. The simple linear relationship is specified as follows:

$$Y_t = \gamma_0 + \gamma_1 Ag_t + \gamma_2 Id_t + \gamma_3 Dis_t + \gamma_4 Ser_t + u_t \quad (5. 2.1.1)$$

Where Ag_t is agricultural contribution; Id_t is industrial contribution; Dis_t is distribution sector contribution, and Ser_t is service sector contribution. Assuming that the error term u_t has constant variance and mean zero, the null hypothesis is that all the parameter coefficients; $\gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = 0$. In addition, it is expected that all the variables to have a positive sign implying that as each variable increase GDP also increase. If the null hypothesis is rejected totally or partially, then economic growth and its relative association with each sector are rejected.

In most cases it is argued that output could be estimated either through examining the regression of output on input variables as is in the production function or based on the expenditure approach through regression of output on the variables of investment, consumption, government expenditure, and net exports. The above equation (5.2.1.1), however, shows a relative contribution but not necessarily causation of the variables on output. For example, if agricultural output fluctuated frequently due to agricultural price policy, rain, lack of important inputs or other reasons, the model does not help us to identify which of these factors has significant effect on the productivity of agriculture. Nevertheless, once it is known that output growth is influenced significantly by agricultural output, agricultural output in turn could be analysed against its determinants. Thus, higher rate of growth of output due to higher coefficient of sectoral contribution is an assertion of correlation between the variable and rate of growth of output. However, once the model of the relationship between total output and sectoral contribution to GDP is specified and regression results are analysed, statistical insignificance may arise due to different reasons. Nevertheless, to get rid off some of these problems such as heteroscedasticity, autocorrelation and multicollinearity, equations are modelled in log-form and/or are transformed using general least square methods. In addition, since the data used in these assessments are limited, a Prais-Winsten transformation method will be used to fill the first observation that might be lost due to lag of the variables so that the degrees of freedom will be maintained. The Prais-Winsten transformation model is specified as $Y_1\sqrt{1-\rho^2}$, $X_{1i}\sqrt{1-\rho^2}$ where, Y_1 is the first observation of the dependent variable, X_{1i} are the first observation of each variable of the independent variables, and rho (ρ) is autocorrelation coefficient calculated from Durbin-Watson statistics (Gujarati, 1995).

The log- form of the equation is specified as follows:

$$\ln Y_t = \alpha + \beta \ln \text{Age}_t + \chi \ln \text{In}_t + \delta \ln \text{Dis}_t + \phi \ln \text{Ser}_t + \varepsilon_t \quad (5.2.1.2)$$

Furthermore, the transformed equation using generalized least square method is specified as follows:

$$Y^* = \alpha + \beta(\text{Age}^*) + \chi \ln(\text{In}^*) + \delta(\text{Dis}^*) + \phi(\text{Ser}^*) \quad (5.2.1.3)$$

Where $Y^* = \ln Y_t - \rho \ln Y_{t-1}$; $\text{Age}^* = \ln \text{Age}_t - \rho \ln \text{Age}_{t-1}$; $\text{In}^* = \ln \text{In}_t - \rho \ln \text{In}_{t-1}$;

$Dis^* = \ln Dis_t - \rho \ln Dis_{t-1}$; and $Ser^* = \ln Ser_t - \rho \ln Ser_{t-1}$. Where ρ (rho) is coefficient of autocorrelation and calculated from Durbin-Watson (d) statistics estimated from regression of the untransformed variables of equation (5.2.1.1)

5.2.2 The Production Function Approach to economic growth

The neoclassical growth theory postulates that output depends on the level of capital stock, the value of employed labor and the kind of technology. The introduction of an exogenous rate of technology change allows for an exogenously determined rate of economic growth. However, the new growth models assumes endogenous technology in the process of economic growth and tried to include more variable, such as, the role of government, trade policy and human capital development as important endogenous factors that affect economic growth (Thirwall, 1999).

In this paper, however, only the neoclassical production function is used rather than endogenous growth model. The reason behind is not to refute the endogenous growth model and accept the neoclassical growth model, but it is the problem of small sample size of the data that does not allow us to include so many variables to consider endogenous growth models. This is because increasing explanatory variables with small sample size data will consume more degrees of freedom and makes regression results meaningless. Furthermore, the production function usually is fitted to aggregate data and tried to trace out empirically the contribution of the factor input to the total output. Constrained and unconstrained production functions are specified below to so that the contribution of each factor to economic growth is analysed properly. The production function that explains output as a function of capital, labor, technology, and land is specified as follows.

$$Y_t = f(K_t, L_t, T, R_t)$$

Where Y_t is Output; T is Total productivity explained in terms of availability of technology; K is capital input; L is labor input; and R is Land. If land is considered as part of capital, the above function could be rewritten in the Cobb-Douglas production function form as:

$$Y_t = T_t K^{0.1} L^{0.2} e^{0.7t} \quad (5.2.2.1)$$

Where θ_1 is partial elasticity of output with respect to capital, holding labor and coefficient of productivity (T) constant; θ_2 is partial elasticity of output with respect to labor, holding capital and coefficient of productivity (T) constant; and u_t is the error term, which accounts for variations due to other variables in the model. If change in technology is exogenously determined and is independent of the change in the factor inputs, then the contribution of each factor could be estimated alternatively. However the appropriate functional form is when it is in log-linear model, and explains the change in output for a unit change in the respective inputs that is capital or labor.

$$\ln Y_t = \ln T_t + \theta_1 \ln K_t + \theta_2 \ln L_t + u_t \quad (5.2.2.2)$$

A dummy variable is included to account for the effect of war on economic growth in Eritrea and zero value before the wartime (1992-1997) and one value during and after wartime (1998-2002) are assigned and the equation is specified as:

$$\ln Y_t = \ln T_t + \theta_1 \ln K_t + \theta_2 \ln L_t + \theta_3 \ln Di + u_t \quad (5.2.2.3)$$

The constant terms T_t , θ_1 , and θ_2 are to be estimated empirically and when the function is constrained, the sum of the partial elasticity indicates the scale of return, while the coefficient of productivity T is a shifting factor. The model might have an extended advantage of looking at changes in output when policy induced growth in the form of investment; improved health and education variables are also included, although not included in this paper.

The partial elasticities θ_1 and θ_2 are expected to be positive with greater value of θ_2 than θ_1 in the context of LDCs and greater value in θ_1 than θ_2 in the condition of developed countries. Empirical results from tests on developing countries indicate that except for (Japan, Israel and Mexico), the contribution to measured growth of total labor input growth is shown to be greater than the contribution of capital input growth (Nadiri, 1972 as quoted by Thirwall, 1999). When the function is constrained the sum of the partial elasticities of output with respect to factors of production gives the scale of return or degree of homogeneity. To analyse the effect of capital labor ratio on output labor ratio based on constrained production function, the equation is specified as follows:

$$\ln Y_t = \ln T_t + \theta_1 \ln K_t + \theta_2 \ln L_t + u_t \quad (5.2.2.4)$$

When $\theta_2 = 1 - \theta_1$; constant return to scale is assumed and the equation is rearranged as follows:

$$\ln(Y_t/L_t) = \theta_0 + \theta_1 \ln(K_t/L_t) + \theta_3 D_t + u_t$$

$$Y_t^* = \theta_0 + \theta_1 K_t^* + \theta_3 D_t^* + u_t \quad (5.2.2.5)$$

Where Y^* is $\ln(Y_t/L_t)$; K^* is $\ln(K_t/L_t)$; and D^* is D_t . In this constant returns to scale model, the change in output-labor ratio is regressed on capital labor ratio and the dummy variable.

5.3 Macroeconomic Model specification

5.3.1 Government expenditure and government revenue

Fiscal policy and government budgetary position are modelled by governments explicitly because of the crucial role they play in shaping the over all economic activities of a country. Fiscal policy deals with influencing the economic variables through policy instruments. These instruments are government expenditure and government revenue. In most cases, the policy recommended is a balanced budget whereby the government should expend what it earned through its revenue. But, in most countries government expenditure exceeds government revenue and prevails deficits. A government spending restraint would be expected to control the size of government deficit. Policy would also be recommended to impose higher taxes so that higher government revenue would be collected. But, imposing higher taxes to restrict the size of government deficit may have a negative impact on private productivity and thus might aggravate the deficit again. Curbing government expenditure allocated to capital investment and social overhead may have also direct as well as indirect impact on national productivity of Eritrea. Thus, a model is required to construct a relationship between government expenditure and government revenue so that the appropriate policy instrument would be recommended. It would also be important to examine the behaviour of the time series data so that the correct model would be identified. Therefore, stationarity and causality tests

are required to analyse the time series data of government revenue and government expenditure so that models are specified correctly.

The test of non-stationarity of the time series data of government expenditure and government revenue are specified with Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) tests (Gujarat, 1995), but the Augmented Dickey-Fuller model which takes account for autocorrelation of the error terms is used in this analysis and is specified as follows

$$\Delta GE_t = \theta + \delta GE_{t-1} + \sum \lambda_i \Delta GE_{t-k} + u_{1t} \quad (5.3.1.1)$$

$$\Delta GR_t = \theta + \delta GR_{t-1} + \sum \lambda_i \Delta GR_{t-k} + u_{2t} \quad (5.3.1.2)$$

Where GE_t is Government Expenditure at time t ; and GR_t is Government Revenue at time t . The null hypothesis is that $\delta = 0$, implying that the time series are non-stationary, when the null hypothesis is rejected. However, when δ is statistically different from zero based on ADF critical values, then the time series data are stationary and OLS estimators are efficient. But, if they are non-stationary, their good correlation could be spurious. Thus, they will have meaningful linear relationship in the long run only when they cointegrated.

However, it is also important to identify the direction of causation between government revenue and government expenditure before a test of cointegration so that appropriate structural equation will be identified.

There are many empirical findings from Granger causal test carried out to identify the causality between government spending and government revenue theory. Empirical results of Marger and Marlow (1986) indicate that government revenue Granger causes government expenditure, while results from empirical tests from (Anderson, Wallace, and Warner; 1987) support the opposite direction. Miller and Frank (1990) came out with different results for USA empirical analysis on Federal and Local levels, on nominal and real, and annual and quarterly data.

Thus, there are about four possible expected results from the test of causation between government revenue and government expenditure. Government expenditure could Granger cause government revenue, or vice versa. The causation might also be either bi-direction so that both are determined jointly or are determined independently so that there is not any significant causation between the two variables. The Granger causal tests of the two variables are specified as follow (Gujarat, 1995).

$$GE_t = \alpha + \sum \beta_i GR_{t-i} + \sum \lambda_i GE_{t-i} + u1_t \quad (5.3.1.3)$$

$$GR_t = \Phi + \sum \gamma_i GE_{t-i} + \sum \delta_i GR_{t-i} + u2_t \quad (5.3.1.4)$$

When the parameter coefficients of the variables in the above equation (5.3.1.3); $\beta_1 = \beta_2 = \beta_3 = \dots = \beta_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GR_t does not Granger cause GE_t is rejected, otherwise. Thus, the causation runs from GR_t to GE_t . By the same token, when the parameter coefficients of the variables in the equation (5.3.1.4); $\gamma_1 = \gamma_2 = \gamma_3 = \dots = \gamma_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GE_t does not Granger cause GR_t is rejected, otherwise. Thus, causation goes from GE_t to GR_t . When the parameter coefficients of the variables in the above two equations are statistically significant different from zero, the null hypotheses that GR_t does not Granger cause GE_t and GE_t does not Granger cause GR_t , are rejected. Thus, there is a bi-directional causality, otherwise.

The standard F test used as critical value for the causal analysis is specified as follows. For m linear restriction in a linear regression model with normal disturbance, n observations and k estimated parameters in the general (unrestricted) model; the F test for the validity of these restrictions follows the relationship below:

$$F = \frac{(SSE_r - SSE_{ur})/m}{SSE_{ur}/(n-k)}$$

Where SSE_r stands for the residual sum of squares model and SSE_{ur} for the residuals sum of square of the unrestricted model. Under the null hypothesis that the linear restrictions imposed are true, the statistic has an F distribution with m and n-k degree of freedom (Gujarati, 1995).

Thus, Granger causal test follows the F-distribution with m and $(n-k)$ df and if the estimated F-value exceeds the critical value at the chosen level of significance, then the null hypothesis does not Granger cause will be rejected, otherwise.

Once the causality is identified, the next step is to test if GE_t and GR_t have long run relationship. One method to test their relationship is to know whether the estimated residual time series retrieved from their OLS estimation for the sample data are stationary or not. Thus, if the estimated residuals are stationary, that is, do not have unit root, then they are integrated of order zero $I(0)$ and thus the two variables are cointegrated.

Once Granger causality test result indicated as expected that the causality runs from GR_t to GE_t , the equation is specified as GR_t independent and GE_t as dependent variables as follows.

$$GE_t = \alpha + \beta GR_t + u_t \quad (5.3.1.5)$$

Rewritten the above equation in the linear combination of the two variables helps us to retrieve the estimated residual time series based on the following relationship.

$$u_t = GE_t - \alpha - \beta GR_t \quad (5.3.1.6)$$

The DF test for unit root test of the estimated residual time series is specified on following equations:

$$\Delta u_t = \delta u_{t-1} + \varepsilon_t \quad \text{random walk form} \quad (5.3.1.7a)$$

$$\Delta u_t = b_0 + \delta u_{t-1} + \varepsilon_t \quad \text{random walk with drift} \quad (5.3.1.7b)$$

$$\Delta u_t = b_0 + b_1 t + \delta u_{t-1} + \varepsilon_t \quad \text{random walk with drift and stochastic trend} \quad (5.3.1.7c)$$

To eliminate the possibility of autocorrelation, which modifies equation (5.3.2.7c) and complements the model of ADF test on the residuals is specified as follows:

$$\Delta u_t = b_0 + \delta u_{t-1} + b_1 t + \sum b_2 \Delta u_{t-1} + \varepsilon_t \quad (5.3.1.8)$$

Where Δ is the first difference operator, t is time detrending variable, and ε_t is error term of white noise, that is, has constant variance and mean zero, the unit root test on the estimated residual time series is done based on ADF test. The null hypothesis is that δ (the coefficient of the lagged estimated residual) is equal zero as it is calculated from the relationship $\delta = 1 - \rho$. Accepting the null hypothesis implies that there is a unit root in the residuals. Thus, they are non-stationary and leads to the conclusion that the two variables are not cointegrated. This specification model is also used in the three hypothesis testing following this topic.

5.3.2 Government revenue and economic growth

Economic growth relies heavily on raising the rate of savings and the level of investment. If there is a distinct influence on taxation policy, which affects savings and capital accumulation, then the impact will be reflected on economic growth. However, a debate may also arise on how the direction of causation is between tax revenue and total output. In the Harrod-Domar growth model, growth rate is dependent on saving-output ratio, and capital-output ratio (Thirwall, 1999). From these relationships it seems that taxation policy indirectly affects economic growth through its effect on saving and investment. However, high tax collection depends on higher output.

Empirical tests from different approaches come out with different results. Kerr and Garry (1999), found mixed evidence on the possibility of causal role for taxation on the rate of economic growth in a sample of Asian countries. Robert and Rebelo (1990) found also that taxation can substantially affect the long run growth rates and in particular in small open economies with substantial capital mobility and it could readily lead to development trap.

Looking at tax revenue versus economic growth in terms of their causation and cointegration is important to know whether the policy should emphasise on output so that more tax will be collected, or on taxation so that incentives will drive private sectors to boost output and collect more tax revenue in the future.

The equations for the unit root test of the time series data of GDP_t and GR_t using ADF test are specified below. In addition, if they are found to be non-stationary then a cointegration test will be

made to identify their linear combined relationship in the long run based on the model specified before. In the Eritrean context, since tax revenue represents high percentage of total revenue, total government revenue is taken as proxy to tax revenue in the following analysis. Thus, the equations for tests of the variables GDP_t and GR_t using ADF statistic are specified as:

$$\Delta GDP_t = d_0 + d_1 GDP_{t-1} + \sum d_i \Delta GDP_{t-k} + u_{3t} \quad (5.3.2.1)$$

$$\Delta GR_t = \lambda_0 + \lambda_1 GR_{t-1} + \sum \lambda_i \Delta GR_{t-k} + u_{4t} \quad (5.3.2.2)$$

Where GDP_t is Gross Domestic Product at time t and GR_t is Government Revenue at time t . Likewise, to identify the direction of the causality between the two variables a test will be carried out based on the specification of the two variables. The Granger causality between GR_t and GDP_t are specified as follows:

$$GDP_t = \beta + \sum \chi_i GR_{t-i} + \sum \phi_i GDP_{t-i} + u_{1t} \quad (5.3.2.3)$$

$$GR_t = a + \sum \mu_i GDP_{t-i} + \sum \kappa_i GR_{t-i} + u_{2t} \quad (5.3.2.4)$$

When the parameter coefficients of the variables in the above equation (5.3.2.3); $\chi_1 = \chi_2 = \chi_3 = \chi_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GDP_t does not Granger cause GR_t is rejected, otherwise. Thus, the causation runs from GR_t to GDP_t . By the same token, when the parameter coefficients of the variables in the equation (5.3.2.4); $\mu_1 = \mu_2 = \mu_3 = \mu_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GR_t does not Granger cause GDP_t is rejected, otherwise. Thus, causation goes from GDP_t to GR_t . When the parameter coefficients of the variables in the above two equations are statistically significant different from zero, the null hypotheses that GR_t does not Granger cause GDP_t , and GDP_t does not Granger cause GR_t , are rejected. Thus, there is a bi-directional causality, otherwise. So, if GDP_t Granger causes GR_t , and then government policy must rely on improving its output growth so that high government revenue is to be collected, but if GR_t Granger causes GDP_t , the government policy should rely on how to improve taxation policy.

The model specification for the unit root test on the estimated residuals and its null hypothesis is presented in equations (5.3.1.7a) through (5.3.1.7d). Therefore there is not need to repeat it again.

5.3.3 Government expenditure and economic growth

In the traditional Keynesian macroeconomics, many kinds of public expenditures, even of recurrent nature can contribute positively to economic growth. High levels of consumption are likely to increase employment rate, profitability and investment via multiplier effect on aggregate demand. The opposite view maintains that government consumption crowds out private investment, changes economic stimulus in the short run and reduces capital accumulation in the long run. Crowding out results from fiscal deficit and the associated effect on interest rate (Diamond, 1989).

Based on the above arguments, empirical results have come with different results in favour and against the debate. Barro (1990) isolated the effect of government expenditure on economic growth by differentiating between productive and non-productive expenditure. He concluded that non-productive expenditure affects economic growth negatively while productive expenditure has positive effect on economic growth. Correa (1970) found from his analysis on Latin American Countries that social investments on dwellings, health, nutrition and education, particularly in developing countries contribute positively to economic growth. Landau (1983) and De Gregorio (1992) have also reached the same conclusion as Barro that consumption expenditure is significantly negative related with the growth rate of real GDP. In contrast, Ram (1986) found that empirical result from developed and developing countries indicate that government expenditure has a positive effect on economic growth and overall performance, with positive externality impact on the rest of the economy.

Thus the effect of government expenditure on economic growth or vice versa could be summarized as causation relationship hypothesis into two approaches. According the Keynesian view government expenditure causes economic growth while according Wagner's law it is economic growth that causes government expenditure (Bird, 1971).

In the Eritrean case however, since there is a deficiency in separated data between productive and non-productive government expenditure, total expenditure will be examined against GDP. Eritrea has directed most of its expenditure to social overhead mainly in the first seven years. Thus, government expenditure is expected to have a positive effect on economic growth. The ADF tests for GDP_t and GE_t are already specified in the above equation. Therefore, there is no need to repeat here. The Granger causality between GE_t and GDP_t are, however, specified as follows:

$$GE_t = A_0 + \sum C_i GDP_{t-i} + \sum \zeta_i GE_{t-i} + u_{2t} \quad (5.3.3.1)$$

$$GDP_t = B_0 + \sum A_i GE_{t-i} + \sum B_i GDP_{t-i} + u_{1t} \quad (5.3.3.2)$$

When the parameter coefficients of the variables in the above equation (5.3.3.1); $C_1 = C_2 = C_3 = C_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GDP_t does not Granger cause GE_t is rejected, otherwise. Thus, the causation runs from GE_t to GDP_t . By the same token, when the parameter coefficients of the variables in the equation (5.3.3.2); $A_1 = A_2 = A_3 = A_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GE_t does not Granger cause GDP_t is rejected, otherwise. Thus, causation goes from GDP_t to GE_t . When the parameter coefficients of the variables in the above two equations are statistically significant different from zero, the null hypotheses that GE_t does not Granger cause GDP_t , and GDP_t does not Granger cause GE_t , are rejected. Thus, there is a bi-directional causality, otherwise. So, if the direction of causality is from GE_t to GDP_t , then government expenditure policy will be important in boosting economic growth, but if the direction is from GDP_t to GE_t then policies are expected to influence output growth so that expenditure will be decided. Once the direction of causality is traced out, based on the model specified earlier, cointegration test will be done.

The model specification for the cointegration if the variables are found to be non-stationary from our first ADF test is specified in the previous sub topics. Hence, repeating again is not important.

5.3.4 Export growth and economic growth

In the development strategy choices between balanced and unbalanced growth models, it has been indicated that balanced growth emphasises more on inward looking or planned economy strategy, while unbalanced growth stresses more on outward looking or market economy strategy. The relationship of export growth and economic growth are taken as one approach in testing models for export promotion versus inward looking policies in many instances. Many empirical analyses conducted on developed and developing countries test not only the correlation between exports and growth rates but also the causation between the two variables

For this reason, four null hypotheses could be identified. First, export growth does not cause economic growth. If this hypothesis is rejected, then export promotion policy could be viable and unbalanced growth strategy is appropriate. Second, economic growth does not cause export growth. If this hypothesis is rejected, then inward looking policy would be viable and balance growth development strategy is recommended. Third, the causation is in both directions so that export growth and economic growth are determined jointly. Forth, the two variables are independent to each other so that economic growth does not cause export growth and vice versa.

Empirical results of Chow (1987), Henriques and Sadorsky (1996), and Kunst and Marin (1989) support that growth rate causes export growths for Newly Industrial Countries of Asia, Canada, and Austria respectively. Martin (1992), Jung and Marshall (1985) find that export led growth strategy is supported from empirical results tested on developed countries of U.S.A, Japan, U.K. and Germany, and fifteen developing countries respectively. In addition, Balassa (1978), Michaely (1977), and Tyler (1981) have come out with empirical evidence to support export-led growth. However, Moran (1983), found from his cross sectional empirical analysis of developing countries that economic growth is not affected by export instability.

Therefore, the direction of causality between export and growth is important for policy makers and planners. Thus, if export growth induces change in output growth then export-promotion development strategy is appropriate, but if output growth induces export growth, then domestic improvement will promote export growth. However, it would be important to identify whether

exports and GDP are stationary or cointegrated so that the relationships established are reliable and meaningful. Thus, the ADF test for the existence of unit root will be done in the following specification.

$$\Delta EX_t = \alpha + \phi EX_{t-1} + \sum \mu_i \Delta EX_{t-k} + u_{1t} \quad (5.3.4.1)$$

Where EX_t is Volume of exports at time t . The null hypothesis that the time series data are non-stationary ($\phi = 0$) and that there is a unit root will be rejected when the value of the lagged coefficient (ϕ) is statistically different from zero. However, if they are non-stationary a cointegration test should be done to trace out their long run linear relationships. But the causation test should be done before their verification of cointegration and the equation for causation test is specified as the follow:

$$EX_t = a + \sum \eta_i GDP_{t-1} + \sum \pi_i EX_{t-i} + u_{1t} \quad (5.3.4.2)$$

$$GDP_t = b + \sum D_i EX_{t-1} + \sum C_i GDP_{t-1} + u_{2t} \quad (5.3.4.3)$$

When the parameter coefficients of the variables in the above equation (5.3.4.2); $\eta_1 = \eta_2 = \eta_3 = \eta_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that GDP_t does not Granger cause EX_t is rejected, otherwise. Thus, the causation runs from EX_t to GDP_t . By the same token, when the parameter coefficients of the variables in the equation (5.3.4.3); $D_1 = D_2 = D_3 = D_i \neq 0$ at different lags are significantly different from zero, the null hypothesis that EX_t does not Granger cause GDP_t is rejected, otherwise. Thus, causation goes from GDP_t to EX_t . When the parameter coefficients of the variables in the above two equations are statistically significant different from zero, the null hypotheses that EX_t does not Granger cause GDP_t , and GDP_t does not Granger cause EX_t , are rejected. Thus, there is a bi-directional causality, otherwise. The equation of test for the cointegration based on unit root test on ADF test is specified already and the estimated residuals are to be retrieved from the regression equation whose dependent and independent variables to be specified from the model.

5.4 Aggregate Demand Models

5.4.1 Partial adjustment model of government expenditure and revenue

Once the correct causal direction and cointegration between the dependent and independent variables is traced out, the long run desired target could be estimated from the independent and lagged variables in the structural equations. Stock adjustment model is commonly used to estimate the parameters so that desired long run targets would be estimated. Thus, governments adjust their desired government expenditure in the short and long term with respect to their actual revenues and their experience on past expenditure. Likewise, government is assumed to have planned its expenditure on the basis of balanced budget policy. Thus in the long run the authorities desired to spend all of the available revenues.

$$GE_t^* = \beta_0 + \beta_1 GR_t + u_t \quad (5.4.1.1)$$

Where GE_t^* is desired government expenditure, GR_t actual revenue, and u_t is the residual with zero mean and constant variance. Equation (5.4.1.1) is the long run equation with desired expenditure as dependent variable and government revenue as explanatory variable. When the coefficient β_1 is one or approaching one then the government has got its balanced budget. In the short run, however, expenditures are adjusted with its lag value to any abrupt changes in revenues. Moreover, the desired or planned expenditure is not directly observable. Thus, it would be appropriate to use the partial adjustment model to determine the long-run equation. The long run equation is then derived as follows:

$$\begin{aligned} \Delta GE_t &= \delta (GE_t^* - GE_{t-1}) \\ \text{But, } \Delta GE_t &= GE_t - GE_{t-1} \\ GE_t - GE_{t-1} &= \delta (GE_t^* - GE_{t-1}) \end{aligned} \quad (5.4.1.2)$$

δ is coefficient of adjustment and lies $0 < \delta \leq 1$. Equation (5.4.1.2) states that the actual change in expenditure in any given time period t is some fraction δ of the desired changes for that period. Rearranging equation (5.4.1.2) in terms of GE_t leads to:

$$GE_t = \delta GE_t^* + (1 - \delta)GE_{t-1} \quad (5.4.1.3)$$

This shows that the actual government expenditure at time t is the weighted average of the desired expenditure and expenditure in the previous time period weighted by δ and $(1-\delta)$. Substituting equation (5.4.1.1) into (5.4.1.3) gives:

$$\begin{aligned} GE_t &= \delta(\beta_0 + \beta_1 GR_t + u_t) + (1 - \delta)GE_{t-1} \\ &= \delta\beta_0 + \delta\beta_1 GR_t + (1 - \delta)GE_{t-1} + \delta u_t \end{aligned} \quad (5.4.1.4)$$

Equation (5.4.1.4) is a short run equation of the government expenditure and indicates that actual government spending adjusts to its actual revenue and its previous expenditure pattern.

5.4.2 Partial adjustment model of government revenue and GDP growth

Similarly, once the causation and cointegration relationship between government revenue and GDP is determined it would be reasonable to estimate government revenue from the actual GDP. Governments are more interested to plan their desired government revenue in the long run from their actual income (GDP) performance. Likewise, they are interested to adjust their short-run revenue based on the estimated current gross domestic income and past experience in total revenue. Thus the long run government revenue equation is determined as follows:

$$GR_t^* = \alpha_0 + \alpha_1 GDP_t + \varepsilon_t \quad (5.4.2.1)$$

Thus, the change in government revenue is the difference between the desired revenue and the revenue of its experience last time explained by its lag value.

$$\Delta GR_t = \delta(GR_t^* - GR_{t-1}) \quad (5.4.2.2)$$

So, the Short-Run government revenue is then a function of GDP_t of the current period and lagged revenue carried from last period and is specified as follows:

$$GR_t = \gamma\alpha_0 + \gamma\alpha_1 GDP_t + (1 - \gamma)GR_{t-1} + \gamma u_t \quad (5.4.2.3)$$

5.4.3 Private consumption expenditure

Consumption expenditure accounts large part of private spending in developing countries in general, and in particular in Eritrea. Thus, understanding its determinants is important for short run and long-run economic analysis. There are many approaches to the study of consumption expenditure such as the Keynesian approach, permanent income hypothesis approach and the life cycle approach. The simplest approach to consumption behaviour of households is the Keynesian approach, which assumes that current consumption is a function of disposable income represented by the following simple model.

$$C_t = a + bY_t^d + u_t \quad (5.4.3.1)$$

Where C_t is current consumption level, a is an intercept, b is marginal propensity to consume, Y_t^d is disposable income which is the difference between total income and taxation, and u_t is the error term. The permanent income hypothesis on the other hand postulates that households set consumption to their permanent income defined as the annuity value of the sum of assets and the discounted present value of expected future disposable income (Barro, 1987). Thus, in this case households consumption pattern have been influenced by intertemporal factors that is a choice between present and future. Therefore, under these conditions household's consumption is influenced mainly by real interest rate, inflation rate, public consumption, and liquidity constraint. However, since many developing countries do not have well developed financial markets, households often have limited access to credit markets and are therefore prone to liquidity constraint. Thus, it might be appropriate to use the above model to estimate Eritrean household consumption pattern.

5.4.4 Investment expenditure growth

Investment is assumed to be dependent on interest rate, output and capital stock explained by one lagged. It is expected that interest rate will have an inverse relationship with investment while output growth and capital stock growth will have a direct relationships. Since the interest rate in Eritrea is fixed, it is very difficult to evaluate the cost of capital, while inflation rate is spiking. Thus, it seems reasonable to take inflation rate as proxy for interest rate estimation.

$$RI_t = b_0 + b_1P_t + b_2RY_t + b_3RK_{t-1} \quad (5.4.4.1)$$

Where RI_t is real investment expenditure, b_0 is the intercept, RE_t is real interest rate, RY_t is real income, and RK_{t-1} is real capital stock

5.4.5 Import demand growth

The demand of imports is determined by both economic and non-economic factors. These, generally include, exchange rate and/or relative prices, economic activities, domestic and external economic conditions, production costs, and political conditions (World Bank, 1997). However, it is affected significantly by relative prices or real exchange rates and economic growth. Imports are assumed to be related to real effective exchange rates negatively and positively to real output growth. A depreciation of domestic currency encourages exports but discourages imports of tradable goods, and vice versa. Thus it has a negative relationship.

$$\Delta \log Z_t = \lambda_0 + \lambda_1 \log REEX_t + \lambda_2 \log Y_t + \lambda_3 \log Z_{t-1} \quad (5.4.5.1)$$

Where, $\Delta \log Z_t$ change in imports, λ_0 is the intercept, $\log REEX_t$ is change in real effective exchange rate, $\log Y_t$ is change in income, and $\log Z_{t-1}$ is the first lag of import which accounts the adjustment between the long run and short run balances of the imports.

CHAPTER SIX

RESULTS AND DISCUSSION

6.1 Introduction

The data analysis focuses on how aggregate output and macroeconomic variables in Eritrea are used for planning and policy decisions and the aim is to assess Eritrean economy growth rate and its macroeconomic policies implication. Simple ordinary least square regression of aggregate outputs based on macroeconomic structural relationships are used to analyze the data so that policy implications could be identified from these relationships. Two approaches are used to analyze the changes in real output. In the first part, total output is regressed on the real time series data of sectoral contribution to GDP of the main economic classifications; agriculture, industry, distribution, and service sectors. However, in the second part, the production function approach is used to analyze how real output is influenced by factor inputs such as capital and labor.

Furthermore, real aggregate demand variables such as government expenditure, government revenue, and exports in relationship to GDP are analyzed to see how macroeconomic management affects economic growth. In this section, rather than looking at the whole aggregate demand equation at a time, like that of Keynesian approach, each variable against economic growth will be analyzed. One of the main reasons is that in small sample size time series data, increasing explanatory variables will consume more degrees of freedom; hence regression estimates become unreliable and invalid. Furthermore, many explanatory variables and small sample size are not convenient for causation test, like that of Johansen error correction mechanisms using all variables at a time. Instead, individual causal test on each pair using Granger causal method is used. Moreover, partial adjustment model is used to determine the long run relationship between desired government expenditure and government revenue, and desired government revenue and current GDP. In addition, private consumption, investment expenditure, and import demand with respect to economic growth are analyzed using simple ordinary least square regressions.

6. 2 Sectoral Contribution to GDP

The result of simple ordinary least square regression of total output on the value added using nominal time series data indicated that the equation is not robust to explain the relationship in the Eritrean economy. Furthermore, as Eritrean economy is dominated by subsistence agriculture, it is expected that sectoral contribution from agricultural sector will have remarkable impact on total output changes. In addition, it is expected that all the variables to have a positive correlation with total output. However, in the nominal time series regression, the result indicated that industrial value added estimated coefficient is statistically insignificant with unexpected sign. In contrary to this, in our earlier discussion of Chapter Three, industrial growth showed a positive impact on output growth when regressed individually. Thus, we suspected that the problem of multicollinearity could be the cause for the statistical insignificance and wrong sign of the industrial value added. Moreover, there was a problem of autocorrelation explained with low Durbin-Watson test statistics. Hence, to improve the multicollinearity problem and minimize the autocorrelation, the data are changed to log-form and then transformed using generalized least square method. In addition, Prais-Winsten transformation method is used to fill the first observation of the first lag variable so that the degrees of freedom problem will not be too series. The equation of the transformed data as specified in Chapter Five in equation (5.2.1.3) along with the regression results are presented below:

$$Y^* = \alpha + \beta(\text{Age}^*) + \chi(\text{In}^*) + \delta(\text{Dis}^*) + \phi(\text{Ser}^*)$$

Table 6.2.1 Results of Parameter Estimates with Standard Error and t-values from SPSS

Variables	Parameters	coefficients	Standard Errors	t-value	Sig
Y _t [*] = dependent					
Constant	α	2.394	0.533	1.637	0.153
(Age _t [*])	β	0.226	0.031	7.39	0.000
(In _t [*])	χ	0.137	0.055	2.502	0.046
(Dis _t [*])	δ	0.387	0.112	3.462	0.013
(Ser _t [*])	φ	0.243	0.084	2.889	0.028
		R ² = 0.96	D.W = 1.72		

However, now, the results indicate that all the parameter coefficients of the variables have positive signs as expected. Autocorrelation has been improved and the estimated coefficient of the industrial sector is also significant with the correct positive sign. The coefficient of determination R^2 showed also very high value and this implies that the logs of the value added of the sectors explain about 96 percent variation in the log of total output. The partial elasticity of output with respect to agricultural value added is highly statistical significant compared to the other sectors. Moreover, this result is consistent to our observation of sectoral contribution to total output in Chapter Three that indicated growth in GDP was very sensitive to agricultural output. Furthermore, the above result showed that, the partial elasticity of output with respect to the distribution sector is more elastic than with respect to agricultural sector, even though it is not as significant as agricultural value added.

The partial elasticity of output with respect to industrial output indicated the lowest value of all the variables in the equation. However, this seems inconsistent with the analysis of sectoral growth rate shown in (table3.2.3.1) of Chapter Three average industrial growth rate was the highest for the past ten years although it is a simple projection of year-to-year growth rates. The industrial average growth rate was 13 compared to -4.5 for agriculture and 6.7 for service and distribution growth rates. Nevertheless, the regression results indicate that there is not much difference between the partial elasticity coefficient estimators with highest value of 0.387 for distribution and lowest value of 0.137 for industrial sector. It seems that the results show balanced growth in the sense that all sectors are growing almost proportionally. However, the balanced and unbalanced development strategies are not limited to these partial elasticity coefficients. It includes resources allocation and investment priorities among many alternatives. Thus this observation of balanced growth development strategy may be a preliminary observation rather conclusive. The most important point to focus from the regression results is that agricultural improvement should be given priority as its output has significant influence on economic growth. Furthermore, the result indicated that regression models have more advantages over the simple growth models in that relationships are analysed over many variables, which in sometimes policy implications could also be identified indirectly.

The above regression equations are used mainly for prediction and forecasting purposes. However, in some cases, it may not be applicable for policy implications for many reasons. First, the relationship

may not be necessarily causation rather it could be a correlation due to time trend because the data are time series. Secondly, it might not indicate directly what input factors and what accompanying policy are required to raise agricultural, industrial, or service output to increase total output. Thus, in order to proceed with policy integration, further breakdown of each sector into specific input variables and policy instruments is required. Hence, estimation from neoclassical production function might be relatively appropriate to use for policy implications because it can accommodate input variables that could be influenced by policy instruments and induce a change in growth rates.

6.3 Production Function Approach to Economic Growth

Since we are interested in decision making at national level, aggregate output is regressed on aggregate capital stock and labor at national level. In this discussion of the aggregate variables, unconstrained and constrained production function models are used to estimate and analyse the time series data.

In the analysis of the time series data using unconstrained production function model, once the parameter coefficients and technical progress are determined from the regression, two possible results could be estimated. Given the technical progress, growth rate of output could be estimated, or given estimated growth rate of output, total productivity or technological progress could be estimated. Moreover, the technical progress represents not only the total productivity but also accommodates errors in estimating the whole equation that are not accounted for in capital and labor input variable growth rates. Basically, the unconstrained production function does not assume any restrictions on the returns to scale and thus can portray increasing, decreasing or constant returns to scale depending on the relationships between the dependent variable output and independent variable inputs that prevailed in the economy.

Thus, to analyze aggregate growth rate using unconstrained production function, output growth rate is regressed on capital and labor inputs. A dummy variable is included to account for differences in economic growth before the war and after the war. Moreover, since there is no recorded employment in Eritrea, population is taken as proxy for labor. The equation, as specified in (5.2.2.3) of Chapter

Five and the results of the regression of output growth rate on labor and capital growth rates based on unconstrained production function are presented below.

$$\ln Y_t = \ln T_t + \theta_1 \ln K_t + \theta_2 \ln L_t + \theta_3 Di + u_t$$

Table 6.3.1 Results of Parameter Estimates with Standard Error and t-values Real Data from SPSS

Variables	Parameters	coefficients	Standard Errors	t-value	sig	
lnY _t * =dependent						
Constant	θ ₀	268.270	0.605	9.239	0.000	
lnK _t *	θ ₁	0.195	0.048	4.085	0.005	
lnL _t *	θ ₂	0.974	0.574	1.695	0.134	
Di*	θ ₃	- 0.093	0.080	-1.171	0.28	
		R ² = .90	D.W = 2.34	df = 7		

The results of the regression parameter coefficients indicate partial elasticities of output with respect to capital (K_t) and labor(L_t). The signs of the coefficients are as expected and the equation is explained well by the given variables in real terms as indicated by a very high value of R² and there is no series autocorrelation problem in the error terms. However, regression result based on nominal time series data showed that L_t has been more statistically significant than K_t and the dummy variable (Di) also was statistically significant at 10 percent significant level. Nevertheless, since real data are more reliable than nominal data and, the above results from regression on real data are taken as the base for this analysis.

The result illustrates that for a given capital, an increase of one percent of labor induces an increase in output by 0.974 percent. By the same token, an increase of one percent in capital, given constant labor, increases growth rate by 0.195 percent. The dummy variable has a correct sign but it is statistically insignificant implying that war did not have significant effect on economic growth. In addition, the result indicates that, output is more elastic with respect to labor than to capital. However, change in K_t is more statistically significant than change in L_t and this implies that with abundant L_t, a small change in K_t could bring significant effect on change on economic growth.

Thus, it could be deduced that low economic growth rate is associated with low K_t investment and abundant L_t . Furthermore, it could be lack of skilled labor that complements the capital investment that led to low capital elasticity in the result. Furthermore, the production function shows increasing return to scale with sum of the coefficients about 1.076, but not far from constant returns to scale.

The unconstrained production function is used not only to see the effect of factor inputs on economic growth, but also to accommodate the impact of technological change in economic growth determination. The change in technology is reflected in the coefficient as a constant value of 268.27. As is explained earlier this value does not explain only the total productivity but also accounts for some of the errors in estimating the inputs. Thus, the higher value may partly attribute to the residuals of the equation.

In the constrained production function, the sum of the parameter coefficients is determined outside the model because it exhibits constant return to scale implying that the sum of the coefficients must be a unit. In addition, technological progress is assumed to be neutral. Under this assumption, the production function estimates the labor-intensive (capital-labor ratio) form to analyze the growth rate of output per head. This implies that in countries with abundant labor small change in capital could increase labor productivity or output per labor. The equation and results of the regression of change in output labor ration on capital labor ratio based on equation (5.2.2.5) as specified in Chapter Five are given below:

$$Y_t^* = \theta_0 + \theta_1 K_t^* + \theta_2 L_t^* + \theta_3 D_t^* + u_t$$

Table 6.3.2 Results of Parameter Estimates with Standard Error and t-values from SPSS

Variables	Parameters	coefficients	Standard Errors	t-value	sig
$Y_t^* =$ dependent					
Constant	θ_0		0.182	31.748	0.000
K_t^*	θ_1	0.202	0.038	5.289	0.001
L_t	θ_2	0.778			
D_t^*	θ_3	-0.073	0.044	-1.677	0.132
		$R^2 = .79$	D.W = 2.3	df = 8	

The change in output per labor input regressed on the change in capital per labor ratio shows a good fitted model with constant returns to scale. The R^2 indicates that the log of the capital labor ratio and the dummy variable explains about 79 percent variation in the log of the output labor ratio. The results are not far from the findings of Nadeem U. Haque and Peter J. Motiel (1991) empirical analysis carried out on cross sectional data on developing countries. It indicates that for every percent increase in growth rate of capital per labor ratio, growth rate of output per head changes by 0.202 percent. Furthermore, assuming neutral technological progress, the growth rate of output per head could be estimated by varying the capital labor ratio. The parameter coefficient of labor is retrieved from the estimated equation based on the assumption of constant returns to scale of the constrained production function. The partial elasticity of output with respect to labor is greater than that of capital labor ratio, but it is not far from its partial elasticity in the unconstrained production function. However, in this analysis it is found that labor share is greater than the range of the empirical findings of De Gregorio (1992) analytical test, in Latin America countries that lies between 0.39 and 0.58. Moreover, although output is more responsive to labor input, its significant level could not be determined in the constrained production function.

Thirwall (1999) indicates that, however, in many regression estimates when the coefficients of capital and labor are compared there is a tendency for the partial elasticity of output with respect to capital to be biased downward compared with elasticity for labor. The reason is that estimating by regression techniques, output is normally related to the capital stock or capacity rather than capital utilization.

As has been used in the unconstrained production function, to see the impact of war on economic growth, a dummy variable with zero value in the peacetime (1992-1997) and one value in wartime (1998-2002) has been included. The dummy variable has the expected sign that war has a negative impact on economic growth. Although the parameter estimate is not statistically significant at 10 percent significant level, it might not be concluded that war does not have any effect on economic growth at all. The important point is that with large sample, the level of significance would improve and lead to rejection of the null hypothesis.

It could be concluded that given constant labor growth rate in the long run, which is one pitfall of the model, an increase in capital will increase output per head. Thus, economic growth rate is more dependent on capital input than labor input in Eritrea for the sample period. Furthermore, in contrast to the neoclassical assumption of neutral technological progress, endogenous growth model tries to endogenize the technical progress as well as includes other variables in the model and assumes increasing returns to scale rather than constant returns to scale. Thus, investigating the relationship with more sample size and relaxation of the constant returns to scale assumption is required in further studies.

6.4 Aggregate Demand Analysis

Apart from the production function and sectoral value added discussed above, aggregate demand management also have a substantial impact on the rate of growth of output. These relationships include, government expenditure and government revenue, government expenditure and economic growth, export growth and economic growth, and government revenue and economic growth. The analysis of these economic indicators is important to identify the direction for the policy implication mainly of the fiscal instruments.

6.4.1 Government revenue and government expenditure

The issue of budget deficit has been widely discussed in resource allocation of developing countries mainly in adjustment programs. Budget deficit may have negative or positive implication on economic growth. Thus, reducing deficit may imply encouraging or discouraging economic growth. There are two possible ways that could reduce budget deficits; either increase revenue through collection more taxes or reduce government expenditure. More revenue collection through taxation may not be promising because it is believed that high taxation retards private saving thus, future investment will not grow as expected, which in turn hamper economic growth. Moreover, government expenditure reduction may not be recommended because cutting public investment implies again impeding economic growth. Therefore, understanding the relationship between government expenditure and government revenue is important to evaluate, plan and even control on

how to allocate scarce resources efficiently. Several analyses have been carried out to investigate the relationship between these two variables and came out with different empirical results. Nevertheless, in general, the arguments posed revolve around four hypotheses. The first null hypothesis suggests a tax-spend, which implies that changes in revenues induce changes in expenditure (Friedman, 1978; Buchanan and Wagner, 1978). The second hypothesis postulates a spend-tax policy and implies changes in expenditure induce changes in revenues (Peacock and Wiseman, 1979; Barro, 1974). The third argument postulates that both revenue and expenditure are determined jointly (Meltzer and Richard, 1981). A fourth argument states that the two variables are determined independently (Baghestani and McNown, 1994). Hence, based on these arguments, it is important to differentiate the causal effect of government expenditure and government revenue of Eritrea.

Furthermore, it has been repeatedly explained that most macroeconomic variables at level form are non-stationary. For example Gujarati (1995), Johansen (1991), and Engle and Granger (1987) provide analyses that most macroeconomic time series data such as GNP, government expenditure, aggregate demand for money in the level form are non-stationary. Empirical results have come with different stationary characteristics for the same country but in different forms. Nominal and real data as well as yearly and quarterly data might give different degree of non-stationarity for the same time period samples. These variations could be explained due to many factors. Nominal and real aggregate variables, for example, might portray different patterns due to inflation, exchange rate, and interest rate differentials, and for that matter policy intervention. Thus, it is important to identify whether time series data are stationary or non stationary before using them in regression analysis to trace out more accurate estimations.

Engle and Granger (1987) and Gujarati (1995) observe that even though economic time series may have the characteristics of non-stationary in their level forms, there may exist some linear combination of these variables that converges to a long run relationship over time. If the series are stationary individually only after differencing, but one finds that a linear combination of their levels is stationary, then the series are said to be cointegrated.

Consequently, four procedures and tests are carried out to investigate government expenditure versus government revenue. These tests and regressions include unit root test for stationarity, cointegration

test, Granger causality test and finally stock adjustment estimate will be carried out for policy and planning purpose. Yearly but nominal and real data are used to test the stationarity. Thus, following are the results of ADF test for unit root test of GE_t and GR_t of Eritrea.

Table 6.4.1.1 Output of Unit Root Test based on ADF Statistics for Stationarity of GE_t , and GR_t , in Nominal and Real Data from E-view.

Variable	ADF- statistics Nominal data	ADF statistic Real data	Lag - length	Mackinnon critical values for rejection of a hypothesis of a unit root
GE_t	-3.355619	-1.85465	2	1% Critical Value -4, 6405
GR_t	-1.406456	-1.74578	2	5% Critical Value -3,335 10% Critical value -2,8169

The results indicate that the calculated ADF statistics are greater than the Mackinnon critical values for nominal data of GE_t at 5 and 10 percent significant levels. This implies that the null hypothesis for the existence of unit root is rejected and, thus the nominal time series are stationary while for the real data the null hypothesis is not rejected and implies that they are non-stationary.

However, the estimated ADF statistics of GR_t for both nominal and real series data are less than Mackinnon critical values for rejection of a hypothesis of a unit root values at the given three specified significant levels. Hence the hypothesis for a unit root is not rejected and thus, the time series are non-stationary. OLS regression of government expenditure on government revenue or government revenue on government expenditure might be misleading unless the two variables have long run linear relationship, thus are cointegrated. The next step is then to test whether these variables are cointegrated or not. The ADF tests show that both GE_t and GR_t real time series data are non-stationary. But, even though they are non-stationary, they may have long run linear combination, thus could be cointegrated. One method to test their cointegration is to know whether the estimated residual time series data retrieved from the OLS regression estimation of the two variable are stationary or not. Thus, if the estimated residual time series are stationary, then they are integrated of order zero $I(0)$ and thus the two variables are cointegrated. Since Granger causal test indicated that

direction runs from GR_t to GE_t , the equation is specified as GR_t independent and GE_t as dependent variables as follows.

$$GE_t = \beta_0 + \beta_1 GR_t + u_t \quad (6.4.1.1)$$

Thus, rewritten the above equation in the linear combination of the two variables gives;

$$u_t^{\wedge} = GE_t - \beta_0 - \beta_1 GR_t \quad (6.4.1.2)$$

So, the simple ordinary least square regression of equation (6.4.1.1) helped us to retrieve the estimated residual time series data so that we can use them for cointegration test and it also serves for preliminary observation whether this regression could be suspected of spurious or not. When equations are characterized by high R^2 value, but few statistically significant t-values and have low autocorrelation values, then they are suspected of spurious relations (Gujarati, 1995). Nevertheless, the result of OLS regression of GE_t on GR_t of real time series data are presented below:

Table 6.4.1.3 Results of Parameter Estimates, Standard Error and t-values of Real data from E-views

Variables	coefficients	Standard Errors	t-value	Probability
$GE_t =$ Dependent				
Constant	-304.34	664.67	-0.458	0.66
GR_t	2.22	0.64	3.46	0.007
	$R^2 = 0.57$		$D.W = 1.62$	

The OLS regression results indicate statistically significant parameters with moderately explained variation and not series autocorrelation problem. Thus, it seems reasonable to use the model for prediction or for policy decision purposes. However, since GE_t and GR_t time series data are found to be non-stationary, the reasonably fitted data might lead us to incorrect decisions. Thus, the next step is to test whether the two variables are cointegrated or not. The unit root test of the residual time series data retrieved from the above equation and result based on the ADF test is given below.

Table 6.4.1.4 Result of Unit Root test of Estimated Residual using E-views

Variable	ADF-statistics	Mackinnon critical values for rejection of a hypothesis of a unit root
Residual in nominal value	-3.520	1% Critical Value -4,6405
Residual in real value	-3.561	5% Critical Value -3,335
		10% Critical value -2,8169

The unit root test is carried out based on ADF test, indicated that the calculated ADF statistic are greater than Mackinnon critical values for rejection of a hypothesis of a unit root at 5 and 10 percent significant levels in both real and nominal data. Hence, the null hypothesis for the existence of a unit root is rejected and this implies that GE_t and GR_t are cointegrated and have long run relationships in the Eritrean context for the sample period data.

However, it is imperative to know the direction of causality so that dependent and independent variables are identified and structural equations are constructed correctly. Subsequently, the Granger causal test is carried out on each structural equation and the results are given below.

Table 6.4.1.2 Results of Granger Causal Test of GE_t versus GR_t on Nominal and Real Data using E-views.

The null hypothesis	Nominal			Real		
	Ob	F-statistics	Prob.	Ob	F-statistics	Prob.
GE_t does not Granger cause GR_t	10	0.6575	0.444	9	0.3732	0.71020
GR_t does not Granger cause GE_t		3.1520	0.1190		5.4547	0.07196
RGE_t does not Granger cause RGR_t	10	0.0273	0.873	9	0.11606	0.40040
RGR_t does not Granger cause RGE_t		2.5939	0.1513		6.44946	0.05603

The Granger causality results in nominal and real time series data indicate that the null hypothesis GE_t does not Granger cause GR_t is not rejected, while the null hypothesis that GR_t does not Granger cause is rejected at two lags in about 5 percent significant level. Thus, the direction of causality is specified as unidirectional running from GR_t to GE_t and supports the argument of tax and spend strategy. Thus, it could be deduced that the policy implication should lie on the revenue side rather

than the expenditure side and when government is intended to increase its expenditure it should plan first to increase its revenue and change in GE_t might be planned based on change in planned GR_t .

Once the causation and cointegration of GE_t and GR_t variables is identified, long run desired GE_t could be reasonably determined from actual GR_t using stock adjustment model. As explained earlier, since the desired long run GE_t is not observable, the parameter estimates of the long run regression equation are reconstructed through the short run regression of GE_t on GR_t and GE_{t-1} . Thus, the short run results of regressing GE_t on GR_t and GE_{t-1} are given below.

Table 6.4.1.5 Results of Parameter Estimates, Standard Error and t-values of Real

Data from E-view				
Variables	coefficients	Standard Errors	t-value	Probability
RGE _t = Dependent				
Constant	40.46	882.7	0.046	0.961
RGR _t	1.252	0.908	1.379	0.201
RGE _{t-1}	0.366	0.231	1.581	0.158
	$R^2 = 0.52$	D.W = 2.33	F = 3.85	

From the above regression equation we can see that both the estimated coefficients of RGR_t and RGE_{t-1} are statistically insignificant for the sample period in Eritrea. The coefficient of determination R^2 is relatively moderate and indicates that GR_t and GE_{t-1} explain about 52 percent variation in RGE_t . In addition, the equation indicates that there is not series autocorrelation problem. When RGE_t is regressed on RGR_t without including the lagged expenditure, the estimated coefficient of the RGR_t is highly statistical significant. This shows that the inclusion of extra variable lagged government expenditure biased the estimated coefficient of RGR_t downward and makes it statistically insignificant. However, we are not interested about the robustness of the results of the equation, rather the aim is to determine an equation that is used to show the long run relationship between the two variables. The next step is then, to determine the coefficient of adjustment so that a long run equation is retrieved from the short run equation.

The coefficient of adjustment δ is about 0.634 as calculated from the coefficient of RGE_{t-1} using (table 6.4.1.5). As the value of the coefficient of adjustment approaches to one the government tends to use a balanced budget and adjusts its current expenditure with very small proportion to its past expenditure in the short run. However, when it approaches to zero it would imply that the government tends to give more weight to their current expenditure based on past expenditure than to current revenue. In the Eritrean case it seems that government tends to adjust its current expenditure with about 35 percent in past pattern and 65 percent with current revenue. Nevertheless, the long run equation derived from the above short run equation is structured as follows.

$$RGE_t^* = -63.82 + 1.97RGR_t \quad (6.4.1.3)$$

Thus, in the long run the desired government expenditure increases by 1.97 nakfa for every one nakfa increase in current revenue. This result seemed consistent with the characteristics of Eritrean deficit in the past years. The policy implication is that the government of Eritrea should stress more on its revenue side rather than on its expenditure side. Thus, deficits could be minimized when appropriate tax policy that increase revenue is implemented and expenditure should be allocated based on income potential.

6.4.2 Economic growth and government revenue

Taxation policy has been related with economic growth mainly in terms of private sector incentives. When incentives of low taxation rates are provided, it is believed that investment will be increased and an increase in investment will have a positive impact on economic growth. However, in developing countries, like Eritrea, the role of private investment to economic growth might be very small, hence public investment could have a major contribution. But public investment will be raised from tax and non-tax revenue. This leads us to the argument whether government revenue causes economic growth or economic growth enforces government revenue. Thus, it is reasonable to identify the cause and effect of the variables for the given time series data.

However, it is imperative to test the stationarity and cointegration of GR_t and GDP_t time series data before investigating their causation. But, the test of stationarity of the time series data of GR_t has

been done already in the above discussion and it is found to be non-stationary. Thus, only the ADF test of stationary of GDP_t time series is given below:

Table 6.4.2.1 Output of Unit Root Test based on ADF Statistics for Stationarity of GDP in Nominal and Real Data from E-view.

Variable	ADF- statistics Nominal data	ADF-statistics Real data	Lag- length	Mackinnon critical values for rejection of a hypothesis of a unit root
RGDP	-2.71643	-1.6449	1	1% Critical Value -4, 6405 5% Critical Value -3,335 10% Critical value -2,8169

The result indicates that the calculated ADF statistic is smaller than the Mackinnon critical values for rejection of a hypothesis of a unit root at 1 percent, 5 percent, and 10 percent significant levels for the sample period. Thus, the null hypothesis that there is a unit root in the series of GDP_t is not rejected and this implies that the time series are non-stationary. The next step is to find out whether the two variables are cointegrated or not. But, before the test of cointegration it would be better to determine the structural equation and look at: the regression equation and know how robust are the estimators to explain the dependent variable. The structural equation of the real value between RGR_t and RGDP_t is modeled as follows:

$$RGR_t = d_0 + d_1RGDP_t + u_{2t} \quad (6.4.2.1)$$

Hence, the regression results of RGE_t on RGDP_t is presented below for analyze of the relationship as well as for calculating the estimated residuals for cointegration test.

Table 6.4.2.3 Results of Parameter Estimates, Standard Error and t-values from E-views

Variables	coefficients	Standard Errors	t-value	Probability
RGR _t = Dependent				
Constant	-278.98	336.79	-0.8283	0.4288
RGDP _t	0.3997	0.1035	3.862	0.0038
	R ² = 0.62	D.W = 1.72		F = 14.9

The result of regression equation indicates that the estimated coefficient is statistically significant and this implies that the change in $RGD\bar{P}_t$ has significant positive influence on RGE_t . The variation in RGR_t is also moderate explained by $RGD\bar{P}_t$ as indicated by R^2 . But, this relation could be spurious, because the two variables are non-stationary. Hence, they must be tested whether they are cointegrated or not through the estimated residual time series data retrieved from the rearranged simple ordinary least square regression given below.

$$u_{2t} = RGR_t - d_0 - d_1 RGD\bar{P}_t \quad (6.4.2.2)$$

Thus, the ADF test for stationarity of the estimated residual time series data are given below:

Table 6.4.2.4 Output of Unit root Test based on ADF Statistics for Non-stationarity of Estimated Residuals in Nominal and Real time series data from E-view.

Variable	ADF-statistics	Mackinnon critical values for rejection of a hypothesis of a unit root
Residual in nominal value	-5.5835*	1% Critical Value --4.8875
Residual in real value	-6.2244*	5% Critical Value -3.42385
		10% Critical value -2.86396

* ADF statistic at 1st difference with intercept

The results indicate that the calculated ADF statistic is greater than the Mackinnon critical values for rejection of a hypothesis of a unit root at the three given significant levels in real and nominal values. Hence, the null hypothesis that the estimated residual time series have unit root is rejected and thus are stationary. Therefore real government revenue and real GDP_t are cointegrated even though they are non-stationary. These imply that the relationship between the variables can be presented in an algebraic equation of their estimated coefficients and will be fixed with respect to time. Therefore there are no stochastic or deterministic trends in the data.

Once the cointegration is done, the next step is to trace out the direction of causation between the two variables. A test is carried out on the two variables using Granger causal null hypothesis and the results are given below:

Table 6.4.2.2 Output of Granger Causal Test between GDP_t and GR_t from E-views

The null hypothesis	Nominal			Real		
	Ob	F-statis	Prob.	Ob	F-statis	Prob.
GDP does not Granger cause GR	10	6.266	0.041	9	1.4122	0.344
GR does not Granger cause GDP		1.530	.256		0.9531	0.459
RGDP does not Granger cause RGR	10	1.0732	0.3346	9	8.9948	0.033
RGR does not Granger cause RGDP		0.2855	0.6096		0.2447	0.793

The result indicates that the null hypothesis that GDP_t does not Granger cause GR_t is rejected at one lag for nominal time series data and at two lags for the real time series data. However, the null hypothesis that GR_t does not Granger cause GDP_t is not rejected at both lags at the given F-statistic in real and nominal values. Hence it could be said that GDP_t Granger causes GR_t. The implication is that policy should promote productivity so that more revenue would be collected. When the policy adopts lower taxation in the present period, private sector will get an incentive to produce more so that more revenue would be collected in the future.

It is now possible to estimate the long run desired government revenue from current GDP_t using stock adjustment model. However, since the desired Government revenue is not observable directly, it is derived from the short run regression equation estimates of current government revenue on GDP_t and its first lag variables. The short run structural equation of the two variables is specified as follows:

$$RGR_t = \gamma\theta_0 + \gamma\theta_1RGR_{t-1} + (1-\gamma)RGR_{t-1} + \gamma u_t \quad (6.4.2.3)$$

In the short run the government tends to adjust its current revenue collection with the variation in real GDP_t and to some extent to its past period revenue pattern. Based on this relationship, the short run estimates for the sample period is given below:

Table 6.4.2.5 Results of Parameter Estimates, Standard Error and t-values of Real data from SPSS

Variables	Coefficients	Standard Errors	t-value	Probability
RGR _t = Dependent				
Constant	438.96	243.1	1.806	0.114
RGDP _t	0.110	0.081	1.367	0.214
RGR _{t-1}	0.442	0.255	1.731	0.127
	R ² = 0.82	D.W = 2.9	F = 16.47	

The result shows that the coefficients of the independent variables GDP_t and lagged government revenue are statistically insignificant. However, we have seen in table (6.4.2.2) that RGDP_t is statistically significant to explain RGR. Thus, adding the lagged variable government revenue to the equation has biased downward the estimated coefficient of RGDP. The coefficient of determination R² indicates that about 82 percent of the total variation Government revenue is explained well by both the independent variables in the equation. Moreover, It has been explained earlier that the two variables have long run linear relationship even though this regression show insignificant coefficient of the independent variable at the given significant levels. Nevertheless, we are not more interested in the short run relationship; rather we are interested to determine the long run relationship between the two variables. The long run equation indicates a relationship between desired government revenue and current GDP_t. However, since the desired long run GR is not directly observable it is retrieved from the short run equation by manipulation of the coefficient of adjustment γ . The coefficient of adjustment, as calculated from the parameter coefficient of GR_{t-1} (table 6.4.2.4), is equal to 0.558. Hence the long run equation is restructured as follows:

$$GR_t^* = 786.67 + 0.197GDP_t \quad (6.4.2.4)$$

This implies that the government of Eritrea collects about 200 thousand nakfa revenue for every one million-nakfa increase in GDP. This result seems consistent with the revenue-collected range of Eritrea explained earlier in Chapter Four. Thus, with caution of small sample used in the analysis, the model could be used for long run estimations or prediction and policy applications.

6.4.3 Government expenditure and economic growth

In many instances, government expenditure is considered as detrimental to economic growth while, in view of development economics it has high contribution to maintain the welfare of society as it plays a vital role in social improvement by investing in social overheads. Quantitative and statistical empirical analyses came out with different results as to the direction of effectiveness between government expenditure and economic growth. Thus, the question whether government expenditure causes economic growth or economic growth causes government expenditure should be addressed so that the direction of the policy would be identified correctly.

The test for stationarity of the time series data of GE_t and GDP_t has been discussed in the previous sub-topics for the sample period and indicated that they are non-stationary. However, GE_t and GDP_t may have long run relationship and thus could be cointegrated. If they are cointegrated then their long run relationship will have meaning for prediction and recommendation. Therefore, the Model is specified, as RGE_t dependent variable and $RGDP_t$ independent variable.

$$RGE_t = a_0 + a_1 RGR_t + \epsilon_t \quad (6.4.3.1)$$

The next step is to regress RGE_t on $RGDP_t$ and observe the linear relationship of the two variables in their level form and retrieve the estimated residual time series data so that cointegration test of the variable is carried out. Accordingly, the result of the regression is presented below.

Table 6.4.3.3 Results of Parameter Estimates, Standard Error and t-values of Real Data Regression of GE_t on GDP_t from E-view

Variables	Coefficients	Standard Errors	t-value	Probability
RGE = Dependent				
Constant	-2029.06	903.29	-2.246	0.051
$RGDP_t$	1.229	0.27	4.430	0.001
	$R^2 = .68$	D.W = 1.73	F = 19.6	

The simple ordinary least square regression indicated that $RGDP_t$ causes RGE_t and about 70 percent variation in RGE_t is explained by $RGDP_t$ variations. Likewise, the t-value indicated that the estimated coefficient is highly statistically significant at below 1 percent significant level. However, further investigation is required whether the two variables are cointegrated or not because it is found already in the previous tests that these two variables are non-stationary. So, the estimated residual time series data used for cointegration test are retrieved from the simple linear regression of the real values of RGE_t and $RGDP_t$ rearranged as follows:

$$\varepsilon_t = RGE_t - a_0 - a_1 RGDP_t \quad (6.4.3.2)$$

Hence, the results for cointegration test based on ADF statistic test are tabulated below.

Table 6.4.3.4 Results of Unit Root Test for Stationarity of estimated Residuals from E-view.

Variable	ADF-statistics	Mackinnon critical values for rejection of a hypothesis of a unit root
Residual in nominal value	-2.6321	1% Critical Value -2.967
Residual in real value	-2.9830	5% Critical Value -1.989
		10% Critical value -1.638

When a test of the unit root of the estimated residual time series in the level form with intercept is done, the ADF statistic are found to be less than the Mackinnon critical values for rejection of a hypothesis of a unit root at the given significant levels. Hence the estimated residual time series are non-stationary with the prevailing condition. However, when a test is done on level form without an intercept, the null hypothesis is rejected. Thus, the second option is taken in this analysis. Therefore, since the calculated ADF statistic test results at both nominal and real value are greater than the Mackinnon critical values for rejection of a hypothesis of a unit root, the null hypotheses for the existence of unit root are rejected and hence the variables are cointegrated for the given sample period in Eritrea. Therefore, albeit the smallness of the sample and inconsistent stability of the sample period, notwithstanding the regression results obtained from RGE_t and $RGDP_t$ are reliable and could be used for both policy and prediction purposes.

However as in the previous tests, a causal test is required to specify the direction between the two variables. The two previous discussions indicated that the causality between government expenditure and government revenue runs from government revenue to government expenditure in one hand, and the causality between government revenue and economic growth runs from economic growth to government revenue on the other hand. From this relationships it could be deduced that economic growth can Granger cause government expenditure. However, with large public investment and parallel increasing growth rate from -2.5 in 1992 to 7.6 in 1997 in the first seven years in Eritrea, it is expected that government expenditure would cause economic growth. Moreover, the Granger causal test between GE_t and GDP_t are carried out and the result are presented below:

Table 6.4.3.2 Results of Granger Causal Test between GDP and GE from E-views

The null hypothesis	Ob	F-sta- tistics	Prob.	Ob	F-stati stic	Prob.
GDP_t does not Granger cause GE_t	10	5.6205	0.0495	9	3.84534	0.11706
GE_t does not Granger cause GDP_t		4.8945	0.0625		1.86170	0.26822
$RGDP_t$ does not Granger cause RGE_t	10	4.7244	0.066	9	4.3647	0.0987
RGE_t does not Granger cause $RGDP_t$		1.0502	0.339		4.000	0.1111

The result of Granger causal test indicates that the null hypothesis GDP_t does not Granger cause GE_t is rejected at one and two lags in both nominal and real values, while the null hypothesis of GE_t does not Granger cause GDP_t is rejected at one lag for the nominal values and at two lags for real value. Therefore, at one lag in nominal value and two lags in real value, both the F- statistics are statistically significant at the given significant levels. Thus, at these levels there is bi directional causation between the two variables and both are to be determined jointly. However, since GDP_t does not Granger cause GE_t is rejected in all cases, it could be given more weight to this decision for the sample period data. Thus the null hypothesis GE_t does not Granger cause GDP_t is accepted, while GDP_t does not Granger cause GE_t is rejected. This result, however, indicates an opposite direction to the expected causation. It contrast to the Keynesian aggregate demand model, but

supports Wagner's law of causality that states causality running from GDP_t to GE_t for Eritrea for the given sample period.

Nevertheless, two points should be taken into account from this result pertinent to Eritrea. First, government expenditure on infrastructures, which has been dominant expenditure in Eritrea mainly before the war in the sample period, might not show its impact on economic growth because of the long run characteristic of the investment. Such investments are less likely to show a substantial impact on economic growth in the short run. The second point is that, more government expenditure in Eritrea has been expended on consumption goods and defense budgets in almost half of the sample period during the war of border conflict with Ethiopia in 1998-2002 and as has been found earlier in Chapter Four that war had a detrimental effect on the economic growth. Thus, with the smallness of the sample size and war effect on economic growth, the result may not be consistent with the expected results. Nonetheless, given the result of causation, the policy decision rule lies on GDP_t manipulation rather than GE_t changes. It is found that the causation runs from $RGDP_t$ to RGE_t .

6.4.4 Export growth and economic growth

Basic macroeconomic theory suggests that exports promote economic growth especially in the case of poor LDCs, which need foreign exchange to import capital inputs for their domestic production. On the other hand, countries with comparative advantages in certain commodities, produce more than they consume and export their surplus, thus GDP_t enforces export growth. It has been explained that when export growth causes the increase in economic growth, then export led development strategy is preferred, while if economic growth causes export growth then inward looking development strategy is appropriate. The non-stationarity of $RGDP_t$ is already confirmed in the previous conducted tests. Hence the test of stationarity is required only on exports in this section and the results are presented below:

Table 6.4.4.1 Output of Unit Root Test based on ADF Statistics for Stationarity of GDP in Nominal and Real data from E-view.

Variable	ADF- statistics Nominal data	ADF-statistics Real data	Mackinnon critical values for rejection of a hypothesis of a unit root
Exports	-1.25754	-1.67524	1% Critical Value -4,6405 5% Critical Value -3,335 10% Critical value -2,8169

The result indicates that the calculated ADF statistic is smaller than the Mackinnon critical values for rejection of a hypothesis of a unit root in the time series data of export at the given Mackinnonn 1 percent, 5 percent, and 10 percent significant levels. Hence the null hypothesis that there is a unit root in the time series data is not rejected. Therefore the time series data are non-stationary.

It has been explained earlier that empirical analysis from different sources of data have come with different results some supporting the export-led and others the inward driven strategy, while others have come with results that indicate joint determination of the two variable or non causal between the two comparable variables. The test of causation between export growth and GDP_t has been done using Granger causality test based on F-statistics and the result is presented below.

Table 6.4.4.2 Results of Granger Causal Test between GDP and GE from E-views

The null hypothesis	Ob	F-sta tistics	Prob.	Ob	F-sta tistics	Prob.	O b	F-stat istics	Prob.
EX _t does not Granger cause GDP _t	10	0.051	0.826	9	0.468	0.656	8	1.017	0.605
GDP _t does not Granger cause EX _t		0.162	0.699		2.715	0.179		1375	0.006
REX _t does not Granger cause RGDP _t	10	1.656	0.239	9	0.997	0.445	8	243.6	0.047
RGDP _t does not Granger cause REX _t		1.899	0.210		1.485	0.329		0.154	0.915

The results indicate that the null hypothesis of GDP_t does not Granger cause EX_t as well as the null hypothesis EX_t does not Granger cause are not rejected at 10 percent significant levels for both nominal and real values at one and two lags. These implies that there is not any significant effect of economic growth on export growth and vice versa for the given sample period. Thus, economic

growth and export growth are determined independent of each other and neither export promotion growth nor economic growth led export hypothesis are supported for the sample data at the two and one lags.

However, further investigation indicated that at three lags the tests gave mixed results for nominal and real value. In nominal values the null hypothesis that EX_t does not Granger cause GDP_t is not rejected, but the null hypothesis GDP_t does not Granger cause EX_t is rejected. Thus, the causation runs from GDP_t to EX_t . In contrast to this, the test in real values indicates that the causation runs from REX_t to $RGDP_t$. These results show the instability of the export and GDP_t relationship. In addition, if the time series has small sample size, the lag length could consume more degree of freedom and estimation will be impossible (Gujarati, 1995). Thus, these results gave us an ambiguous causation between the two variables and using them as causal relationship could lead to unreliable conclusion. We tried to examine indirectly, if there is statistical significance relationship between the two variables, using simple linear regression of $RGDP_t$ on REX_t and interchanging the regression of REX_t on $RGDP_t$ in real time series data. Moreover, one of the equations to be regressed is specified as follows:

$$RGDP_t = b_0 + b_1REX_t + \mu_t \quad (6.4.4.1)$$

Hence, result of the simple ordinary least square regression of $RGDP_t$ on REX_t is presented below:

Table 6.4.4.3 Results of Parameter Estimates, Standard Error and t-values of Real data E-view.

Variables	Coefficients	Standard Errors	t-value	Probability
RGDP = Dependent				
Constant	3833.77	1199.29	3.196	0.010
REX_t	3.96	2.98	1.327	0.217
	$R^2 = 0.163$	D.W = 0.24	F = 1.76	

The regression result indicates that export is very weak to explain the changes of real GDP_t . The variation explained by R^2 is very low and is about 16 percent only. This gives additional information

that the two variables are independent of each other in Eritrea for the sample period. Thus, the two variables are expected not to be cointegrated. Moreover, The cointegration test is not possible unless the direction of causality is determined between the two variables. Nevertheless, we tried to investigate taking alternate causality direction between REX_t and $RGDP_t$ and retrieve the estimated residuals and test for the non-stationarity, but all results show that there is a unit root in the residual time series. Hence the two variables are not cointegrated. Thus, mixed and conflicting results are possible due to omitted variables that could serve as a link between export growth and economic growth in the Eritrea context. The smallness of the sample would also contribute to the unstable result between export growth and GDP_t . In addition, the export sector of Eritrea has been exposed to internal shocks like poor harvest due to drought and war that led the sectors to contribute insignificant amount to GDP_t in the last four years and this has been reflected in the increasing current account deficit of Eritrea.

6.5 Private consumption Expenditure

Most economic theories indicate that private consumption depends on interest rate and disposable income. When saving interest rate is raised people tend to postpone their current consumption to the future so that they would increase their earning from saving. Thus current consumption and interest rates have a negative relationship. However, household's consumption depends mainly on its disposable income and has positive relationship. Models may differ from the theoretical point of view and the economic stage of the country understudy. In some instances the, real interest rate may be omitted, while in other models like of that Hall (1978) lagged disposable income are included to account for the liquidity constraint in the model. However, in the Eritrean context, simple model, which includes only disposable income and lagged consumption variables, will be used in the private consumption analysis. This is because interest rate on savings is almost fixed from 5.5 percent to 6 percent. Thus, it is expected that interest rate will have less significant influence in the pattern of household consumption. Furthermore, since we are dealing with small samples, including large number of explanatory variables may lead us to invalid and misleading results for they consume more degrees of freedom. Thus, given this limitation, real private consumption is regressed on disposable income and lagged consumption and the result is given below.

Table 6.4.1 Results of Parameter Estimates, Standard Error and t-values from SPSS

Variables	coefficients	Standard Errors	t-value	Probability
RC _t = Dependent				
Constant	85.76	868.73	0.099	0.924
RY _t ^d	0.914	0.141	6.494	0.000
RC _{t-1}	-0.0215	0.142	-0.152	0.88
	R ² = 0.86		D.W = 1.5	

The above results indicate that disposable income, as anticipated, has the correct sign with highly statistically significant estimated coefficient. Given other variables are constant, an increase of one nakfa in disposable income would lead to 91.4 cents increase in current consumption in the short run. This result is consistent with the very low saving rate of Eritrea explained in chapter four. The policy implication is that households should be either encouraged to consume less through higher interest rate earning from their foregone consumption or discourage them through higher taxation so that national saving would be increased. Thus, the ultimate aim should foster on how to increase gross saving so that gross investment would be increased. Once investment is raised income will rise and future consumption would be raised.

The coefficient of the lagged value of the consumption, however, is not consistent with the permanent income hypothesis as expected to have positive and significant effect on consumption. To the contrary, it has a negative sign and at the same time is insignificant at 10 significant levels. However, we are concerned about the relationship between private consumption and disposable income. This model could be appropriate in the Eritrean context for the pattern of consumption and disposable income is not so complex compared to high-income households in other countries that required many variables. However, further investigation including interest rate with large sample size in the model is recommended for future studies.

6.6 Investment Expenditure Growth

The theory of investment provides different factors that could explain the cause of variation or growth in investment expenditure. The changes in income, interest rate, and exchange rate along

with prudent investment and taxation policies are some of the factors that affect investment expenditure. The choice of relevant variables for analysis, however, might differ depending upon the economic development or stage of a given country or sector. In developing countries like Eritrea, which have limited financial and capital market, the role of interest rate and exchange rate is very limited related to developed countries with efficient capital and goods markets. Hence, this study focuses on how investment expenditure is influenced only by variation in income and interest rate. In addition, lag value of capital formation will be included as one of the variables in the model to account for past period effect on current investment. The approach is based on studies made by (Khan, et al, 1991) in macroeconomic models used for adjustment for developing countries. As in most developing countries, lending interest rate in Eritrea is pegged to 8 percent for some sectors and at 12 percent for other sectors. Hence, there is no evidence or trend that could be traced out that interest rate would show the cost of capital investment accurately. In addition, Wai (1980) emphasized that in most developing countries, government investment is a large component of total investment and government decision on the level of investment are not usually made on the availability of funds or the profitability of the project in the short run. Furthermore, private investment is determined more by the availability of funds rather than the level of interest rate as credit rationing is prevalent.

Thus, with this limitation and interest rate characteristics in Eritrea, inflation rate is used as proxy for interest rate because it might show the cost of investment better than interest rate. The results of the simple ordinary least square regression of real investment expenditure on real GDP, consumer price index and lag of real capital stock are presented below.

Table 6.5.1 Results of Parameter Estimates, Standard Error and t-values from SPSS

Variables	coefficients	Standard Errors	t-value	Probability
RI _t = Dependent				
Constant	-1324.1	483.3	-2.745	0.033
RGDP _t	0.684	0.16	4.269	0.005
P _t	-9.721	10.666	-0.911	0.397
RK _{t-1}	0.00432	0.274	0.016	0.988
	R ² = 0.89		D.W = 2.8	

The above results indicate that the variables exhibit their expected signs. The t-value also indicates that the parameter estimate of output is statistically significant at less than one significant level. Inflation rate has a negative sign in its coefficient as expected and this shows that an increase in inflation rate or interest rate has detrimental effect on domestic investment expenditure. However, the t- statistic shows that the estimated coefficient of inflation is statistically insignificant at ten percent significant level, which implies that inflation rate does not have significant effect on domestic investment expenditure. Likewise, the lagged capital formation has the correct sign as expected, but since the estimated t-value is very low, the estimated coefficient is statistically insignificant and this implies that the lagged capital formation does not have significant effect on investment expenditure. Thus, private investment expenditure in Eritrea is merely dependent on change in positive productivity or economic growth. The insignificance of the inflation rate and lagged real capital formation could be attributed to the undeveloped characteristics of the Eritrean economy in one hand, and the smallness of the sample data on the other hand.

The estimated coefficient of the lagged variable in the above equation, although is statistically insignificant, it is important to determine the long run investment equation with respect to the two variables. The coefficient of adjustment of the investment expenditure is determined from its lagged value. The coefficient of adjustment is about 0.995. This coefficient is used to determine the desired long run investment equation as follows:

$$I_t^* = -1330.75 + 0.687RGDP_t \quad (6.5.1)$$

The equation indicates that 68 cents of planned investment expenditure is expected for every one nakfa increase in GDP in the long run in the Eritrean economy which seems consistent with the position of the investment level of the country before the war. Furthermore, inflation rate is omitted from the above equation because it is statistically insignificant similarly in the long run. Hence, the long-run desired investment expenditure is solely dependent on real GDP in Eritrea.

6. 7 Import Demand and Economic Growth

The balance of payments approach adheres to maintain balanced current account policy whereby to increase the level or rate in exports or else to minimize import requirement. Growth theory on the other hand, supports increase of imports to supplement domestic capital investments mainly in developing countries. Therefore, an increase in imports does not necessarily hamper economic growth. If the imported goods and services are for consumption purposes, which do not have short or long run trickle down effect on the economy, then it would inflate consumption and lead to high deficit and may retard economic growth. However, if the imported goods are investment goods, then it will have positive effect. This argument is not different from Barro's (1990) empirical findings on his analysis of productive and non-productive public consumption impact on economic growth. We have seen in the Eritrean case, that GDP causes government expenditure. Similarly, it is also expected that GDP will cause imports. However, the quantities of imported goods depend not only on income but also on real exchange rates. Imports are related positively to economic growth and negatively to real exchange rate. However, in this analysis lag of imports is included as one variable to account for any difference between current and past imports. Hence, regression analysis based on the above relationships gave us, the following results.

**Table 6.6.1 Results of Parameter Estimates, Standard Error
and t-values from SPSS**

Variables	coefficients	Standard Errors	t-value	Probability
lnZ _t = Dependent				
Constant	-3.496	0.994	-3.516	0.013
LnRY _t	1.596	0.253	6.299	0.001
REEX _t	-0.00293	0.004	-0.832	0.437
lnZ _{t-1}	-0.205	0.159	-1.287	0.246
	R ² = 0.98		D.W = 2.4	

The simple ordinary linear square regression of changes in imports on change in income and real effective exchange rate indicates that expected correct signs of the parameter estimates. Furthermore, the estimated t-value indicates that the estimated coefficient of the change in real income is highly

statistically insignificant with low autocorrelation coefficient. This implies that imports in Eritrea rise by 1.596 percent nakfa for every one percent increase in output and this seems consistent with the present current account portion of the balance of payments of Eritrea that shows very high deficits. Although, the parameter coefficient of the effective real exchange rate is insignificant, it has got the right sign. One of the reasons for the insignificance level of the real exchange rate could be the controlled and almost pegged exchange rate market of Eritrea. The real exchange rate in countries with pegged exchange rate regime is most of the time reflected in the parallel exchange rate markets. In such exchange rate market, where currencies are not traded freely and other financial instruments are absent, it would be less likely that the true real exchange rate effect will be reflected in the volume of import requirements. By the same token, the parameter coefficient of the lagged import has the correct sign but it is statistically insignificant. Once again the smallness of the sample data along with the condition of exchange rate market of Eritrea, might lead to weak and inconclusive regression results.

CHAPTER- SEVEN

CONCLUSION AND RECOMMENDATION

This paper is aimed to assess the integration of development planning and macroeconomic policies in Eritrea. We approached the problem through overall assessment of the sectors, which contribute to economic growth, and aggregate demand variables and macroeconomic policies that have a substantial impact on economic growth.

In the assessment of sectoral contribution to GDP versus economic growth, regression results indicated that economic growth has been more aligned with agricultural output, although total output is more elastic with respect to industrial, service, and distribution sectors. Furthermore, regression analysis carried out on the structural transformation of Eritrean economy showed that the estimated coefficient of the income per capita of the regression of agricultural share of GDP on income per capita has been less than of that industrial share of GDP and service sector. However, the estimated coefficient of income per capita has been lower for industrial sector but very large for service sector, which is inconsistent with the empirical results of Chenery and Syrquin findings. Nevertheless, two possible inferences could be made on these results. First, empirical findings of Chenery and Syrquin might not be applicable for all economies equally as countries differ in their structure and resource availabilities or other related factors. Secondly, the small sample size of the study as well as internal economic shocks rather than transformation might lead to inconsistent result

Further analysis was carried out on economic growth through regression analysis of aggregate output on capital and labor using unconstrained and constrained production function models. The result indicated that, as in many developing countries, Eritrea's economic growth is hampered due to lack of sufficient capital investment. Moreover, the result indicated that a policy, which encourages more saving and channels it to capital investment, could increase economic growth rate.

Similarly, the analysis of stationarity, Granger and cointegration tests are carried out individually in most of the aggregate demand variable in order to identify the long run characteristics and the

direction of causality of the variables. ADF statistical test indicated that all the macroeconomic variables under the discussion are non-stationary. However, although the variables are found to be non-stationary, most of the variables are cointegrated. Furthermore, the causal test indicated that government revenue causes government expenditure, economic growth causes government expenditure and government revenue, while the causal relationship between export growth and economic growth are ambiguous. Hence, fiscal policy planned to change government revenue will influence government expenditure and the policy implication is that the government of Eritrea's plan to increase expenditure should be based on the ability of its revenue collection, which emanates from prudent tax policy that is implemented to raise productivity. Results of the regression analysis of economic growth versus government expenditure indicated that progressive economic growth rate would lead to increase government expenditure. Thus, the policy should lie on how to increase productivity in order to increase government expenditure. In addition, as the analysis of government revenue versus economic growth has shown that the causation runs from economic growth to government revenue, only increase in productivity will push more output and more output leads to more revenue collection. The result supports that taxes should be incentive to increase productivity rather than discouraging output. The implication is that government can collect more revenue only when there is much output.

Ultimately, the above three causality and cointegration points are related to each other. Government revenue causes government expenditure; economic growth causes government revenue; and lastly economic growth causes government expenditure. Thus, the final aim lies on how to increase economic growth. Although fiscal management has an effect on economic growth, the result indicates that improving the productivity of factor contributions has more influence than macroeconomic management effects on economic growth in Eritrea.

It has been indicated in the above that the causation between export led growth and economic growth is ambiguous. Furthermore, the correlation between the two variables is also found to be very weak. This could be mainly due to weak export performance of the country which in itself is caused by internal shocks such as poor harvest and unstable environment of the region in the past five years. Moreover, one of the key problems with econometric studies in this idea is lack of the time series data

over a sufficiently long period. This causes particular problem to test for the unit roots and cointegration among the time series data with many lags.

Furthermore, we tried to examine private consumption, investment expenditure and import demand in Eritrea. Results from all the regression analyses indicate that the estimated coefficients of all the variables show correct signs. However, the estimated coefficient of income is statistically significant at one percent significant levels in the three equations while, the other variables are statistically insignificant at ten percent significant levels. This added impetus to the conclusion we gave about the importance of productivity in the Eritrean economy. It is true that the importance of economic growth comes first in any debate of economic theory. However, many adjustment programs gave more emphasis to macroeconomic imbalances and instabilities than to economic growth. The result of the analysis, however, hinted that structural and institutional rigidities of the Eritrea economy impeded growth more than its imbalances.

The second important policy, which helps to govern economic growth and demand management, is monetary policy. In the discussion of monetary policy of Eritrea, it is observed that monetary policy in Eritrea has been very limited to achieve its objectives. The implementation of monetary policy has been hampered due to lack of an analytically sound and transparent monetary framework, which makes it difficult to assess the performance of the central bank. The National Bank of Eritrea does not announce and explain its monetary objective, in particular, its objectives for inflation and exchange rates (IMF Country Report for Eritrea, 2003). The none existence of financial market along with small and undeveloped financial institutions, contributed to weak interest rate movement and intermediation between saving and investment. The graphical analysis of money supply against domestic creation and international reserve requirement indicated that the increase in money supply is mainly associated with domestic money creation. Furthermore, the role of reserve requirement to ease the continuous rising of money supply has been very limited due to its deterioration in the last five years. The need to finance fiscal deficits through high debt from commercial bank of Eritrea also weakened the role of monetary policy as an instrument to stabilize inflation and exchange rates. Moreover, the limitation of financial time series data restricted our discussion of the demand for money in this paper although it should have been included as part of our macroeconomic variable analysis.

Therefore, Our basic analysis of the overall assessment of the Eritrean economy indicates that development planning exercise has been limited for the fact that the country has deficiency of skilled human resources and limited institutional framework to mobilize resources towards these targets. Furthermore, annual budgets are prepared based on simple projections of expenditure of previous year, but are not processed regularly thorough analysis of specific macroeconomic targets. Thus, the capacity of maneuvering fiscal and monetary policies to influence the path of economic growth and demand management seems minimal. Alternatively, it has been tried in this paper to analyze some growth models and macroeconomic relationships, which would allow fostering policy instruments on macroeconomic objectives.

Finally, because of the institutional and structural factors in most developing countries in general, and in particular in Eritrea, the assumptions underlying the standardized optimizing models typically may not be satisfactory. Moreover, it is important to note, at the outset, that data limitations make the empirical analysis of the determinants of all the variables studied difficult in the Eritrean context. Further investigation using more and relevant data is recommended for future study.

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Appendix i Gross Domestic Product of Eritrea by Industrial Origin (1992-2002) at 1992 Constant Factor cost

In millions of nakfa

item	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002 *
Agriculture	598.0	481.9	658.5	581.5	547.9	550.9	866.7	800.3	452.2	584.1	738.9
Crops	2815	16.2	324.9	239.7	201.5	202.6	50.23	418.0	143.0	260.1	399.2
Livestock	223.9	222.5	229.9	232.6	235.9	241.1	253.2	265.8	186.1	195.4	205.1
Fishing	2.6	3.5	8.4	11.2	9.8	3.4	4.5	6.7	10.1	12.3	15
Hunting											
Forestry	90.1	92.6	95.3	98	100.8	103.7	106.7	109.8	113.0	116.3	119.6
Industry	235.3	337.4	384.7	466.2	638.4	764.5	715.0	735.3	688.3	731.6	792.6
Mining & Quarry.	2	4	4.0	4.0	4.1	8.8	6.8	6.1	3.0	1.3	1.9
Manufacturing	137.2	166.1	176.6	213.0	240.9	256.6	233.5	234.6	242.9	256.2	272.9
Small in. & Husba.	24.2	28.1	32.7	38.1	50.2	93	85	88.4	91.5	96.5	102.8
Construction	48.7	115.3	145.1	183.3	313.7	373.9	356.9	371.1	315.5	340.7	374.8
Electricity	13.9	14.4	16.4	17.7	19.1	21.5	21.9	23.7	23.9	25.0	28.0
Water	9.3	9.6	9.8	10.1	10.4	10.7	11.0	11.3	11.6	11.9	12.3
Distribution	722.1	828.4	970.1	1074	1149	1222.6	1019.2	1029.4	967.6	1025.7	1097.5
Wholesale & Retail T.	484.6	567.8	641.4	717.8	763.9	808.9	648.9	655.4	589.8	625.2	669.0
Transport & Commun.	237.5	260.6	328.8	353.6	384.9	413.8	370.3	374	377.8	400.4	428.5
Other Services	401.7	502.8	689.0	654.9	696.8	728.9	793.8	838.9	888.6	915.8	945.4
Banking & Insurance	23.6	34.2	52.2	64.9	86.5	91.7	96.8	100.2	98.2	104.1	111.4
Public Administ. & D	225.1	294.5	447.5	396.5	409.2	419.4	468.2	498.8	538.7	546.8	555.0
Real Estate & Housing	47.8	48.4	49.1	50.3	51.8	53.9	55.8	57.4	59.2	61.2	63.4
Education	38.9	45.2	50.8	54.6	58.7	63.5	68.2	72.9	78.0	83.5	89.3
Health	15.9	28.3	35.6	32.9	33.1	40.8	43.3	45.9	48.6	51.8	55.2
Domestic Service	3.2	3.3	3.4	3.5	3.6	3.7	3.9	4	4.1	4.3	4.4
Others	47.2	48.8	50.5	52.2	54.0	55.8	57.7	59.7	61.7	64.2	66.7
GDP at C. Factor cost	1957.	2150.	2702.	2777.	3032	3266.9	3394.6	3403.9	2997	3257.2	3574.3

Source: The Ministry of Finance of Eritrea

*: Forecast

Appendix ii Summary of Government Expenditure and its Financing (1992-2002)

In millions of nakfa

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Total expenditure	553.7	1415.2	1601.6	2703	2556.4	2589	4309.6	5703.6	4136.4	4545.4	5176.9
Total current expenditure	462.1	960.1	1171.4	2131	1717.3	1445.5	2872.4	3440.7	3364.2	3188.3	3649.6
current expenditure domestic	462.1	960.1	1118	1960.4	1688.6	1412.8	2781.7	3298.7	2579.5	2322.5	3166.2
current expenditure. External grant	-	-	53.4	170.6	28.7	32.7	90.7	142	784.7	866.3	483.4
Total capital expenditure	91.6	455.2	430.3	571.9	839.1	1143.5	1437.2	2263.6	727.2	1356.6	1527.3
capital expenditure domestic	91.6	1049.6	106.4	238.7	499.4	683.4	584	1177.4	340.5	539.8	460.7
capital expenditure external grant	-	364.6	169.7	287.2	284.1	255.3	367.5	213.5	431.7	509.3	635
capital expenditure external loan	-	1	154.2	46	55.7	204.8	485.7	872.7	45	307.5	431.6
Total revenue	488.8	893.2	1026.5	1521.3	1420.3	2045.7	1900.7	2128.7	2108.3	1986.4	2291.5
tax revenue	297.6	517.6	657.5	715.6	830.4	959.4	977	1018.7	982.7	1278.8	1538.2
non tax revenue	191.2	375.6	369	629.3	560	1080.2	748.4	701.2	802.8	532.7	724.1
other	-	-	-	176.4	29.6	6.1	175.3	408.8	322.8	174.9	29.2
Overall balance											
excluding grant	-64.9	-522	575.1	-1181.7	1136.1	-543.3	-2408.9	-3575.6	-2028.1	-2559	-2885.4
including grant	-64.9	-157.4	-352.1	-723.9	823.3	-255.3	-2041	-3220.1	-823.3	-1183.4	-1767
Financing of the Deficit											
external loans	-	1	154.2	46	55.7	204.8	485.7	872.7	45	307.5	431.6
domestic borrowing	64.9	156.4	197.9	677.8	767.6	50.3	1465	2347.4	778.3	875.9	1335.4
GDP at Current market prices	2190.9	2845.4	3701.1	4097.3	4678.1	5185.9	5801.2	6167	6212.7	7533.6	9031.0

Source: The Ministry of Finance of Eritrea

Appendix iii Government Account Summary in Nominal and Real Time series data (1992-2002)

In millions of nakfa

Item	GE	GR	GDP	Z	X	RGE	RGR	RGDP	RX	RI	REEX	LNZ	LNy
1992	553.7	488.8	2190.9	983.08	46.2	553.7	488.8	2190.9	46.2	118.30	94	6.89	7.69
1993	1415.2	893.2	2845.4	1734.72	208.0	1214.8	766.7	2442.4	178.5	368.84	94	7.46	7.95
1994	1601.6	1026.5	3701.1	2688.94	429.1	1288.5	825.8	2977.6	345.2	530.01	96	7.90	8.22
1995	2703.0	1521.3	4097.3	2543.94	507.8	2017.2	1135.3	3057.7	379.0	590.15	100	7.84	8.32
1996	2556.4	1420.3	4678.1	3288.32	609.9	1833.9	1018.9	3355.9	437.5	939.67	107	8.10	8.45
1997	2589.0	2045.7	5185.9	3561.10	385.2	1792.9	1416.7	3591.3	266.8	1145.64	115	8.18	8.55
1998	4309.6	1900.7	5801.2	3898.30	208.7	2713.9	1196.9	3653.1	131.4	971.73	118	8.27	8.67
1999	5703.6	2128.7	6167.0	4055.72	164.8	3393.0	1266.3	3668.6	98.0	1250.98	119	8.31	8.73
2000	4136.4	2108.3	6212.7	4514.88	352.3	2153.3	1097.5	3234.1	183.4	598.33	126	8.42	8.73
2001	4545.4	1986.4	7533.6	5850.03	216.9	2157.9	943.0	3576.5	103.0	1019.27	129	8.67	8.93
2002	5176.9	2291.5	9031.0	7467.60	725.2	2087.5	924.0	3641.5	292.4	957.74	117	8.92	9.11

Source: Author's calculation from appendix i and ii

Appendix iv Summary of Output, Capital, and Labor (1992-2002)

In millions of nakfa

TIME	Y	K	L	D	REY	RK	LnRY	LnRK	LnL	RY/L	RK/L	LnRY/L	LnRKL
1992	2190.9	118	3.31	0	2190.90	118.30	7.69	4.77	1.20	661.90	35.74	6.50	3.58
1993	2845.4	445	3.39	0	2482.30	381.97	7.82	5.95	1.22	732.24	112.68	6.60	4.72
1994	3701.1	454	3.48	0	3011.00	365.25	8.01	5.90	1.25	865.23	104.96	6.76	4.65
1995	4097.3	582	3.57	0	3098.30	434.33	8.04	6.07	1.27	867.87	121.66	6.77	4.80
1996	4678.1	869	3.67	0	3386.50	623.39	8.13	6.44	1.30	922.75	169.86	6.83	5.13
1997	5184.9	1148	3.77	0	3654.00	795.00	8.20	6.68	1.33	969.23	210.88	6.88	5.35
1998	5801.2	1437	3.88	1	3719.80	904.91	8.22	6.81	1.36	958.71	233.22	6.87	5.45
1999	6167.0	2246	3.98	1	3734.70	1336.11	8.23	7.20	1.38	938.37	335.71	6.84	5.82
2000	6212.8	925	4.08	1	3245.50	481.52	8.09	6.18	1.41	795.47	118.02	6.68	4.77
2001	7533.6	2005	4.20	1	3576.50	954.76	8.18	6.86	1.44	851.55	227.32	6.75	5.43
2002	9031.2	1991	4.30	1	3640.80	806.04	8.20	6.69	1.46	846.70	187.45	6.74	5.23

Source: The Ministry of Finance of Eritrea, IMF Country Report No. 03/166 and author's calculations

Appendix v Summary of Aggregate Demand Expenditure (1992-2002)

In millions of nakfa

TIME	GE	I	C	Z	X	Y	NTAX	YD	CPI	REYD	REC
1992	553.7	118.3	2455.8	983.08	46.2	2190.9	297.60	1893.30	7.20	2024.78	2626.32
1993	1415.2	429.7	2527.2	1734.72	208.0	2845.4	517.60	2327.80	9.60	1867.09	2027.04
1994	1601.6	658.8	3700.5	2688.94	429.1	3701.1	659.50	3041.60	6.80	3444.16	4190.32
1995	2703.0	790.8	2639.6	2543.94	507.8	4097.3	715.60	3381.70	11.00	2367.19	1847.75
1996	2556.4	1309.9	3490.2	3288.32	609.9	4678.1	830.40	3847.70	3.40	8713.91	7904.32
1997	2589.0	1654.3	4117.5	3561.10	385.2	5184.9	959.40	4225.50	7.70	4225.50	4117.50
1998	4309.6	1543.1	3638.1	3898.30	208.7	5801.2	977.00	4824.20	9.00	4127.37	3112.60
1999	5703.6	2102.9	2251.4	4055.72	164.8	6167.0	1018.70	5148.30	10.60	3739.80	1635.47
2000	4136.4	1149.4	5089.6	4514.88	352.3	6212.8	982.70	5230.10	26.80	1502.68	1462.30
2001	4545.4	2147.0	6474.3	5850.03	216.9	7533.6	1278.80	6254.80	7.70	6254.80	6474.33
2002	5176.9	2375.2	8221.5	7467.60	725.2	9031.2	1538.20	7493.00	23.80	2424.21	2659.90

Source: The Ministry of Finance of Eritrea, IMF Country Report No. 03/166, and author's calculations